WAHLTEC®
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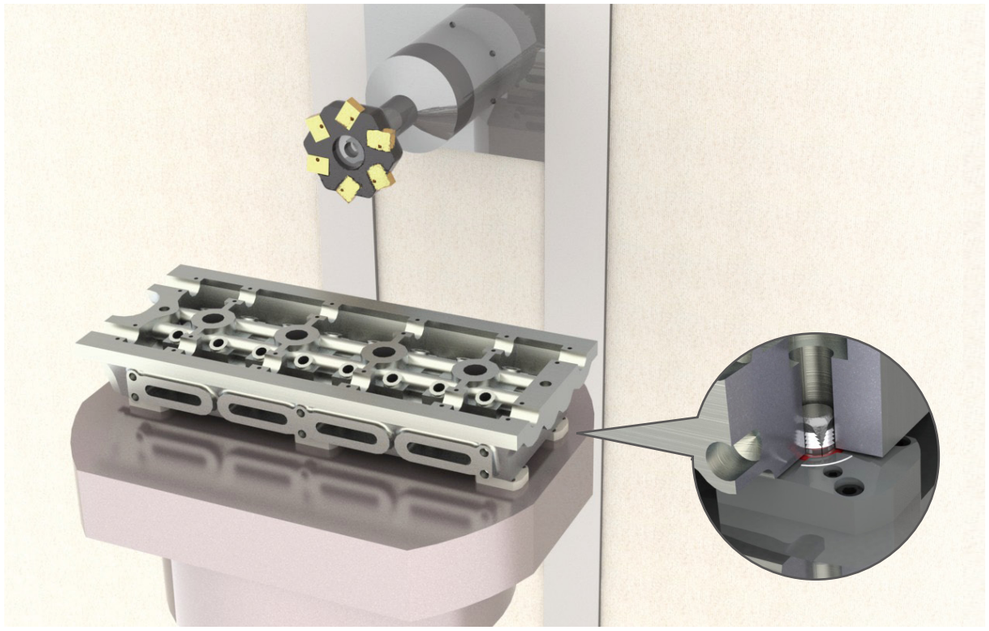
Pneumatic Hole Clamp

Model **SWH**

Expansion of gripper, pull and clamp in the workpiece hole

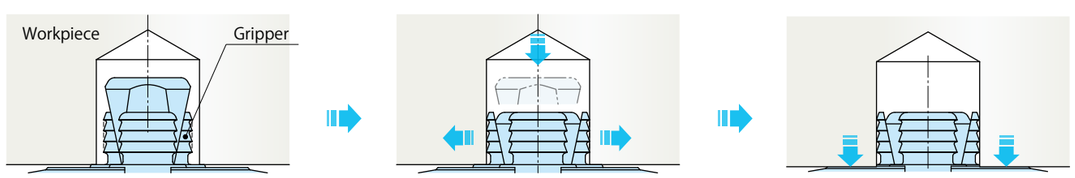
PAT.

Interference free work holding concept



Action Description（Tip of Hole Clamp）

※The alignment with hole (±0.5mm).



＜ Released State ＞
Loading/Unloading Workpiece

＜ Clamping State ＞
Gripper expands to hold workpiece hole.

＜ Clamping Completed ＞
Pulls down onto resting surface.
※Creates a dig mark in the clamping hole.

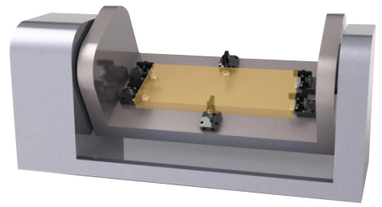
Advantages

To workpiece

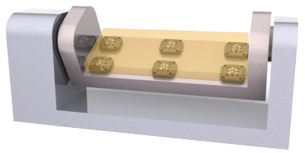
- Zero interference with 5 faces except clamping face.
- Possible to use standard length tool which provides better precision.
- Possible to enhance cutting parameters which leads to shorter cycle times.

To processing facility

- Fixture could be extremely downsized.
- Turn-table could be downsized.
- The movement of tool could be shorten.
- For saving weight of fixture.
- Processing facility could be more simple.
- Good design for efficient swarf management and reduction in coolant usage.



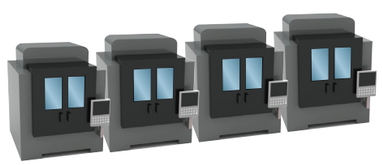
<Before>
Clamping the outer side of the workpiece.



<After>
Using the hole clamps.

To processing line

- 5 faces processing makes it possible to put process together.
- Processing line is kept small and simple.
- Possible to enhance cutting parameters which leads to shorter cycle times.



