

# Ball Lock Cylinder

2 larger sizes added to the lineup! (April, 2019)

Model WKA

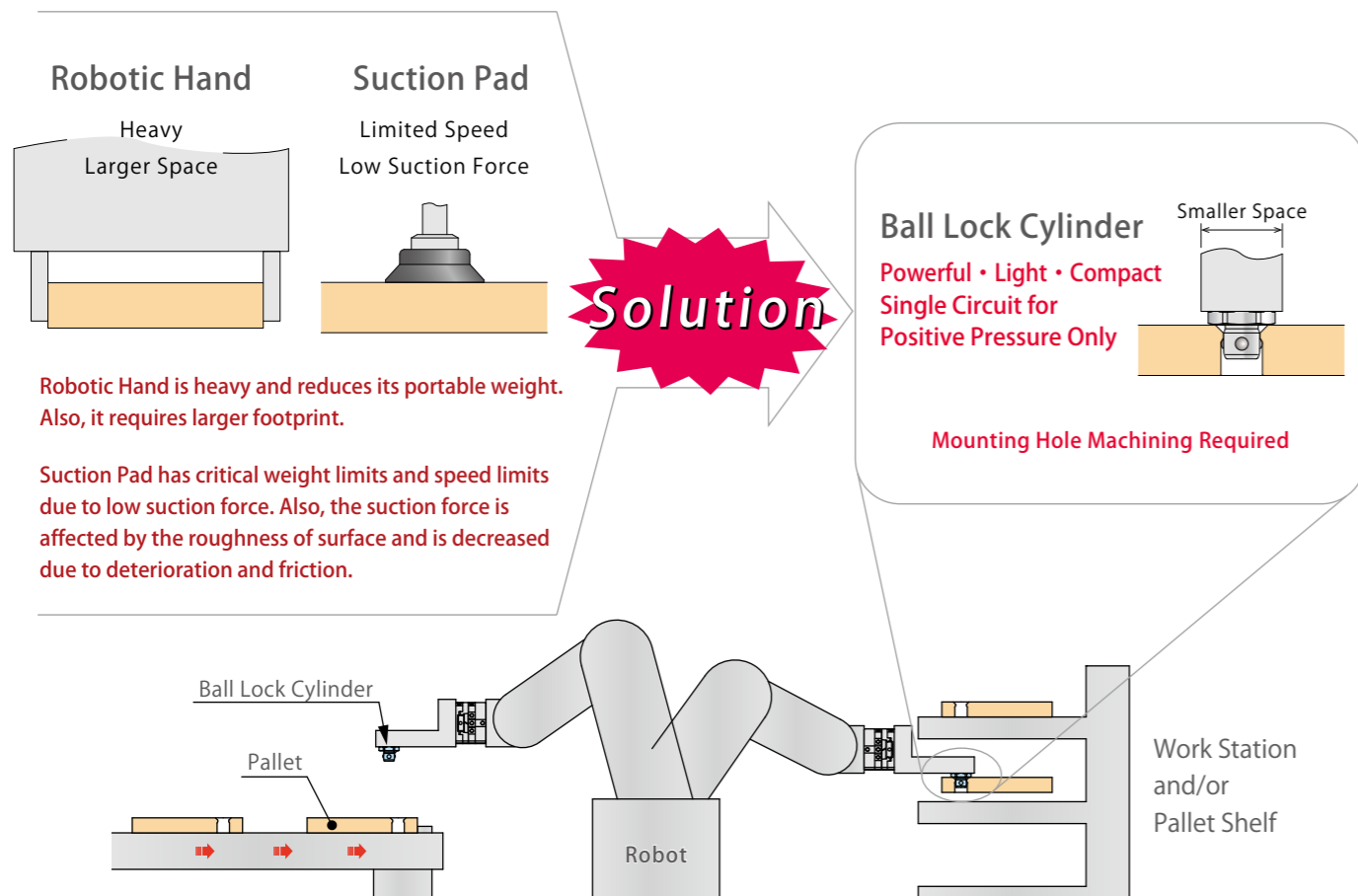


## Spring Lock Design

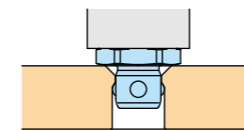
## Securely Transfers Pallets and Prevents Pallet Drops

The light weight and compact design allows for maximizing the robot's ability without reducing its portable weight.

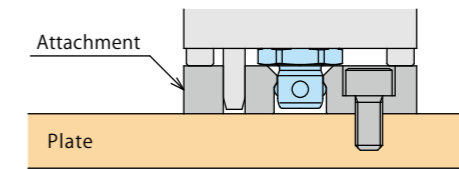
The ball lock cylinder is used for transfer pallets, plates, temporary tool stocker, etc.



