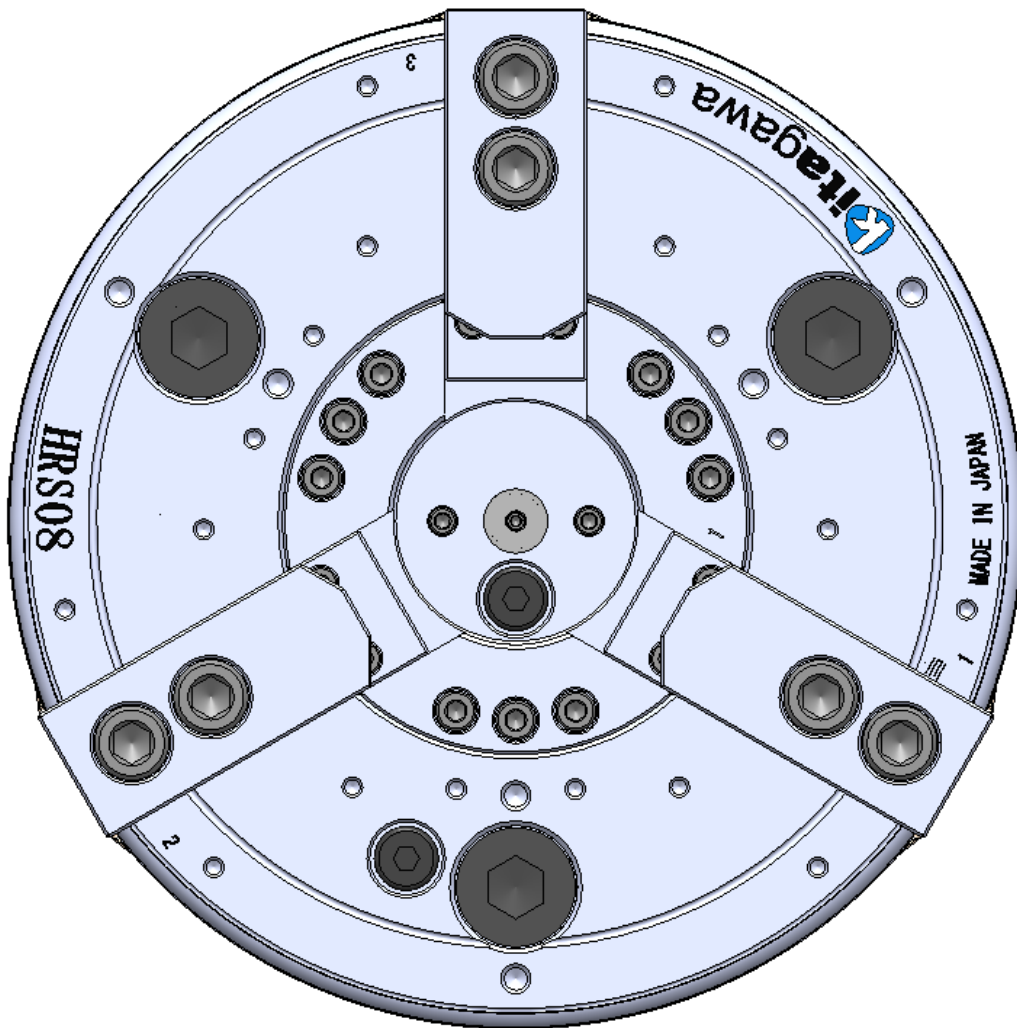


INSTRUCTION MANUAL

HRS08 type

High speed cylinder built-in chuck



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Before using this product, be sure to read this manual carefully to understand how to use it correctly.

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1. Preface

1.1. How to Use This Manual

- This manual provides detailed information on this product so that you can understand its performance and functions and use it safely and correctly. Before using this product, be sure to read this manual carefully to understand how to use it correctly.
- This manual has been prepared for intended use for persons in charge of installation, operation, inspection, and maintenance of this product. When the beginners use this product, be sure to receive the guidance from skilled persons, sales agents, or us in advance.
- Store this manual with care in the specified place at hand, and reread it as necessary for correct use of the product.
- This manual is a part of the product. Do not sell or transfer the product to a third party without attaching this manual.
- Read the section "Important Safety Precautions" at the beginning of this manual especially carefully, which summarizes precautions that particularly you should know or follow.
- Failure to follow the instructions and warnings in this manual could result in serious human accidents. Kitagawa shall not be held liable for human accidents, death, damage, or loss that occurred due to a failure to follow this manual.
- This manual does not predict all potential hazards in installation, operation, maintenance, and inspection under all environmental conditions. Therefore, the matters, unless otherwise mentioned clearly as "can be done" or "may be done" in this manual, should be considered as "cannot be done" or "must not be done".
- Please contact us or our agents if you have an uncertainty about safety when you try to perform installation, operation, inspection, or maintenance of the product.
- The information and product specifications described in this manual are subject to change without notice for the purpose of improvement.

1.2. Signal Word Definition

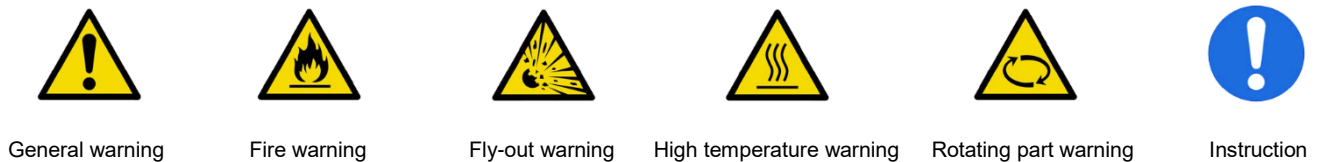


The triangle shown on the left indicates warning. The warning signs are used to alert you to potential safety hazards. To avoid death or injuries that could occur, follow all the instructions given with the warning signs.

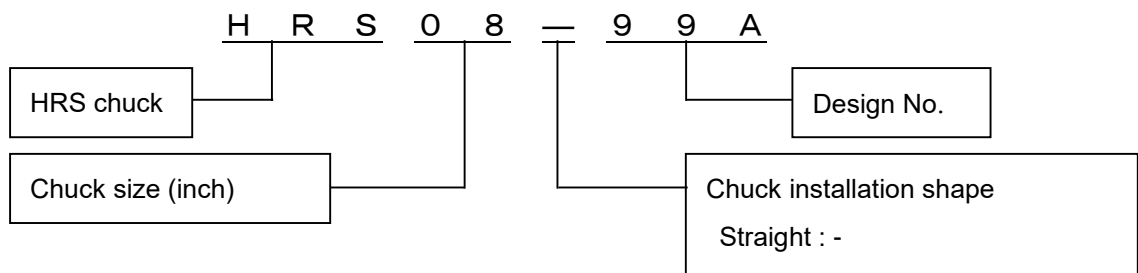
Handling precautions that are considered especially important are classified and indicated as shown below according to the degree of risk that could result.

| | |
|----------------|--|
| Danger | Failure to follow the safety precautions below will result in death or serious injuries. |
| Warning | Failure to follow the safety precautions below could result in death or serious injuries. |
| Caution | Failure to follow the safety precautions below may result in minor or moderate injuries. |
| Notice | Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment. |

The signs are classified and indicated as follows according to the type of risk.



1.3. Type Designation



The chuck installation shapes conform to JIS B 6109-1: 2005 and JIS B 6109-2: 2005.

Figure 1 Type designation

1.4. Application Purpose of This Product

The High speed cylinder built-in chucks are installed on machine tools such as NC lathes and machining centers and are suitable for clamping workpieces. The High speed cylinder built-in chucks are equipped with jaws for clamping workpieces, which are opened and closed by the built-in cylinder mechanism. For applications other than those listed above, please contact us.

1.5. Unacceptable Application Example

The High speed cylinder built-in chuck is not designed for the applications mentioned below for example.

- To fix an object to be pressed, punched, welded or fused
- To use as a tool holder
- To suspend or transfer an object
- To fix another chuck that grips a workpiece

1.6. Structural Drawing

The High speed cylinder built-in chuck is installed on the face of the machine spindle and connected to the hydraulic and air circuit by pipes.

The hydraulic pressure applied to the cylinder inside the chuck is converted into thrust that pulls the wedge plunger. Then the wedge hook actuates the master jaw inward and transfers force to the top jaw.

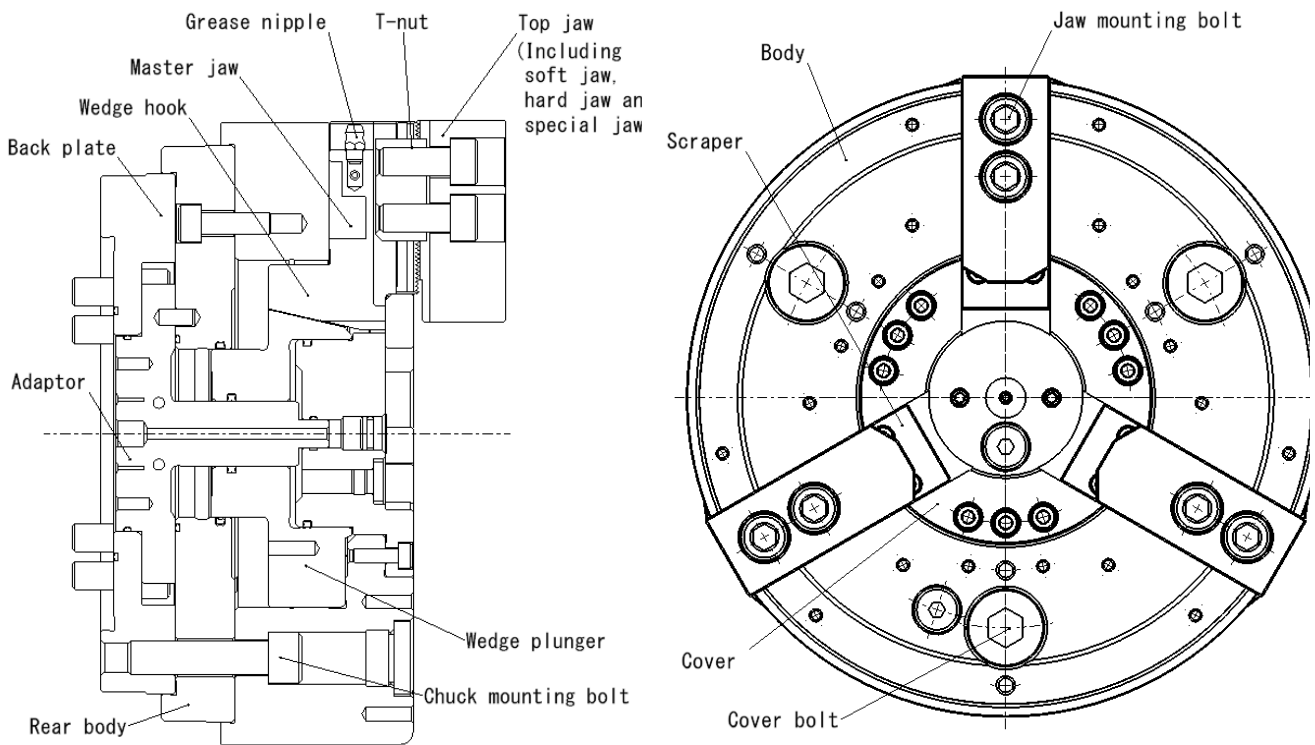


Figure 2 Structural drawing

1.7. Product Range

- This is the chuck instruction manual.

For the Rotary Joint and other peripheral devices, refer to their respective instruction manuals.

