

### 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 3 µ m	Hydraulic Single Action (Spring Lock / Hyd. Release)	VL	VFL
High Accuracy Model 3 µ m	Hydraulic Double Action (Hyd. Lock / Hyd. Release)	VM	VFM
Multi-Purpose Model 10 µ m	Hydraulic Single Action (Hyd. Lock / Spring Release)	٧J	VFJ
Multi-Purpose Model 10 µ m	Hydraulic Double Action (Hyd. Lock / Hyd. Release)	VK	VFK
High Accuracy Model 3 µ m	Pneumatic Double Action (Air Lock / Air Release)	WM	VWM
Multi-Purpose Model 10 µ m	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.

## Pneumatic Expansion Locating Pin

#### Model VWM Model VWK



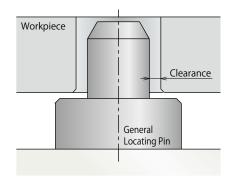
### Locating Repeatability VWM : $3 \mu$ m VWK : $10 \mu$ m

Zero Clearance between Reference Hole and Expansion Locating Pin

PAT.

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

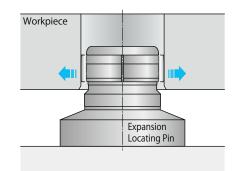
# The general locating pin has some clearance between pin and reference hole.



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.

0

**Reference Location** 

**Round Pin** 

J

Datum Cylinder

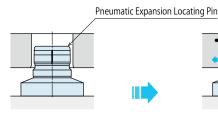
Two types of locating pins (Cylindrical and Diamond shaped pins). Expansion Locating Pin consisting of Datum-D and Cut-C cylinder.

0

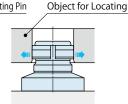
One Direction Locating Diamond-Shaped Pin

> ↓ Cut Cylinder

Action Description —



< Released State >



< Locked State >

% VWM is used in the picture above.

Pneumatic Expansion Locating Pir Digest	n Action Description	Model No. Indication Specifications	External Dimensions	Cautions P.309	KOS	
Features						High-Power Series
<ul> <li>Simple Ar</li> </ul>	rangement	<ul> <li>Easy to Check the</li> </ul>	ne Accuracy 🔹 F	or Shallow Workpi	ece Hole	Pneumatic Series
	ody can be installed amp, so fixture design	The same core part wit top allows to determin measure the distance a	e the origin and sl	he low head pin can be us nallow workpiece hole.	sed for	Hydraulic Series
Work Cla		Measure the Distance Ad	ccuracy			Valve / Coupler Hydraulic Unit
0	Expansion Locating Pin	Probe			e e	Manual Operation Accessories
			×1 φ 0.01 X	The second secon	Shallow Hole	Cautions / Others
					ج ع	Pneumatic Hole Clamp
	Set Close		<u> </u>			SWA
Function ——		※1. It is <i>ϕ</i> 0.02 for VWK.				Pneumatic Swing Clamp WHA
• Air Blow Fu Equipped to /		• With Seating Surfac -B: With Seating Sur		<b>elease Confirma</b> M : Release Confirmation		Double Piston Pneumatic Swing Clamp WHD
Air blow preven from coming in	nts foreign substances	Seat check is availab the gap sensor.		elease confirmation is a y using the gap sensor.	vailable	Pneumatic Link Clamp WCA
						Air Flow Control Valve
				<u>ក្រុ</u>		BZW
						Pneumatic Expansion Locating Pin VWM
					•	<b>М</b> К
			c l			Pneumatic Sensor Pin WWA
※ VWM is used i	in the picture above.					
Variation ——						
	1		I			
		B		3		
		International Action		an Tanun.		
	Mode	elVWM → P.287		Model VWK → P.2	99	
Type	High Acc	uracy Model		ti-Purpose Model		
Locating Repeatability		βμm ble Action		10 $\mu$ m Double Action		
Control Method		ring Lock / Air Release)	(Aiı	Lock / Air Release)		
Operating Pressure Range	0.35 ~	~ 0.7 MPa		0.35 ~ 0.7 MPa		
		Taper Sleeve		Steel Ball		

Operating Pressure Range	0.35 ~ 0	0.7 MPa	0.35~0	0.7 MPa
Action		ber Sleeve		Steel Ball
	Released State	Locked State	Released State	Locked State
	Taper sleeve	e expands.	Steel balls come	out from the pin.
Sample Reference	Finishing Line /	Dividing Line	Locating Casti	ng Core Holes

PAT.

### Pneumatic Expansion Locating Pin

Model **VWM** 

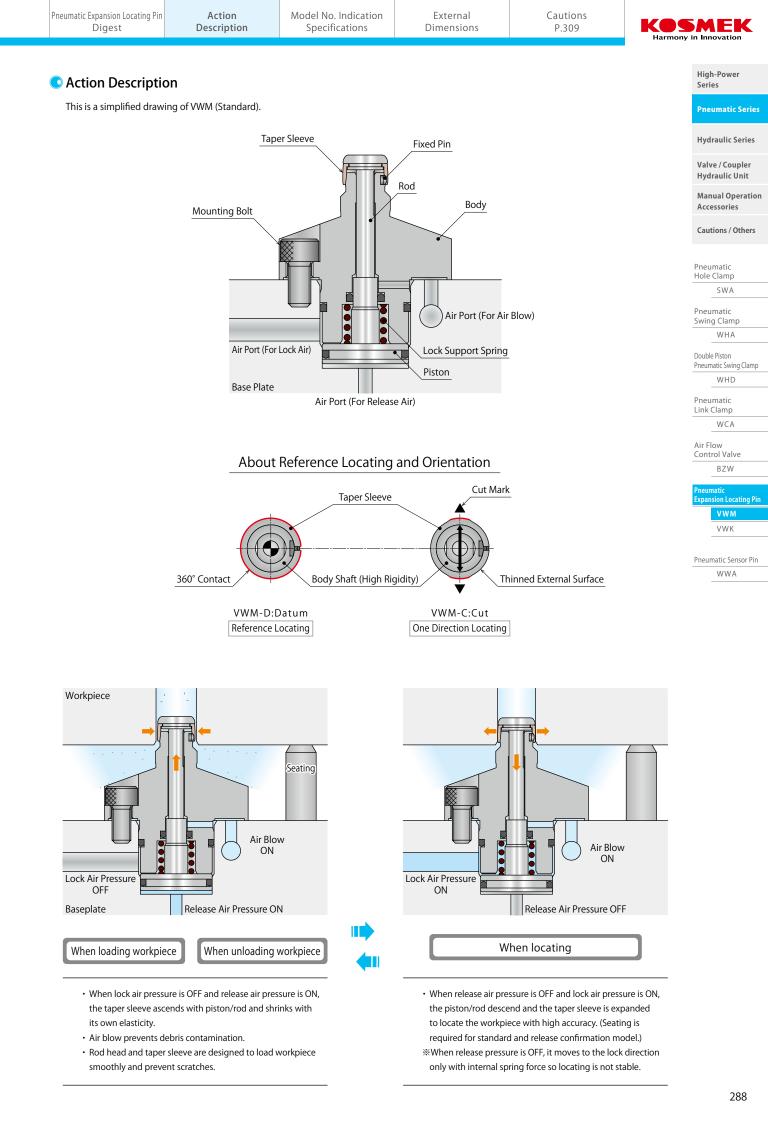
Pneumatic • Double Action Locating Repeatability :  $3 \mu$  m



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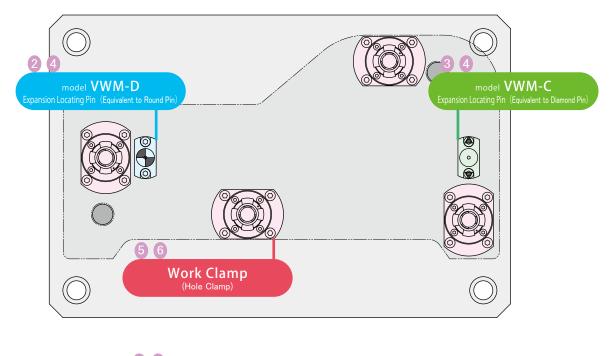
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Release Confirmation Model	P.297
Cautions	
Notes for Pneumatic Expansion Locating Pin	P.309
Cautions (Common)	P.1237

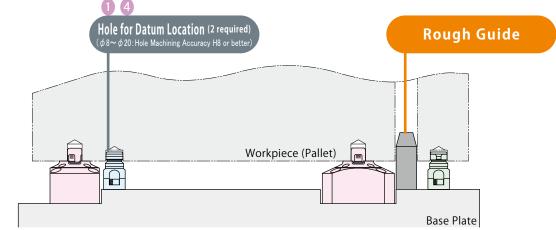
Notes on Handling · Maintenance/Inspection · Warranty

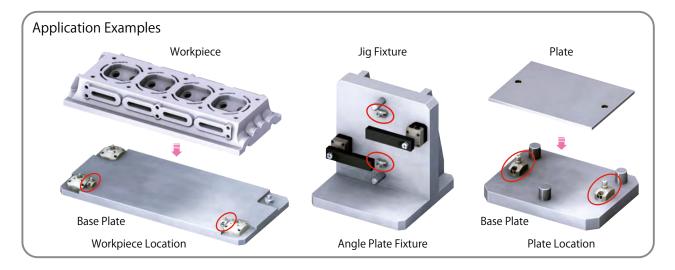


- System References
  - Repeated locating accuracy of  $3 \mu m$  (One step locating reduces setup time!)
  - Avoid deterioration of workpiece accuracy when changing pallets to perform multiple operations.

• Using with hole clamp allows for 5-face machining, minimum setup and more compact fixture!







Pneumatic Expansion Locating Pin Digest	Action Description	Model No. Indication Specifications	External Dimensions	Cautions P.309	Kog Harmony	in Innovation
Essential Points						High-Power Series
<ol> <li>Workpiece Hol</li> <li>Workpiece hole diam</li> </ol>	le for Locating eter is $\phi 8 \sim \phi 20$ (in 1m	im increments).		Workpiece Hole Diameter $\phi$ 8~20H8 $\leftarrow \rightarrow$		Pneumatic Series Hydraulic Series
-		wo holes) is H8 or better				Valve / Coupler Hydraulic Unit Manual Operation Accessories
from expanding force • Expanding force is the (expands) against the • Refer to the specificat	at expansion locating pi e. e force with which the e e workpiece. tion page for each mode	n is able to locate with is expansion locating pin p el's calculation method o	ushes out	Maximum workpiece v calculated from expand	-	Cautions / Others Pneumatic Hole Clamp SWA Pneumatic Swing Clamp WHA Double Piston Pneumatic Swing Clamp WHD
<ul> <li>Mounting Phas</li> <li>The reference positio</li> <li>VWM-C (Cut: for one of so phasing is necessan perpendicular to VWM</li> </ul>	n (origin) is determined direction locating) locat ny. When mounting, ens M-D (datum). ▲) on top of the flange	ating. For One Direction by VWM-D (Datum: for the es in one direction (Y-ax sure the VWM-C (cut) cur on the VWM-C unit that	reference locating). is), t mark is	(Expan) (Ex	Cut Mark ding Direction) war Uter the second	Pneumatic Link Clamp WCA Air Flow Control Valve BZW Pneumatic Expansion Locating Pin VWK Pneumatic Sensor Pin WWA
The distance accuracy     * *1. The distance accuracy	y for the expansion loca	nting Pins and between <sup>1</sup> ting pin should be withi ts (pallet holes) should b for Design".)	n ±0.02mm.	Workpiece Hole Distant	Workpiece Base Plate	
		del have no seating surfa	z¢	Reference Su Workpiece Seat Base Plate ion Locating Pin	urface of Z-axis	
•	onal Work Clamp in has no clamping func ould be added to	tion.	Clamp Expansion locat	ting pin is used only for locating Work Clarr	_	
						290

Model No. Indication



#### 1 Body Size

- 2 : Select from Workpiece Diameter  $\phi 8 / \phi 9 / \phi 10 / \phi 11 / \phi 12 / \phi 13 / \phi 14 / \phi 15$
- **3** : Select from Workpiece Diameter  $\phi$  16 /  $\phi$  17 /  $\phi$  18 /  $\phi$  19 /  $\phi$  20

#### 2 Design No.

0 : Revision Number

oplicable Workpiece		rkpiece hole machining accuracy sho	
<b>)80</b> :	<b>120</b> :φ12 H8 <sup>+0.027</sup> mm	<b>160</b> :φ 16 <sub>H8</sub> <sup>+0.027</sup> mm	Workpiece Hole Diameter
<b>090</b> : φ 9 H8 <sup>+0.022</sup> mm	<b>130</b> ∶ <i>ϕ</i> 13 H8 <sup>+0.027</sup> <sub>0</sub> mm	<b>170</b> ∶ <i>ϕ</i> 17 H8 <sup>+0.027</sup> mm	
<b>100</b> : φ 10 H8 <sup>+0.022</sup> mm	<b>140</b> : φ 14 H8 <sup>+0.027</sup> mm	<b>180</b> ∶ <i>ϕ</i> 18 H8 <sup>+0.027</sup> mm	
<b>110</b> :φ11 <sub>H8</sub> <sup>+0.027</sup> mm	<b>150</b> :φ15 H8 <sup>+0.027</sup> mm	<b>190</b> ∶ <i>ϕ</i> 19 H8 <sup>+0.033</sup> mm	
		<b>200</b> : φ 20 H8 <sup>+0.033</sup> mm	
unctions			

**C** : Cut (for One Direction Locating)





#### 5 Seating Height

H15 : 15mm H20 : 20mm

H25 : 25mm

Note :

eating Heigh

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

#### 6 Options

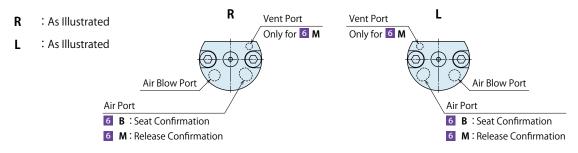
#### Blank : Standard

- **B** : with Seating Surface
- **M** : Release Confirmation Model

Note :

Contact us for combined use of  ${\bf B}$  : With Seating Surface and  ${\bf M}$  : Release Confirmation model.





Pneumatic Expansion Locating Pin Digest	Action Description	Model No. Indication Specifications	External Dimensions	Cautions P.309	KOSMEI
3					Harmony in Innovation

#### Specifications

Specificat	10115													(mm)	Series
Model No.					VWM	2000					١	VWM300	D		Pneumatic Series
3 Applicable	Workpiece Hole Diam.	080	090	100	110	120	130	140	150	160	170	180	190	200	
Workpiece Hole Diameter (Standar	d Diam.) mm	$\phi 8_{{ m H8}^{+0.022}}$	$\phi 9_{\mathrm{H8}^{+0.022}}$	φ10 <sub>H8</sub> <sup>+0.022</sup>	¢ 11 <sub>H8</sub> <sup>+0.027</sup>	φ12 <sub>H8</sub> <sup>+0.027</sup> <sub>0</sub>	\$\$\$ \$\$\$ \$	$\phi14_{H8}{}^{+0.027}_{0}$	$\phi$ 15 <sub>H8</sub> $^{+0.027}_{0}$	φ16 <sub>H8</sub> <sup>+0.027</sup>	$\phi_{17_{H8}}^{+0.027}$	φ18 <sub>H8</sub> <sup>+0.027</sup>	$\phi$ 19 <sub>H8</sub> $^{+0.033}_{0}$	$\phi  20_{H8}  {}^{+0.033}_{0}$	Hydraulic Series
Locating Repeatab	ility 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	Valve / Coupler
Funna dina Faran (F) %1	at 0.35MPa	140	150	170	150	150	170	150	150	180	190	190	190	200	Hydraulic Unit
Expanding Force (F) *1	at 0.5MPa	220	230	250	230	220	250	230	220	280	290	290	290	300	Manual Operation
Ν	at 0.7MPa	330	330	350	330	330	350	340	330	420	430	430	430	440	Accessories
Allowable Thrust Load	d <sup> %2</sup> N	1500	1500	2000	2000	2500	2500	2500	2500	3000	3000	3000	3000	3500	Cautions / Others
Cylinder Capacity	Release side		0.	18			0.2	21				0.38			
(Empty Action) cm <sup>3</sup>	Lock side		0.	17			0.2	20				0.34			
Operating Pressure Rar	nge MPa						(	0.35 ~ 0.7	7						Pneumatic Hole Clamp
Withstanding Press	sure MPa							1.0							SWA
Recommended Air Blow Pres	ssure MPa							$0.3 \sim 0.4$							
Operating Temperature Ra	ange ℃							$0\sim 70$							Pneumatic Swing Clamp
Usable Fluid								Dry Air							WHA

Notes:

%1. Expanding force shows the calculated value when coefficient friction is  $\mu$ 0.2. 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	
Washiniana Wainba (M) <	Expanding Force per One Piece of Expansion Locating Pin (F) $\times$ Efficiency 0.5	
Workpiece Weight (W) $\leq$	Friction Coefficient of Workpiece Seat Face ( $\mu$ )	

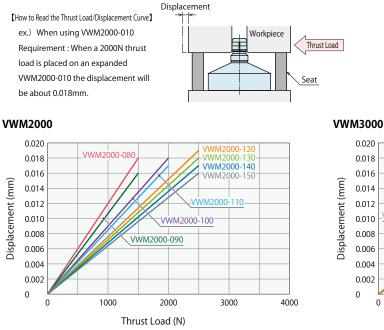
Workpiece Weight (W) ≦ Expanding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5

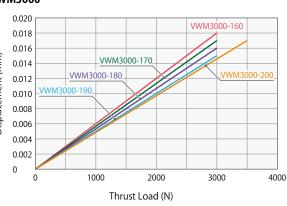
F W

#### 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.





For Vertical Attitude

K

High-Power

Double Piston

Pneumatic Link Clamp

Air Flow Control Valve BZW

Pneumatic Swing Clamp WHD

WCA

imatic Insion Locating F

VWK

Pneumatic Sensor Pin WWA

Identification Mark \*\*1

Q

φCB 8

VWM-C

(Cut: One Direction Locating)

View A

5 Seating Height : H15 φL φM

60°

2-Thread for Jack Bolt

V

#### External Dimensions

2-Mounting Bolt (Included)

U

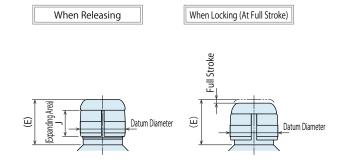
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% The drawing shows the released state of VWM.

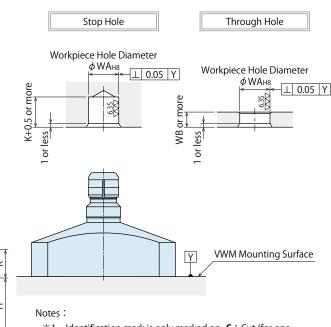
P

Q

#### Expanding Area Detail

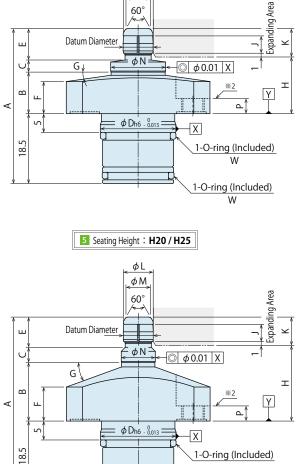


#### Workpiece Hole Dimensions



\*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.



W

1-O-ring (Included) W



Cautions P.309



High-Power

**Pneumatic Series** 

Hydraulic Series

Valve / Coupler Hydraulic Unit

Accessories Cautions / Others

Pneumatic Hole Clamp

Pneumatic

Double Piston

Swing Clamp

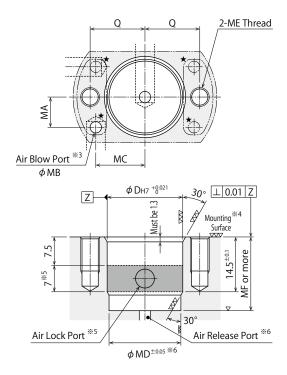
SWA

WHA

Manual Operation

Series

Machining Dimensions for Mounting



#### Notes:

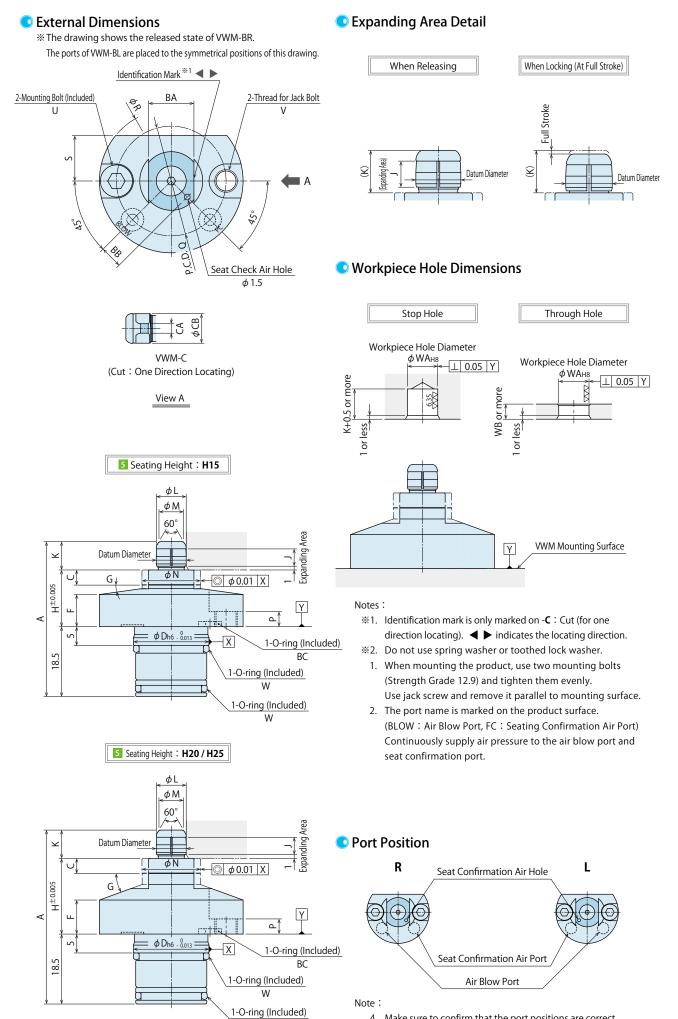
- %3. Install the air blow port choosing one port from four  $\bigstar$  parts. ₩4. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.
- %5. Prepare the air lock port within .........
- %6. Prepare the air release port on the bottom within 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.)

Pneumatic Swing Clamp WHD Pneumatic Link Clamp

WCA

Air Flow Control Valve BZW

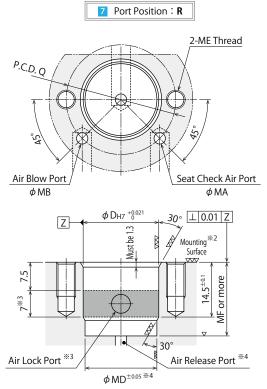
Model No.					VWM200		1				104/14				
	pplicable Workpiece Hole Diam.		000	1						VWM3000-□-□-□ 160 170 180 190 200					
			090 H15 H20 H25	100	110	+	130	+	150	F			+		
د مح ا Vorkpiece Hole Diamet	5 5										<b>ф</b> 17 <sub>Н8</sub>				
		ф 8н8	ф 9 <sub>H8</sub>	ф 10н8	ф11 <sub>H8</sub>	ф 12н8	ф13н8	ф14 <sub>H8</sub>	ф15н8	ф 16н8		ф18 <sub>H8</sub>	ф 19 <sub>H8</sub>	ф 20н8	
)atum Diameter 🗁	At Releasing	$\phi$ 7.94 or less								φ 15.89 or less					
	At Full Stroke	φ 8.05 or more	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	1.	φ 11.05 or more	φ 12.05 or more	1.	1.1	φ 15.05 or more	φ 16.07 or more	φ 17.07 or more		φ 19.07 or more	$\phi$ 20.07 or more	
Full Stroke		41 46 51		65	41 46 51	41 5 46 5 54 5		75	41 5 46 5 51 5	42 40 52	42 40 52	1.0	42 40 52	42 40 52	
A			41 46 51												
B			5 11 15 20												
C		3.2 4 4	3.2 4.5 4.5		3.2 4.5 4.5	3.2 5 5			3.2 5 5	3./ 4 4	3./ 4 4		3./ 4 4	3./ 4 4	
D				0				0			40.0	23		40.0 40 40	
E										10.3 10 10					
F										8 11 11					
G			8° 20° 35°												
<u> </u>		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				.6		5.1						6			
K				.5			1	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 12 12	18.5 13 13			18.5 16 16	22.5 17 17	22.5 18 18		22.5 20 20	22.5 21 21	
Р				4		4				5					
Q				1.5		14.5				17.5					
R				8		38				47					
S				.4		24				27					
U			M5x0			M5x0.8x12				M6x1x16					
V			Mé			M6x1				M8x1.25					
W			AS568-0		1		AS568-0					68-018 (		1	
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				3				3		15					
MD				9				9				22			
ME		M5×0	.8 Thread		or more	M5×0	.8 Thread	•	or more	M	$6 \times 1$ Thre	•	12 or mo	ore	
MF				9.5				9.5				20			
WA		8 +0.022	9 <sup>+0.022</sup>	10 +0.022	11 +0.027	12 +0.027	13 +0.027	14 +0.027	15 +0.027	16 +0.027	$17^{+0.027}_{0}$	18 +0.027	19 <sup>+0.033</sup>	20 +0.033	
WB				4				.5				5.5			
Weig	iht q	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	

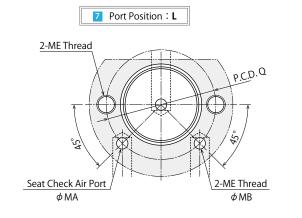


W

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.
   \*2. Prepare the six lock part within formed
- \*3. Prepare the air lock port within .
- %4. Prepare the air release port on the bottom within the range of  $\phi$  MD.
- 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.)

