Pneumatic Expansion Locating Pin

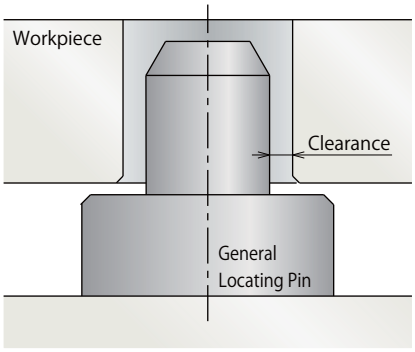
Model WM
Model WK

Locating Repeatability　WM：3μm　WK：10μm

Zero clearance between reference hole

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

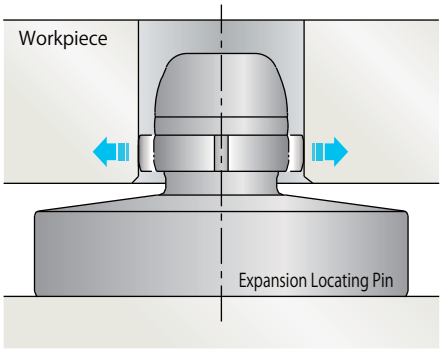
The general locating pin has some clearance between pin and reference hole.



General Locating Pin

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

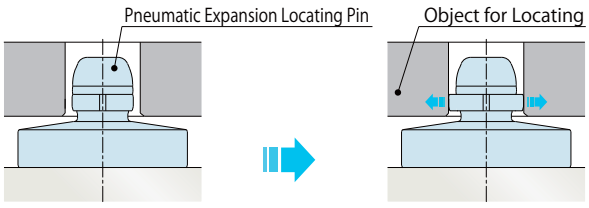
High accuracy, cutting down the operation time and total cost reduced.



The expanding and reducing function of pin diameter. (world-first locating mechanism)

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

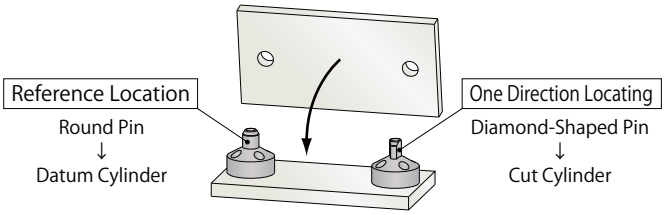
Action Description



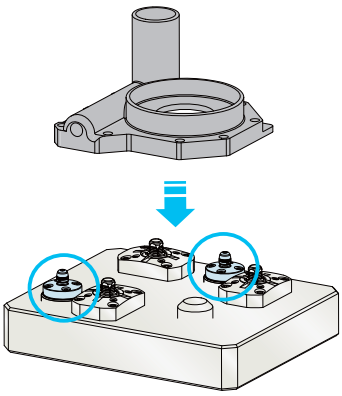
＜ Released State ＞　　＜ Locked State ＞

※WM is used in the picture above.

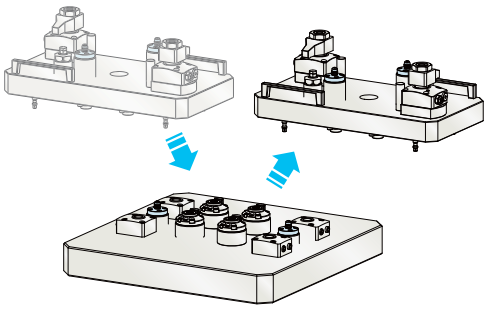
Two types of locating pins (Cylindrical and Diamond shaped pins).
Expansion Locating Pin consisting of Datum-D and Cut-C cylinder.



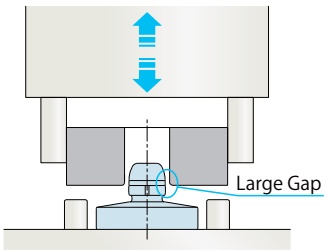
Application Examples



For casting core holes location



For pallet change over location & transfer

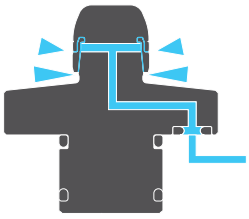


When it is released, the clearance is so large enough to load and unload work piece, hence most appropriate for automation.

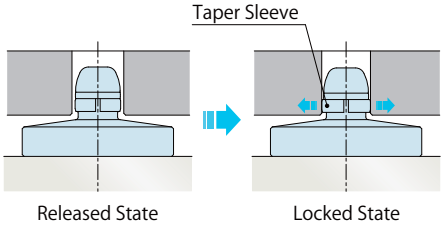
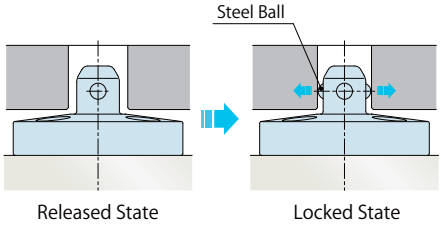
Function

● Air Blow Function

Air blow prevent foreign substances from coming in.



※WM is used in the picture above.

	 Model WM → P.217	 Model WK → P.225
Locating Repeatability	3 μm	10 μm
Control Method	Double Action (Air Pressure+Spring Lock / Air Release)	Double Action (Air Lock / Air Release)
Operating Pressure Range	0.4 ~ 1 MPa	0.4 ~ 1 MPa
Action	 Taper sleeve expands	 Steel ball comes out from pin.
Application Examples	Finishing Line/Dividing Line	Locating Casting Core Holes

Pneumatic Expansion Locating Pin

PAT.

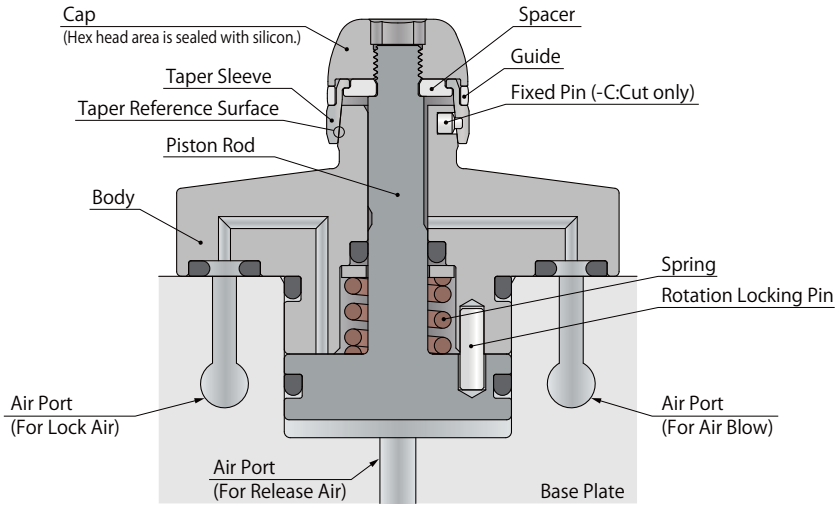
Model WM

Pneumatic・Double Action

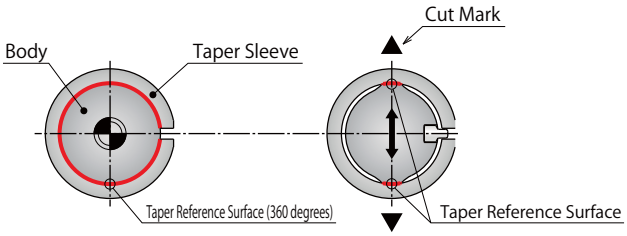
Locating Repeatability : 3 μm

Index

Action Description

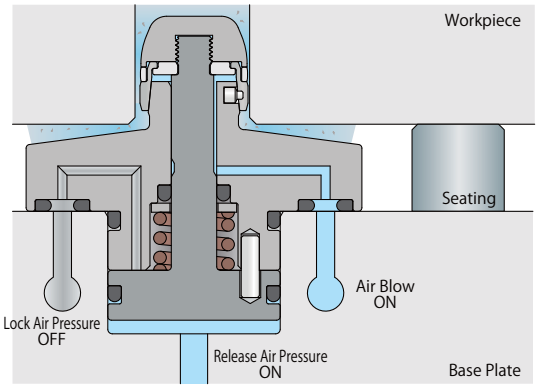


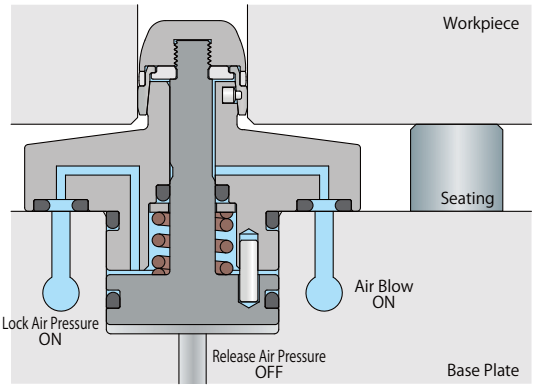
Taper Sleeve and Taper Reference Surface



WM-D: Datum
(Reference Location)

WM-C: Cut
(One Direction Locating)





When loading workpiece **When unloading workpiece**

- Piston rod rises by release air pressure. Taper sleeve expands together with piston rod, and shrinks using its own elasticity.
- Air blow prevents debris contamination.
- Regarding cap/guide/taper sleeve: the shape is designed to load workpiece smoothly and prevent scratches.

