Diaphragm Type Air Chuck

DC

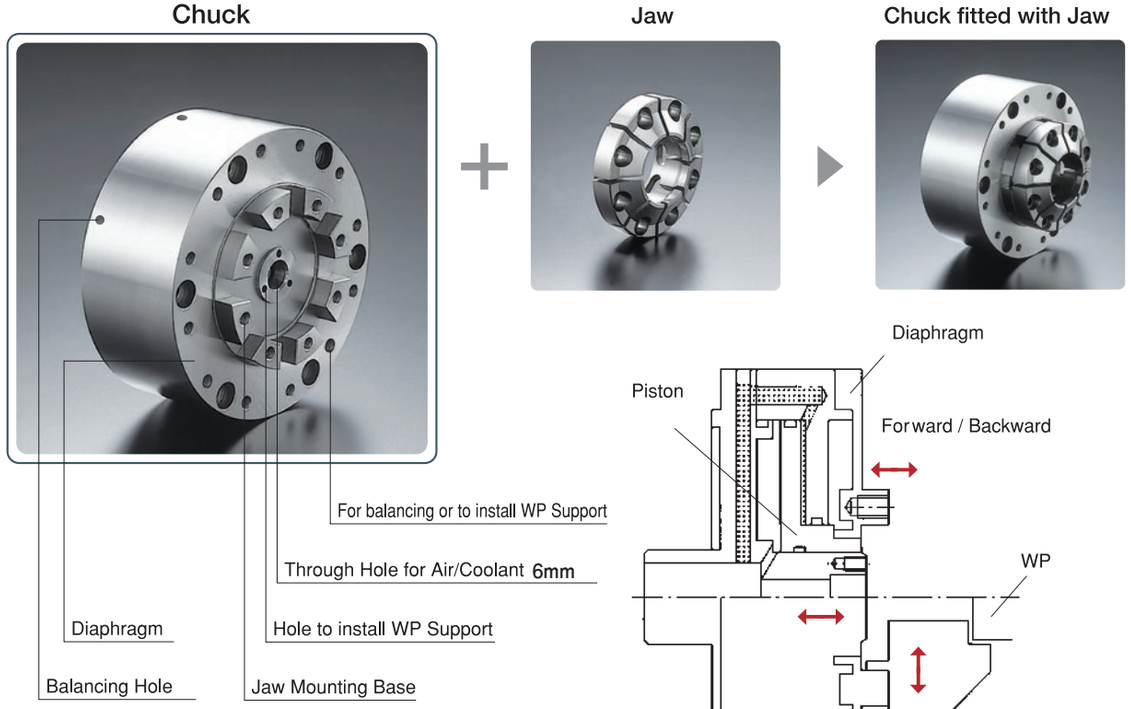
●Main Features

- ■Repeatability : 0.4㎛
- ■100% sealed : No maintenance required (No lubrication required)
- ■Excellent high speed capability up to 12,000min^{-1} (Counter-weight incorporated)
- ■Flexible adjustment of air pressure for flexible control of clamp power
- ■High durability & Long life
- ■Both internal & external clamp possible with one(1) chuck

For High Precision turning, grinding & measuring

1 DC Operation System (Structure & Function)

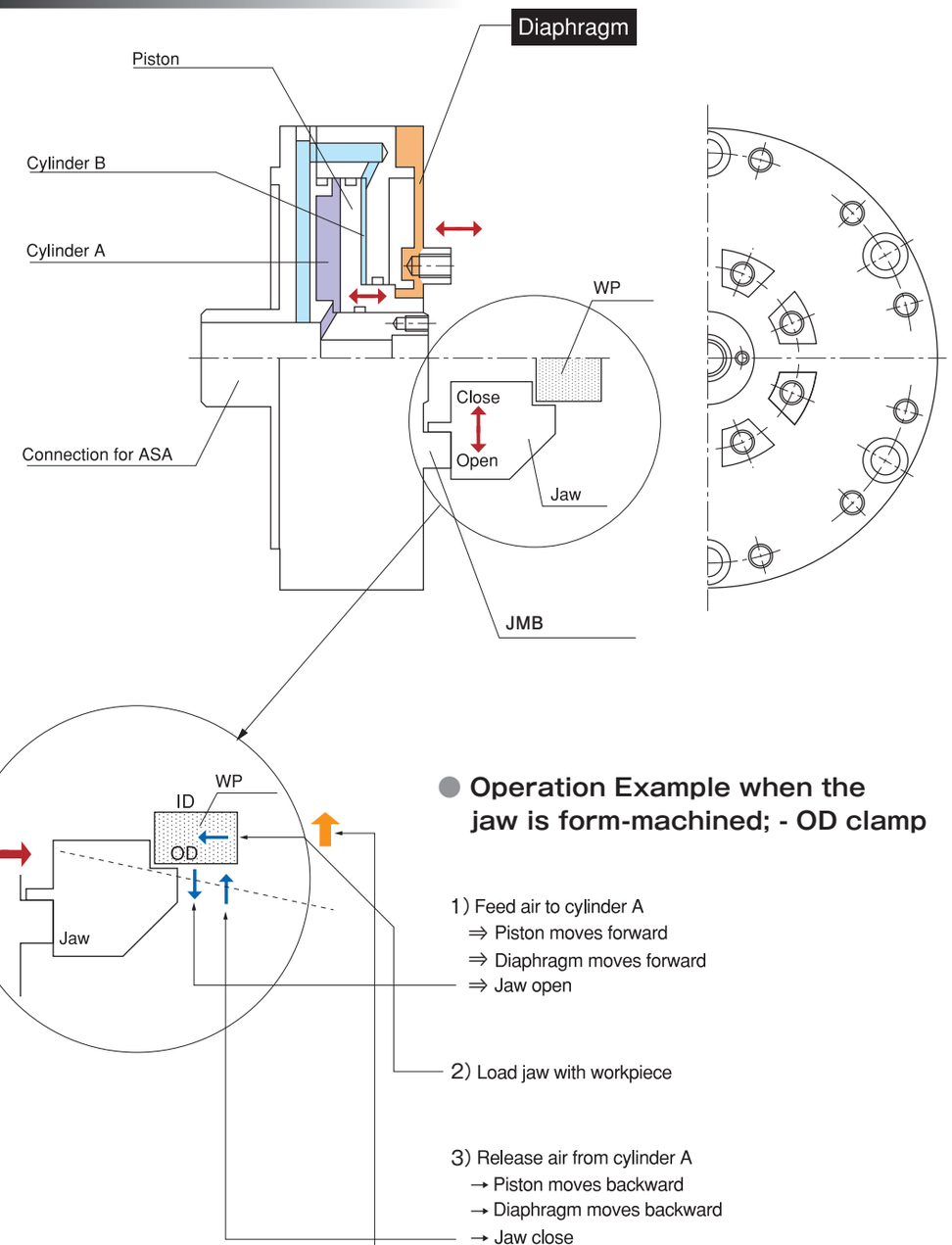
●Structure & Mechanism



DC is to clamp WP by utilizing the elasticity of diaphragm material, which is generated when the diaphragm move back and forth through the piston to be actuated by air.

Diaphragm Type Air Chuck

Example: OD Clamping



● Operation Example when the jaw is form-machined; - OD clamp

1) Feed air to cylinder A
⇒ Piston moves forward
⇒ Diaphragm moves forward
⇒ Jaw open

