

# INSTRUCTION MANUAL

## DLR type (DLR08)

### Thin Dual Lock 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

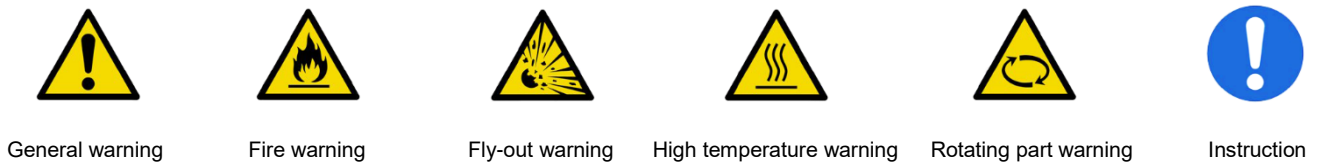


The triangle shown on the left indicates warning. The warning signs are used to alert you to potential safety hazards. To avoid death or injuries that could occur, follow all the instructions given with the warning signs.

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

<b>Danger</b>	Failure to follow the safety precautions below will result in death or serious injuries.
<b>Warning</b>	Failure to follow the safety precautions below could result in death or serious injuries.
<b>Caution</b>	Failure to follow the safety precautions below may result in minor or moderate injuries.
<b>Notice</b>	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

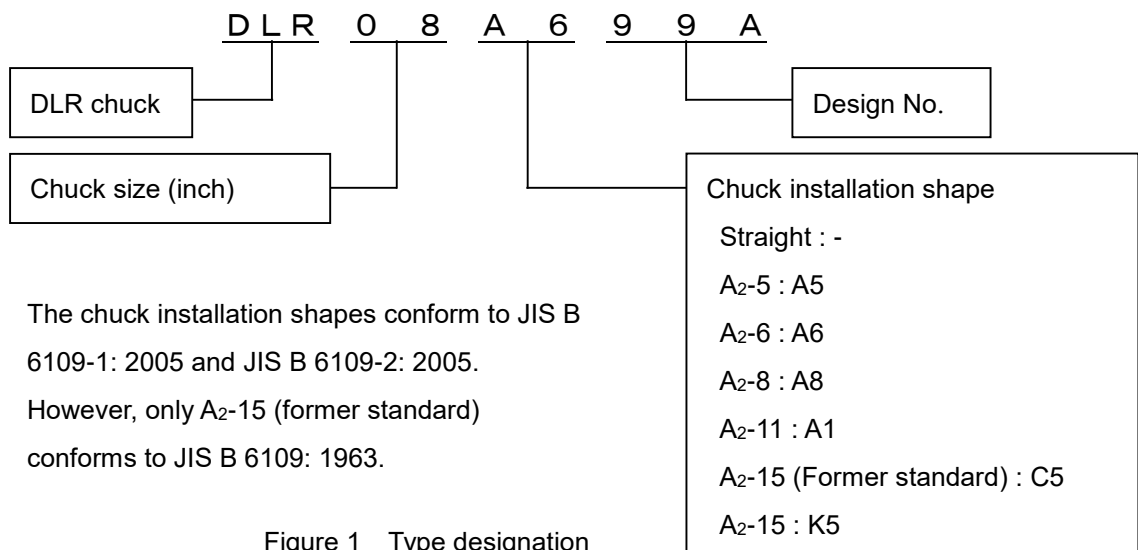


Figure 1 Type designation

#### 1.4. Application Purpose of This Product

The power chuck is installed on machine tools such as NC lathes and machining centres to fix a workpiece. The power chuck is equipped with the jaws to fix the workpiece and they are opened and closed by means of a rotary cylinder. For any other applications, please contact us.

#### 1.5. Unacceptable Application Example

The power 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 power chuck and rotary hydraulic cylinder are respectively installed on both side of the machine spindle and connected with the draw pipe.

The hydraulic pressure applied to the cylinder is converted to thrust that pulls the draw pipe and operates the wedge plunger backward via the draw pipe. Then the master jaw is operated inwardly by the wedge hook and the force is transferred to the top jaw.

Front body is connected to Rear body through Spring plate. Front body performs a retracting action together with Master jaw. The retracting action can be adjusted by a retraction adjustment mechanism.