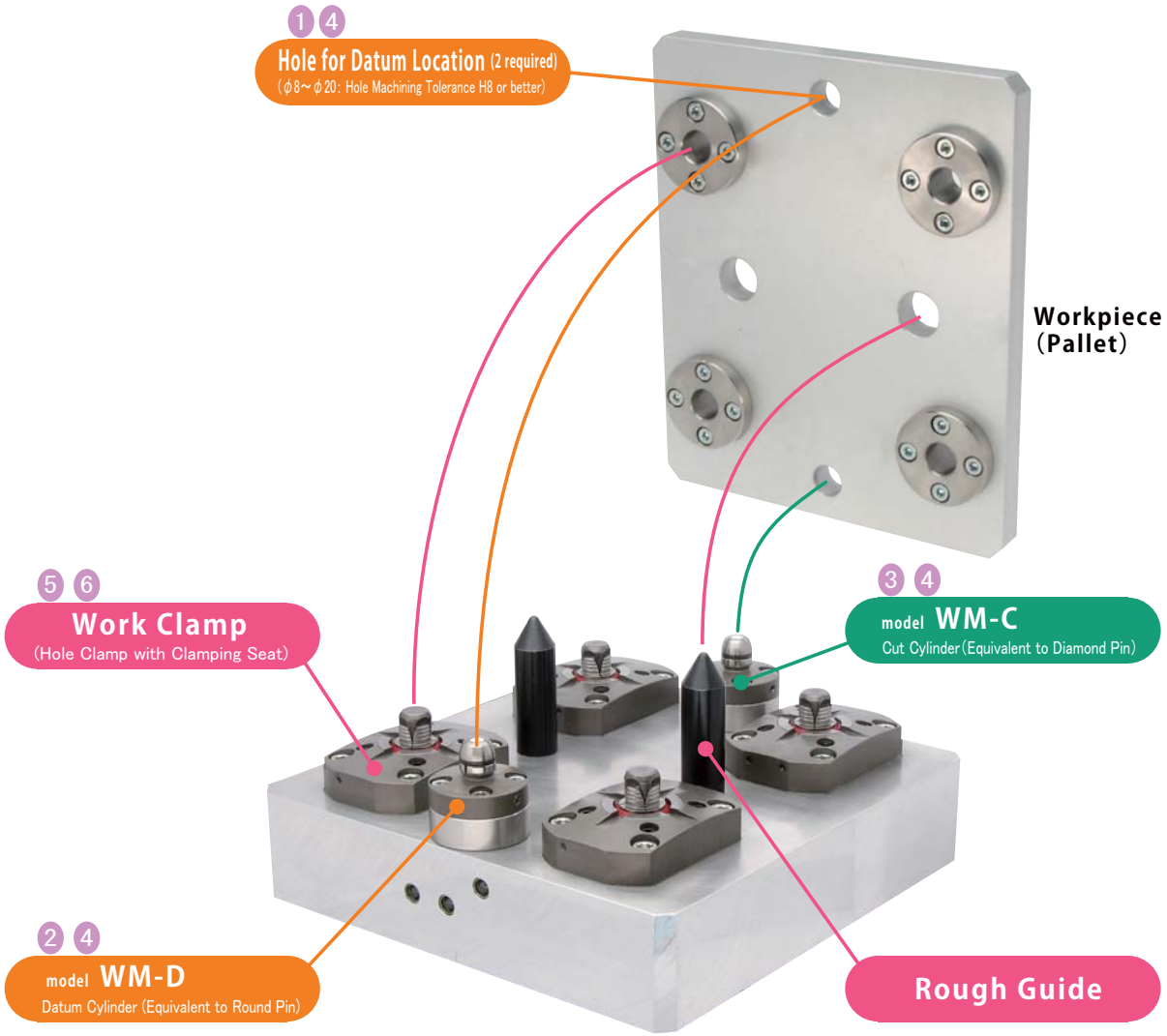
When locating

- When release air pressure is turned off and lock air pressure is on, piston rod is pulled down by air pressure and spring force, and taper sleeve expands to locate the workpiece.
(For Z-axis, seat is also required.)

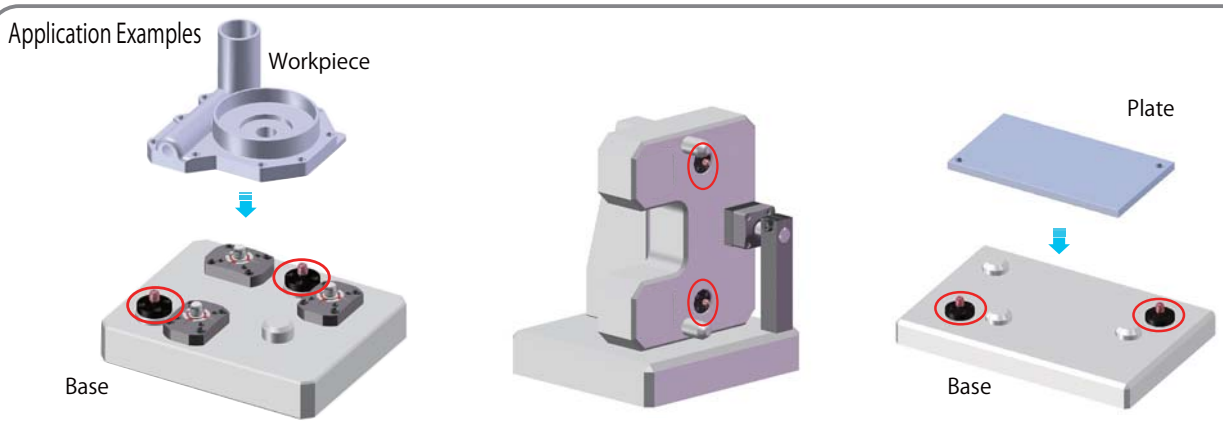
※ When releasing air pressure is turned off, by spring force, it moves towards locking direction. However, it can't do location by only spring force.

System References

- Repeated locating accuracy of 3μm (One step locating reduces setup time!)
- Avoid deterioration of workpiece accuracy when changing pallets to perform multiple operations.
- 5 axis machining is possible by combining datum cylinder with hole clamp or ball lock clamp.



Application Examples

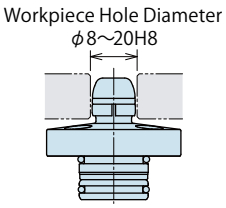


Workpiece Location | Angle Plate Fixture | Plate Location

Essential Points

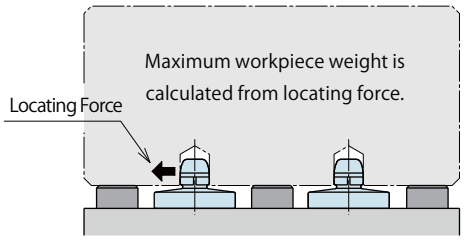
1 Workpiece Hole for Locating

- Available in diameters between 8 and 20mm (in 0.1mm increments).
- Hole machining tolerance is H8 or better.



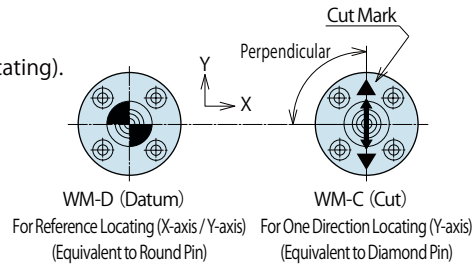
2 Locating Force

- Workpiece weight that expansion locating pin is able to locate with is calculated from locating force.
- Locating force is the force with which the expansion locating pin pushes out (expands) against the workpiece.
- The specification helps you find out how to calculate each model's locating force and the workpiece weight.



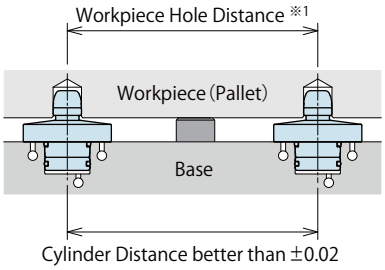
3 Cut Cylinder's Mounting Phase

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



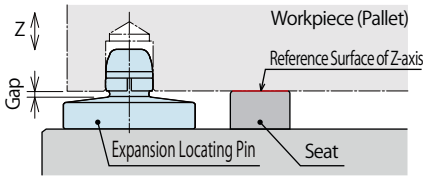
4 Distance accuracy between cylinders and between workpiece holes

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



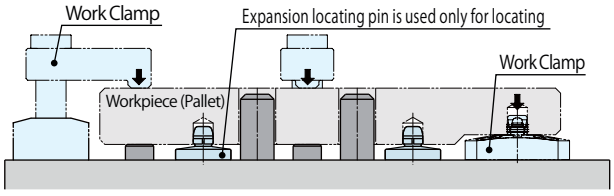
5 Seat Setting

- Expansion locating pin locates only in X and Y-axis.
  For Z-axis location, prepare additional seat block.
- Make sure there is a clearance between the top of the flange on the expansion locating pin and the workpiece (pallet).
  (Recommended Clearance : 0.5～1mm)



6 Setting Additional Work Clamps

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



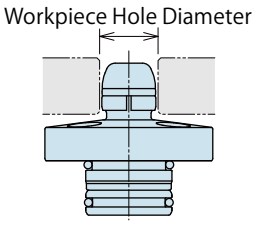
Model No. Indication

WM 0 12 1 - D - S

1 2 3 4

1 Workpiece Hole Diameter (Standard)

08 : $\phi 8^{H8\ +0.022}_{0}$ mm
09 : $\phi 9^{H8\ +0.022}_{0}$ mm
10 : $\phi 10^{H8\ +0.022}_{0}$ mm
12 : $\phi 12^{H8\ +0.027}_{0}$ mm
13 : $\phi 13^{H8\ +0.027}_{0}$ mm
15 : $\phi 15^{H8\ +0.027}_{0}$ mm
16 : $\phi 16^{H8\ +0.027}_{0}$ mm
18 : $\phi 18^{H8\ +0.027}_{0}$ mm
20 : $\phi 20^{H8\ +0.033}_{0}$ mm