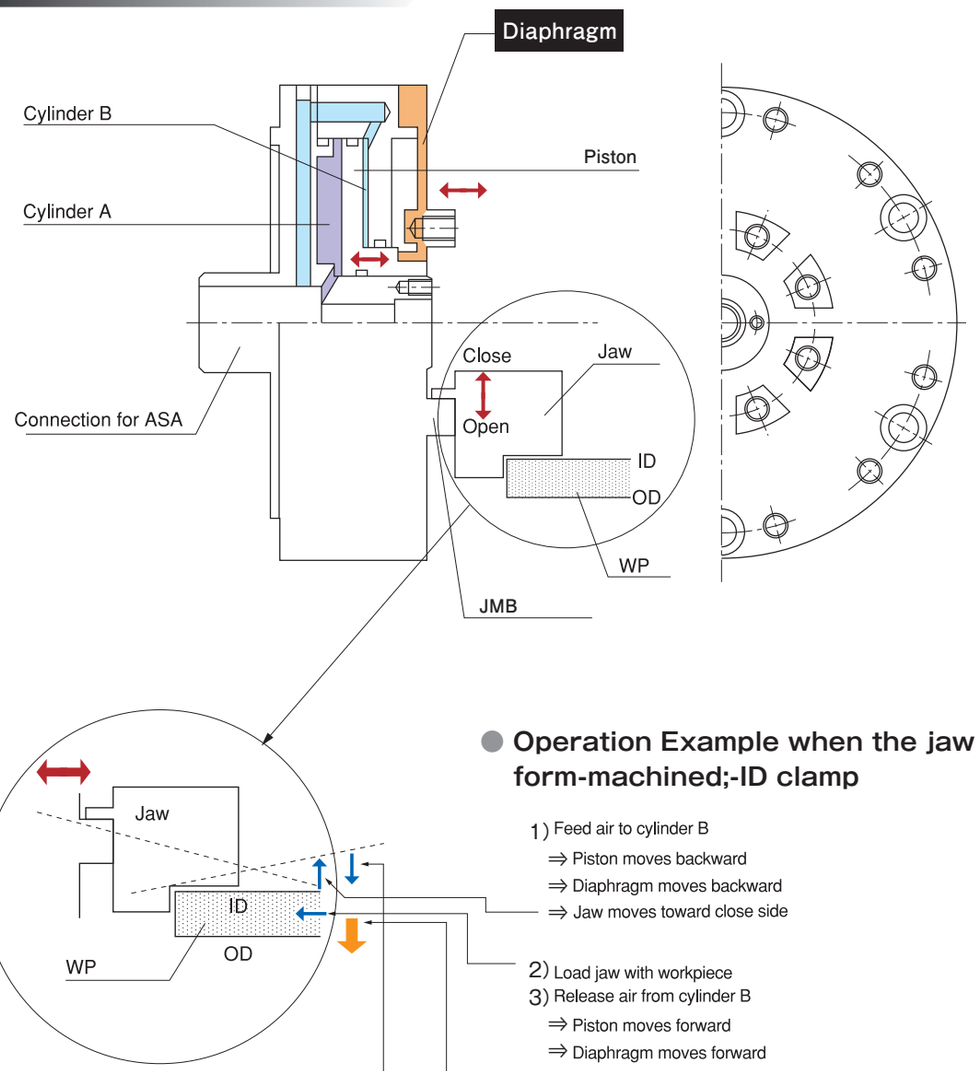
2) Load jaw with workpiece

3) Release air from cylinder A
→ Piston moves backward
→ Diaphragm moves backward
→ Jaw close

4) Workpiece is clamped.＊＊
＊＊Feed air to cylinder B when more clamping power is required.
⇒ Piston moves backward further
⇒ Diaphragm moves backward further
⇒ Clamping power is increased by the additional clamping power obtained from above operation

This example is the operation example when WP is clamped by the pressure to be caused when the jaw returns to the original position after released the air from cylinder A.
The air pressure to open the jaw, in the procedure 1), need to be bigger than the one used when form-machining the jaw to get the clearance for loading/unloading of WP.
(Refer to page 19)

Example:ID Clamping



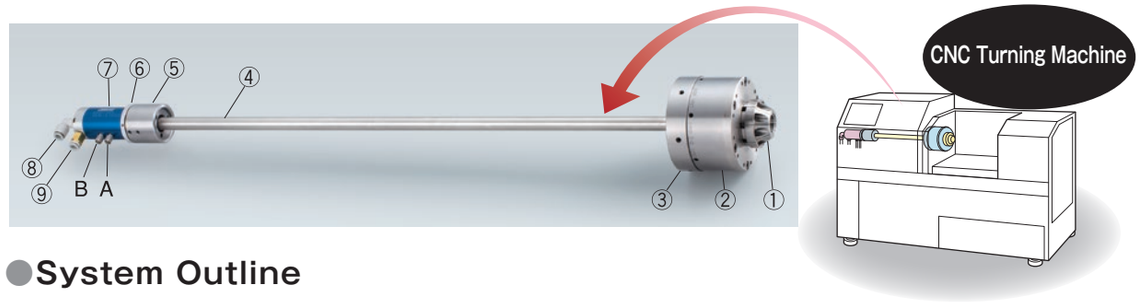
● Operation Example when the jaw is form-machined;-ID clamp

1) Feed air to cylinder B
   ⇒ Piston moves backward
   ⇒ Diaphragm moves backward
   ⇒ Jaw moves toward close side

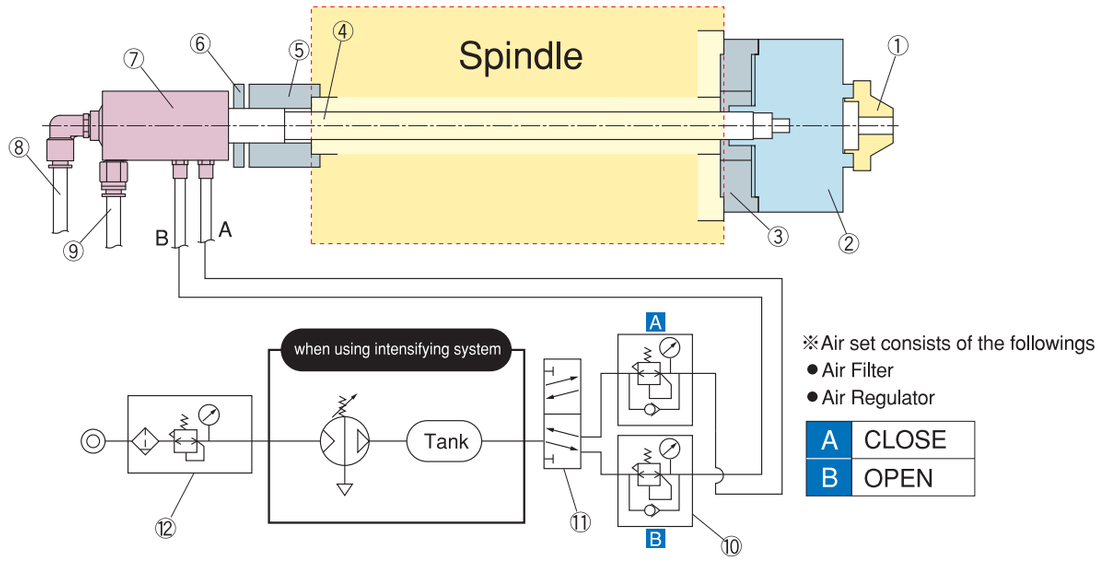
2) Load jaw with workpiece
3) Release air from cylinder B
   ⇒ Piston moves forward
   ⇒ Diaphragm moves forward
   ⇒ Jaw moves toward open side

4) WP is clamped. **
** Feed air to cylinder A when more clamping power is required.
   ⇒ Piston moves forward further
   ⇒ Diaphragm moves forward further
   ⇒ Clamping power is increased by the additional clamping power obtained from above operation

This example is the operation example when WP is clamped by the pressure to be caused when the jaw returns to the original position after released the air from cylinder B.



●System Outline



※Air set consists of the followings
- Air Filter
- Air Regulator

A	CLOSE
B	OPEN

Intensifying system is to stabilize the supply of air pressure during the operation, and/or to use higher air pressure than the normal std. factory air pressure (usually 0.5MPa) to increase the clamping power.

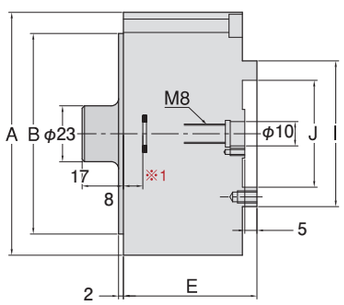
●Name and Performance of each access

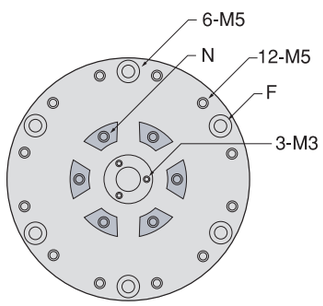
No.	Part Name	Performance	For more inf.
①	Jaw	Clamp workpiece	P.14~
②	DC	High Precision Diaphragm Chuck Body	P.05~
③	Chuck Adapter	To fix DC with spindle nose	—
④	Pipe	To feed air and/or coolant to DC	—
⑤	ASA Adapter	To fix ASA with rear end of spindle	—
⑥	S.R.Bushing	To install ASA with DC, and for safety	P.48
⑦	Rotary Journal	Rotary bearing housing perform also as terminal for air and coolant	P.48~50
⑧	Port	For coolant and air blow	—
⑨	Port	To drain returned coolant	—
⑩	Regulator	To regulate the air to open and close the jaw	—
⑪	Solenoid Valve	Auto change valve for On/Off of air	—
⑫	Air Set	Consists of air regulator and air filter	—
A	Air for Jaw Close	Port/Regulator for jaw close	—
B	Air for Jaw Open	Port/Regulator for jaw open	—

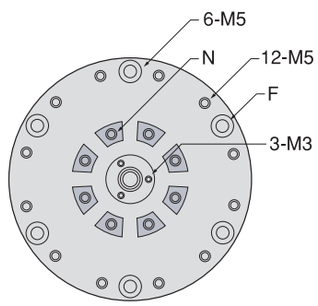
2 Model No./Dimension/Spec.

6div

8div

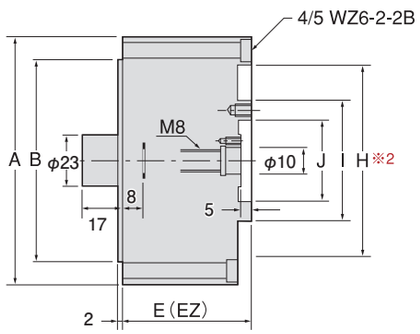


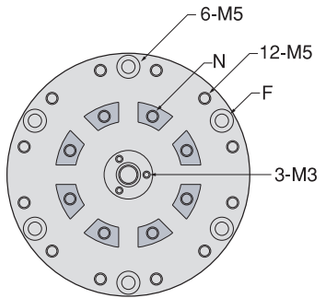


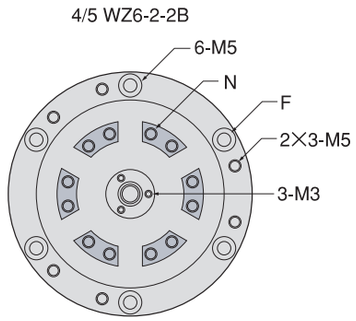


※Above drawing is for 4HN.