Air Flow Control Valve BZW Pneumatic Expansion Locating Pin

High-Power

**Pneumatic Series** 

Hydraulic Series

Valve / Coupler Hydraulic Unit Manual Operation Accessories Cautions / Others

Pneumatic

Hole Clamp

Pneumatic

Double Piston

Pneumatic Link Clamp

(mm)

Swing Clamp

SWA

WHA

Pneumatic Swing Clamp

WHD

WCA

Series

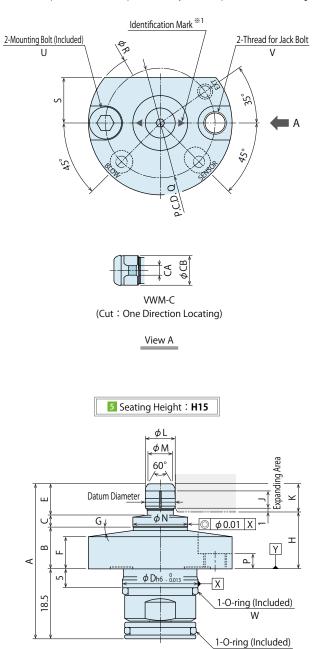
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Dansion Locating Pir
VWM
VWK
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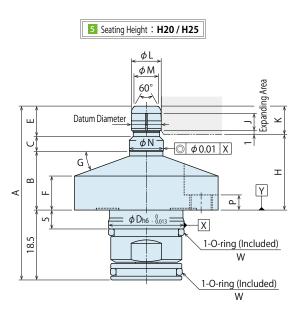
```
Pneumatic Sensor Pin
WWA
```

Model No.				V	VM2000-	<b>□-</b> □- <b>□</b> - <b>E</b>	30				VWM3	000-🗆-🗆	- <b>D-B</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 H2
Vorkpiece Hole Diam	neter (Standard Diam.)	<i>ф</i> 8 <sub>Н8</sub>	<i>ф</i> 9 <sub>Н8</sub>	<i>ф</i> 10 <sub>Н8</sub>	<i>ф</i> 11 <sub>Н8</sub>	ф12н8	<i>ф</i> 13 <sub>Н8</sub>	<i>ф</i> 14 <sub>Н8</sub>	<i>ф</i> 15н8	<i>ф</i> 16 <sub>Н8</sub>	<i>ф</i> 17 <sub>Н8</sub>	<i>ф</i> 18 <sub>Н8</sub>	<i>ф</i> 19 <sub>Н8</sub>	<i>ф</i> 20на
Datum Diameter	At Releasing	$\phi$ 7.94 or less	$\phi$ 8.94 or less	$\phi$ 9.94 or less	$\phi$ 10.94 or less	$\phi$ 11.92 or less	$\phi$ 12.92 or less	$\phi$ 13.92 or less	$\phi$ 14.92 or less	$\phi$ 15.89 or less	$\phi$ 16.89 or less	$\phi$ 17.89 or less	$\phi$ 18.89 or less	¢ 19.89 or l
	At Full Stroke	$\phi$ 8.05 or more	$\phi$ 9.05 or more	$\phi$ 10.05 or more	$\phi$ 11.05 or more	$\phi$ 12.05 or more	$\phi$ 13.05 or more	$\phi$ 14.05 or more	$\phi$ 15.05 or more	$\phi$ 16.07 or more	$\phi$ 17.07 or more	$\phi$ 18.07 or more	$\phi$ 19.07 or more	φ 20.07 or m
ull Stroke				65			0.	-				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 5
	С	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					2	-				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
(	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
ł	Н	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 2
	J			.6			5.					6		
	K		7	.5	1		8		1		1	9.5	1	
	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
	Ν	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
	Р			4			4					5		
	Q			.9		29				35				
	R		-	8		38				47				
	S			2		12				13.5				
	U			).8x12		M5x0.8x12				M6x1x16				
	V		Me	-			Mé			M8x1.25				
	N		AS568-0		1		AS568-0		1			68-018(	1	
	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		AS568-0				AS568-0					68-007(		1
	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
	1A			3			3					4		
	AB			3			3					4		
	1D			9			1					22		
	ЛЕ 	M5×0		Depth 9 c	or more	M5 $\times$ 0.8 Thread Depth 9 or more				M	6×1 Thre		12 or mc	re
	ΛF	0.007		9.5		19.5						20	10 10023	0.5.100
	VA	8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 +0.022	11 +0.027	12 +0.027	13 +0.027	14 +0.027	15 +0.027	16 +0.027	17 0 0 17	18 +0.027	19 +0.033	20 +0.0
	VB			4			4	-				5.5		
We	ight 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 2

#### External Dimensions

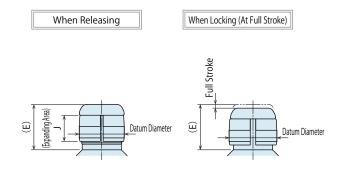
% The drawing shows the released state of VWM-MR. The ports of VWM-ML are placed to the symmetrical positions of this drawing.



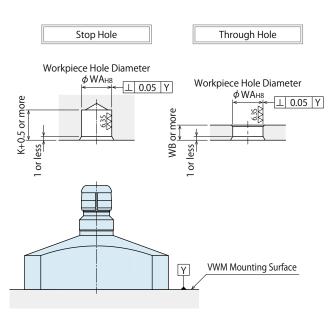


W

#### 오 Expanding Area Detail



#### • Workpiece Hole Dimensions

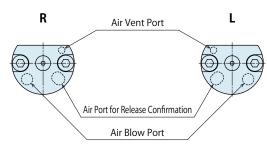


#### Notes:

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

- 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.
- 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.

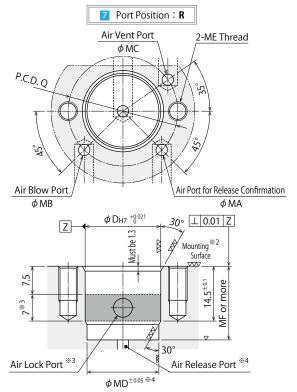
#### Port Position

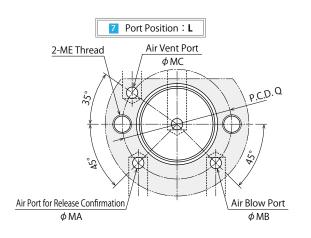


Note :

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

Air Flow Control Valve BZW

• External Dimensions and Machining Dimensions for Me	ountina
	o annen ry

Nodel No.				VV	VM2000-	<b>№</b>					VWM3	000-🗆-	- <b>D-M</b>	
3	Applicable Workpiece Hole Diam.	080	090	100	110	120	130	140	150	160	170	180	190	200
	3 3	H15 H20 H2	5 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 H
orkpiece Hole Dian	eter (Standard Diam.)	<i>ф</i> 8н8	ф 9 <sub>Н8</sub>	ф10н8	ф11н8	ф12н8	<i>ф</i> 13 <sub>Н8</sub>	ф14 <sub>Н8</sub>	ф15н8	ф 16н8	ф17 <sub>Н8</sub>	<i>ф</i> 18 <sub>Н8</sub>	ф19 <sub>Н8</sub>	ф 20на
atum Diameter	At Releasing	$\phi$ 7.94 or less	$\phi$ 8.94 or less	$\phi$ 9.94 or less	$\phi$ 10.94 or less	$\phi$ 11.92 or less	$\phi$ 12.92 or less	$\phi$ 13.92 or less	$\phi$ 14.92 or less	$\phi$ 15.89 or less	$\phi$ 16.89 or less	φ 17.89 or less	$\phi$ 18.89 or less	¢ 19.89 or l
	At Full Stroke	$\phi$ 8.05 or more	$\phi$ 9.05 or more	$\phi$ 10.05 or more	$\phi$ 11.05 or more	$\phi$ 12.05 or more	$\phi$ 13.05 or more	$\phi$ 14.05 or more	$\phi$ 15.05 or more	$\phi$ 16.07 or more	$\phi$ 17.07 or more	$\phi$ 18.07 or more	$\phi$ 19.07 or more	φ 20.07 or n
ull Stroke				65				75				1.0		
	4	41 46 51	41 46 51	41 46 51		41.5 46.5 51.5								
	3	11 15.5 20.				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 2
	2	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
[	)		2	0				20				23		
	Ξ	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
	-	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
(	3	8° 20° 35°	8° 20° 35°	8° 20° 35°	8° 20° 35°		8° 20° 35°							8° 15° 3
	1	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
J 4.6					5.1 6									
К 7.5					8	1			9.5	1				
	_	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
	Λ	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14	15	16	17	18
	١	14.5 9 9	14.5 10 10		14.5 12 12	18.5 13 13			18.5 16 16	22.5 17 17	22.5 18 18		22.5 20 20	22.5 21
	0			4		4				5				
	2			.9		29				35				
	3		-	8			-	8				47		
	5			2				2				13.5		
	J		M5x0					).8x12				M6x1x16		
	/			óx1				5x1				M8x1.25		
	V		AS568-0				AS568-0					68-018		1
	A	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5
	В	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
	IA			3				3				4		
	IB			3				3				4		
MC 3			3				4							
	D			9		19				22				
	1E	M5×0	).8 Thread	•	or more	M5×0		Depth 9 o	or more	M6×1 Thread Depth 12 or more				
	1F	- 10033		9.5		19.5				20				
	/A	8 +0.022	9 <sup>+0.022</sup>	10 +0.022	11 +0.027	12 +0.027	13 +0.027	14 +0.027	15 +0.027	16 +0.027	17 +0.027	18 +0.027	19 <sup>+0.033</sup>	20 +0.0
	/B			4				.5				5.5		
We	ight g	110 130 150	0 120 140 150	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 2



High-Power Series

**Pneumatic Series** 

Hydraulic Series

Valve / Coupler Hydraulic Unit

Manual Operation Accessories

Cautions / Others

Pneumatic Hole Clamp SWA

Pneumatic Swing Clamp

WHA

Double Piston Pneumatic Swing Clamp

WHD

Pneumatic Link Clamp

WCA

(mm)

eumatic pansion Locating Pi VWM VWK

```
Pneumatic Sensor Pin
      WWA
```

### Pneumatic PAT. Expansion Locating Pin

Model VWK

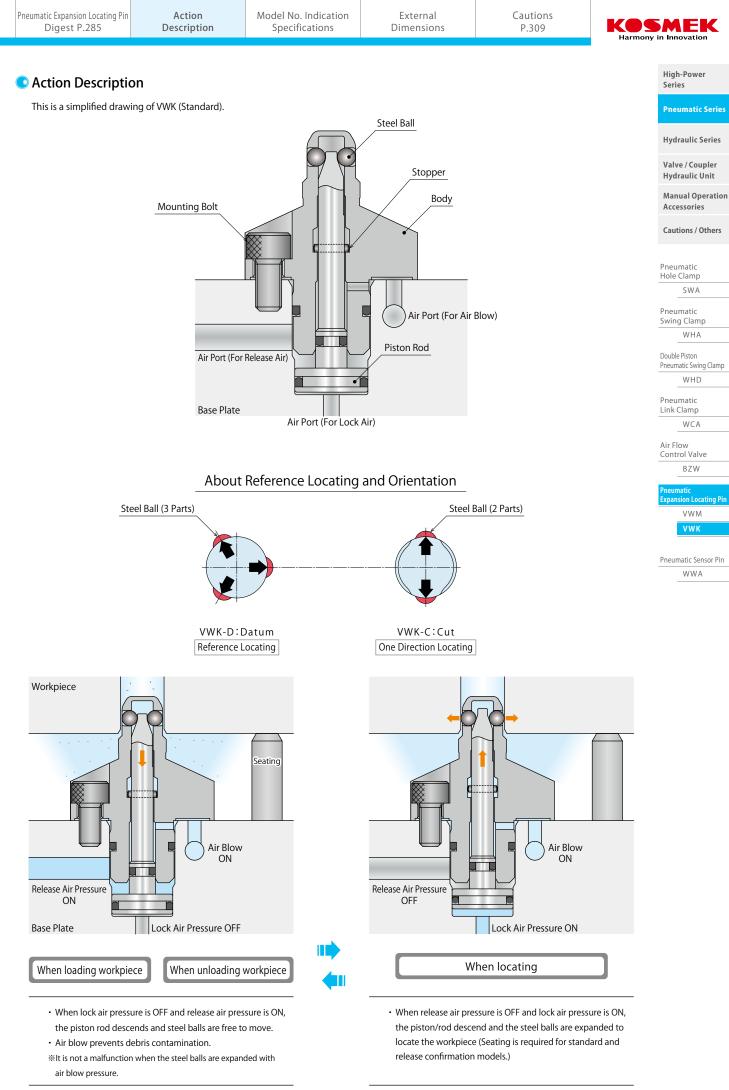
Pneumatic  $\cdot$  Double Action Locating Repeatability : 10  $\mu$  m



#### Index

Pneumatic Expansion Locating Pin Digest	P.285
Action Description	P.300
Model No. Indication	P.301
Specifications	P.302
External Dimensions	
Standard	P.303
with Seating Surface	P.305
Release Confirmation Model	P.307
Cautions	
Notes for Pneumatic Expansion Locating Pin	P.309
Cautions (Common)	P.1237

Notes on Handling · Maintenance/Inspection · Warranty



**M** : Release Confirmation

Model No. Indication VWK 2 00 0 - 080 - D - H20 - M R 4 2 Body Size **2** : Select from Workpiece Diameter  $\phi$  7.6~ $\phi$  10.8 2 Design No. 0 : Revision Number 3 Applicable Workpiece Hole Diameter Straight Hole **Taper Hole 080** : Straight Hole  $\phi$  7.6~8.5mm / Taper Hole  $\phi$  8~8.5mm Slope Angle **090** : Straight Hole  $\phi$  8.5~9.5mm / Taper Hole  $\phi$  9~9.5mm Workpiece Hole Diameter 2.5° or less **100** : Straight Hole  $\phi$  9.5~10.8mm / Taper Hole  $\phi$  10~10.8mm Workpiece Hole Diameter **4** Functions **D** : Datum (for Reference Locating) D Steel Ball С **C** : Cut (for One Direction Locating) Datum Cut 5 Seating Height Dimension H15 : 15mm eating Heig Note : H20 : 20mm Prepare the seat separately for **6** Option **Blank** : Standard H25 : 25mm and M: Release Confirmation Model. 6 Options Blank : Standard Note: В : with Seating Surface Contact us for combined use of **B** : With Seating Surface М : Release Confirmation Model and **M** : Release Confirmation model. 7 Port Position Only for 6 Options : B (with Seating Surface), and M (Release Confirmation Model) R L Vent Port Vent Port : As Illustrated R Only for 🧕 M Only for 6 M L : As Illustrated Air Blow Port Air Blow Port Air Port Air Port 6 B : Seat Confirmation 6 B : Seat Confirmation

**M** : Release Confirmation

Pneumatic Expansion Locating Pin	Action	Model No. Indication	External	Cautions	
Digest P.285	Description	Specifications	Dimensions	P.309	KOSM
					Harmony in Inno

#### Specifications

Model No.		VWK2000-080	VWK2000-090	VWK2000-100	Pneumatic Series	
Workpiece Hole Diameter	Standard Hole	$\phi$ 7.6 $\sim$ $\phi$ 8.5	$\phi$ 8.5 $\sim$ $\phi$ 9.5	φ 9.5 ~ φ 10.8		
mm	Taper Hole	$\phi$ 8 $\sim$ $\phi$ 8.5	$\phi 9 \sim \phi 9.5$	φ 10 ~ φ 10.8	Hydraulic Series	
Locating Repeatability *1	mm		0.01		Thyuraune series	
Allowable Offset (C : Cut)	mm	±0.4	±0.4	±0.5	Valve / Coupler	
France dia a France (F) \%2	at 0.35MPa		40		Hydraulic Unit	
Expanding Force (F) *2	at 0.5MPa		Manual Operation			
N	at 0.7MPa		70		Accessories	
Allowable Thrust Load **3	N	450	600	800	Cautions / Others	
Cylinder Capacity	Release side		0.23		cuultons, others	
(Empty Action) cm <sup>3</sup>	Lock side		0.28			
Operating Pressure Range	MPa		0.35 ~ 0.7		Pneumatic Hole Clamp	
Withstanding Pressure	MPa		1.0		SWA	
Recommended Air Blow Pr	ressure MPa		0.3 ~ 0.4			
Operating Temperature Ra	inge ℃		0~70		Pneumatic Swing Clamp	
Usable Fluid			Dry Air		WHA	

Notes:

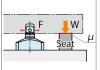
%1.~ It shows locating repeatability under the specific condition (no load).

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.

#### 오 Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

	For Horizontal Attitude		
Walinian Wainht (W)	Expanding Force per One Piece of Expansion Locating Pin (F) $\times$ Efficiency 0.5		Manduriana Mainha (M) < Funa
Workpiece Weight (W) ≦	Friction Coefficient of Workpiece Seat Face ( $\mu$ )		Workpiece Weight (W) ≦ Expa
		1	



For Vertical Attitude

banding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5





High-Power

Series

Double Piston

Pneumatic Link Clamp

Air Flow Control Valve BZW

Pneumatic Swing Clamp

WHD

WCA

matic nsion Locating P VWM VWK

Pneumatic Sensor Pin

WWA

<+0.5 or more

R2 or less

Taper Hole

Workpiece Hole Diameter φWC

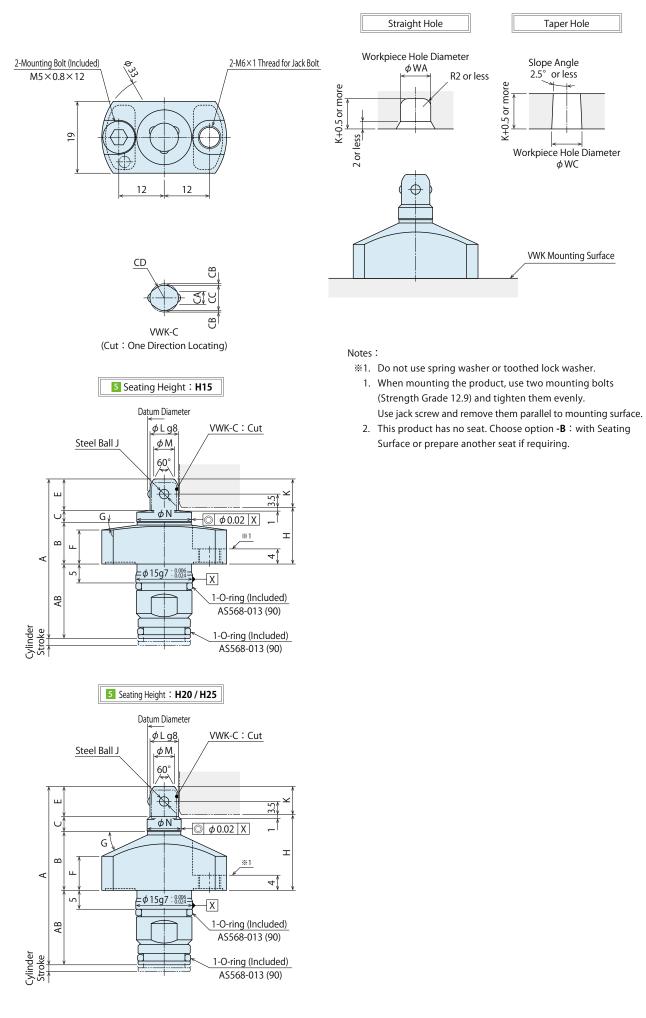
VWK Mounting Surface

Slope Angle 2.5° or less

#### External Dimensions

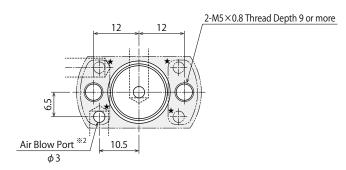
% This drawing shows VWK clamping action without workpiece.

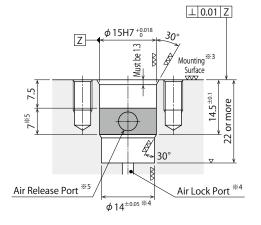
#### • Workpiece Hole Dimensions



Pneumatic Expansion Locating Pin	Action	Model No. Indication	External	Cautions	KOSMEK
Digest P.285	Description	Specifications	Dimensions	P.309	Harmony in Innovation
Machining Dime	nsions for Mountin	a			

#### Machining Dimensions for Mounting





#### Notes:

- %2. Install the air blow port choosing one port from four  $\bigstar$  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.)

Double Piston Pneumatic Swing Clamp
WHD
Pneumatic Link Clamp
WCA

**Pneumatic Series** 

Hydraulic Series

Valve / Coupler Hydraulic Unit Manual Operation Accessories

Cautions / Others

SWA Pneumatic Swing Clamp

WHA

Pneumatic Hole Clamp

Air Flow Control Valve BZW

Pi Ex

(mm)

natic Ision Locating	Pir
VWM	
VWK	

Pneumatic Sensor Pin WWA

#### External Dimensions and Machining Dimensions for Mounting

<u> </u>					-		(111			
Model No.		VWK2000-080-□-□			VW	K2000-090-	<b>--</b>	VWK2000-100-□-□		
	3 Applicable Workpiece Hole Diam.		080			090			100	
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Vorkpiece Hole Diameter	WA (Straight Hole)		7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8	
vorkpiece noie Diameter	WC (Taper Hole)		8~8.5			9~9.5			10~10.8	
	At Releasing		$\phi$ 7.5 or less	5		\$ 8.3 or les	5		$\phi$ 9.3 or less	5
Datum Diameter	At Full Stroke		\$\$.5 or mo	ore		\$ 9.5 or mo	ore		φ 10.8 or m	ore
Cylinder Stroke			1.8			2.2			2.6	
	Α	42.2	47.2	52.2	42.3	47.3	52.3	42.4	47.4	52.4
	В	11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
	С	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°
	Н	15	20	25	15	20	25	15	20	25
	J	2.5			3			3.5		
	К		7.5		8 8.3 - 0.005 - 0.027				8.5	
	L		7.5 - 0.02	5 7				9.3 - 0.005 - 0.027		
	М		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	
	СВ		0.4			0.4			0.5	
	СС	6.7			7.5			8.3		
	CD		R3.35		R3.75			R4.15		
	Weight g	70	80	100	70	80	100	70	90	100

Taper Hole

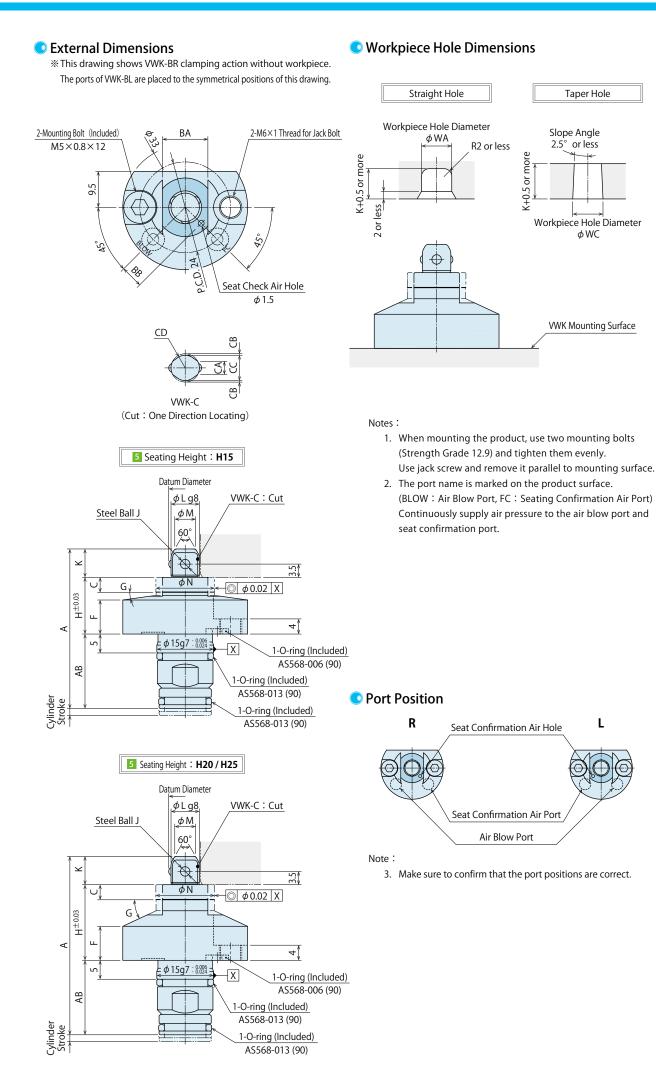
φWC

VWK Mounting Surface

L

Slope Angle

2.5° or less



Machining Dimensions for Mounting

2-M5×0.8 Thread Depth 9 or more

ŝŻ

Seat Check Air Port

φ3

before installation. (Refer to P.311.)