<Before>
Big machining centers and long machining lines

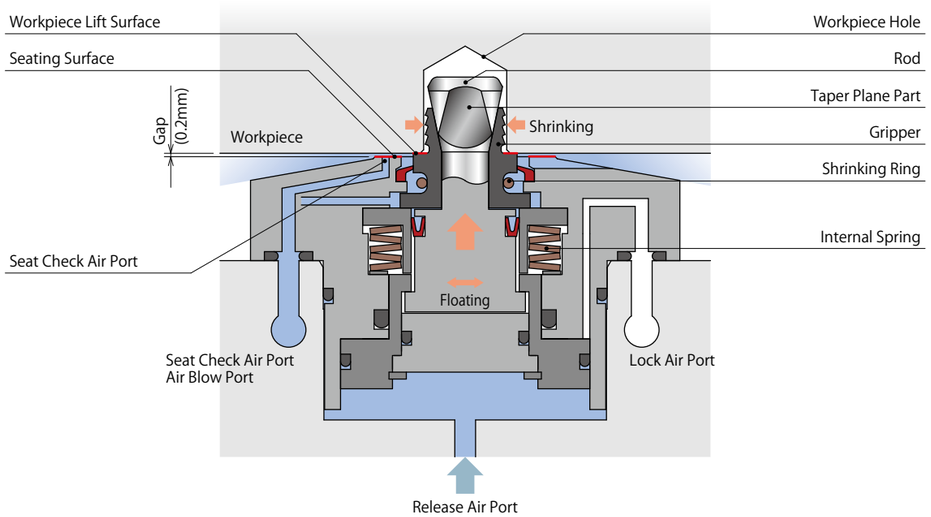
<After>
Smaller machining centers and shorter machining lines.

Action Description

Released State

When air pressure is supplied to the release port, the rod is lifted up and the gripper retracts.
(Gap is generated between workpiece bottom surface and seating surface.)

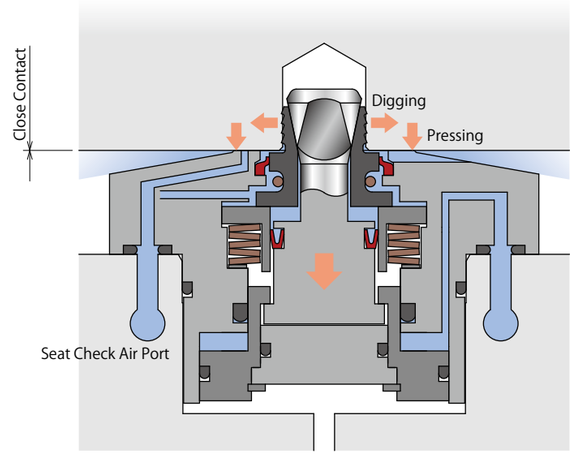
Air Pressure Switch		Seat Check Detection
Release Air Pressure	Lock Air Pressure	(Air Sensor)
ON	OFF	OFF



Locked State

When air pressure is supplied to the lock port, the rod descends and the gripper expands along the taper plane.
(At this moment, because dish-spring is lifting the gripper, the gripper does not do pulling down action.)
When pulling force exceeds the internal spring force, pulling down force works after the gripper digs into workpiece. Then, it presses workpiece onto seating surface.
(Clamping force = Pressing force onto seating surface.)

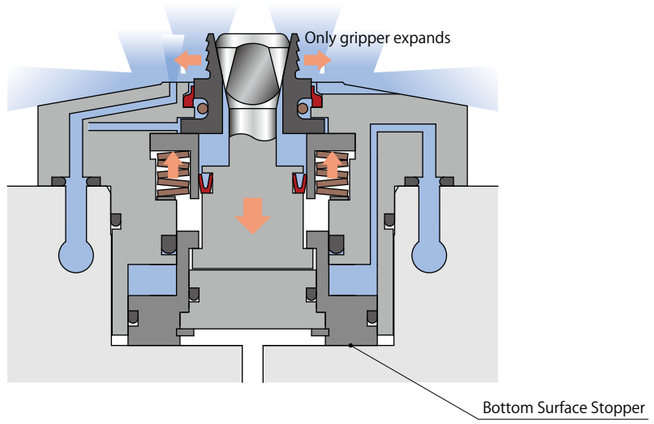
Air Pressure Switch		Seat Check Detection
Release Air Pressure	Lock Air Pressure	(Air Sensor)
OFF	ON	ON



Operation without Workpiece

When air pressure is supplied to the lock port without the component, the gripper expands fully.
(Pulling down action is not operated because of internal spring force.)