1.8. Warranty

The product is warranted for one year after the date of delivery. However, the following cases will void the warranty.

- When parts other than Kitagawa's genuine parts are used.
- When proper maintenance and inspection such as periodic greasing are not performed.
- Other than above, when the product is used in methods not following this manual.

1.9. Parts List

All parts used including consumables shall be genuine parts delivered by Kitagawa.

Kitagawa shall not be held liable for human accidents, death, damage, or loss that occurred due to the use of non-genuine parts.

Table 1 Standard delivery range

| No. | Parts name | Quantity | No. | Parts name | Quantity |
|-----|-------------------------|----------|-----|--------------------------|----------|
| 1 | Body | 1 | 16 | Scraper mounting bolt | 6 |
| 2 | Rear body | 1 | 17 | Cover mounting bolt | 9 |
| 3 | Wedge plunger | 1 | 18 | Adaptor mounting bolt | 8 |
| 4 | Adaptor | 1 | 19 | Back plate mounting bolt | 8 |
| 5 | Back plate | 1 | 20 | O-ring | 11 |
| 6 | Lock valve | 2 | 21 | O-ring | 2 |
| 7 | Master jaw | 3 | 22 | O-ring | 2 |
| 8 | Scraper | 3 | 23 | O-ring | 1 |
| 9 | Cover | 1 | 24 | X-ring | 1 |
| 10 | Cover cap | 1 | 25 | X-ring | 1 |
| 11 | Soft jaw | 3 | 26 | X-ring | 1 |
| 12 | T-nut | 3 | 27 | Pin | 1 |
| 13 | Jaw mounting bolt | 6 | 28 | Grease nipple | 3 |
| 14 | Chuck mounting bolt | 3 | 29 | Screw plug | 2 |
| 15 | Rear body mounting bolt | 3 | 30 | Cover bolt | 3 |

Table 2 Consumables

| No. | Parts name | HRS08 | No. | Parts name | HRS08 |
|-----|------------|-----------|-----|------------|------------|
| 6 | Lock valve | 61R817583 | 24 | X-ring | X119 |
| 20 | O-ring | P 6 | 25 | X-ring | X142 |
| 21 | O-ring | S 10 | 26 | X-ring | X143 |
| 22 | O-ring | S 67 | 29 | Screw plug | JIG010 |
| 23 | O-ring | S 85 | 30 | Cover bolt | MSWGP20-10 |

Table 3 Optional parts (Paid item)

| No. | Parts name | Quantity | No. | Parts name | Quantity |
|-----|------------|----------|-----|------------|----------|
| 31 | Tnut-Plus | 3 | | | |

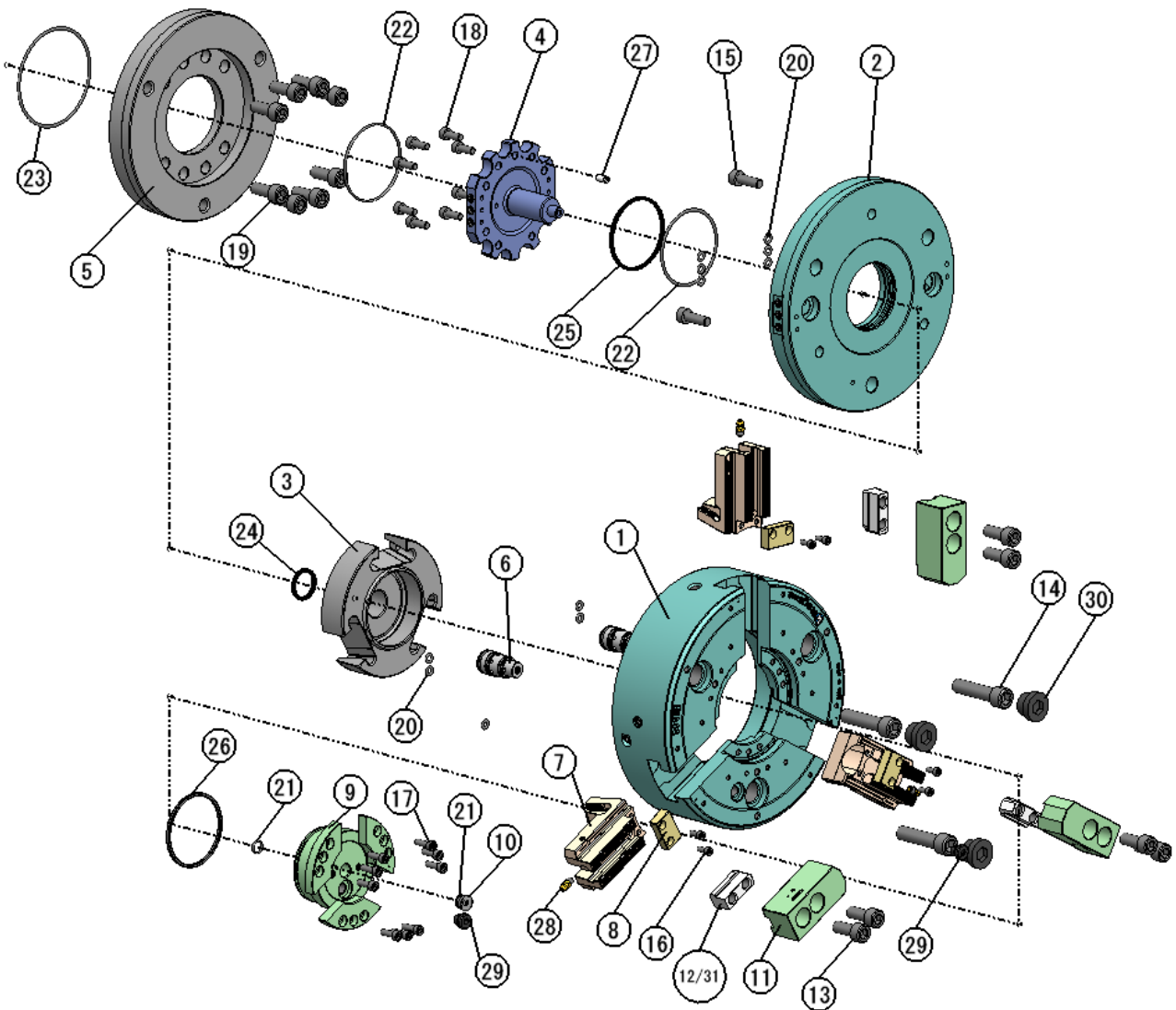


Figure 3 Parts



2. Important Safety Precautions

This chapter summarizes precautions that particularly you should know or follow.

Please read them before starting to use the product.



Danger Failure to follow the safety precautions below will result in death or serious injuries.



Turn off the main power supply of the machine when installing, inspecting, greasing, or replacing the chuck.

- The chuck may rotate unexpectedly and entangle your body or clothing.



Do not rotate the spindle with the door open.

Provide an interlock to allow spindle rotation only when the door is closed.

- If the door is not closed, the rotating chuck may entangle your body or clothing or cause the workpiece to fly out.



Do not turn OFF the hydraulic pump or operate the solenoid valve during spindle rotation.

Before performing workpiece transfer during spindle rotation on an opposed 2-spindle lathe, confirm the machine manufacturer that the operation can be performed safely.

- Operating the solenoid valve during spindle rotation will drop or block the hydraulic pressure, causing the gripping force to drop suddenly and the workpiece to fly out.



The rotational speed and hydraulic pressure must not exceed the limit in operation. (Refer to "3. Technical Data")

- Excessive rotational speed may cause the workpiece to fly out.
- Excessive hydraulic pressure may damage the chuck, causing the workpiece to fly out.



Only the machine manufacturer or the user is to determine cutting conditions, gripping force, and rotational speed according to test cutting result. Adjust the hydraulic pressure so as to obtain the gripping force necessary for machining, and confirm that the necessary gripping force is obtained before starting machining.

- Insufficient gripping force may cause the workpiece to fly out.



If you use a top jaw higher or heavier than the standard top jaw, determine the operating condition according to "3.2. Calculation of Operating Condition" on page 13.

- Using a top jaw under excessive operating conditions may damage the chuck, causing the workpiece to fly out.



Chuck should always be used with a supply of hydraulic oil.

- When chuck is used without supply of hydraulic oil, the oil inside the chuck will gradually which would cause loss of gripping force that would cause the workpiece to fly out.



For internal gripping, use the chuck with 1/2 or less of the max. permissible hydraulic pressure for external gripping.

- Excessive hydraulic pressure may damage the chuck, causing the workpiece to fly out.



When using fixed jaws instead of one or two top jaws, the hydraulic pressure must be 2/3 or less or 1/3 or less of the max. permissible hydraulic pressure.

- Since the hydraulic pressure that is normally applied to three jaws evenly is concentrated in two or one jaw, the chuck may be damaged, causing the workpiece to fly out.



The gripping diameter must be equal to or less than the body outside diameter.

- Using the chuck with the gripping diameter exceeding the body outside diameter may damage the chuck, causing the workpiece to fly out.



When machining a workpiece with a long protrusion, support it with the steady rest or the tailstock.

- If not, the workpiece may turn at the end, causing the workpiece to fly out.



Do not grip a workpiece with slope shapes or tapered shapes such as a cast.

- Otherwise, the workpiece may slip, causing it to fly out.



If a workpiece or jig causes an unbalance, reduce the rotational speed or correct the state by mounting a balance weight. The recommended balance quality is G6.3 or less in JIS B 0905:1992.

- An unbalanced workpiece generates centrifugal force, causing the workpiece to fly out.
- Vibration generated by the unbalance may damage the chuck, causing the workpiece to fly out.



Confirm that the chuck or workpiece does not interfere with the cutter or the turret at a low rotational speed before starting machining.

- A large impact on the chuck or workpiece by interference may damage the chuck, causing the chuck or workpiece to fly out.



If an impact is given to the machine by interference between the chuck/workpiece and the cutter/turret due to malfunction or program errors, immediately stop rotation. Then thoroughly check for damage or crack on the parts by disassembling and cleaning them and perform repair or replacement if necessary. (Refer to page 26.)

- The impact may cause damage or crack on the parts. Continuous use of faulty parts may damage the chuck, causing the workpiece to fly out.



Be sure to tighten the bolts with the specified torque listed in Table 4-1 and Table 4-2.

Use a proper tool that can control torque such as a torque wrench.

Use only the bolts attached to the chuck. Do not use other bolts.

- Rotating the chuck with the jaw mounting bolts loosened may cause the jaws and workpiece to fly out.
- If insufficient bolts are mounted, bolt length is wrong, or tightening torque is improper, the bolts may be damaged, causing the chuck and workpiece to fly out.

Table 4-1 Specified torque for hex. socket head cap screw

| Thread size | M5 | M6 | M8 | M10 | M12 | M14 | M16 | M20 | M22 | M24 |
|-------------------------|-----|----|----|-----|-----|-----|-----|-----|-----|-----|
| Tightening torque [N·m] | 7.5 | 13 | 33 | 73 | 107 | 171 | 250 | 402 | 539 | 666 |

* Strength classification: M20 or smaller = 12.9, M22 or larger = 10.9

Table 4-2 Specified torque for hex. socket button head screw

| Thread size | M3 | M4 | M5 | M6 | M8 | M10 | M12 | M16 |
|-------------------------|-----|-----|-----|------|------|------|------|-----|
| Tightening torque [N·m] | 1.4 | 3.2 | 6.4 | 10.8 | 26.3 | 52.1 | 90.9 | 224 |



Prevent your hands and fingers from being caught when gripping a workpiece with the chuck. (To prevent risks, it is recommended to automate the workpiece attaching/detaching operation.)