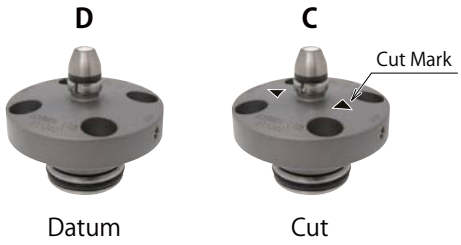


2 Design No.

1 : Revision Number

3 Functions

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



4 Applicable Workpiece Hole Diameter

S : Standard Diameter
A□□□ : Custom Diameter

※Example
ex. 1 : WM0121-D-A125
WM0121-D with Workpiece Hole Diameter of $\phi 12.5H8\ ^{+0.027}_{0}$

ex. 2 : WM0091-C-A093
WM0091-C with Workpiece Hole Diameter of $\phi 9.3H8\ ^{+0.022}_{0}$

ex. 3 : WM0181-D-S
WM0181-D with Workpiece Hole Diameter of $\phi 18H8\ ^{+0.027}_{0}$

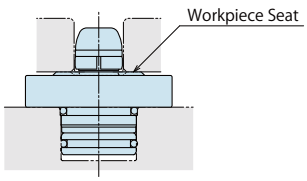
Model No.	S : Standard Diameter	A□□□ : Custom Diameter
WM0081	$8^{H8\ +0.022}_{0}$	$8.1^{H8\ +0.022}_{0}$ ~ $8.8^{H8\ +0.022}_{0}$
WM0091	$9^{H8\ +0.022}_{0}$	$8.9^{H8\ +0.022}_{0}$ ~ $9.9^{H8\ +0.022}_{0}$
WM0101	$10^{H8\ +0.022}_{0}$	$10.1^{H8\ +0.027}_{0}$ ~ $11.3^{H8\ +0.027}_{0}$
WM0121	$12^{H8\ +0.027}_{0}$	$11.4^{H8\ +0.027}_{0}$ ~ $12.7^{H8\ +0.027}_{0}$
WM0131	$13^{H8\ +0.027}_{0}$	$12.8^{H8\ +0.027}_{0}$ ~ $14.2^{H8\ +0.027}_{0}$
WM0151	$15^{H8\ +0.027}_{0}$	$14.3^{H8\ +0.027}_{0}$ ~ $15.7^{H8\ +0.027}_{0}$
WM0161	$16^{H8\ +0.027}_{0}$	$15.8^{H8\ +0.027}_{0}$ ~ $16.9^{H8\ +0.027}_{0}$
WM0181	$18^{H8\ +0.027}_{0}$	$17.0^{H8\ +0.027}_{0}$ ~ $17.9^{H8\ +0.027}_{0}$
		$18.1^{H8\ +0.033}_{0}$ ~ $18.4^{H8\ +0.033}_{0}$
WM0201	$20^{H8\ +0.033}_{0}$	$18.5^{H8\ +0.033}_{0}$ ~ $19.9^{H8\ +0.033}_{0}$

Notes
1. Custom diameters are available in increments of 0.1mm.
2. When workpiece hole diameter is $\phi 9.5H8\ ^{+0.022}_{0}$, Model No. is "WM0091-D-A095" .
3. Please contact us if above work hole diameter is larger or smaller than standard.
   (The accuracy of workpiece hole diameter machining should be greater than H8.)

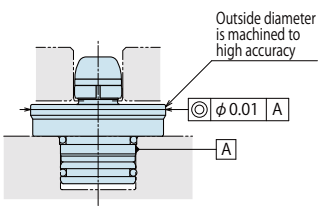
Other Special Options (Reference)

For below options, please contact us.

Used when seat cannot be installed separately



If it is not possible to measure the datum hole distance, it can be measured indirectly (Especially machined outside diameter of WM).



Specifications

Model No.		WM0081	WM0091	WM0101	WM0121	WM0131	WM0151	WM0161	WM0181	WM0201
Workpiece Hole Diameter	Standard Diam. mm	8H8 $^{+0.022}_{0}$	9H8 $^{+0.022}_{0}$	10H8 $^{+0.022}_{0}$	12H8 $^{+0.027}_{0}$	13H8 $^{+0.027}_{0}$	15H8 $^{+0.027}_{0}$	16H8 $^{+0.027}_{0}$	18H8 $^{+0.027}_{0}$	20H8 $^{+0.033}_{0}$
	Custom Diam. ※1 mm	8.1～8.8	8.9～9.9	10.1～11.3	11.4～12.7	12.8～14.2	14.3～15.7	15.8～16.9	17.0～18.4	18.5～19.9
Locating Repeatability mm		0.003								
Offset Tolerance (C:Cut) mm		±0.05	±0.05	±0.10	±0.10	±0.10	±0.10	±0.15	±0.15	±0.15
Locating Force ※2 N	at 0.4MPa	230	230	230	230	230	230	260	260	260
	at 1.0MPa	300	300	300	300	300	300	330	330	330
Allowable Thrust Load ※3 kN		1.5	1.5	2.0	2.5	2.5	2.5	3.0	3.0	3.5
Cylinder Capacity cm³	Lock	0.14	0.14	0.14	0.14	0.14	0.14	0.27	0.27	0.27
	Release	0.14	0.14	0.14	0.14	0.14	0.14	0.30	0.30	0.30
Max. Operating Pressure MPa		1.0								
Min. Operating Pressure MPa		0.4								
Operating Temperature ℃		0～70								
Usable Fluid		Dry Air								
Mass g		95	95	95	100	100	105	120	125	130

Notes ※1. Custom diameters are available in increments of 0.1mm. The accuracy of workpiece hole diameter machining should be greater than H8.
※2. Locating force is the force with which the expansion locating pin pushes out (expands) against the workpiece. The value assumes that coolant has been applied. [Reference Values] (The relationship between locating force and the weight of workpiece is shown in the graph below.) It can't be located only by spring force (supply air pressure is 0MPa).
※3. The allowable thrust load means the maximum thrust load that can be applied to this product.

About Locating Force and Workpiece Weight

Workpiece (Pallet) Weight Calculation - Horizontal Attitude

$$\text{Workpiece Weight} \leqq \frac{\text{Locating Force per One Piece of Expansion Locating Pin}}{\text{Friction Coefficient of Workpiece Seat Face}}$$

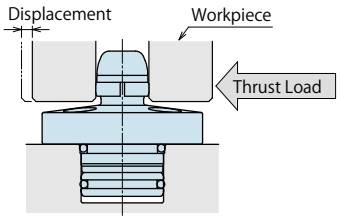
Workpiece (Pallet) Weight Calculation - Vertical Attitude

$$\text{Workpiece Weight} \leqq \text{Locating Force per One Piece of Expansion Locating Pin}$$