Notes:

φ14.

Cautions P.309

7 Port Position:L

%1. There might be foam near the flange bottom depending on

\*2. Prepare the air lock port on the bottom within the range of

roughness of mounting surface, but this is not a malfunction.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase



P.C.D. 24

Air Blow Port

φ3

#### High-Power

Series

Pneumatic Series

Hydraulic Series

Valve / Coupler Hydraulic Unit

Manual Operation Accessories

Cautions / Others

Pneumatic Hole Clamp SWA

Pneumatic Swing Clamp

WHA

Double Piston Pneumatic Swing Clamp WHD

Pneumatic Link Clamp

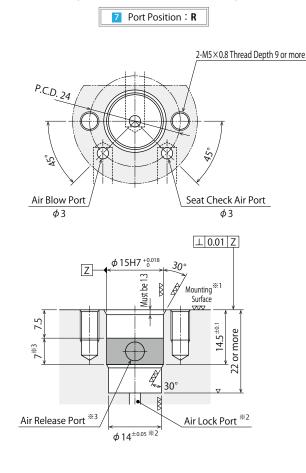
Link Clamp WCA

Air Flow Control Valve BZW

> eeumatic pansion Locating Pi VWM VWK

Pneumatic Sensor Pin WWA

(mm)



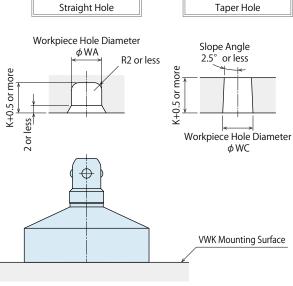
#### External Dimensions and Machining Dimensions for Mounting

		5								
Model No.		VWK2000-080-□-□-B□			VWK2	2000-090-	- <b>D-BD</b>	VWK2000-100-□-□-B□		
	3 Applicable Workpiece Hole Diam.		080			090			100	
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Vorkpiece Hole Diameter	WA (Straight Hole)		7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8	
vorkpiece noie Diameter	WC (Taper Hole)	8~8.5				9~9.5			10~10.8	
	At Releasing		$\phi$ 7.5 or less	5		\$ 8.3 or les	S		$\phi$ 9.3 or less	;
Datum Diameter At Full Stroke			\$ 8.5 or mo	re		\$ 9.5 or mo	ore		\$ 10.8 or m	ore
Cylinder Stroke			1.8			2.2			2.6	
	Α	42.2	47.2	52.2	42.3	47.3	52.3	42.4	47.4	52.4
	С	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°
	Н	15	20	25	15	20	25	15	20	25
	J	2.5 7.5 7.5 : 0005				3		3.5		
	К				8 8.3 - 0.005 - 0.027			8.5 9.3 - 0.005 - 0.027		
	L									
	М		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	
	СВ		0.4			0.4			0.5	
	СС		6.7		7.5 R3.75			8.3 R4.15		
	CD		R3.35							
	Weight g	80	90	110	80	90	110	80	100	110

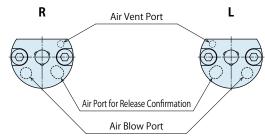
#### External Dimensions % This drawing shows VWK-MR clamping action without workpiece. The ports of VWK-ML are placed to the symmetrical positions of this drawing. Straight Hole 2-Mounting Bolt (Included) 2-M6×1 Thread for Jack Bolt φWA M5×0.8×12 K+0.5 or more 9.5 ኒ 2 or less ŝ CD 8 VWK-C (Cut: One Direction Locating) Notes : 5 Seating Height : H15 Datum Diameter VWK-C:Cut ¢Lg8 Steel Ball J φM <u>60</u>° ð ш φN L G↓ © φ0.02 X മ ш 4 4 ഹ φ15g7 - 0.006 X 1-O-ring (Included) AB AS568-013 (90) Port Position Cylinder Stroke 1-O-ring (Included) AS568-013 (90) R 5 Seating Height : H20 / H25 Datum Diameter ∮Lg8 VWK-C:Cut Steel Ball J φM 60° Note: ð ш 3.5 φN © φ0.02 X G Т ά ш 4 φ15g7 0.006 ഹ X AB 1-O-ring (Included) AS568-013 (90) Cylinder Stroke

1-O-ring (Included) AS568-013 (90)

#### Workpiece Hole Dimensions



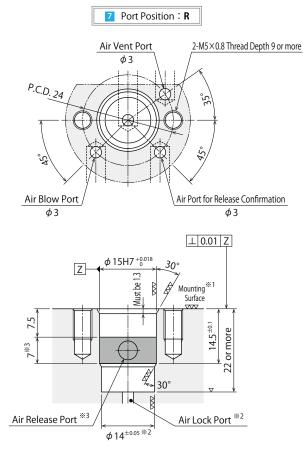
- 1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
- 2. The port name is marked on the product surface. (EXT: Air Vent Port, BLOW: Air Blow Port, SENSOR : Release Confirmation Air Port) Continuously 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.

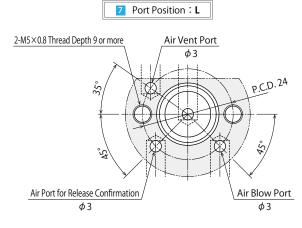


4. Make sure to confirm that the port positions are correct.



#### Machining Dimensions for Mounting





#### 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  $\phi$  14.
- - 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.)

High-Power Series

\_ ......

Pneumatic Series

Hydraulic Series

Valve / Coupler Hydraulic Unit

Manual Operation Accessories

Cautions / Others

Pneumatic Hole Clamp SWA

Pneumatic Swing Clamp

WHA

Double Piston Pneumatic Swing Clamp WHD

Pneumatic Link Clamp

WCA

Air Flow Control Valve BZW

> eumatic pansion Locating Pin VWM VWK

Pneumatic Sensor Pin WWA

(mm)

#### External Dimensions and Machining Dimensions for Mounting

		-			5		(11)			
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			
	At Releasing	$\phi$ 7.5 or less		\$ 8.3 or less		φ9.3 or less				
Datum Diameter	At Full Stroke	$\phi$ 8.5 or more		$\phi$ 9.5 or more		\$\phi 10.8 or more				
Cylinder Stroke		1.8		2.2		2.6				
	Α	42.2	47.2	52.2	42.3	47.3	52.3	42.4	47.4	52.4
	В	11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
	С	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°
	Н	15	20	25	15	20	25	15	20	25
J K L M		2.5		3		3.5				
		7.5		8		8.5				
		7.5 - 0.005		8.3 - 0.005		<b>9.3</b> - 0.005 - 0.027				
		5.5		6		6.5				
	N	14.5	9	9	14.5	10	10	14.5	11	11
AB CA			19.7			19.3			18.9	
		3.5		4		4.5				
СВ		0.4		0.4		0.5				
CC CD		6.7 R3.35		7.5		8.3 R4.15				
				R3.75						
	Weight g	80	90	110	80	90	110	80	100	110

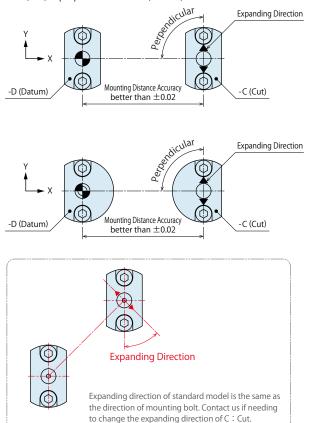
#### Cautions

- Notes for Design
  - n 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.
  - vwk locates and releases with pneumatic pressur
- 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.

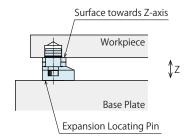
- 3) Air Supply
- Continuously supply air pressure to the air blow port. If air supply is shut off during operation, contaminants enter into the cylinder leading to malfunctions.
- Continuously supply air pressure to the seat confirmation air port for -B : with seating surface, and to the release confirmation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

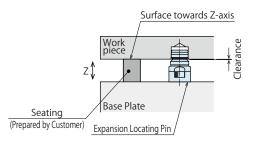


- 6) Reference Surface towards Z-axis
- -B: with Seating Surface has seating on upper part of the flange, but standard/-M: Release Confirmation model have no seating (reference surface towards Z-axis). Please prepare the seat separately.

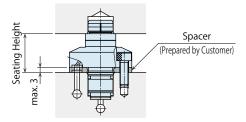
-B: With Seating Surface



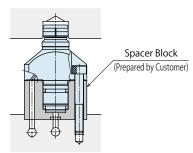




- 7) Adjusting Height of Expansion Locating Pin
- Seating height can be selected from 15mm / 20mm / 25mm.
- For slight adjustment of seating height and expanding part height, install a spacer (3mm or less) under the flange.



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



High-Power Series

**Pneumatic Series** 

Hydraulic Series

Valve / Coupler Hydraulic Unit

> Manual Operation Accessories

Cautions / Others

Pneumatic Hole Clamp SWA

Pneumatic Swing Clamp WHA

Double Piston Pneumatic Swing Clamp

> WHD Pneumatic Link Clamp

WCA

Air Flow Control Valve BZW

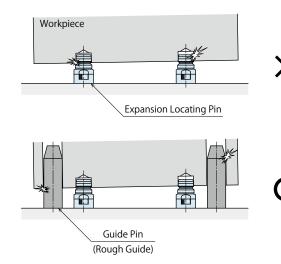


Pneumatic Sensor Pin WWA

- 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  $\sim$  5/100 (approx. 2  $\sim$  3°) of tilt between workpiece and expansion locating pin plane.

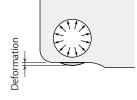
If necessary, provide guide pins to keep the pallet level during loading and unloading. Please prepare guide pin (rough guide) etc.



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.



Model No. Indication Specifications

External Dimensions

Cautions

P.309

Pneumatic Expansion Locating Pin Digest P.285

Action Description

- 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.

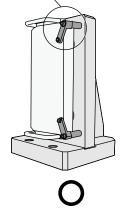
If it is locked out of position, the machine or clamps may be damaged. As the workpiece may fall down during releasing, it is recommended

- 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.

Example of Latching Mechanism





#### Cautions

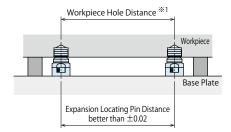
- Notes for Design Regarding to VWM
- 1) Distance Accuracy of VWM
- Distance accuracy of the VWM's mounting hole should be within  $\pm$ 0.02mm.

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 Distanc	e 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).

Pneumatic Expansion Locating Pin Digest P.285	Action Description	Model No. Indication Specifications	External Dimensions	Cautions P.309	KOSMEK Harmony in Innovation
					High-Power Series

#### 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.

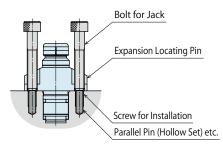
3) Applying Sealing Tape

does not enter in products.

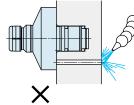
- Wrap with tape 1 to 2 times following the screwing direction.
   Wrapping in the wrong direction will cause leaks and malfunction.
- Pieces of the sealing tape can lead to air leaks and malfunction.
- When piping, be careful that contaminant such as sealing tape
- 4) Mounting / Removing Expansion Locating 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.



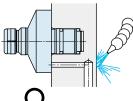
- 5) Appropriate Measures for the Air Vent Port
- For the air vent port of -M : Release Confirmation model, consider the environment and avoid coolant or any contaminants.
   If coolant or contaminants enter in the product, it will not function properly.



#### Examples

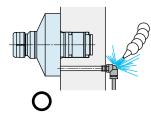
① Prepare the manifold piping.

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.





eumatic pansion Locating P

Pneumatic Series

**Hydraulic Series** 

Valve / Coupler

Hydraulic Unit

Accessories

Pneumatic Hole Clamp SWA

Pneumatic

Double Piston

Pneumatic Link Clamp

Air Flow Control Valve

Swing Clamp

WHA

Pneumatic Swing Clamp

WHD

WCA

BZW

Manual Operation

Cautions / Others

#### Circuit Reference

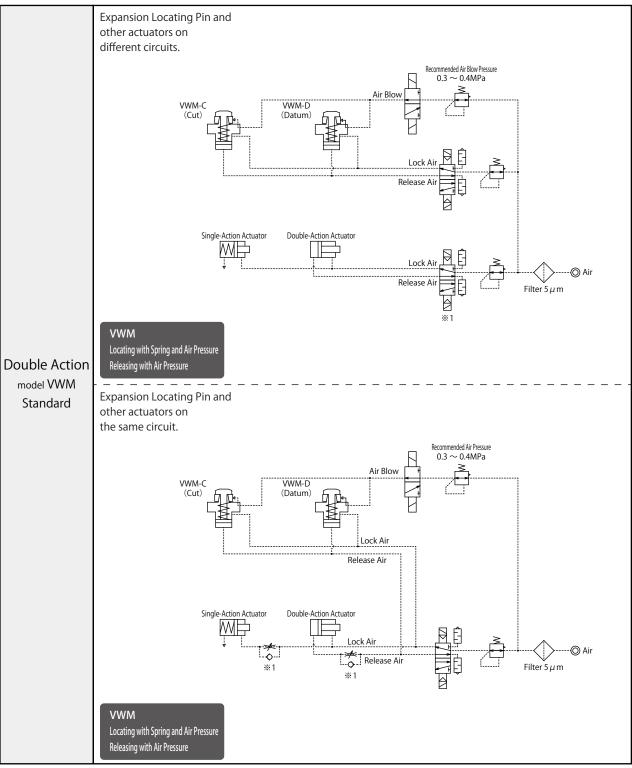
Notes on Pneumatic Cylinder Speed Control Unit

VWM (Standard)

Please pay attention to the cautions below. Design the circuit for controlling the action speed of cylinder.

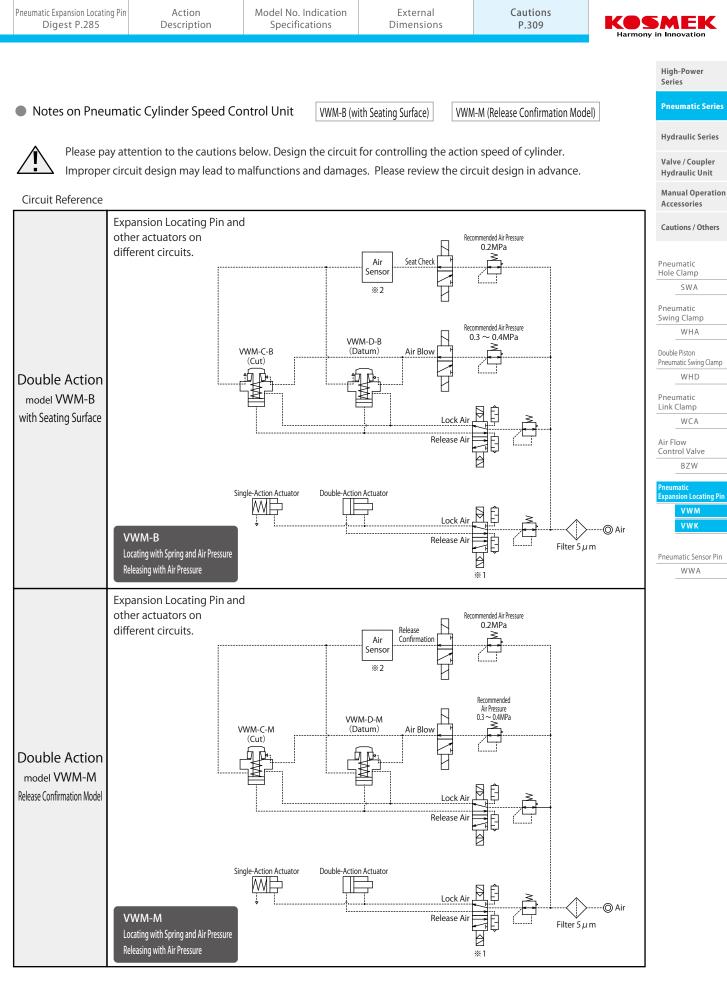
Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Circuit Reference



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 :

%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

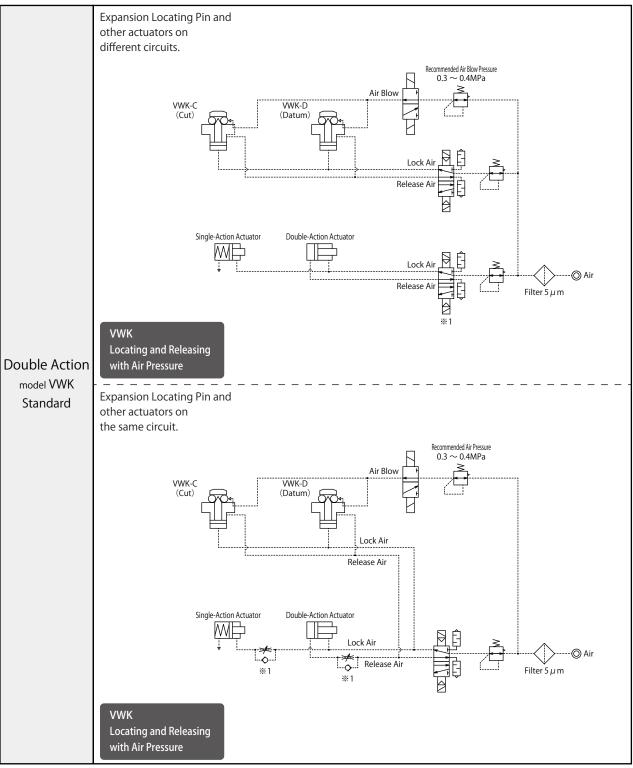
Notes on Pneumatic Cylinder Speed Control Unit

VWK (Standard)

Please pay attention to the cautions below. Design the circuit for controlling the action speed of cylinder.

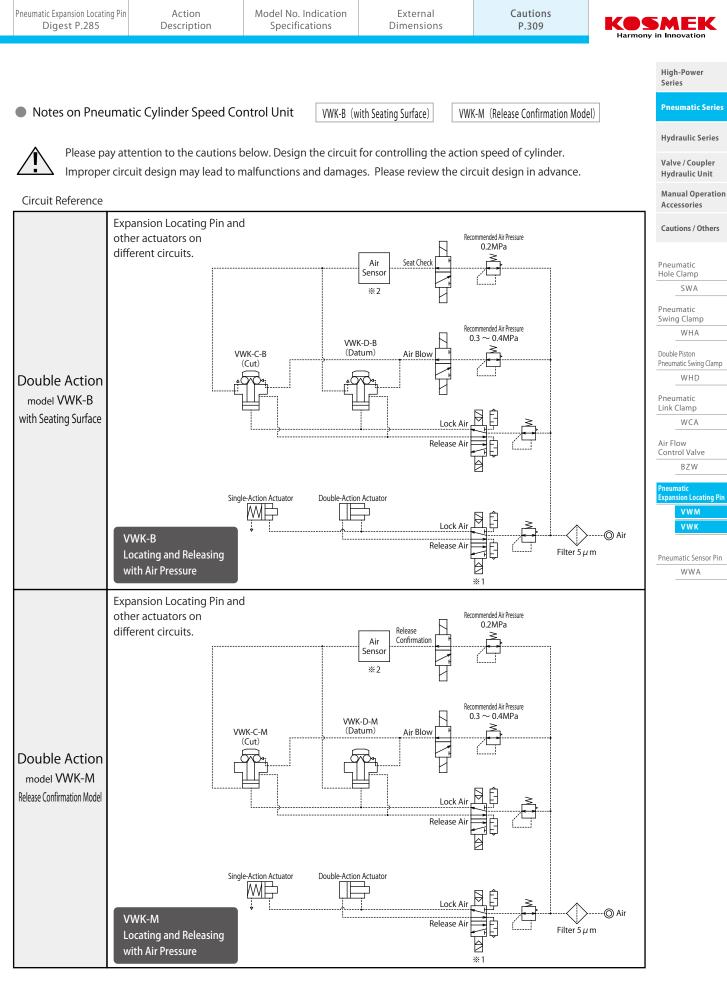
Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Circuit Reference



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 :

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

<sup>%1</sup>. 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.

<sup>1.</sup> 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



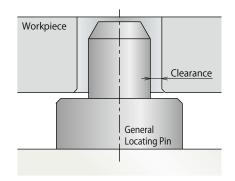
### Locating Repeatability VFL/VFM : $3 \mu m$ VFJ/VFK : $10 \mu m$

Zero Clearance between Reference Hole and Expansion Locating Pin

PAT.

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

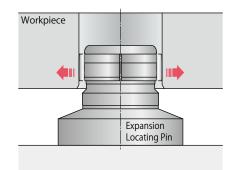
# The general locating pin has some clearance between pin and reference hole.



General Locating Pin

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

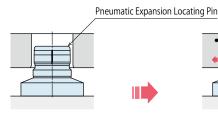
High Accuracy, Setup Time and Total Cost Reduction

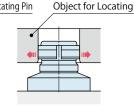


#### The World's First Locating Mechanism

 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.

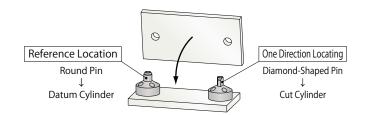
Action Description





< Locked State >

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

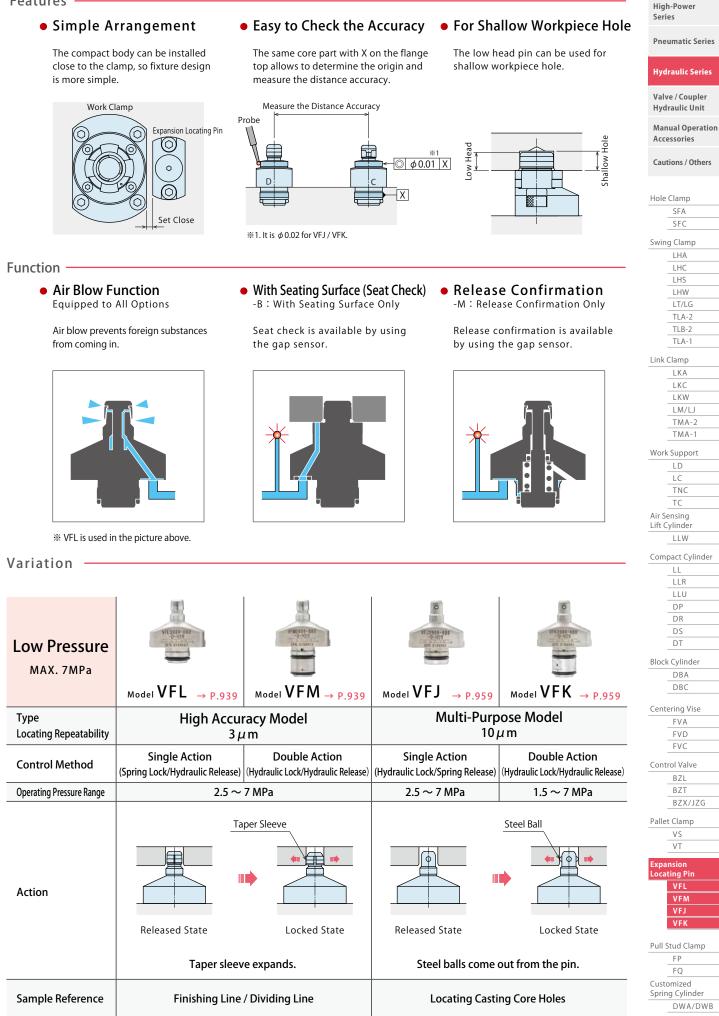


< Released State >

% VFL and VFM is used in the picture above.