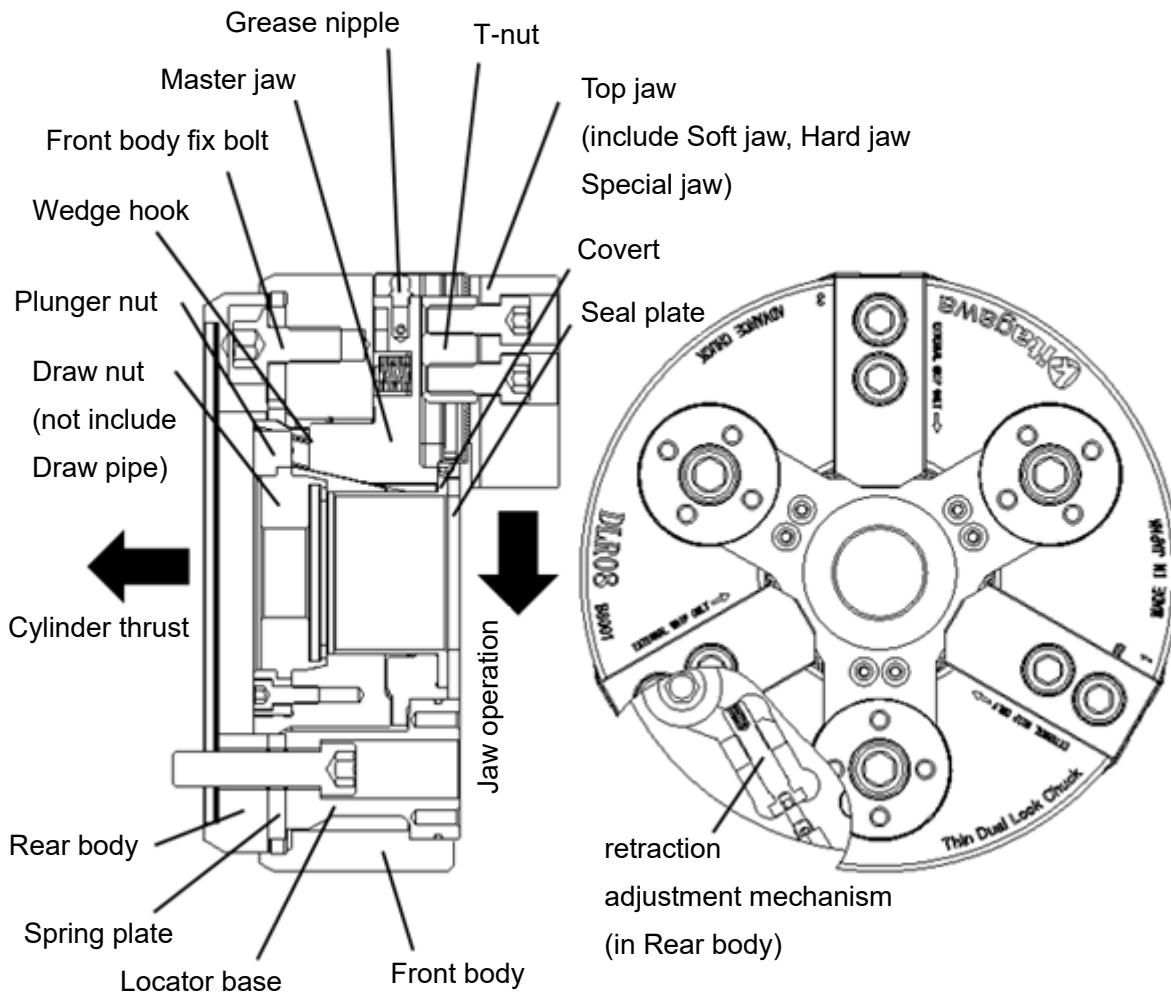


Figure 2 Structural drawing

### 1.7. Product Range

- This is the chuck instruction manual.  
For the cylinder 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	Front body	1	15	Spring pin	3
2	Rear body	1	16	Seal plate	1
3	Master jaw	3	17	Grease nipple	3
4	Wedge plunger	1	18	Plunger nut mounting bolt	9
5	Spring plate	1	19	Rear body mounting bolt	12
6	Locator base	3	20	Chuck mounting bolt	3
7	Draw nut	1	21	Jaw mounting bolt ※1	6
8	Plunger nut	1	22	Cover mounting bolt	6
9	Cover	1	23	Spring plate mounting bolt	3
10	T-nut ※1	3	24	Steel ball	4
11	Soft jaw ※1	3	25	O ring	3
12	Screw pin	3	26	Coil spring (large)	3
13	Coil spring (small)	7	27	Set screw with hexagon socket	3
14	Block	3	28	Handle wrench for draw nut ※2	1

Table 2 Optional parts (Paid item)

No.	Parts name	Quantity	No.	Parts name	Quantity
29	Tnut-Plus ※1	3	31	Back plate mounting bolt	3
30	Back plate	1			

\*1 : Consumables

\*2 : This is the same tool that comes with the BB200 series.

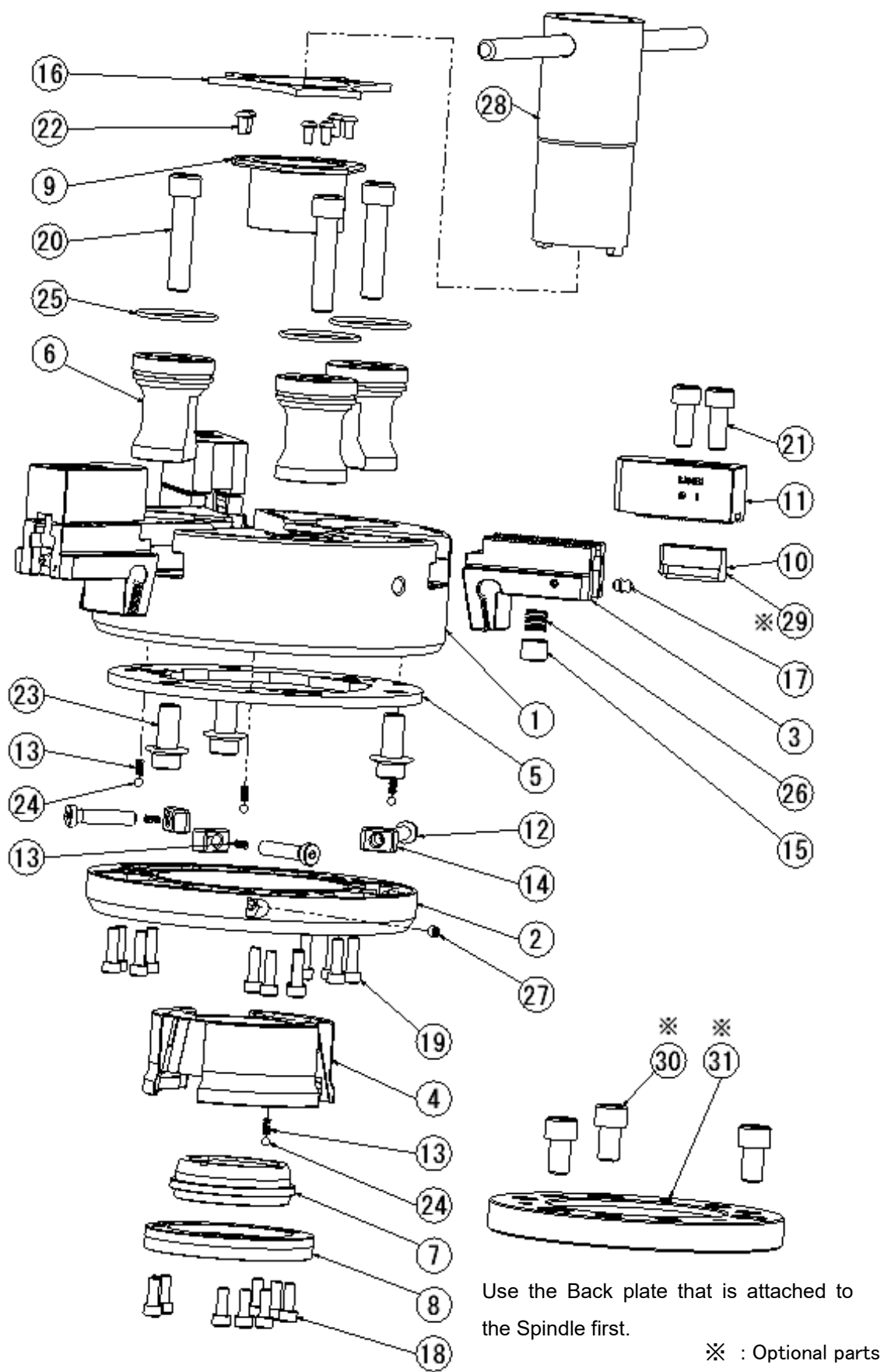


Figure 3 Parts





## 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 input force must not exceed the limit in operation. (Refer to "3. Technical Data")**

- Excessive rotational speed may cause the workpiece to fly out.
- Excessive input force 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 14.**

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



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

- Since the input force 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 34.)

- 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.



Use the chuck and cylinder that are both manufactured by Kitagawa.

If you must use the chuck together with a cylinder manufactured by another company, confirm Kitagawa or sales agents that the combination of the chuck and the cylinder is safe.

- Depending on the combination with a particular cylinder, the chuck and the cylinder may be damaged, causing the workpiece to fly out.



Be sure to tighten the bolts with the specified torque listed in Table 3-1 and Table 3-2.

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 3-1 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 3-2 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 40, immediately stop using the chuck.

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

If the cylinder combined is to be changed due to such as model change of a rotary hydraulic cylinder, change the hydraulic pressure accordingly so as to obtain proper gripping force.

- Use of the chuck under low hydraulic pressure leads to insufficient gripping force, causing the workpiece to fly out.
- Use of the chuck under high hydraulic pressure leads to damage of the chuck, causing the workpiece to fly out.



