Expansion Locating Pin

Model VRA
Model VRC

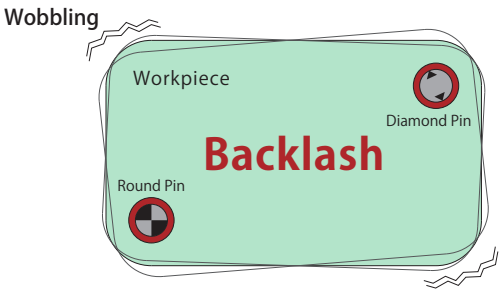
Zero Clearance between the Pin and Reference Hole

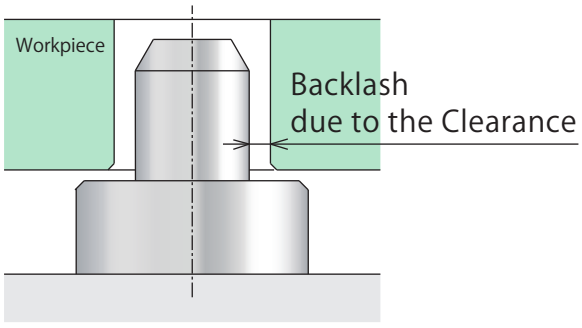
Locating Repeatability：Within 3μm！

Durability of Ten Million Cycles！ ※ When Using VRA

PAT.

Before





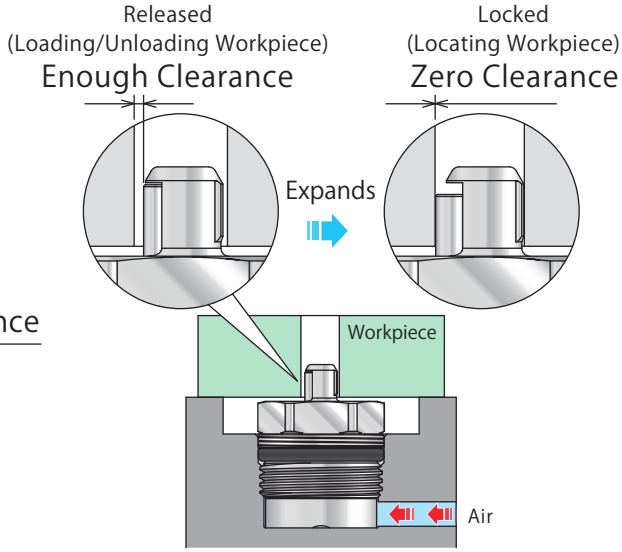
General Locating Pin

Non-Constant Accuracy (Depends on the clearance.)

Difficult to Load/Unload

Backlash due to the Clearance

After



Expansion Locating Pin

Constant Accuracy with Zero Clearance

Released：Easy to Load/Unload

Locked：Hold Workpiece with Zero Clearance

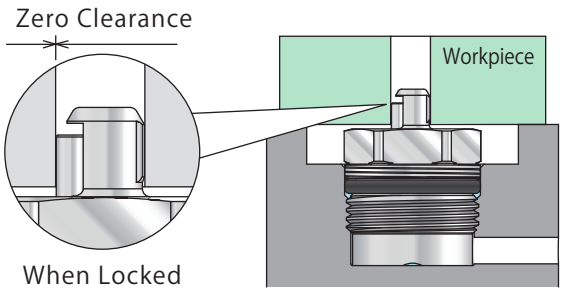
High Quality Cost Reduction

High Accuracy Locating Pin enables high accuracy machining / cost reduction in alignment equipment.

After High Accuracy Locating

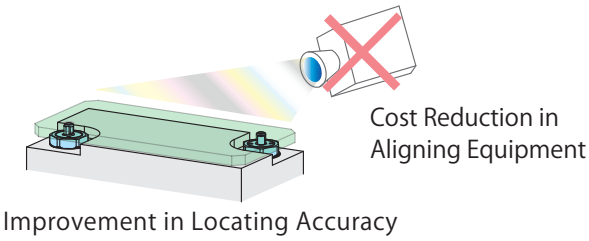
Expansion locating pin expands and the clearance between the pin and reference hole becomes zero which leads to high accuracy locating. Also locking from the inside of the hole enables zero backlash.

Locating Repeatability : 3 μm



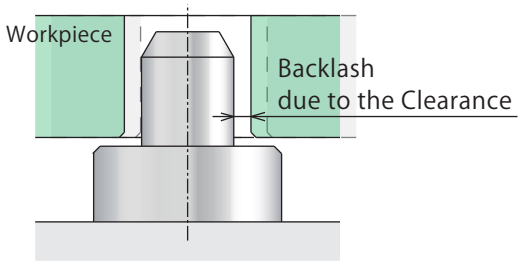
After Cost Reduction

Improvement in locating accuracy enables cost reduction in accuracy-alignment equipment for computer vision and improves operation of manual systems.



