Pneumatic Hole Clamp

Smart Series
Pneumatic Hole Clamp

Model KSH



Powered by Third-Party Source: Smart Series

Gripper expands and clamps in the workpiece hole

Clamps the workpiece by holding its holes, allowing for 5 faces accessible. Light Weight and Smaller Footprint

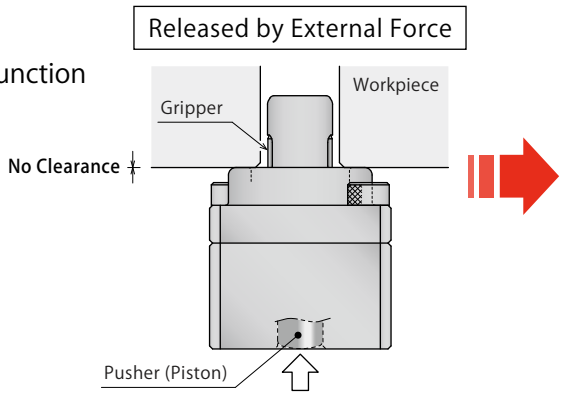
Using Low-dust Grease for Clean Environments

Action Description

Holds workpiece hole

KSH (Standard)：without Pulling Function





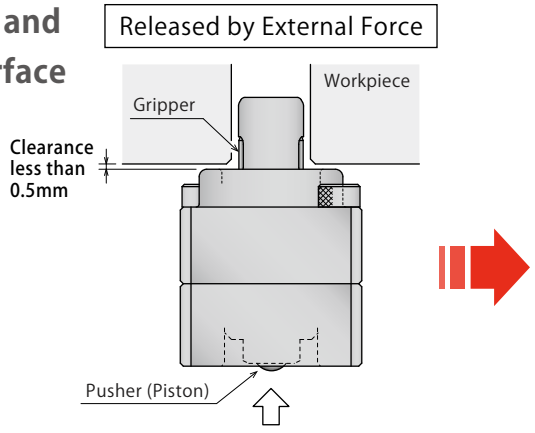
When the pusher is pushed in, the gripper retracts.

When the pusher is released, the gripper expands with the built-in spring and **grips a workpiece.**

Clamps after gripper expands and pulls workpiece to seating surface

KSH-P：with Pulling Function





When the pusher is pushed in, the gripper retracts.

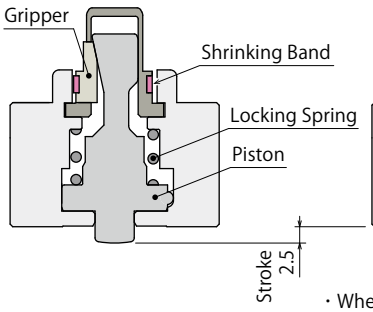
When the pusher is released, the gripper expands and **pulls to clamp the workpiece hole.**

Action Description

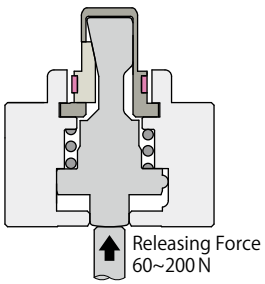
※ This is a simplified drawing. Actual components are different.

Standard : without Pulling Function

Fully Stroked State

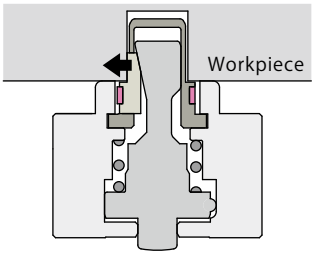


Loading/Unloading a Workpiece (Release)



・When releasing force is applied to the piston, the locking spring is compressed and the clamp is released.

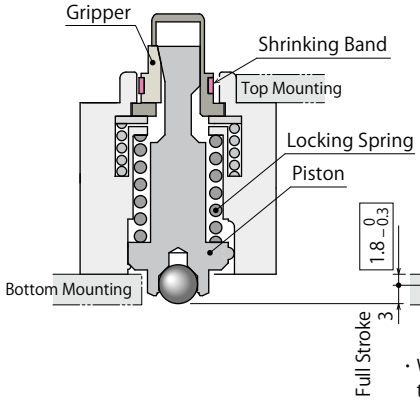
Holding a Workpiece (Lock)



・When releasing force is released, the gripper expands with the locking spring force and holds the workpiece.

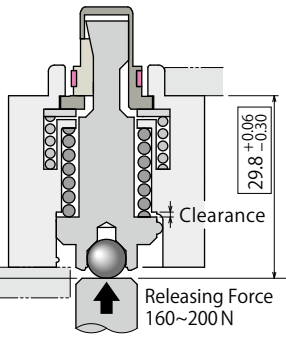
Option P : with Pulling Function

Fully Stroked State



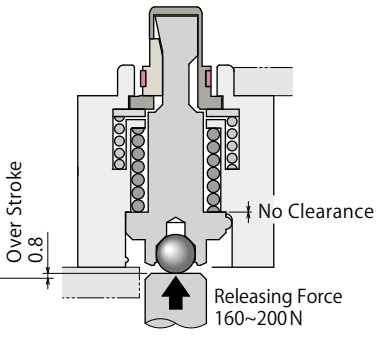
Loading/Unloading a Workpiece (Release)

(Stroke End Position)



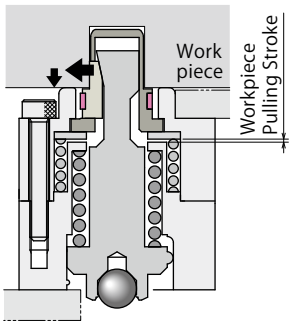
・When releasing force is applied to the piston bottom, the locking spring is compressed and the gripper is retracted.
・Stroke End Position is shown in ▭ in the drawing.