For machine manufacturers

The draw pipe must have sufficient strength with respect to the operating conditions, not causing run-out and unbalance. The thread accuracy must be 6H / 6g. Tighten the thread securely with a sufficient penetration length.

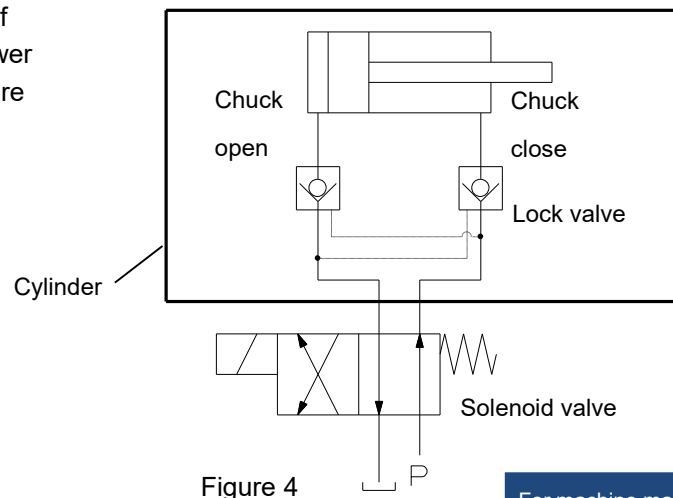
- Insufficient strength of the draw pipe, vibration due to unbalance, and looseness of the thread may damage the draw pipe. If the draw pipe is broken, the gripping force is lost instantaneously, causing the workpiece to fly out.



For machine manufacturers

Use a lock valve (check valve) built-in type cylinder. (According to JIS B 6150 : 2015, the cylinder must be provided with equipment such as a check valve so as to maintain the pressure for a certain period of time when the hydraulic pressure to the cylinder is blocked.) Design the hydraulic circuit so that the solenoid valve holds the gripping port position when the current is not applied.

- Sudden drop or interruption of hydraulic pressure due to power failure or hydraulic pump failure will lose the gripping force instantaneously, causing the workpiece to fly out.



For machine manufacturers

Use a stroke control sensor built-in type cylinder. (According to JIS B 6150 : 2015, the cylinder must be provided with equipment such as a stroke control sensor so that the power chuck or the cylinder ensures effective generation of the gripping force.)

- 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.



For machine manufacturers



## Warning

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

	<p><b>Any additional machining on Front body is prohibited. (Refer to page 32.)</b></p> <ul style="list-style-type: none"> <li>• Additional machining performed on Front body may damage the chuck, causing the workpiece to fly out.</li> <li>• Especially, additional machining to the master jaws and T-nut directly causes fly-out of the workpiece.</li> </ul>
	<p><b>Supply grease every day.</b>  <b>When supplying grease, turn OFF the machine main power and be sure to use the specified grease. (Refer to page 33.)</b></p> <ul style="list-style-type: none"> <li>• Insufficient greasing or use of grease other than the specified one may drop the gripping force, causing the workpiece to fly out.</li> </ul>
	<p><b>Disassemble and clean the chuck every six months or 100,000 strokes (cast machining: every two months). (Refer to page 34.)</b></p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
	<p><b>Remove the eye bolts and wrench from the chuck after use.</b></p> <ul style="list-style-type: none"> <li>• Rotating the chuck without removing the eye bolts and wrench may cause them to fly out.</li> </ul>
	<p><b>Use rustproof coolant.</b></p> <ul style="list-style-type: none"> <li>• Otherwise, rust that will be formed inside the chuck may drop the gripping force, causing the workpiece to fly out.</li> </ul>
	<p><b>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.</b></p> <ul style="list-style-type: none"> <li>• Otherwise, rust that will be formed inside the chuck may drop the gripping force, causing the workpiece to fly out.</li> </ul>
	<p><b>Do not wear clothing or accessories such as gloves and necktie which are easy to be caught in.</b></p> <ul style="list-style-type: none"> <li>• Otherwise, your body or clothing may be entangled.</li> </ul>
	<p><b>Do not perform the work after drinking alcohol or taking medicine.</b></p> <ul style="list-style-type: none"> <li>• Impaired judgment or operation mistake may cause serious hazards.</li> </ul>



## Caution

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

	<p><b>Do not touch machined workpieces with bare hands. (To prevent risks, it is recommended to automate the workpiece attaching/detaching operation.)</b></p> <ul style="list-style-type: none"> <li>• Touching workpieces with bare hands may cause a burn because the workpieces may be very hot.</li> </ul>
	<p><b>Remove the workpiece from the chuck when stopping the machine for a long time.</b></p> <ul style="list-style-type: none"> <li>• Failure to do so may lead to drop or interruption of hydraulic pressure or malfunction of the cylinder, causing the workpiece to drop.</li> </ul>
	<p><b>When attaching/detaching the chuck to/from the machine, use appropriate lifting devices such as eye bolts and a floor-operated crane.</b></p> <ul style="list-style-type: none"> <li>• Lifting a heavy chuck by hands will cause a backache.</li> <li>• Slipping and dropping the chuck from hands may result in a bruise.</li> </ul>

### 3. Technical Data

#### 3.1. Specifications

Table 4-1 Specification table

Type	DLR08			
Plunger stroke	mm	12		
Jaw stroke (in diameter)	mm	5.5		
Through hole diameter	mm	52		
Max. permissible input force	kN	24		
Max. static gripping force	kN	60		
Max. permissible speed	min <sup>-1</sup>	5000		
Gripping range (Standard soft jaw)	mm	φ 19~ φ 203		
Mass	kg	17.2		
Moment of inertia	kg · m <sup>2</sup>	0.095		
Dynamic gripping force at max. speed	kN	20		
Max. permissible hydraulic pressure	MPa	2.41	1.98	1.86
Operating cylinder		SR1453C	SS1452K	S1552
Standard soft jaw		SJ06B1		
Gripping center height in specifications	mm	31		
Tnut-Plus type (option)		TN06PLUS		
Balance quality of chuck body (not include standard soft jaw)		JIS B 0905 : 1992 G6.3		
Storage temperature / operating temperature		-20~+50°C / -10~+40°C		

\*1 : The max. permissible hydraulic pressure differs depending on the cylinder used.

Set the hydraulic pressure according to the cylinder type.

\*2 : DLR chuck is exclusively designed for gripping the outer diameter. It cannot grip the inner diameter.

\*3 : The mass is a value when the standard soft jaws and chuck mounting bolts are included.


\*4 : 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.

\*5 : The balance quality of the chuck body is a value when the soft jaws, T-nut, and jaw mounting bolts are not included.

\*6 : When storing the product, it should be subjected to the antirust treatment and stored in a place free from wetting, condensation, or freeze.