Before General Locating Pin

Locating accuracy of general locating pin depends on clearance between the pin and reference hole.
Also it leads to inaccuracy of work and construction.

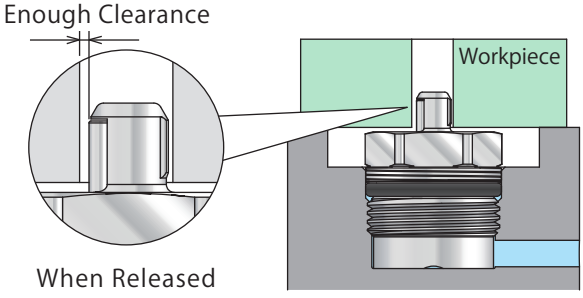


Productive

Improvement in loading/unloading function avoids loading/unloading errors.

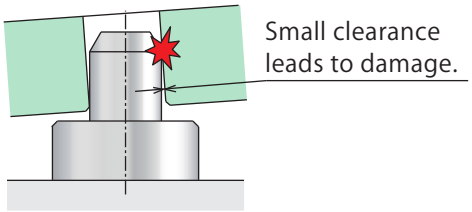
After Optimum Clearance for Loading

When releasing the clearance between the pin and reference hole is large enough for smooth loading/unloading and conveyance automation.

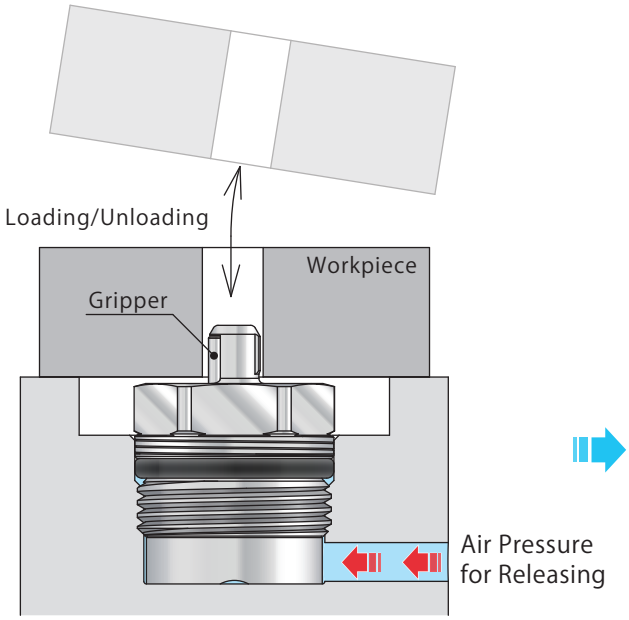


Before Locating Accuracy and Loading

Improving locating accuracy of general locating pin causes inefficiency in loading/unloading.
It is impossible to manage both high locating accuracy and loading/unloading efficiency.



Action Description



When Loading/Unloading (Released)

Release Air Pressure **ON**

＜Releasing with Air Supply＞
Release action (pin diameter reduced) is processed by air supply.

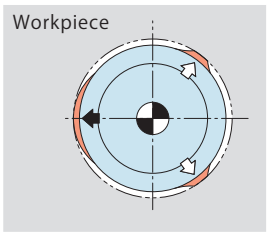
When Locating (Locked)

Release Air Pressure **OFF**

＜Expanding with Built-in Spring＞
When air pressure is OFF (air venting), the diameter of pin expands with the built-in spring and locates the workpiece.

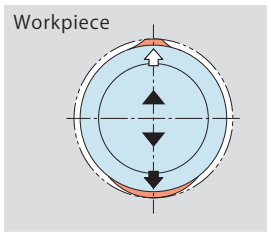
- General locating pin consists of round pin and diamond-shaped pin.
  Alike general locating pin, D: datum pin (equivalent to round pin) contacts with 3 points on hole for reference locating.
  C: cut pin (equivalent to diamond-shaped pin) contacts with 2 points on hole for one direction locating.