(Mechanical End Position)



・When released 0.8mm further from the stroke end (over stroke), the piston cannot be stroked any further. (Mechanical End Position)

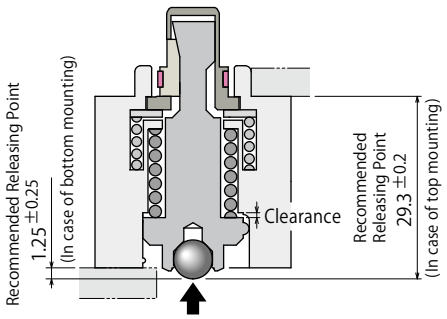
Clamping a Workpiece (Lock)



・When releasing force is released, the gripper expands, and pulls in to clamp a workpiece.

Applying a force exceeding 200N at the mechanical end position may damage the inside of the clamp.

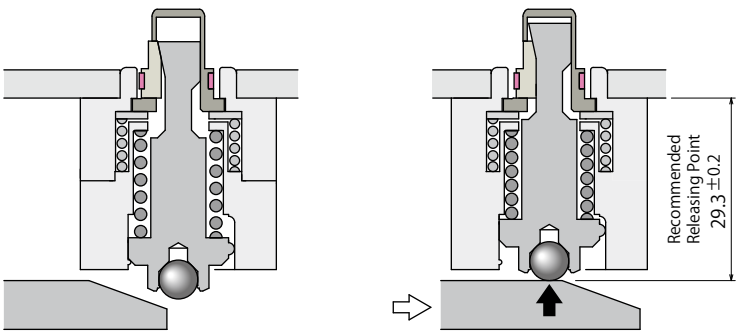
Especially in case of a driving device using as shown in "Application Examples", set the piston to a position where it stops within the over stroke range before the mechanical end when released to avoid overloading. (Refer to the recommended releasing point on the right.)



Application Examples

Operation by sliding cam

(Only when selecting **KSH-P** : with Pulling Function)



Model No. Indication

KSH005 0 - 090 - D - F - P

1 2 3 4 5

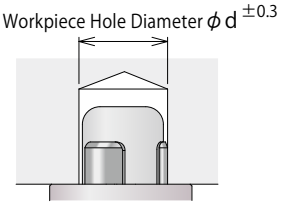
1 Design No.

0 : Revision Number

2 Workpiece Hole Code

Workpiece Hole Code : Workpiece Hole Diameter ϕd $^{\pm 0.3}$

※ Indicate the workpiece hole diameter ϕd in 0.5mm increments from the allowable range in the list below.



Workpiece Hole Code	060	065	070	075	080	085	090	095	100
Workpiece Hole Diam. ϕd $^{\pm 0.3}$ (mm)	6	6.5	7	7.5	8	8.5	9	9.5	10

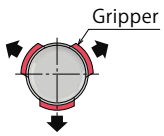
3 Functions

D : Datum (For Reference Locating)

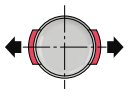
C : Cut (For One Direction Locating)

M : Floating of Expanding Area (No Locating Function)

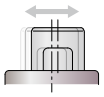
Workpiece Hole Code	060 ~ 085	090 ~ 100
Function **D**	Not Available	Available No. of Grippers : 3
Function **C**	Available No. of Grippers : 2	Available No. of Grippers : 2
Function **M**	Available No. of Grippers : 2	Available No. of Grippers : 3



D Datum
Reference Locating



C Cut
One Direction Locating



M Floating of Expanding Area
Expanding area follows a workpiece hole.

※ When roughly locating with workpiece hole code 060~085, please refer to P.37 "Installation of Hole Clamp".

4 Shape of Gripper

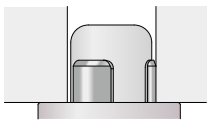
Blank : No Serration (In case of 5 **Option : Blank**)

F : No Serration (In case of 5 **Option : P**)

S : With Serration (In case of 5 **Option : P**) ※

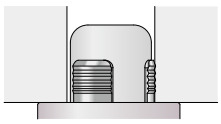
※ 'With Serration' can be selected only when selecting 5 **Option : P**.

Blank / F



No Serration

S



With Serration
Digs into and powerfully clamps a workpiece.