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

 **DLR chuck is exclusively designed for gripping the outer diameter. It cannot grip the inner diameter. If use gripping the inner diameter may damage the chuck, causing the workpiece to fly out.**

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

- At the max. permissible input force
- Kitagawa's standard soft jaws are used. (DLR08 is using SJ06A1-066).
- The soft jaw mounting bolts are tightened to the specified torque. (Refer to page 9.)
- The gripping meter is gripped at the center of the jaw stroke. Here, the soft jaws are attached to the position where the soft jaw circumference side end face and the chuck circumference are almost aligned.
- The gripping force is measured by the Kitagawa's gripping meter, and the height of the gripping position is as shown in Figure 5. (Also refer to Table 5 at page 14)
- The specified grease is used. (Refer to page 33.)
- 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.

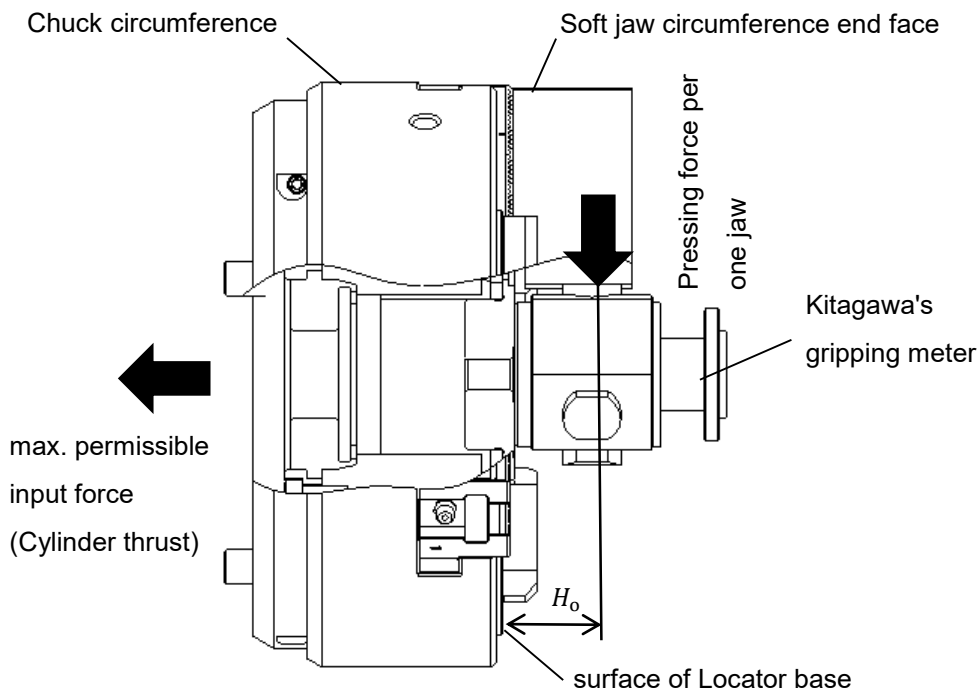


Figure 5 Gripping force measuring method

\* 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 5 Symbols for calculation and the meanings

Symbol	Meaning		DLR08			
$H_o$	Gripping center height in specifications	mm	31			
$H$	Gripping center height in operation	mm	-			
$H_T$	Top surface height of standard soft jaw	mm	34			
$H_{max}$	Gripping part center limit height (recommended value)	mm	60			
$F_{g\ max}$	Max. static gripping force	kN	60			
$F_{gH}$	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	kN	24			
$Q$	Input force in operation	kN	-			
$m_o$	Mass of one standard soft jaw	kg	0.42			
$m$	Mass of one top jaw used	kg	-			
$r_o$	Gravity radius of standard soft jaw	mm	62.4			
$r$	Gravity radius of top jaw used	mm	-			
$z$	Number of jaws		3			
$n_{max}$	Max. permissible speed	min <sup>-1</sup>	5000			
$n$	Rotational speed in operation	min <sup>-1</sup>	-			
$F_{c\ max}$	Loss of gripping force at max. permissible speed	kN	40			
$F_c$	Loss of gripping force at rotational speed during operation	kN	-			
$\Delta F_c$	Loss of gripping force of moment of mass increase	kN	-			
$A$	Coefficient specific to each type		500			
$B$			22			

### 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 Locator base 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 input force 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 input force 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.

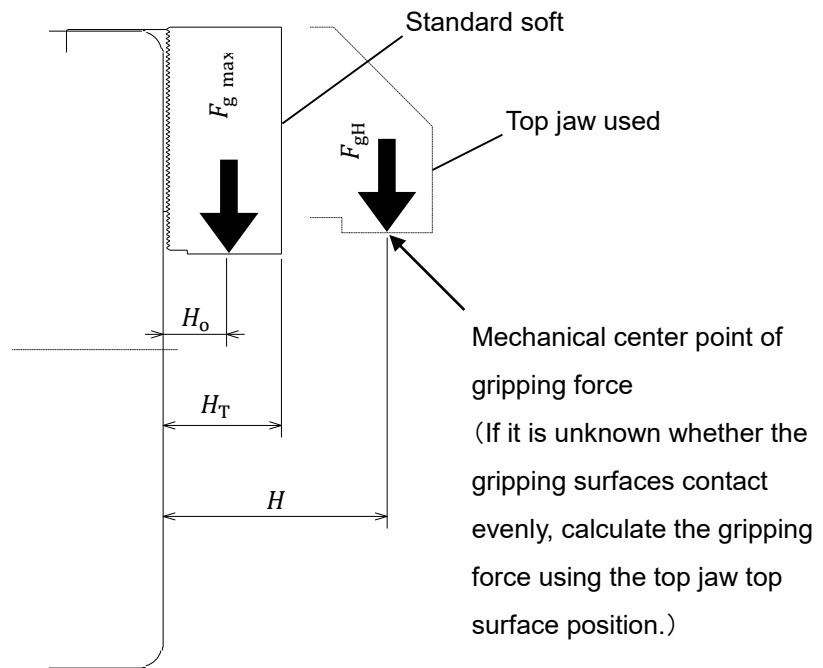


Figure 6 Gripping center height

- $H$  when  $H_T$  is or less

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

- $H$  when  $H_T$  is more than

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



### 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.

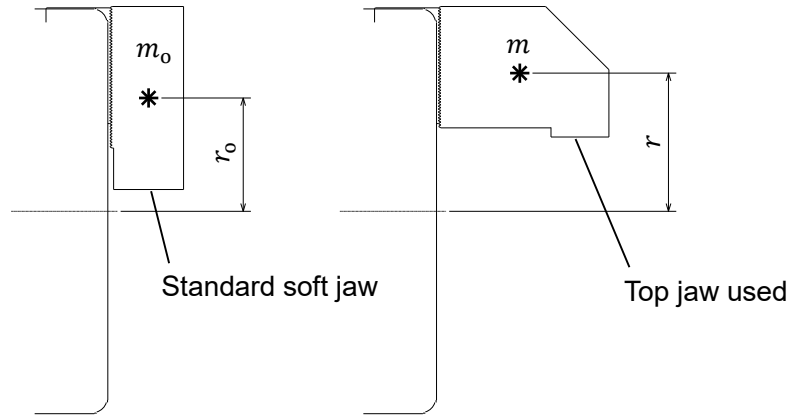


Figure 7 Loss of gripping force due to centrifugal force

- $m \times r$  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

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

### 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 rotary hydraulic cylinder to obtain the necessary input force.

The following description is predicated on the use of Kitagawa's SR cylinder or SS-K cylinder or S cylinder. When using another cylinder, refer to its instruction manual.