#### Features -



PAT.

### Hydraulic Expansion Locating Pin

Model VFL/VFM

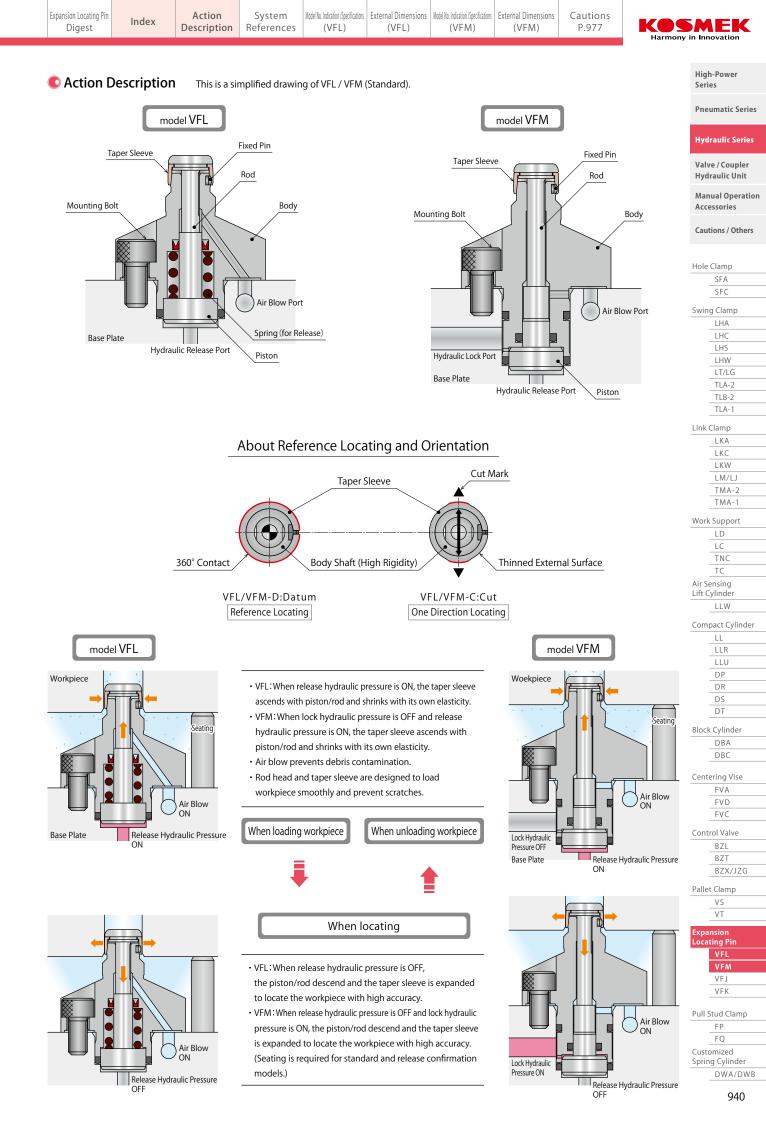
Hydraulic • Single Action/Double Action Locating Repeatability :  $3 \mu$  m



#### C Index

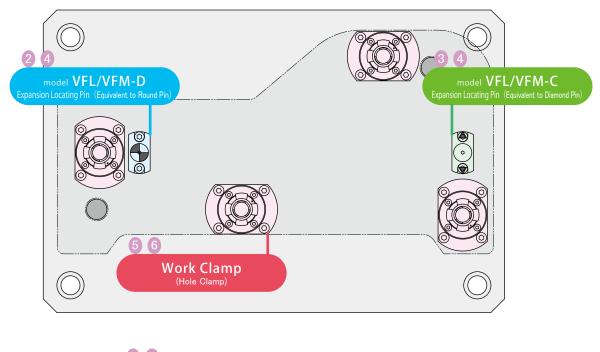
Expansion Locating Pin Digest	P.937
Action Description	P.940
System References and Essential Matters	P.941
VFL Model No. Indication / Specifications	P.943
VFL External Dimensions	
• Standard	P.945
with Seating Surface	P.947
Release Confirmation Model	P.949
VFM Model No. Indication / Specifications	P.951
VFM External Dimensions	
• Standard	P.953
with Seating Surface	P.955
Release Confirmation Model	P.957
Cautions	
Notes for Hydraulic Expansion Locating Pin	P.977
Cautions (Common)     Installation Notes · Hydraulic Fluid List · Notes on Hydraulic Cylinder Speed Control Circuit	P.1235

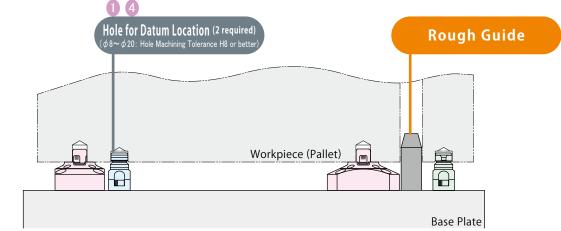
Notes on Handling · Maintenance/Inspection · Warranty

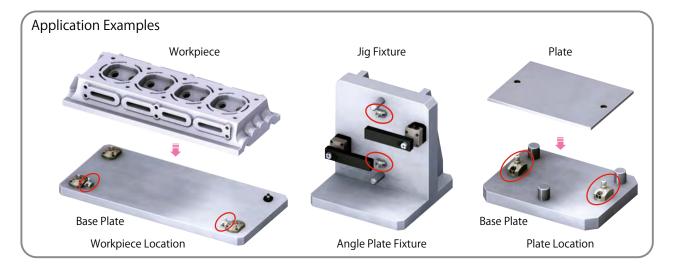


- System References
  - Repeated locating accuracy of  $3 \mu m$  (One step locating reduces setup time!)
  - Avoid deterioration of workpiece accuracy when changing pallets to perform multiple operations.

• Using with hole clamp allows for 5-face machining, minimum setup and more compact fixture!







Expansion Locating Pin Digest	Index	Action Description	System References	Model No. Indication /Specifications (VFL)	External Dimensions (VFL)	Model No. Indication /Specifications (VFM)	External Dimensions (VFM)	Cautions P.977	

# **Essential Points**

# Workpiece Hole for Locating

- Workpiece hole diameter is  $\phi 8 \sim \phi 20$  (in 1mm increments).
- Hole machining accuracy for locating hole (two holes) is H8 or better.

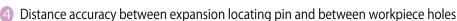
# 2 Workpiece Weight

- · 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.

# B 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).

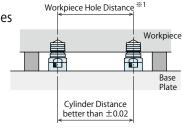
(There is a cut mark (**A**) on top of the flange on the VFL/VFM-C unit that shows the locating direction.)

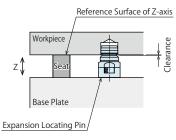


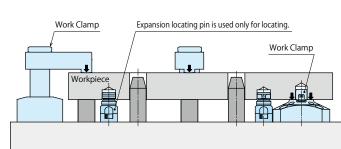
- The distance accuracy for the expansion locating pin should be within  $\pm 0.02$  mm.
- %1. The distance accuracy of workpiece holes (pallet holes) should be within allowable difference. (Refer to "Notes for Design".)

• Standard and -M: Release Confirmation model have no seating surface

(reference surface towards Z-axis). Please prepare the seat separately.







Valve / Coupler Hydraulic Unit										
Manual Operatio Accessories										
Cau	tions / Others									
Hole	Clamp									
	SFA									
	SFC									
Swin	g Clamp									
	LHA									
	LHC									
	LHS									
	LHW									
	LT/LG									
	TLA-2									
	TLB-2									
	TLA-1									
Link	Clamp									
	LKA									
	LKC									
	LKW									
	LM/LJ									
	TMA-2									
	TMA-1									

High-Power

**Pneumatic Series** 

Hydraulic Series

Series

VFL/VFM-D (Datum) For reference locating (X-axis / Y-axis) (Equivalent to Round pin)

Expanding

Force

Workpiece Hole Diameter

Maximum workpiece weight is

calculated from expanding force.

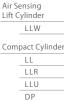
(Equivalent to Diamond pin)

VFL/VFM-C (Cut)

For one direction (Y-axis)

Cut mark (Expanding Direction)

dicular

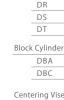


Work Support

LD

LC

TNC ТC



FVA FVD

FVC Control Valve

> BZL BZT BZX/JZG

Pallet Clamp

VS VT

iting Pin

VFM

VFJ VFK

# 6 Setting Additional Work Clamps

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

💪 Seat Setting

Model No. Indication

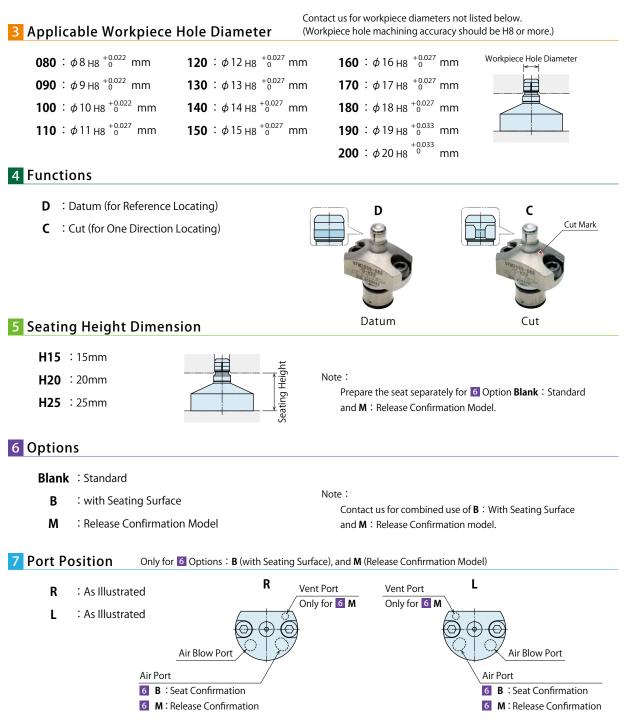


#### 1 Body Size

- **2** : Select from Workpiece Diameter  $\phi 8 / \phi 9 / \phi 10 / \phi 11$
- **3** : Select from Workpiece Diameter  $\phi$  12 /  $\phi$  13 /  $\phi$  14 /  $\phi$  15
- 4 : Select from Workpiece Diameter  $\phi$  16 /  $\phi$  17 /  $\phi$  18 /  $\phi$  19 /  $\phi$  20

#### 2 Design No.

**0** : Revision Number



Expansion Locating Pin Digest	Index	Action Description	System References	Model No. Indication /Specifications (VFL)	External Dimensions (VFL)	Model No. Indication /Specifications (VFM)	External Dimensions (VFM)	Cautions P.977	
Digest	Index	Description	References	(VFL)	(VFL)	(VFM)	(VFM)	P.977	Harmony

Specifications													(mm)	Series
Model No.		VFL2	:000			VFL	3000				VFL4000			Pneumatic Series
3 Applicable Workpiece Hole Diam.	080	090	100	110	120	130	140	150	160	170	180	190	200	
Workpiece Hole Diameter (Standard Diam.) mm	$\phi 8_{H8^{+0.022}}$	$\phi 9_{{\rm H8}^{+0.022}}$	$\phi10_{ m H8}^{+0.022}_{ m 0}$	$\phi$ 11 <sub>H8</sub> $^{+0.027}_{0}$	\$\$\$ \$\$\$ \$\$\$\$ \$	\$\$\$ \$	φ14 <sub>H8</sub> <sup>+0.027</sup>	ф15 <sub>H8</sub> +0.027 0	\$\$\$ \$\$\$ \$\$\$\$ \$	$\phi$ 17 <sub>H8</sub> $^{+0.027}_{0}$	$\phi$ 18 <sub>H8</sub> $^{+0.027}_{0}$	$\phi$ 19 <sub>H8</sub> $^{+0.033}_{0}$	φ 20 <sub>H8</sub> <sup>+0.033</sup> 0	Hydraulic Series
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	Valve / Coupler
Expanding Force (F) * 1 N	190	200	220	200	180	200	190	180	280	290	290	290	290	Hydraulic Unit
Allowable Thrust Load <sup>*2</sup> N	1500	1500	2000	2000	2500	2500	2500	2500	3000	3000	3000	3000	3500	Manual Operation
Cylinder Capacity (Empty Action) cm <sup>3</sup>		0.0	)7		0.08							Accessories		
Operating Pressure Range MPa							$2.5 \sim 7.0$							Cautions / Others
Withstanding Pressure MPa							10.5							cautions/ others
Recommended Air Blow Pressure MPa							0.3 ~ 0.4							
Operating Temperature Range °C							$0 \sim 70$							Hole Clamp
Usable Fluid					General	Hydraulic	Oil Equiva	alent to IS	0-VG-32					SFA SFC

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	For Vertical Attitude		Link Clamp LKA LKC
Workpiece Weight (W) $\leq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5}}{\text{Friction Coefficient of Workpiece Seat Face (}\mu\text{)}}$	Workpiece Weight (W) $\leq$ Expanding Force per One Piece of Expansion Locating Pin	n (F)×Efficiency 0.5	LKW LM/LJ TMA-2 TMA-1
F W P		F W	Work Support LD LC TNC TC

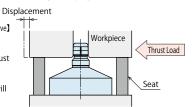
#### C Thrust Load/Displacement Curve

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

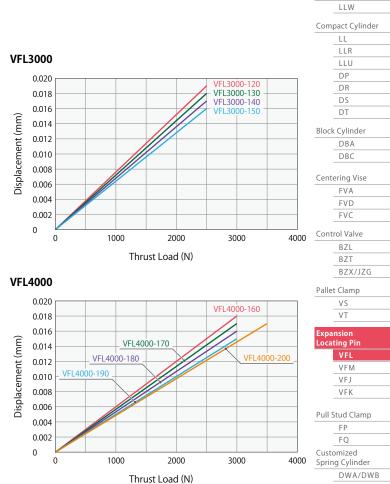
This graph shows the thrust load (static load) on a single datum (VFL-D) cylinder that is not used with any clamp cylinders.

Dis [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.



#### VFL2000





Swing Clamp

LHA

LHC LHS

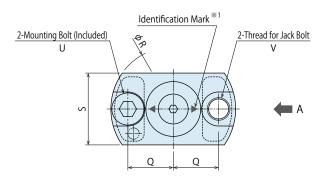
LHW

LT/LG

TLA-2 TLB-2 TLA-1

Air Sensing Lift Cylinder

% The drawing shows the released state of VFL.



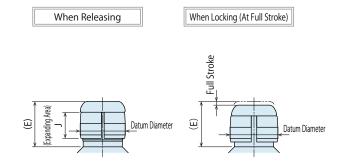
¢CB

VFL-C

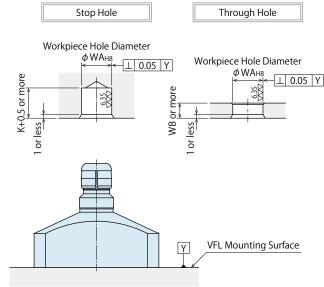
(Cut: One Direction Locating)

View A

# Expanding Area Detail

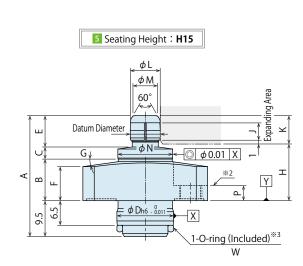


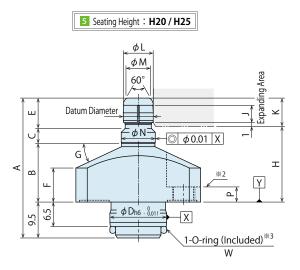
#### Workpiece Hole Dimensions



#### 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.
- 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.
- This product has no seat. Choose option -B : with Seating Surface or prepare another seat if requiring.

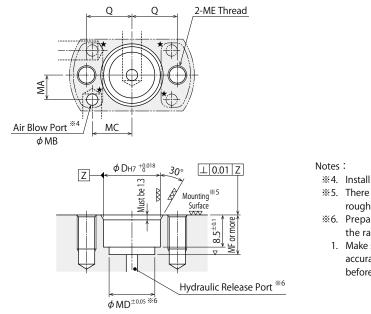




945

Expansion Locating Pin Digest       Index       Action       System       Model No. Indication /Specifications       External Dimensions       Model No. Indication /Specifications       External Dimensions       Cautions         Digest       Index       Action       References       (VFL)       (VFL)       (VFM)       (VFM)       P.977
--

# C Machining Dimensions for Mounting



Install	tho	əir	blow

- %4. Install the air blow port choosing one port from four  $\bigstar$  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  $\phi$  MD.
  - 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

External Dimen:	sions a	nd Mac	hining	Dimer	nsions	for Mo	unting						(mm)	TMA-2 TMA-1
Model No.		VFL2000	-0-0-0			VFL3000	)			VFL	<b>4000-⊡-</b> [	7-0		Work Support
3 Applicable Workpiece Hole Dia	n. 080	090	100	110	120	130	140	150	160	170	180	190	200	LD
5 Seating Height	H15 H20 H2	5 H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	6 H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	5 H15 H20 H25	LC
Workpiece Hole Diameter (Standard Diam.)	<b>ф</b> 8н8	ф 9н8	<i>ф</i> 10 <sub>Н8</sub>	ф11 <sub>Н8</sub>	ф12н8	ф13 <sub>Н8</sub>	φ14 <sub>H8</sub>	ф15н8	<i>ф</i> 16н8	ф17н8	ф 18на	ф19н8	ф 20на	TNC
At Releasing	φ 7.94 or less	1				· · ·			φ 15.89 or less		,	1	1	TC
Datum Diameter At Full Stroke	,	$\phi$ 9.05 or more									Air Sensing Lift Cylinder			
	φ 6.03 01 1101	1.1	1.	φ 11.05 01 11018	φ 12.05 01 1100	1.	1.	φ 13.03 0111016	φ 10.07 οι ποιε	φ17.07 0111018	LLW			
Full Stroke	0.65 32 37 42 32 37 42 32 37 42 32 37 42 32 37 42 3						.75	00 5 07 5 40 5	24 20 44	24 20 44				
Α														Compact Cylinder
В		5 11 15.5 20.5												LL
С	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	LLU
D		15				15					DP			
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	DR
F	9 9 9.5	999.5	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	DS
G	8° 25° 40°	8° 25° 40°	8° 25° 40°						8° 15° 30°			8° 15° 30°		DT
Н	15 20 25	15 20 25	15 20 25									15 20 25	15 20 25	Block Cylinder
	10 20 20		.6	10 20 20	10 20 20		5.1	10 20 20	10 20 20	10 20 20	DBA			
K			.5				8				DBC			
K	7.9	8.9		10.8	11.8	12.8	13.8	14.8	15.7	16.7	9.5 17.7	18.7	19.7	Centering Vise
L	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14	15	16	17	19.7	FVA
														FVD
N	14.5 9 9	14.5 10 10		14.5 12 12	18.5 13 13			18.5 10 10	22.5 1/ 1/	22.5 18 18		22.5 20 20	22.5 21 21	FVC
P			4				4		5 17.5					Control Valve
Q			2		14						BZL			
R		-	3		37						BZT			
S		1	9		19						BZX/JZG			
U		M5×0	).8×12		M5×0.8×12					Ν	Pallet Clamp			
V		M6	×1		M6×1						M8×1.25	5		VS
W		AS568-0	013 (90)			AS568-0	013 (90)			AS5	568-015	(90)		VT
CA	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5	
СВ	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	Expansion Locating Pin
MA			.5				5.5				7.5			VFL
MB			3				3				4			VFM
			-				-							VFJ
MC			0.5				0.5				13 15.1			VFK
MD		12.1					2.1					Pull Stud Clamp		
ME	M5×0	).8 Thread		or more	M5×0	).8 Thread	•	or more	M	6×1 Thre	ead Depth	n 12 or mo	ore	FP
MF			0.5		10.5				11					FQ
WA	8 +0.022	9 +0.022	10 +0.022	11 +0.027	12 +0.027	13 +0.027	14 +0.027	15 +0.027	16 +0.027	17 +0.027	18 +0.027	19 +0.033	20 +0.033	Customized
WB			4		4.5				5.5					Spring Cylinder
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	DWA/DWB

Valve / Coupler Hydraulic Unit Manual Operation

High-Power

**Pneumatic Series** 

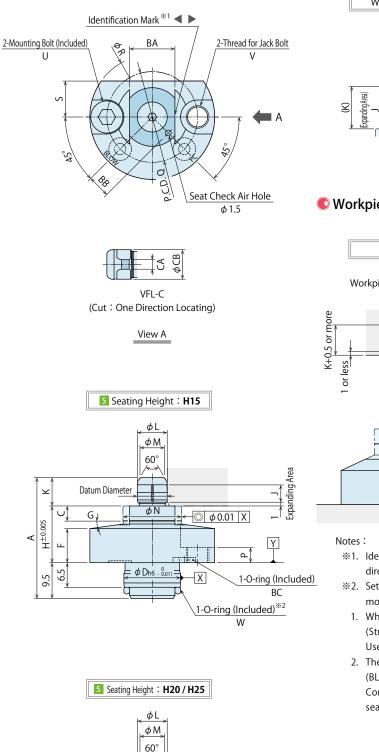
Hydraulic Series

Series

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 Support LD LC TNC ТC ensing Sylinder

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



Datum Diameter

G

U

ш

6.5

H±0.005

9.5

∢

φN

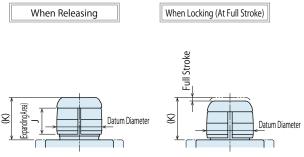
φDh6 - 0.011

h

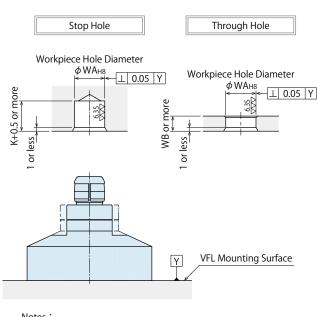
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X

# Expanding Area Detail



#### Workpiece Hole Dimensions

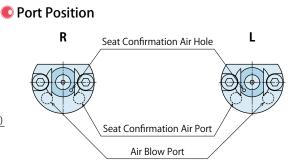


\*1. Identification mark is only marked on -C: Cut (for one direction locating). **I** hindicates the locating direction.

\*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.