5 Option

Blank : Standard (without Pulling Function)

P : With Pulling Function

Specifications

Standard (5 Option : Blank)

Model No.			KSH0050-□-□								
2 Workpiece Hole Code			060	065	070	075	080	085	090	095	100
Workpiece Hole Diam. ϕd $^{\pm 0.3}$		mm	6	6.5	7	7.5	8	8.5	9	9.5	10
Clamping Diameter	at Release	mm	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
	at Full Stroke	mm	6.4	6.9	7.4	7.9	8.4	8.9	9.4	9.9	10.4
Gripping Force ※1		N	50								
Repeatability ※2		mm	0.03 (When combining 3 D and C) ※4								
Allowable Offset (Floating Clearance of Expanding Area) ※3		mm	±0.2 (When selecting 3 M)								
Stroke		mm	2.5								
Releasing Force	Minimum	N	60								
	Maximum	N	200								
Operating Temperature Range		℃	0 ~ 70								
Grease			Low-dust Grease for Clean Environments : AFF manufactured by THK								
Weight		g	About 55								

Notes :
※1. The gripping force shows the workpiece holding force acting perpendicular to the clamp's center axis.
Also it shows the calculated value when the friction coefficient of expanding area is μ0.15.
※2. It shows the repeatability under the same condition (without a load).
※3. The expanding part of 3 Function **M** is an adjusting structure and the gripping operation is done by locating a workpiece hole. The value in the table shows the allowable offset of single hole clamp. Please consider the distance accuracy of each cylinder mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.
※4. 3 Function **D** is not available for 2 Workpiece Hole Code **060 ~ 085**. Repeatability cannot be ensured since reference locating is not possible.

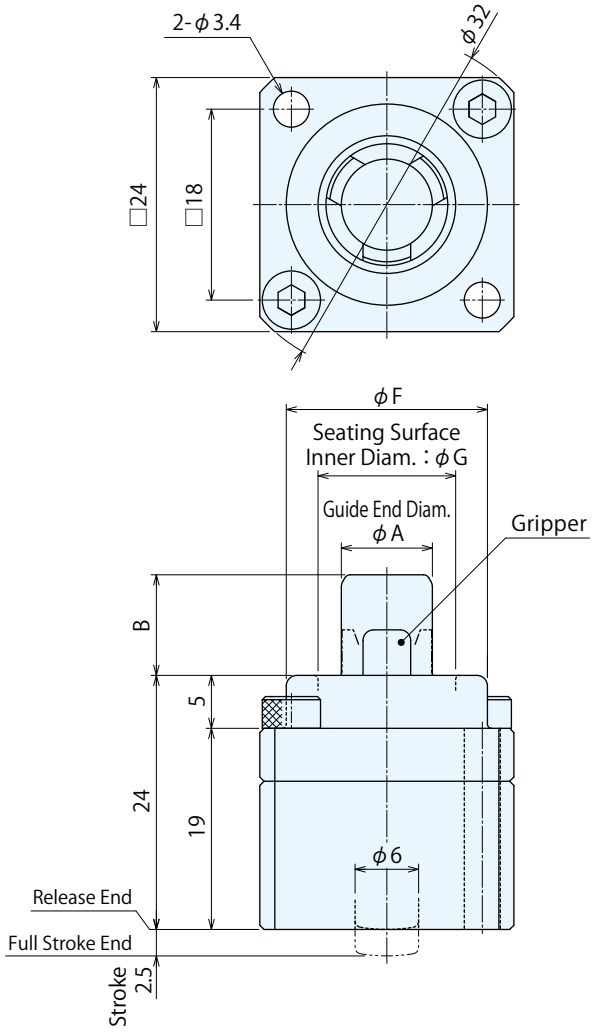
With Pulling Function (5 Option : P)

Model No.			KSH0050-□-□-□-P								
2 Workpiece Hole Code			060	065	070	075	080	085	090	095	100
Workpiece Hole Diam. ϕd $^{\pm 0.3}$		mm	6	6.5	7	7.5	8	8.5	9	9.5	10
Hardness			HB250 or less (When selecting 4 S)								
Clamping Diameter	at Release	mm	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
	at Full Stroke	mm	6.6	7.1	7.6	8.1	8.6	9.1	9.6	10.1	10.6
Clamping Force ※5	No Serration	N	10 (When selecting 4 F)								
	With Serration	N	45 (When selecting 4 S)								
Repeatability ※6		mm	0.03 (When combining 3 D and C) ※9								
Allowable Offset (Floating Clearance of Expanding Area) ※7		mm	±0.2 (When selecting 3 M)								
Over Stroke		mm	0.8								
Full Stroke		mm	3.0								
Workpiece Pulling Stroke		mm	0.5								
Releasing Force	Minimum	N	160								
	Maximum ※8	N	200								
Operating Temperature Range		℃	0 ~ 70								
Grease			Low-dust Grease for Clean Environments : AFF manufactured by THK								
Weight		g	About 85								