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

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 input force or select the cylinder again.

Table 6-1 Combination with SR cylinder

Symbol	Meaning		SR1453C			
$Q_{c \max}$	Max. thrust of cylinder	External gripping kN	43.9			
$P_{c \max}$	Max. permissible hydraulic pressure of cylinder	MPa	4.2			

Table 6-2 Combination with SS-K cylinder

Symbol	Meaning		SS1452K	SS1453K		
$Q_{c \max}$	Max. thrust of cylinder	External gripping kN	52.1	52.1		
$P_{c \max}$	Max. permissible hydraulic pressure of cylinder	MPa	4.5	4.5		

Table 6-3 Combination with S cylinder

Symbol	Meaning		S1552			
$Q_{c \max}$	Max. thrust of cylinder	External gripping kN	56			
$P_{c \max}$	Max. permissible hydraulic pressure of cylinder	MPa	4			

### 3.3. Relationship Between Gripping Force and Rotational Speed

The graphs in Figure 8 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.

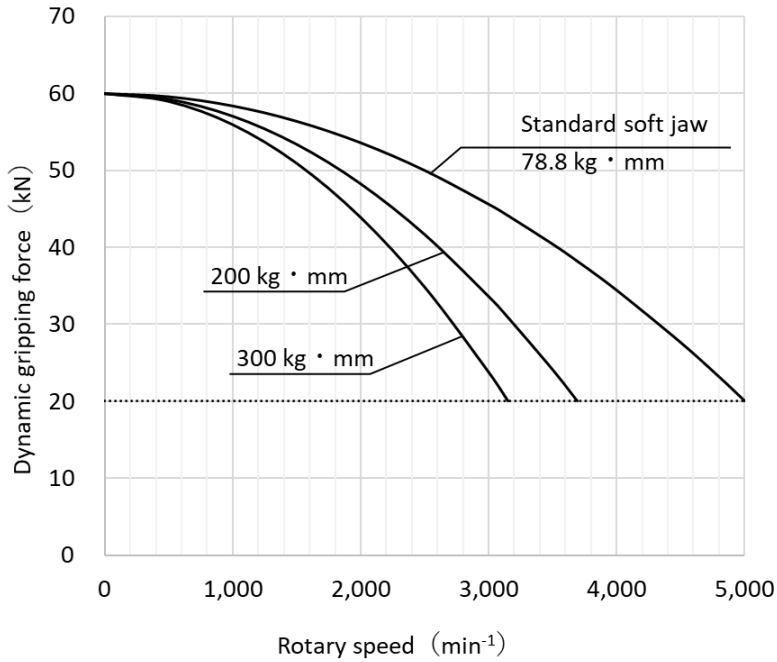


Figure 8-1 DLR08

### 3.4. Relationship Between Gripping Center Height and Static Gripping Force / Input Force Relationship Between Moment of Mass of Top Jaw and Loss of Gripping Force

The graphs in Figure 9 indicate the relationship between the gripping center height and the static gripping force/input force, 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 DLR08 for example.

- When the gripping center height is 31 mm and the input force is 24 kN, the gripping force is 60 kN.
- If the gripping center height exceeds 34 mm, the input force must be reduced. For example, when the gripping center height is 50 mm, the input force is limited to 19 kN 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 40 kN when the static gripping force is 60 kN.
- The loss of gripping force due to centrifugal force is 40 kN when the moment of mass of the top jaw is 78.8 kg·mm and the rotational speed is 5000 min<sup>-1</sup>.

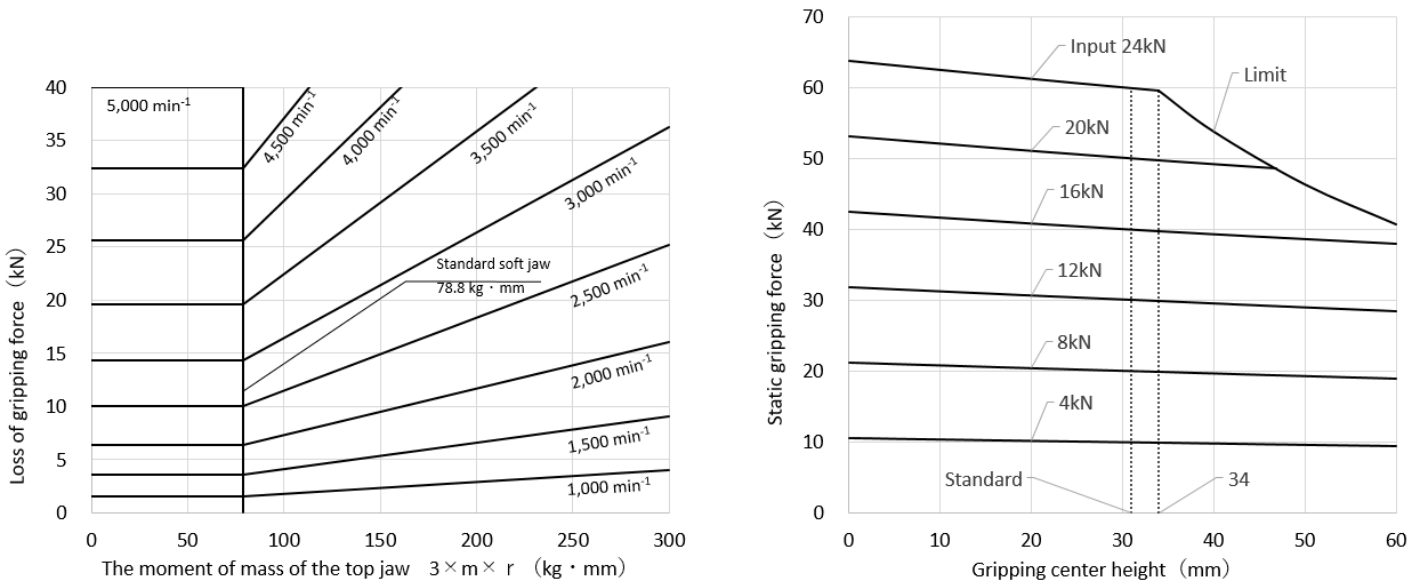


Figure 9-1 DLR08

## 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.



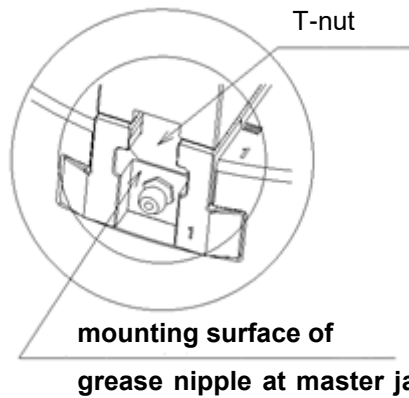
**Danger**

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

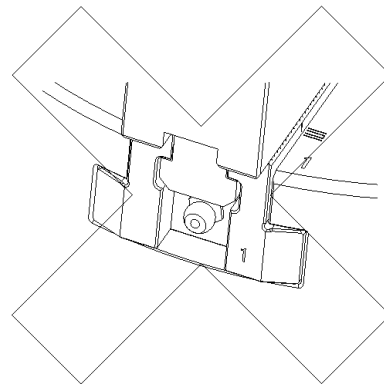
**Use the T-nut in a state where it does not protrude from the mounting surface of grease nipple at master jaw circumference side. (refer to Figure 10)**