- Otherwise, your hands and fingers may be crushed or cut off.

If any of the abnormalities shown below suddenly occurs during operation, it may be a sign of damage of the chuck.



- ✓ The workpiece slips.
- ✓ Machining accuracy has become worse.
- ✓ Chuck gripping force is reduced.
- ✓ Chattering occurs.
- ✓ Machine vibration has been increased.

(Gripping force is not increased even by increasing hydraulic pressure.)

If the status is not improved even after taking the measures described on page 26, immediately stop using the chuck.

- Continuous use of faulty parts may damage the chuck, causing the workpiece to fly out.



Warning

Failure to follow the safety precautions below could result in death or serious injuries.

Perform additional machining of tapped holes and pin holes on the chuck only within the allowable range. (Refer to page 24.)



- Additional machining performed out of the allowable range may damage the chuck, causing the workpiece to fly out.
- Especially, additional machining to the master jaws and T-nut directly causes fly-out of the workpiece.

Supply grease every day.



When supplying grease, turn OFF the machine main power and be sure to use the specified grease. (Refer to page 25.)

- Insufficient greasing or use of grease other than the specified one may drop the gripping force, causing the workpiece to fly out.

Disassemble and clean the chuck every six months or 100,000 strokes (cast machining: every two months). (Refer to page 26.)



- Omitting the disassembly and cleaning and use of the chuck with chips and coolant remaining inside the chuck will lead to insufficient stroke and gripping force drop, causing the workpiece to fly out.

Remove the eye bolts and wrench from the chuck after use.



- Rotating the chuck without removing the eye bolts and wrench may cause them to fly out.

Use rustproof coolant.



- Otherwise, rust that will be formed inside the chuck may drop the gripping force, causing the workpiece to fly out.

When stopping the machine for a long time or when storing the chuck without using it for a long period, supply grease and rustproof them beforehand.



- Otherwise, rust that will be formed inside the chuck may drop the gripping force, causing the workpiece to fly out.

Do not wear clothing or accessories such as gloves and necktie which are easy to be caught in.



- Otherwise, your body or clothing may be entangled.

Do not perform the work after drinking alcohol or taking medicine.



- Impaired judgment or operation mistake may cause serious hazards.



Caution

Failure to follow the safety precautions below may result in minor or moderate injuries.



Do not touch machined workpieces with bare hands. (To prevent risks, it is recommended to automate the workpiece attaching/detaching operation.)

- Touching workpieces with bare hands may cause a burn because the workpieces may be very hot.



Remove the workpiece from the chuck when stopping the machine for a long time.

- Failure to do so may lead to drop or interruption of hydraulic pressure or malfunction of the built-in cylinder, causing the workpiece to drop.



When attaching/detaching the chuck to/from the machine, use appropriate lifting devices such as eye bolts and a floor-operated crane.

- Lifting a heavy chuck by hands will cause a backache.
- Slipping and dropping the chuck from hands may result in a bruise.



Supply hydraulic oil and operate the chuck several times without gripping the workpiece when the power is on.

- A sudden increase in pressure increases the gripping force and may cause deformation of the workpiece.

3. Technical Data

3.1. Specifications

Table 5 Specification table

| | | |
|--|---|------------------------|
| Type | | HRS08 |
| Jaw stroke (in diameter) mm | | 5.5 |
| Max. permissible speed min ⁻¹ | | 3000 |
| External gripping | Max. static gripping force kN | 38.3 |
| | Max. permissible hydraulic pressure MPa | 5.0 |
| | Dynamic gripping force at max. speed kN | 23.4 |
| | Gripping range mm | φ45~φ222 |
| Internal gripping | Max. static gripping force kN | 13.9 |
| | Max. permissible hydraulic pressure MPa | 2.5 |
| Mass *1 kg | | 28.5 |
| Moment of inertia *2 kg·m ² | | 0.18 |
| Standard soft jaw type | | SJ06B1 |
| Tnut-Plus type (option) | | TN06PLUS |
| Balance quality of chuck body *3 | | JIS B 0905 : 1992 G6.3 |
| Storage temperature / operating temperature *4 | | -20~+50°C / -10~+40°C |

*1 : The mass is a value when the standard soft jaws and chuck mounting bolts are included.

*2 : The moment of inertia is obtained by including the standard soft jaws and chuck mounting bolts.

Here, the soft jaws are mounted to the position protruding outward from the master jaws by a half pitch at the center of the jaw stroke.

*3 : The balance quality of the chuck body is a value when the soft jaws, T-nut, and jaw mounting bolts are not included.

*4 : When storing the product, it should be subjected to the antirust treatment and stored in a place free from wetting, condensation, or freeze.

The max. static gripping force in the specifications is the value to be obtained under the following conditions.

- At the max. permissible hydraulic pressure
- Kitagawa's standard soft jaws are used.
- The soft jaw mounting bolts are tightened to the specified torque. (Refer to page 8.)
- The gripping meter is gripped at the center of the jaw stroke and the soft jaws are attached at the position where the distance between the jaw mounting bolt and the master jaw is 9.25 mm.
- The gripping force is measured by the Kitagawa's gripping meter, and the height of the gripping position is as shown in Figure 4. (Also refer to Table 6)
- The specified grease is used. (Refer to page 25.)
- A variable capacity type pump having a delivery capacity of 20 L/min or more is used as the hydraulic pressure source.
- The pressure is set by the regulator of the pump or that separately provided.

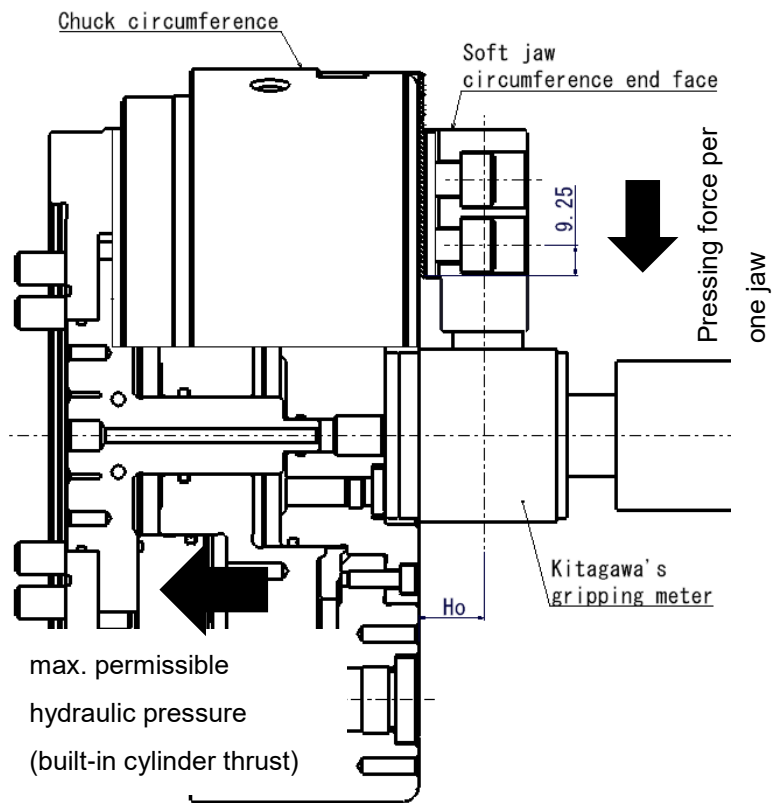


Figure 4 Gripping force measuring method

* The gripping meter indicates the pressing force per one jaw. The gripping force is the total of the pressing forces of all jaws.

3.2. Calculation of Operating Condition

Table 6 Symbols for calculation and the meanings

| Symbol | Meaning | | HRS08 | |
|--------------|--|---|-------|------|
| H_o | Gripping center height in specifications | mm | 18 | |
| H | Gripping center height in operation | mm | - | |
| H_T | Top surface height of standard soft jaw | mm | 33 | |
| H_{max} | Gripping part center limit height (recommended value) | mm | 60 | |
| $F_{g \max}$ | Max. static gripping force | External gripping | kN | 38.3 |
| | | Internal gripping | kN | 13.9 |
| F_{gH} | Static gripping force with H at max. permissible input force | kN | - | |
| F_g | Static gripping force in operation | kN | - | |
| F_{gD} | Dynamic gripping force in operation | kN | - | |
| Q_{max} | Max. permissible input force | External gripping (hydraulic pressure :5.0MPa) | kN | 14.7 |
| | | Internal gripping (hydraulic pressure :2.5MPa) | kN | 4.6 |
| Q | Input force in operation | kN | - | |
| m_o | Mass of one standard soft jaw | kg | 0.424 | |
| m | Mass of one top jaw used | kg | - | |
| r_o | Gravity radius of standard soft jaw | mm | 73.6 | |
| r | Gravity radius of top jaw used | mm | - | |
| z | Number of jaws | | 3 | |
| n_{max} | Max. permissible speed | min ⁻¹ | 3000 | |
| n | Rotational speed in operation | min ⁻¹ | - | |
| $F_{C \max}$ | Loss of gripping force at max. permissible speed | kN | 14.9 | |
| F_c | Loss of gripping force at rotational speed during operation | kN | - | |
| ΔF_c | Loss of gripping force of moment of mass increase | kN | - | |
| A | Coefficient specific to each type | | 260 | |
| B | | | 23 | |
| $P_{c \max}$ | Max. permissible hydraulic pressure | MPa | 5.0 | |

3.2.1. Calculation of Static Gripping Force at Gripping Center Height H

The gripping center height is the distance from the mechanical center point of the gripping force acting on the workpiece to the chuck surface.

When the gripping surfaces of the top jaws contact the workpiece evenly, the mechanical center point of the gripping force is at the center of the gripping surface. If the gripping surfaces contact unevenly or estimation of the gripping center height is difficult, the gripping force should be calculated using the distance from the top jaw top surface to the chuck surface so as to give priority to safety.

- When the gripping center becomes higher, the static gripping force is decreased even if the hydraulic pressure is the same.
- If the gripping center height is higher than, load to be applied to the master jaws, T-nuts, and jaw mounting bolts will increase. To prevent these parts from being damaged, the hydraulic pressure must be reduced to suppress the gripping force to a low level.
- It is recommended to adjust the gripping center height to be H_{max} or less.

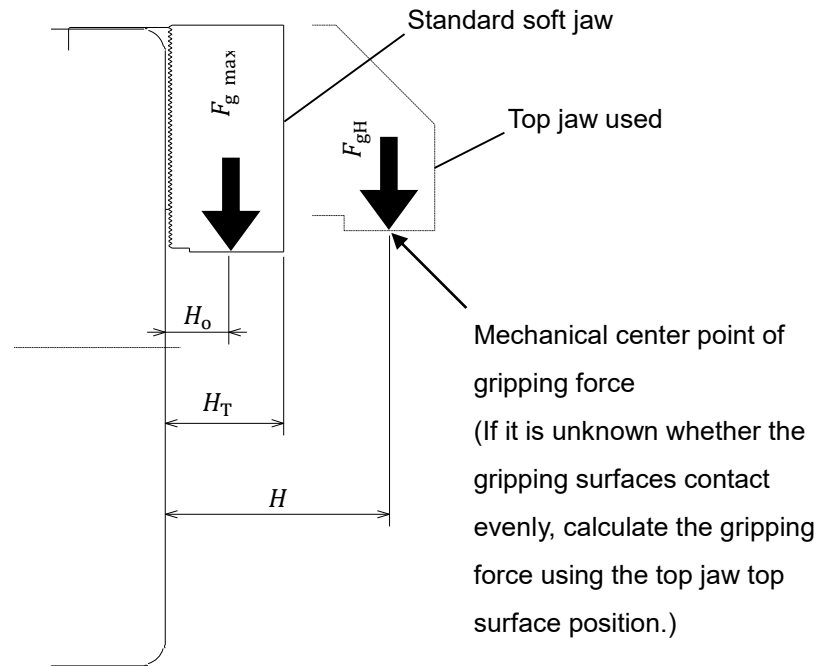


Figure 5 Gripping center height

- H when H_T is or less

$$F_{gH} = F_{g \max} \times \frac{H_o + A}{H + A}$$

- H when H_T is more than

$$F_{gH} = F_{g \max} \times \frac{H_o + A}{H + A} \times \frac{H_T + B}{H + B}$$

3.2.2. Calculation of Loss of Gripping Force due to Centrifugal Force

Centrifugal force is produced on the jaws during chuck rotation. It acts in the direction reducing the gripping force especially in external gripping. This is called "loss of gripping force due to centrifugal force".