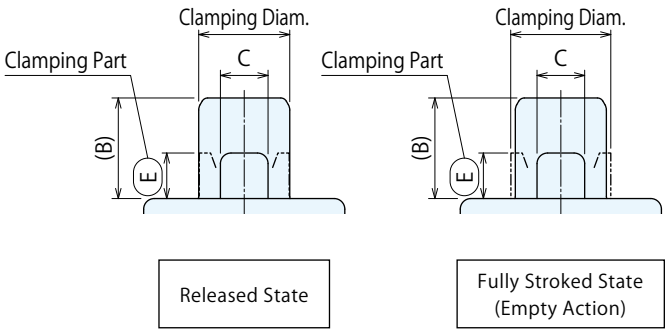
Notes :
※5. Clamping force shows the force that pulls a workpiece onto the seating surface.
Clamping force of 'without Serration' shows the calculated value when the friction coefficient of workpiece hole and gripper is μ0.1.
※6. It shows the repeatability under the same condition (without a load).
For the gripper with serration, repeatability is unstable due to the serration getting into a workpiece, etc.
※7. The expanding part of 3 Function **M** is an adjusting structure and the clamping operation is done by locating a workpiece hole. The value in the table shows the allowable offset of single hole clamp. Please consider the distance accuracy of each cylinder mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.
※8. Please do not apply releasing force exceeding 200N when stopping at the mechanical end position.
When releasing force is exceeding 200N, stop it within the over stroke range. (Refer to P.35 'Recommended Releasing Position.')
※9. 3 Function **D** is not available for 2 Workpiece Hole Code **060 ~ 085**. Repeatability cannot be ensured since reference locating is not possible.

External Dimensions

※ The drawing shows the released state of KSH0050-□-D.

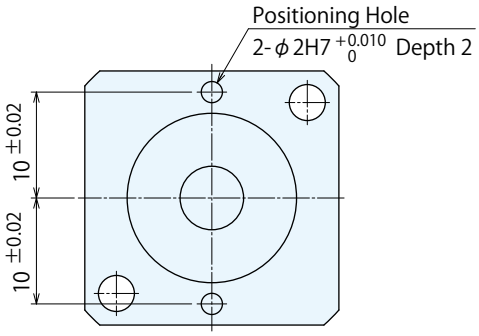


※ Expanding Area Detail

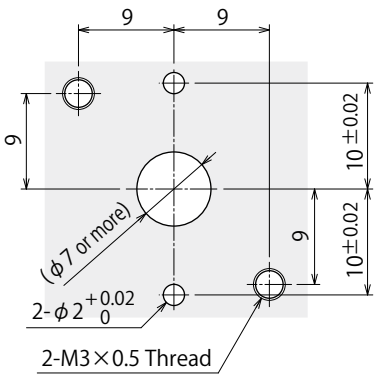


Notes :

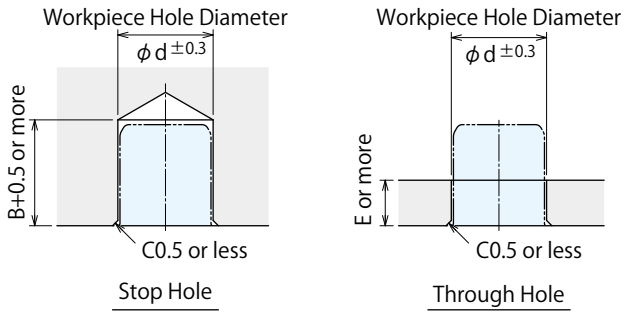
1. Mounting bolts are not provided. Please prepare them according to the mounting position. (Refer to 'Installation of the Product' on P.38.)
2. This product is locked by the built-in spring and released (retracted) by applying external force. (When releasing force is not applied, the gripper is in a locked state.)



Machining Dimensions of Mounting Area



Workpiece Hole Machining Dimensions



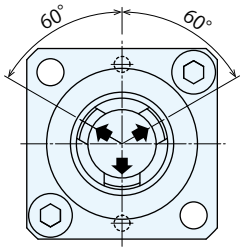
Note :

1. Thin wall around the workpiece hole can be deformed by gripping action, and the specifications may not be filled. Please make sure to test clamping beforehand and adjust the force accordingly.

Functions and Gripper Direction

KSH0050 - **090** / **095** / **100** - **D** / **M**

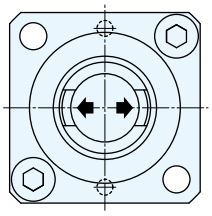
Number of Grippers : 3
(120° interval)



KSH0050 - □ - **C**

KSH0050 - **060** / **065** / **070** / **075** / **080** / **085** - **M**

Number of Grippers : 2

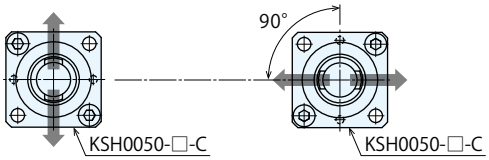


➡ shows the expanding direction of the gripper.

Mounting Direction of KSH0050-□-C

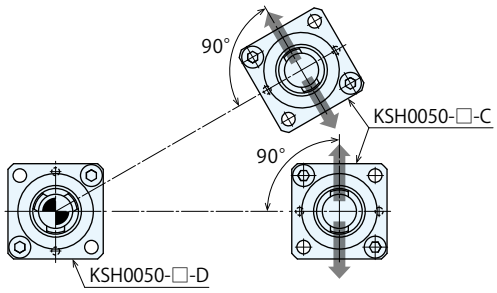
When roughly locating with workpiece hole code **060 ~ 085**

※ Rotate 90° of the expanding direction of two cylinders : KSH0050-□-C.



When locating with workpiece hole code **090 ~ 100**

※ The expanding direction of KSH0050-□-C must be vertical toward the line connecting the centers of KSH0050-□-D and KSH0050-□-C.