※1) 3SN8(6)6mm

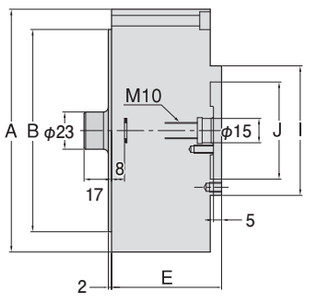


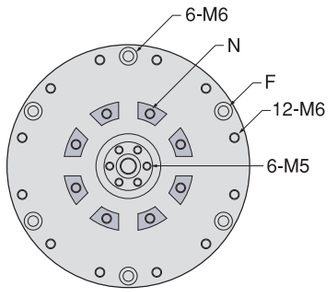




※2) 4/5WZ6-2-2B:77mm
5WZ8-3:100mm

※Above drawing is for 4/5HN





※Above drawing is for 6HN

Diaphragm Type Air Chuck

Dimensions & Specification

*8 or 6 after HN signity the number of seats where the jaw is mounted on, i.e., the number of slits of jaw to be used with DC.

	Model No.	Aφ (mm)	Bφ (mm)	E (mm)	Iφ (mm)	Jφ (mm)	P.C.D.F (mm)	P.C.D.N (mm)	N	Speed ※3	Chucking cap. ※4	Wgt. (kg)
③	3SN8(6)-3	82	60	36	36	25	70	30.5	8(6)-M4	12,000min^{-1}	2.0mm～40.0mm	1.0
	3HN8(6)-3	82	60	55	36	25	70	30.5	8(6)-M4	12,000min^{-1}	2.0mm～40.0mm	1.7
④	4HN6-3	100	82.55	55	48	32	88.9	40	6-M5	12,000min^{-1}	2.0mm～60.0mm	2.6
	4HN8-3	100	82.55	55	48	32	88.9	40	8-M5	12,000min^{-1}	2.0mm～60.0mm	2.6
	4/5HN8-3	100	82.55	55	60	44	88.9	52	8-M5	10,000min^{-1}	2.0mm～60.0mm	2.6
⑥	6HN8-3	150	124.97	68	80	60	135.8	70	8-M6	8,000min^{-1}	3.0mm～90.0mm	7.1
	6/8HN8-3	150	124.97	68	102	77	135.8	90	2×8-M6	8,000min^{-1}	3.0mm～90.0mm	7.1
④	4/5WZ6-2-2B	100	82.55	53	60	44	88.9	52	2×6-M5	8,000min^{-1}	2.0mm～60.0mm	2.3
⑤	5WZ8-3	126	101.6	58	60	44	114.3	52	8-M5	8,000min^{-1}	3.0mm～70.0mm	3.8

BTO

WZ Type

Original design. There's a projection around the outer surface of type WZ, and that is to allow the additional machining to arrange the workpiece support. Additional machining to arrange workpiece support around the outer DC surface is now possible on all HN models without the projection.

■Jaw Stroke

Attention to secure the clearance required for auto loading/unloading is required as the law stroke of DC is relatively small, much smaller than that of slide jaw type air chuck. Refer to page 13 for stroke chart.

■Gripping Force

Refer to the graph of page 13.

※3 ■Speed

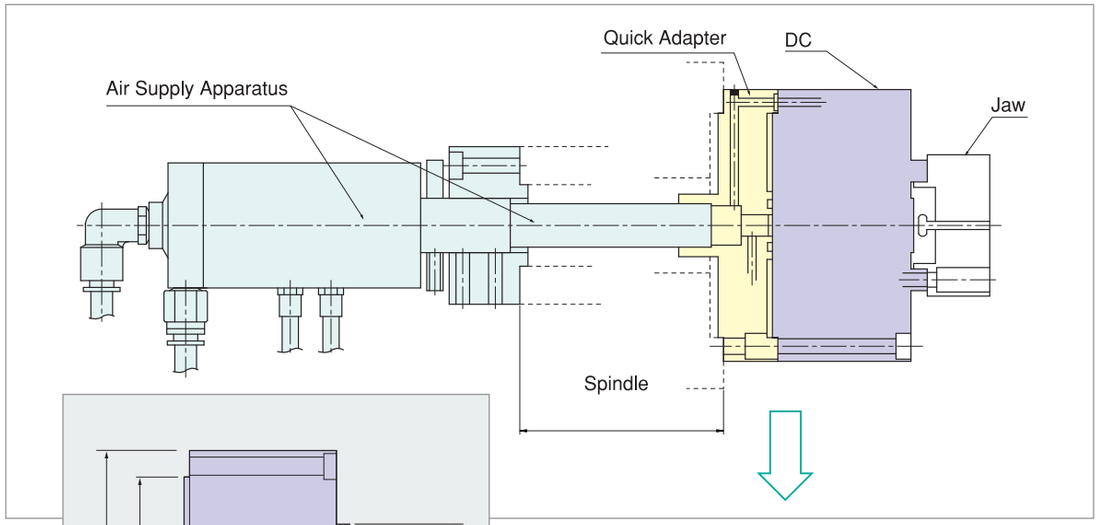
Speeds described above are nearly considered as max. Generally speaking, higher the spindle speed, bigger the centrifugal force. The mass of workpiece, therefore, will affect the speed. The max. speed will also depend on the cutting conditions, the accuracies required and etc. Generally speaking, smaller and lighter the mass, higher the spindle speed can be applied. On the other hands, bigger and heavier the mass, lower the speed will have to be applied.

※4 ■Chucking Range

The chucking capacity (range) can't be summed up easily due to the unique contiguration of jaw. It has to be affected by the configuration, weight, material of workpiece, spindle speed, cutting conditions and accuracies required. Please take the figures described above as the reference range.
In general, as an example, when the real high accuracy, micron or sub micron, is required, usually the workpiece has to be relatively light and small, and its diameter needs to be smaller than the PCD of bolt hole of jaw.

3 Quick Change System

Chuck can be changed without dismounting the ASA.
Changeover time is drastically reduced, and machine's down time is also significantly reduced.



Models listed below are standard and available from stock.
Quick change type is basically available on any type of diaphragm chucks shown in page 10.

※1 M10 for 6HN and 6/8HN
※2 No therads for 4HN8/14 and 6/8HN8/30(through hole type)

Dimensions & Specification

Refer to the equivalent model of page 10 for the spec. of mounting bolt etc,

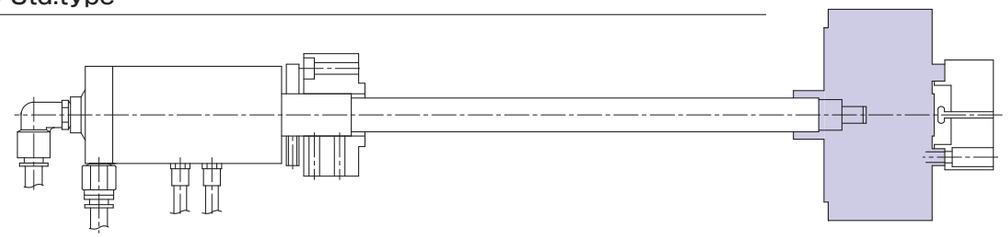
	Model No.	A φ (mm)	B φ (mm)	F (mm)	I φ (mm)	J φ (mm)	Wgt. (kg)
③	3HN6-3-QTN	82	60	45	36	25	2.2
	3HN8-3-QTN	82	60	45	36	25	2.2
④	4HN6-3-Q	100	82.55	55	48	32	2.6
	4HN8-3-Q	100	82.55	55	48	32	2.6
	4/5HN8-3-Q	100	82.55	55	60	44	2.6
	4HN8/14-3-Q	100	82.55	55	48	32	2.5
	New triple piston						
	4HN8-3-QT	100	82.55	58	52	32	2.9
⑥	6HN8-3-Q	150	124.97	68	80	60	7.1
	6/8HN8-3-Q	150	124.97	68	102	77	7.1
	6/8HN8/30-3-Q	150	124.97	68	102	77	6.8

*8 or 6 after HN signify the number of seats where the jaw is mounted on, i.e.,the number of slits of jaw to be used with DC.

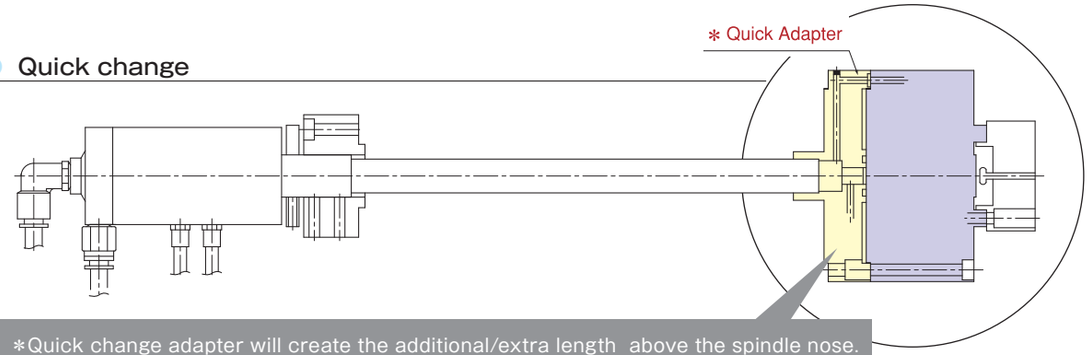
*Triple piston···has the equivalent repeatability to double piston type, and 1.4 times in gripping power.