### Application Examples



Pallet Transfer



Install attachments for plates that cannot have workpiece holes.

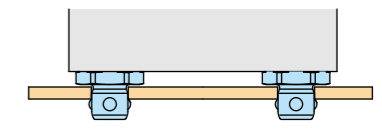
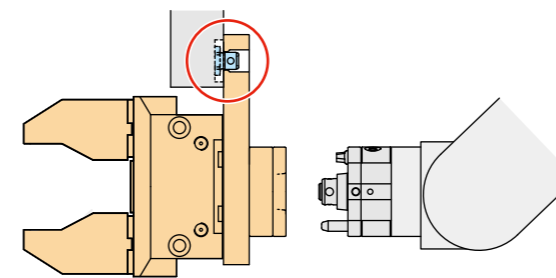
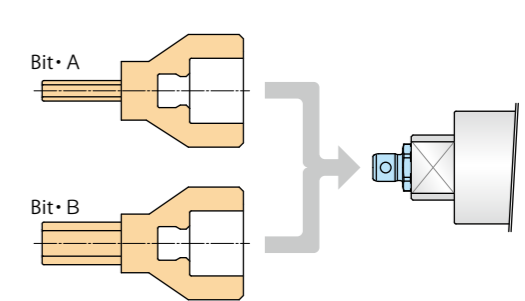


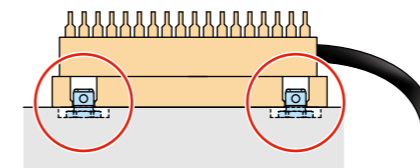
Plate Transfer



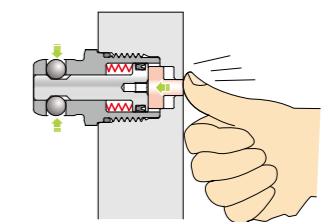
Temporary Stopper/Falling Prevention for Stocker



Bit/Tool Change

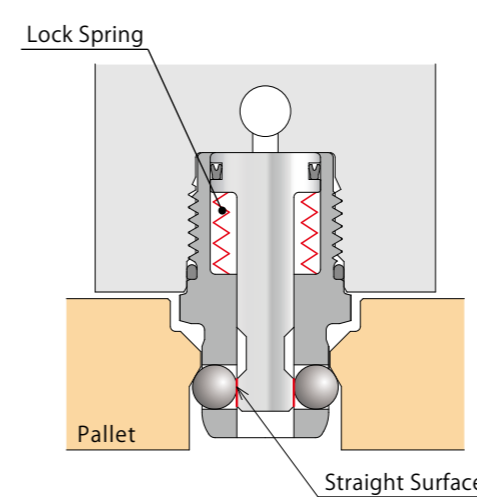


Falling Prevention for Nozzle Unit



Used by Hand or Another Cylinder

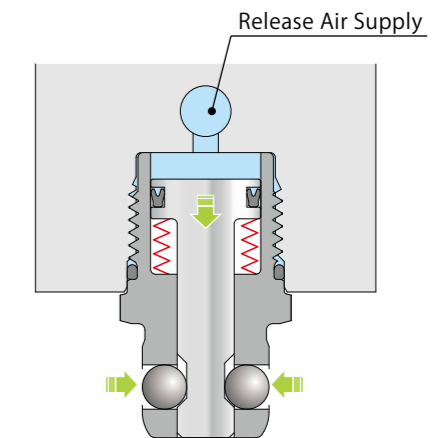
### Action Description ※ This is a simplified drawing. Actual components are different.



Transferring (Lock)

Release Air Pressure **OFF**

The piston is pulled down via internal spring and the steel balls will expand. The steel balls will engage with the straight surface to hold the pallet. The ball lock cylinder maintains clamping force even with air pressure loss during power failure.



Loading/Unloading (Release)

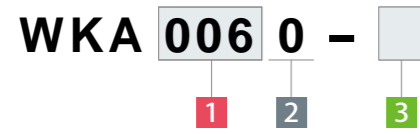
Release Air Pressure **ON**

The piston is pushed by air pressure (positive pressure) and the steel balls will be set inside the cylinder.

Low Air Consumption and Low Running Cost.