➡ shows the expanding direction of the gripper.

Model No. Indication

KSH005 0 - 090 - D / C / M

1 Design No.
2 Workpiece Hole Diameter
3 Functions

External Dimension List

(mm)

Model No.		KSH0050								
2 Workpiece Hole Code		060	065	070	075	080	085	090	095	100
Workpiece Hole Diameter ϕd $^{\pm 0.3}$		6	6.5	7	7.5	8	8.5	9	9.5	10
Clamping Diameter	at Release	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
	at Full Stroke	6.4	6.9	7.4	7.9	8.4	8.9	9.4	9.9	10.4
Stroke		2.5								
A		5.6	6.1	6.6	7.1	7.6	8.1	8.6	9.1	9.6
B		8	8	8	8	8	8	9.5	9.5	9.5
C		2	2	2.5	2.5	3	3	4.5	4.5	5
E		3.3	3.3	3.3	3.3	3.3	3.3	4.3	4.3	4.3
F		15	16	16	17	17	18	19	19.5	19.5
G		9	10	10	11	11	11.5	13	14	14
3 **Function D** Repeatability ※1		0.03 ※3								
3 **Function M** Allowable Offset (Floating Clearance ※2 of Expanding Area)		±0.2								

Notes :

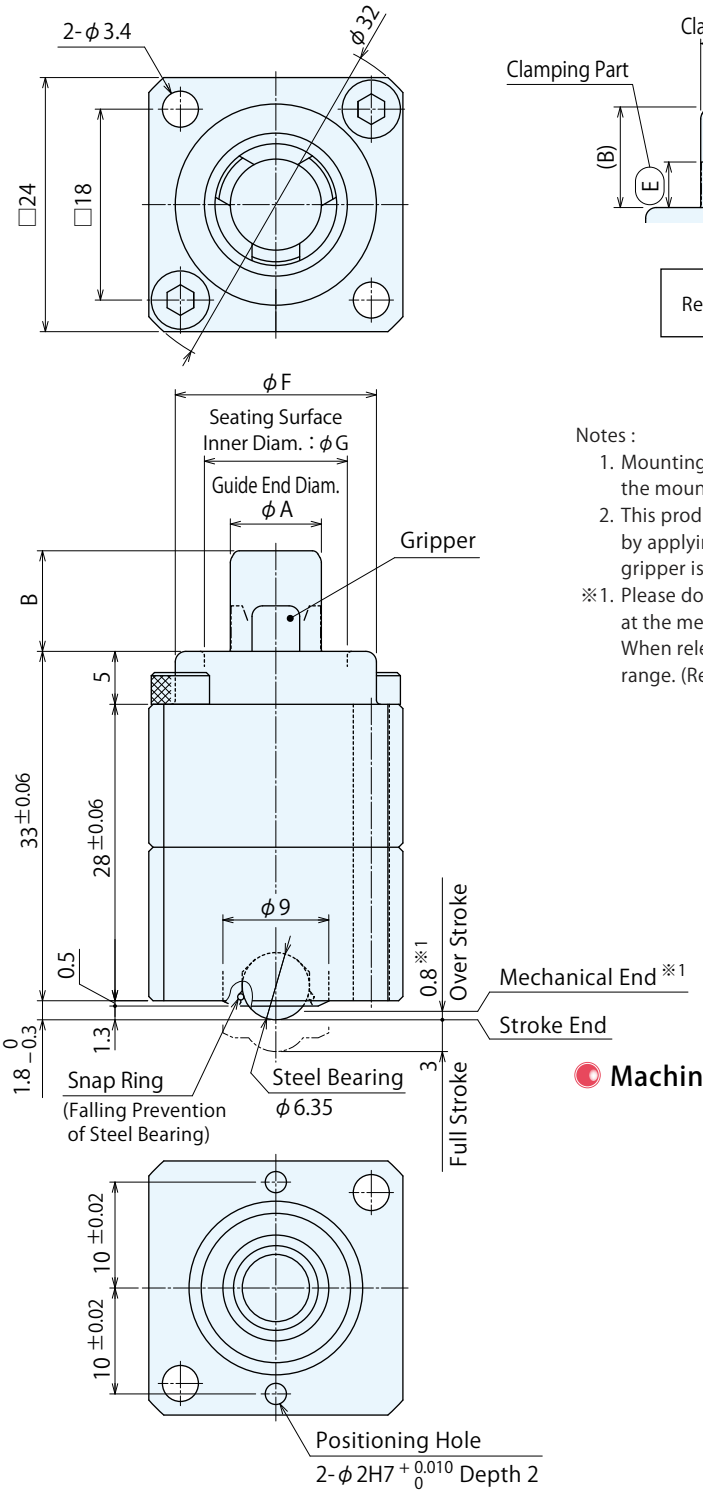
※1. It shows the repeatability under the same condition (without a load).

※2. The expanding part is an adjusting structure and the gripping operation is done by locating a workpiece hole. The value in the table shows the allowable offset of single hole clamp. Please consider the distance accuracy of each cylinder mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.