Air Pressure Switch		Seat Check Detection
Release Air Pressure	Lock Air Pressure	(Air Sensor)
OFF	ON	OFF



Model No. Indication

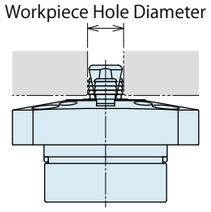
SWH 2 10 0 - G N

1 2 3

1 Workpiece Diameter (Standard)

06 : φ6 $^{+0.70}_{-0.30}$ mm
07 : φ7 $^{+0.70}_{-0.30}$ mm
08 : φ8 $^{+0.70}_{-0.30}$ mm
09 : φ9 $^{+0.70}_{-0.30}$ mm
10 : φ10 $^{+0.70}_{-0.30}$ mm
11 : φ11 $^{+0.70}_{-0.30}$ mm
12 : φ12 $^{+0.70}_{-0.30}$ mm
13 : φ13 $^{+0.70}_{-0.30}$ mm

Workpiece Hole Diameter



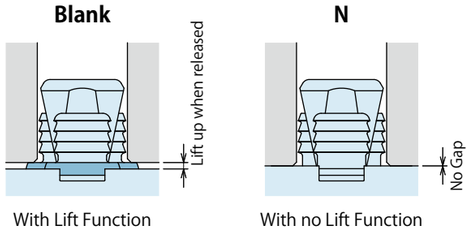
2 Design No.

0 : Revision Number

3 Workpiece Lifting Option

Blank : With Lift Function
N : With No Lift Function

Notes
1. When using locating cylinders (model VL, VM, VJ, VK, WM, WK, VX) please choose with no lift function model. (Please refer to layout sample and hydraulic and pneumatic circuit reference.)



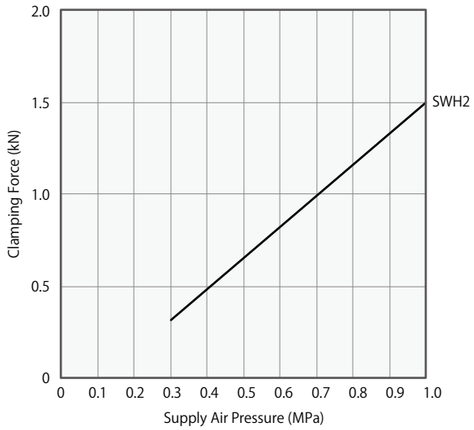
Specifications

	Model No. (Workpiece Hole Diameter:Standard)		SWH2							
			060	070	080	090	100	110	120	130
Machine Part	Workpiece Hole Diam.φd	mm	6 $^{+0.70}_{-0.30}$	7 $^{+0.70}_{-0.30}$	8 $^{+0.70}_{-0.30}$	9 $^{+0.70}_{-0.30}$	10 $^{+0.70}_{-0.30}$	11 $^{+0.70}_{-0.30}$	12 $^{+0.70}_{-0.30}$	13 $^{+0.70}_{-0.30}$
	Hardness		HB250 or less							
	Slope Angle		3° or less							
Clamp Specifications	Clamp Diam.	When Released mm	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
		Empty Action mm	7.3	8.3	9.3	10.3	11.3	12.3	13.3	14.3
	Clamping Force Formula ※1	kN	F = 1.70 × P – 0.20							
	Allowable Offset (Floating Clearance of Expanding Area)	mm	±0.5							
	Full Stroke	mm	4.5							
	Pulling Stroke of Machine Part	mm	1.2							
	Lifting Force of Machine Part ※3	mm	0.2							
	Work Lift Force ※3	kN	0.1							
	Cylinder Capacity (Empty Action)	Release cm³	9.6							
		Lock cm³	8.3							
	Max. Operating Pressure ※4	MPa	0.8	1.0						
	Min. Operating Pressure ※4	MPa	0.3	0.3						
	Withstanding Pressure ※4	MPa	1.2	1.5						
	Usable Fluid		Dry Air							
	Recommend Air Blow Pressure	MPa	0.4～0.5							
	Operating Temperature	℃	0～70							
	Mass	kg	0.72							

Notes
※1. Clamping force shows pressing force against the seating surface. F：Clamping Force（kN）, P：Supply Air Pressure (MPa).
※2. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole.
The numerical value in the table shows the amount of tolerance value of one clamp.
Please consider the clamp installation distance accuracy and distance accuracy of the component hole when used with another location clamp / location cylinder, or when using more than two of these products.
※3. The lift stroke and the lift force are functions only for lifting options (Standard model).
※4. Only in the case of SWH2060; Maximum operating pressure, Minimum operating pressure and design pressure are different from others.