- Locating + Clamp
- Locating
- Hand • Clamp
- Support
- Valve • Coupler
- Cautions • Others
- Lifting Hole Clamp
  - SWJ
- Locating Pin Clamp
  - SWP
- High-Power Pull Stud Clamp
  - WPT
- High Accuracy Cylinder Sensor
  - JES
- FA Pneumatic Hole Clamp
  - WKH
- Ball Lock Cylinder**
  - WKA**
- Pneumatic Robotic Hands
  - WPW-C
  - WPS-C
  - WPA
  - WPH
  - WPP
  - WPQ
- Auto Switch Proximity Switch
  - JEP
- High-Power Pneumatic Hole Clamp
  - SWE
- High-Power Pneumatic Swing Clamp
  - WHE
- High-Power Pneumatic Link Clamp
  - WCE
- Pneumatic Hole Clamp
  - SWA
- Pneumatic Swing Clamp
  - WHA
- Pneumatic Link Clamp
  - WCA
- Air Flow Control Valve
  - BZW
- Manifold Block
  - WHZ-MD

Model No. Indication



1 Body Size

- 006 : Released Diameter  $\phi$  6.5 Pull-Out Load Capacity 50N
- 008 : Released Diameter  $\phi$  8 Pull-Out Load Capacity 70N
- 010 : Released Diameter  $\phi$  10 Pull-Out Load Capacity 100N
- 012 : Released Diameter  $\phi$  12 Pull-Out Load Capacity 150N
- 016 : Released Diameter  $\phi$  16 Pull-Out Load Capacity 200N

2 Design No.

- 0 : Revision Number

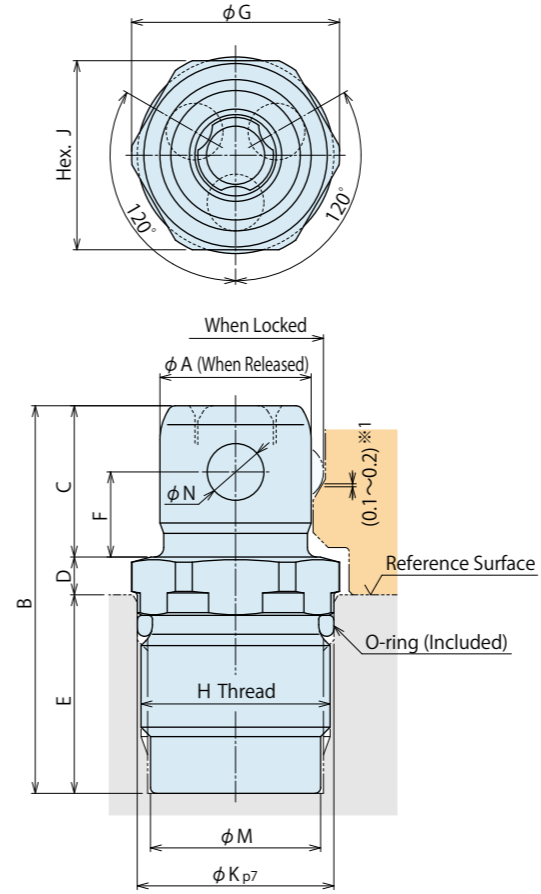
3 Operating Temperature (Sealing Material)

- Blank : Standard Temperature (Operating Temperature 0 ~ 70°C) Sealing Material: Nitrile Rubber
- V : High Temperature (Operating Temperature 0 ~ 120°C) Sealing Material: Fluorine Rubber

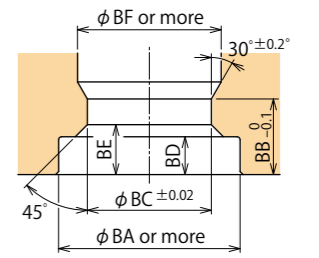
Specifications

Model No.	WKA0060-□	WKA0080-□	WKA0100-□	WKA0120-□	WKA0160-□
Pull-Out Load Capacity (Holding Force) N	50	70	100	150	200
Release Cylinder Capacity cm <sup>3</sup>	0.08	0.08	0.15	0.26	0.49
Max. Operating Pressure MPa	0.7				
Min. Operating Pressure MPa	0.25				
Withstanding Pressure MPa	1.0				
Operating Temperature °C	3 Blank	0 ~ 70			
	3 V	0 ~ 120			
Weight g	7	8	13	20	41

