Pneumatic
Expansion Locating Pin

Model VWH Large Expansion Model
Model VWM High Accuracy Model
Model VWK Casting Material Model

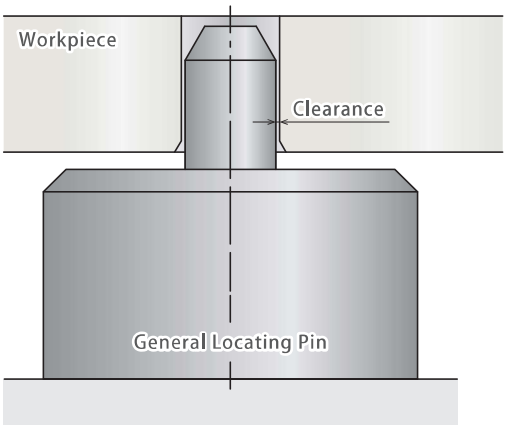
Locating Repeatability VWM : 3 μm, VWH/VWK : 10 μm

Zero Clearance between Reference Hole and Large Expansion Locating Pin

What is an Expansion Locating Pin ?

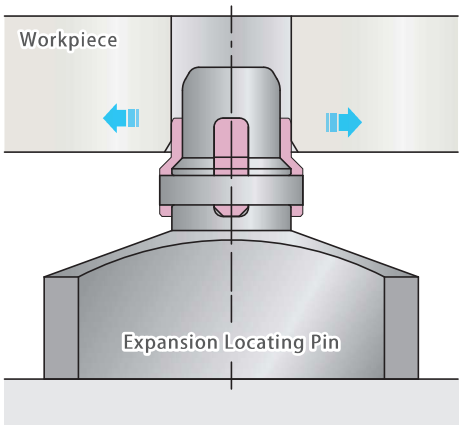
It is an Air Control High-Accuracy Locating Pin that locates a workpiece by expanding the pin diameter.

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

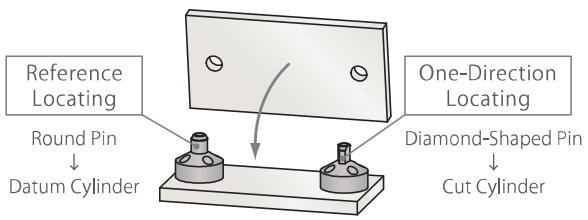


Expansion locating pin has zero clearance!!

High Accuracy Suitable for Automation
Setup Time Reduction Cost Reduction



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



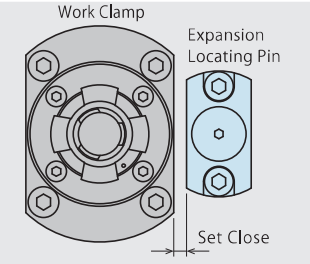
The World's First Locating Mechanism

When expanded : Clearance between the pin and reference hole becomes zero to locate with high accuracy.
When released : Easy to load/unload workpieces with enough clearance.

Features

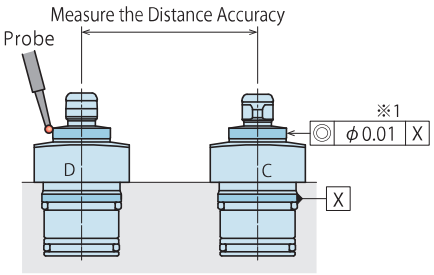
Simple Arrangement

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



Easy to Check the Accuracy

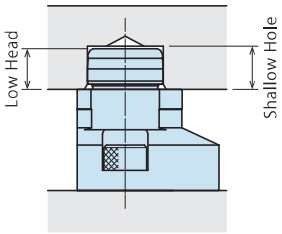
The same core part with X on the flange top allows to determine the origin and measure the distance accuracy.



※1. It is ϕ0.02 for VWH and VWK.

For Shallow Workpiece Hole

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



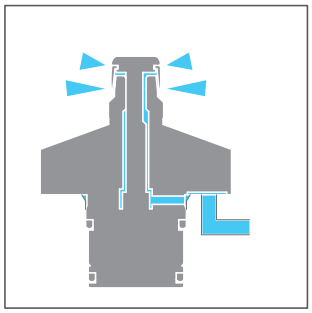
※1. Not applicable for VWH.

Function

Air Blow Function

Equipped to All Options

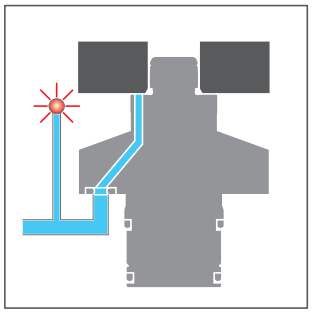
Prevent contamination.



With Seating Surface (Seat Check)

Only for VWM-B/VWK-B :
With Seating Surface Option

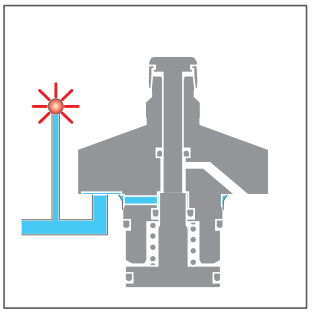
Available by using a gap sensor.



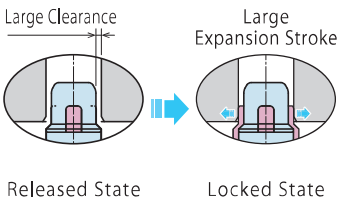
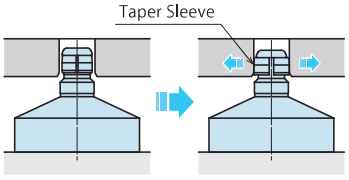
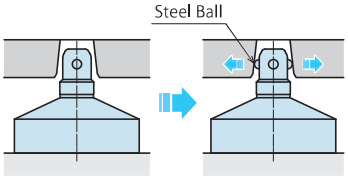
Release Confirmation

Only for VWM-M/VWK-M :
Release Confirmation Option

Available by using a gap sensor.