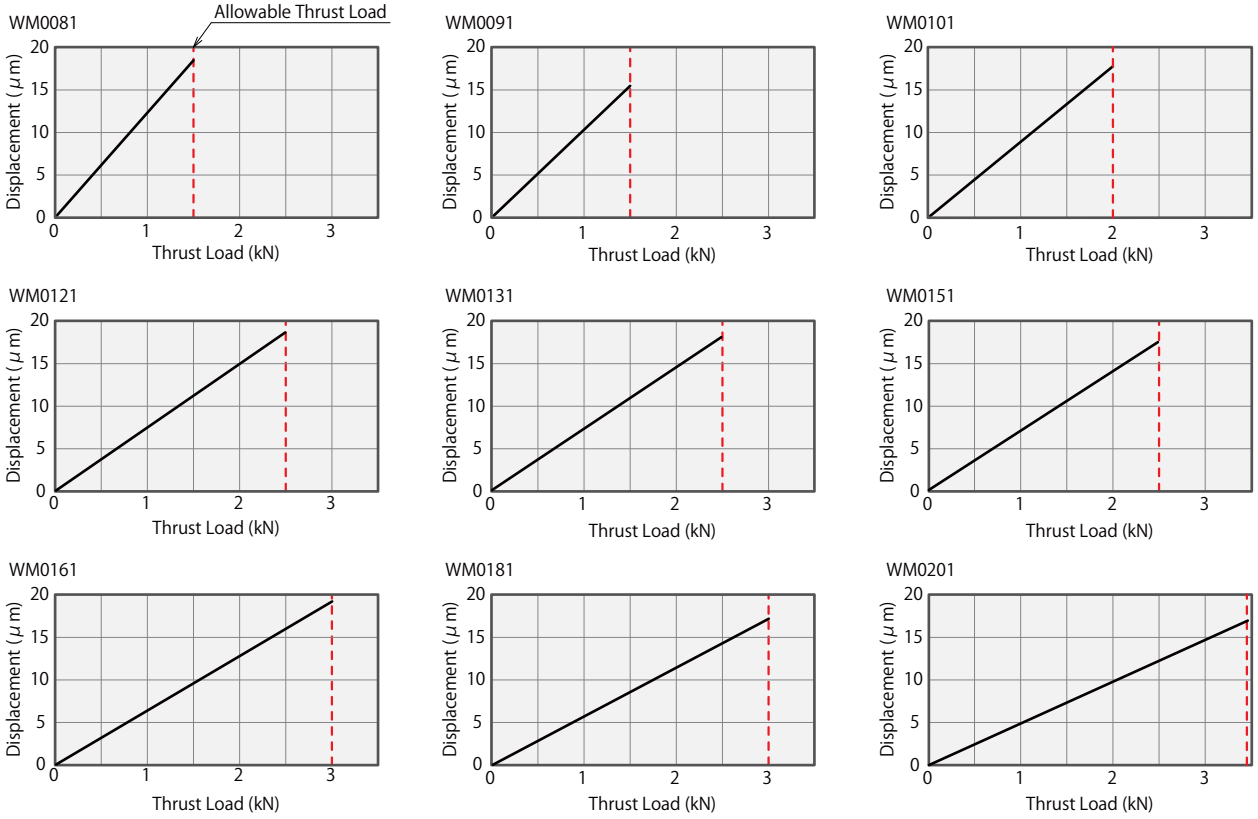
Load / Displacement Curve

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

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

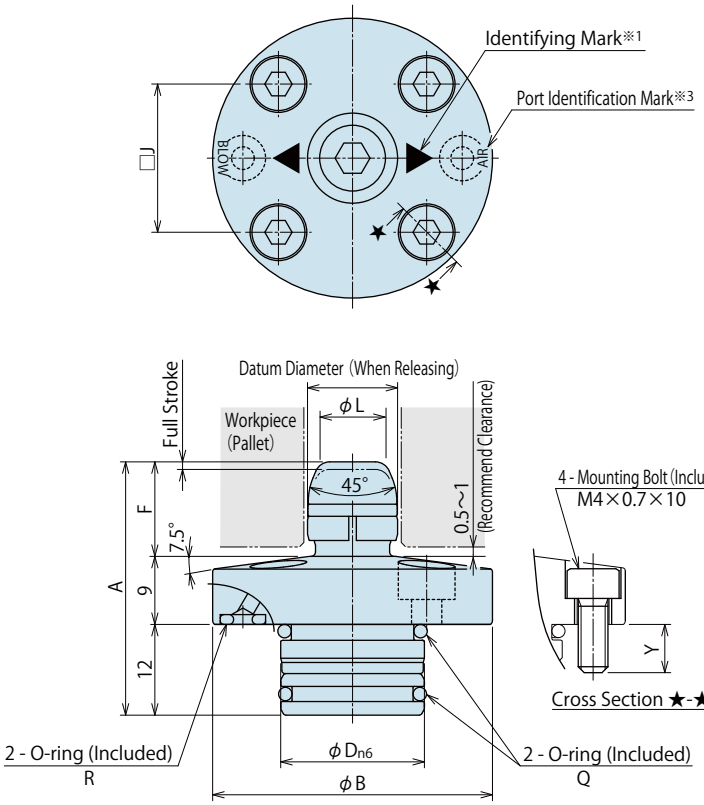


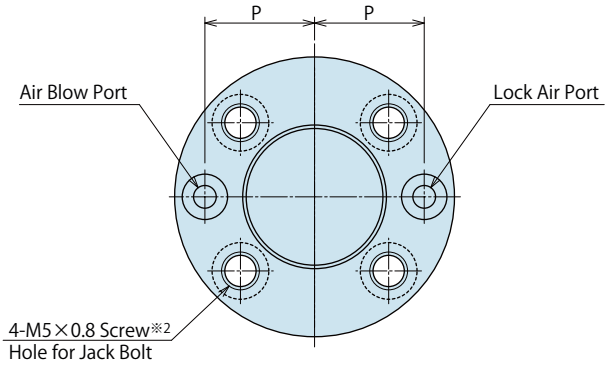
(How to read the load/displacement curve)
ex.) When using WM161
Requirement : When a 2 kN thrust load is placed on an expanded WM0161 the displacement will be about 13 μm.



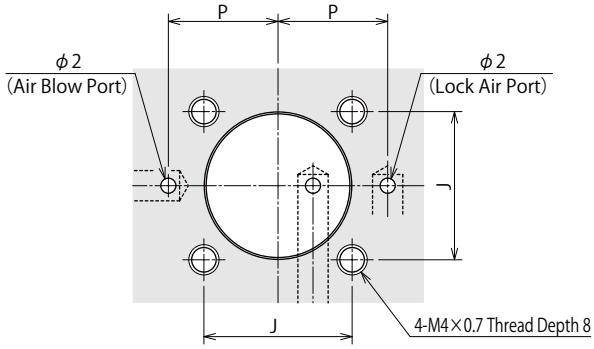
External Dimensions

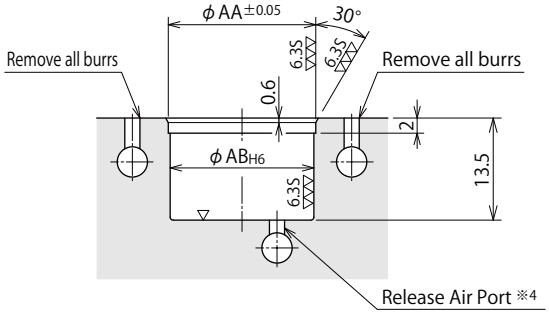
※This drawing shows the released state of WM-C (when air pressure is supplied).





Machining Dimensions of Mounting Area



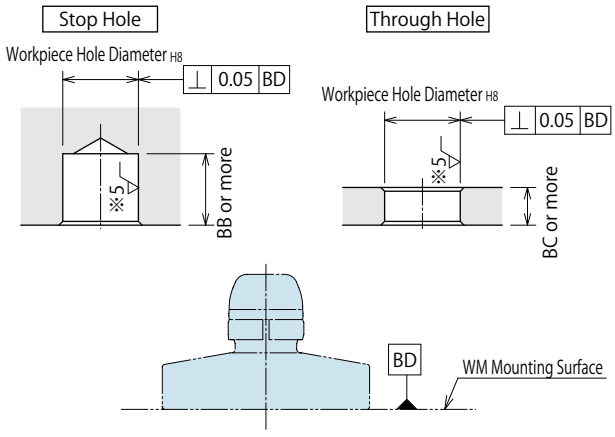


Notes

1. There should be no burring at the intersection of processed hole.

※4. Please prepare release (unclamping) air port on bottom surface of mounting hole. The port size is not specified.

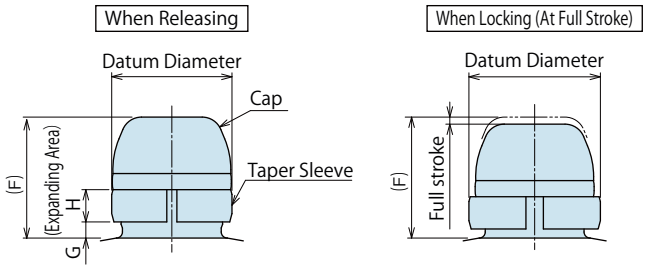
Workpiece (Pallet) Machining Dimensions



Note

※5. When the same object, such as a pallet, is to be repeatedly positioned, the recommended surface correlation is 6.3S.

※Expanding Area Detail



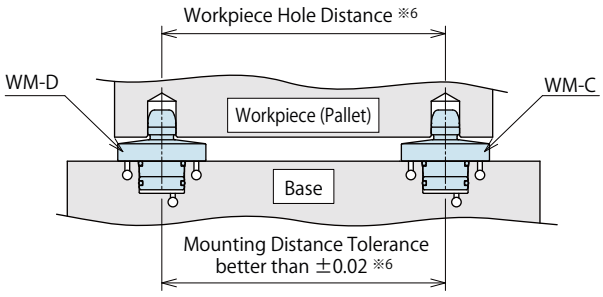
Notes

※1. The identification mark is only found on –C: Cut.
◀ ▶ identification mark shows the direction.

※2. The M5 x 0.8 threads are used when removing the expanding locating pin. (See P.234 for usage.)

※3. Each port name is marked on the flange surface.
Please pay attention to proper mounting direction.
(AIR : Lock Air Port, BLOW: Air Blow Port)

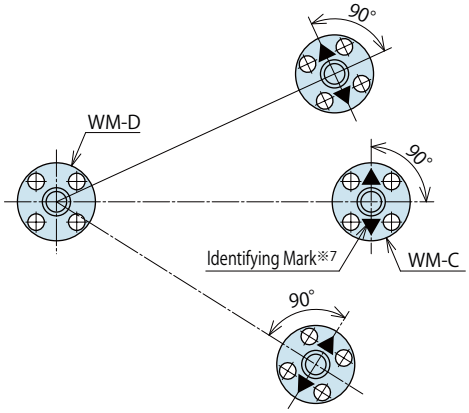
Mounting Distance Tolerance



Note

※6. Please ensure the distance tolerance between each locating cylinder is better than ±0.02mm.
The distance accuracy of each workpiece hole (pallet hole) should be within the offset tolerance.
(Please refer to table under JIS B 0613 Class 2 on P.233).

WM-C Mounting Phase



Note

※7. Attach the WM-C identification mark perpendicular to the line which runs through the center of WM-D and WM-C.

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		WM0081	WM0091	WM0101	WM0121	WM0131	WM0151	WM0161	WM0181	WM0201
Hole Diameter of Workpiece	Standard mm	8H8 $^{+0.022}_{0}$	9H8 $^{+0.022}_{0}$	10H8 $^{+0.022}_{0}$	12H8 $^{+0.027}_{0}$	13H8 $^{+0.027}_{0}$	15H8 $^{+0.027}_{0}$	16H8 $^{+0.027}_{0}$	18H8 $^{+0.027}_{0}$	20H8 $^{+0.033}_{0}$
	Substandard ※8 mm	8.1～8.8	8.9～9.9	10.1～11.3	11.4～12.7	12.8～14.2	14.3～15.7	15.8～16.9	17.0～18.4	18.5～19.9
Datum Diameter (Standard)	At Releasing (MAX) mm	7.94	8.94	9.94	11.92	12.92	14.92	15.89	17.89	19.89
	At Full Stroke (MIN) mm	8.05	9.05	10.05	12.05	13.05	15.05	16.08	18.08	20.08
Datum Diameter (Substandard)	At Releasing (MAX) mm	Workpiece Hole Diameter - 0.06			Workpiece Hole Diameter - 0.08			Workpiece Hole Diameter - 0.11		
	At Full Stroke (MIN) mm	Workpiece Hole Diameter + 0.05			Workpiece Hole Diameter + 0.05			Workpiece Hole Diameter + 0.08		
Full Stroke mm		0.6	0.6	0.6	0.7	0.7	0.7	1.0	1.0	1.0
Offset Tolerance (C : Cut) mm		±0.05	±0.05	±0.10	±0.10	±0.10	±0.10	±0.15	±0.15	±0.15
A		33			33.5			37.5		
B		37			37			40		
D		19n6 $^{+0.028}_{+0.015}$			19n6 $^{+0.028}_{+0.015}$			22n6 $^{+0.028}_{+0.015}$		
F		12			12.5			16.5		
G		2.5	2.5	2.3	2.1			2.7		
H		2.6	2.6	2.8	3.2			4.5		
J		19.6			19.6			21.8		
L	Standard Datum Diameter	4.8	5.8	6.8	8.7	9.7	11.7	11.3	13.3	15.3
	Substandard Datum Diameter	Workpiece Hole - 3.2			Workpiece Hole - 3.3			Workpiece Hole - 4.7		
P		14.5			14.5			16		
Y		6.9			6.7			6.6		
O-ring Q		AS568-016(70°)			AS568-016(70°)			AS568-018(70°)		
O-ring R		AS568-005(70°)			AS568-005(70°)			AS568-005(70°)		
AA		19.1			19.1			22.1		
AB		19H6 $^{+0.013}_{0}$			19H6 $^{+0.013}_{0}$			22H6 $^{+0.013}_{0}$		
BB		12.5			13			17		
BC		5.5			5.5			7.5		

Note ※ 8. Custom diameters are available in increments of 0.1mm. The accuracy of workpiece hole diameter machining should be greater than H8.