VR□-D：Datum Pin



Contacts with 3 Points on Hole
For Reference Locating

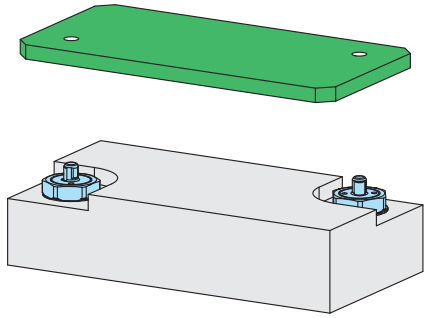
VR□-C：Cut Pin



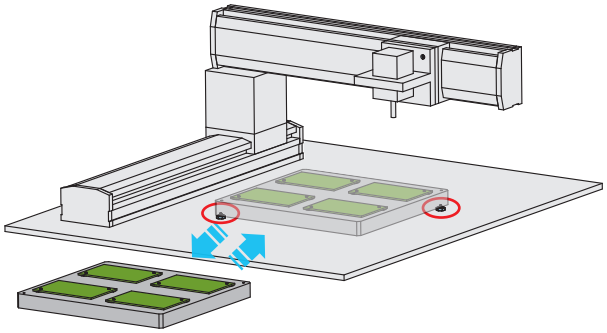
Contacts with 2 Points on Hole
For One Direction Locating

◆ indicates the locating direction (gripper part).
◇ indicates the locating direction (fixation locating part).

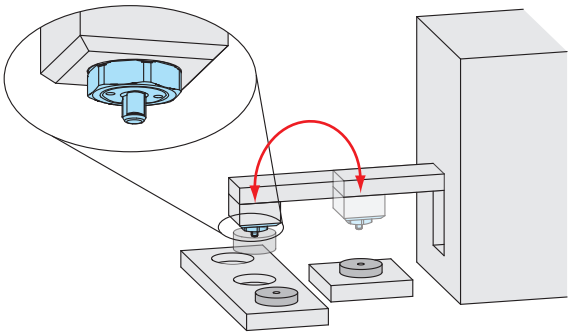
Application Examples



For Locating Workpiece

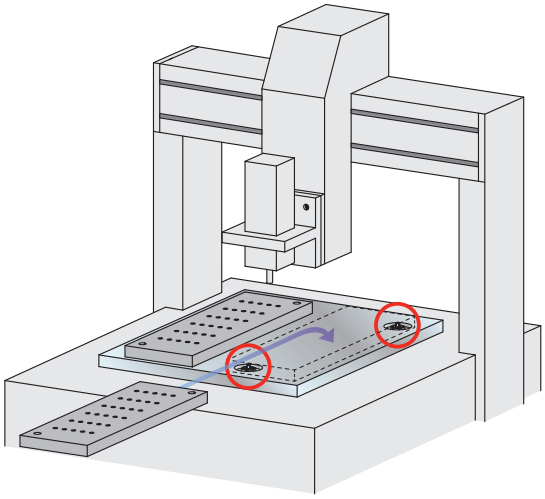


For Pallet Changeover

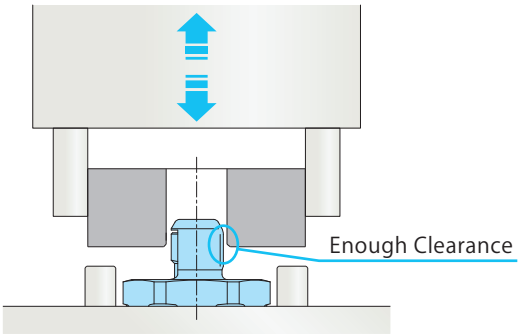


For Pick and Place with Transfer System or Table Robot

※ Check the gripper expanding force.



For Locating Pallet of Table Robot



Suitable for Loading/Unloading Automation
with Enough Clearance at Released State

Model No. Indication

VRA 040 0 - D

1 2 3 4

1 Workpiece Holding Force

VRA : Standard Model
VRC※ : High Gripping Force Model

2 Workpiece Hole Diameter

030 : ϕ3H10 $^{+0.040}_{0}$ mm
040※ : ϕ4H10 $^{+0.048}_{0}$ mm
050 : ϕ5H10 $^{+0.048}_{0}$ mm
060 : ϕ6H10 $^{+0.048}_{0}$ mm

※Able to select 1 Workpiece Holding Force **VRC** : High Gripping Force only when selecting
2 Workpiece Hole Diameter **040** : ϕ4H10mm

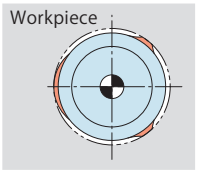
3 Design No.