Diaphragm Type Air Chuck

Std.type



Quick change



*Quick change adapter will create the additional/extra length above the spindle nose. It is therefore, suggested to check if there's enough space among tool post, loader arm and the top of jaw before adopting the quick change system, to avoid interference.

Procedure & Time required for changing chuck

1.Remove ASA from the spindle.
2.Remove chuck from the spindle.
3.Mount new chuck to the spindle/Not tightening the bolts to full extent.
4.Secure the chuck firmly by tightening the bolts to the full extent and do centering again.
5.Install ASA into the chuck.
6.Center ASA and secure it firmly.

Normally, it will take about an hour for above operation.

In Case of Quick Change

Eliminate operation 5,6 of above procedure,
and changeover time is reduced to 15 min. or so.

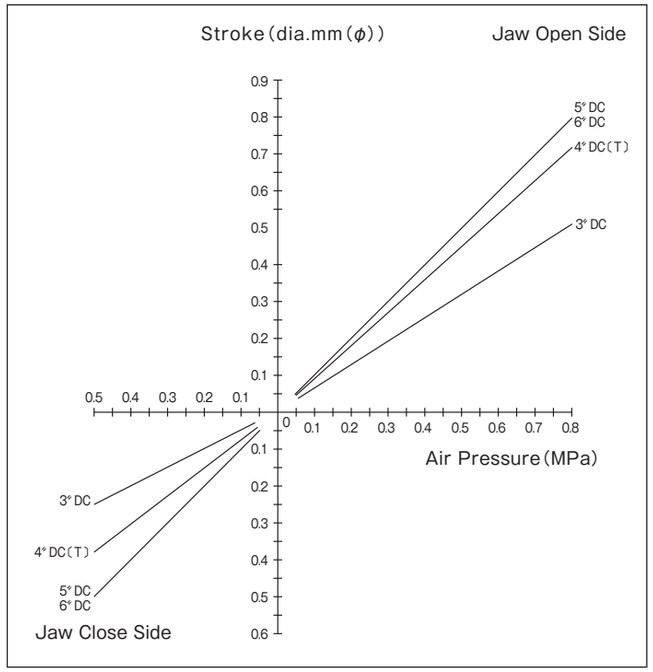
Reduce Down-Time Drastically!

●Note

More procedures than written here are required to be done in the practical operation, Refer to the operation/instruction manual of AC and/or DC for what need to be done exactly.

Quick change system is ideal, because of above feature, for in case the workpiece is changed time to time and require high precision.

●Air pressure & Jaw Stroke



Max. Air Pressure
Jaw Open : 0.8MPa
Jaw Close : 0.5MPa

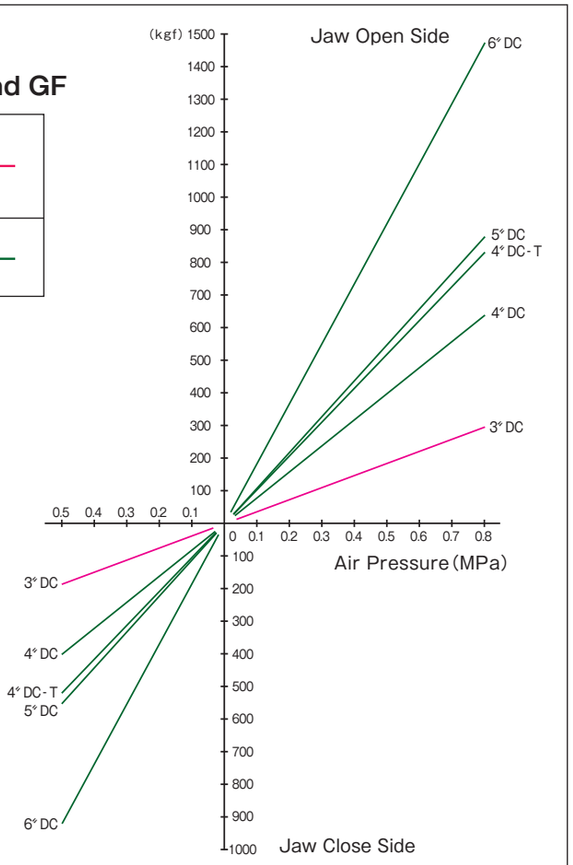
※Stroke amount is not exactly like the graph shown above. There is always a little variation with it depending on the chuck. Stroke amount of Jaw opening side and closing side under the same air pressure is not exactly and directly proportional to each other. It is always with a little variation and difference. Take the stroke amount shown above in left graph, therefore, as the guide value.

It may affect the durability and life of diaphragm to use any higher pressure described above, breakage of diaphragm after relatively a short period of use in the worst case.
Stroke, described above, was measured at 23mm H of Jaw.

Correlation Diagram between AP and GF

3″ DC (Jaw Height:20mm) [3HN8 (6)]

4″ 5″ 6″ DC (Jaw Height:23mm)



4 Jaw/Form Machining

■One piece collet type. Special material that has very high rigidity and elasticity to insure high accuracy and long life, is used.
■Hardened and tempered steel is used as std. and its hardness is about HRC40. Harder jaw to HRC55-60 is available. Due to the unique collet like design of jaw, and as it's usually designed to light weight for high speed operation, and form-machined to relatively thin meat, each segment of jaw is relatively thin. Therefore, and in general, any material over HRC30 is recommended for use.

●How to order std. blank jaw

Chuck Size
4HN⇒4 4/5HN⇒ 5 6HN⇒ 6
3HN⇒3 6/8HN⇒ 8 5WZ⇒ 5

Jaw Height
e.g:23=23mm⇒ (4″)
25=25mm⇒ (5″, 6″, 8″)

4 A 8 1 – 10 – 23

Type A or B
Number of slit (8or 6)
Jaw Hardness (see Note 3)
Width of slit
e.g:05=0.5mm
10=1.0mm
15=1.5mm

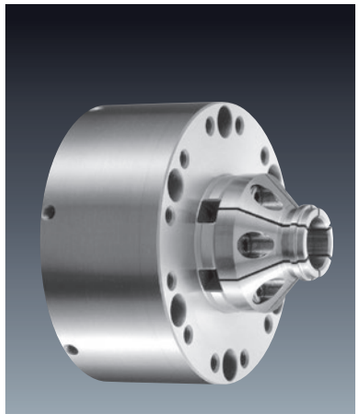
Note 1: In case of 4/5WZ6-2-2B, the last number have to be 25(std.) instead of 23 unless other special size is requested. Two bolts are used per jaw. So, it actually has to be 25-2B,

Note 2:Most popular size of slit being used like standard is 1.0mm. Other sizes such as0.5mm, 1.5mm and 2.0mm are also available. Generally speaking, wider the slit, better the chips removal. If, often the chips get stuck at the slit, it will be recommendable trying 1.5mm or 2.0mm. If, however, the accuracy required is severe, in micron or sub-micron order, you will kindly be requested to expect the decrease of accuracy along with the increase of slit width. If the out of roundness, for example, required is like 20㎛ to 30㎛ or more, it won't be necessary for you to be concerned about the width of slit.

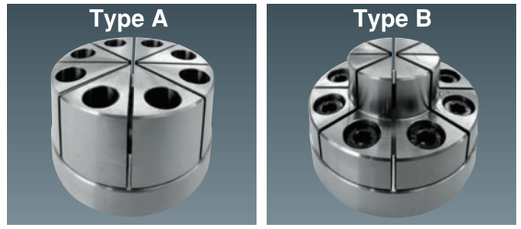
Note 3: Pre-hardened mold alloy steel (HRC40) is used as standard. Any other material being considered feasible can be used. There's no data showing the difference of performance among each different material. It is generally suggested to pick up any one which have enough hardness, machinability, and durability to clamp and turn the WP. FYI, soft and flex. Clamp with DC is largely because of the material of diaphragm and designing related to it.

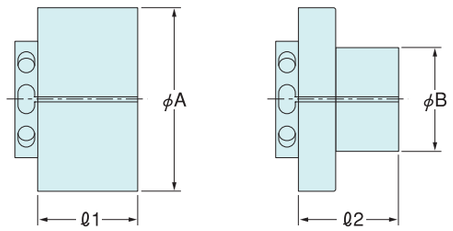
Form-Machined Jaws

4HN6-3 supplied w/machined jaw



Outline Drawing of Std.Jaws





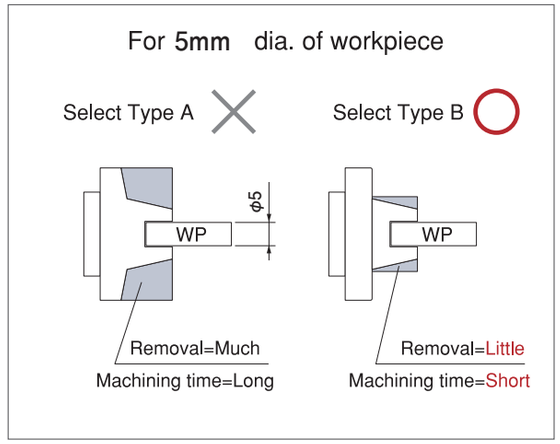
Dimensions of Std.jaw

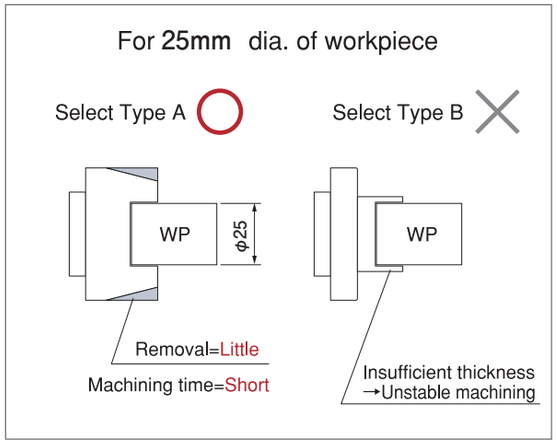
Chuck \ Jaw	Type A				Type B			
	ϕA (mm)	ℓ1 (mm)		Wgt. (kg)	ϕB (mm)	ℓ2 (mm)		Wgt. (kg)
3SN 3HN	40	23	30	—	22	23	30	—
4HN	52	23	30	0.38	28	23	30	0.3
5WZ 4/5HN	63	25	30	—	40	25	30	—
6HN	82	25	30	—	50	25	30	—
6/8HN	110	25	30	—	—	—	—	—

Other sizes available on request as option.