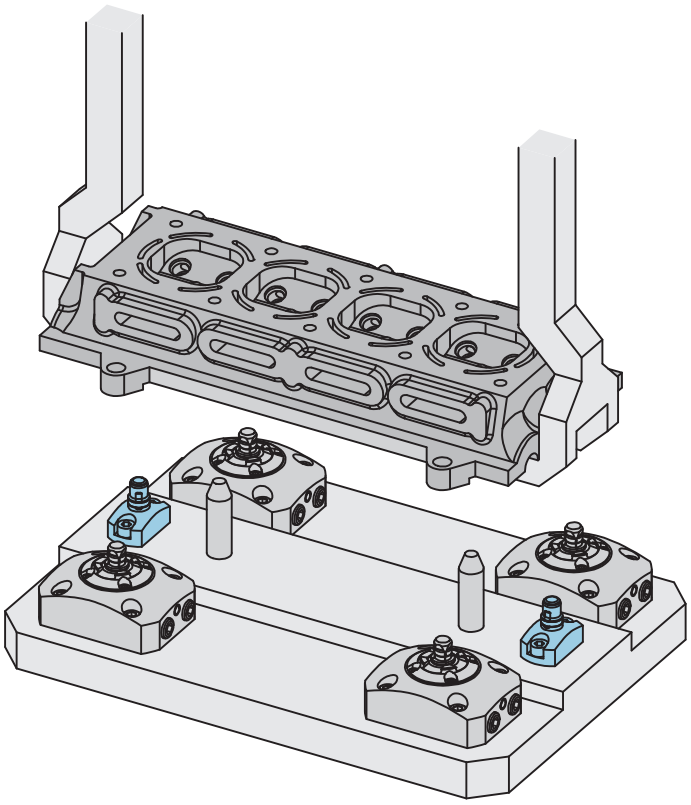


※This drawing shows VWM.

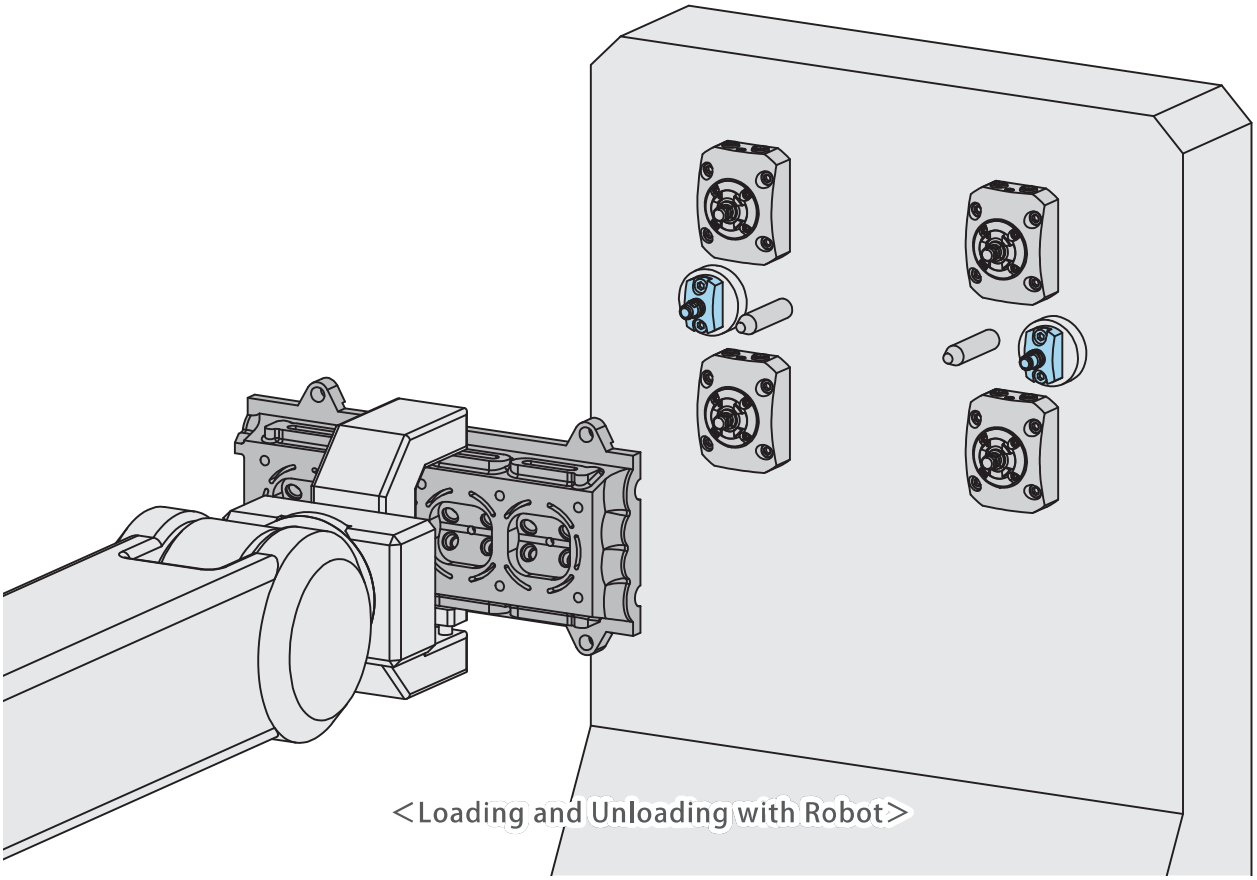
Pneumatic MAX 0.7MPa	 New Model VWH → P.179	 Model VWM → P.185	 Model VWK → P.203
Model/ Locating Repeatability	Multi-Purpose Model 10μm	High Accuracy Model 3μm	Casting Material Model 10μm
Control Method	Double Action (Air Lock / Air Release)	Double Action (Air+Spring Lock / Air Release)	Double Action (Air Lock / Air Release)
Op. Pressure	0.35 ~ 0.7 MPa	0.35 ~ 0.7 MPa	0.35 ~ 0.7 MPa
Action Description	 Large Gripper Expansion	 The taper sleeve expands.	 The steel balls come out from the pin.
Application Examples	Finishing Line / Dividing Operation Line		Locating Casting Core Holes / First Process