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

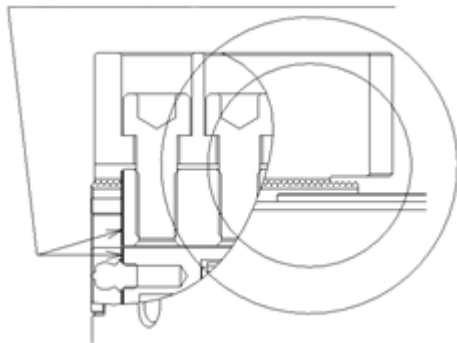
Correct



Wrong



align the end of surface of T-nut  
and the mounting surface of grease  
nipple at master jaw circumference side.



T-nut must not protrude from the  
mounting surface of grease nipple at  
master jaw circumference side.

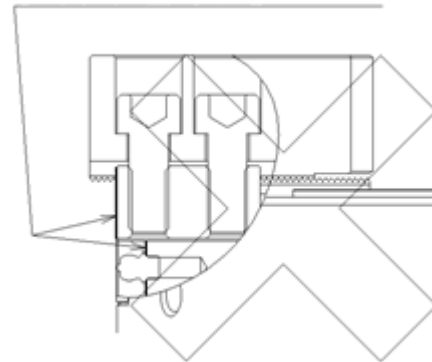
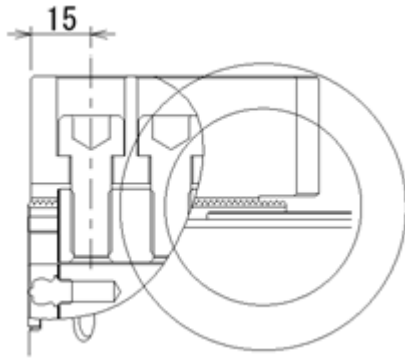
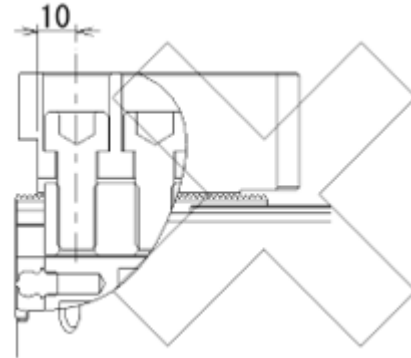


Figure 10

- Should be used the standard soft jaw or Top jaws which has a distance of 15mm or more from the end of the serration on the outer periphery to the center of the seating hole on the outer periphery. If not, the master jaws and T-nut may be damaged, causing the jaws and workpiece to fly out. (refer to Figure 11)



Correct



Wrong

Figure 11

**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.



## Danger

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

**Failure to follow the safety precautions below, the Master jaws and T-nut may be damaged, causing the jaws and workpiece to fly out.**

- Use the T-nut and the attaching bolts attached to the chuck.
- Be sure to tighten the bolts with the specified torque. If the torque is insufficient or excessive, the bolt will break, which is dangerous as the chuck or work will fly out. (Refer to page 9. Table 3.)
- Pay attention to the length of the bolt and the depth of the counter bore hole, and ensure that the tip of the bolt falls within the range indicated in the Figure 12 and Table 7.
- Do not use bolts that have suffered damage, such as excessive loads, deformation, or rust.
- Do not rotate the chuck when the bolts are loose.
- Do not use T-nut from other manufacturers. Always use standard T-nut and refrain from making any modifications. Additionally, do not use T-nut that may have been damaged due to collisions or other incidents.

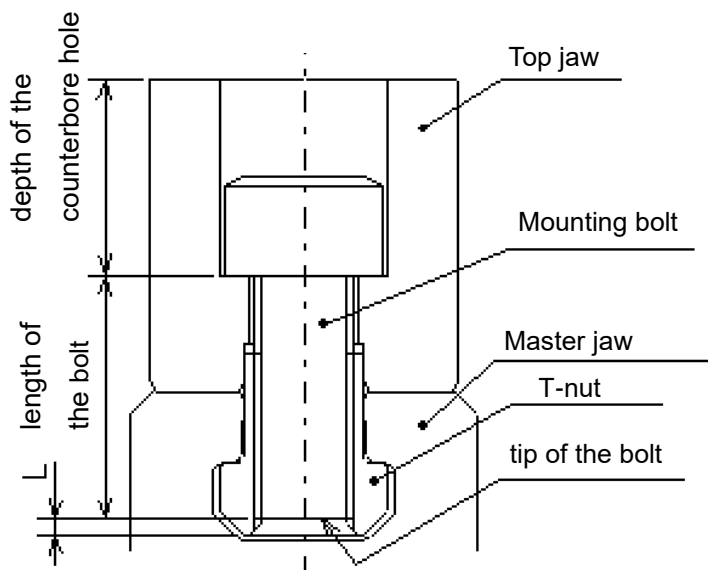


Table 7

Type	L (mm)
DLR08	0 ~ +2

Figure 12

## 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 13.

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.

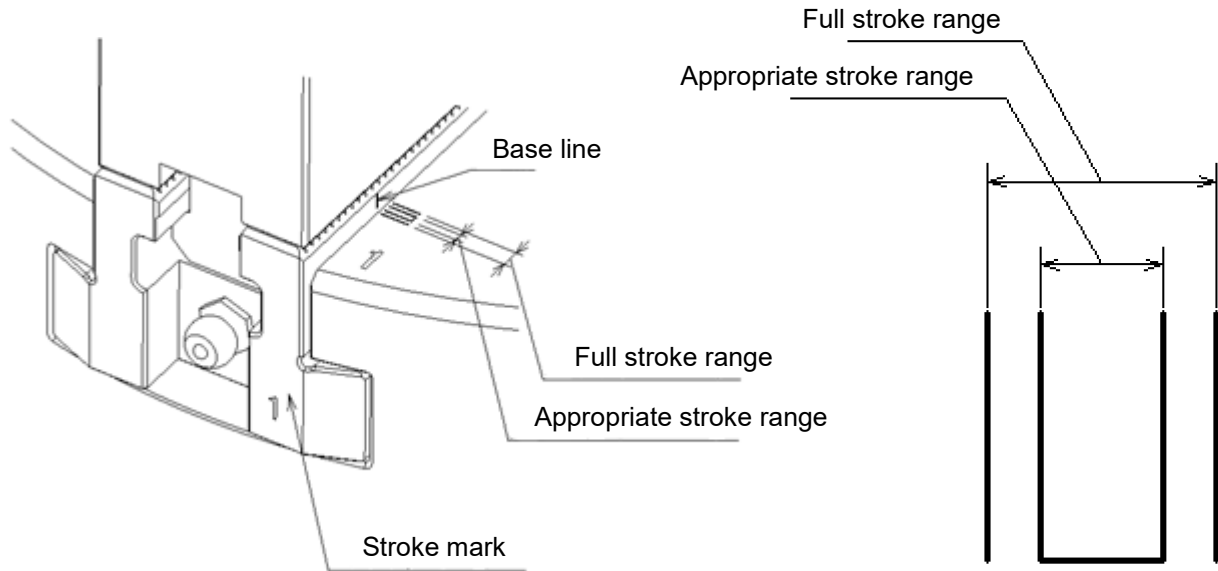


Figure 13 Stroke mark

Table 8

Type	DLR08			
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.