0 : Revision Number

4 Functions

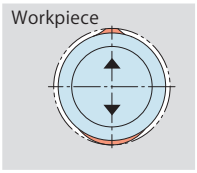
D : Datum Pin (For Reference Locating)
C : Cut Pin (For One Direction Locating)

D



Contact with 3 points on hole

C



Contact with 2 points on hole

Specifications

Model No.			Standard				High Gripping Force
			VRA0300-□	**VRA0400-□**	**VRA0500-□**	**VRA0600-□**	**VRC0400-□**
Workpiece Hole Diameter		mm	$\phi 3H10^{+0.040}_{0}$	$\phi 4H10^{+0.048}_{0}$	$\phi 5H10^{+0.048}_{0}$	$\phi 6H10^{+0.048}_{0}$	$\phi 4H10^{+0.048}_{0}$
Diameter Dimensions	Release	mm	ϕ2.94 or less	ϕ3.94 or less	ϕ4.94 or less	ϕ5.94 or less	ϕ3.94 or less
	Lock	mm	ϕ3.06 or more	ϕ4.06 or more	ϕ5.06 or more	ϕ6.06 or more	ϕ4.06 or more
Stroke		mm	(0.9)				
Locating Repeatability ※1		mm	0.003				
Gripper Expansion Force ※2		N	4 ~ 7		7 ~ 13		23 ~ 30
Workpiece Holding Force (Reference) ※3		N	1.0		1.8		5.0
Allowable Thrust Load ※4		N	10		18		100
Cylinder Capacity		cm^3	0.03		0.05		0.07
Max. Operating Pressure		MPa	0.5				1.0
Min. Operating Pressure		MPa	0.3				
Operating Temperature		℃	0 ~ 70				
Usable Fluid			Dry Air				
Weight		g	3.7	3.9	5.6	5.8	18

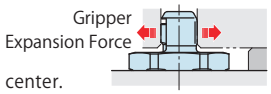
Notes :

※1. Locating repeatability under the same condition (no load).

※2. Gripper expansion force is the force which acts in vertical direction towards the Pin's center axis.

※3. Workpiece holding force is the force with which the single pin holds the workpiece in the direction of the axis center.
Workpiece holding force varies depending on the material of the workpiece and the condition of lubrication.

※4. Allowable thrust load is the maximum load that can be applied to the center of axis of this product in vertical direction.

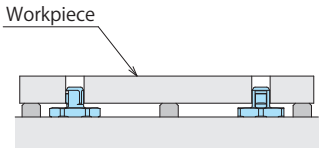


Workpiece Weight

Please take the workpiece attitude into consideration and follow the list below when setting the workpiece weight.
For locating in vertical attitude, a workpiece needs a support (supporting force) to avoid detaching from workpiece seat face.

Workpiece in Horizontal Attitude (Horizontal Position)

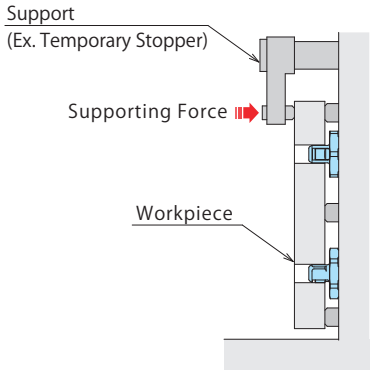
Model No.	Workpiece Mass Calculation Formula
VRA0300-□ **VRA0400-□**	Workpiece Weight ≦ $\frac{200}{\text{Friction Coefficient of Workpiece Seat Face}}$ (g)
VRA0500-□ **VRA0600-□**	Workpiece Weight ≦ $\frac{350}{\text{Friction Coefficient of Workpiece Seat Face}}$ (g)
VRC0400-□	Workpiece Weight ≦ $\frac{1000}{\text{Friction Coefficient of Workpiece Seat Face}}$ (g)



Workpiece in Horizontal Attitude
(Horizontal Position)

Workpiece in Vertical Attitude (Vertical Position)