Application Examples : model VWH (Large Expansion Locating Pin)

Suitable for Robot Application



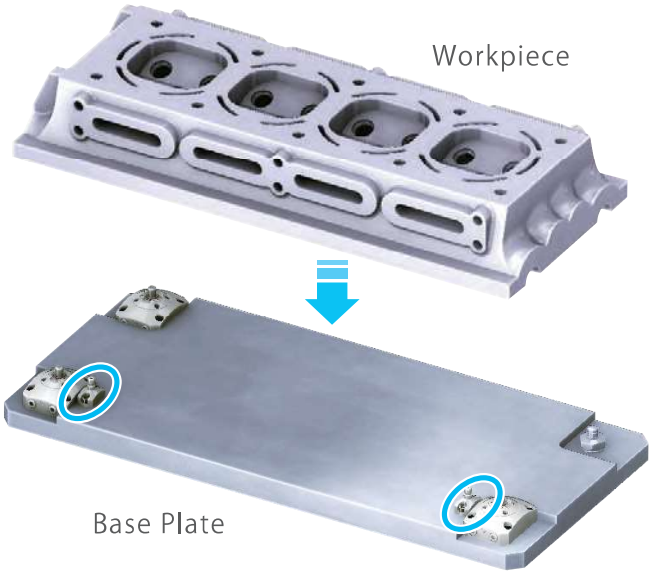
<Knocking in from the Loader>



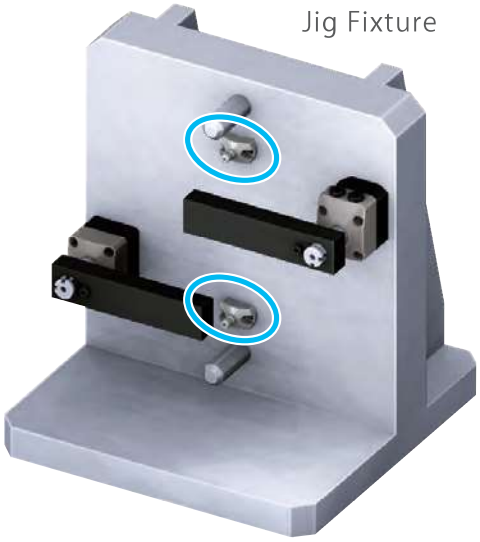
<Loading and Unloading with Robot>

Application Examples : model VWM/VWK

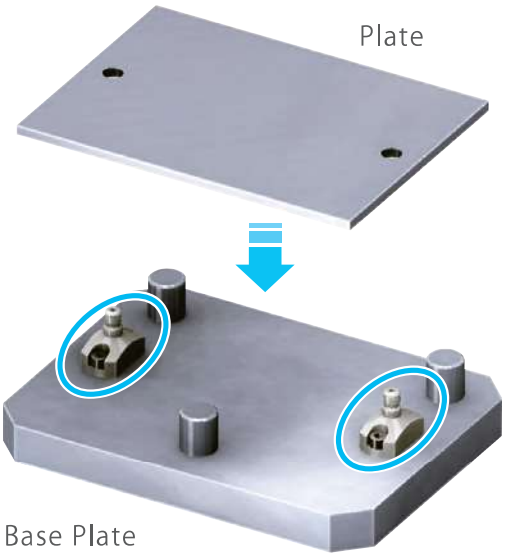
Suitable for Automation



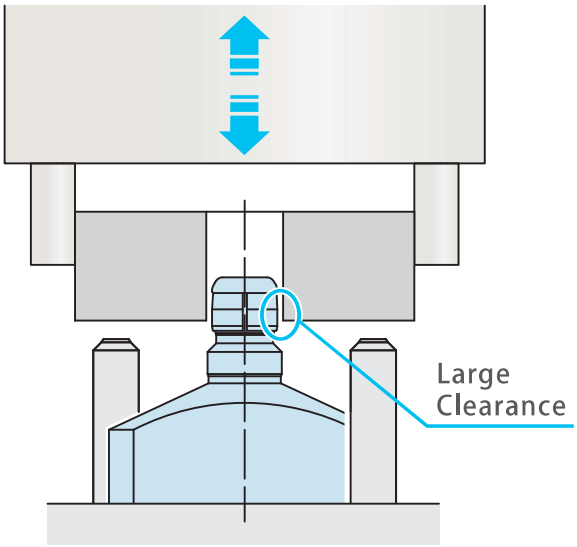
<Locating the Workpiece>



<Angle Plate Fixture>



<Locating the Plate>



<Loading and Unloading Automation>

System References

- High Accuracy (3 μm or 10 μm) + One-Touch Locating Pin

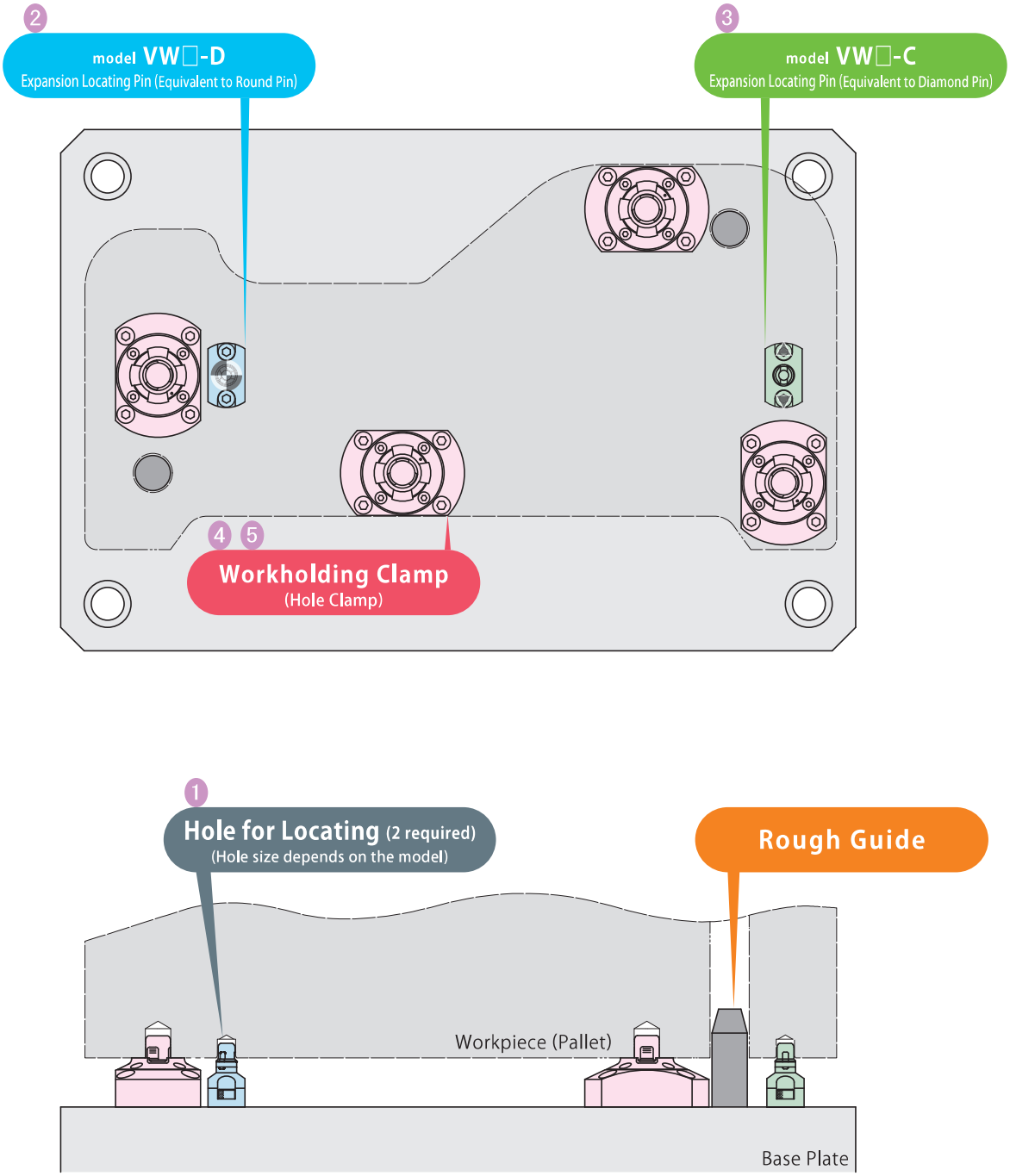
Reduces Setup Time!

- When dividing operations into different fixtures, High Accuracy Locating Pin (3 μm or 10 μm)

Prevents Deterioration of Workpiece Accuracy!

- Using with Hole Clamps enables 5-face machining,

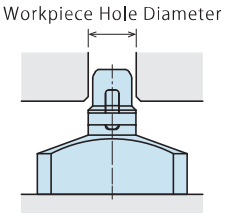
Integrated Operation and More Compact Fixture!



Essential Points

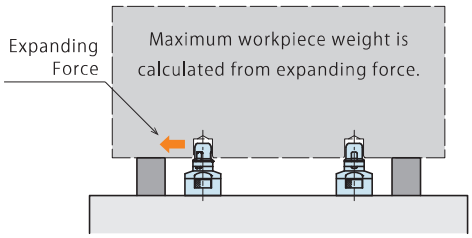
1 Workpiece Hole for Locating

- VWH : Workpiece hole diameter is ϕ9 ~ ϕ15 (in 1mm increments).