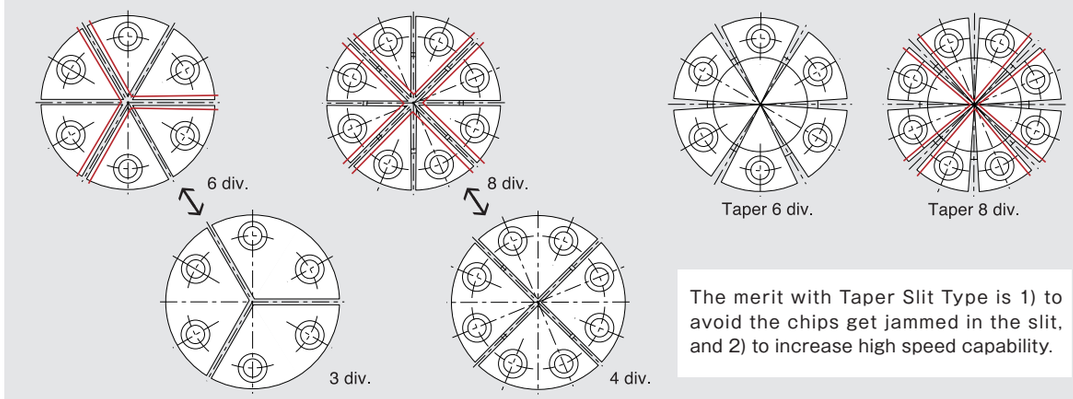
Type A is basically for OD clamping, and Type B is for ID clamping. The selection of A or B depends on how fast and efficiently it can be form-machined to the required shape.

Example of Std. Jaw Selection





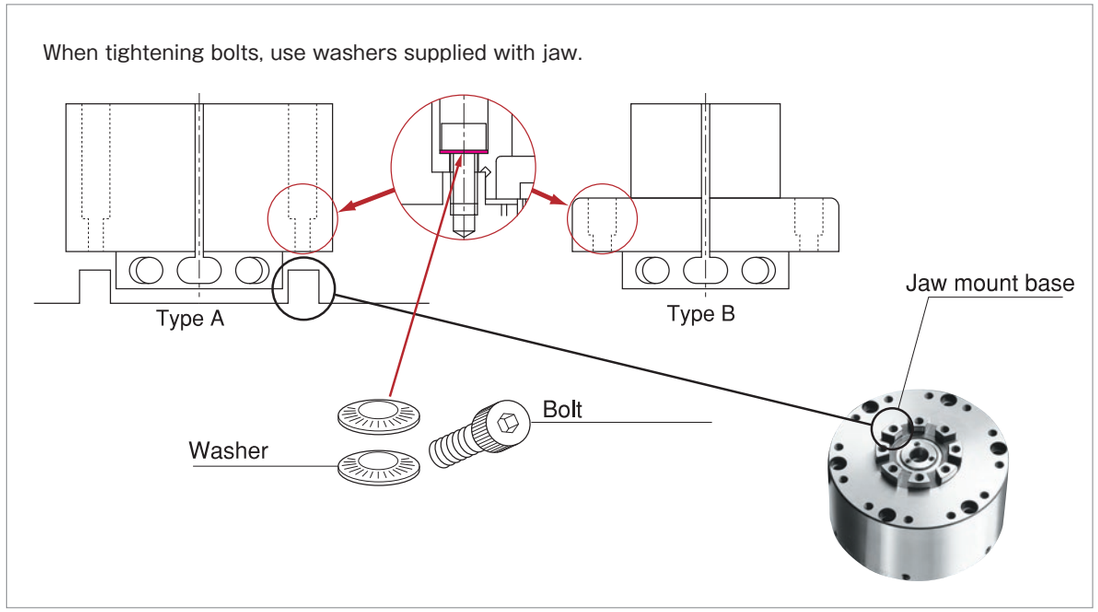
Type of Jaw



The merit with Taper Slit Type is 1) to avoid the chips get jammed in the slit, and 2) to increase high speed capability.

Mounting of Jaw

1) Mount the jaw onto the JMB. Remove the chips and dust from the surface of JMB, and from the seating surface of Jaw. Tighten the bolts not to full extent, leaving a little allowance for further final tightening. This operation should be done under no air pressure to the chuck.



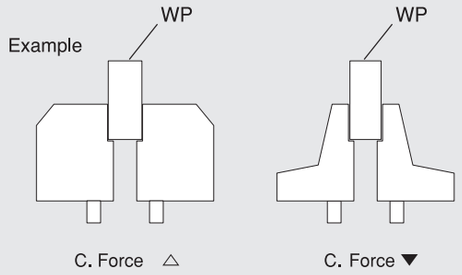
2) Tighten the bolts to secure the jaw to the chuck. It is recommended to use the torque wrench by setting it to 6N-m for M4, or, 12N-m for M5 and 15N-m for M6. When tightening the bolts by torque wrench, apply 0.15MPa to 0.2MPa of closing air pressure to clamp the pilot of jaw. This operation is to remove the clearance between the pilot of jaw and the internal surface of JMB, and thence to make it possible to clamp the workpiece accurately with good concentricity.

3) After tightening bolts, release the air pressure and make sure again the tightening torque. Make sure, in other words, if the jaw is tightened with the chuck with the right torque.

4) Machine the jaw to the shape and dimensions required to clamp the workpiece. There are slits with the jaw, and therefore, the machining will have to be intermittent. It is suggested, therefore, to set the feed rate, removal rate etc. as small as possible. Enough attention need to be paid for this operation.

■ Form-machining of Jaw Sample

①Machine to the shape and dimension to make clamping possible
②Machine by considering where to clamp, range for clamping, and where/how to be supported on the workpiece to achieve the accuracy required.
③For as higher speed of operation as possible, remove as much meat as possible from the jaw to reduce the mass.



■ Finish-Machining

If once the Jaw is dismounted from the chuck after finished with the chuck, it will have to be off-centered. If the accuracy required is high, re-machining of jaw may have to be required when the jaw is put back to the original chuck or onto another chuck. (Occasionally, and when the required accuracy is not high, it might be used without re-machining.)

■ How to test cut to find most feasible air pressure for form-machining

If, for example, once the jaw is machined by 0.1MPa of air pressure for opening, then, it can not be re-machined by any higher air pressure than 0.1MPa. Therefore, it is suggested to use highest possible air pressure to machine the jaw at the beginning. After machining of jaw, test cut is done and the machining accuracy is measured. If the accuracy to be obtained by that air pressure is not good enough, and if lower pressure considered to be better, reduce the air pressure perhaps by 0.05MPa, and then, try a test cut and measure again. If still not good enough, try further lower air pressure.
Note: Lower the air pressure is, lower the gripping force will be. So, in case the air pressure is lowered, the use of additional air pressure to move the law to closing side have to be considered to compensate the loss of clamping force.

●Attention need to be paid when for-machining jaw

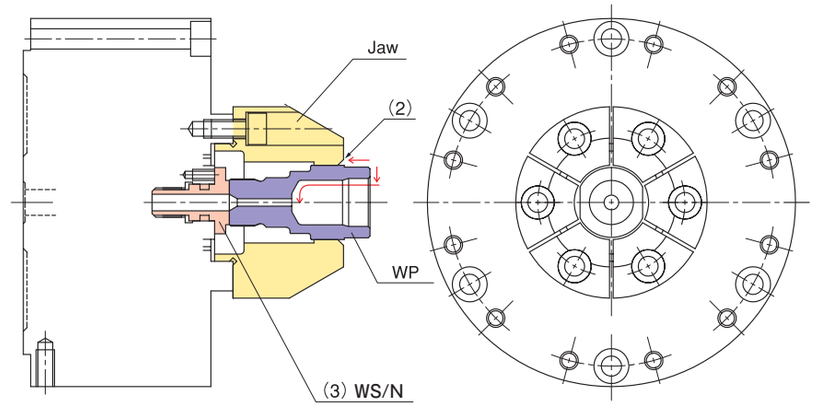
Refer to next page

①Select most feasible air pressure to clamp WP is critical.
Lower the air pressure, better the accuracy. If, however, the air pressure is too low, WP will be force-moved by the centrifugal force while rorating/turning. Air pressure should be needed is to make it possible to turn WP at as higher rpm as possible, and to reduce the distortion when clamped WP to the smallest degree as possible. (Refer to page 11 and 20)

②WP should be clamped as close to the machining area as possible to get max. possible accuracy.