Note :

Expanding

Υ

1-0-ring (Included)

BC

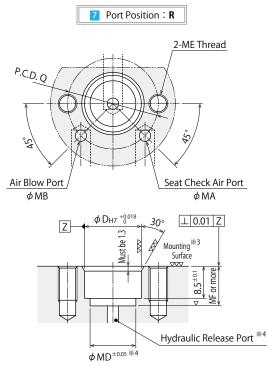
Ъ

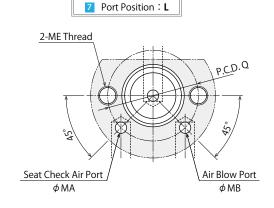
1-O-ring (Included)<sup>\*\*2</sup>

W

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

# C 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  $\phi$  MD.
- 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

Model No.       UFL 2000-0-0-8-0       UFL 2000-0-0-0-8-0       UFL 2000-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0-0-0-0-0-0-0       UFL 2000-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-						Dimer	1510115		anning						((1)(1))	TMA-1
Image: bound part of the part of t	Model No.		v	FL2000-	]- <b>  -  -B</b> [	]	V	FL3000-	]-□-□-B			VFL40	000-🗆-🗆-	- <b>B</b> -		Work Support
Note: A product in the last in the	3	Applicable Workpiece Hole Diam	080	090	100	110	120	130	140	150	160	170	180	190	200	
minimize       minimize <th< td=""><td>5</td><td>Seating Height</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>6 H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td>5 H15 H20 H25</td><td>H15 H20 H25</td><td>H15 H20 H25</td><td></td></th<>	5	Seating Height	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	H15 H20 H25	6 H15 H20 H25	H15 H20 H25	H15 H20 H25	5 H15 H20 H25	H15 H20 H25	H15 H20 H25	
Data Diame       AT Releasing       of 394 mick       994 mick       9103 wick       91103 wick </td <td>Workpiece Hole Dian</td> <td>neter (Standard Diam.)</td> <td><i>ф</i> 8<sub>Н8</sub></td> <td>ф 9н8</td> <td><i>ф</i> 10<sub>Н8</sub></td> <td>ф11<sub>Н8</sub></td> <td>ф12н8</td> <td>ф13<sub>Н8</sub></td> <td>ф14<sub>Н8</sub></td> <td>ф 15н8</td> <td>ф16н8</td> <td>ф17н8</td> <td>ф18н8</td> <td>ф 19н8</td> <td>ф 20н8</td> <td></td>	Workpiece Hole Dian	neter (Standard Diam.)	<i>ф</i> 8 <sub>Н8</sub>	ф 9н8	<i>ф</i> 10 <sub>Н8</sub>	ф11 <sub>Н8</sub>	ф12н8	ф13 <sub>Н8</sub>	ф14 <sub>Н8</sub>	ф 15н8	ф16н8	ф17н8	ф18н8	ф 19н8	ф 20н8	
Part Buttorie       4 & Buttorie       9 & DoStrome       0 & DOST       0 & DOST       0 & DO		At Releasing	φ 7.94 or less	φ 8.94 or less	$\phi$ 9.94 or less	$\phi$ 10.94 or less	φ 11.92 or less	φ 12.92 or less	\$ 13.92 or less	φ 14.92 or less	$\phi$ 15.89 or less	\$ 16.89 or less	s φ17.89 or less	$\phi$ 18.89 or less	φ 19.89 or less	
A       32       y	Datum Diameter At Full Stroke		$\phi$ 8.05 or more	$\phi$ 9.05 or more	$\phi$ 10.05 or more	φ 11.05 or more	e $\phi$ 12.05 or more	$\phi$ 13.05 or more	φ 14.05 or mor	e $\phi$ 15.05 or more	$\phi$ 16.07 or more	φ 17.07 or mor	e $\phi$ 18.07 or more	$\phi$ 19.07 or more	$\phi$ 20.07 or more	
C     4 <td colspan="3">Full Stroke 0.6</td> <td>65</td> <td></td> <td colspan="5">0.75</td> <td></td> <td>LLW</td>	Full Stroke 0.6			65		0.75						LLW				
D     1 <th1< th="">     1     1     1     1<td></td><td>A</td><td>32 37 42</td><td>32 37 42</td><td>32 37 42</td><td>32 37 42</td><td>32.5 37.5 42.5</td><td>32.5 37.5 42.5</td><td>32.5 37.5 42.5</td><td>5 32.5 37.5 42.5</td><td>34 39 44</td><td>34 39 44</td><td>34 39 44</td><td>34 39 44</td><td>34 39 44</td><td>Compact Cylinder</td></th1<>		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	5 32.5 37.5 42.5	34 39 44	34 39 44	34 39 44	34 39 44	34 39 44	Compact Cylinder
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		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	
F     9 <td colspan="2">D</td> <td colspan="4">15</td> <td></td> <td>1</td> <td>5</td> <td></td> <td></td> <td></td> <td></td>	D		15					1	5							
G     ℓ <th<< th="">     ℓ     ℓ     ℓ     ℓ<td></td><td>F</td><td>9 9 9.5</td><td>9 9 9.5</td><td>9 9 9.5</td><td>9 9 9.5</td><td>9 9 9.5</td><td colspan="7">9 9 95 9 9 95 9 9 95 9 9 95 9 9 95 9 9 95 8 11 11 8 11 11 8 11 11 8 11</td><td>8 11 11</td><td></td></th<<>		F	9 9 9.5	9 9 9.5	9 9 9.5	9 9 9.5	9 9 9.5	9 9 95 9 9 95 9 9 95 9 9 95 9 9 95 9 9 95 8 11 11 8 11 11 8 11 11 8 11							8 11 11	
Image: Image	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°		
K $-5.1$ $0$ $0.1$ $0$ $0.1$ $0$ $0.1$ $0$ $0.1$ <td></td> <td>Н</td> <td>15 20 25</td> <td></td>		Н	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	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		J		4	.6			5.	.1				DT			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		K		7	.5			8	3		9.5					Block Cylinder
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       P       Image: Second		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	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	I	М	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14	15	16	17	18	DBC
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		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	Centering Vise
Q $24^{+}$ $26^{+}$ $33^{-}$ $37^{-}$ $38^{-}$ $37^{-}$ $38^{-}$ $37^{-}$ $38^{-}$ $38^{-}$ $38^{-}$ $31^{-}$ $38^{-}$ $38^{-}$ $31^{-}$ $38^{-}$ $38^{-}$ $31^{-}$ $38^{-}$ $38^{-}$ $31^{-}$ $38^{-}$ $38^{-}$ $31^{-}$ $38^{$	P 4				2	1				5			FVA			
R       33 3       37 47         S       9.5       9.5       11.5       Control Value         U $M5 \times 0.8 \times 12$ $M5 \times 0.8 \times 12$ $M6 \times 1 \times 16$ Control Value         V $M6 \times 1$ $M6 \times 1 \times 16$ $M6 \times 1 \times 16$ $M8 \times 1.25$ $M8 \times 1.25$ $M8 \times 1.25$ $B21$	Q 24					2	8				35					
S       9.5       0.5       11.5         U $M5 \times 0.8 \times 12$ $M5 \times 0.8 \times 12$ $M6 \times 1 \times 16$ V $M6 \times 1$ $M6 \times 1$ $M6 \times 1 \times 16$ $M8 \times 1.25$ W $A5568 - 013$ (90) $A5568 - 013$ (90) $A5568 - 015$ (90)       Pallet Clamp         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)       AS568-007 (90)       VT       Expansion         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       3.5       3.5       3       4       4       4.5       4.5       5.5       5       5         MB       3       3       3.5       3.5       3.5       4       4       4.5       4.5       5.5		R	33					3	7		47					FVC
U       M5 × 0.8 × 12       M5 × 0.8 × 12       M6 × 1 × 16       B       B       B       M6 × 1       M6 × 1 × 16       BZT       BZT <td></td> <td>S</td> <td></td> <td>9</td> <td>.5</td> <td></td> <td colspan="4">9.5</td> <td colspan="5">11.5</td> <td></td>		S		9	.5		9.5				11.5					
V       M6×1       M6×1       M8×1.25       BZ/JZG         W       AS568-013 (90)       AS568-013 (90)       AS568-015 (90)       BZ       BZ       AS568-015 (90)       Pallet Clamp       Pallet Clamp         BA       12       13       14       14       15       16       17       18       19       20       21       22       23       Pallet Clamp         BB       6       6.5       7       7.5       8       8.5       9       9.5       10       10.5       11       11.5       12       VT         BC       AS568-06 (90)       AS568-006 (90)       AS568-007 (90)       AS568-007 (90)       AS568-007 (90)       AS568-007 (90)       VE       Expansion         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       3.5       3.5       4       4       4.5       4.5       5.5       5       5       5       5       5       5       5       5       5       5       5       5       5       5       5       5       5       5       5		U		M5×0	.8×12		M5×0.8×12									
$ \begin{array}{ c c c c c c c c } \hline W & AS568-013 (90) & AS568-013 (90) & AS568-015 (90) \\ \hline BA & 12 & 13 & 14 & 14 & 15 & 16 & 17 & 18 & 19 & 20 & 21 & 22 & 23 \\ \hline BB & 6 & 6.5 & 7 & 7.5 & 8 & 8.5 & 9 & 9.5 & 10 & 10.5 & 11 & 11.5 & 12 \\ \hline BC & AS568-006 (90) & AS568-007 (90) & AS568-007 (90) \\ \hline CA & 2.5 & 2.5 & 3 & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline 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 \\ \hline MA & & 3 & & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & 3 & & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & & 3 & & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & & 3 & & 3 & 3 & 3.5 & 3.5 & 4 & 4 & 4.5 & 4.5 & 5 & 5 \\ \hline MB & & 3 & & & & & & & & & & & & & & & & $	,	V		M6	×1		M6×1									
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)       Expansion       Locating Pin         CA       2.5       2.5       3       3       3.5       3.4       4       4.5       4.5       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       VFL         MA       3       3       3.5       3.5       4       4       4.5       4.5       4.5       5.5       5	١	N		AS568-0	13 (90)		AS568-013 (90)									
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)     AS568-007 (90)     Expansion       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     3.5     3.5     4     4     4.5     4.5     4.5     5     5     5       MA     3     3.5     3.5     4     4     4.5     4.5     4.5     10.5     17.5     18.5     19.5       MB     3     3.7     10.7     11.7     12.7     13.7     14.7     15.5     16.5     17.5     18.5     19.5       MB     3     3     3     3     3     3     3     3     3     3     3     3     3       MB     3     3     3     3     3     3     3     3     3     3     3     3	E	BA	12	13	14	14	15	16	17	18	19	20	21	22	23	
CA       2.5       2.5       3       3       3.5       3.5       4       4       4.5       4.5       7       10.5       11.7       12.7       13.7       14.7       15.1       15.1       10.5       10.5       11       12.0       10.5       10.5       10.5       10.5       11       10.	E	3B	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	
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     3.5     3     3.7     14.7     15.5     16.5     17.5     18.5     19.5       MA     3     3.5     3     3.7     14.7     15.5     16.5     17.5     18.5     19.5       MB     3     3.3     3.5     3     3.7     3.7     14.7     15.5     16.5     17.5     18.5     19.5       MB     3     3.3     3.7     3.7     3.7     14.7     15.5     4     4       MD     12.1     12.1     4     4.5     4     4     4.5     4       ME     M5×0.8 Thread Depth 9 or more     M5×0.8 Thread Depth 9 or more     M6×1 Thread Depth 12 or more     10.5     10.5       MA     8 *0022     9 *0022     10 *0022     11 *0027     12 *0027     13 *0027     14 *0027     15 *0027     16 *0027     17 *0027     18 *0027     19 *0033     20 *003       WB     4 <td>E</td> <td>BC</td> <td></td> <td>AS568-0</td> <td>06 (90)</td> <td></td> <td></td> <td>AS568-0</td> <td>06 (90)</td> <td></td> <td></td> <td>AS</td> <td>568-007 (</td> <td>(90)</td> <td></td> <td>Expansion</td>	E	BC		AS568-0	06 (90)			AS568-0	06 (90)			AS	568-007 (	(90)		Expansion
MA       3       3       14.7       15.3       16.3       17.3       18.3       19.5         MA       3       3       4       VFM         MB       3       3       4       VFM         MD       12.1       12.1       15.1       16.5       17.5       18.5       19.5         ME       M5×0.8 Thread Depth 9 or more       M5×0.8 Thread Depth 9 or more       M6×1 Thread Depth 12 or more       Pull Stud Clamp         MF       10.5       10.5       11       12.1       12.1       12.1       10.5	(	CA	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	(	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	
MB     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 * <sup>0022</sup> 9 * <sup>0022</sup> 10 * <sup>0022</sup> 11 * <sup>0027</sup> 12 * <sup>0027</sup> 14 * <sup>0027</sup> 15 * <sup>0027</sup> 16 * <sup>0027</sup> 17 * <sup>0027</sup> 18 * <sup>0027</sup> 19 * <sup>0033</sup> 20 * <sup>0033</sup> WB     4     4.5     5.5	N	٨A			3			3	3				4			
MD         12.1         12.1         15.1         Pull Stud Clamp           ME         M5×0.8 Thread Depth 9 or more         M5×0.8 Thread Depth 9 or more         M6×1 Thread Depth 12 or more         Pull Stud Clamp           MF         10.5         10.5         11         FP         FQ           WA         8 *0022         9 *0022         11 *0027         12 *0027         14 *0027         15 *0027         16 *0027         17 *0027         18 *0027         19 *0033         20 *0033         FP         Customized           WB         4         4.5         5         5.5         5         5         5         5         5         5         5         5         5         5         5         5         5         5         5         5 <t< td=""><td>٨</td><td>ЛB</td><td colspan="4"></td><td></td><td>3</td><td>3</td><td></td><td></td><td></td><td>4</td><td></td><td></td><td></td></t<>	٨	ЛB						3	3				4			
ME     MS × 0.3 Infead Depth 9 of more     Infead Depth 12 of more       MF     10.5     10.5     11     10.5     11     FQ     FQ       WA     8 *0022     9 *0022     10 *0027     12 *0027     13 *0027     15 *0027     16 *0027     17 *0027     18 *0027     19 *0033     20 *0033       WB     4     4.5     5.5     5.5     5.5     Spring Cylinder	N	١D		12	2.1			12	2.1				15.1			
MF         10.5         10.5         11         FQ           WA         8 *0022         9 *0022         10 *0022         11 *0027         14 *0027         15 *0027         16 *0027         17 *0027         18 *0027         19 *0033         20 *0033         Customized           WB         4         4.5         5.5         5.5         Spring Cylinder	Ν	ЛE	M5×0	.8 Thread	Depth 9 c	or more	M5×0	.8 Thread	Depth 9	or more	M	6×1 Thr	ead Depth	12 or mo	ore	
WA         8 +0.022         9 +0.022         10 +0.022         11 +0.027         13 +0.027         14 +0.027         15 +0.027         16 +0.027         17 +0.027         18 +0.027         19 +0.033         20 +0.033         Customized           WB         4         4.5         5.5         Spring Cylinder	٨	ΛF			•						•					
WB   4   4.5   5.5	V	VA	8 +0.022	9 <sup>+0.022</sup>	10 +0.022	11 +0.027	12 +0.027				$\begin{array}{c c c c c c c c c c c c c c c c c c c $				20 +0.033	
Weight g 70 80 100 70 80 100 70 80 100 70 80 100 70 80 100 70 80 100 10 80 100 110 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	V	VB											5.5			
	We	ight 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	0 130 160 190	140 160 190	140 160 190	DWA/DWB

High-Power Series

**Pneumatic Series** 

#### Hydraulic Series

Valve / Coupler Hydraulic Unit

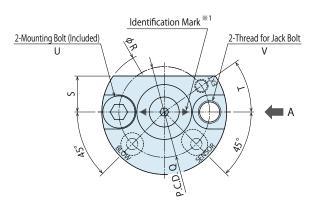
Manual Operation Accessories

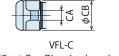
Cautions / Others

(mm)

Hole	Clamp							
	SFA							
	SFC							
Swin	g Clamp							
	1 H A							
	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							
	ensing Sylinder							
	LLW							

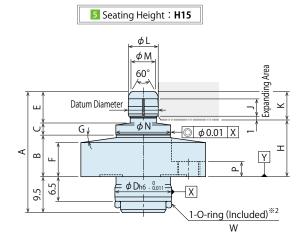
※ The drawing shows the released state of VFL-MR. The ports of VFL-ML are placed to the symmetrical positions of this drawing.

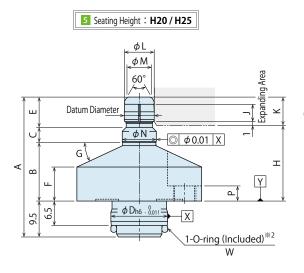




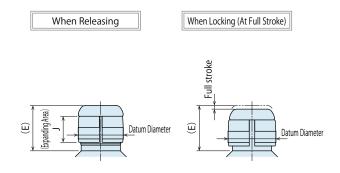
(Cut : One Direction Locating)

View A

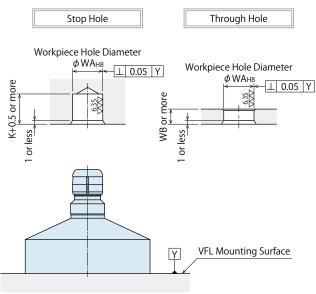




# C Expanding Area Detail



#### C Workpiece Hole Dimensions

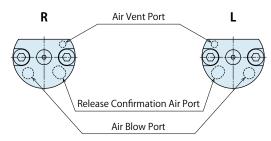


#### Notes:

※1. Identification mark is only marked on -C : Cut (for one direction locating). < ► indicates the locating direction.</p>

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

Expansion Locating Pin Digest         Index         Action         System         Model No. Indiation /Specifications         External Dimensions         Model No. Indiation /Specifications         External Dimensions         V/FL         V/FL         V/FL         External Dimensions         External Dimensions         V/FL         V	Cautions P.977	K
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High-Power

**Pneumatic Series** 

**Hydraulic Series** 

Valve / Coupler

Hydraulic Unit

Hole Clamp SFA

SFC

LHA

LHC

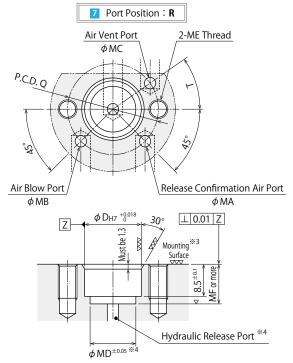
LHS

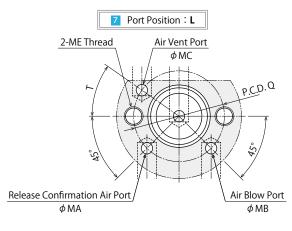
Swing Clamp

Manual Operation Accessories Cautions / Others

Series

# C 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  $\phi$  MD.
- 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

														(1111)	IMA-I
Model No.		VI	FL2000-	]-□-□-M		v	FL3000-	]-□-□-M		VFL4000-□-□-M□					Work Support
3	Applicable Workpiece Hole Diam	080	090	100	110	120	130	140	150	160	170	180	190	200	LD
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	6 H15 H20 H25	H15 H20 H25	H15 H20 H25	LC
Workpiece Hole Dia	meter (Standard Diam.)	<i>ф</i> 8 <sub>Н8</sub>	<i>ф</i> 9 <sub>Н8</sub>	<i>ф</i> 10 <sub>Н8</sub>	<i>ф</i> 11 <sub>Н8</sub>	ф12н8	<i>ф</i> 13 <sub>Н8</sub>	ф14 <sub>Н8</sub>	<i>ф</i> 15н8	ф 16н8	<i>ф</i> 17 <sub>Н8</sub>	<i>ф</i> 18 <sub>Н8</sub>	<i>ф</i> 19 <sub>Н8</sub>	ф 20н8	TNC
D D'	At Releasing	$\phi$ 7.94 or less	$\phi$ 8.94 or less	$\phi$ 9.94 or less	$\phi$ 10.94 or less	φ 11.92 or less	$\phi$ 12.92 or less	$\phi$ 13.92 or less	$\phi$ 14.92 or less	$\phi$ 15.89 or less	$\phi$ 16.89 or less	$\phi$ 17.89 or less	$\phi$ 18.89 or less	$\phi$ 19.89 or less	Air Sensing
Datum Diameter	At Full Stroke	$\phi$ 8.05 or more	$\phi$ 9.05 or more	$\phi$ 10.05 or more	$\phi$ 11.05 or more	$\phi$ 12.05 or more	$\phi$ 13.05 or more	$\phi$ 14.05 or more	$\phi$ 15.05 or more	$\phi$ 16.07 or more	$\phi$ 17.07 or more	$\phi$ 18.07 or more	$\phi$ 19.07 or more	$\phi$ 20.07 or more	Lift Cylinder
Full Stroke			0.	65		0.75				1.0					LLW
	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	Compact Cylinder
	В	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	5 10.5 15.5 20.5	10.5 15.5 20.5	10.5 15.5 20.5	LL
	С	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	LLR
	D		1	5			1	5				18			DP
	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	DR
	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	DS
	G	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°	DT
	Н	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	Block Cylinder
	J		4	.6			5.	.1				6			DBA
	K		7	.5		8				9.5					DBC
	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	Centering Vise
I	Μ	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14	15	16	17	18	FVA
	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					FVD
	Р	4				4				5					FVC
	Q	24				28				35					Control Valve
	R	33				37				47					BZL
	S		9	.5		9.5				11.5					BZX/JZG
	Т		35	5°			30	٥				30°			
	U		M5×0	).8×12			M5×0	.8×12		M6×1×16				Pallet Clamp VS	
,	V		M6	×1			M6	×1				M8×1.25	5		VT
	N		AS568-0	013 (90)		AS568-013 (90)				AS568-015 (90)					Expansion
(	CA	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5	Locating Pin
(	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	VFL
Ν	1A			3		3					1	4	1		VFM
N	ЛВ			3			3	3				4			VFJ VFK
Ν	١C			3			3	3		4					VIK
N	1D		12	2.1			12	2.1			15.1				
٨	ΛE	M5×0.	.8 Thread	Depth 9 c	or more	$M5 \times 0.8$ Thread Depth 9 or more				M6×1 Thread Depth 12 or more					FP
Ν	٨F			).5			10	•		11					FQ Customized
	/A	8 +0.022	9 +0.022	10 +0.022	11 <sup>+0.027</sup>	12 +0.027	13 +0.027		15 +0.027	16 +0.027	17 +0.027		19 +0.033	20 +0.033	Spring Cylinder
	VB			4			4.					5.5			DWA/DWE
We	ight 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	950
															200

LHW LT/LG TLA-2 TLB-2

TLA-1

#### Link Clamp LKA LKC LKW LM/LJ TMA-2 TMA-1

(mm)

Model No. Indication

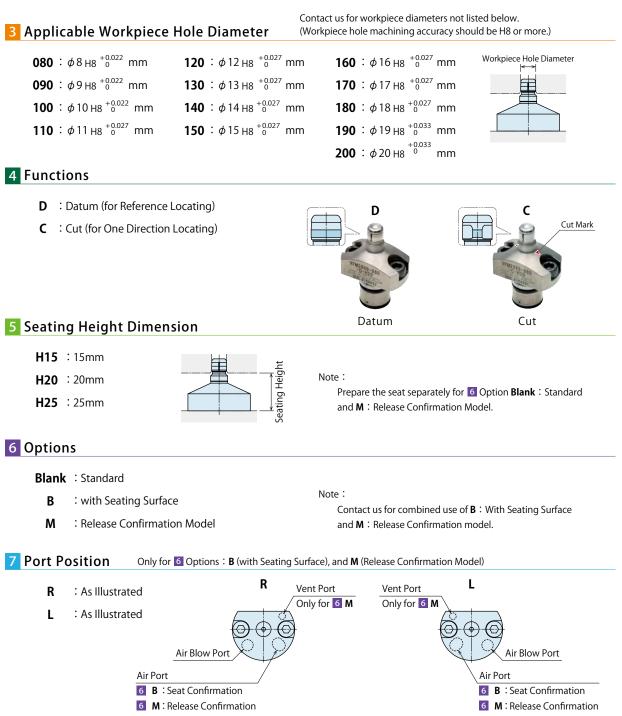


#### 1 Body Size

- **2** : Select from Workpiece Diameter  $\phi 8 / \phi 9 / \phi 10 / \phi 11$
- **3** : Select from Workpiece Diameter  $\phi$  12 /  $\phi$  13 /  $\phi$  14 /  $\phi$  15
- 4 : Select from Workpiece Diameter  $\phi$  16 /  $\phi$  17 /  $\phi$  18 /  $\phi$  19 /  $\phi$  20

#### 2 Design No.

**0** : Revision Number



Expansion Locating Pin Digest     Index     Action Description     System References <i>Vodel Vo. Indication Specifications</i> (VFL)     External Dimensions (VFL)     External Dimensions (VFM)     External Dimensions (VFM)     Cautions P.977
--

Model No.         VFM200         VFM300         VFM4000         Pneumatic Series           Is Appliade Workpice Hole Dam         080         090         100         110         120         130         140         150         160         170         180         190         200           Workpice Hole Diameter (Standard Diam.) mm $\phi$ 8 <sub>H8</sub> + <sup>6022</sup> $\phi$ 9 <sub>H8</sub> + <sup>6022</sup> $\phi$ 11 <sub>H</sub> $\phi$
Workpiece Hole Diameter (Standard Diam) mm         \$\phi \ 8 \ 8 \ 8^{+0022} \$\phi \ 9 \ 9 \ 9 \ 8^{+0022} \$\phi \ 1 \ 1 \ 8 & +0022 \$\phi \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$
Locating Repeatability mm         Use under the second sec
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
N         at 5.0m/a         680         680         700         680         680         710         690         680         990         990         990         1000         Manual Operation Accessories           Allowable Thrust Load <sup>1</sup> ×2 N         1010         1020         1040         1020         1040         1030         1020         1450         1460         1460         1470           Allowable Thrust Load <sup>1</sup> ×2 N         1500         2000         2000         2500         2500         2500         300
at 7.0MPa       1010       1020       1040       1020       1040       1030       1020       1450       1460       1460       1460       1470       Attessmes         Allowable Thrust Load **2 N       1500       1500       2000       2000       2500       2500       2500       3000       3000       3000       3000       3500         Cylinder Capacity       Release side       0.07       0.08       0.18       0.12       0.12       Hole Clamp         Operating Pressure Range       MPa       MPa       MPa       MPa       State       State       Hole Clamp
Cylinder Capacity         Release side         0.07         0.08         0.18           (Empty Action)         cm <sup>3</sup> Lock side         0.06         0.12           Operating Pressure Range         MPa         2.5 ~ 7.0         Hole Clamp
Cylinder Capacity         Release side         0.07         0.08         0.18           (Empty Action)         Crk side         0.06         0.12           Operating Pressure Range         MPa         2.5 ~ 7.0         Hole Clamp
Operating Pressure Range MPa 2.5 ~ 7.0 Hole Clamp
Operating Pressure Range MPa $2.5 \sim 7.0$
SFA 10.5
Recommended Air Blow Pressure MPa 0.3 ~ 0.4
Operating Temperature Range °C 0 ∼ 70 Swing Clamp
Usable Fluid General Hydraulic Oil Equivalent to ISO-VG-32
Notes:     LHC

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
Warksings Waight (M)	Expanding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5
Workpiece Weight (W) ≦	Friction Coefficient of Workpiece Seat Face ( $\mu$ )



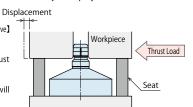
#### Thrust Load/Displacement Curve

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.