- VWM : Workpiece hole diameter is ϕ8 ~ ϕ30 (in 1mm increments).
- VWK : Workpiece hole diameter is ϕ7.6 ~ ϕ16.2.



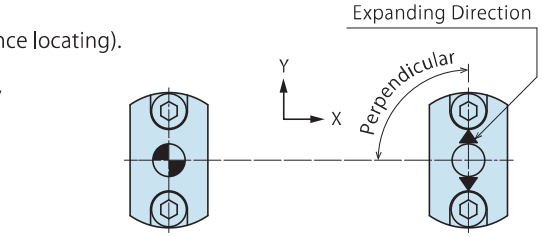
2 Workpiece Weight

- 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 expanding force and allowable workpiece weight for locating.



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

- Reference position (origin) is determined by VW□-D (Datum: for reference locating).
- VW□-C (Cut: for one direction locating) locates in one direction (Y-axis), so phasing is necessary.
  When mounting, ensure the expanding direction of VW□-C (cut) is perpendicular to VW□-D (datum).

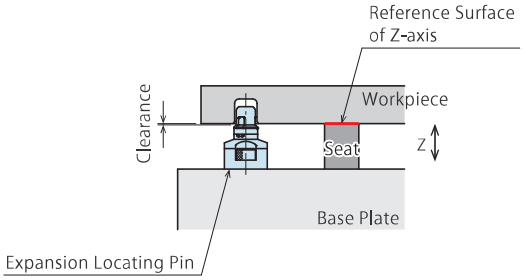


VW□-D (Datum)
For Reference Locating (X-axis / Y-axis)
(Equivalent to Round Pin)

VW□-C (Cut)
For One Direction (Y-axis)
(Equivalent to Diamond Pin)

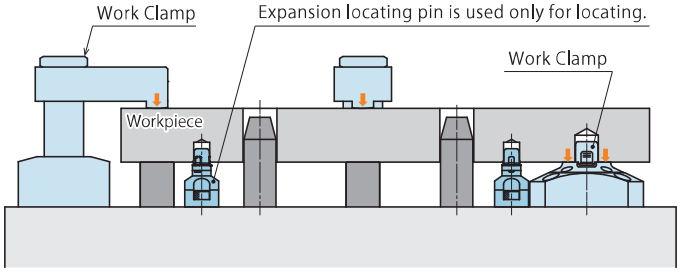
4 Setting an Additional Seat

- The large expansion model (VWH), standard model of VWM/VWK and release confirmation option (VWM-M/VWK-M) have no seating surface (reference surface towards Z-axis). Please prepare a seat separately.