Pneumatic Expansion Locating Pin

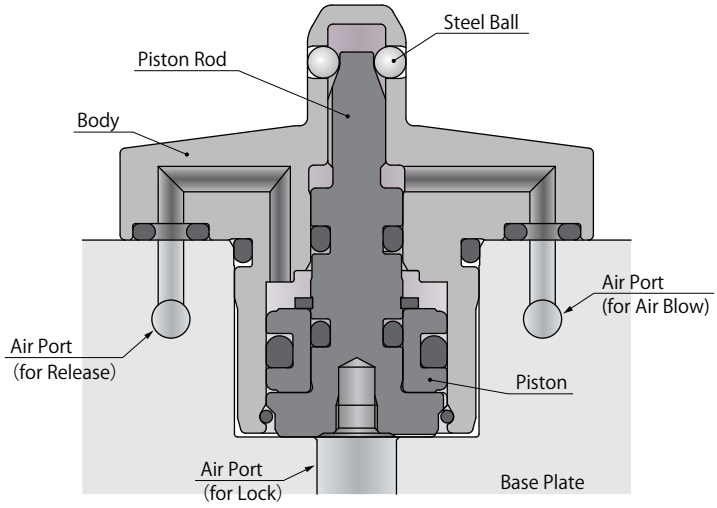
Model WK

Pneumatic・Double Action

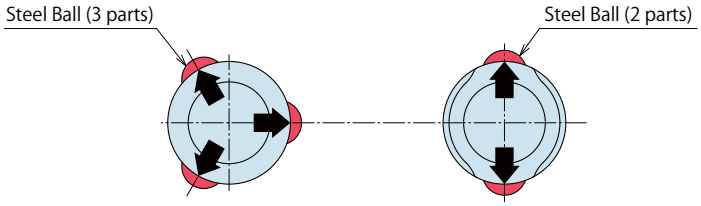
Locating Repeatability：10μm

Index

Action Description



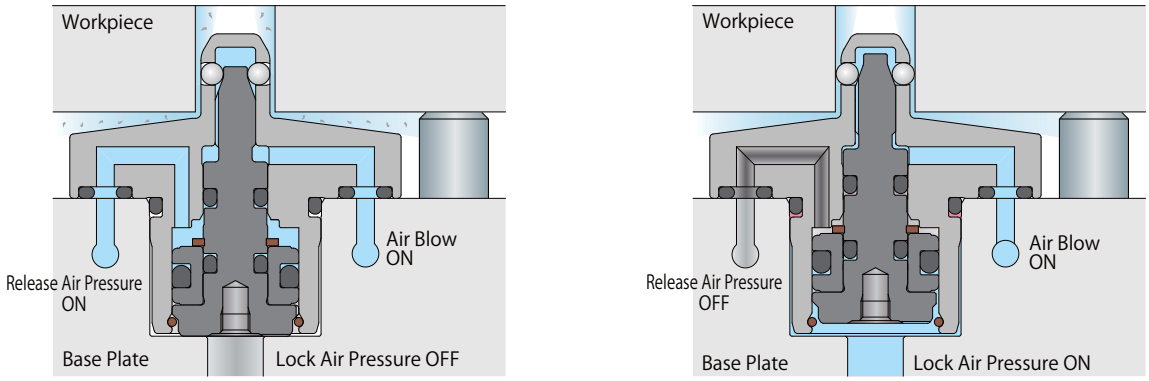
About Reference Locating and Orientation



WK-D:Datum ※1
(Reference Location)

WK-C:Cut
(One Direction Locating)

Notes ※1. Locating force varies according to phase.



When loading workpiece | When unloading workpiece

- When release air pressure is turned on and lock air pressure is off, piston rod is pulled down by air pressure and expansion locating pin is released.
- Air blow prevents debris contamination.

When locating

- When release air pressure is turned off and lock air pressure is on, piston rod rises.
  The steel ball comes out from the pin and locates workpiece.
  (For Z-axis, seat is also required.)

Model No. Indication

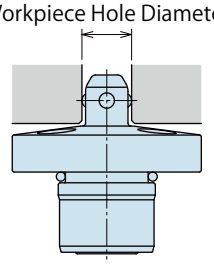
WK 0 09 0 - D

1 2 3

1 Workpiece Hole Diameter

08 : ϕ7.6~8.5 mm
09 : ϕ8.5~9.5 mm
10 : ϕ9.5~10.8mm

Workpiece Hole Diameter

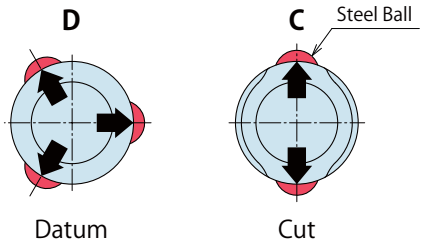


2 Design No.

0 : Revision Number

3 Functions

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



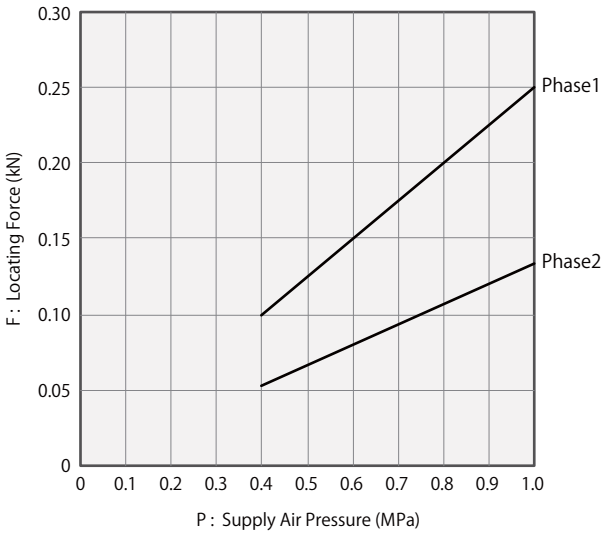
Specifications

Model No.			WK0080	WK0090	WK0100
Workpiece Hole Diameter (Standard)		mm	ϕ7.6~8.5	ϕ8.5~9.5	ϕ9.5~10.8
Locating Repeatability ※1		mm	0.010		
Offset Tolerance (C:Cut)		mm	±0.4	±0.4	±0.5
Allowable Thrust Load ※2		kN	0.45	0.6	0.8
Cylinder Capacity cm^3	Lock		0.28	0.34	0.40
	Release		0.21	0.25	0.30
Max. Operating Pressure		MPa	1.0		
Min. Operating Pressure		MPa	0.4		
Withstanding Pressure		MPa	1.5		
Air Blow Pressure		MPa	0.4~0.5		
Operating Temperature		℃	0~70		
Usable Fluid			Dry Air		
Mass		g	95	95	100

Notes :
※1. It shows locating repeatability under the specific condition (no load).
※2. "Allowable thrust load" has been calculated from "Pressure of contacted surface" on steel ball part.
In case an extra load force is applied than the above table value, will cause workpiece hole deformation or unsatisfied locating function.

Locating Force Curve

	Locating Force (kN)	
Supply Air Pressure (MPa)	Phase 1	Phase 2
1.0	0.25	0.13
0.9	0.23	0.12
0.8	0.20	0.11
0.7	0.18	0.09
0.6	0.15	0.08
0.5	0.13	0.07
0.4	0.10	0.05
Calculation Formula ※2	F = 0.25 × P	F = 0.132 × P



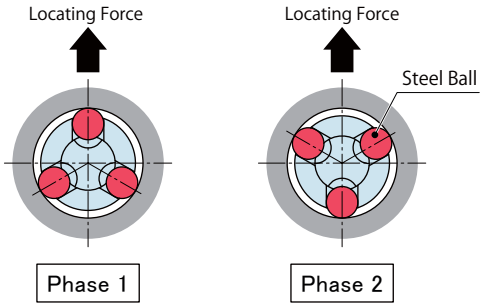
Notes

※2. F : Locating Force (kN), P : Supply Air Pressure (MPa)

1. The graphs show the relationship between the locating force and the supply air pressure.
2. Locating force indicates when the friction coefficient is μ=0.1 between workpiece hold surface and cylinder ball.
3. If the hole around area of workpiece is thin, there is a case that expansion force may deform workpiece hole, and results not perform well.
4. Maximum usable pneumatic pressure is 1 MPa and minimum is 0.4 MPa.

○ Phase 1、Phase 2

1. [Phase1][Phase2] in the graph above indicates the locating force in the case where workpiece is slid toward the arrow in the graph at right side.
2. Datum cylinder has no clamping function. Additional clamps should be added to secure workpiece.