Performance Curve

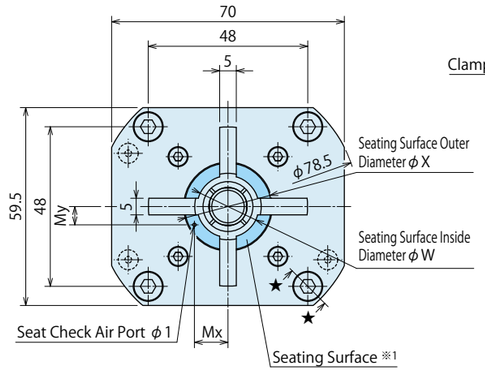
Model No.	Clamping Force (kN) Non-Usable Range (■) SWH2							
Supply Air Pressure (MPa)	060	070	080	090	100	110	120	130
1.0	–	1.50						
0.9	–	1.33						
0.8	1.16							
0.7	0.99							
0.6	0.82							
0.5	0.65							
0.4	0.48							
0.3	0.31							
Clamping Force Formula※5 (kN)	F = 1.70×P – 0.20							
Max. Operating Pressure (MPa)	0.8	1.0						

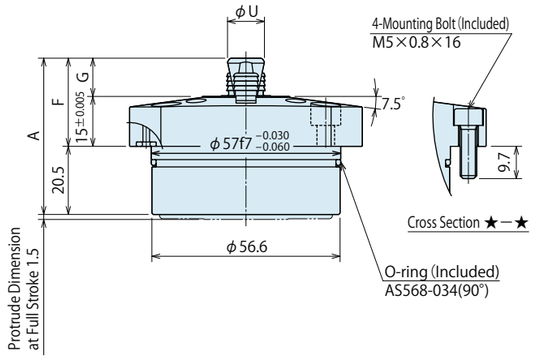


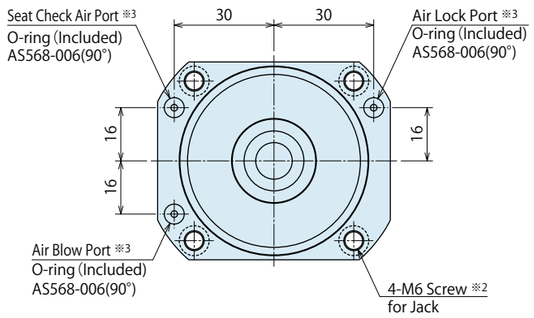
Notes
※5. F：Clamping Force（kN）, P：Supply Air Pressure (MPa).
1. This graph shows the relationship between clamping force (kN) and supply air pressure (MPa).
2. Clamping force shows pressing force against the seating surface.
3. If the hole around area of workpiece is thin, there is a case that expansion force may deform workpiece hole, and results not perform well. Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
4. The maximum operating air pressure is 1.0MPa and minimum operating pressure is 0.3MPa.
SWH2060 only：The maximum operating air pressure is 0.8MPa and minimum operating pressure is 0.3MPa.

External Dimension

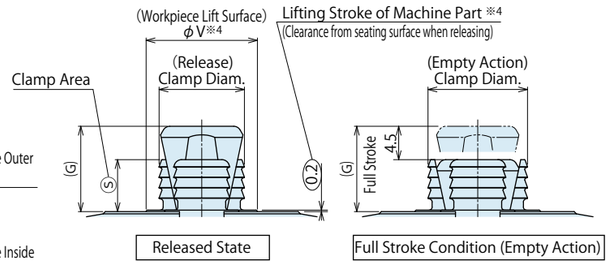
※This drawing shows the released state of SWH.



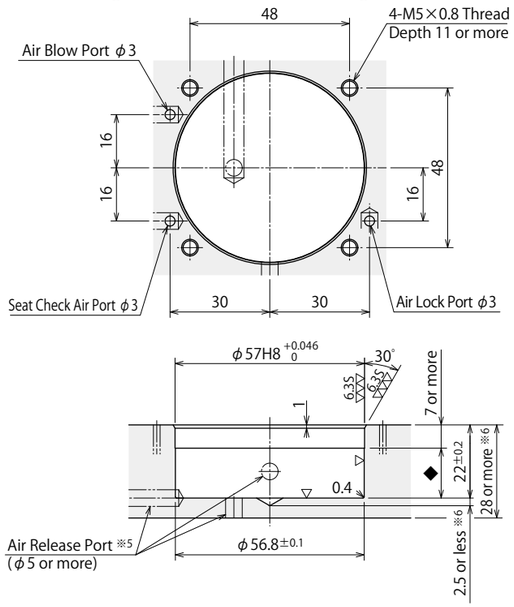




Expanding Area Detail



Machining Dimensions of Mounting Area



Notes

1. Make sure no burrs are on or around the hole intersection.

※5. Release air pressure can be supplied from the side or bottom.
When supplying from side, please make the hole in the range of ◆.