Loss of gripping force due to centrifugal force is proportional to the square of the rotational speed, and thorough consideration is necessary especially for high speed rotation. In addition, a larger mass or gravity radius of the top jaws will increase loss of gripping force due to centrifugal force.

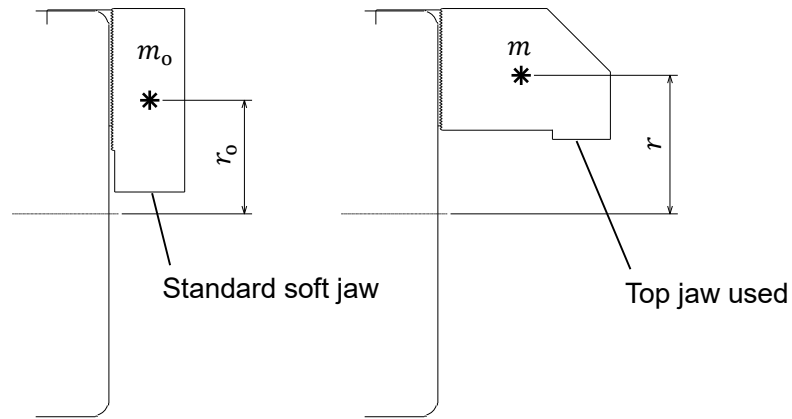


Figure 6 Loss of gripping force due to centrifugal force

- $m \times r$ when $m_o \times r_o$ is more than

$$\Delta F_c = z \times (m \times r - m_o \times r_o) \times \left(\frac{2 \times \pi \times n}{60} \right)^2 \times 10^{-6}$$

$$F_c = F_{c \max} \times \frac{n^2}{n_{\max}^2} + \Delta F_c$$

- $m \times r$ when $m_o \times r_o$ is or less

$$F_c = F_{c \max} \times \frac{n^2}{n_{\max}^2}$$

3.2.3. Determination of Gripping Force

Determine F_g in consideration of gripping force loss due to centrifugal force and necessary operating conditions such as cutting conditions, workpiece distortion, and strength of the top jaws. However, F_g must be F_{gH} or less. The dynamic gripping force during rotation F_{gD} is calculated as indicated below.

- For external gripping

$$F_{gD} = F_g - F_c$$

- For internal gripping

$$F_{gD} = F_g + F_c \quad (F_{gD} \leq F_{gH})$$

3.2.4. Calculation of Input Force for Operation

Calculate the input force required to obtain the necessary gripping force.

- H when H_T is or less

$$Q = Q_{\max} \times \frac{F_g}{F_{gH}}$$

- H when H_T is more than

$$Q = Q_{\max} \times \frac{F_g}{F_{gH}} \times \frac{H_T + B}{H + B}$$

3.2.5. Calculation of Hydraulic Pressure in Operation

Calculate the hydraulic pressure to be applied to the built-in cylinder to obtain the necessary input force.

$$P = (P_{c \max} - 0.25) \times \frac{Q}{Q_{\max}} + 0.25$$

When the hydraulic pressure in operation is less than 0.5 MPa, the cylinder may not operate or the operation speed may become extremely slower.

In this case, it is necessary to increase the hydraulic pressure.

3.3. Relationship Between Gripping Force and Rotational Speed

The graphs in Figure 7 indicate the relationship between the gripping force in each moment of mass of the top jaw and the rotational speed. They can be used for approximate calculation of operating conditions.

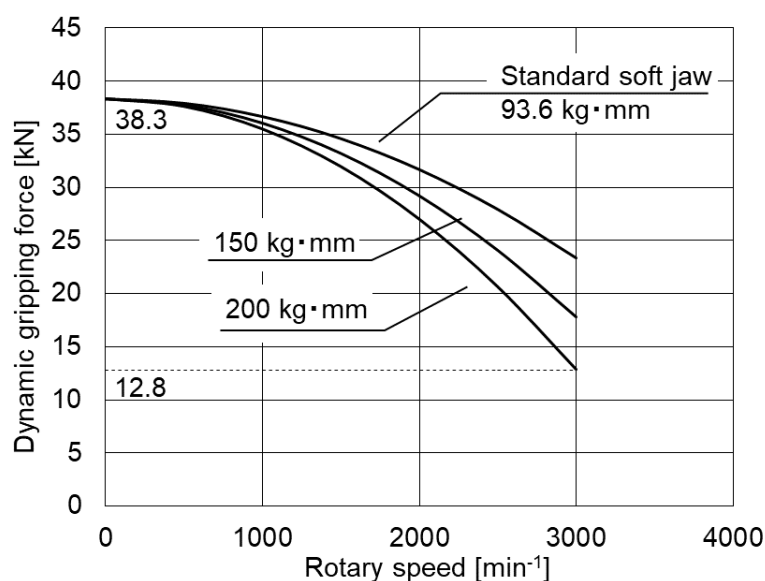


Figure 7 HRS08

3.4. Relationship Between Gripping Center Height and Static Gripping Force / Hydraulic Pressure

Relationship Between Moment of Mass of Top Jaw and Loss of Gripping Force

The graphs in Figure 8 indicate the relationship between the gripping center height and the static gripping force/hydraulic pressure, and the relationship between the moment of mass of the top jaw and the loss of gripping force, respectively. They can be used for approximate calculation of operating conditions.

How to read the graphs is explained below taking HRS08 for example.

- When the gripping center height is 18mm and the hydraulic pressure is 5 MPa, the gripping force is 38.3 kN.
- If the gripping center height exceeds 33 mm, the hydraulic pressure must be reduced. For example, when the gripping center height is 50 mm, the hydraulic pressure is limited to 3.8 MPa or less.
- It is recommended to use the chuck with the gripping center height adjusted to 60 mm or less.
- According to JIS B 6150 : 2015, the loss of gripping force due to centrifugal force must not exceed 2/3 (67%) of the actual static gripping force. Therefore, the permissible loss of gripping force is 25.5 kN when the static gripping force is 38.3 kN.
- The loss of gripping force due to centrifugal force is 14.9 kN when the moment of mass of the top jaw is 93.6 kg· mm and the rotational speed is 3000 min⁻¹.

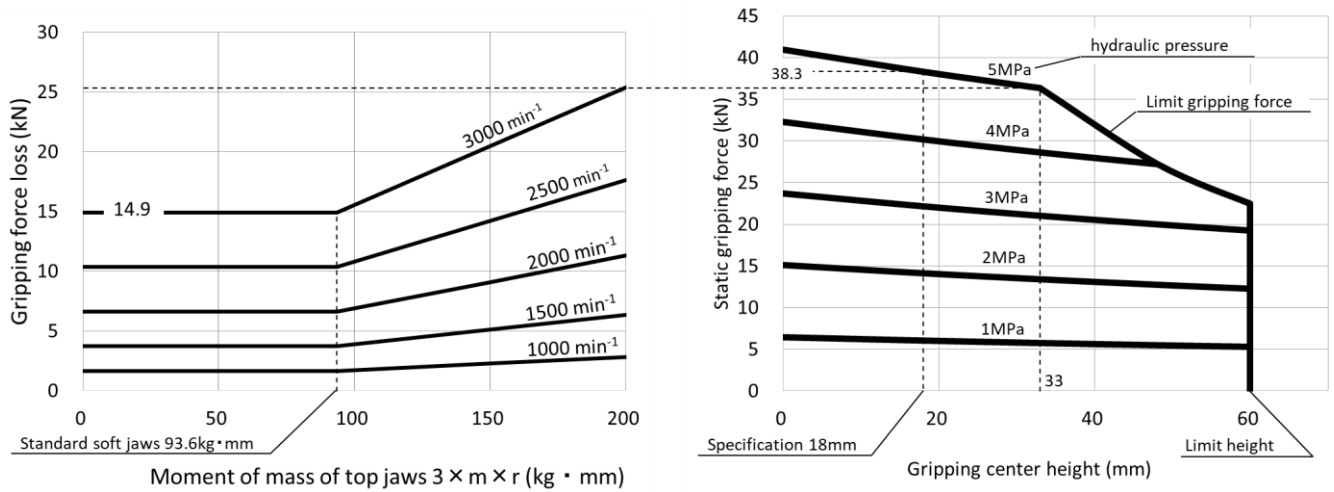


Figure 8 HRS08

4. Soft Jaw

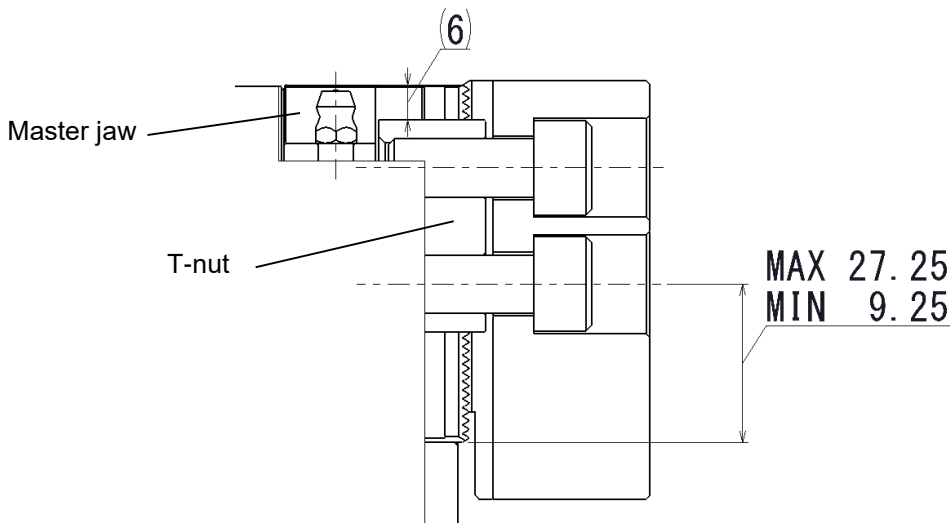
4.1. Installation of Soft Jaw

The soft jaw mounting positions can be adjusted by loosening the jaw mounting bolts and changing the serration engaging position with the master jaws.

Danger Failure to follow the safety precautions below will result in death or serious injuries.

Use T-nuts within the specified range.

- If not, the master jaws and T-nut may be damaged, causing the jaws and workpiece to fly out.



Do not use soft jaws as follows.

- ✓ Soft jaws manufactured by other companies
- ✓ With serration pitch different from that of master jaw
- ✓ Soft jaws joined by welding
- If serration engagement is faulty, the master jaws may be deformed and the gripping force is reduced, or the soft jaws may be damaged due to insufficient strength, causing the workpiece to fly out.

Notice

Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment.



When replacing the soft jaws, carefully clean fitting parts of the serration and the T-nuts.

- Insufficient cleaning will lead to an accuracy failure.