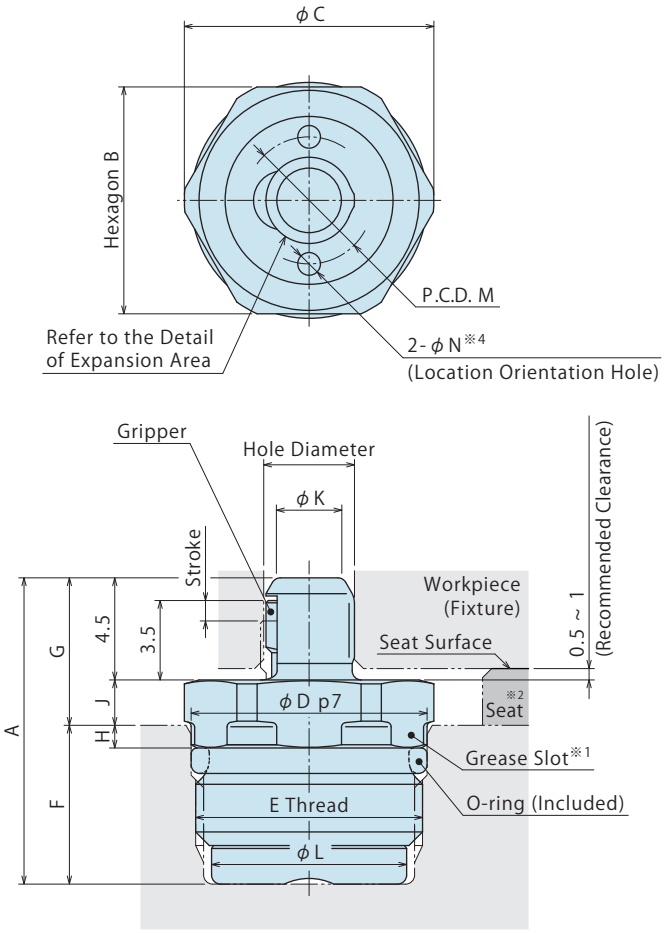
Model No.	Workpiece Mass Calculation Formula
VRA0300-□ **VRA0400-□**	Workpiece Weight ≦ 200 − (Supporting Force × Friction Coefficient of Workpiece Seat Face) (g)
VRA0500-□ **VRA0600-□**	Workpiece Weight ≦ 350 − (Supporting Force × Friction Coefficient of Workpiece Seat Face) (g)
VRC0400-□	Workpiece Weight ≦ 1000 − (Supporting Force × Friction Coefficient of Workpiece Seat Face) (g)



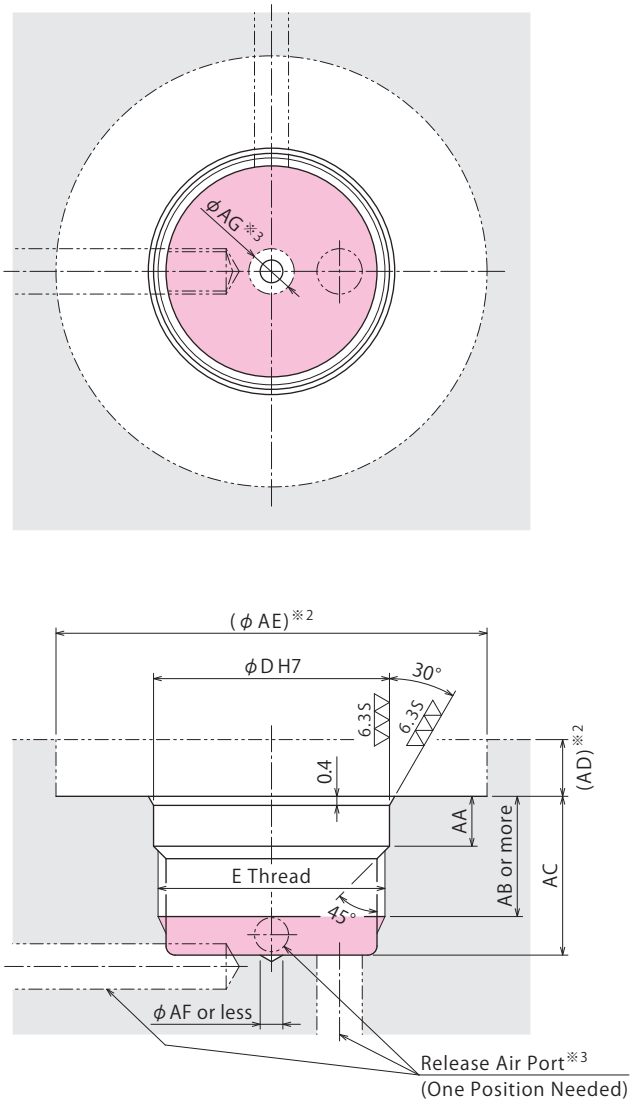
Workpiece in Vertical Attitude
(Vertical Position)

External Dimensions

※ The drawing shows the released state of VR□-C
(Pin Diameter Retracted).

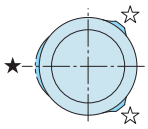


Machining Dimensions of Mounting Area

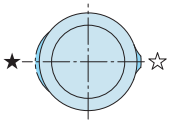


※ Expansion Area Detail

VR□-D
(For Reference Locating)



VR□-C
(For One Direction Locating)



★ indicates gripper part.
☆ indicates fixation locating part.