About Locating Force and Workpiece Weight

Workpiece (Pallet) Weight Calculation - Horizontal Attitude

$$\text{Workpiece Weight} \leqq \frac{\text{Locating Force per One Piece of Expansion Locating Pin}}{\text{Friction Coefficient of Workpiece Seat Face}}$$

Workpiece (Pallet) Weight Calculation - Vertical Attitude

$$\text{Workpiece Weight} \leqq \text{Locating Force per One Piece of Expansion Locating Pin}$$

(How to calculate the weight of workpiece)

Ex.) The condition where pneumatic pressure 7.0MPa is supplied to WK and the friction coefficient on workpiece's seating area is set up at μ=0.1.

[Phase2] The locating force is 0.05kN → The maximum weight of workpiece is around 54.9kg in the following condition.

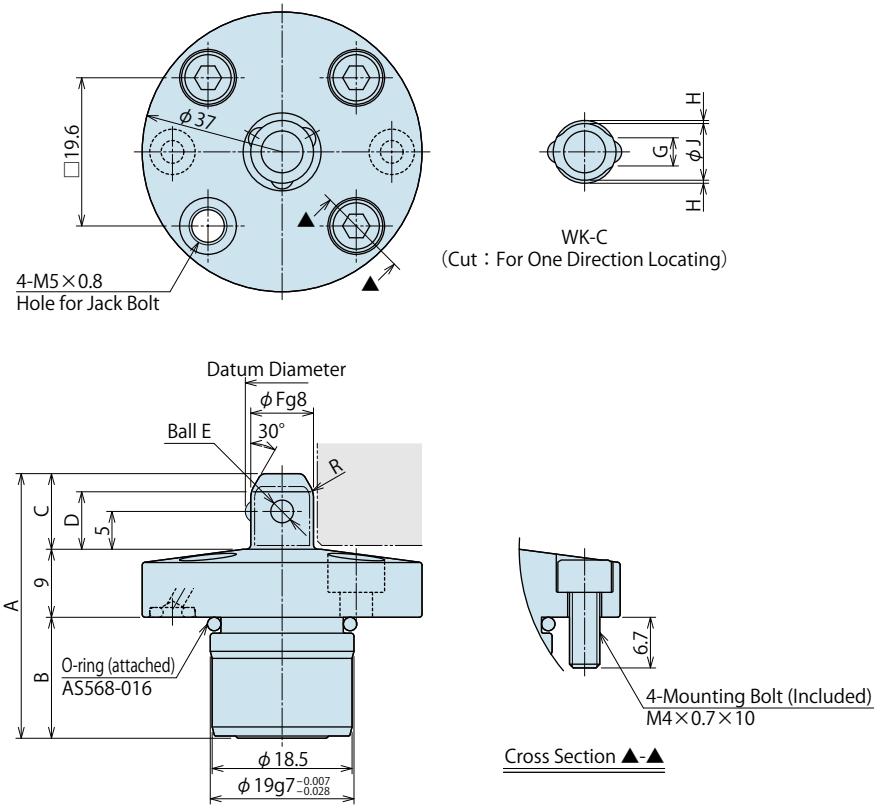
(set the workpiece in horizontal position)

[Phase1] The locating force is 0.10kN → The maximum weight of workpiece is around 54.9kg in the following condition.

(set the workpiece in vertical position and lay out WK as it is like phase 1)

External Dimensions

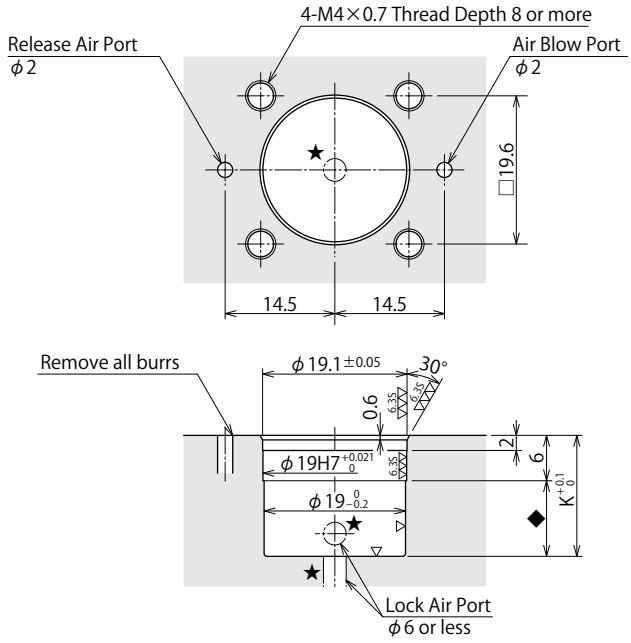
※This drawing shows the WK-D: (for Reference Locating).



Note

1. Tighten 4 bolts evenly (grade 12.9) when mounting. Remove mounting bolt. Insert jack bolt and tighten evenly to lift it.

Machining Dimensions of Mounting Area



Notes

1. Locking pressure can be supplied from either side or bottom of mounting hole (★ part) of this product.
   In case of supplying pressure from side of the hole, please prepare the port within the range of ◆ mark.
2. Roughness of mounting surface (O-ring seal surface) should be 6.3S or less.

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		WK0080	WK0090	WK0100
Hole Diameter of Machine Part (Standard) mm		ϕ7.6～8.5	ϕ8.5～9.5	ϕ9.5～10.8
Datum Diameter mm	At Releasing (Max.)	ϕ7.5 or less	ϕ8.3 or less	ϕ9.3 or less
	At Full Stroke (Min.)	ϕ8.5 or more	ϕ9.5 or more	ϕ10.8 or more
Stroke mm		1.8	2.2	2.6
A		34.0	35.0	35.5
B		15.5	16.0	16.0
C		9.5	10.0	10.5
D		7.2	7.6	7.8
E		2.5	3.0	3.5
F		$7.5^{-0.005}_{-0.027}$	$8.3^{-0.005}_{-0.027}$	$9.3^{-0.005}_{-0.027}$
G		3.5	4.0	4.5
H		0.4	0.4	0.5
J		6.7	7.5	8.3
K		15.5	16.0	16.0
R		R2.5	R3	R3

Cautions

Notes for Design WM/WK Common

1) Check Specifications

- Please use each product according to the specifications. WM/WK locates and releases with pneumatic pressure.

2) Notes for Circuit Design

- Please read "Notes on Cylinder Speed Control Circuit" on P.235、P.236 to assist with proper pneumatic circuit design. Carry out sufficient advance review as the wrong circuit design may lead to machine malfunctioning and damage.
- It is recommended to use the air flow path over ϕ6mm.

3) Air is always recommended to be supplied to the air blow port.

- If it is used under the condition that pneumatic pressure is not supplied, foreign substances would enter inside cylinder which causes malfunctions.

4) Setting Up the Clamps

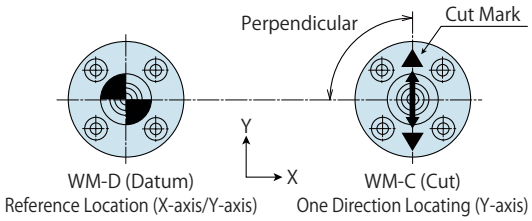
- The datum cylinder is a positioning cylinder and has no clamping mechanism. A clamp must be provided separately.

5) Cylinder Mounting Direction (Phase)

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

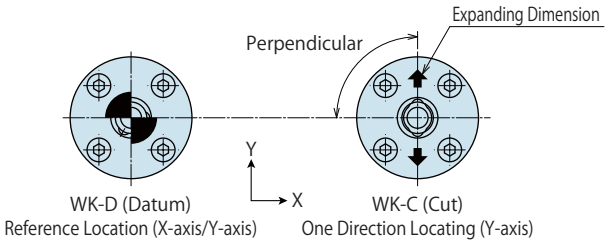
In the case of WM

When you mount it, make sure the WM-C (cut) cut mark is perpendicular to WM-D (datum).
(There is a cut mark (▲) on top of the flange on the WM-C unit that shows the positioning direction.)



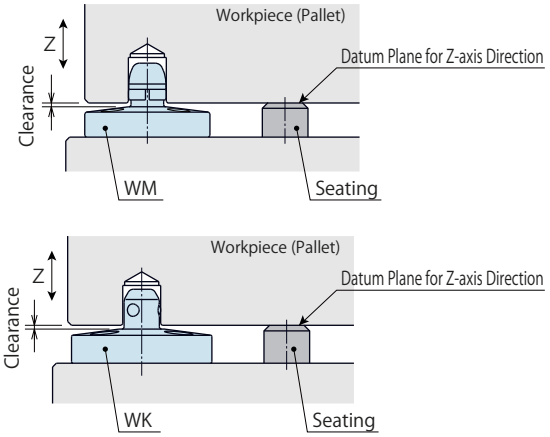
In the case of WK

Please mount this product WK-C steel ball is perpendicular (90 degree) to WK-D.