Set the hydraulic pressure according to the shape and cutting conditions of the workpiece.

- Clamping a pipe-shaped workpiece with a high gripping force may deform it.

4.2. Stroke mark

A stroke mark to check the jaw stroke position is stamped on the No. 1 jaw part on the body.

When the jaw is at the open end, the base line of the master jaw is aligned with the outer line of the full stroke range as shown in Figure 10.

The base line moves across the full stroke range when the jaw is opened / closed. However, the base line must be within the appropriate stroke range when the chuck grips a workpiece.

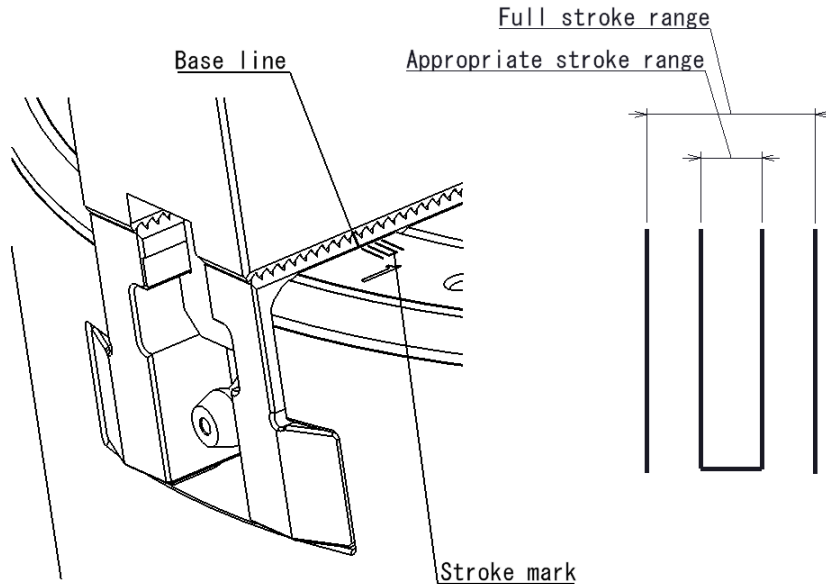


Figure 10 Stroke mark

Table 7

| | |
|--------------------------|-------|
| Type | HRS08 |
| Appropriate stroke range | 1 |

[mm]

! Danger Failure to follow the safety precautions below will result in death or serious injuries.

When gripping a workpiece, the master jaw base line must be within the appropriate stroke range.



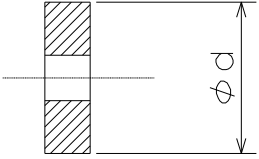
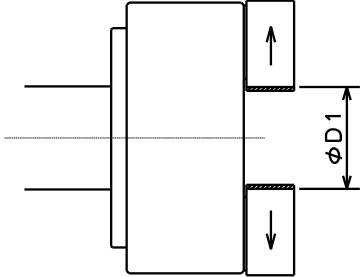
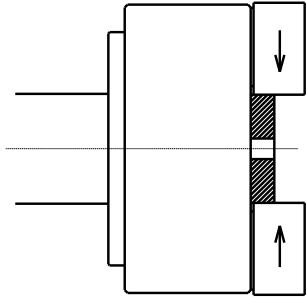
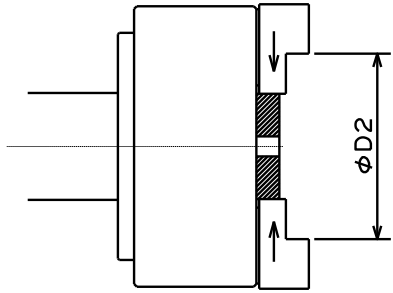
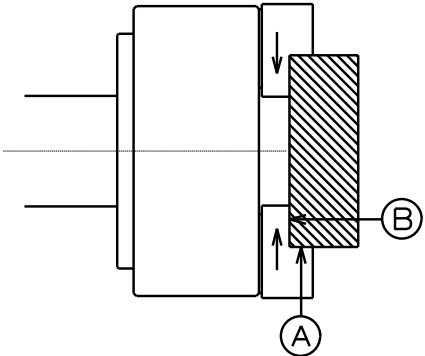
- Gripping a workpiece near the stroke end may fail due to unevenness of the tolerance at the workpiece gripping part, causing the workpiece to fly out.
- Frequently gripping a workpiece near the stroke end will apply excessive force to the master jaws and lead to damage of the chuck, causing the workpiece to fly out.

Before starting work, open and close the jaws without gripping a workpiece and confirm that the master jaw base line moves within the full stroke range.

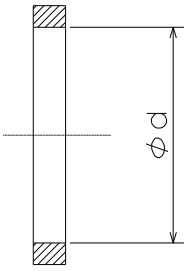
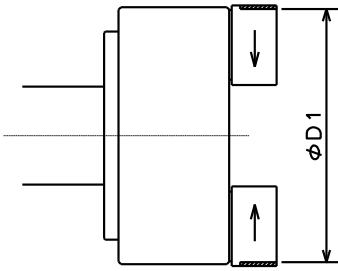
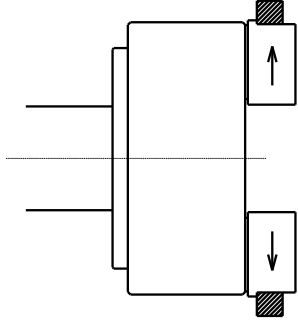
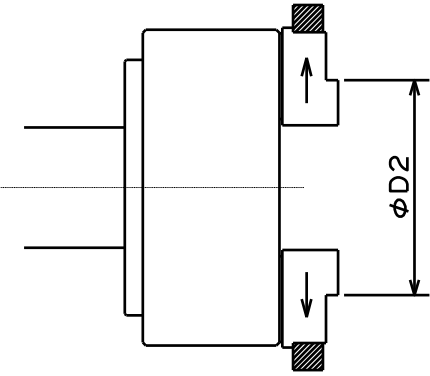
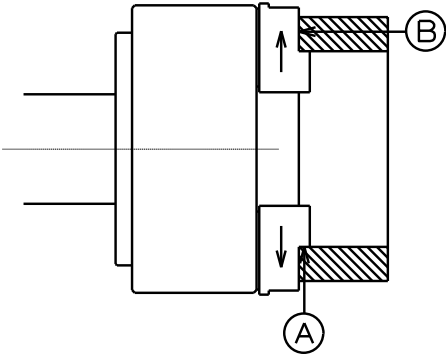


- If the jaw stroke becomes insufficient due to chips accumulating inside the chuck or loosened draw nut, the chuck may not grip the workpiece, causing the workpiece to fly out.

4.3. External Gripping Soft Jaw Forming Procedure

| | |
|--|---|
| <p>① Preparation of disc for finish turning of top jaw</p> <p>The disc for finish turning of top jaw must have a thickness not to be distorted with the surface roughness of about 25 s.</p> <ul style="list-style-type: none"> ● It is convenient to prepare several types of discs with different outside diameters so as to use them properly according to the dimension of the forming part. ● It is convenient to cut threads at the center in order to guide the disc using a bolt when gripping the disc. |  |
| <p>② Machining of disc gripping part</p> <p>Unclamp the chuck and open the jaws to the maximum.</p> <p>Next, machine D_1. D_1 must be the dimension that can grip the disc near the center of the jaw stroke.</p> $D_1 = d + \frac{\text{jaw stroke}}{2}$ |  |
| <p>③ Gripping of disc</p> <p>Grip the disc at the D_1 part.</p> <ul style="list-style-type: none"> ● Grip the disc while pressing against the chuck front face to prevent it from tilting. Stabilize the disc by gripping it several times. ● Confirm that the master jaw base line is within the appropriate stroke range when the disc is gripped. (Refer to page 19.) |  |
| <p>④ Forming</p> <p>Machine D_2 with the disc gripped.</p> <p>D_2 must be the same as the workpiece diameter (approx. H7) and the surface roughness must be 6.3 s or less.</p> <ul style="list-style-type: none"> ● Set the hydraulic pressure during forming to equal to or slightly higher than that during machining a workpiece. ● If the disc becomes deformed, reduce the hydraulic pressure or change the disc shape to the one that is hardly deformed. |  |
| <p>⑤ Test cutting</p> <p>Remove the disc and grip a workpiece.</p> <ul style="list-style-type: none"> ● Confirm that the master jaw base line is within the appropriate stroke range when the workpiece is gripped. (Refer to page 19.) ● Perform test cutting to confirm that the desired machining accuracy is obtained and no slip occurs. ● Grip the workpiece so that it is brought into contact with the gripping surface A and B. |  |

4.4. Internal Gripping Soft Jaw Forming Procedure

| | |
|--|---|
| <p>① Preparation of ring for finish turning of top jaw</p> <p>The ring for finish turning of top jaw must have a thickness not to be distorted with the surface roughness of about 25 s.</p> <ul style="list-style-type: none"> It is convenient to prepare several types of rings with different inside diameters so as to use them properly according to the dimension of the forming part. |  |
| <p>② Machining of ring gripping part</p> <p>Unclamp the chuck and close the jaws to the minimum.</p> <p>Next, machine D_1. D_1 must be the dimension that can grip the disc near the center of the jaw stroke.</p> $D_1 = d - \frac{\text{jaw stroke}}{2}$ |  |
| <p>③ Gripping of ring</p> <p>Grip the ring at the D_1 part.</p> <ul style="list-style-type: none"> Grip the ring while pressing against the jaws to prevent it from tilting. Stabilize the ring by gripping it several times. Confirm that the master jaw base line is within the appropriate stroke range when the ring is gripped. (Refer to page 19.) |  |
| <p>④ Forming</p> <p>Machine D_2 with the ring gripped.</p> <p>D_2 must be the same as the workpiece diameter (approx. h7) and the surface roughness must be 6.3 s or less.</p> <ul style="list-style-type: none"> Set the hydraulic pressure during forming to equal to or slightly higher than that during machining a workpiece. For internal gripping, use the chuck with 1/2 or less of the max. permissible input force for external gripping. If the ring becomes deformed, reduce the hydraulic pressure or change the ring shape to the one that is hardly deformed. |  |
| <p>⑤ Test cutting</p> <p>Remove the ring and grip a workpiece.</p> <ul style="list-style-type: none"> Confirm that the master jaw base line is within the appropriate stroke range when the workpiece is gripped. (Refer to page 19.) Perform test cutting to confirm that the desired machining accuracy is obtained and no slip occurs. Grip the workpiece so that it is brought into contact with the gripping surface A and B. |  |

4.5. Tnut-Plus

A Tnut-Plus as shown in Figure 11-1 is provided for HRS08 chucks as an option.

Soft jaws formed using the Tnut-Plus can maintain the gripping accuracy equivalent to just-formed soft jaws even after they are removed from the chuck once, because they can be reinstalled in the same positions.

- For corresponding Tnut-Plus types, refer to Table 5.
- To maintain the installation repeatability of the Tnut-Plus for a long period of time, always tighten the jaw mounting bolts from the chuck outside diameter side ① with the specified torque. (See Figure 11-2)
- The Tnut-Plus is elastically deformed when the bolts are tightened. Therefore, the resistance you feel when tightening the bolts is different from ordinary T-nuts, it is normal.
- If the Tnut-Plus is used for a long period of time, the soft jaws may be fixed and become hard to be removed. In this case, remove them by tapping with a plastic hammer. Apply CHUCK GREASE PRO to the side of the T-nut to stop it becoming fixed.
- The gripping accuracy may be deteriorated due to aging such as fatigue of the workpiece gripping surface. In such a case, re-form the soft jaws.