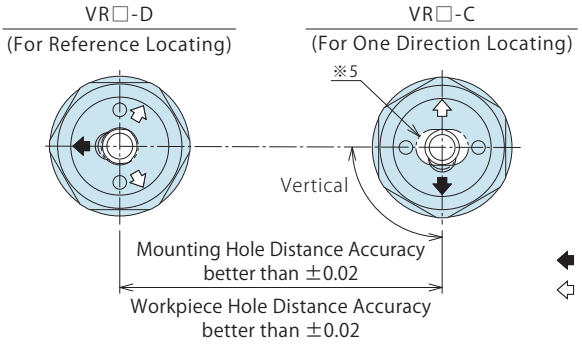
Notes :
※1. When mounting this product, please apply grease in the greasing slot and tighten it with the hexagon socket.
※2. This product has no seat surface towards the center of its axis.
Please prepare the seat separately or machine the mounting area.
Keep it in mind that there are the recommended clearance：0.5~1mm and the mounting tool dimension.
※3. Please machine release air port within the range of ▭.

External Dimensions and Machining Dimensions of Mounting Area

(mm)

Model No.		Standard				High Gripping Force
		VRA0300-□	**VRA0400-□**	**VRA0500-□**	**VRA0600-□**	**VRC0400-□**
Workpiece Hole Diameter		$\phi 3H10^{+0.040}_{0}$	$\phi 4H10^{+0.048}_{0}$	$\phi 5H10^{+0.048}_{0}$	$\phi 6H10^{+0.048}_{0}$	$\phi 4H10^{+0.048}_{0}$
Diameter Dimensions	Release	ϕ2.94 or less	ϕ3.94 or less	ϕ4.94 or less	ϕ5.94 or less	ϕ3.94 or less
	Lock	ϕ3.06 or more	ϕ4.06 or more	ϕ5.06 or more	ϕ6.06 or more	ϕ4.06 or more
Stroke		(0.9)				
A		13.5		15.5		20
B		10		12		14
C		11		13.5		15.5
D p7		$10.4^{+0.036}_{+0.018}$		$12.4^{+0.036}_{+0.018}$		$15.4^{+0.036}_{+0.018}$
D H7		$10.4^{+0.018}_{0}$		$12.4^{+0.018}_{0}$		$15.4^{+0.018}_{0}$
E		M10×0.75		M12×1		M15×1
F		7		8.5		11.5
G		6.5		7		8.5
H		1		1		1.8
J		2		2.5		4
K		2	3	4	5	3
L		8.6		10.3		13.7
M		5.6		7.5		8
N		1		1		1.5
AA		2.2		2.6		3.5
AB		5.3		6.5		8
AC		$7^{\pm 0.05}$		$8.5^{\pm 0.05}$		11.5
AD		2.5 ~ 3		3 ~ 3.5		4.5 ~ 5
AE		19		22		24
AF		1		1		2
AG		2		3		3
O-ring		SS8.5 (made by NOK)		S10 (made by NOK)		S12.5 (made by NOK)

Mounting Phase※4 and Distance Accuracy※5



◆ indicates the locating direction (gripper part).
◇ indicates the locating direction (fixation locating part).

Notes :

※4. The direction of mounting pin is very important to make the best performance. Please make adjustment to the mounting direction of pin using the locating orientation hole, before tightening the body whole way to the mounting area.

※5. The distance accuracy for the pin and workpiece hole should be within ±0.02mm.
If this cannot be done, please make the workpiece hole of VR□-C (for one direction locating) to be slot.
The width of the object should be within the workpiece hole diameter H10 dimensions.

Cautions

Notes for Design

1) Check Specifications

- This product releases by supplying air which allows loading/unloading workpiece (fixture). When the air supply is shut off and releasing supplied air, it locates workpiece (fixture) with the built-in spring. Used with the combination of the expansion locating pin for reference locating (-D) and one direction locating (-C). The combination of (-D) and (-D), or (-C) and (-C) does not satisfy the specification.
  When gripping only one workpiece hole to convey lightweight work, use the expansion pin for locating (-D).

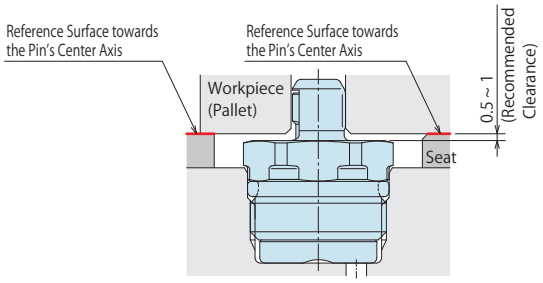
2) Do not use the product in the environment with cutting chips and coolant.