6) Reference Surface towards Z-axis

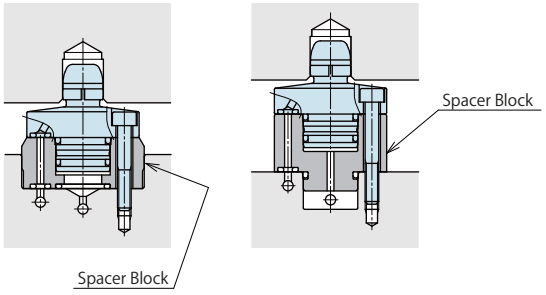
- Datum cylinder has no seat face (Z axis datum face). Please prepare the seat separately for proper Z axis direction positioning.
  Make sure there is a clearance between the top of the flange on the datum cylinder and the workpiece (pallet).
  (Recommended clearance：0.5 ～ 1mm)



7) Adjusting Height of Datum Cylinder

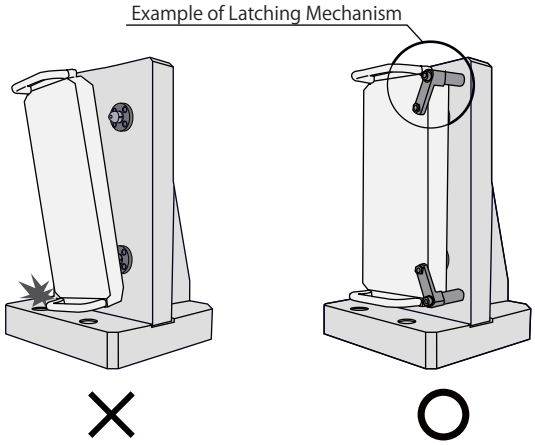
- For applications where the seat face is high and the height of datum cylinder is not enough, the height of datum cylinder is adjustable using a spacer block under the datum cylinder.

Example of Height Adjustment



8) When the workpiece (pallet) is in vertical position.

- When the workpiece (pallet) 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 (pallet) may fall down during releasing, it is recommended to set up the latching mechanism to prevent it from falling down.
- When the workpiece (pallet) is used in vertical position (hanging on the wall), the internal moving parts tend to wear out.
  Confirm the positioning precision in a regular manner. In case the allowed range is exceeded, change the machine.



9) Workpiece (Pallet) Weight

- Workpiece (Pallet) Weight Calculation - Horizontal Attitude:

$$\text{Workpiece Weight} \leqq \frac{\text{Locating Force per One Piece of Expansion Locating Pin}}{\text{Friction Coefficient of Workpiece Seat Face}}$$

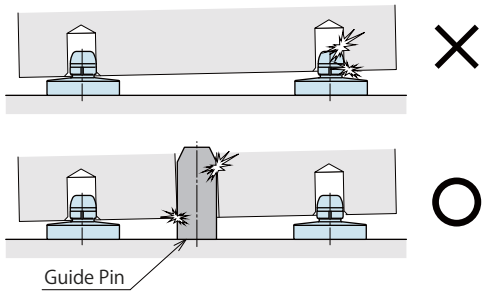
- The workpiece (pallet) weight calculation - vertical attitude:

$$\text{Workpiece Weight} \leqq \text{Locating Force per One Piece of Expansion Locating Pin}$$

- Please contact us in case the pallet is in other positions.

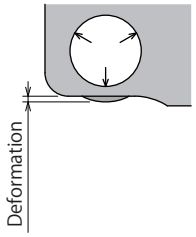
10) Incline in the Z-axis direction.

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



11) Thickness around the Workpiece Hole

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



Cautions

Notes for Design Regarding to WM

1) Distance Accuracy of WM

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

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

[JIS B 0613 Except] unit : mm

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

Notes for Design Regarding to WK

1) Distance Accuracy of WK

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

2) Regarding taper angle of hole on workpiece.

- Allowable taper angle should be within 5° or inclination should be within 2.5° . In addition to that, please adjust the seating block level (Z axis level) to make the hole diameter within catalogue range.

Installation Notes

1) Check the fluid to use
- Please supply filtered clean dry air.
- Oil supply with a lubricator etc. is unnecessary.

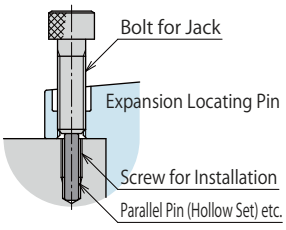
2) Procedure before Piping
- The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly.
  The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
- There is no filter provided with this product for prevention of contaminants in the air circuit.

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

4) Mounting / Removing Cylinder
- 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)
WM	M4×0.7	3.2
WK	M4×0.7	3.5

- When detaching, please use screw for the jack (the installation bolt hole : four 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) Port Location of Datum Cylinder
- The name of each port is marked on the flange surface of the equipment.
  Be careful of installation direction.

Regarding to WM
AIR : Air Lock Port、BLOW : Air Blow Port
Regarding release air port, it is supposed to be supplied either from cylinder bottom surface area.

Regarding to WK
AIR : Air Release Port、BLOW : Air Blow Port
Regarding lock air port, it is supposed to be supplied either from cylinder bottom surface area.

6) Please use air blow circuit with outside diameter.
φ6 (inside diameter φ4) or larger.
- To do an effective air blow, it is recommended to use air piping with outside diameter φ6 (inside diameter φ4) or larger.

※ Please refer to P.1045 for common cautions. • Notes on Handling • Maintenance/Inspection • Warranty

Cautions

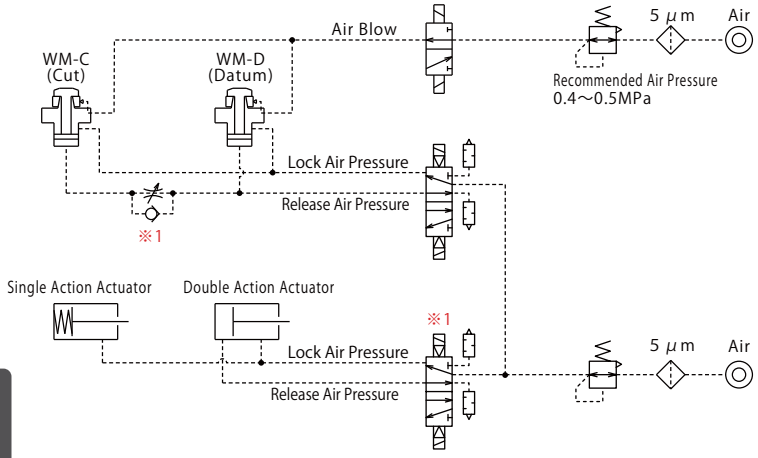
Notes on Cylinder Speed Control Circuit Regarding to WM

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

Circuit Reference

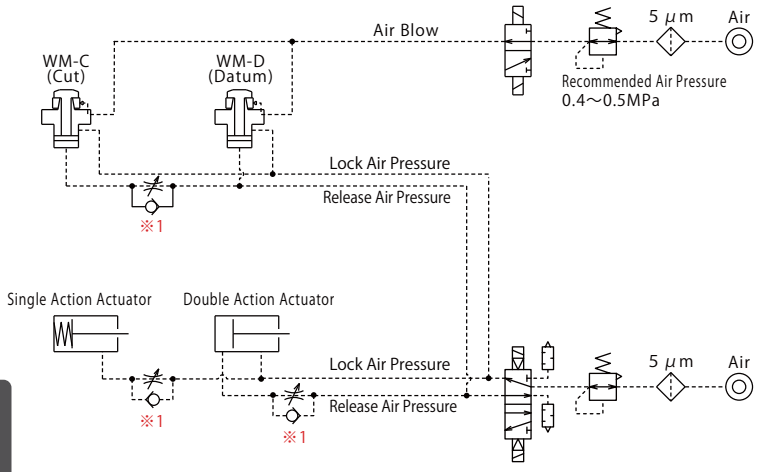
Double Action
model WM

Datum cylinders and other actuators on different circuits



WM
Locating with Spring and Air Pressure
Releasing with Air Pressure

Datum cylinders and other actuators on the same circuit



WM
Locating with Spring and Air Pressure
Releasing with Air Pressure

Note

※1. Process order during lock operation should be " WM-D (Datum)"→" WM-C (Cut)"→ other actuator.

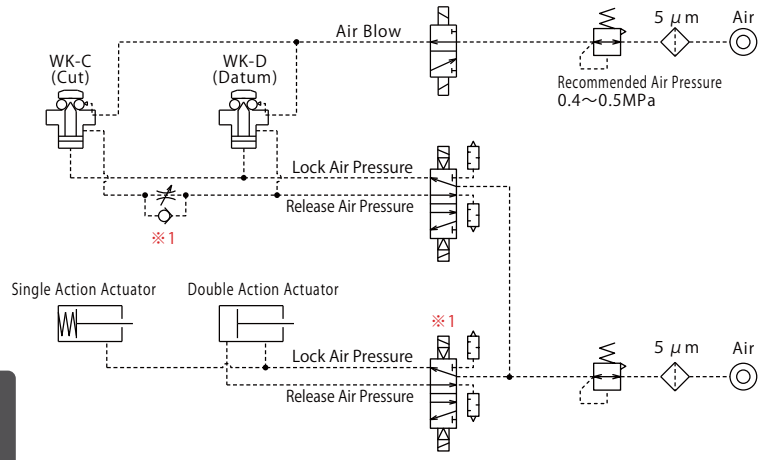
Notes on Cylinder Speed Control Circuit Regarding to WK

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

Circuit Reference

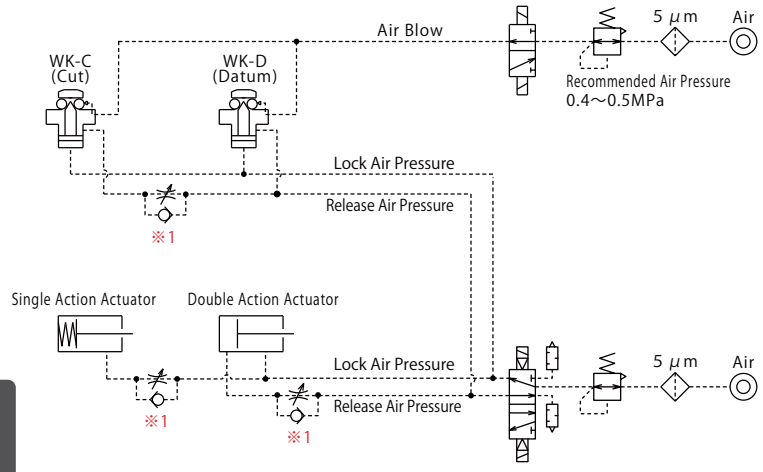
Double Action
model WK

Datum cylinders and other actuators on different circuits



WK
Locating and Releasing with Air Pressure

Datum cylinders and other actuators on the same circuit



WK
Locating and Releasing with Air Pressure

Note

※1. Process order during lock operation should be " WK-D (Datum)"→" WK-C (Cut)"→ other actuator.