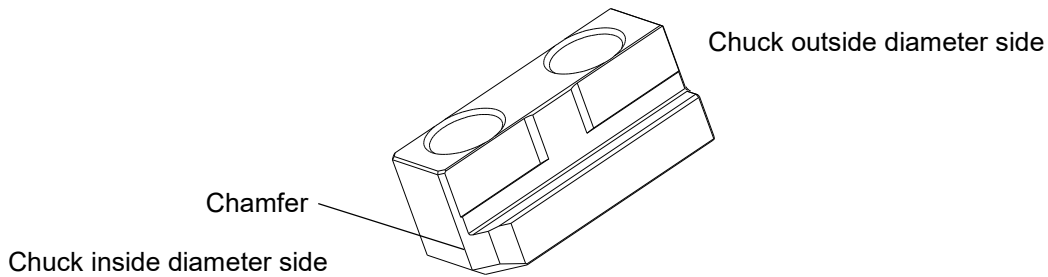


Figure 11-1 Tnut-Plus

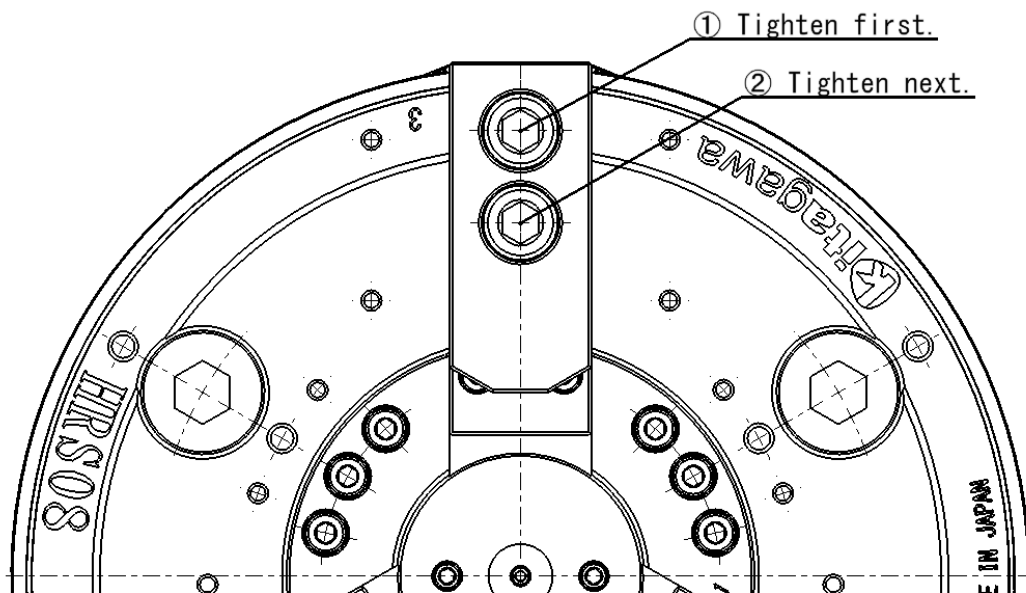


Figure 11-2 Tightening order of the jaw mounting bolts



Warning

Failure to follow the safety precautions below could result in death or serious injuries.

Mount the Tnut-Plus with the chamfer side facing the chuck inside diameter side. (See Figure 11-1)



- If it is mounted in the opposite direction, seizure may occur due to significant deformation of the master jaws. As a result, the gripping force will be reduced, causing the workpiece to fly out.

Do not use the Tnut-Plus on a chuck that does not correspond to it. (The T-slot shapes of such chucks do not match the Tnut-Plus, so the Tnut-Plus cannot be mounted physically. Do not use the Tnut-Plus forcedly on such chucks by additionally machining them.)



- If the Tnut-Plus is used on such chucks, seizure may occur due to significant deformation of the master jaws. As a result, the gripping force will be reduced, causing the workpiece to fly out.
- Additional machining of the T-nut and master jaws may damage them, causing the workpiece to fly out.

Do not use soft jaws manufactured by other companies.



- If soft jaws manufactured by other companies are used, seizure may occur due to significant deformation of the master jaws. As a result, the gripping force will be reduced, causing the workpiece to fly out.
- Using soft jaws manufactured by other companies may damage the T-nut, causing the workpiece to fly out.

Notice

Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment.

Do not use soft jaws manufactured by other companies.



When mounting already-formed soft jaws again, use the same T-nut used when the soft jaws were formed, match the jaw No. of the soft jaws and master jaws, and mount the soft jaws in the same serration position. Also, carefully clean fitting parts of the serration and the T-nuts.

- Failure to follow the above precautions may lead to poor accuracy.

5. Additional Machining Allowable Range

When mounting a locator or jig on the body surface, add tapped holes and pin holes within the additional machining allowable range shown by the oblique line parts in Figure 12.

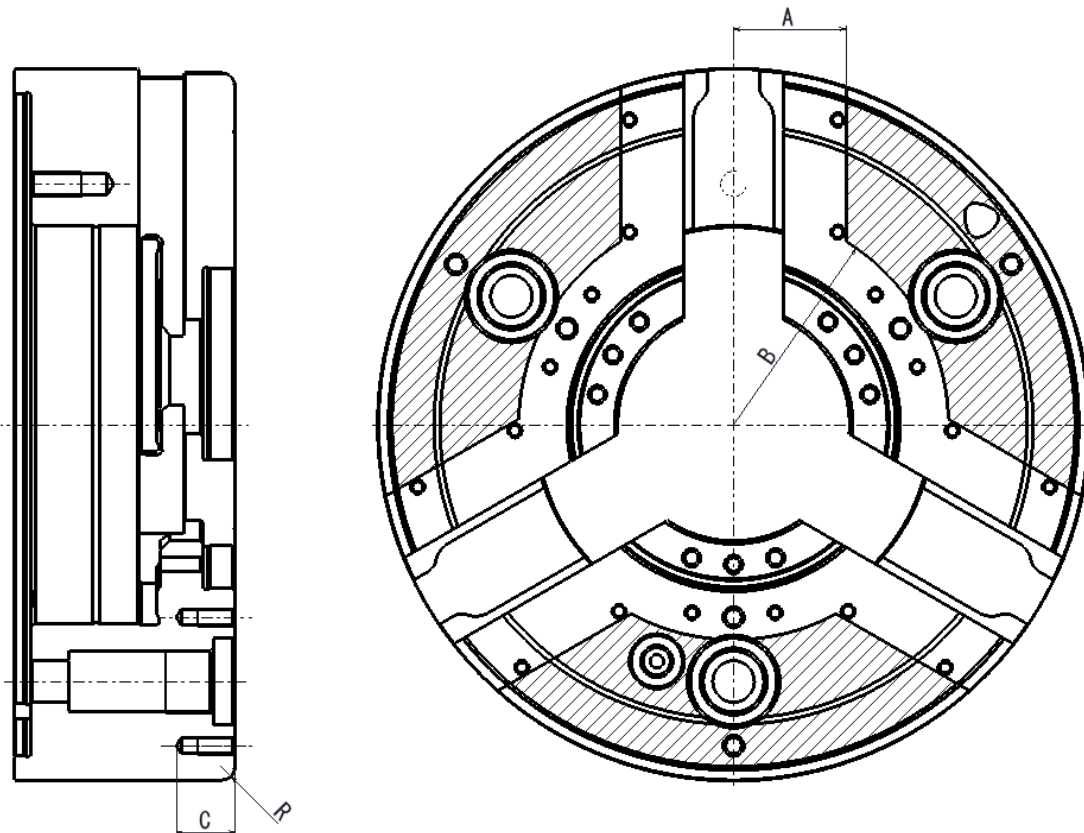


Figure 12 Additional machining allowable range

Table 8

| Type | HRS08 |
|---------|-------|
| A | 35 |
| B | 67 |
| C (max) | 18.5 |
| R | 5 |

[mm]

Danger Failure to follow the safety precautions below will result in death or serious injuries.



Provide measures to prevent fly-out by centrifugal force (such as dowel pins) for the locator or jig. In addition, mount the locator or jig with enough bolts with sufficient strength.

- Otherwise, the locator or jig may fly out due to centrifugal force.

6. Maintenance and Inspection

6.1. Periodic Inspection

Table 9 Periodic inspection

| Interval | Contents |
|---|--|
| Every day | <ul style="list-style-type: none"> ● Supply grease. When using high speed rotation or a large quantity of water soluble coolant, shorten the greasing interval according to the operating conditions. ● Before starting work, open and close the jaws without gripping a workpiece and confirm that the master jaw base line moves within the full stroke range. (Refer to page 19.) ● Upon completion of the work, clean the chuck using an air gun. |
| Every 3 months | <ul style="list-style-type: none"> ● Check the bolts of each part for looseness. |
| Every 6 months or 100,000 strokes (Cast machining: every 2 months) | <ul style="list-style-type: none"> ● Disassemble and clean the chuck.(Refer to page 26.) |

6.2. Grease Supply

6.2.1. Specified grease

Table 10 Specified grease

| Type | Specified grease | Grease nipple | Grease amount per one point [g] |
|-------|------------------|---------------------------------------|---------------------------------|
| HRS08 | CHUCK GREASE PRO | JIS B 1575 : 2000 type 1 (M6×0.75) | 6 |

6.2.2. Greasing Procedure

- ① Open the jaws, and be sure to turn OFF the main power of the machine before starting the work.
- ② Supply the amount of grease shown in Table 10 from the grease nipple of each master jaw using a grease gun.
- ③ After supplying the grease, open and close the jaws several times without gripping the workpiece.

6.2.3. Safety Information on Grease and Antirust Oil

Applicable range

- Specified grease
- Antirust agent applied to the product at the delivery

For the grease other than the specified one and antirust oil prepared by the customer, refer to the safety data sheet (SDS) prepared for respective oils.

Table 11 First-aid treatment

| | |
|-----------------------|---|
| Aspiration | In case of much aspiration, go to a place where there is fresh air, and cover your body with a blanket to keep your body warm. Consult a doctor if necessary. |
| Sticking to your skin | Wipe off the oil, and wash your skin with water and soap. If you feel itchy or you get inflamed, consult a doctor immediately. |
| Entering your eye | Wash your eye with fresh water for at least 15 minutes, and then consult a doctor. |
| Accidental drinking | Consult a doctor immediately without vomiting forcibly. |

6.3. Disassembly

Read the following disassembling procedure referring to page 5 and 6.

- ① Before start of work, be sure to turn off the main power of the machine.
 - ② Loosen the jaw mounting bolts [13] and remove the soft jaws [11] and T-nuts [12] from master jaw [7].
 - ③ Loosen the scraper mounting bolts [16] and remove the scraper [8] from master jaw [7]
 - ④ Loosen the cover mounting bolts [17] and remove the cover [9] from body [1].
 - ⑤ Remove the cover bolts [30]. Loosen the chuck mounting bolts [14] and remove the chuck from back plate [5]
 - ⑥ Loosen the adaptor mounting bolts [18] and remove the adaptor [4] from rear body [2]
 - ⑦ Loosen the rear body mounting bolts [15] and remove the rear body [2] from the body [1].
 - ⑧ Remove the wedge plunger [3] toward the rear of the chuck.
 - ⑨ Remove the master jaws [7] toward the inner circumference of the chuck.
- Reassemble the product through reverse procedure of disassembly while applying the specified grease sufficiently.
 - When reinstalling the chuck to the machine, refer to "8.4 Chuck Installation Procedure".
 - After reassembly, it is recommended to confirm that the specified gripping force is obtained according to the procedure on page 12.