3) The Distance Accuracy for the Pin and Workpiece Hole

- The distance accuracy for the pin (-D and -C) and workpiece hole should be better than ±0.02.
  If this is not possible, make the workpiece hole (-C) to be slot.

4) The Reference Surface towards the Pin's Center Axis

- This product has no reference surface towards the center of its axis.
  Please keep in mind the recommended clearance (0.5~1mm) and tool dimensions for mounting, and apply embedding machining or prepare the seat separately.



5) Mounting/Removing Workpiece (Pallet)

- If needed, please apply a guide pin (rough guide) separately to avoid increasing the force which exceeds allowable thrust load when mounting/ removing workpiece (pallet).

Installation Notes

1) Check the fluid to use.
- Please supply filtered clean dry air.

2) Preparation for 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.
- There is no filter provided with this product for prevention of contaminants in the air circuit.

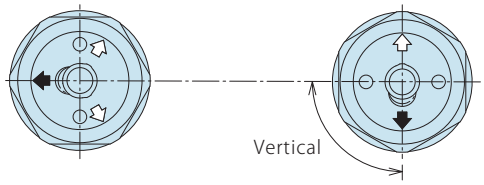
3) Applying Sealing Tape (Sealing Tape for Piping etc.)
- Not required to apply sealing tape for the thread of the expansion locating pin.
- Wrap with tape 1 to 2 times following the screwing direction.
  Wrapping in the wrong direction will cause leaks and malfunction.
- Pieces of the sealing tape can lead to air leaks and malfunction.
- When piping, be careful that contaminant such as sealing tape does not enter in products.

4) Installation/Removal of the Product
- When mounting the product, please apply grease on the grease slot to prevent burning.
  Tighten the body with the torque as shown in the table below.
  (Please do not tighten with an excessive torque.)

Model No.	Thread Size (mm)	Tightening Torque (N·m)
VRA0300	M10×0.75	3.2
VRA0400		
VRA0500	M12×1	4.0
VRA0600		
VRC0400	M15×1	25

5) Mounting Direction (Phase)
- The mounting direction (phase) of the product is important for high accuracy locating.
  Gripper part as a reference, please follow the figure below.

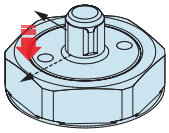
VR□-D (For Reference Locating) | VR□-C (For One Direction Locating)



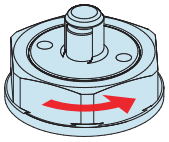
◆ indicates the locating direction (gripper part).
◇ indicates the locating direction (fixation locating part).

Adjustment Procedure of Mounting Direction

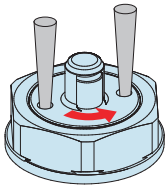
① At mounted state, measure the angle from the first direction of gripper to the desired direction.



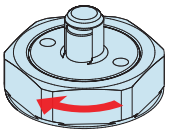
② Loosen 1/4 of the hexagon part.



③ Use the location orientation hole to rotate only the body of pin by the angle measured in the procedure ①.



④ Tighten the hexagon part with a prescribed torque wrench.



※ Please refer to P.715 for common cautions. • Notes on Handling • Maintenance/Inspection • Warranty

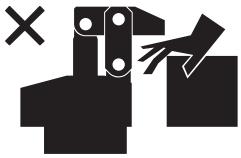
Cautions

Notes on Handling

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

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

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

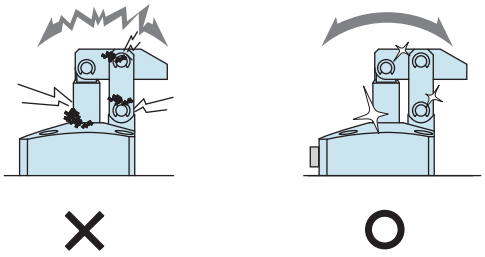


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

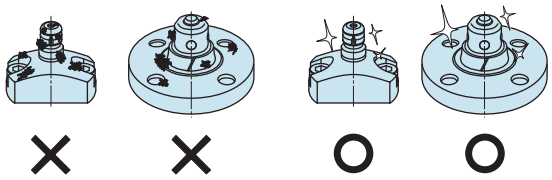
Maintenance and Inspection

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

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



3) Regularly clean the reference surfaces (taper reference surface and seating surface) of locating products (SWT/SWQ/SWP/VRA/VRC/VX/VXE/VXF/WVS/VWH/VWM/VWK).
- Locating products (except VRA/VRC/VX/VXE/VXF and SWR without air blow port) can remove contaminants with the cleaning function. When installing a workpiece or a pallet, make sure there are no contaminants such as thick sludge.
- Continuous use with dirt on components will lead to locating failure, fluid leakage and malfunction.