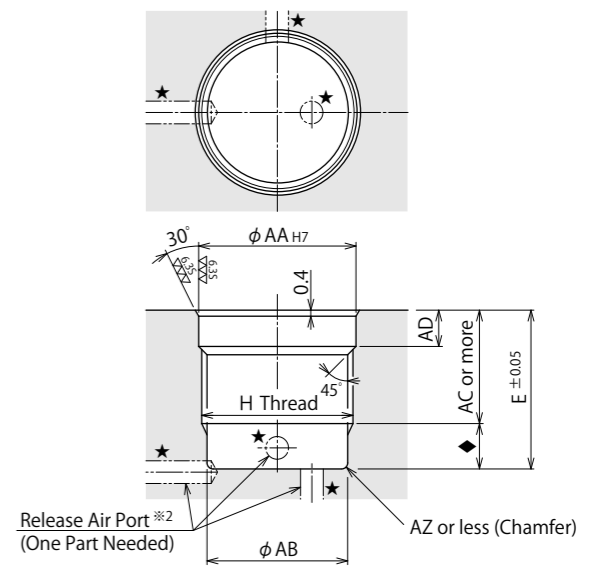
External Dimensions



Workpiece Hole Reference Dimensions



Mounting Hole Machining Dimensions



Note :  
 ※1. There is a gap between the workpiece hole and cylinder when locked.  
 ※2. Release air pressure can be supplied from the side or bottom surface of the mounting hole (★ part).  
 If machining the release air port on the side, please machine it within ◆ area.

External Dimensions and Machining Dimensions for Mounting

Model No.	WKA0060-□	WKA0080-□	WKA0100-□	WKA0120-□	WKA0160-□
	Diameter	A (Released) 6.5 <sup>0</sup> <sub>-0.05</sub>	8 <sup>0</sup> <sub>-0.05</sub>	10 <sup>0</sup> <sub>-0.05</sub>	12 <sup>0</sup> <sub>-0.05</sub>
	Locked 7.7	9.3	11.5	13.8	18.2
B	19.5	20.5	22.5	25	29.5
C	7	8	9	10	11.5
D	2	2	2.5	3	4
E	10.5	10.5	11	12	14
F	4	4.5	5	5.5	6.5
G	11	11	13.5	15.5	21.2
H (Nominal × Pitch)	M10×0.75	M10×0.75	M12×1	M14×1	M18×1.5
J	10	10	12	14	19
K	10.4 <sup>+0.036</sup> <sub>+0.018</sub>	10.4 <sup>+0.036</sup> <sub>+0.018</sub>	12.4 <sup>+0.036</sup> <sub>+0.018</sub>	14.4 <sup>+0.036</sup> <sub>+0.018</sub>	19.4 <sup>+0.043</sup> <sub>+0.022</sub>
M	9	9	10.7	12.7	16.1
N	2.5	3	3.5	4	5
O-ring	SS8.5 (NOK-made)	SS8.5 (NOK-made)	SS10.5 (NOK-made)	S12 (NOK-made)	AS568-016
AA	10.4 <sup>+0.018</sup> <sub>0</sub>	10.4 <sup>+0.018</sup> <sub>0</sub>	12.4 <sup>+0.018</sup> <sub>0</sub>	14.4 <sup>+0.018</sup> <sub>0</sub>	19.4 <sup>+0.021</sup> <sub>0</sub>
AB	9.3 <sup>+0.07</sup> <sub>-0.11</sub>	9.3 <sup>+0.07</sup> <sub>-0.11</sub>	11 <sup>+0.15</sup> <sub>-0.08</sub>	13 <sup>+0.15</sup> <sub>-0.08</sub>	16.5 <sup>+0.17</sup> <sub>-0.12</sub>
AC	7.5	7.5	8	9	10.5
AD	2.4	2.4	2.4	2.8	3.8
AZ (Chamfer)	0.2	0.2	0.4	0.4	0.4
BA	12	12	14.5	17	23
BB	4.7	5	5.8	6.45	8
BC	6.7	8.2	10.2	12.2	16.2
BD	2.5	2.5	3	3.5	4.5
BE	3.3	3.3	4.6	4.9	6.5
BF	7.9	9.5	11.7	14.2	18.6

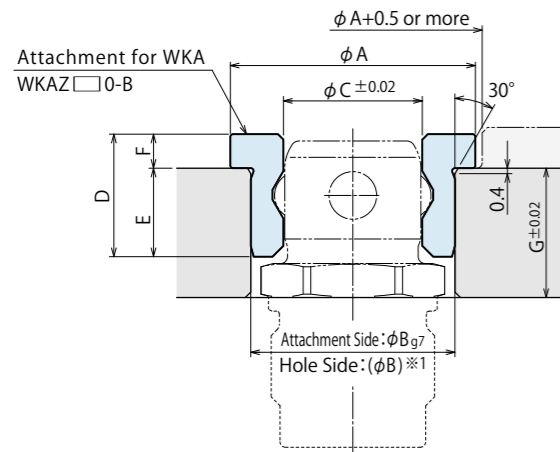
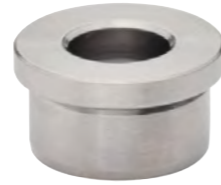
Accessory : Attachment for WKA