※6. Base thickness (28mm) and remaining depth of the lower hole processing (2.5mm) is for when the material is S50C.

Notes

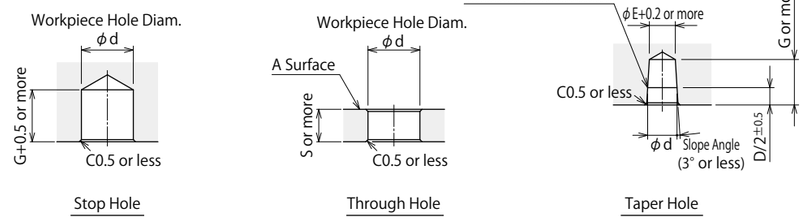
※1. The workpiece must be resting on all seating surfaces when clamping.
If this is not done the work piece can become deformed by the clamping force.

※2. Screw jack is used when removing hole clamp.
Remove mounting bolt. Insert jack bolt and tighten evenly to lift it.

※3. The name of each port is marked in the flange surface of this work piece.
(AIR : Air lock port、FC : Seat check air port、BLOW : Air blow port)
Air is always recommended to be supplied to the air blow port and seat check port.

※4. This numerical value is only of the lifting option (standard).

Workpiece Hole Dimension



Notes

1. When there is a thin wall around the workpiece hole, the work hole could be deformed by the clamping operation.
The clamping force does not fill the specification value.
Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
2. If the clamp head pops out from the surface of workpiece A, please take into account so that there is no interference to the clamp during the machining workpiece.

External Dimensions and Machining Dimensions for Mounting

	Model No. (Workpiece Hole Diameter:Standard)		SWH2							
			060	070	080	090	100	110	120	130
Machine Part	Workpiece Hole Diameter φd	mm	6 +0.70 −0.30	7 +0.70 −0.30	8 +0.70 −0.30	9 +0.70 −0.30	10 +0.70 −0.30	11 +0.70 −0.30	12 +0.70 −0.30	13 +0.70 −0.30
	Hardness		HB250 or less							
	Slope Angle		3° or less							
Specifications of Clamp	Clamp Diam. When Releasing (Max.)	mm	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
	Clamp Diam. Empty Action (Min.)	mm	7.3	8.3	9.3	10.3	11.3	12.3	13.3	14.3
	Allowable Offset ※7 (Floating Clearance of Expanding Area)	mm	±0.5							
	Full Stroke	mm	4.5							
	Pulling Stroke of Machine Part	mm	1.2							
	Lifting Stroke of Machine Part ※8	mm	0.2							

(mm)

Model No. (Workpiece Hole Diameter:Standard)		SWH2							
		060	070	080	090	100	110	120	130
A		44.5		45.5			47		
F		24		25			26.5		
G		9		10			11.5		
Mx		7.5	8	8.4	8.8	9.3	9.7	10.1	10.6
My		4	4.2	4.5	4.7	5	5.2	5.5	5.7
S		5.5		6			7		
U		5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
V		9	10	11	12	13	14	15	16
W	SWH-G : Workpiece Lift Function	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5
	SWH-GN: Without Workpiece Lift Function	10	11	12	13	14	15	16	17
X		20	21	22	23	24	25	26	27