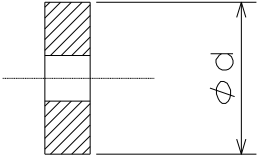
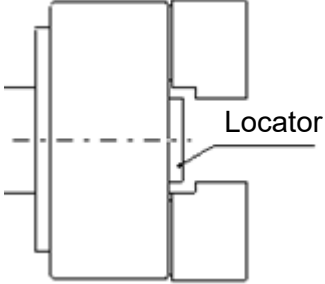
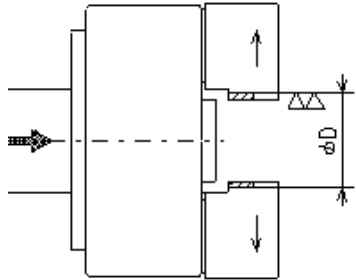
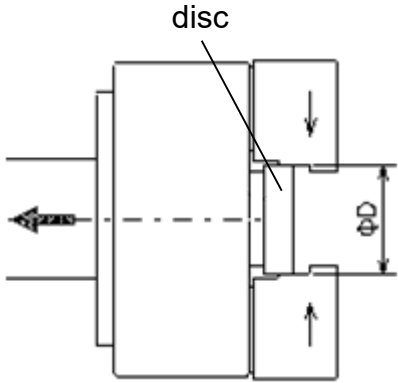
**Before starting work, open and close the jaws without gripping a workpiece and confirm that the master jaw base line moves within the full stroke range.**



- 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. 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"> <li>● 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.</li> <li>● It is convenient to cut threads at the center in order to guide the disc using a bolt when gripping the disc.</li> </ul>	
<p>② Mount on Locator and Soft jaw</p> <ul style="list-style-type: none"> <li>● Mount on Locator.</li> <li>● Mount on Soft jaw in accordance with the jaw number.</li> <li>● To ensure that jaw does not interfere with Locator during operation, additional modifications will be made in advance.</li> </ul>	
<p>③ Machining of disc gripping part</p> <p>Unclamp the chuck and open the jaws to the maximum.</p> <p>Next, machine <math>D_1</math>. <math>D_1</math> 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>④ Gripping of disc</p> <p>Grip the disc at the <math>D_1</math> part.</p> <ul style="list-style-type: none"> <li>● Grip the disc while pressing against the chuck front face to prevent it from tilting. Stabilize the disc by gripping it several times.</li> <li>● Confirm that the master jaw base line is within the appropriate stroke range when the disc is gripped. (Refer to page 23.)</li> <li>● Check if the gripped disc is not floating, if the retraction of the nearby jaw on the gripped surface is not too large, using dial gauge or similar objects, and make adjustments if necessary.</li> </ul>	

<p>⑤ Forming</p> <p>Machine <math>D_2</math> with the disc gripped.</p> <p><math>D_2</math> 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"> <li>● Set the hydraulic pressure during forming to equal to or slightly higher than that during machining a workpiece.</li> <li>● If the disc becomes deformed, reduce the hydraulic pressure or change the disc shape to the one that is hardly deformed.</li> </ul>	
<p>⑥ Test cutting</p> <p>Remove the disc and grip a workpiece.</p> <ul style="list-style-type: none"> <li>● Confirm that the master jaw base line is within the appropriate stroke range when the workpiece is gripped. (Refer to page 23.)</li> <li>● Perform test cutting to confirm that the desired machining accuracy is obtained and no slip occurs.</li> <li>● Grip the workpiece so that it is brought into contact with the gripping surface A and B.</li> <li>● Check if the gripped work piece is not floating, if the retraction of the nearby jaw on the gripped surface is not too large, using dial gauge or similar objects, and make adjustments if necessary.</li> </ul>	

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

**DLR chuck is exclusively designed for gripping the outer diameter. It cannot grip the inner diameter. If use gripping the inner diameter 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.

- When using Jaw which made on other chuck, there is a possibility that the contact between workpiece may worsen, resulting in instability in retracting action and a decrease in gripping accuracy.
- There is a possibility of a decrease in gripping accuracy if the end face of disc is not properly aligned with the reference surface of Locator during the cutting process.
- The position at which the disk is gripped, closer to the surface where workpiece is gripped, results in greater stability for gripping accuracy.
- The insufficient rigidity of disc can cause a decrease in gripping accuracy and a misalignment of the position of stroke.

#### 4.4. Tnut-Plus

A Tnut-Plus as shown in Figure 14-1 is provided for DLR 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 4-1 at page 12.
- To maintain the reproducibility of the Tnut-Plus, insert the Soft jaw into the Master jaw with the Master jaw positioned upward and tighten the attachment bolt. (See Figure 14-2)
- 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 14-3)
- 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.