 **Danger** Failure to follow the safety precautions below will result in death or serious injuries.



Clean the disassembled parts with kerosene, carefully check them for damage, wear, crack, or seizure, and repair or replace them if necessary.

- Continuous use of faulty parts may damage the chuck, causing the workpiece to fly out.

Notice

Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment.



Reassemble the parts with the jaw numbers marked on the body, wedge plunger, and master jaws matched respectively.

Also, do not hit the parts each other or give a shock to them. Be especially careful not to hit the body when installing the master jaw.

- Failure to observe the precautions may result in accuracy failure.

7. Troubleshooting

7.1. Troubleshooting

If a failure is suspected, check the contents in Table 12 again and take necessary measures.

Table 12 Troubleshooting

| Problem | Cause | Countermeasure |
|------------------------|---|---|
| Jaws do not move | Parts are damaged | Disassemble and clean the chuck. Replace damaged parts. (Refer to page 26.) |
| | Slideways get seized | Disassemble and clean the chuck. Correct the seized part with an oilstone or replace the part. (Refer to page 26.) |
| | Hydraulic pressure does not supplied | Check the piping and electric system, and if normal. |
| Stroke is insufficient | Chips accumulate inside | Disassemble and clean the chuck. (Refer to page 26.) |
| Workpiece slips | Jaw stroke insufficient | Confirm that the master jaw base line is within the appropriate stroke range when a workpiece is gripped. (Refer to page 19.) |
| | Lack of gripping force | Confirm that the hydraulic pressure is appropriate. |
| | The formed diameter of the top jaw does not match the workpiece diameter | Re-form the jaw according to the correct forming method. (Refer to "4. Soft Jaw") |
| | Excessive cutting force | Calculate cutting force and check that it is appropriate for the chuck and machine specifications. |
| | Lack of grease | Supply grease. (Refer to page 25.) |
| | Excessive rotational speed | Slow down the rotational speed to obtain required gripping force. |
| | Swing due to misalignment of the bar feeder, steady rest, tailstock, etc. | Thoroughly conduct alignment to eliminate swing. |

| | | |
|------------------|--|---|
| Accuracy failure | Run-out of chuck circumference is large | Adjust the run-out to 0.020 mm T.I.R. or less. |
| | Dust accumulates in serration parts of master jaw and top jaw | Remove the top jaws and thoroughly clean the serration parts. |
| | Jaw mounting bolts are not sufficiently tightened | Tighten the jaw mounting bolts with the specified torque. (Refer to page 8.) |
| | Top jaw forming method is improper | Confirm that the disc for finish turning of top jaw is parallel to the chuck end face and it is not deformed by the gripping force. |
| | Due to excessive top jaw height, top jaws are deformed and jaw mounting bolts are extended | Lower the top jaw height. Adjust the top jaws so that the gripping surfaces contact the workpiece evenly. |
| | Excessive gripping force deforms workpiece. | Reduce the gripping force to the extent that machining can be executed to prevent deformation. |

7.1.1. Aging of markings due to use

The type and serial numbers marked on the surface of the body may become difficult to see due to prolonged exposure to chips. Also, the logo plate (blue K mark) is strongly adhered to the body with adhesive, but for the same reason, it may be scratched or peeled off. If it should peel off, it will not affect performance or safety. This is not a malfunction, so please use the product with peace of mind.



Danger

Failure to follow the safety precautions below will result in death or serious injuries.



In case that the chuck failed to operate due to a seizure or breakage, remove the chuck from the machine following the disassembly procedure on page 26. When the top jaws and covers cannot be removed due to a blockage of workpiece, do not disassemble forcibly but please contact us or our agent.

- Forcible disassembly could cause serious human accidents.



The chuck must be repaired only by skilled persons who have received the training course.

- Repair by unskilled persons or persons other than us or our agents could cause serious human accidents.

7.2. Contact Information In Case Problem Occurs

Please get in touch with our sales agent from which you purchased the chuck or our office of the address given on the back cover when the chuck fails.

For Machine Manufacturers

The sections starting from this page provide explanations for machine manufacturers (who mount the chuck on machines).

Not only machine manufacturers but also persons who attach/detach the chuck are to read and thoroughly understand the contents so as to perform safety work.

8. Installation

8.1. Installation Conceptual Diagram

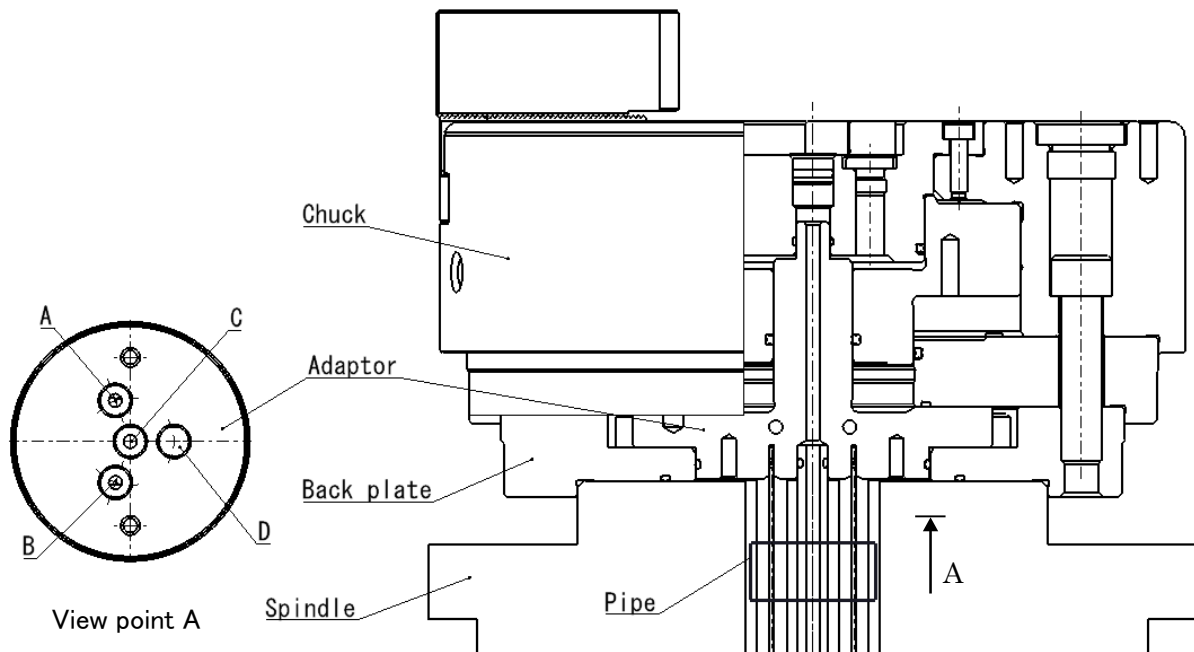


Figure 13 Installation conceptual diagram

Table 13 Adaptor port

| | port | size [mm] |
|---|---|-----------|
| A | hydraulic pressure supply port (Close side) | φ9 |
| B | hydraulic pressure supply port (Open side) | φ9 |
| C | air circuit | φ9 |
| D | unused | φ9 |

Danger Failure to follow the safety precautions below will result in death or serious injuries.



Confirm that the cylinder does not cause pressure drop during machining beforehand when operating other actuators together with the cylinder using the same hydraulic source.

- Reduction of hydraulic pressure will reduce the gripping force, causing the workpiece to fly out.

Notice

Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment.



Especially when using a large hydraulic unit, insert a throttling valve in the pressure supply line to restrict surge pressure.

- An excessive surge will shorten the chuck service life.

8.2. Back plate

Use the back plate supplied with the chuck.

The chuck mounting dimensions conform to JIS B 6109-2: 2005.

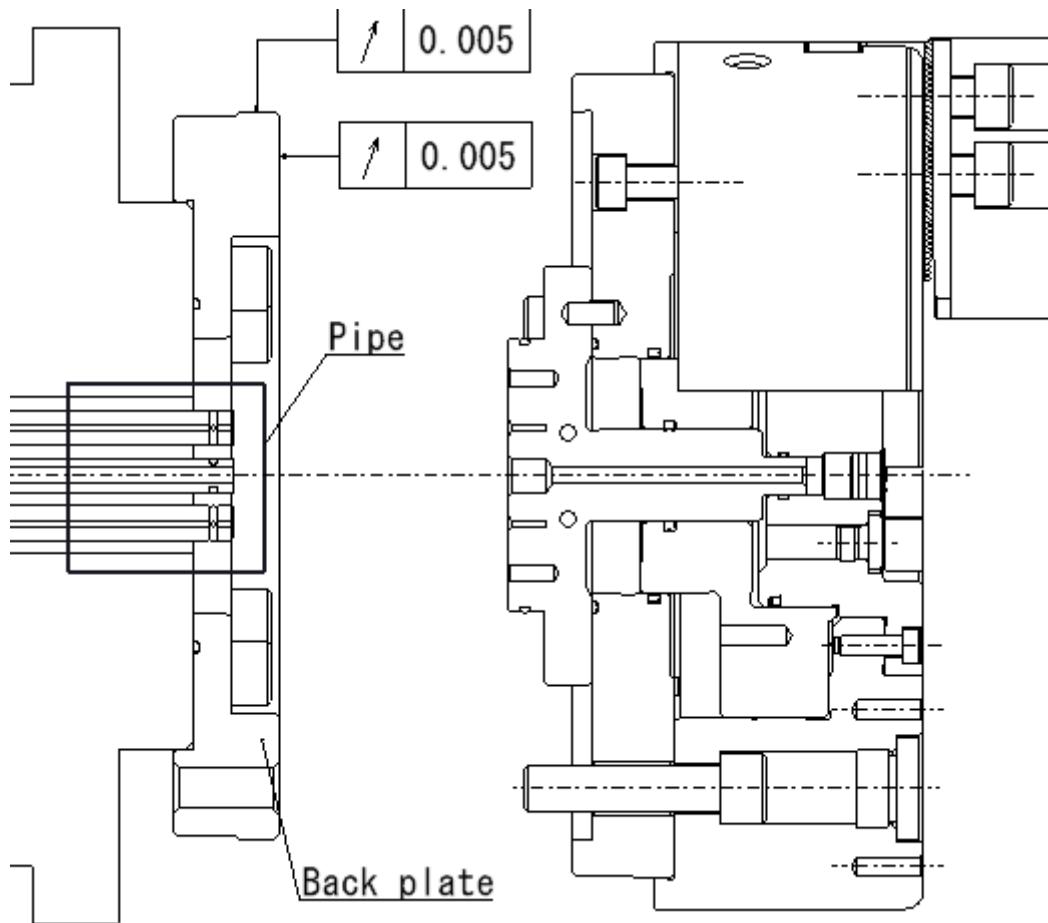


Figure 14 Mounting dimensions

Notice

Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment.



The end face run-out and fitting diameter run-out of the back plate must be 0.005 mm T.I.R. or less, respectively. (It is also allowed to mount the back plate on the machine and finish the end face and fitting diameter in this state.)

- Excessive back plate run-out may result in accuracy failure.

8.3. Pipe

Whether sufficient strength is obtained with respect to the operating conditions must be judged by the designer of the pipe. The dimensions provided in this manual do not guarantee that the pipe will not be damaged under every condition.