5 Setting Additional Work Clamps

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



Large Expansion Locating Pin

Model VWH

Pneumatic・Double Action

Locating Repeatability：10μm

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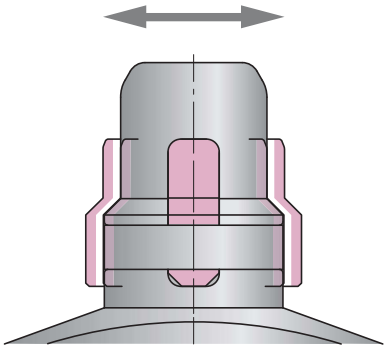
• Large Expansion

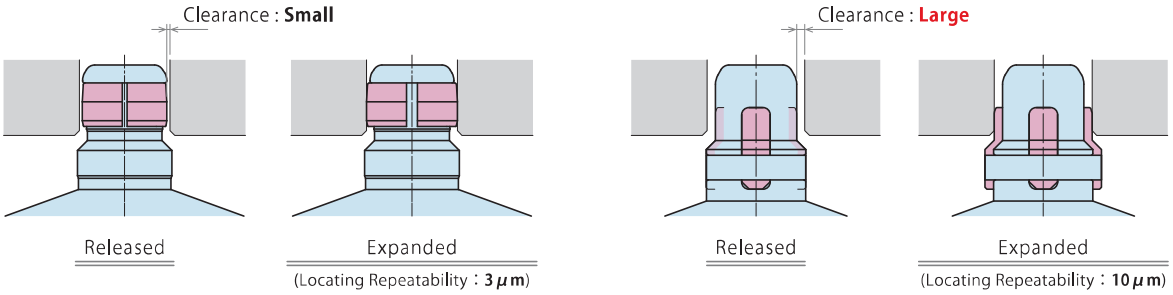
Expansion Stroke : 1.1mm



• Suitable for Automation • Robot Application

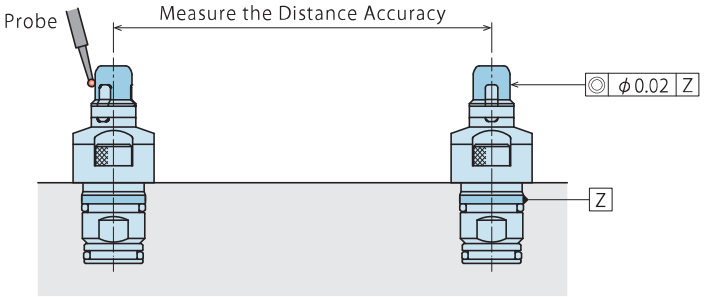
Existing high accuracy model **VWM** has small clearance, but with high locating repeatability : 3 μm.

The additional model **VWH** has large clearance when released, suitable for automation such as transfer robot application. (Locating Repeatability : 10 μm)



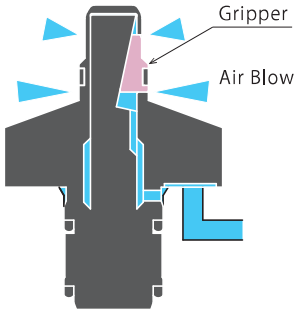
• Easy to Measure the Mounting Distance Accuracy

Able to measure the distance accuracy with the same core part on the top.



• High Durability

Air blow from the inside of the cylinder comes out from the gripper gap and prevents contaminants.



Model No. Indication

VWH **2** 00 **0** - **090** - **D** - **H20**

1 2 3 4 5

1 Body Size

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

2 Design No.

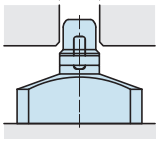
0 : Revision Number

3 Workpiece Hole Diameter

Please contact us for unlisted workpiece hole diameters.

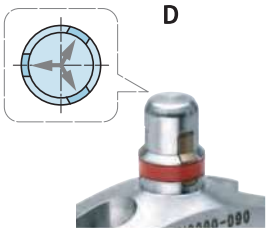
Workpiece Hole Diam. Code	090	100	110	120	130	140	150
Workpiece Hole Diam. φWA	$9^{+0.7}_{-0.3}$	$10^{+0.7}_{-0.3}$	$11^{+0.7}_{-0.3}$	$12^{+0.7}_{-0.3}$	$13^{+0.7}_{-0.3}$	$14^{+0.7}_{-0.3}$	$15^{+0.7}_{-0.3}$
VWH2000	Selection Range						
VWH3000						Selection Range	

Workpiece Hole Diam.
φWA

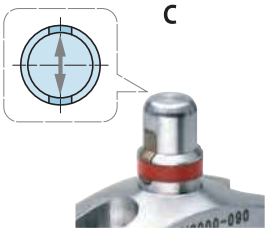


4 Functions

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



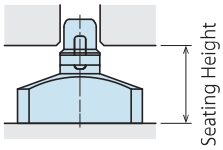
Datum



Cut

5 Seating Height

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



Note: Please prepare a seat separately.