0.008

0.006

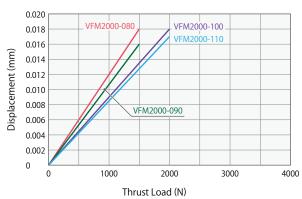
0.004

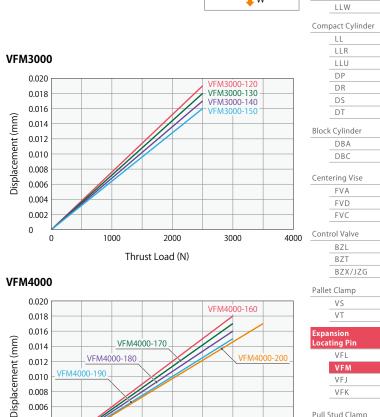
0.002

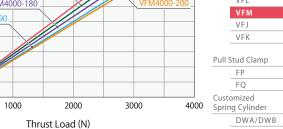
0

0

#### **VFM2000**







For Vertical Attitude

Workpiece Weight (W) ≦ Expanding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5





LHW

LT/LG

TLA-2

TLB-2

TLA-1

LKC LKW

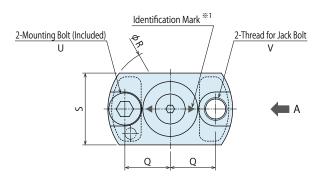
LM/LJ TMA-2 TMA-1

Work Support LD LC TNC

ТC Air Sensing Lift Cylinder

Link Clamp LKA

% The drawing shows the released state of VFM.



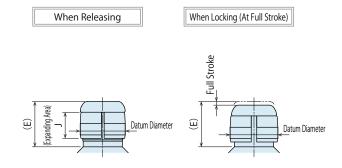
¢CB

VFM-C

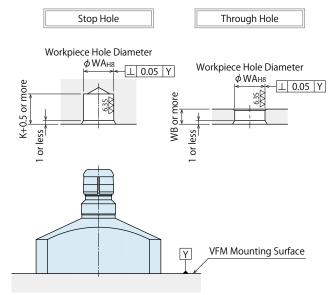
(Cut: One Direction Locating)

View A

# Expanding Area Detail



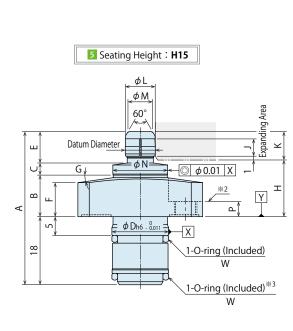
#### Workpiece Hole Dimensions

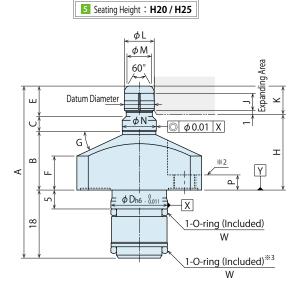


#### Notes :

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

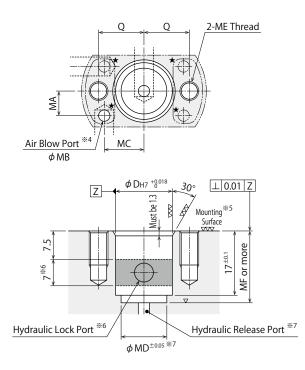
- \*2. Do not use spring washer or toothed lock washer.
- \*3. Set the O-ring to the mounting hole side (fixture side) before mounting the body.
- When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove them parallel to mounting surface.
- This product has no seat. Choose option -B : with Seating Surface or prepare another seat if requiring.





		KOSMEK Harmony in Innovation	Cautions P.977	External Dimensions (VFM)	Model No. Indication /Specifications (VFM)	External Dimensions (VFL)	Model No. Indication /Specifications (VFL)	System References	Action Description	Index	Expansion Locating Pin Digest	
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# Machining Dimensions for Mounting



Notes	
notes	1

#### nes.

- ※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.
- \*7. Prepare the hydraulic release port on the bottom within the range of  $\phi$  MD.
- 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

							· · J						(11111)	IMA-I	
Model No.		VFM2000	<b>)-</b> □-□-□			VFM3000	)-□-□-□		VFM4000-□-□-□					Work Support	
3 Applicable Workpiece Hole	e Diam. <b>080</b>	090	100	110	120	130	140	150	160	170	180	190	200	LD	
5 Seating Heigh	t H15 H20 H25	5 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	6 H15 H20 H25	H15 H20 H25	LC	
Vorkpiece Hole Diameter (Standard Di	iam.) $\phi 8_{H8}$	ф 9 <sub>Н8</sub>	<i>ф</i> 10 <sub>Н8</sub>	ф11н8	<i>ф</i> 12 <sub>Н8</sub>	ф13н8	ф14н8	ф15н8	ф16н8	ф17н8	<i>ф</i> 18 <sub>Н8</sub>	<i>ф</i> 19 <sub>Н8</sub>	<i>ф</i> 20 <sub>Н8</sub>	TNC TC	
At Releasin	ng φ 7.94 or less	$\phi$ 8.94 or less	$\phi$ 9.94 or less	φ 10.94 or less	\$ 11.92 or less	$\phi$ 12.92 or less	φ 13.92 or less	φ 14.92 or less	φ 15.89 or less	φ 16.89 or less	φ 17.89 or less	$\phi$ 18.89 or less	$\phi$ 19.89 or less	Air Sensing	
Datum Diameter At Full Stro	ke $\phi$ 8.05 or more	$\phi$ 9.05 or more	$\phi$ 10.05 or more	$\phi$ 11.05 or more	$\phi$ 12.05 or more	$\phi$ 13.05 or more	$\phi$ 14.05 or more	φ 15.05 or more	$\phi$ 16.07 or more	$\phi$ 17.07 or more	$\phi$ 18.07 or more	e $\phi$ 19.07 or more	$\phi$ 20.07 or more	Lift Cylinder	
ull Stroke		0.	65			0.	75				1.0			LLW	
А	40.5 45.5 50.5	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	Compact Cylir	
В	11 15.5 20.5	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	5 10.5 15.5 20.5	10.5 15.5 20.5	LL	
С	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	LLR	
D		1	5			1	5	· ·			18	· · · · · ·	·	 DP	
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	DR	
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	DS	
G	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°	DT	
Н	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	Block Cylinde	
J		4	.6			5	.1				6			DBA	
К		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	Centering Vis	
М	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14	15	16	17	18	FVA	
Ν	14.5 9 9	9 145 10 10 145 11 11 145 12 12 12 185 13 13 185 14 14 185 15 15 18 18 16 16 225 17 17 225 18 18 225 19 19 225 20 20 225 21 21					FVD								
Р		4 4				· · · · · ·			5		· · · · ·	FVC			
Q		12				14				17.5					
R		33				37			47					BZL	
S		1	9			19 23					BZT BZX/J				
U		M5×0	).8×12			M5×0	).8×12			M6×1×16					
V		M6	×1			M6	×1						Pallet Clamp		
W		AS568-0	013 (90)			AS568-0	13 (90)			ASS	568-015	(90)		VS VT	
CA	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5		
СВ	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	Expansion Locating Pin	
MA		6.5				6	.5	1	7.5					VFL VFM	
MB		3				3				4					
MC		10.5				1(	).5		13					VFJ VFK	
MD		10.5				12.1				15.1					
ME	M5×0	).8 Thread	Depth 9 d	or more	$M5 \times 0.8$ Thread Depth 9 or more				M	l6×1 Thre	ead Depth	n 12 or mo	re	Pull Stud Clar	
MF			9				9				19.5			FP FQ	
WA	8 +0.022	9 +0.022	10 +0.022	11 +0.027	12 +0.027	13 +0.027	14 +0.027	15 +0.027	16 +0.027	17 +0.027	18 +0.027	19 +0.033	20 +0.033	FQ Customized	
WB			4			4	.5				5.5			Spring Cylind	
Weight g	70 80 90	70 80 90							400 400 400					DWA/E	

Cautions / Others

High-Power

**Pneumatic Series** 

Hydraulic Series Valve / Coupler Hydraulic Unit Manual Operation

Accessories

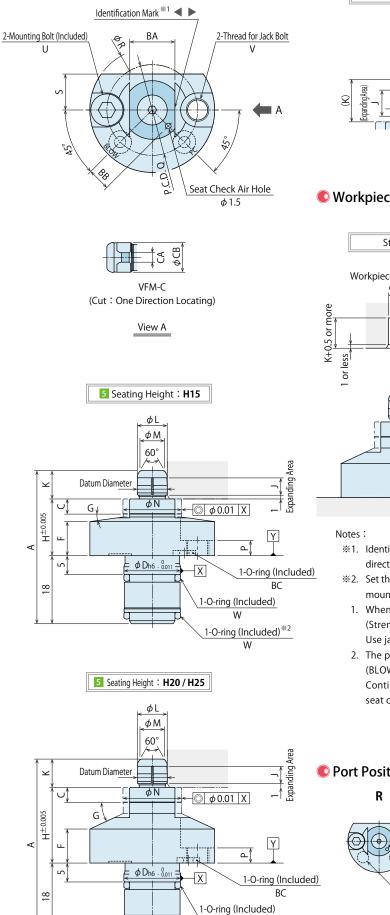
Series

Hole	Clamp
	SFA
	SFC
Swin	g 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

(mm)

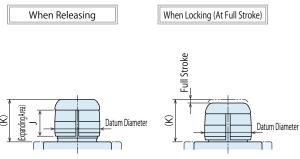
954

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

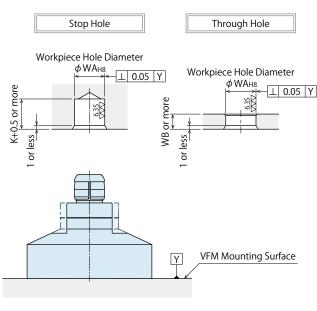


h

# Expanding Area Detail

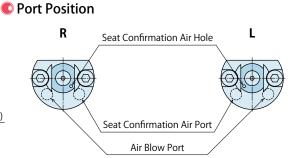


#### C Workpiece Hole Dimensions



※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.
- 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.
- 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.



Note :

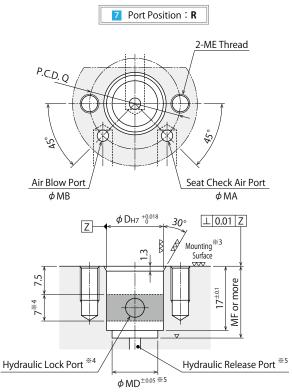
W

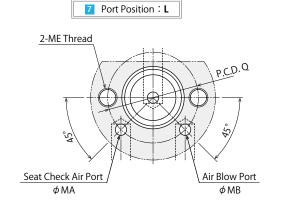
1-O-ring (Included)<sup>\*\*2</sup>

W

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  $\phi$  MD.
- 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 Dimens	ions ai	iu muc	inning	Dimer			unung						(mm)	TMA-1
1odel No.	V	FM2000-[	<b>_</b> - <b>B</b>		V	FM3000-[	]-□-□-B			VFM40	00	- <b>D-B</b>		Work Support
3 Applicable Workpiece Hole Diam.	080	090	100	110	120	130	140	150	160	170	180	190	200	LD
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	6 H15 H20 H25	LC
orkpiece Hole Diameter (Standard Diam.)	<i>ф</i> 8н8	ф 9н8	<i>ф</i> 10 <sub>Н8</sub>	ф11н8	ф12н8	<i>ф</i> 13 <sub>Н8</sub>	ф14 <sub>Н8</sub>	ф15н8	ф 16н8	ф17н8	ф18н8	<i>ф</i> 19 <sub>Н8</sub>	ф 20н8	TNC
At Releasing	φ 7.94 or less	φ 8.94 or less	φ 9.94 or less	φ 10.94 or less	φ 11.92 or less	φ 12.92 or less	φ 13.92 or less	φ 14.92 or less	φ 15.89 or less	φ 16.89 or less	φ 17.89 or less	φ 18.89 or less	$\phi$ 19.89 or less	TC Air Sensing
tum Diameter At Full Stroke	φ 8.05 or more								φ 16.07 or more	Lift Cylinder				
Ill Stroke	7		65	,	,	0.		,	,	,	1.0	7	, <del>, , </del>	LLW
A	40 5 45 5 50 5		40.5 45.5 50.5	40 5 45 5 50 5	41 46 51			41 46 51	425 475 525	42 5 47 5 52 5		42 5 47 5 52 5	6 42.5 47.5 52.5	Compact Cylir
С	4 4 4	4 4 4	4 4 4			4 4 4	4 4 4			4 4 4	4 4 4	4 4 4		LL
C	1 1 1		5		т і т 	1			<b>T T T</b>		18	7 1 1		LLR
F	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	LLU
G			8° 25° 40°					<sup>9</sup> <sup>9</sup> <sup>9</sup> <sup>9</sup> .5 8° 25° 40°		8° 15° 30°				DP
														DR DS
н	15 20 25			15   20   25	15 20 25			15   20   25	15 20 25	15 20 25		15 20 25	15 20 25	DT
J			.6			5					6			
K	7.5 8 9.5							Block Cylinder						
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	DBA
Μ	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	Centering Vise
Р	4         4         5           24         28         35						FVA							
Q	24				28					FVD FVC				
R	33				37									
S			.5		9.5					Control Valve				
U		M5×0	5         9.5         11.5           .8×12         M5×0.8×12         M6×1×16					BZL						
V		M6	×1			M6	×1			M8×1.25				
W		AS568-0	013 (90)			AS568-0	13 (90)			AS568-015 (90)				BZX/JZ
BA	12	13	14	14	15	16	17	18	19	20	21	22	23	Pallet Clamp VS
BB	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	VS
BC			06 (90)			AS568-0	06 (90)			AS568-007 (90)				
CA	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5	Expansion Locating Pin
СВ	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	VFL
MA	7.0					12.7			. 5.5		4			VFM
MB	3									VFJ				
MD	3				3				4					VFK
ME	M5×0		Depth 9 c	r moro	M5×0	.8 Thread		r moro	Ν.Α	6×1 Thre	ad Depth	12 or ma	aro	Pull Stud Clar
ME	1012 × 0		9	more	1012 × 0	.8 Thread		more	M		19.5		ле	FP
	8 +0.022	9 <sup>+0.022</sup>	9 10 <sup>+0.022</sup>	11 +0.027	12 +0.027	13 <sup>+0.027</sup>	9 14 <sup>+0.027</sup>	15 <sup>+0.027</sup>	16 +0.027	17 <sup>+0.027</sup>	19.5 18 <sup>+0.027</sup>	19 <sup>+0.033</sup>	20 +0.033	FQ
WA	8 0			11 0	12 0.027			15 0.027	10 0.00	1/ 0		19 000	20 0	Customized Spring Cylind
WB			4			4					5.5			DWA/E
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	

# Valve / Coupler Hydraulic Unit Manual Operation

High-Power

Pneumatic Series

**Hydraulic Series** 

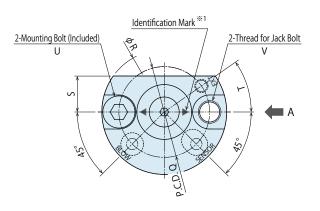
Series

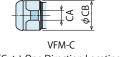
Accessories

Cautions / Others

Hole	Clamp
	SFA
	SFC
Swin	g 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
	ensing
Lift C	ylinder
	LLW

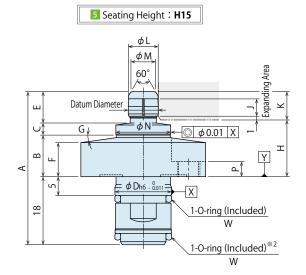
% The drawing shows the released state of VFM-MR. The ports of VFM-ML are placed to the symmetrical positions of this drawing.

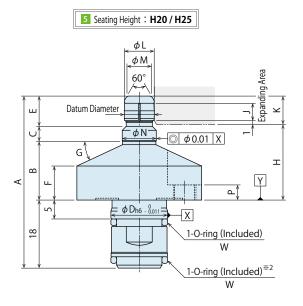




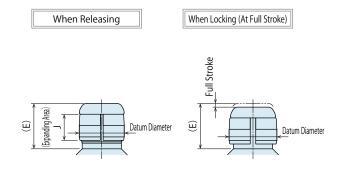
(Cut: One Direction Locating)

View A

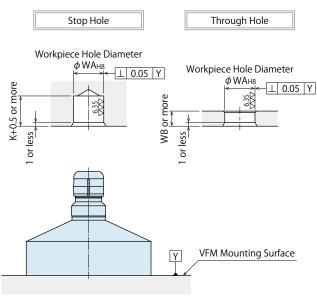




# Expanding Area Detail



# C Workpiece Hole Dimensions

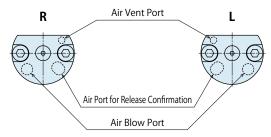


#### Notes :

※1. Identification mark is only marked on -C : Cut (for one direction locating). < ► indicates the locating direction.</p>

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

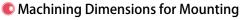
#### Port Position

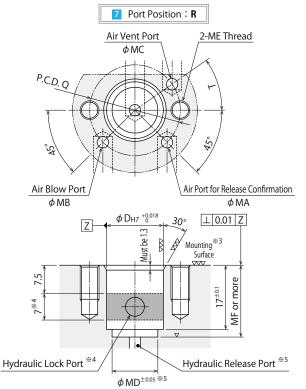


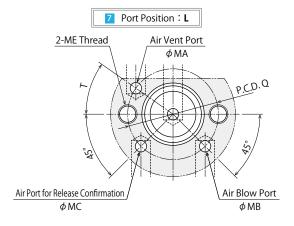


4. Make sure to confirm that the port positions are correct.

Expansion Locating Pin Digest	Index [	Action Description	System References	Model No. Indication /Specifications (VFL)	External Dimensions (VFL)	Model No. Indication /Specifications (VFM)	External Dimensions (VFM)	Cautions P.977	K
----------------------------------	---------	-----------------------	----------------------	---	------------------------------	---	------------------------------	-------------------	---







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  $\phi$  MD.
- 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.)

Extern	al Dimens	ions ar	nd Mac	hinina	Dimer	nsions	for Mo	untina						(mm)	TMA-2
Model No.			FM2000-[					<u></u>			VEMAG	00-□-□-		(1111)	TMA-1
	Applicable Workpiece Hole Diam.	080	090	100	110	120	130	140	150	160	170	180	190	200	Work Support
	Seating Height							+						5 H15 H20 H25	LC
	meter (Standard Diam.)				φ11 <sub>H8</sub>	φ 12H8	φ 13 <sub>H8</sub>	φ 14 <sub>H8</sub>	φ15 <sub>H8</sub>	ф 16н8	ф 17н8	φ 18 <sub>H8</sub>	φ 19 <sub>H8</sub>		TNC
NOTKPIECE HOLE DIA		ф 8н8	ф 9 <sub>Н8</sub>	ф 10 <sub>H8</sub>		1				1	,	,	,	ф 20н8	TC
Datum Diameter	At Releasing													s φ19.89 or less	Air Sensing
- 11.6. 1	At Full Stroke	$\phi$ 8.05 or more	1.	1.	$\phi$ 11.05 or more	φ 12.05 or more	1.	1.	φ 15.05 or more	$\phi$ 16.07 or more	$\phi$ 17.07 or more	1.1	φ 19.07 or mor	$\phi$ 20.07 or more	Lift Cylinder LLW
-ull Stroke				65				.75		10 F 17 F		1.0			
	A													5 42.5 47.5 52.5	Compact Cylind
	В													5 10.5 15.5 20.5	LL
	С	3.2 4 4			3.2 4.5 4.5	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	LLU
	D			5				15				18			DP
	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	10.3 10 10	10.3 10 10	10.3 10 10	10.3 10 10	10.3 10 10	DR
	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	DS
(	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°	DT
1	Н	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	Block Cylinder
	J		4	.6			5	5.1				6			DBA
	K		7	.5		8				9.5					DBC
	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	Centering Vise
1	M	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14	15	16	17	18	FVA
	N	14.5 9 9	14.5 10 10	14.5 11 11	14.5 12 12	185 13 13 185 14 14 185 15 15 18 16 16 225 17 17 225 18 18 225 19 19 225 20 20 225 21 2							22.5 21 21	FVD	
	Р			4				4				5			FVC
	Q			24		28				35					Control Valve
	R			33				37		47				BZL	
	S			).5 ).5				9,5		11.5					BZT
	J T		35				3(			30°					BZX/JZG
	U			, ).8×12											Pallet Clamp
	V			5×1		M5×0.8×12				M6×1×16					VS
	v N		-			M6×1 AS568-013 (90)				M8×1.25 AS568-015 (90)				VT	
		25		)13 (90)	2	2.5				4.5				F	Expansion
	CA	2.5	2.5	3	3	3.5	3.5	4	4	4.5	4.5	5	5	5	Locating Pin VFL
	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	VFM
	1A			3				3				4			VFJ
	MB 3				3				4			VFK			
N	ЛС	3		3			4								
	1D	12.1		12.1			15.1					Pull Stud Clamp FP			
N	ЛE	M5 $\times$ 0.8 Thread Depth 9 or more		M5×0.8 Thread Depth 9 or more				M6×1 Thread Depth 12 or more					FQ		
N	ΛF			9		19			19.5					Customized	
V	VA	8 +0.022	9 +0.022	10 +0.022	11 +0.027	12 +0.027	13 +0.027	14 +0.027	15 +0.027	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				20 +0.033	Spring Cylinder
V	VB			4			4	1.5				5.5			DWA/DV
	ight g	80 90 110	80 90 110	80 00 110	00 100 110	00 110 120	00 110 120	00 110 120	100 110 120	150 170 200	150 100 200	150 100 200	150 100 210	150 100 210	958



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

LKA LKC

LKW

LM/LJ

Link Clamp

PAT.