③Arrange WS

Example
4HN6—3—Q



●3 patterns for finishing/arranging the jaw

1 Pattern 1

Order std, jaw type A or B. (supplied with support ring as std.) → Clamp the support ring and semi-finishing with other machine than the one to be used for practical production. (Make sure if the jaw is tightened firmly with support ring by the bolts.)Remove the semi-finished jaw from the chuck, and support ring from the semi-finished jaw. Then, mount it onto the chuck to be used for finishing. (Support ring is no longer in use.) Secure the chuck and jaw firmly and evenly by torque wrench. → Carry out finish-machining. → Ready

2 Pattern 2

Order the semi-finished jaw. (Support ring is used to avoid any deformation when shipping.) → Remove the support ring, and mount the semi-finished jaw on the chuck to be used for practical production. → Carry out finish-machining. → Ready

3 Pattern 3

Order the jaw finished with the chuck as a set. → Jaw is already centered against the chuck. Do the centering on the chuck after installed with the machine spindle preferably within 1㎛. → Ready

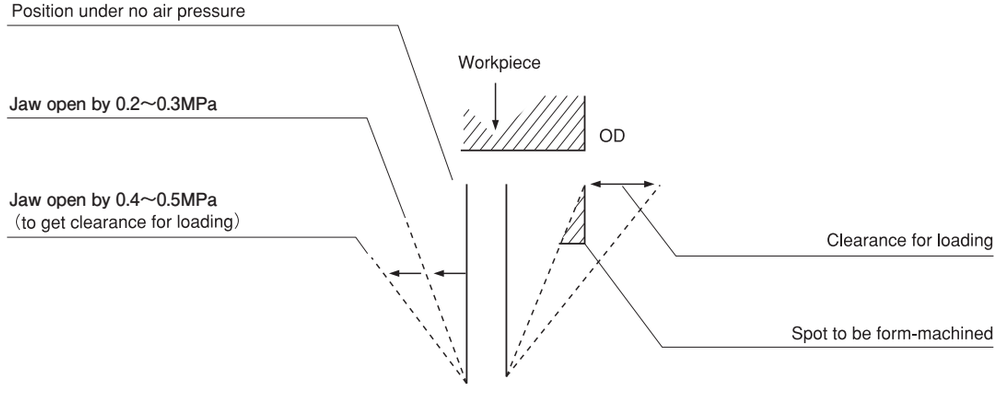
Order the finish-machined jaw Independently → No matter how the jaw is finished, it will have to be off-centered when it's shipped independently and remounted to the chuck. → Therefore, it has to be re-machined with the chuck and machine to be used for practical production.

●Form-machining of Jaw

①Form-Machining of Jaw for OD Clamping

The pressure to be set at regulator A means the clamping power. In case 0.2~0.3MPa air pressure is considered enough to hold the workpiece, machine the jaw by opening it by 0.2~0.3MPa. If the loading accuracy or auto loading/unloading equipment is good, or, if the loading/unloading is done manually, usually 0.4~0.5MPa air pressure to be set at regulator A is enough to get the clearance for loading/unloading.

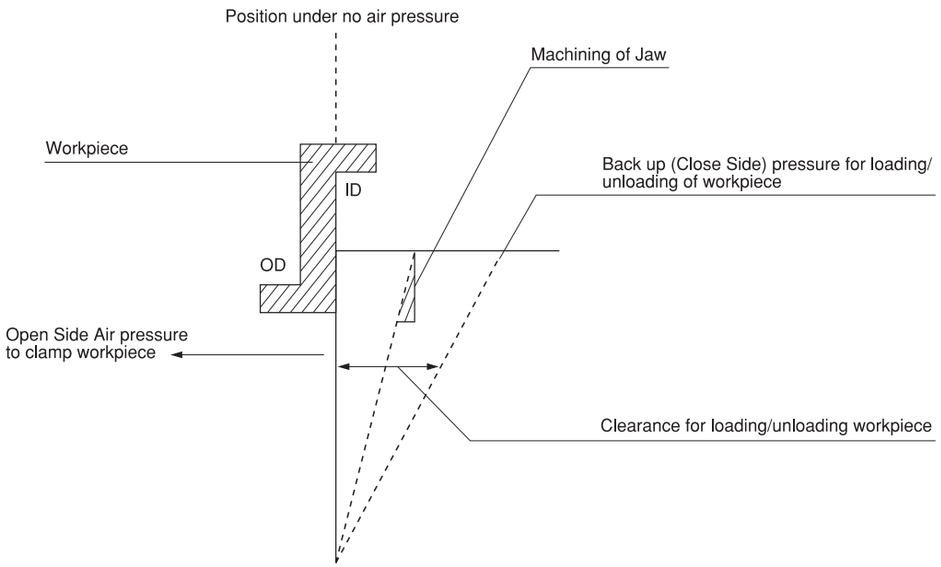
Note: Max. air pressure can be used to open the jaw; 0.8MPa



②Form-Machining of Jaw for ID Clamping

The pressure to be set at regulator B means the clamping power. In case 0.1~0.2MPa of air pressure is enough to hold the workpiece, machine the jaw by closing it by 0.3~0.4MPa when loading the workpiece. If the loading accuracy of auto loader/unloader is good, and/or, if the loading/unloading is done manually, usually 0.3~0.4MPa of air pressure is enough to get the clearance for loading/unloading.

Note: Max. air pressure can be used to close the jaw ; 0.5MPa



●Operation for OD clamping

1. In case the air pressure used for form-machining of jaw is 0.3MPa, as an example, set the air pressure at regulator B (this regulator is to control the air to open the jaw) higher than 0.3MPa.

Example: For manual loading/unloading ⇒ 0.35MPa
For auto loading/unloading ⇒ 0.4~0.5MPa

Above pressure can be determined from the comparison chart of air pressure and stroke.

In case of 4" DC fitted with 23mm(h) of jaw, the displacement of stroke per 0.1MPa of change of air pressure is approx. 0.1mm. The following is the guide to select air pressure in case of both 0.1mm or lower loading clearance and between 0.2mm and 0.1mm loader clearance.

	In case Loading Accuracy is below 0.1mm							In case Loading Accuracy is between 0.2mm and 0.1mm					
Air Pressure to machine the Jaw (MPa)	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.6	0.5	0.4	0.3	0.2	0.1
Air Pressure for loading Workpiece (MPa)	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.8	0.7	0.6	0.5	0.4	0.3

2. The air pressure to be set at regulator A (this regulator is to control the air to close the jaw) will be the additional pressure for clamping WP in addition to the power to be obtained at the point where WP is clamped, where the jaw was form-machined, when releasing the air from cylinder B.

In case of O.D. Clamping, finish-machine the clamping part of jaw to approx. +0.01mm above the dimension of workpiece.

●Operation for ID clamping

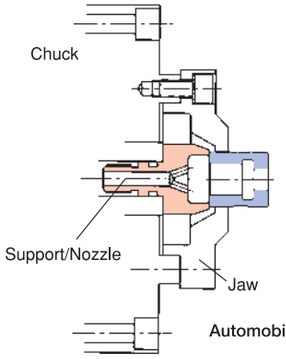
1. In case the air pressure used to form-machine the Jaw is 0.2MPa, set the pressure at regulator A (this regulator is to control the air pressure to close the jaw) higher than 0.2MPa to get the clearance for loading/unloading WP.

Example: Manual loading/unloading ⇒ 0.25MPa
Auto loading/unloading ⇒ 0.3~0.4MPa

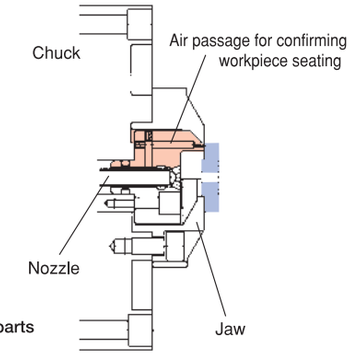
2. Set the pressure at regulator B (this regulator is to control the air pressure to open the jaw), in ID clamp operation, will be the additional pressure for clamping WP in addition to the power to be obtained at the point where WP is clamped, where the jaw was form-machined, when releasing the air from cylinder A.

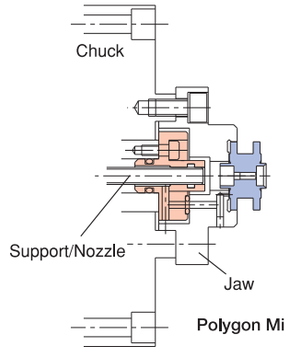
In case of I.D. clamping, finish-machine the clamping part of jaw to approx. -0.01mm below the dimension of workpiece.