Specifications

(mm)

Model No.		VWH2000					VWH3000	
3 Workpiece Hole Diam. Code		090	100	110	120	130	140	150
Workpiece Hole Diam. (Straight Hole) mm		$\phi 9^{+0.7}_{-0.3}$	$\phi 10^{+0.7}_{-0.3}$	$\phi 11^{+0.7}_{-0.3}$	$\phi 12^{+0.7}_{-0.3}$	$\phi 13^{+0.7}_{-0.3}$	$\phi 14^{+0.7}_{-0.3}$	$\phi 15^{+0.7}_{-0.3}$
Locating Repeatability ※1 mm		0.01						
Allowable Offset (C : Cut) mm	at Min. Hole Diam.	±0.05						
	at Max. Hole Diam.	±0.55						
Expanding Force (F) ※2 N	at 0.35MPa	70	70	70	70	70	110	110
	at 0.5MPa	110	110	110	110	110	170	170
	at 0.7MPa	160	160	160	160	160	250	250
Allowable Thrust Load ※3 N		800	800	900	1000	1000	1200	1300
Cylinder Capacity (Empty Action) cm^3	Release	0.46	0.46	0.46	0.46	0.46	0.76	0.76
	Lock	0.35	0.35	0.35	0.35	0.35	0.53	0.53
Operating Pressure Range MPa		0.35 ~ 0.7						
Withstanding Pressure MPa		1						
Recommended Air Blow Pressure MPa		0.2 ~ 0.3						
Operating Temperature Range ℃		0 ~ 70						
Usable Fluid		Dry Air						

Notes :

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

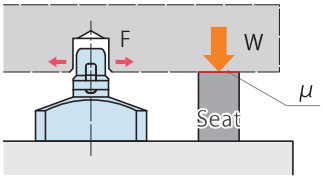
※2. Expanding force shows the calculated value when coefficient friction is μ 0.2. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

※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-Acting Model)
2. This cylinder is used only for locating and does not have a clamping function.

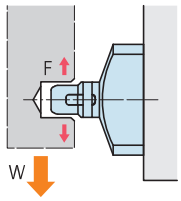
Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

Horizontal Attitude



$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per Expansion Locating Pin (F)} \times \text{Efficiency } 0.25}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$

Vertical Attitude



Workpiece Weight (W) ≦ Expanding Force per Expansion Locating Pin (F) × Efficiency 0.25

Thrust Load/Displacement Curve

This graph shows the relationship between thrust load and displacement. Thrust load is the static load applied perpendicular to the center axis of the VWH (Pneumatic Expansion Locating Pin).

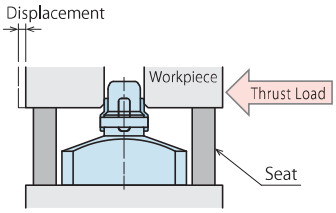
Note :

This graph shows the thrust load (static load) applied to a single datum cylinder (VWH-D) that is not used with any other cylinders, etc.

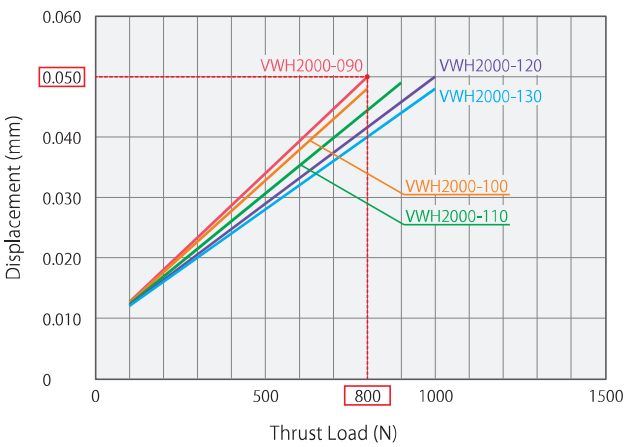
【How to Read the Thrust Load/Displacement Curve】

ex.) In case of VWH2000-090

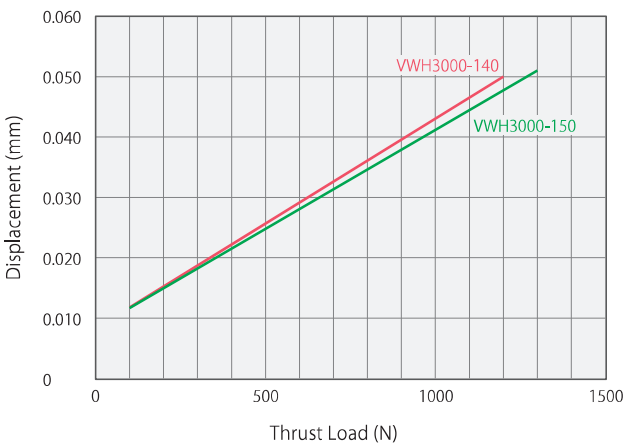
Requirement : When an 800N thrust load is applied to an expanded VWH2000-090, the displacement will be about 0.050mm.



VWH2000



VWH3000



PAT.

Expansion Locating Pin

Model VWM

Pneumatic • Double Action

Locating Repeatability : 3μm

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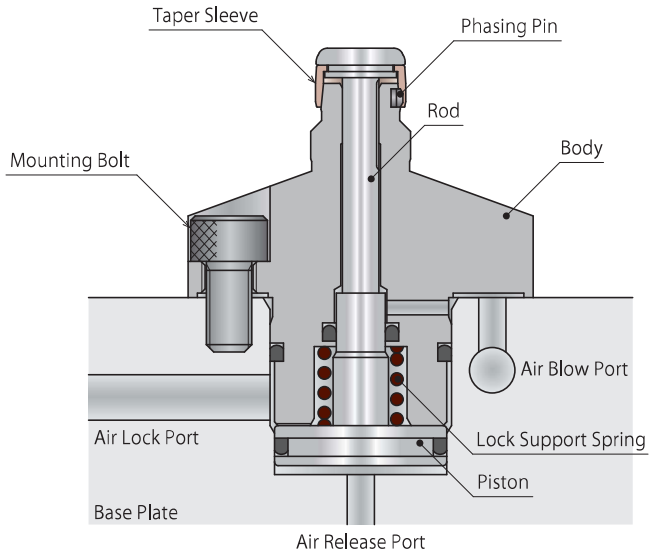
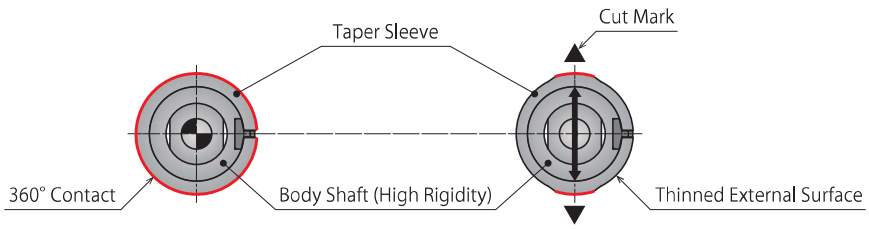
Action Description

This is a simplified drawing of VWM (Standard).