Attachment for WKA

Model No. Indication

**WKAZ 06 0 - B**

Size (Refer to the table) Design No. (Revision Number)



(mm)						
Model No.	WKAZ060-B	WKAZ080-B	WKAZ100-B	WKAZ120-B	WKAZ160-B	
Corresponding Model No.	WKA0060-□	WKA0080-□	WKA0100-□	WKA0120-□	WKA0160-□	
A	14	14	18	20	26	
B	Attachment	12 <sup>-0.006</sup> <sub>-0.024</sub>	12 <sup>-0.006</sup> <sub>-0.024</sub>	15 <sup>-0.006</sup> <sub>-0.024</sub>	17 <sup>-0.006</sup> <sub>-0.024</sub>	23 <sup>-0.007</sup> <sub>-0.028</sub>
	Hole	(12)*1	(12)*1	(15)*1	(17)*1	(23)*1
C	6.7	8.2	10.2	12.2	16.2	
D	7.5	7.5	9	10	11.5	
E	5.5	5.5	6.5	7.5	8.5	
F	2	2	2.5	2.5	3	
G	8	8	9.5	11	13	
Weight	5 g	4 g	8 g	10 g	19 g	

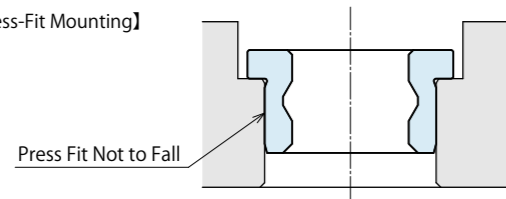
Notes :

1. Material : Martensitic Stainless Steel (HRC29 ~ 33)

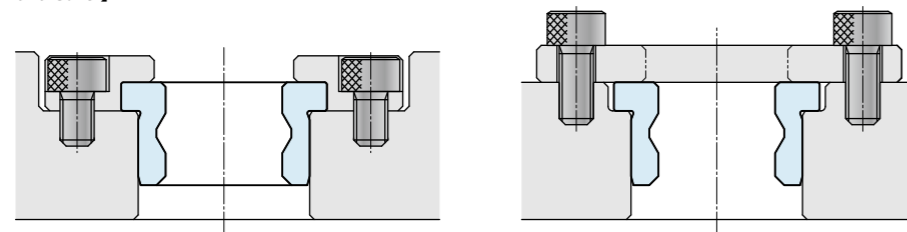
\*1. Hole Side : Determine phi B tolerance of mounting hole based on the dimensions of the attachment.  
(Refer to the following attachment mounting examples.)

Attachment Mounting Examples

[Press-Fit Mounting]



[Mounting with a Cover]



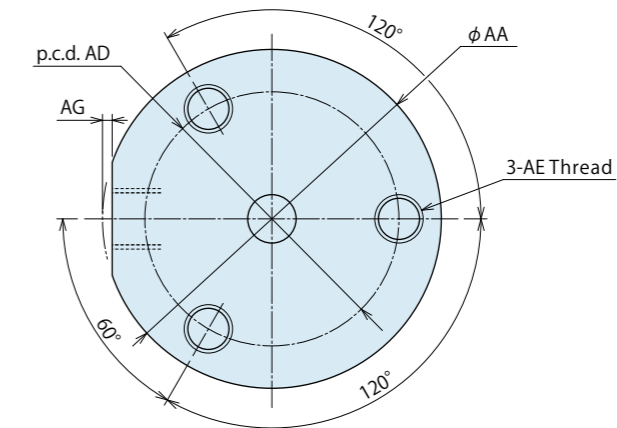
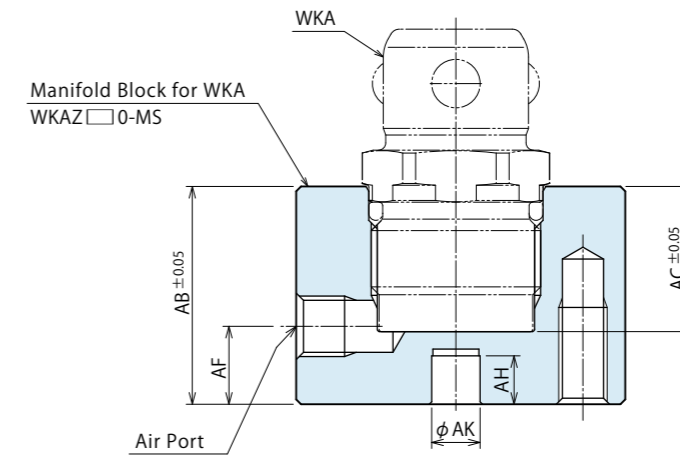
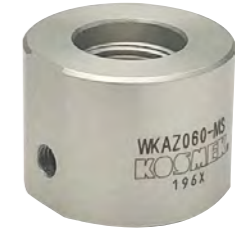
Accessory : Manifold Block for WKA