Cautions

Installation Notes (For Hydraulic Series)

1) Check the Usable Fluid

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

2) Procedure before Piping

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

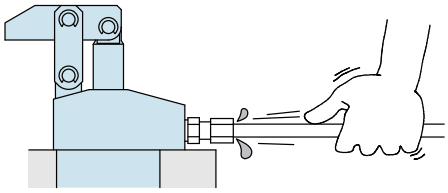
3) Applying Sealing Tape

- Wrap with tape 1 to 2 times following the screw direction.
- Pieces of the sealing tape can lead to oil leakage and malfunction.
- In order to prevent a foreign substance from going into the product during the piping work, it should be carefully cleaned before working.

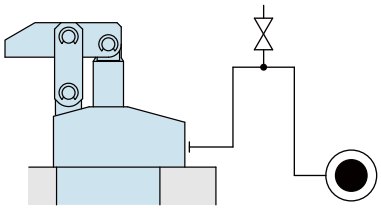
4) Air Bleeding of the Hydraulic Circuit

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

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



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



5) Checking Looseness and Retightening

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

Hydraulic Fluid List

ISO Viscosity Grade ISO-VG-32

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

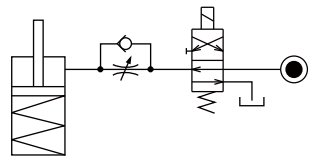
Note As it may be difficult to purchase the products as shown in the table from overseas, please contact the respective manufacturer.

Notes on Hydraulic Cylinder Speed Control Unit

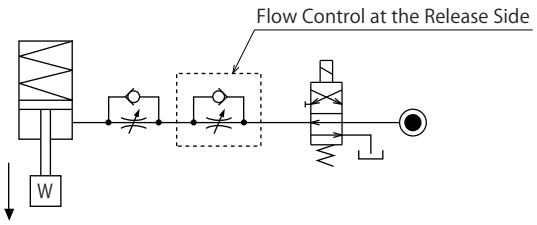
Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Flow Control Circuit for Single Acting Cylinder

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



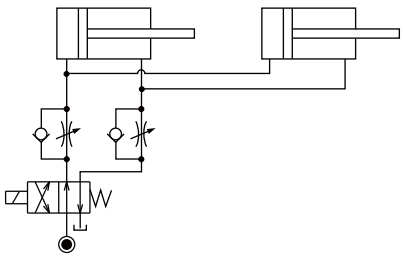
Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)



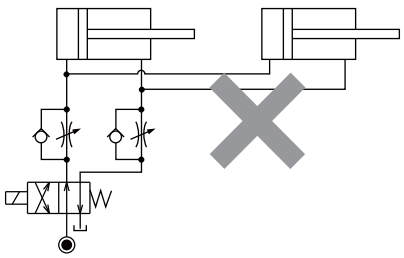
Flow Control Circuit for Double Acting Cylinder

Flow control circuit for double acting cylinder should have meter-out circuits for both the lock and release sides. Meter-in control can have adverse effect by presence of air in the system.
However, in the case of controlling LKE, TMA, TLA, both lock side and release side should be meter-in circuit.
Refer to P.47 for speed adjustment of LKE.
For TMA and TLA, if meter-out circuit is used, abnormal high pressure is created, which causes oil leakage and damage.

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

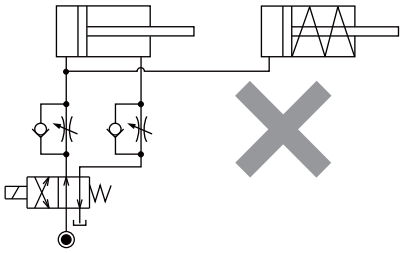


【Meter-in Circuit】(LKE/TMA/TLA must be controlled with meter-in.)



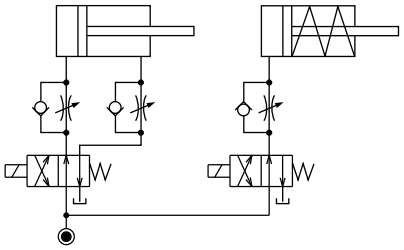
In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

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

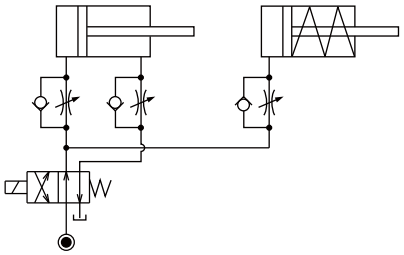


Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.

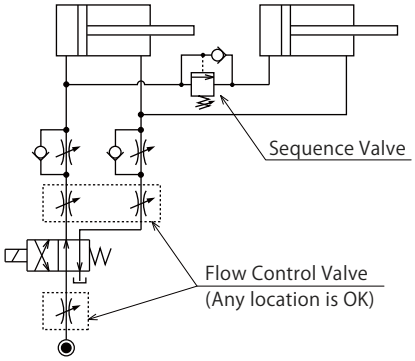
○ Separate the control circuit.



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



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



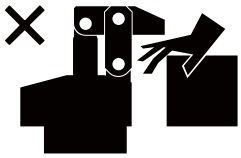
Cautions

Notes on Handling

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

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

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

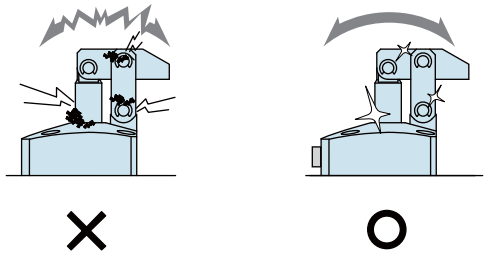


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

Maintenance and Inspection

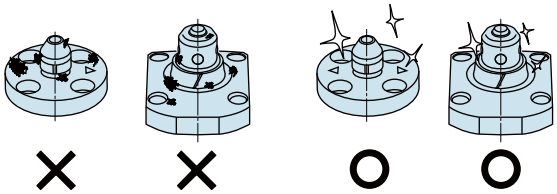
1) Removal of the Machine and Shut-off of Pressure Source
- Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
- Make sure there is no abnormality in the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

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



3) Please clean out the reference surface regularly (taper reference surface and seating surface) of locating machine .(VS/VT/VL/VM/VJ/VK/WVS/WM/WK/VX)

- Location products, except VX/VXF model, can remove contaminants with cleaning functions.
  When installing pallets makes sure there is no thick sludge like substances on pallets.
- Continuous use with dirt on components will lead to locating functions not work properly, leaking and malfunction.



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

5) Regularly tighten nuts, bolts, pins, cylinders and pipe line to ensure proper use.

6) Make sure the hydraulic fluid has not deteriorated.

7) Make sure there is smooth action and no abnormal noise.
- Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

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

9) Please contact us for overhaul and repair.

Warranty

1) Warranty Period

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

2) Warranty Scope

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

① If the stipulated maintenance and inspection are not carried out.
② If the product is used while it is not suitable for use based on the operator's judgment, resulting in defect.
③ If it is used or handled in 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.

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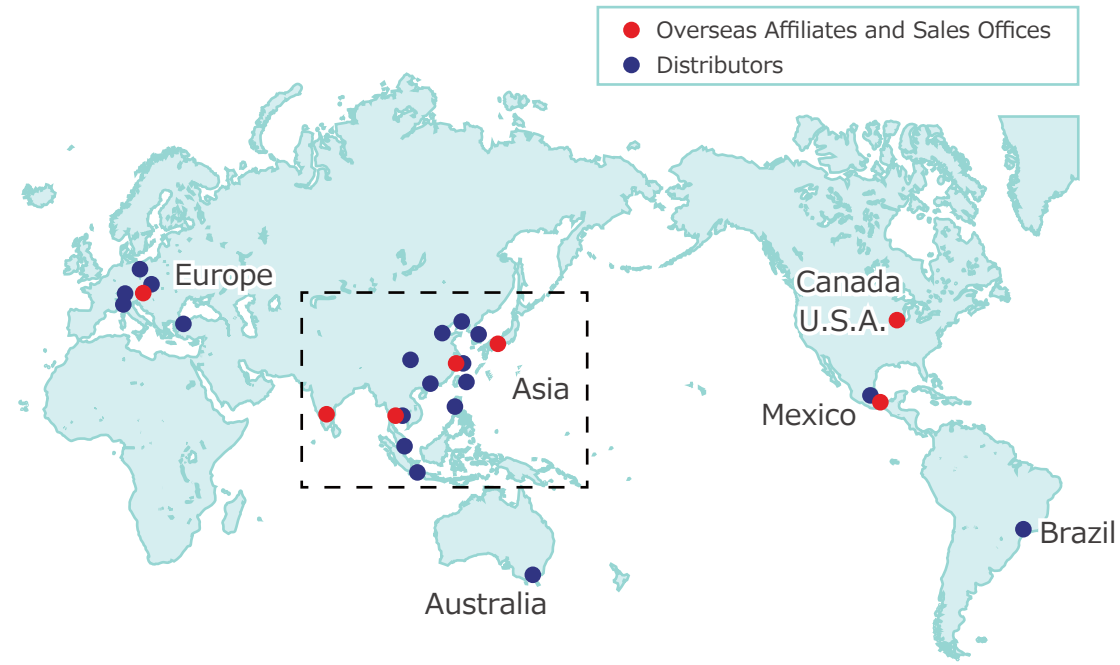
Global Network



Asia Detailed Map

KOSMEK
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