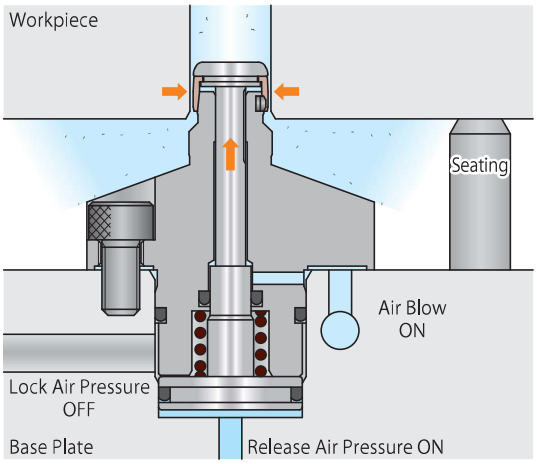


About Reference Locating and Orientation



VWM-D:Datum
Reference Locating

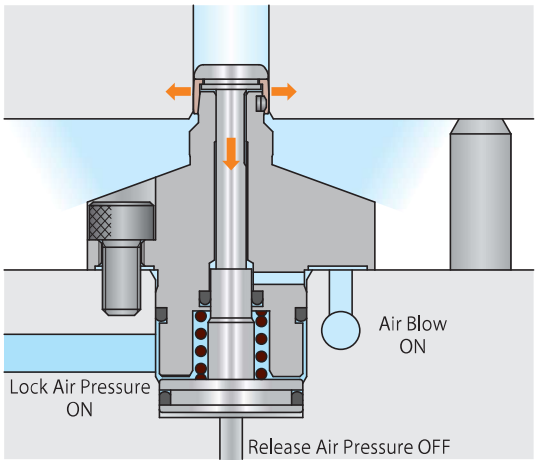
VWM-C:Cut
One Direction Locating



When loading workpiece

When unloading workpiece

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



When locating

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

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

Model No. Indication

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

1 2 3 4 5 6 7

1 Body Size

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

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

4 : Select from Workpiece Hole Diameter ϕ21 / ϕ22 / ϕ23 / ϕ24 / ϕ25

5 : Select from Workpiece Hole Diameter ϕ26 / ϕ27 / ϕ28 / ϕ29 / ϕ30

2 Design No.

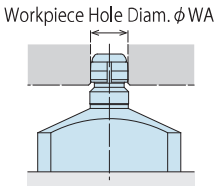
0 : Revision Number

3 Workpiece Hole Diameter

Contact us for unlisted workpiece hole diameters.
(Workpiece hole machining accuracy should be H8 or better.)

Workpiece Hole Diam. Code	080	090	100	110	120	130	140	150	160	170	180	190	200
Workpiece Hole Diam. ϕWA H8	$8^{+0.022}_{0}$	$9^{+0.022}_{0}$	$10^{+0.022}_{0}$	$11^{+0.027}_{0}$	$12^{+0.027}_{0}$	$13^{+0.027}_{0}$	$14^{+0.027}_{0}$	$15^{+0.027}_{0}$	$16^{+0.027}_{0}$	$17^{+0.027}_{0}$	$18^{+0.027}_{0}$	$19^{+0.033}_{0}$	$20^{+0.033}_{0}$
VWM2000	Selection Range												
VWM3000									Selection Range				

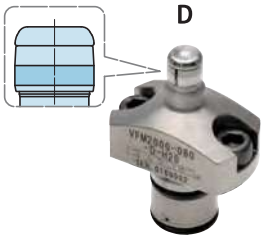
Workpiece Hole Diam. Code	210	220	230	240	250	260	270	280	290	300
Workpiece Hole Diam. ϕWA H8	$21^{+0.033}_{0}$	$22^{+0.033}_{0}$	$23^{+0.033}_{0}$	$24^{+0.033}_{0}$	$25^{+0.033}_{0}$	$26^{+0.033}_{0}$	$27^{+0.033}_{0}$	$28^{+0.033}_{0}$	$29^{+0.033}_{0}$	$30^{+0.033}_{0}$
VWM4000	Selection Range									
VWM5000						Selection Range				



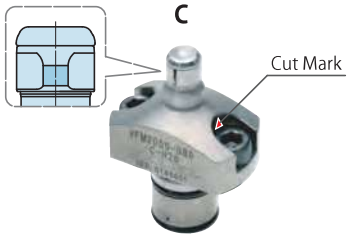
4 Functions

D : Datum (for Reference Locating)

C : Cut (for One Direction Locating)



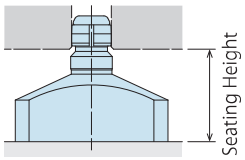
Datum



Cut

5 Seating Height

Model No.	Seating Height H (mm)			
	15	20	25	30
VWM2000	Selection Range			
VWM3000	Selection Range			
VWM4000	Selection Range			
VWM5000		Selection Range		



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

6 Options

Blank : None (Standard)

B : with Seating Surface

M : Release Confirmation Model

Note :

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

7 Port Position

Not required only when selecting 6 Option : Blank (Standard) of VWM2000 / VWM3000.

R : Refer to External Dimensions

L : Refer to External Dimensions

Note :

Refer to **Port Position** on each External Dimension page for details.