4) Regularly tighten pipe, mounting bolt, nut, snap ring, cylinder and others to ensure proper use.

5) Make sure the hydraulic fluid has not deteriorated.

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

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

8) Please contact us for overhaul and repair.

Warranty

1) Warranty Period

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

2) Warranty Scope

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

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

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

Sales Offices

Sales Offices across the World

JAPAN HEAD OFFICE Overseas Sales	**TEL. +81-78-991-5162**	FAX. +81-78-991-8787 KOSMEK LTD. 1-5, 2-chome, Murotani, Nishi-ku, Kobe-city, Hyogo, Japan 651-2241 〒651-2241　兵庫県神戸市西区室谷2丁目1番5号
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THAILAND REPRESENTATIVE OFFICE KOSMEK Thailand Representation Office	**TEL. +66-2-300-5132**	FAX. +66-2-300-5133 67 Soi 58, RAMA 9 Rd., Suanluang, Suanluang, Bangkok 10250, Thailand
TAIWAN (Taiwan Exclusive Distributor) Full Life Trading Co., Ltd. 盈生貿易有限公司	**TEL. +886-2-82261860**	FAX. +886-2-82261890 16F-4, No.2, Jian Ba Rd., Zhonghe District, New Taipei City Taiwan 23511 台湾新北市中和區建八路2號 16F－4（遠東世紀廣場）
PHILIPPINES (Philippines Exclusive Distributor) G.E.T. Inc, Phil.	**TEL. +63-2-310-7286**	FAX. +63-2-310-7286 Victoria Wave Special Economic Zone Mt. Apo Building, Brgy. 186, North Caloocan City, Metro Manila, Philippines 1427
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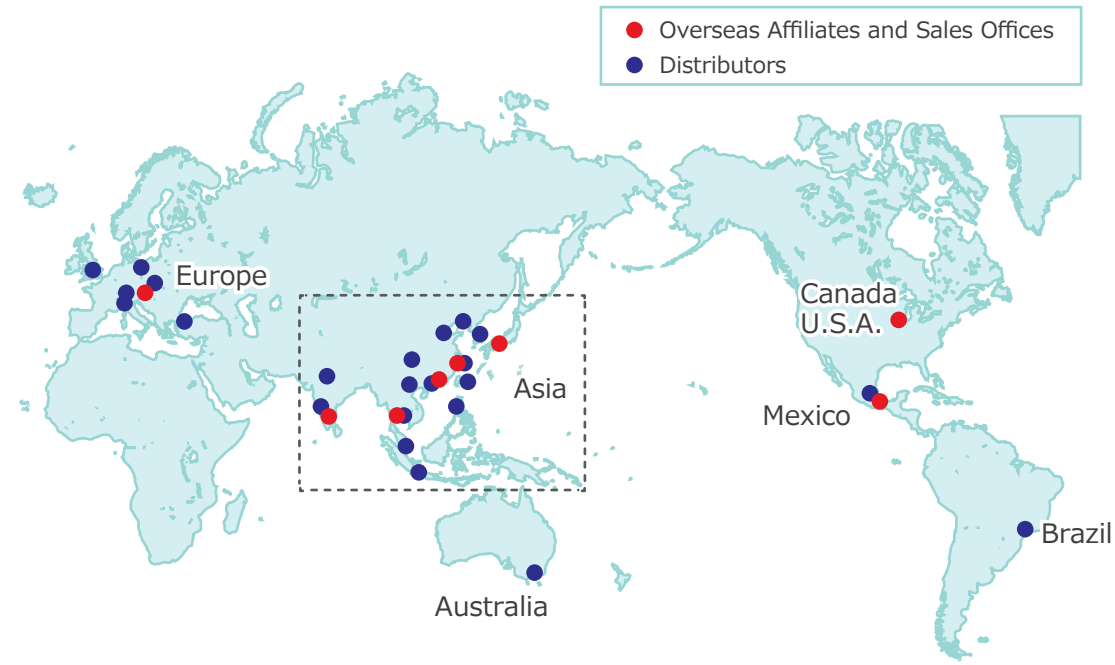
Nagoya Sales Office	**TEL. 0566-74-8778**	FAX. 0566-74-8808 〒446-0076　愛知県安城市美園町2丁目10番地1
Fukuoka Sales Office	**TEL. 092-433-0424**	FAX. 092-433-0426 〒812-0006　福岡県福岡市博多区上牟田1丁目8-10-101

Global Network



Asia Detailed Map

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