5 Application Examples

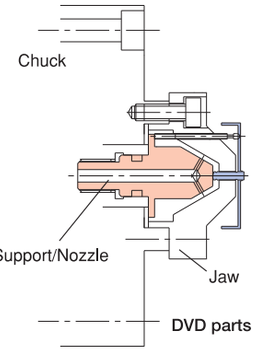


Automobile parts

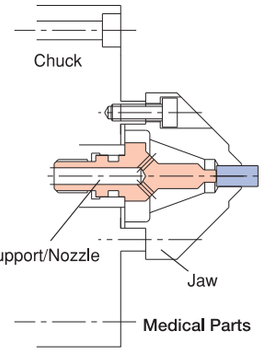




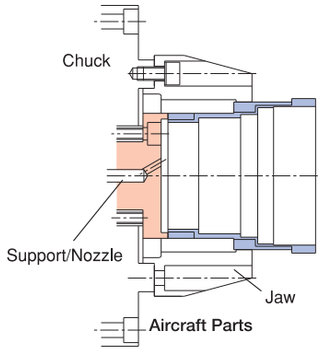
Polygon Mirror



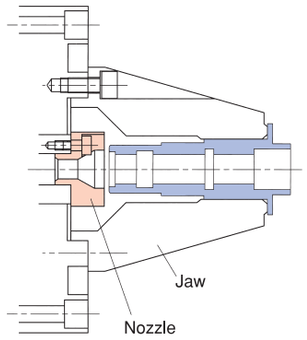
DVD parts



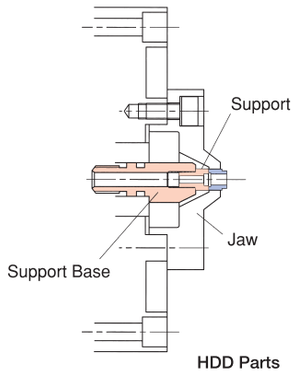
Medical Parts



Aircraft Parts



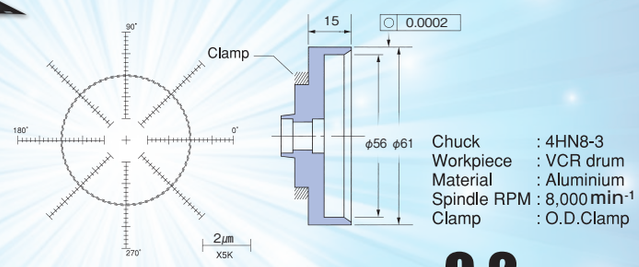
Sleeve for Transmission



HDD Parts

Flashback !

VHS, Beta system is no longer in the production, but when they were main stream for VTR, the key component to achieve fine image sharpness was how accurately the drum (aka: cylinder) is machined. Our diaphragm chuck made it possible to achieve all time high 0.2㎛.

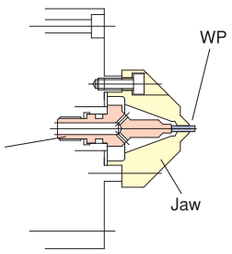


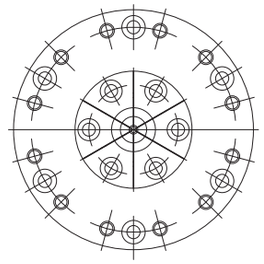
Chuck : 4HN8-3
Workpiece : VCR drum
Material : Aluminium
Spindle RPM : 8,000 min^{-1}
Clamp : O.D.Clamp

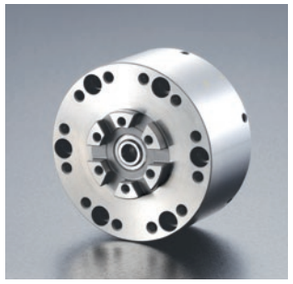
Out of roundness — **0.2㎛**

Diaphragm Type Air Chuck

3HN6-3
O.D.clamp



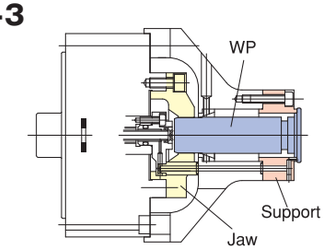


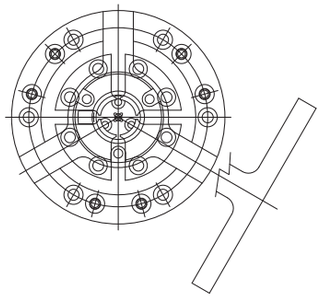


3HN6-3

Accuracy Required
Repeatability required : Within 0.001mm

4/5HN8-3
O.D.clamp

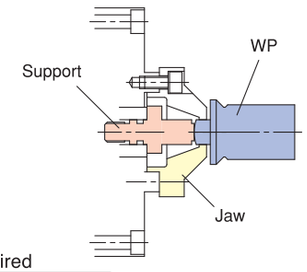


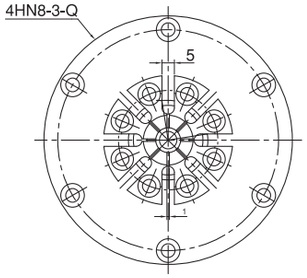


4/5HN8-3

Accuracy Required
Cylindricity : 0.008mm
Out of roundness : 0.005mm

4HN8-3-Q
O.D.clamp



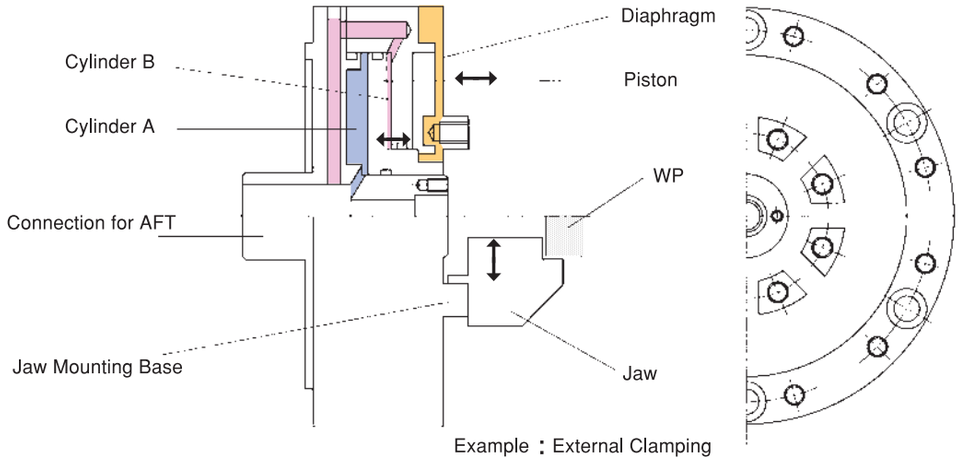


4HN8-3-Q

Accuracy Required
Out of roundness : 0.003mm
Cylindricity : 0.003mm
Rectangularity : 0.005mm

Work Example

6 How Diaphragm Chuck Work



Example：External Clamping

●Mechanism of diaphragm movement

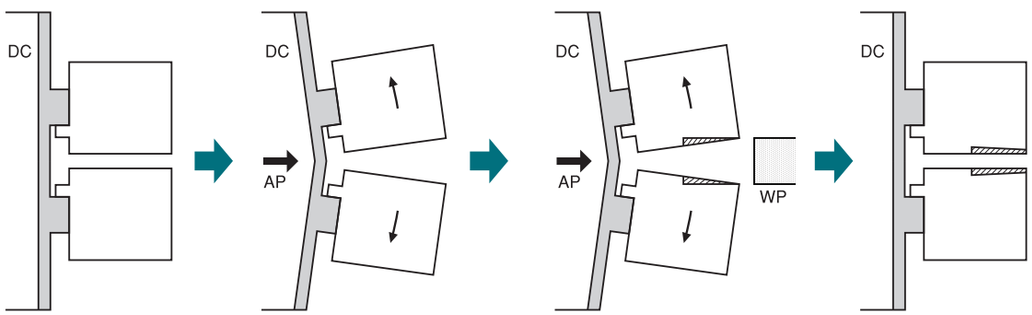
Air to Cylinder **A** → Piston Move **Forward** → Jaw Open

Air to Cylinder **B** → Piston Move **Backward** → Jaw Close

●Work Example：External Clamping

AP to form machine the jaw=0.2MPa

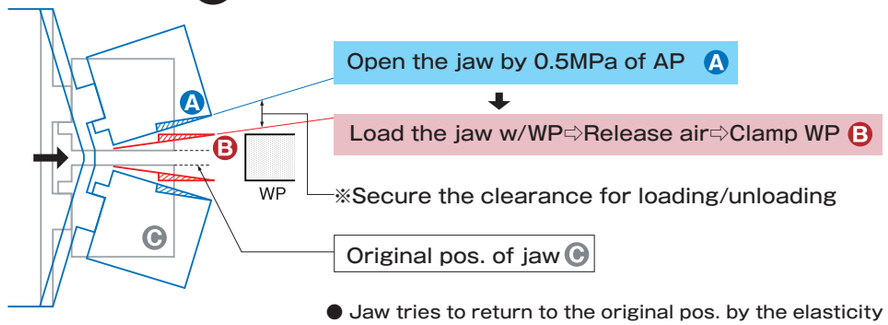
1. Before machining of jaw
2. Open the jaw by 0.2MPa for form machining
3. Machine the oblique part to the dia. of workpiece
4. Release air ⇨Jaw come back to original position



Form machining is finished, and go into practical operation for machining & production

Diaphragm Type Air Chuck

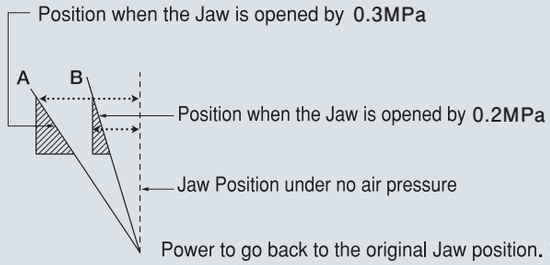
5 Jaw Open⇨WP loading ⇨ Release AP=Clamp WP ⇨Machining starts B

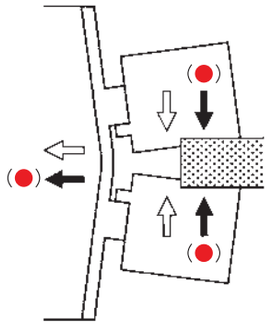


● Jaw tries to return to the original pos. by the elasticity of diaphragm material. That represent clamp power.