Expansion Locating Pin

Model VWK

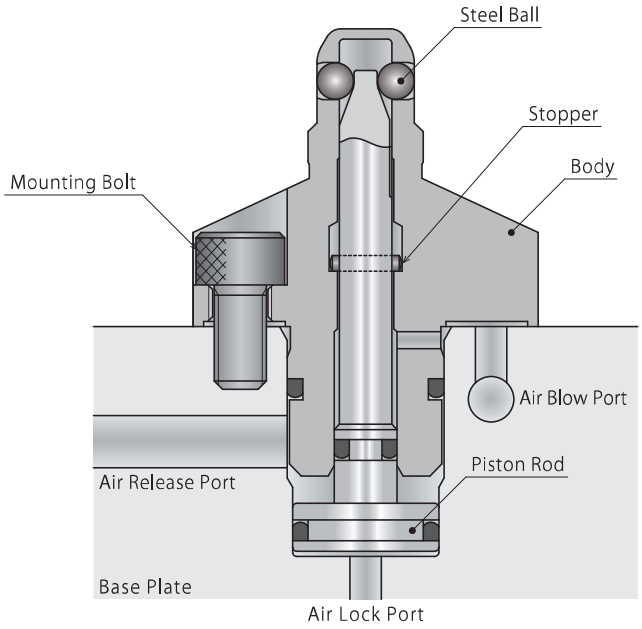
Pneumatic・Double Action

Locating Repeatability : 10μm

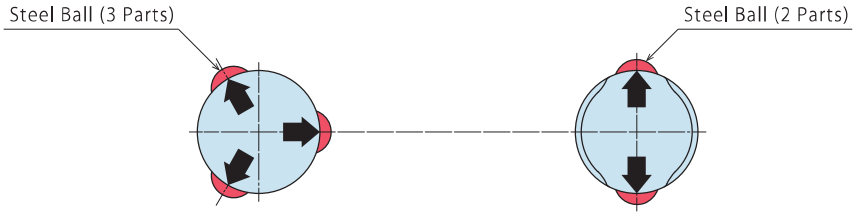
Index

Action Description

This is a simplified drawing of VWK (Standard).

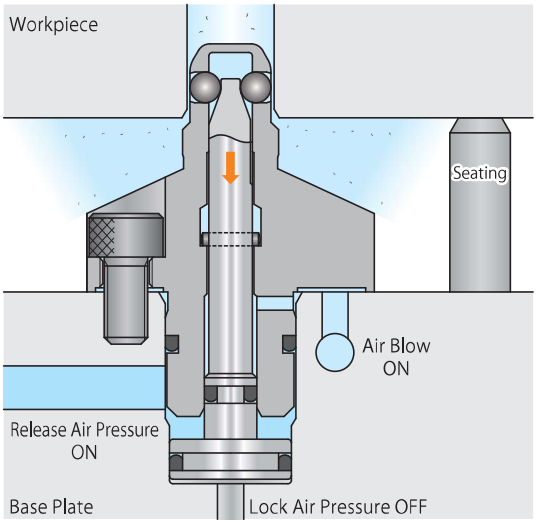


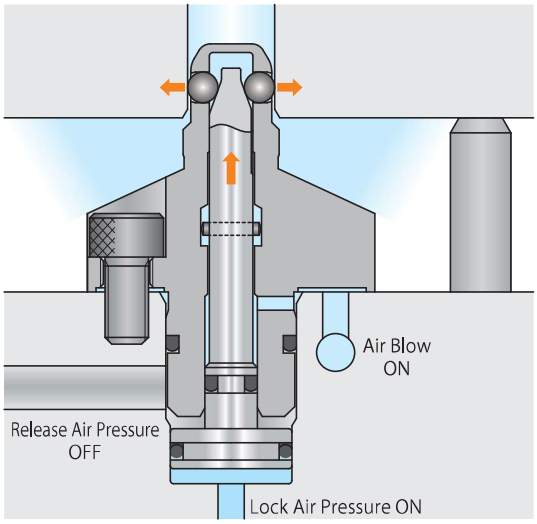
About Reference Locating and Orientation



VWK-D : Datum
Reference Locating

VWK-C : Cut
One Direction Locating





When loading workpiece | When unloading workpiece

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

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

When locating

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

Model No. Indication

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

1 2 3 4 5 6 7

1 Body Size

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

3 : Select from Workpiece Hole Diameter ϕ10.4 ~ ϕ16.2

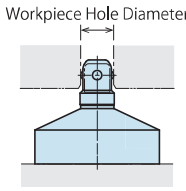
2 Design No.

0 : Revision Number

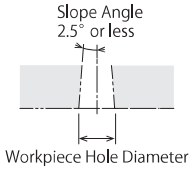
3 Workpiece Hole Diameter

Workpiece Hole Diameter Code		080	090	100	110	120	130	140	150
Workpiece Hole Diameter (mm)	Straight Hole	ϕ7.6 ~ ϕ8.5	ϕ8.5 ~ ϕ9.5	ϕ9.5 ~ ϕ10.8	ϕ10.4 ~ ϕ12	ϕ11.4 ~ ϕ13	ϕ12.2 ~ ϕ14.1	ϕ13.2 ~ ϕ15.1	ϕ14 ~ ϕ16.2
	Taper Hole	ϕ8 ~ ϕ8.5	ϕ9 ~ ϕ9.5	ϕ10 ~ ϕ10.8	ϕ11 ~ ϕ12	ϕ12 ~ ϕ13	ϕ13 ~ ϕ14.1	ϕ14 ~ ϕ15.1	ϕ15 ~ ϕ16.2
VWK2000		Selection Range							
VWK3000					Selection Range				

Straight Hole



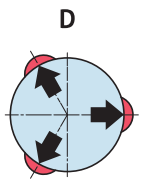
Taper Hole

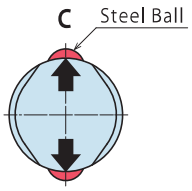


4 Functions

D : Datum (for Reference Locating)

C : Cut (for One Direction Locating)



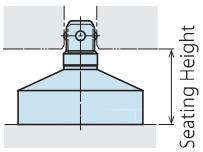


5 Seating Height Dimension

H15 : 15mm

H20 : 20mm

H25 : 25mm



Note :

Prepare an addtional seat for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

Blank : None (Standard)

B : with Seating Surface

M : Release Confirmation Model

Note :

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

7 Port Position

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

R : As Illustrated

L : As Illustrated