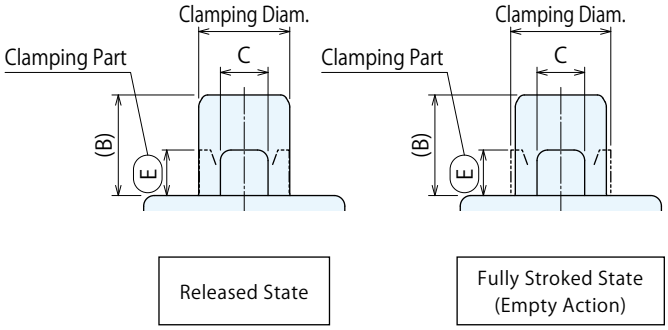
※3. 3 Function **D** is not available for 2 Workpiece Hole Code **060 ~ 085**. Repeatability cannot be ensured since reference locating is not possible.

External Dimensions

※ The drawing shows the released state of KSH0050-□-D-F-P.



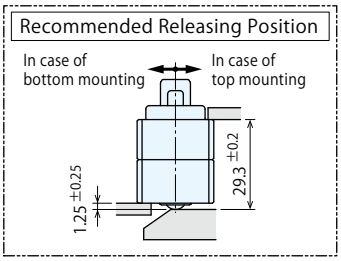
※ Expanding Area Detail



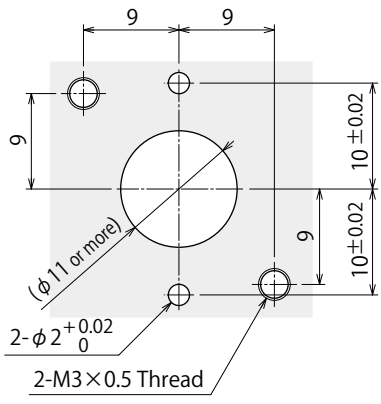
Notes :

1. Mounting bolts are not provided. Please prepare them according to the mounting position. (Refer to 'Installation of the Product' on P.38.)
2. This product is locked by the built-in spring and released (retracted) by applying external force. (When releasing force is not applied, the gripper is in a locked state.)

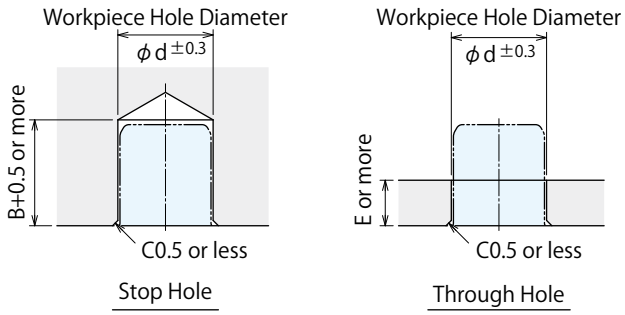
※1. Please do not apply releasing force exceeding 200N when stopping at the mechanical end position.
When releasing force is exceeding 200N, stop it within the over stroke range. (Refer to the following 'Recommended Releasing Position' .)



Machining Dimensions of Mounting Area



Workpiece Hole Machining Dimensions



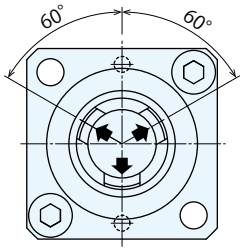
Note :

1. Thin wall around the workpiece hole can be deformed by clamping action, and the specifications may not be filled. Please make sure to test clamping beforehand and adjust the force accordingly.

Functions and Gripper Direction

KSH0050-090/095/100 D/M-□-P

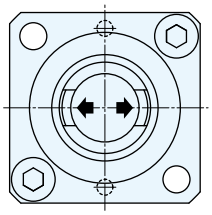
Number of Grippers : 3
(120° interval)



KSH0050-□-C-□-P

KSH0050-060/065/070/075/080/085-M-□-P

Number of Grippers : 2

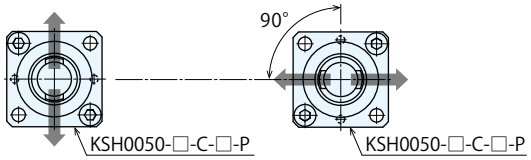


➡ shows the expanding direction of the gripper.

Mounting Direction of KSH0050-□-C-□-P

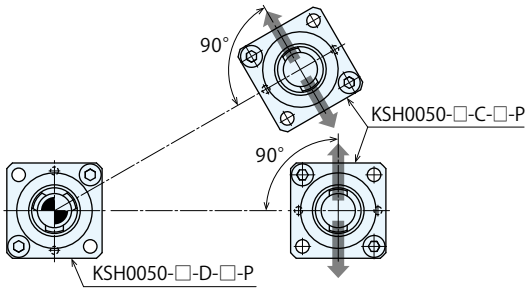
When roughly locating with workpiece hole code **060 ~ 085**

※ Rotate 90° of the expanding direction of two cylinders : KSH0050-□-C-□-P.



When locating with workpiece hole code **090 ~ 100**

※ The expanding direction of KSH0050-□-C-□-P must be vertical toward the line connecting the centers of KSH0050-□-D-□-P and KSH0050-□-C-□-P.



➡ shows the expanding direction of the gripper.