■Clamping Power

As shown right, higher the AP to form machine the jaw, stronger the clamp power. Lower the AP to form machine the jaw, weaker the clamp power.



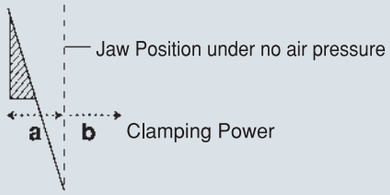


※Air pressure to cylinder B-Piston is forced to move backward-Diaphragm is moved backward, and thus the additional clamping force is obtained.

6 When the clamp power is not enough under the clamp condition of 5, the additional air pressure for additional clamping power(●)can be applied by feeding the air into the cylinder B.

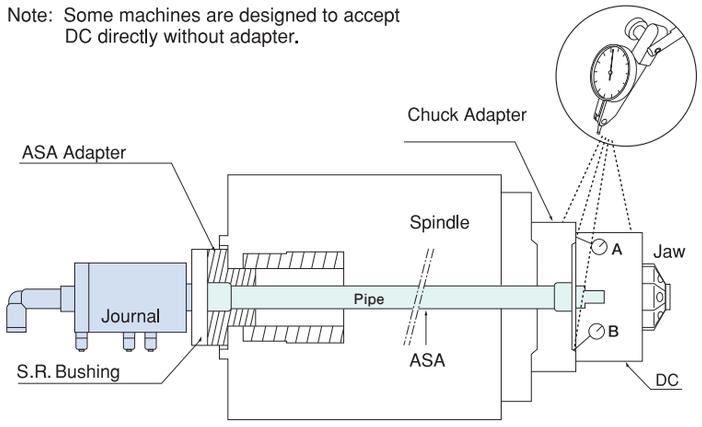
7 In case of 5, after finished the machining, WP can be unclamped by opening the jaw to A position. After that, the jaw can be moved back to the original C position where it should be under no air pressure, by releasing the air from cylinder A.

The clamping power can be flexibly adjusted by air pressure to be used for both machining the Jaw and additional clamping power.



M1 Installation

Note: Some machines are designed to accept DC directly without adapter.



Installation of DC

1. Mount adapter onto the spindle nosel temporarily & not fully, leaving a little allowance for final firm tightening
2. Center the adapter at its OD within 2㎛.
3. Tighten the bolts firmly to secure the adapter with the spindle nose. Make sure the runout at OD is still within 2㎛. If not, and out of 2㎛", loosen the bolts a little and repeat procedure 2 until within 2㎛ of runout is obtained. Check the runout of surface A and B. Runout
4. of surface A have to be within 2㎛, and B within 10㎛. Mount DC onto the adapter by tightening 6 bolts
5. temporarily & not fully, leaving a little allowance for final firm tightening, and do the centering at its OD. Runout at 5mm-10mm away from the chuck surface is required to be within 1㎛. After centering, tighten 6 bolts to secure DC
6. with adapter firmly. If DC is not centered within1㎛, loosen 6 bolts a
7. little and try centering again from procedure 5 mentioned above. Torque wrench is recommended to be used for
8. tightening bolts. Recommended torque: 3",4",5"DC ⇨ M5 12N-m
: 6" ⇨ M6 15N-m

M2 Maintenance & Caution

1.Handling

·If once the jaw is dismounted, after finishing, from the SFJ of DC, and when it's put back onto the SFJ, usually approx. 3㎛ to 10㎛ of off-centering is caused. So, if once the jaw is dismounted, carry out re-machining of jaw. As to the air pressure to be set for re-machining, refer to aforementioned instruction.

·Jaw is split into 8 (or 6) pieces, and all 8 pcs are linked together only at the bottom of jaw. This linkage is relatively small and thin. So, it is recommended to pay enough attention to the handling of jaw to avoid deformation or damage.

·Jaw can get rusted. When it's not in use, carry out the anti-corrosion treatment. It is also recommended to be kept with Ring which was originally supplied with the jaw.

2.Storage

When DC is not in use, apply anti-corrosion oil to it, and wrap it up by clean nylon cover etc. to avoid dust, chips etc.

3.Maintenance

a.Cutting Chips

·On auto operation, stop the machine periodically and check if there are any cutting chips with the clamping area of jaw. If there are, they have to be removed and cleaned.

·To avoid cutting chips cumulated at the bottom area of jaw, set-up the angle and position of nozzle for coolant and/or air blow right.

·If the cutting chips piled up, that may affect the jaw's movement. and eventually to the cutting accuracy.

·If cutting chips are found piled up, remove them by using a wire or whatever through the slits of jaw.

·If is recommended to install coolant nozzle to avoid the cutting chips stay on the clamping surface of jaw. Coolant nozzle should be arranged according to the shape of workpiece, taking efficiency into consideration. Clamp surface of jaw will be kept clean by feeding the coolant and for air through ASA, DC and nozzle.

b.Exchange of Jaw

When the jaw need to be changed, follow the aforementioned instruction about the installation and machining.

c.It is requested not to dis-assemble DC any time.
The manufacturer and supplier is completely free from any responsibility on the trouble or problem resulted from disassembly.

d.Because of erroneous operation or whatever, when some shock is given to the jaw, and naturally to the SFJ of DC, off centering may have to be caused on both jaw and SFJ.
If off-centering take place, the machining accuracy will have to be lost.
If the accuracy is found went wrong after collision, and/or the deformation of jaw is found, the chuck will have to be repaired, and the jaw will also have to be newly made.

e.Jaw can wear. When it's worn, and when it's necessary to be re-machined, follow afore-mentioned instruction in Article 10.

4. Check the Air Filter periodically to see if there is any damage with it, or if it stuffed heavily with chips, sludge etc. If the chips or sludge etc. get into the air, malfunction of air chuck and/or ASA assembly is caused.

5. When the coolant is used through the center hole of DC supplied with the nozzle to flow the chips away while cutting, make sure the coolant is relatively clean, and not dirty. Especially when the nozzle is inside the jaw, and if the coolant is not clean, back pressure against the coolant flow is increased, and much coolant will flow back to the journal. In this case, occasionally, the coolant get into the bearing area, and wash grease away. If this happen, Bearings will generate the heat, and eventually the jamming of journal may have to be caused.

6. For the maintenance of ASA, refer to the separate instruction manual of ASA.

7. When the chuck supplied with the jaw accidentally had the collision with the Tool Post or whatever, usually the jaw will be damaged 100% of the case, and will have to be replaced with new one. Since, in this case, the chuck itself (Mainly the Diaphragm and SFJ) may also have to be damaged, though difficult to be found visually. In case of collision by operational mistake or whatever, it is recommended to send the chuck to the local distributor or to the manufacturer for precise inspection.

Diaphragm Type Air Chuck

❶ Power

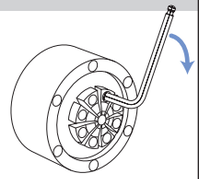
Turn off power while changing Chuck or ASA, or while doing inspection. **OFF**

❷ Shock

Refrain from hitting DC, Jaw and WP by hammer etc.

❸ Bolt

Tighten the bolts, for both chuck and jaw, firmly and evenly, by using the torque wrench at the torque specified at page 16 and 25.



❹ Change Valve

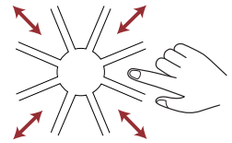
Do not operate Valve (Manual or Solenoid) while Spindle is rotating.
Operate it only after Spindle is stopped.

❺ Rotation Speed

Use of higher MIN^{-1} than that specified in the catalog may have workpiece fly from Jaws because of the depression of clamping force. Depending on the cutting conditions etc., even the MIN^{-1} specified in the catalog may occasionally not be used. When high MIN^{-1} is required to be used. Contact manufacturer or local representative.

❻ Hand

Be careful with finger not to be caught by Jaws.



❼ Spindle Start

For the safety, set System so that the spindle can not be started when the door is open.

❽ Coolant

Max. pressure to be used to feed the coolant ranges to 0.4MPa max. Any higher pressure may harm Journal of ASA.

Model	Max. Coolant pressure
4L3	0.4MPa
JHP3HS	0.4MPa
JHP3	0.4MPa
JHP2	0.4MPa
JHP3AHPR	1.0MPa
4L3AHPR	1.0MPa

❾ Air Pressure

Max. Air Pressure to Open The Jaw : 0.8MPa
Max. Air Pressure to Close The Jaw : 0.5MPa

Use of any higher pressure than above will shorten the life of DC.

Notice: Water contained in the air to be used for the chuck and ASA will affect their life and performance. Dehumidification by supplying air dryer etc. is recommended.