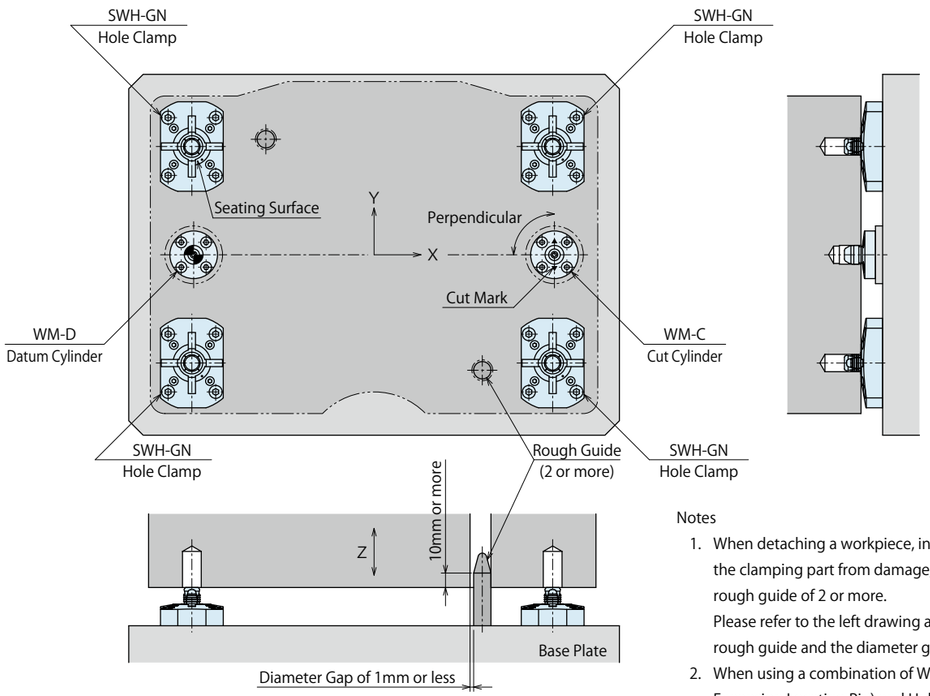
Notes

※7. The clamping part is an adjusting structure and the clamping operation is done by locating the work hole.
The numerical value in the table shows the amount of tolerance of one clamp.
Please consider the clamp installation distance accuracy and the workpiece hole distance accuracy when using with another locating clamp / locating cylinder, or using more than two of these products.

※8. The lift stroke and the lift force are functions only for lifting option (Standard).

Mounting Layout Sample

※ The following figure shows a layout sample of SWH-GN (Hole Clamp) and WM (Pneumatic Expansion Locating Pin).

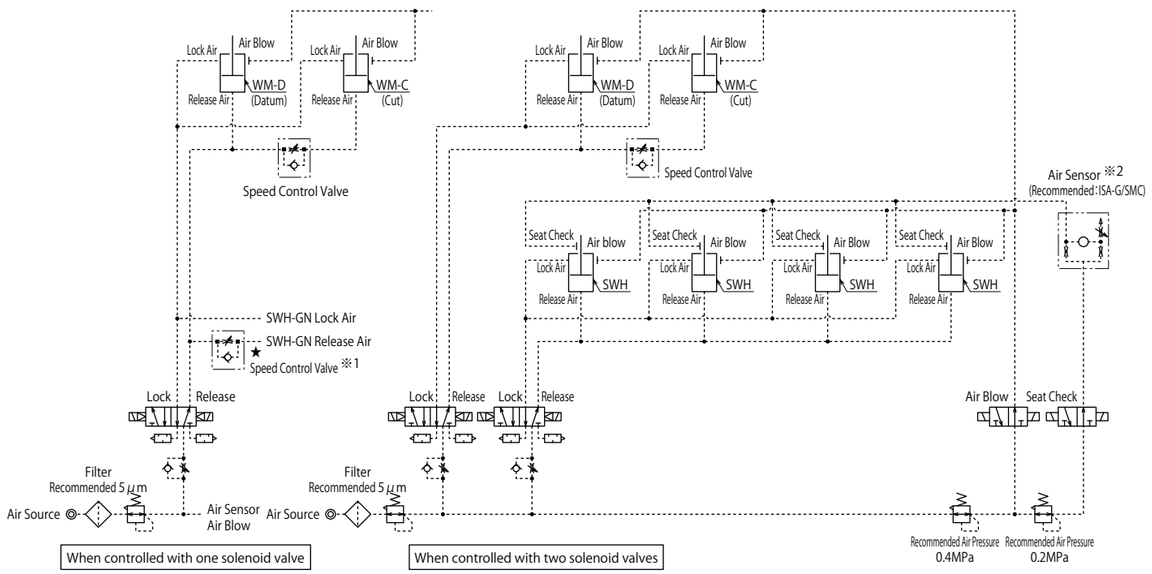


Notes

1. When detaching a workpiece, in order to prevent the clamping part from damage, please set up rough guide of 2 or more.
   Please refer to the left drawing about the length of rough guide and the diameter gap.
2. When using a combination of WM (Pneumatic Expansion Locating Pin) and Hole Clamp please choose non-lift function.

Pneumatic Circuit Reference

※ This drawing shows a combination circuit reference of SWH-GN (Hole Clamp) and WM (Pneumatic Expansion Locating Pin).



Notes

※1. When using with other location clamps / location cylinders, make a sequence operating circuit. After the location cylinder activated, make sure to activate hole clamp by using a solenoid valve. When unable to use solenoid valve, please prepare flow control valve with check valve at ★(1 piece) to adjust sequencing speed. If SWH hole clamp operates before WM location cylinder, there is a possibility for the the equipment to be damaged due to a thrust load on SWH hole clamp.