Model No. Indication

KSH005 0 - 090 - D/C/M - F/S - P

1 Design No.
2 Workpiece Hole Diameter
3 Functions
4 Shape of Gripper
5 Option

External Dimension List

(mm)

Model No.		KSH0050-□-□-□-P								
2 Workpiece Hole Code		060	065	070	075	080	085	090	095	100
Workpiece Hole Diameter ϕd $^{\pm 0.3}$		6	6.5	7	7.5	8	8.5	9	9.5	10
Clamping Diameter	at Release	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
	at Full Stroke	6.6	7.1	7.6	8.1	8.6	9.1	9.6	10.1	10.6
Over Stroke		0.8								
Full Stroke		3								
A		5.6	6.1	6.6	7.1	7.6	8.1	8.6	9.1	9.6
B		8	8	8	8	8	8	9.5	9.5	9.5
C		2	2	2.5	2.5	3	3	4.5	4.5	5
E		3.3	3.3	3.3	3.3	3.3	3.3	4.3	4.3	4.3
F		15	16	16	17	17	18	19	19.5	19.5
G		9.5	10.5	10.5	11.5	11.5	12	13.5	14.5	14.5
3 **Function D** Repeatability ※2		0.03 ※4								
3 **Function M** Allowable Offset (Floating Clearance of Expanding Area) ※3		±0.2								

Notes :

※2. It shows the repeatability under the same condition (without a load).

※3. The expanding part is an adjusting structure and the clamping operation is done by locating a workpiece hole. The value in the table shows the allowable offset of single hole clamp. Please consider the distance accuracy of each cylinder mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.

※4. 3 Function **D** is not available for 2 Workpiece Hole Code **060 ~ 085**. Repeatability cannot be ensured since reference locating is not possible.

Cautions

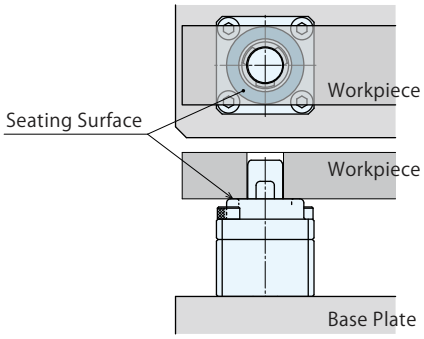
Notes for Design

1) Check Specifications

- This product is locked by the built-in spring and released by applying external force.
  Apply force within the range shown in specifications sections (refer to P.32 Releasing Force) to release.
- Please use each product according to the specifications.

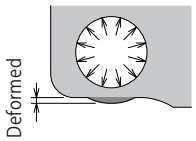
2) Reference Surface (Seating Surface) towards Z-axis

- The top surface of the flange of this product is the seating surface of workpiece and locates in Z direction.



3) Wall Thickness around Workpiece Hole

- Thin wall around the workpiece hole can be deformed by clamping action, gripping and clamping forces do not fill the specification. Please make sure to conduct test clamping before use. If clamping force is insufficient, workpiece may fall out.



4) Hole size and hardness of a workpiece should be within the range of the specification.

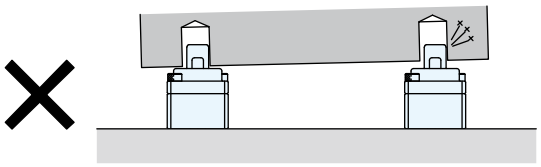
When workpiece hole diameter is larger than specification.	Expansion stroke is insufficient and the gripping and clamping forces will not fill the specifications.
When using it with insufficient clamping and gripping forces.	Leads to falling of the workpiece.
When workpiece hole diameter is smaller than specification.	Difficult to attach/detach the workpiece leading to damage.
When workpiece hole depth is shallow.	May lead to abnormal seating and damage.
When workpiece hole is harder than specified.	Gripper does not dig into workpiece enough and it cannot clamp securely.

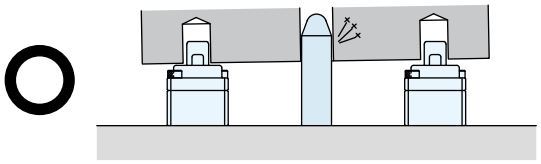
5) Please detach a workpiece with all clamps fully released.

- When detaching a workpiece during lock or release operation, it may cause damage to the hole clamp and a workpiece fall.

6) Please set up rough guides.

- When detaching a workpiece with slope it may cause the damage to the hole gripper and a workpiece fall.





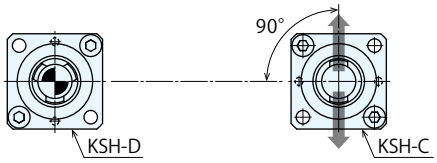
Please set up rough guides considering the distance accuracy of location clamp / location cylinder mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, etc.

7) Installation of Hole Clamp

- In case of using Function -D and -C
  -C：Cut locates the orientation using -D：Datum as a reference. Therefore, it is required to determine the phase of -C：Cut when mounting.

When locating with workpiece hole code **090 ~ 100**
(When using Function -D and -C together)

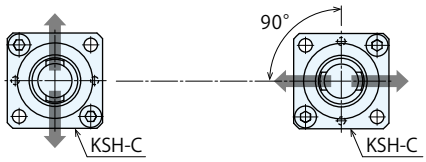
The expanding direction of KSH-C must be vertical toward the line connecting the centers of KSH-D and KSH-C.