# Hydraulic Expansion Locating Pin

Model VFJ/VFK

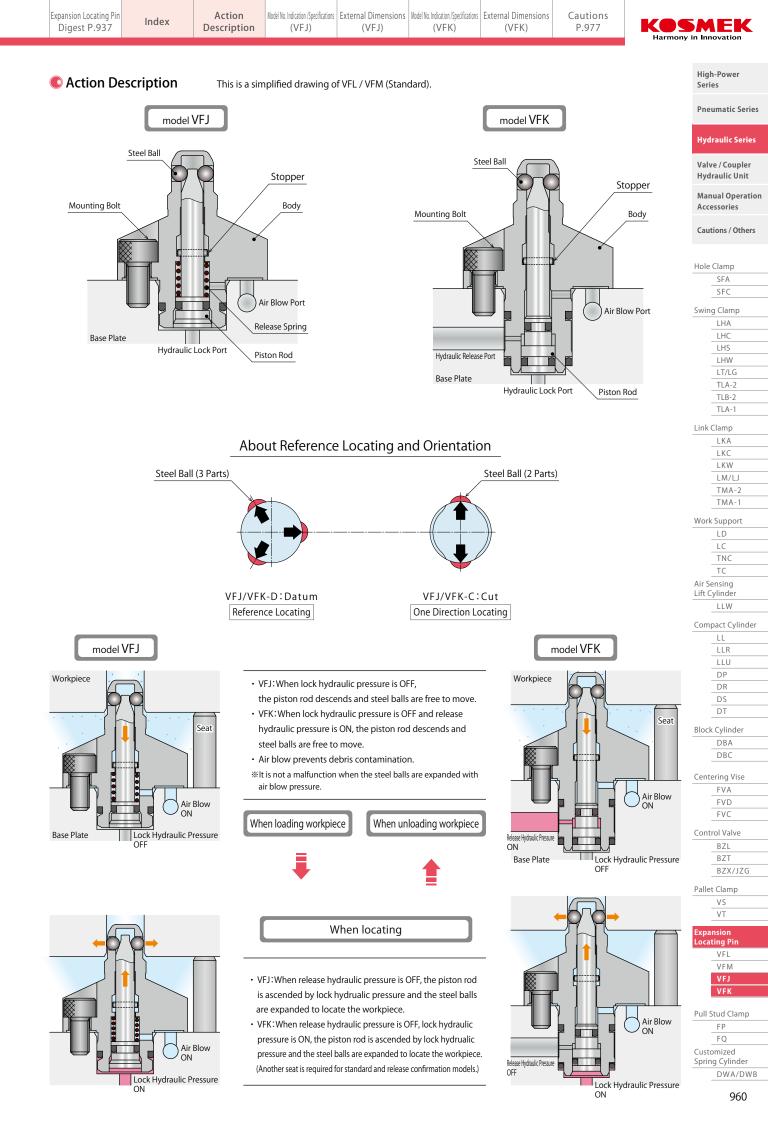
Hydraulic • Single Action/Double Action Locating Repeatability :  $10 \,\mu$  m

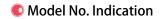


# Index

Expansion Locating Pin Digest						
Action Description	P.960					
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VFJ External Dimensions						
• Standard	P.963					
with Seating Surface	P.965					
Release Confirmation Model	P.967					
VFK Model No. Indication / Specifications	P.969					
VFK External Dimensions						
• Standard	P.971					
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Release Confirmation Model	P.975					
Cautions						
Notes for Hydraulic Expansion Locating Pin	P.977					
Cautions (Common)     Hydraulic Fluid List · Notes on Hydraulic Cylinder Speed Control Circuit	——— P.1235					

Notes on Handling · Maintenance/Inspection · Warranty







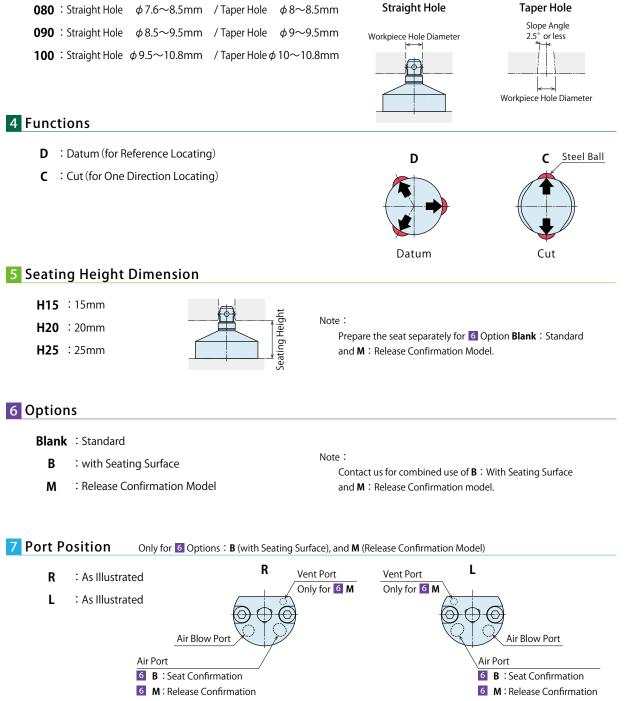
#### 1 Body Size

**2** : Select from Workpiece Diameter  $\phi$  7.6 $\sim \phi$  10.8

#### 2 Design No.

0 : Revision Number

# 3 Applicable Workpiece Hole Diameter



	Expansion Locating Pin	Index	Action	Model No. Indication / Specifications					
	Digest P.937	mucx	Description	(VFJ)	(VFJ)	(VFK)	(VFK)	P.977	K
_									н



High-Power

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

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 xpansion ating Pin VFL VFM VFJ

Lift Cylinder

Series

# Specifications

Model No.		VFJ2000-080	VFJ2000-090	VFJ2000-100	Pneumatic Series					
Workpiece Hole Diameter	Straight Hole	$\phi 7.6 \sim \phi 8.5 \qquad \phi 8.5 \sim \phi 9.5$		φ 9.5 ~ φ 10.8	Theunade series					
mm	Taper Hole	<i>φ</i> 8~ <i>φ</i> 8.5 <i>φ</i> 9~ <i>φ</i> 9.5		φ 10 ~ φ 10.8	Hydraulic Series					
Locating Repeatability *1	mm		0.01		injunu					
Allowable Offset (C : Cut)	mm	±0.4	±0.4	±0.5	Valve / Coupler					
Балана I'на к Балаа (Б) Ж2	at 2.5MPa		50		Hydraulic Unit					
Expanding Force (F) *2	at 5.0MPa		130							
Ν	at 7.0MPa		190							
Allowable Thrust Load **3	Ν	450	600	800	Cautions / Others					
Cylinder Capacity (Empty Action	n) cm <sup>3</sup>		cuuters, etters							
Operating Pressure Range	e MPa									
Withstanding Pressure	MPa		Hole Clamp							
Recommended Air Blow Pressure			SFA SFC							
Operating Temperature Range ℃			0~70							
Usable Fluid			General Hydraulic Oil Equivalent to ISO-VG-32							
			LHA							

Notes:

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

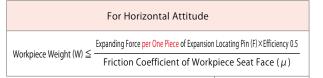
%2. Expanding force shows the calculated value when coefficient friction is μ0.1. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

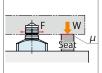
\*3. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

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





Workpiece Weight (W)  $\leq$  Expanding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5

For Vertical Attitude



	VFK	
'ull S	Stud Clamp	
	FP	
	FQ	
	omized	
Sprin	g Cylinder	

DWA/DWB 962

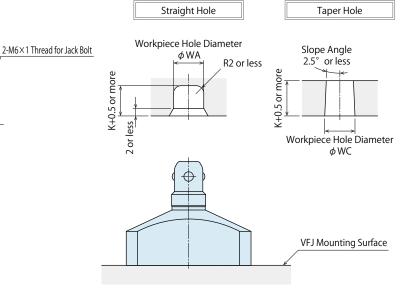
2-Mounting Bolt (Included)

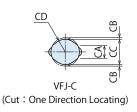
 $M5 \times 0.8 \times 12$ 

19

\* This drawing shows VFJ clamping action without workpiece.

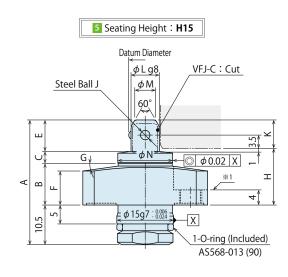
# C Workpiece Hole Dimensions

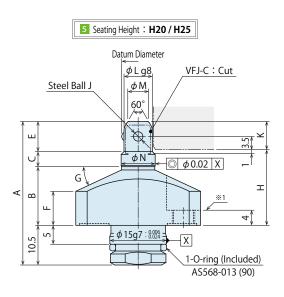




12

12





#### Notes :

- %1. Do not use spring washer or toothed lock washer.
  - 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.
  - This product has no seat. Choose option -B : with Seating
  - Surface or prepare another seat if requiring.

Expansion Locating Pin Digest P.937IndexAction DescriptionModel No. Indication /SpecificationsExternal Dimensions (VFJ)Model No. Indication /SpecificationsExternal Dimensions (VFK)External Dimensions	Cautions P.977	K
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High-Power

**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

LKC

LKW

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 xpansion cating Pin VFL VFM VFJ

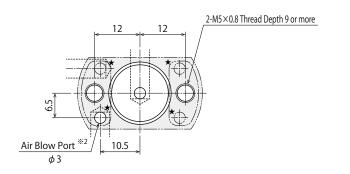
LM/LJ TMA-2 TMA-1 Work Support LD LC TNC TC Air Sensing Lift Cylinder

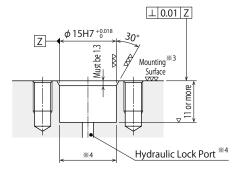
Link Clamp LKA

(mm)

Series

# C Machining Dimensions for Mounting





#### Notes :

- %2. Install the air blow port choosing one port from four  $\bigstar$  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  $\phi$  15.
  - 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

Model No.		VF.	<b>J2000-080-</b> [	]-[]	VF	<b>J2000-090-</b> [	]-[]	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			$8.5 \sim 9.5$			$9.5 \sim 10.8$			
workpiece noie Diameter	WC (Taper Hole)		8~8.5			$9 \sim 9.5$			10~10.8			
Datum Diameter	At Releasing		$\phi$ 7.5 or less	5		$\phi$ 8.3 or less	5		$\phi$ 9.3 or less	S		
Datum Diameter	At Full Stroke		φ 8.5 or mo	re		$\phi$ 9.5 or mo	re		φ 10.8 or m	ore		
Cylinder Stroke			1.8	-		2.2	-		2.6			
	A	33	38	43	33.5	38.5	43.5	34	39	44		
	В	11	15.5	20.5	11	15.5	20.5	11	15.5	20.5		
	С	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°		
	Н	15	20	25	15	20	25	15	20	25		
	J		2.5		3 8			3.5 8.5				
	К		7.5									
	L		7.5 - 0.00	5 7		8.3 - 0.005			9.3 - 0.005			
	Μ		5.5		6			6.5				
	Ν	14.5	9	9	14.5	10	10	14.5	11	11		
CA			3.5			4			4.5			
СВ			0.4			0.4			0.5			
СС		6.7				7.5			8.3			
	CD	R3.35				R3.75			R4.15			
	Weight g	60	70	80	60	70	80	60	70	90		

VFK Pull Stud Clamp

FP

FQ Customized

Spring Cylinder

DWA/DWB

964

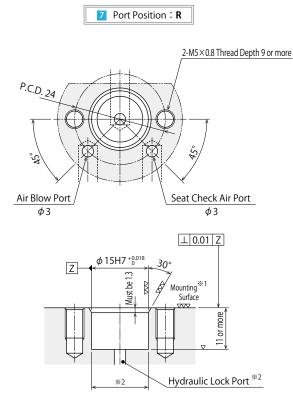
#### Workpiece Hole Dimensions External Dimensions % This drawing shows VFJ-BR clamping action without workpiece. The ports of VFJ-BL are placed to the symmetrical positions of this drawing. Straight Hole Taper Hole Workpiece Hole Diameter 2-Mounting Bolt (Included) ΒA 2-M6×1 Thread for Jack Bolt Slope Angle φWA 2.5° or less M5×0.8×12 R2 or less K+0.5 or more K+0.5 or more 9.5 2 or less Workpiece Hole Diameter φWC °C, de la constante de la constant ġ Seat Check Air Hole φ1.5 VFJ Mounting Surface CD 8 VFJ-C (Cut: One Direction Locating) Notes : 1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. 5 Seating Height : H15 Use jack screw and remove it parallel to mounting surface. Datum Diameter 2. The port name is marked on the product surface. VFJ-C:Cut ¢Lg8 (BLOW: Air Blow Port, FC: Seating Confirmation Air Port) Steel Ball J φM Continuously supply air pressure to the air blow port and seat confirmation port. <u>60</u>° Ð ۲. ا φN U G © φ0.02 X H<sup>±0.03</sup> ∢ ш 4 φ15g7 : 0.006 10.5 X 1-O-ring (Included) AS568-006 (90) 1-O-ring (Included) AS568-013 (90) Port Position R Seat Confirmation Air Hole 5 Seating Height : H20 / H25 Datum Diameter ∮Lg8 VFJ-C:Cut Seat Confirmation Air Port Steel Ball J φM Air Blow Port 60° Note: Ð $\sim$ 3.5 1 3. Make sure to confirm that the port positions are correct. φN U © φ0.02 X H<sup>±0.03</sup> G < LL. 4) the φ15g7 - 0.006 Ь X 10.5 1-O-ring (Included) AS568-006 (90)

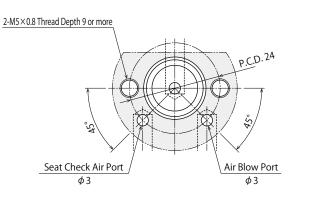
1-O-ring (Included) AS568-013 (90)

L

Expansion Locating Pin Digest P.937IndexAction DescriptionModel No. Indication /Specifications (VFJ)External Dimensions (VFJ)Model No. Indication /Specifications (VFK)External Dimensions (VFK)Cautions P.977	
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# Machining Dimensions for Mounting





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  $\phi$  15.
- 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

Model No.		VFJ2	000-080-🗆-	<b>□-B</b> □	VFJ2	000-090-🗆-	<b>□-B</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			
vorkpiece noie Diameter	WC (Taper Hole)		8~8.5			9~9.5			$10 \sim 10.8$			
	At Releasing		$\phi$ 7.5 or less	5		$\phi$ 8.3 or less	5		$\phi$ 9.3 or less	5		
Datum Diameter	At Full Stroke	$\phi$ 8.5 or more				\$ 9.5 or mo	ore		\$ 10.8 or m	ore		
Cylinder Stroke			1.8			2.2			2.6			
	A	33	38	43	33.5	38.5	43.5	34	39	44		
	С	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°		
	Н	15	20	25	15	20	25	15	20	25		
	J	2.5			3			3.5				
	К		7.5		8			8.5				
	L	7.5 - 0.005			8.3 - 0.005 - 0.027			9.3 - 0.005				
	М		5.5		6			6.5				
	Ν	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 CC			0.4			0.4			0.5			
			6.7		7.5				8.3			
	CD	R3.35				R3.75			R4.15			
	Weight g	70	80	100	70	80	100	70	80	100		

VFK Pull Stud Clamp FP

High-Power

**Pneumatic Series** 

**Hydraulic Series** 

Valve / Coupler

Hydraulic Unit Manual Operation Accessories Cautions / Others

Hole Clamp SFA

SFC

LHC LHS

LHW

LT/LG

TLA-2

TLB-2

TLA-1

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 xpansion . cating Pin VFL VFM VFJ

Link Clamp

(mm)

Swing Clamp LHA

Series

FQ Customized

Spring Cylinder DWA/DWB

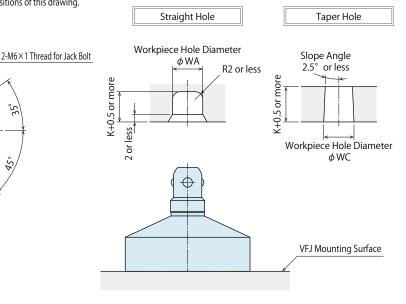
966

2-Mounting Bolt (Included)

M5×0.8×12

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

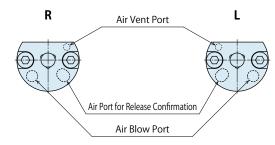




Notes :

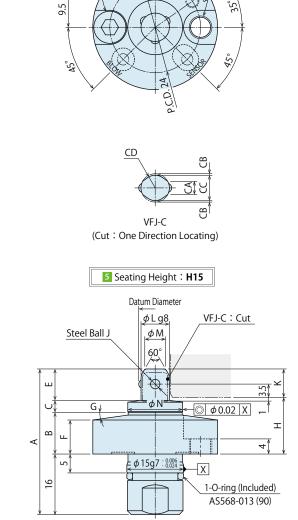
- When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
- The port name is marked on the product surface.
   (EXT : Air Vent Port, BLOW : Air Blow Port, SENSOR : Release Confirmation Air Port) Continuously 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.

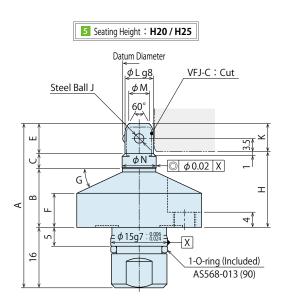
#### Port Position



Note :

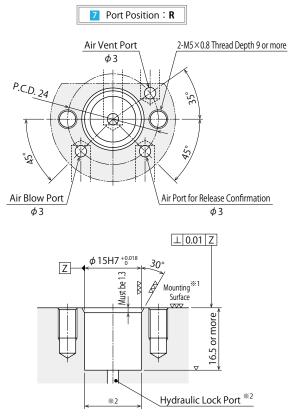
4. Make sure to confirm that the port positions are correct.

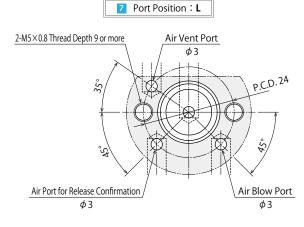






# C Machining Dimensions for Mounting





#### 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 *φ*15.
- 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

Model No.		VFJ20	00-080-00	□-M□	VFJ20	000-090-🗆-	□-M□	VFJ2	000-100-🗆-	<b></b> 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)		$7.6 \sim 8.5$			$8.5 \sim 9.5$			9.5 ~ 10.8		
workpiece noie Diameter	WC (Taper Hole)		$8 \sim 8.5$			9~9.5			$10 \sim 10.8$		
Datum Diameter	At Releasing		$\phi$ 7.5 or less	5		$\phi$ 8.3 or less	5		$\phi$ 9.3 or less	5	
Datum Diameter	At Full Stroke	$\phi$ 8.5 or more				\$ 9.5 or mo	re		φ 10.8 or m	ore	
Cylinder Stroke			1.8	-		2.2	-		2.6	-	
	A	38.5	43.5	48.5	39	44	49	39.5	44.5	49.5	
	В	11	15.5	20.5	11	15.5	20.5	11	15.5	20.5	
С		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°	
	Н	15	20	25	15	20	25	15	20	25	
	J		2.5		3 8 8.3 - 0.005 - 0.027			3.5 8.5			
	К		7.5								
	L		7.5 - 0.00	5 7				9.3 - 0.005			
	М		5.5			6			6.5		
Ν		14.5	9	9	14.5	10	10	14.5	11	11	
CA			3.5			4		4.5			
CB CC			0.4			0.4			0.5		
			6.7			7.5			8.3		
	CD		R3.35			R3.75			R4.15		
	Weight g	70	100	110	70	100	110	80	100	110	

VFK Pull Stud Clamp FΡ

FQ Customized

Spring Cylinder

DWA/DWB

Valve / Coupler Hydraulic Unit

High-Power

**Pneumatic Series** 

**Hydraulic Series** 

Series

Manual Operation Accessories

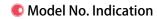
Cautions / Others

Hole	Clamp
	SFA
	SFC
Swin	g 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
	ensing

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 xpansion cating Pin VFL VFM VFJ

(mm)





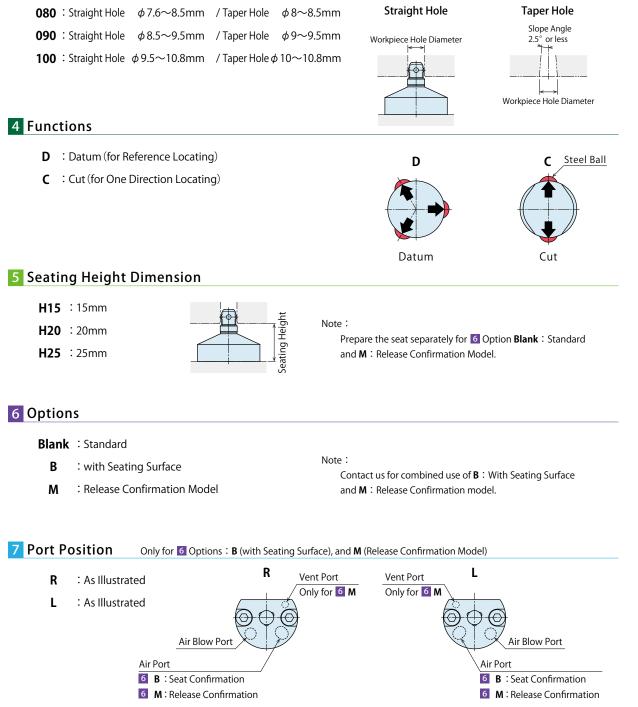
#### 1 Body Size

**2** : Select from Workpiece Diameter  $\phi$  7.6 $\sim \phi$  10.8

#### 2 Design No.

0 : Revision Number

# 3 Applicable Workpiece Hole Diameter





High-Power

Series

# Specifications

Mode	el No.	VFK2000-080	VFK2000-090	VFK2000-100	Pneumatic Series				
Workpiece Hole Diameter	Straight Hole	$\phi$ 7.6 $\sim$ $\phi$ 8.5	$\phi$ 8.5 ~ $\phi$ 9.5	$\phi$ 9.5 $\sim$ $\phi$ 10.8	Theundere Series				
mm	Taper Hole	$\phi 8 \sim \phi 8.5$	$\phi$ 9 $\sim$ $\phi$ 9.5	φ 10 ~ φ 10.8	Hydraulic Series				
Locating Repeatability *1	mm	mm 0.01							
Allowable Offset (C : Cut)	mm	±0.4	±0.4	±0.5	Valve / Coupler				
Балан d'ала Балаа (Б) Ж2	at 2.5MPa		50		Hydraulic Unit				
Expanding Force (F) *2	at 5.0MPa		150						
Ν	at 7.0MPa		210						
Allowable Thrust Load **3	N	450	600	800	Cautions / Others				
Cylinder Capacity	Release side		0.03		cuutons, etters				
(Empty Action) cm <sup>3</sup>	Lock side		0.08						
Operating Pressure Range	MPa			Hole Clamp					
Withstanding Pressure	MPa		10.5		SFA				
Recommended Air Blow P	ressure MPa		0.3 ~ 0.4		SFC				
Operating Temperature Ra	ange °C		0~70		Swing Clamp LHA				
Usable Fluid	<u> </u>	General Hydraulic Oil Equivalent to ISO-VG-32							
	.50 10 52	LHC							

For Vertical Attitude

Workpiece Weight (W)  $\leq$  Expanding Force per One Piece of Expansion Locating Pin (F)×Efficiency 0.5

#### Notes:

 $\%1.\;$  It shows locating repeatability under the specific condition (no load).

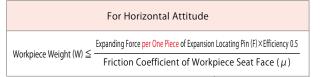
%2. Expanding force shows the calculated value when coefficient friction is  $\mu$  0.1. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

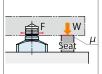
%3. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

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





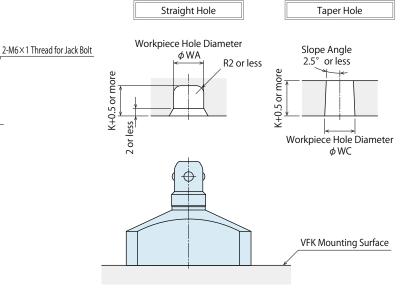
Swing Clamp
LHA
LHC
LHS
LHW
LT/LG
TLA-2
TLB-2
TLA-1
Link Clamp
LKA
LKC
LKW
LM/LJ
TMA-2
TMA-1
Work Support
LD
LC
TNC
TC
Air Sensing
Lift Cylinder
LLW
Compact Culindar
Compact Cylinder LL
LLR
LLU
DP
DR
DS
DT
Block Cylinder
DBA
DBC
- · · · · ·
Centering Vise
FVA
FVD
FVC
Control Valve
BZL
BZT
BZX/JZG
Pallet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

2-Mounting Bolt (Included)

M5×0.8×12

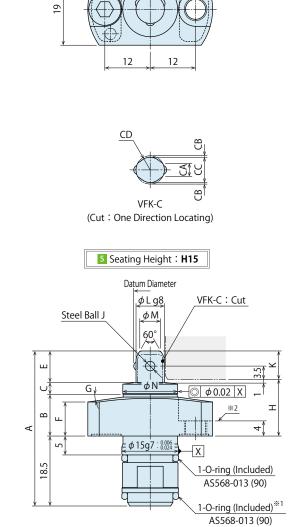
% This drawing shows VFK clamping action without workpiece.