Manifold Block for WKA

Model No. Indication

**WKAZ 06 0 - MS**

Size (Refer to the table) Design No. (Revision Number)



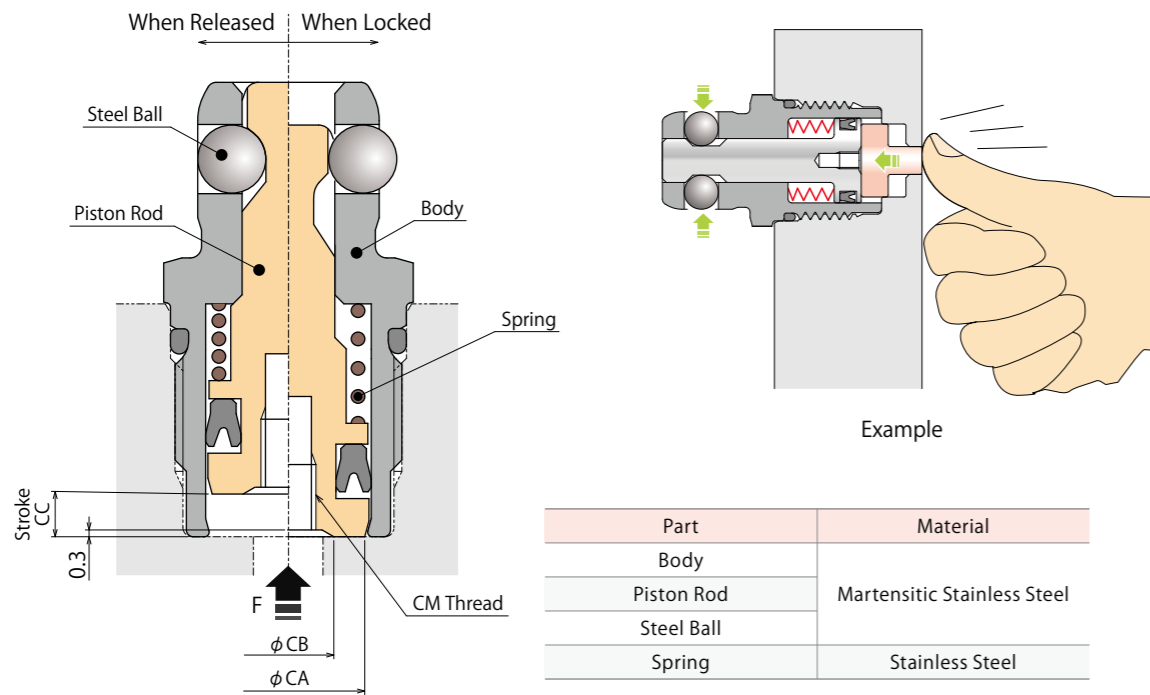
(mm)					
Model No.	WKAZ060-MS	WKAZ100-MS	WKAZ120-MS	WKAZ160-MS	
Corresponding Model No.	WKA0060-□	WKA0080-□	WKA0100-□	WKA0160-□	
AA	20	22	28	32	
AB	15	16	18	20	
AC	10.5	11	12	14	
AD	15	17	21	25	
AE (Nominal×Pitch×Depth)	M3×0.5×6	M3×0.5×6	M4×0.7×8	M4×0.7×8	
Air Port	M3×0.5	M3×0.5	M5×0.8	M5×0.8	
AF	5	5	6	6	
AG	0.5	0.5	0.8	0.8	
AK	2 <sup>+0.03</sup> <sub>0</sub>	3 <sup>+0.03</sup> <sub>0</sub>	4 <sup>+0.03</sup> <sub>0</sub>	4 <sup>+0.03</sup> <sub>0</sub>	
AH	2	3	4	4	
Weight	10g	13g	24g	33g	