※2. To reach required accuracy in setting air sensor, please install air sensor for each individual clamp.

1. Activation of WM-D (Datum) should be approximately simultaneous or earlier than the WM-C (Cut).

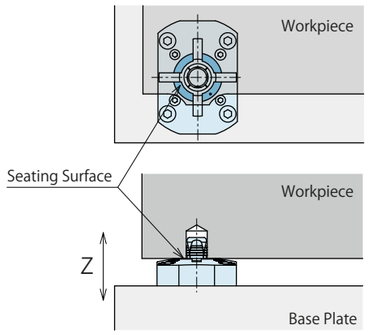
MEMO

Cautions

Notes for Design

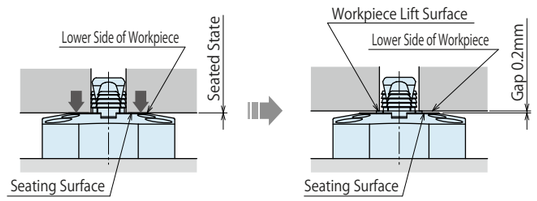
1) Check Specifications
- Please use each product according to the specifications.
- This equipment is clamped and released by air pressure.

2) Working Reference Plate (Seating Surface) Z axis.
- The upper surface of the flange of this equipment is the seating surface of the work piece and locates in the Z direction.



When clamping, make sure all seating surfaces are touching work piece. When the work piece is not touching the seating surface area, please refer to the outline dimension chart and calculate clamping force, seating area and contacting pressure not to deform the work piece.

3) Seating Check Mechanism
- Work piece is pressed against the seating surface by lock (clamp) operation and the seating check is detected.



In case of using lift-up function option(Model: SWH□0-GN), when work is set (before supplying the lock air pressure), the work piece is lifted up by a built-in spring. There will be a gap of 0.2mm between the workpiece bottom surface and the seating surface.

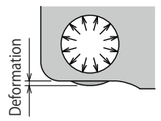
4) Clamp Installation
- The clamping part of this equipment has the adjusting mechanism (±0.5mm).
  When using two or more location clamps, location cylinders, etc., please consider the accuracy between clamping installation distance accuracy of the holes.

5) Clamping Force
- Clamping force shows power of pressing force against the seating surface.
  Please do trial testing and adjust to proper pneumatic pressure.
  When using in a state that the clamping force is insufficient, the work piece may fallout.

6) Please use work hole size and workspace hardness within the range of the specification.

When the work hole diameter is larger than specification.	The amount of the diameter expansion is insufficient and the clamping force does not satisfy the specification.
When using insufficient clamping force.	Leads to fallout of the work piece.
When the work hole diameter is smaller than specification.	Detaching of the work piece becomes difficult and could lead to damage.
When the work hole depth is shallow.	Could lead to abnormal seating and damage.
When the work piece hole taper is larger than standard.	The load concentrates on the gripper point when clamping and could lead to damage.
When the workpiece is harder than specified.	Gripper does not dig into work enough reliable clamping cannot be achieved.

7) Workpiece Hole Material Thickness
- When there is a thin wall around the work piece hole, the work hole could be deformed by the clamping operation.
  The clamping force does not fill the specification.
  Please do trial testing and adjust to proper pneumatic pressure.
  When using in a state that the clamping force is insufficient, the work piece may fallout.



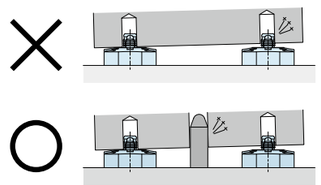
8) Air Blow Port and Seating Check Port
- Air is always recommended to be supplied to the air blow port and the seating check port. Using the product without air supply, this will lead to contaminants entering and leading to malfunction.

9) Release Condition
- When releasing, it lifts up the work piece which is normal.
  When using in a horizontal application, it' s recommended to install work fallout preventions and other temporary stop mechanisms.

10) Horizontal Locating
- When the work piece is set, please make sure that there is no lifting or slope of the work piece.
  If the clamping operation is done with lifting or slope of the work piece, it will lead to possible damage of the work hole.

11) Please detach work piece with all clamps released completely.
- When detachment of the work piece during lock operation or release operation, it will lead to deformation and clamping damage of the work piece hole.

12) Please set up rough guides.
- When detachment of the work piece with slope it may will lead work piece or clamping damage and work piece fallout.



Please prepare rough guides when using with the other location clamps and location cylinders.
Please consider the distance between hole clamps installation tolerance and work piece hole distance tolerance.