➡ shows the expanding direction of the gripper.

When roughly locating with workpiece hole code **060 ~ 085**
(When using Function -C and -C together)

Rotate 90° of the gripper expanding direction of two cylinders toward the line connecting the centers of two KSH-C.
(Accuracy is not guaranteed since there is no reference locating.)



➡ shows the expanding direction of the gripper.

- When Using Function -M：Floating of Expanding Area
  Function -M has the floating function (±0.2mm).
  Please consider the distance accuracy of each hole clamp mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.

8) Fall Prevention Measures

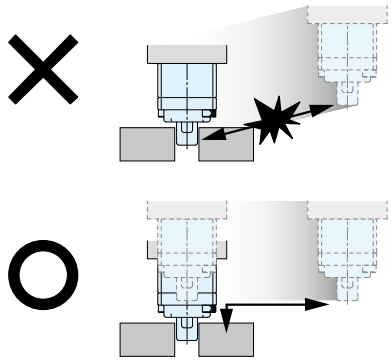
- In case of accident such as detachment of a workpiece, please prepare fall prevention measures for safety.

9) Operating Environment

This product has no function that prevents foreign substances. Do not use under environment with coolant and cutting chips.

10) Damage Prevention during Robot Handling, etc.

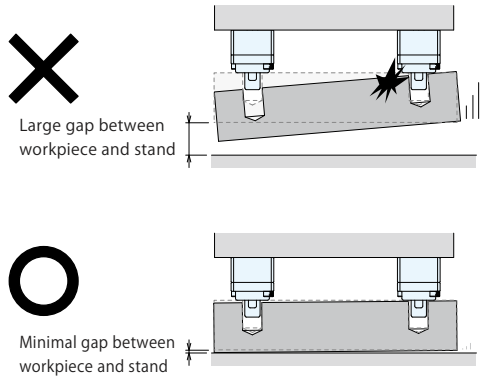
- When inserting the hole clamp tip into/taking it out of a workpiece hole, the hole clamp tip has to be vertical to the workpiece hole. Especially after releasing a workpiece, the hole clamp tip must be fully taken out from the workpiece hole before moving to a next coordinate.



- If the hole clamp tip touches a workpiece when inserting, control the insertion speed to avoid damage on the workpiece and the hole clamp tip.

- When the hole clamp is mounting/removing a workpiece, make sure that a robot operates only after the hole clamp completes clamping or releasing action by using a sensor or timer. If the robot starts operating in the middle of clamping or releasing action, the workpiece may be fallen off.

- When mounting/removing a workpiece, it may be tilted due to a gap between the workpiece and the stand. This causes damage of the hole clamp. The gap has to be minimized as much as possible when mounting/removing.



Installation Notes

1) Installation of the Product

- When installing the product, use 2 hexagonal socket bolts (with tensile strength of A2-70 or more) and tighten them with the torque shown in the list below. Also, tighten them evenly to prevent tilting of the product.

Model No.	Mounting Bolt Size	Tightening Torque (N·m)
KSH0050	M3×0.5	1.3

Maintenance and Inspection

1) Clamping force and gripping force will be decreased after repetitive operation due to friction of a gripper surface. Replacement period differs depending on operating pressure, workpiece material, and shape of hole. When you find friction on gripper surface, the gripper part needs to be replaced. Please contact us for replacement.

※ Please refer to P.45 for common cautions. ・Notes on Handling ・Maintenance and Inspection ・Warranty

Common Cautions

Notes on Handling

1) It should be operated by qualified personnel.
- Machines and devices should be operated and maintained by qualified personnel.

2) Do not operate or remove the product unless the safety protocols are ensured.
① Machines and devices 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 external force is applied to the product.
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 a machine or device.

3) Do not touch a cylinder or workpiece while it is working.
- Otherwise, your hands may be injured.

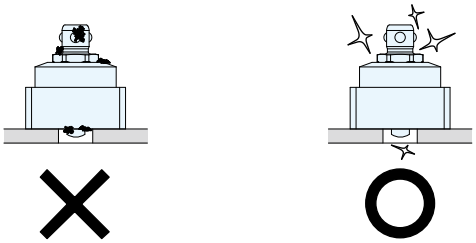


4) Do not disassemble or modify.
- Contains a powerful spring which is dangerous.
  If the product is taken apart or modified, the warranty will be voided even within the warranty period.

Maintenance and Inspection

1) Removal of the Product and Shut-off of Pressure Source
- Before the product is removed, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no external force is applied to the product.
- Make sure there is no trouble/issue in the bolts and respective parts before restarting.

2) Regularly clean the moving parts and reference surfaces.
- Using the product contaminated with dirt may lead to malfunctioning.



If there is malfunction even after cleaning the product from outside, there may be contaminants or damage within internal parts. In this case, overhaul is required. Please call us for overhaul. If overhauled by unauthorized personnel, the warranty will be void even the period is still active.

3) Regularly tighten mounting bolts to ensure proper use.

4) 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.

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

6) Please contact us for overhaul and repair.
- Contains a powerful spring which is dangerous.

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