Note :

1. Material : A2017BE-T4 Surface Finishing : Anodized Aluminum Finishing

● Releasing Force and Dimensions when Operating with External Force

- WKA is released by air pressure. It also can be operated by applying external force to the piston rod in such cases:
- Unable to supply air pressure directly
  - Unable to secure sealing ability due to high temperature environment
  - Operating manually



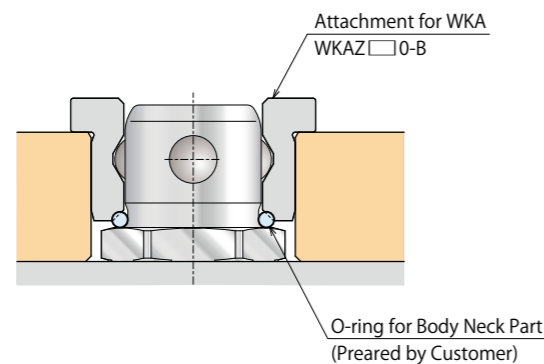
Part	Material
Body	Martensitic Stainless Steel
Piston Rod	
Steel Ball	
Spring	Stainless Steel

Model No.	WKA0060-□	WKA0080-□	WKA0100-□	WKA0120-□	WKA0160-□	
Required Releasing Force F N	10	10	12	12	17	
Max. Releasing Force F ※1 N	40	40	60	60	100	
Dimensions mm	CA	6.8	6.8	8.5	10.5	13.5
	CB	4	4	5	6.5	9.5
	CC	1.8	2	2.3	2.7	3.2
	CM (Nominal×Pitch×Depth)	M2.5×0.45×3	M2.5×0.45×3	M3×0.5×4	M4×0.7×6	M5×0.8×8

Note :  
 ※1. External force F (applying when releasing) should be more than the required releasing force and less than the maximum releasing force. External force greater than the maximum releasing force will damage the product.

● Backlash Prevention with O-ring (Reference)

There is a clearance between a workpiece hole and WKA when locked.  
 Simple backlash prevention is possible by mounting an o-ring to the neck part of WKA if necessary.

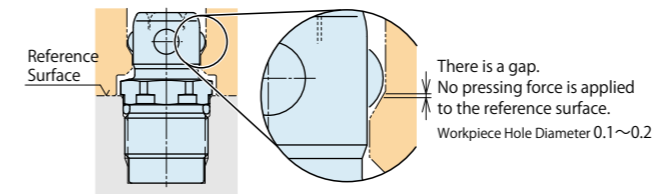


Model No.	WKA0060-□	WKA0080-□	WKA0100-□	WKA0120-□	WKA0160-□
O-ring for Body Neck Part	SS6.5 (NOK-made)	SS8 (NOK-made)	S10 (NOK-made)	S12 (NOK-made)	A568-015 ~ 016

● Cautions

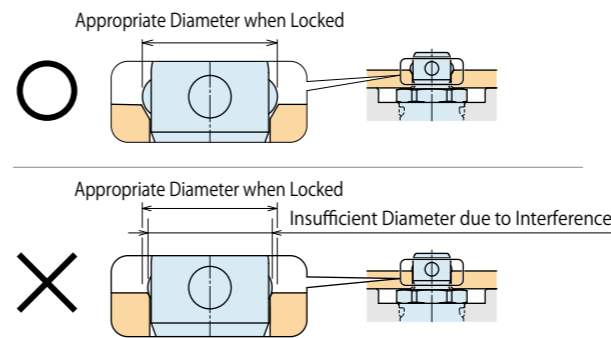
● Notes for Design

- 1) Check Specifications
  - Please use each product according to the specifications.
  - The steel balls of WKA will be set within the cylinder by supplying air and it allows for loading and unloading the pallet (workpiece). By stopping air supply and releasing the supplied air, the steel balls will be expanded via internal spring to lock (prevent falling of) the pallet (fixture) or workpiece.
- 2) Do not use the product in the environment with cutting chips and coolant.
- 3) WKA fixes the workpiece hole with the steel balls (when locked).
  - There is a gap between the workpiece hole and cylinder when locked.
  - There is no locating function or pressing force applied to the reference surface.