Notes on installation

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

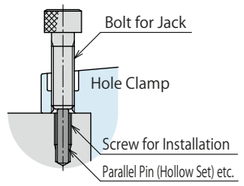
2) Procedure before Piping
- The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly.
  The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
- There is no filter provided with this product for prevention of contaminants in the air circuit.

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 the Body
- When mounting the product use all hexagon socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the chart below.
  Tighten them evenly to prevent twisting or jamming.

Model No.	Thread Size	Tightening Torque (N·m)
SWH2	M5×0.8	6.3

- 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.



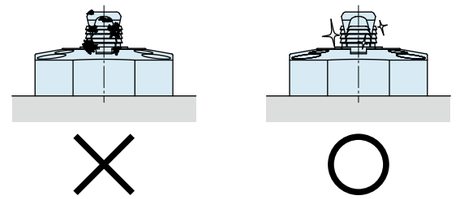
5) Port Position of the Hole Clamp
- The name of each port is marked on the flange surface of the equipment.
  Be careful of installation direction.
  (AIR : Air Lock Port、FC : Seating Check Port、BLOW : Air Blow Port)
  Release pressure is supplied from the bottom of cylinder.

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.

Maintenance and Inspection SWH Model

1) Please refer to P.1045 for general maintenance.

2) Please clean the clamping part regularly.
- There is an air blow mechanism in this equipment and cutting chips and coolant can be removed. However, as it may be hard to remove clinging cutting chip and sludge, etc., please confirm there is no foreign body when work piece is set.
  If operating with dirt adhering to the clamping part, it will lead to work fallout due to clamping force shortage, defective operation, and air leaks, etc.



Even with general cleaning on exterior of hole clamp, there may be contaminants within internal parts of the component.
If repair is needed please call us.
If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.

3) Continuous use will result in wear of the gripper and creating less clamping force.
Whenever the wear is found replacement of the gripper is needed. Depending on operating pressure, work piece material and hole shape etc., the timing of replacement will differ due to those dependent conditions.
Please contact us.

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

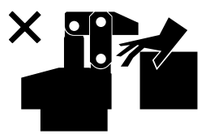
Cautions

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.

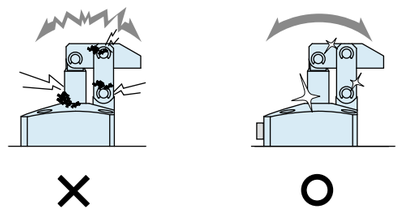


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

Maintenance and Inspection

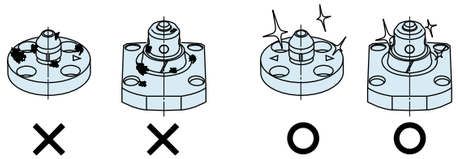
1) Removal of the Machine and Shut-off of Pressure Source
- Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
- Make sure there is no abnormality in the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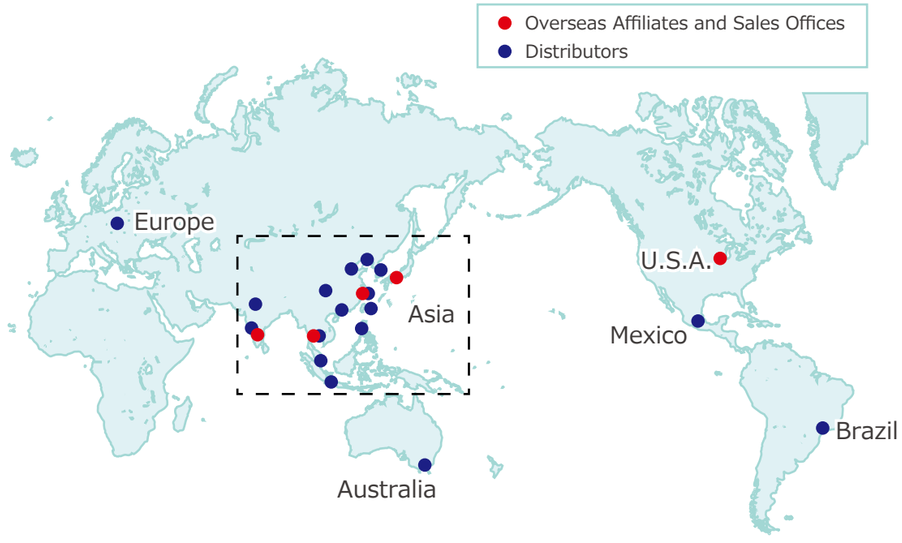
Global Network



Asia Detailed Map

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