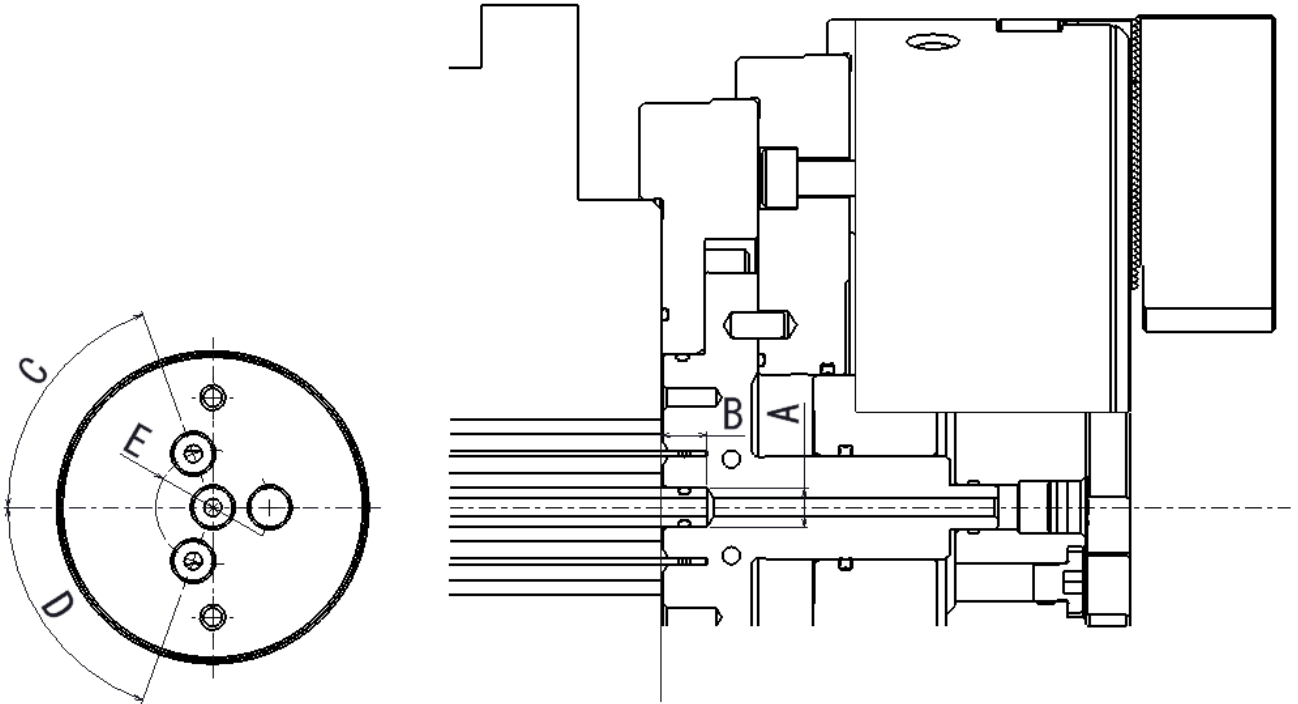


Figure 15 Distance between chuck mounting face and spindle mounting face

Table 14 Pipe dimensions

| Type | A | B | C | D | E |
|-------|----|------|-----|-----|-----|
| HRS08 | φ9 | 10.5 | 70° | 70° | φ26 |

[mm]

8.4. Chuck Installation Procedure

- ① Before start of work, be sure to turn off the main power of the machine.
- ② Provide a pipe with adjustable port phase.
- ③ Remove the soft jaws, cover and scraper of the chuck.
- ④ Connect the pipe and adaptor until the chuck is completely fitted to the spindle installation surface.
- ⑤ Tighten the chuck mounting bolts evenly with the specified torque. (See “2.Important Safety Precautions”)
The chuck circumference run-out must be 0.020 mm T.I.R. or less. When performing centering adjustment, tap the body side face with a plastic hammer.

- ⑥ Turn on the machine power, and operate the chuck several times at 0.5 MPa, and confirm that is no abnormality.
- ⑦ If its normal, confirm that the master jaw base line moves within the full stroke range. (Refer to page 19.) If it does not move for the whole full stroke range, loosen the screw plug (See Figure 16) and vent the air.

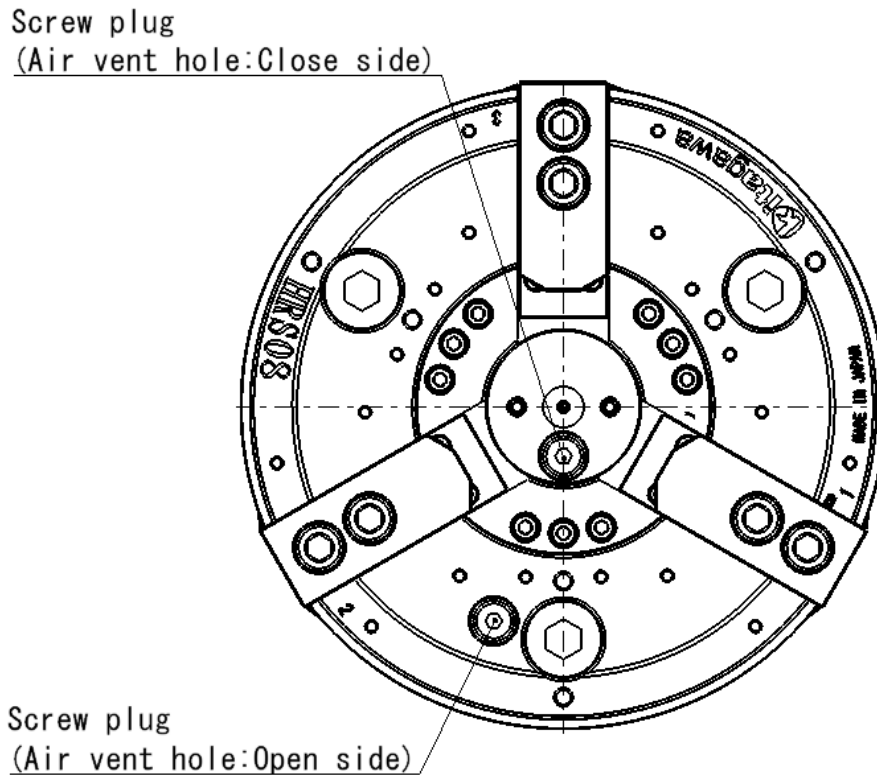


Figure 16

Warning Failure to follow the safety precautions below could result in death or serious injuries.



When replacing a hydraulic pressure equipment, consult the machine manufacturer for installation.

- Insufficient gripping force may cause the workpiece to fly out.

Notice

Indicates instructions which, if you do not heed given instructions, could result in damage to the product or shortened service life, or damage to peripheral equipment.



Tighten the chuck mounting bolts evenly with the specified torque. (Refer to page 8.)

- If the tightening torque is insufficient, will increase the gap between body and master jaw. Failure to follow the above precautions may lead to poor accuracy and will shorten the chuck service life.

9. Others

9.1. Marking of Product

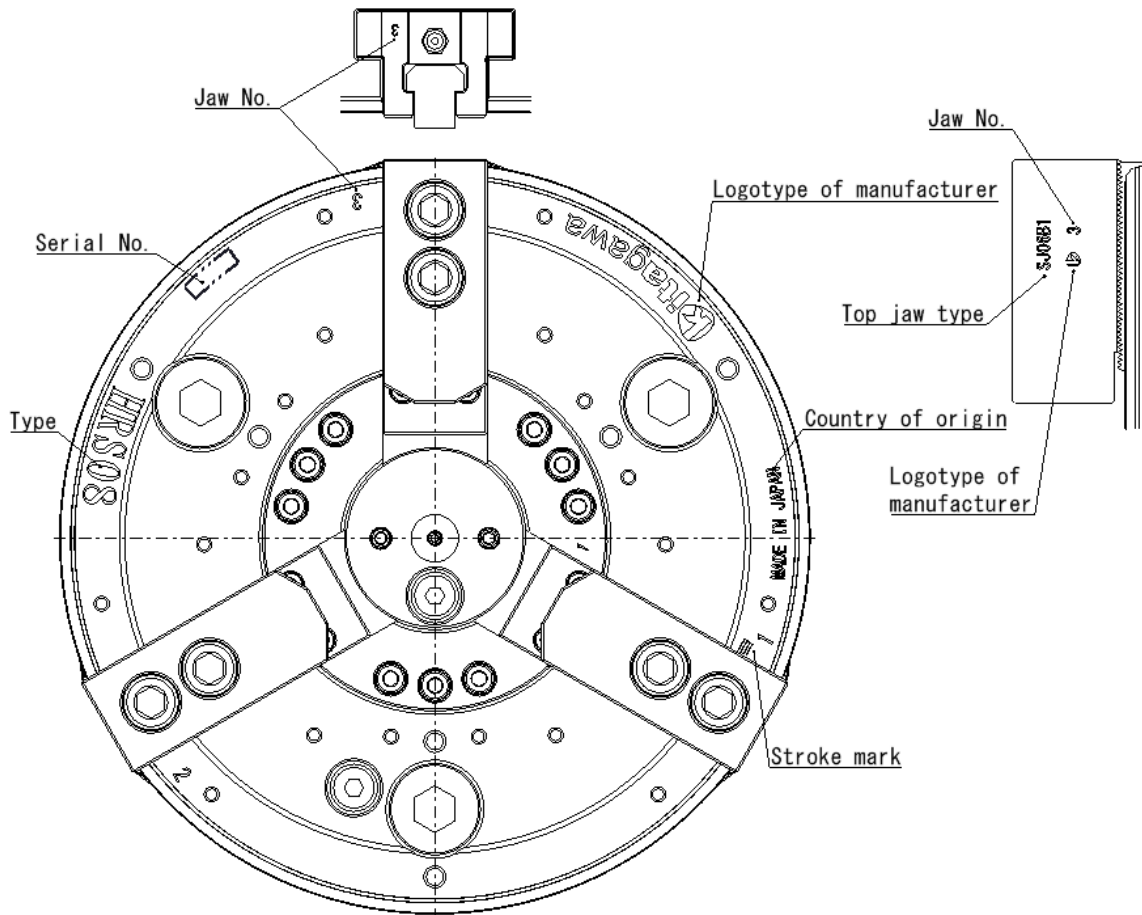


Figure 17 Marking



Danger

Failure to follow the safety precautions below will result in death or serious injuries.



Markings are standard specifications. Since specifications may be limited due to specification changes or modifications, refer to the delivery specifications, if available. If there are no delivery specifications, such as for changes to the jaws by the customer, determine the operating condition according to "3.2. Calculation of Operating Condition".

- If the mass of the jaws is large, the centrifugal force will increase and the gripping force will decrease, may cause the workpiece to fly out.
- Excessive rotational speed may cause the workpiece to fly out.
- Excessive hydraulic pressure may damage the chuck, causing the workpiece to fly out.

9.2. Disposal

Dispose of this unit in accordance with the laws and regulations of your country.

Kitagawa Corporation Kitagawa Global hand Company
 77-1, Motomachi, Fuchu-shi, Hiroshima, 726-8610, Japan

Tel. +81-847-40-0561 Fax. +81-847-45-8911

■ JAPAN DOMESTIC

| | |
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| Sendai office | 4-15-13, Yamatomachi, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0042, Japan Tel. +81-22-232-6732 Fax. +81-22-232-6739 |
| Nagoya office | 2-62, Kamitakabata, Nakagawa-ku, Nagoya-shi, Aichi, 454-0873, Japan Tel. +81-52-363-0371 Fax. +81-52-362-0690 |
| Osaka office | 3-2-9, Kitakagaya, Suminoe-ku, Osaka-shi, Osaka, 559-0011, Japan Tel. +81-6-6685-9065 Fax. +81-6-6684-2025 |
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| Overseas office | 77-1, Motomachi, Fuchu-shi, Hiroshima, 726-8610, Japan Tel. +81-847-40-0526 Fax. +81-847-45-8911 |

■ OVERSEAS

| | |
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