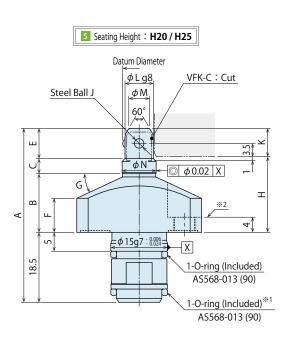
# C Workpiece Hole Dimensions



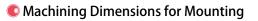
# Notes :

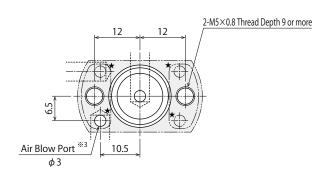
- %1. Set the O-ring to the mounting hole side (fixture side) before mounting the body.
- %2. Do not use spring washer or toothed lock washer.
- When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
- 2. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

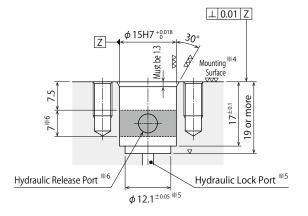




Expansion Locating Pin Digest P.937         Index         Action Description         Model No. Indication /Specifications (VFJ)         External Dimensions (VFJ)         Model No. Indication /Specifications (VFK)         External Dimensions (VFK)         Cautions P.977	KOSME Harmony in Innovati	KO								Index	Expansion Locating Pin Digest P.937
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#### Notes:

- %3. Install the air blow port choosing one port from four  $\bigstar$  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  $\phi$  12.1.
- %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

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	
Vorkpiece Hole Diameter	WA (Straight Hole)		7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
vorkpiece noie Diameter	WC (Taper Hole)		8~8.5			9~9.5			$10 \sim 10.8$		
Datum Diameter	At Releasing		$\phi$ 7.5 or less	5		$\phi$ 8.3 or less			$\phi$ 9.3 or less	5	
Datum Diameter	At Full Stroke		φ 8.5 or mo	re		φ 9.5 or mo	re		φ 10.8 or m	ore	
Cylinder Stroke			1.8	-		2.2			2.6	-	
	A	41	46	51	41.5	46.5	51.5	42	47	52	
	В	11	15.5	20.5	11	15.5	20.5	11	15.5	20.5	
	С	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°	
	Н	15	20	25	15	20	25	15	20	25	
	J	2.5			3			3.5			
	К	7.5			8			8.5			
	L		7.5 - 0.00	5 7	8.3 - 0.005 - 0.027			9.3 - 0.005			
	Μ		5.5		6			6.5			
	Ν	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		
l l	Weight g	70	80	90	70	80	90	70	80	100	

Pull Stud Clamp FP

High-Power

**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

LKA LKC

LKW

LM/LJ

TMA-2

TMA-1

Work Support

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 xpansion . cating Pin VFL VFM VFJ

(mm)

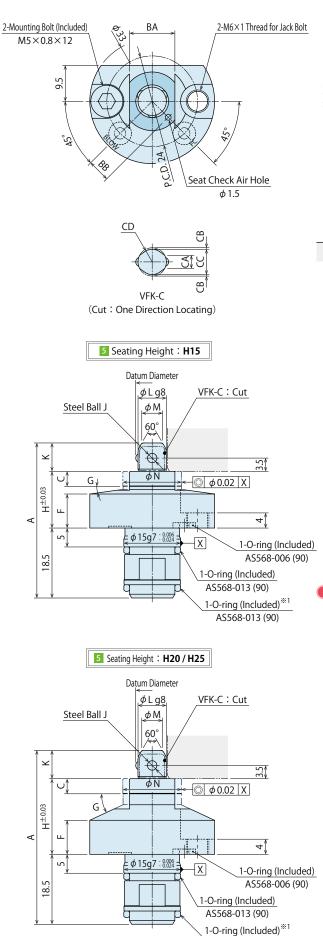
Link Clamp

Series

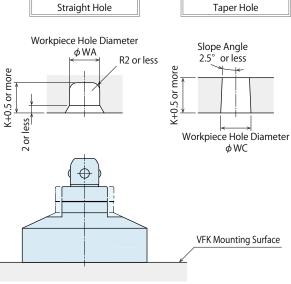
FQ Customized Spring Cylinder

Spring Cylinder DWA/DWB

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



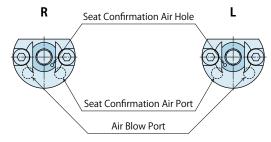
#### C Workpiece Hole Dimensions



#### Notes:

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



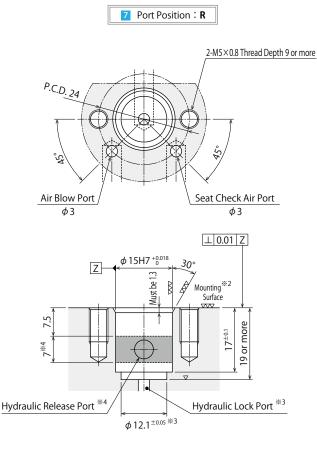
Note 3

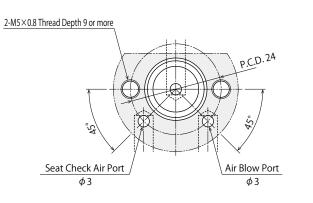
AS568-013 (90)

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



# C Machining Dimensions for Mounting





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 *φ*12.1.
- 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

Model No. 3 Applicable Workpiece Hole Diam.		VFK2	000-080-🗆-	<b>□-B</b> □	VFK2	000-090-🗆-	<b>□-B</b> □	VFK2000-100-□-□-B□			
		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				$8.5 \sim 9.5$			9.5 ~ 10.8		
workpiece noie Diameter	WC (Taper Hole)		$8 \sim 8.5$			$9 \sim 9.5$			$10 \sim 10.8$		
Datum Diameter	At Releasing		$\phi$ 7.5 or less			$\phi$ 8.3 or less	5		$\phi$ 9.3 or less	\$	
Datum Diameter	At Full Stroke		\$\$ 0 mo	re		\$ 9.5 or mo	re		φ 10.8 or m	ore	
Cylinder Stroke			1.8		2.2			2.6			
	A	41	46	51	41.5	46.5	51.5	42	47	52	
	С	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°	
	Н	15	20	25	15	20	25	15	20	25	
	J		2.5		3			3.5			
	К		7.5		8			8.5			
	L		7.5 0.00	7	8.3 - 0.005			9.3 - 0.005 - 0.027			
	М		5.5		6			6.5			
	Ν	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	

Pull Stud Clamp FΡ

High-Power

**Pneumatic Series** 

**Hydraulic Series** 

Valve / Coupler

Hydraulic Unit Manual Operation Accessories Cautions / Others

Hole Clamp SFA

SFC

LHC LHS

LHW

LT/LG

TLA-2

TLB-2

TLA-1

LKA LKC

LKW LM/LJ

TMA-2

TMA-1

Work Support LD LC TNC ТC 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 xpansion ating Pin VFL VFM VFJ

Link Clamp

Swing Clamp LHA

Series

FQ Customized

Spring Cylinder

DWA/DWB

2-Mounting Bolt (Included)

M5×0.8×12

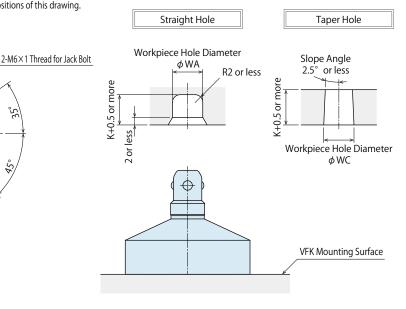
9.5

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

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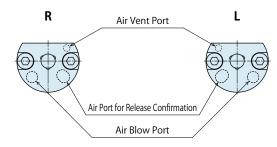




Notes :

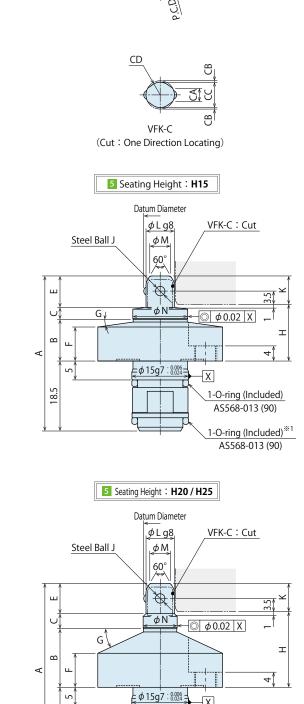
- %1. Set the O-ring to the mounting hole side (fixture side) before mounting the body.
  - 1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
  - 2. The port name is marked on the product surface. (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 3

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



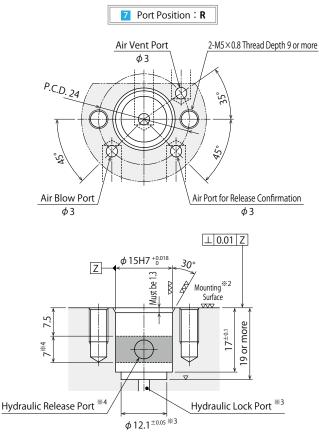
X

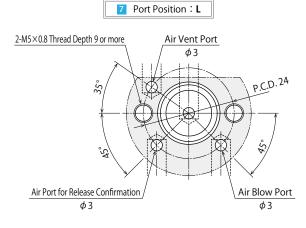
1-O-ring (Included) AS568-013 (90) 1-O-ring (Included)<sup>\*\*1</sup> AS568-013 (90)

18.5



# C 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 hydraulic lock port on the bottom within the range of  $\phi$  12.1.
- 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

Model No.		VFK2	000-080-🗆-	□-M□	VFK2000-090-□-□-M□			VFK2000-100M			
	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		
Norkpiece noie Diameter	WC (Taper Hole)		$8 \sim 8.5$			9 ~ 9.5			10~10.8		
	At Releasing		$\phi$ 7.5 or less	;		$\phi$ 8.3 or less			$\phi$ 9.3 or less	5	
Datum Diameter	At Full Stroke		\$\$.5 or mo	re		φ 9.5 or mo	re		¢ 10.8 or m	ore	
Cylinder Stroke			1.8			2.2			2.6		
	A	41	46	51	41.5	46.5	51.5	42	47	52	
	В	11	15.5	20.5	11	15.5	20.5	11	15.5	20.5	
	С	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°	
	Н	15	20	25	15	20	25	15	20	25	
	J	2.5			3			3.5			
	К		7.5		8			8.5			
	L		7.5	5	8.3 - 0.005 - 0.027			9.3 - 0.005			
	Μ		5.5		6			6.5			
	Ν	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	

Pull Stud Clamp FΡ

High-Power

**Pneumatic Series** 

**Hydraulic Series** 

Valve / Coupler

Hydraulic Unit

Hole Clamp SFA

SFC

LHC LHS

LHW

LT/LG

TLA-2

TLB-2

TLA-1

LKA

LKC LKW LM/LJ

TMA-2

TMA-1

Work Support LD LC TNC ТC 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 xpansion ating Pin VFL VFM VFJ

(mm)

Link Clamp

Swing Clamp LHA

Manual Operation Accessories Cautions / Others

Series

FQ Customized

Spring Cylinder

DWA/DWB

# Cautions

- Notes for Design
- In 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.

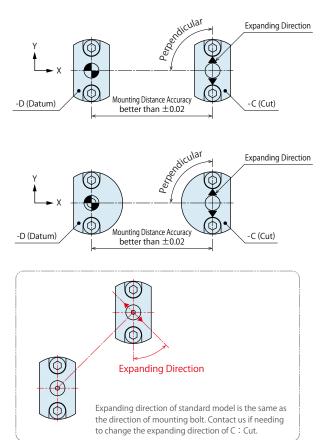
VFK locates and releases with hydraulic pressure.

- 2) Notes for Circuit Design
- Please read "Circuit Reference" to assist with proper hydraulic circuit design.

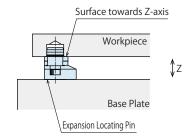
Carry out sufficient advance review as the wrong circuit design may lead to machine malfunctioning and damage.

- 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.

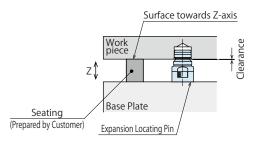
When mounting the product, make sure that expanding direction of -C (Cut) is perpendicular to -D (Datum).



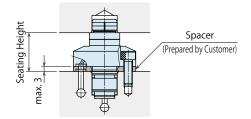
- 6) Reference Surface towards Z-axis
- -B: with Seating Surface has seating on upper part of the flange, but standard/-M: Release Confirmation model have no seating (reference surface towards Z-axis). Please prepare the seat separately.
  - -B: With Seating Surface



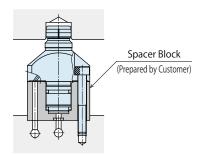




- 7) Adjusting Height of Expansion Locating Pin
- Seating height can be selected from 15mm / 20mm / 25mm.
- For slight adjustment of seating height and expanding part height, install a spacer (3mm or less) under the flange.



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



#### Expansion Locating Pin Digest P.937





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 TLB-2 TLA-1 Link Clamp LKA LKC

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
Locating Pin VFL
VFM
VFJ
VFK
Pull Stud Clamp

Pull Stud Clamp FP FQ Customized Spring Cylinder DWA/DWB

- 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.

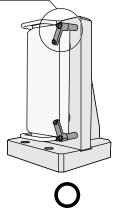
If it is locked out of position, the machine or clamps may be damaged. As the workpiece may fall down during releasing, it is recommended

- 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.

Example of Latching Mechanism



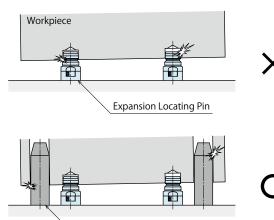


9) Incline in the Z-axis direction.

 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

 $4/100 \sim 5/100$  (approx.  $2 \sim 3^{\circ}$ ) 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.

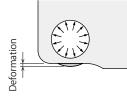


Guide Pin (Rough Guide)

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.



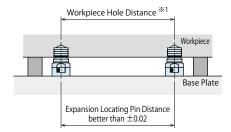
# Cautions

- 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  $\pm 0.02$  mm.

The distance accuracy of each workpiece hole should be within the allowable offset.

Please refer to below table under JIS B 0613 Class 2.

[JIS B 0613	Except]	unit : mm
Center Distanc	e 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

Expansion Locating Pin

Digest P.937

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

Cautions

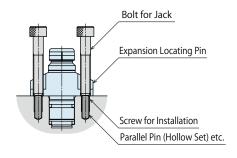
- 2) Procedure before Piping
- The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly.

The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.

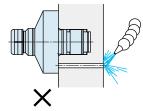
- 3) Applying Sealing Tape
- Wrap with tape 1 to 2 times following the screwing direction.
   Wrapping in the wrong direction will cause leaks and malfunction.
- Pieces of the sealing tape can lead to oil leaks and malfunction.
- When piping, be careful that contaminant such as sealing tape does not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



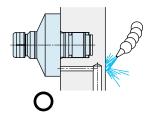
- 5) Appropriate Measures for the Air Vent Port
- For the air vent port of -M : Release Confirmation model, consider the environment and avoid coolant or any contaminants.
   If coolant or contaminants enter in the product, it will not function properly.



#### Examples

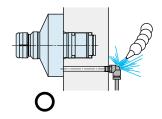
① Prepare the manifold piping.

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



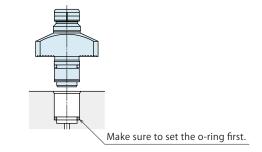
② Prepare the external piping.

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	<ul> <li>Hydraulic Fluid List</li> </ul>	Notes on Hydraulic Cylinder Speed Control Circuit
	<ul> <li>Notes on Handling</li> </ul>	Maintenance/Inspection	• Warranty

#### Circuit Reference

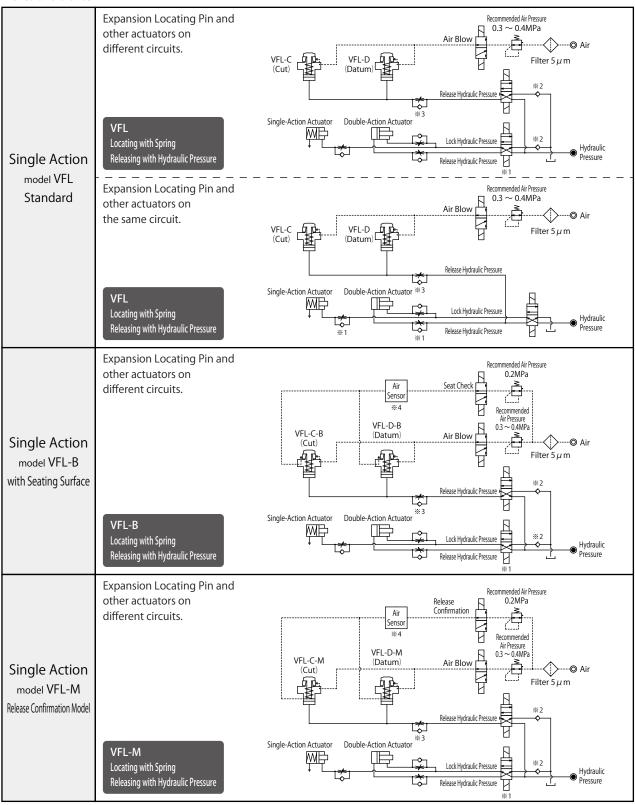
Notes on Pneumatic Cylinder Speed Control Unit

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.





Notes:

- %1. The procedure for lock operation should be "VFL (Expansion Locating Pin)"  $\rightarrow$  "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.



High-Power

Series **Pneumatic Series** Notes on Pneumatic Cylinder Speed Control Unit VFM (Standard) VFM-B (with Seating Surface) VFM-M (Release Confirmation Model) Hydraulic Series 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. Valve / Coupler Hydraulic Unit **Circuit Reference** Manual Operation Accessories Expansion Locating Pin and Recommended Air Pressure  $0.3 \sim 0.4 MPa$ other actuators on Air Blow Cautions / Others @ Aiı  $\langle \rangle$ different circuits. VFM-D VFM-C b b Filter 5  $\mu$  m Й Γ (Cut) (Datum Hole Clamp 宁 Lock Hydraulic Press SEA SFC Release Hydraulic Pressur -7 Swing Clamp Single-Action Actuator Double-Action Actuato VFM LHA M中 Lock Hydraulic Pressu Locating and Releasing LHC Hvdraulic **Double Action** with Hydraulic Pressure T. ressure LHS Release Hydraulic Pressure F LHW model VFM \_ \_ \_ \_ \_ -LT/LG Expansion Locating Pin and Recommended Air Pressure TLA-2 Standard 0.3 ~ 0.4MPa other actuators on TLB-2 Air Blow - Air TLA-1 the same circuit. VFM-D 6 67 VFM-C Filter 5 $\mu$ m Ы Link Clamp (Cut) (Datum LKA LKC Lock Hydraulic Pressure LKW Double-Action Actuator \*\*3 Release Hydraulic Pressur LM/LJ Single-Action Actuator VFM TMA-2 Ē Μ₽ C<sup>2</sup> Lock Hydraulic Pressu TMA-1 Locating and Releasing Hvdraulic 5 with Hydraulic Pressure L\$ Pressure Work Support Release Hydraulic Pressure LD LC Expansion Locating Pin and Recommended Air Pressure TNC other actuators on 0.2MPa ТC Air Seat Check different circuits. è Air Sensing Sensor Lift Cylinder ×. A B Recommended Air Pressure 0.3 ~ 0.4MPa LLW VFM-D-B VFM-C-B Compact Cylinder Air Blow (Datum) È **Double Action** • Air  $\langle \rangle$ (Cut) LL Filter 5  $\mu$  m LLR model VFM-B LLU with Seating Surface DP Lock Hydraulic Pres DR t Release Hydraulic Pressure DS Single-Action Actuator Double-Action Actuator DT VFM-B MÞ œ Locating and Releasing × 7 Block Cylinder Lock Hydraulic Press Hydraulic L d DBA with Hydraulic Pressure Là. ressure Release Hydraulic Pressure P DBC Expansion Locating Pin and Centering Vise Recommended Air Pressure FVA other actuators on Release Confirmation 0.2MPa FVD Air ź different circuits. Sensor FVC i... Air Pressure 0.3 ~ 0.4MPa ----Й Control Valve VFM-D-M BZL VFM-C-M (Datum Air Blow BZT **Double Action** • Air (Cut)  $\langle \rangle$ BZX/JZC Filter 5  $\mu$  m 山山 山陸 model VFM-M И Г Pallet Clamp **Release Confirmation Model** × 7 VS Lock Hydraulic Pressur VT Release Hydraulic Pressur x<u>p</u>ansion Single-Action Actuator Double-Action Actuato VFM-M ating Pir MB Locating and Releasing Lock Hydraulic Pressur Hvdraulic VFM with Hydraulic Pressure L 🎝 Release Hydraulic Pressure Pressure VFJ VFK Notes: Pull Stud Clamp

%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.

FΡ

FQ

#### Circuit Reference

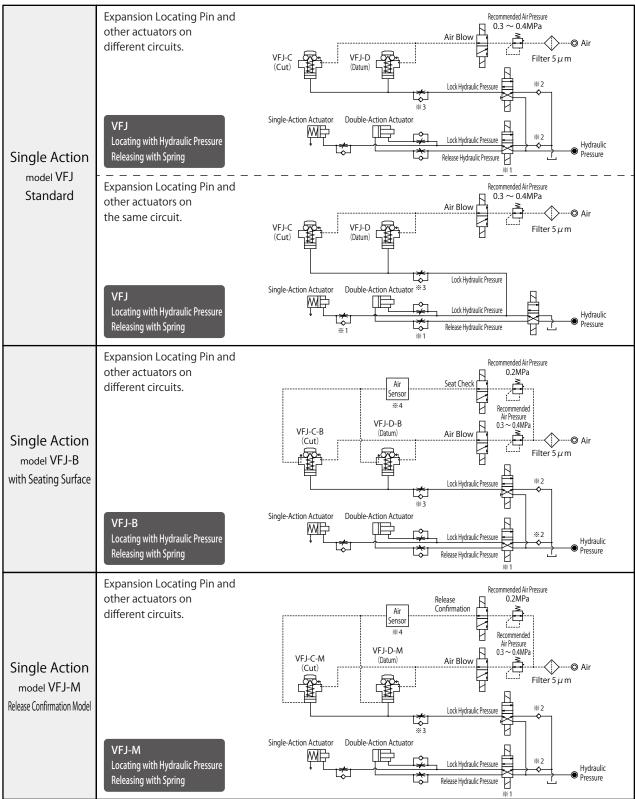
Notes on Pneumatic Cylinder Speed Control Unit

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



Notes:

%1. The procedure for lock operation should be "VFJ (Expansion Locating Pin)"  $\rightarrow$  "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

Cautions

VFK (Standard) VFK-B (with Seating Surface)

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. High-Power **Pneumatic Series** 

Series

VFK-M (Release Confirmation Model)

Hydraulic Series

Valve / Coupler Hydraulic Unit

Manual Operation

Accessories Expansion Locating Pin and Recommended Air Pressure  $0.3 \sim 0.4 MPa$ other actuators on Air Blow Cautions / Others @ Aiı  $\langle \rangle$ different circuits. VFK-C VFK-D Ь Filter 5  $\mu$  m Й Γ (Cut) (Datum) Hole Clamp Lock Hydraulic Pressur SEA SFC 3 Release Hydraulic Pressure Swing Clamp Single-Action Actuator Double-Action Actuato VFK MB LHA Lock Hydraulic Pressu Locating and Releasing LHC Hydraulic **Double Action** with Hydraulic Pressure T. Pressure LHS Release Hydraulic Pressure F LHW model VFK \_ \_ \_ \_ \_ -LT/LG Expansion Locating Pin and Recommended Air Pressure TLA-2 Standard 0.3 ~ 0.4MPa other actuators on TLB-2 Air Blow - Air TLA-1 the same circuit. VFK-D VFK-C 5 Filter 5 $\mu$ m Ы Link Clamp (Cut) (Datum) LKA Lock Hydraulic Pressure LKC LKW Ċò Release Hydraulic Pressure LM/LJ Double-Action Actuator ×٦ Single-Action Actuator VFK TMA-2 MÞ ļĘ பீ Lock Hydraulic Pressu TMA-1 Locating and Releasing Hvdraulic with Hydraulic Pressure L\$ Pressure Work Support Release Hydraulic Pressure LD LC Expansion Locating Pin and Recommended Air Pressure TNC other actuators on 0.2MPa TC Air Seat Check è different circuits. Air Sensing Sensor Lift Cylinder B Recommended Air Pressure 0.3 ~ 0.4MPa LLW VFK-D-B VFK-C-B Compact Cylinder Air Blow (Datum) È **Double Action** • Air  $\langle \rangle$ (Cut) LL Filter 5  $\mu$  m LLR model VFK-B LLU with Seating Surface DP Lock Hydraulic Pre DR t Release Hydraulic Pressure DS Single-Action Actuator Double-Action Actuator DT VFK-B MÞ æ Locating and Releasing × 7 Block Cylinder Lock Hydraulic Press Hydraulic DBA Pressure with Hydraulic Pressure Là. Release Hydraulic Pressure P DBC Expansion Locating Pin and Centering Vise Recommended Air Pressure FVA other actuators on Release Confirmation 0.2MPa FVD Air ÷Ē different circuits. Sensor FVC A Recommended Control Valve Air Pressure VFK-D-M П 0.3 ~ 0.4MPa BZL VFK-C-M (Datum Air Blow è BZT **Double Action** • Air (Cut)  $\langle \rangle$ BZX/JZC Filter 5  $\mu$  m model VFK-M И Pallet Clamp **Release Confirmation Model** Lock Hydraulic Pressure × 7 VS VT হা Release Hydraulic Pressur x<u>p</u>ansion Single-Action Actuator Double-Action Actuato VFK-M ating Pir MÞ Locating and Releasing Lock Hydraulic Pressur Hydraulic VFM with Hydraulic Pressure L 🎝 ressure Release Hydraulic Pressure VFJ

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.

VFK

Pull Stud Clamp

FΡ

FQ

Spring Cylinder

Customized

C MEMO



# C MEMO

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
Liel: Clemen
Link Clamp LKA
LKC
LKW
LM/LJ
TMA-2
TMA-1
Work Support
LD
LC
TNC
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
VFM VFJ
VFK
Pull Stud Clamp
FP
FQ
Customized Spring Cylinder