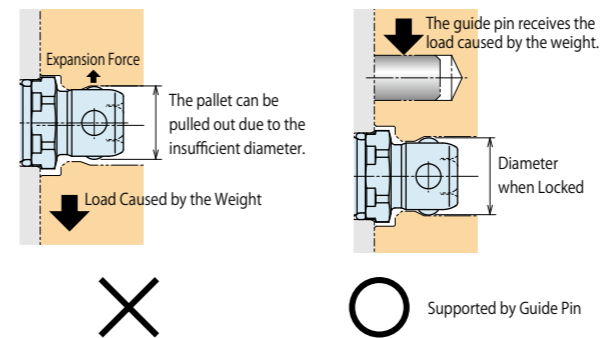
4) Workpiece Hole

- When temporarily locking the hole with the external dimensions other than shown on P.184, make sure to design so that the steel balls expand till the proper locked diameter. Otherwise, WKA can be released even with low pull-out force.



5) Mounting/Removing Pallet (Workpiece)

- If needed, please apply a guide pin (rough guide) separately to avoid increasing the force which exceeds allowable thrust load when mounting/ removing pallet (workpiece).
- The steel balls have only a slight expansion force when locking. If the pallet is heavy and/or the position of the product and pallet hole is dislocated, the steel balls may not expand properly. Please install a guide pin (rough guide) to ensure proper lock action.



● Installation Notes

- 1) Check the fluid to use.
  - Make sure to supply filtered clean dry air.
- 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 (Sealing Tape for Piping etc.)
  - Not required to apply sealing tape for the thread of the ball lock cylinder.
  - 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 Product
  - When mounting, make sure there are no scratches or damage on the O-ring or the seals, and tighten the product according to the torque shown in the table below.

Model No.	Thread Size (mm)	Tightening Torque (N·m)
WKA0060-□	M10×0.75	2.5
WKA0080-□		
WKA0100-□	M12×1	4.0
WKA0120-□	M14×1	6.0
WKA0160-□	M18×1.5	10.0

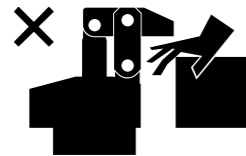
- Apply an adequate amount of grease to the O-ring.
  - If it is mounted under dry state, the O-ring may have twisting or be defective.
  - If it is tightened with an excessive torque, it may lead to malfunction or damage to the product.
- 5) Please avoid repetitive operation of WKA without a workpiece.

※ Please refer to P.461 for common cautions.  
 • Notes on Handling • Maintenance/Inspection • Warranty

**Cautions**

● Notes on Handling

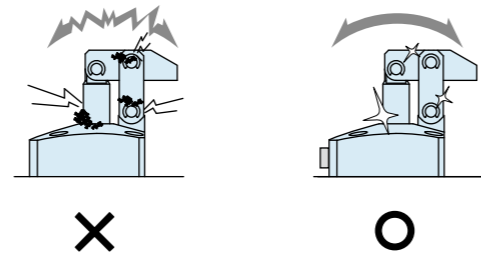
- 1) It should be handled by qualified personnel.
  - The hydraulic machine and air compressor should be handled and maintained by qualified personnel.
- 2) Do not handle or remove the machine unless the safety protocols are ensured.
  - ① The machine and equipment can only be inspected or prepared when 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 clamp (cylinder) while clamp (cylinder) is working. Otherwise, your hands may be injured due to clinching.



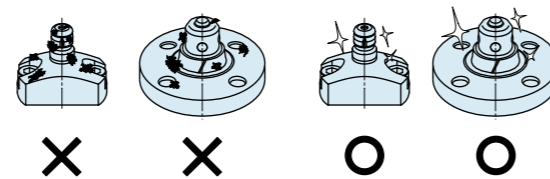
- 4) Do not disassemble or modify.
  - If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

● 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) Regularly clean the reference surfaces (taper reference surface and seating surface) of locating products (SWT/SWQ/VRA/VRC/VX/VXF/WVS/VWM/VWK).
  - Locating products (except VRA/VRC/VX/VXF and SWR without air blow port) can remove contaminants with cleaning functions. When installing pallets make 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) Regularly tighten pipings, mounting bolts, nuts, snap rings and cylinders to ensure proper use.
- 5) Make sure the hydraulic fluid has not deteriorated.
- 6) 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.
- 7) The products should be stored in the cool and dark place without direct sunshine or moisture.
- 8) Please contact us for overhaul and repair.

● Warranty

- 1) Warranty Period
  - The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.
- 2) Warranty Scope
  - If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense. Defects or failures caused by the following are not covered.
    - ① If the stipulated maintenance and inspection are not carried out.
    - ② 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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- Locating + Clamp
- Locating
- Hand · Clamp
- Support
- Valve · Coupler
- Cautions · Others

Cautions

Installation Notes

Maintenance/Inspection

Warranty

Company Profile

Company Profile

Our Products

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