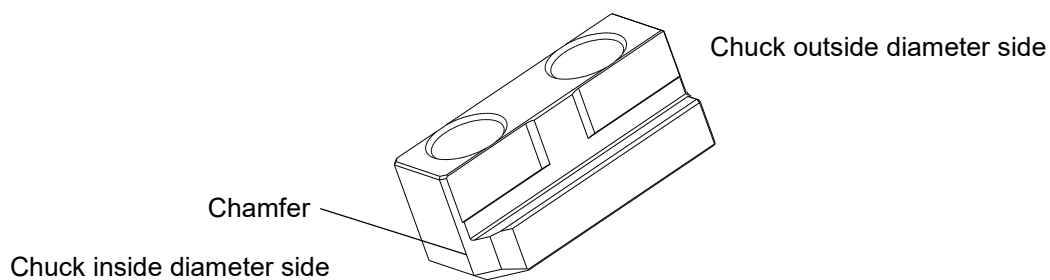


Figure 14-1 Tnut-Plus

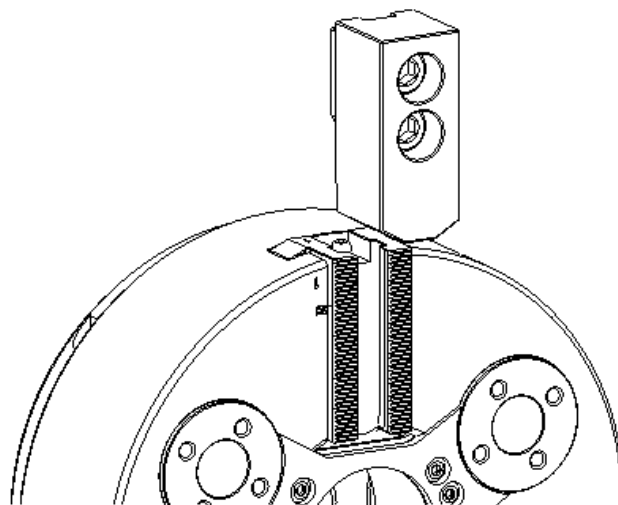


Figure 14-2 Insert the Tnut-Plus and Soft jaw into Master jaw

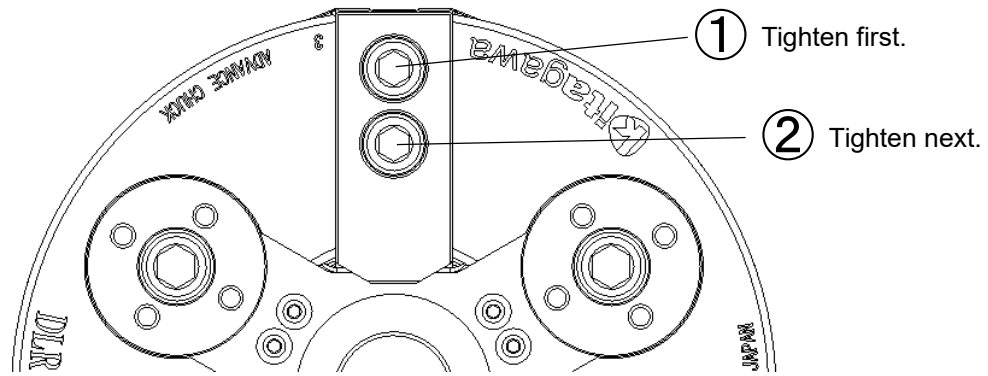


Figure 14-3 Tightening order of the jaw mounting bolts

**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 14-1)**



- 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.

#### 4.5. Jaw with grooves/jaw with grip pieces

The jaws with grooves or grip pieces cannot be used.

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

The Top jaws with grooves or grip pieces cannot be used. The gripping face increases frictional force. As a result, it becomes large and a great load will be applied to the jaws, T-nut and mounting bolts, and their parts will damage of the chuck, causing the workpiece to fly out.

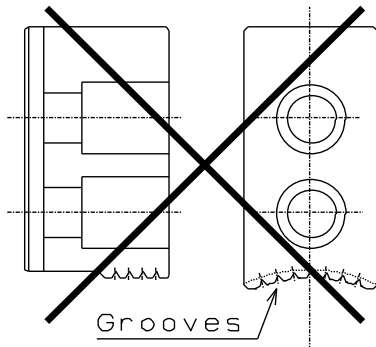


Fig.15

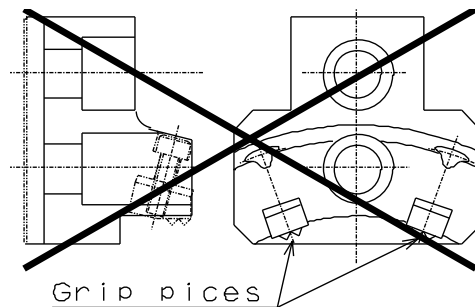


Fig.16

#### 4.6. Attachment of locator and jig

To attach Locator to DLR chuck, use the screw holes of Locator base and the through-hole at the center of Front body (refer to Figure 17 at page 29). When performs a retracting action, Front body also moves, so attach Locator to Locator base. Additionally, to prevent malfunctions caused by objects like cutting chips getting stuck between Locator and Front body when the body is in retracting action, use the accompanying Seal plate and secure Locator to prevent such occurrences.

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

**Failure to follow the safety precautions below, the Master jaws and T-nut may be damaged, causing the jaws and workpiece to fly out.**



- Locator should be attached using the screw holes of Locator base. It is prohibited to modify Chuck for the installation of Locator.
- Locator should be secured to all three positions of Locator base. Additionally, do not attach separate Locators components to each of the three positions of Locator base.
- Using Seal plate, attach it in a way that it is held down by Locator.

### 4.6.1 Manufacturing of locator

Since the run out of the locator datum end face remarkably influences the finishing accuracy of the workpiece, sufficient hardness and accuracy are required for a datum end face. To improve the accuracy on the datum end face, it is recommended that the Locator is finished with it mounted to the chuck after quenching.

Locator should be secured to all three positions of Locator base, and Using Seal plate, attach it in a way that it is held down by Locator. Figure 17 show the examples of a Locator.

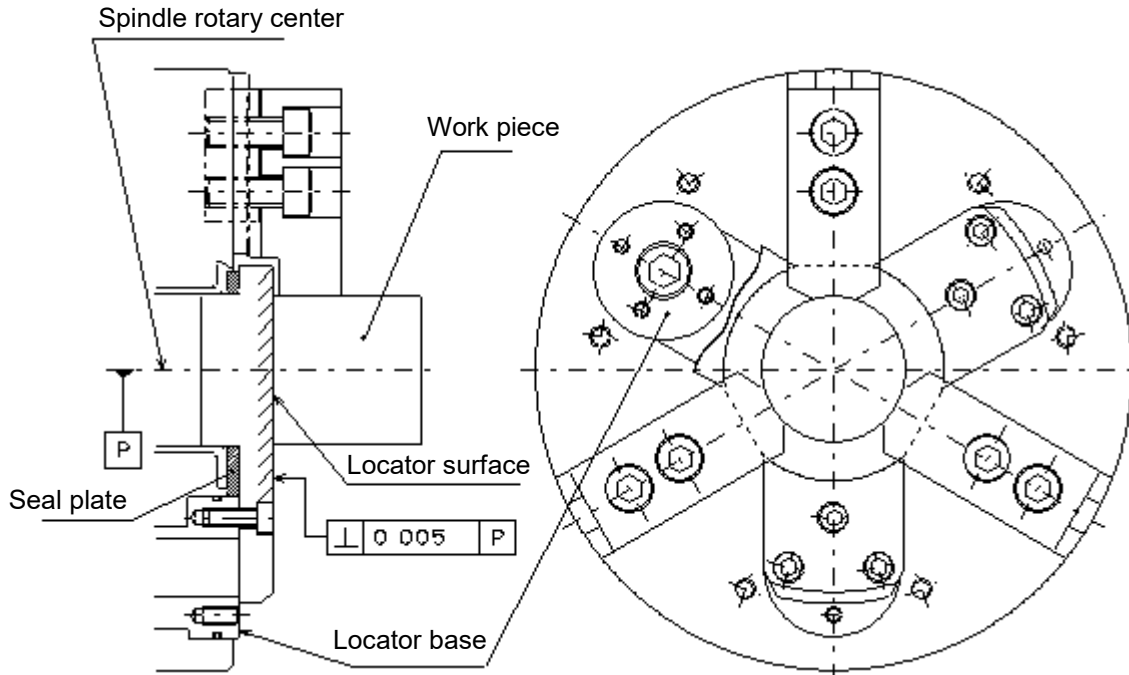


Fig.17

### 4.6.2 Seating spec. locator and air feed tube

Fig. 18 shows an example of a Locator in the seating spec. The air feed tube is mounted to the spindle back to supply air or coolant for seating to the Locator.

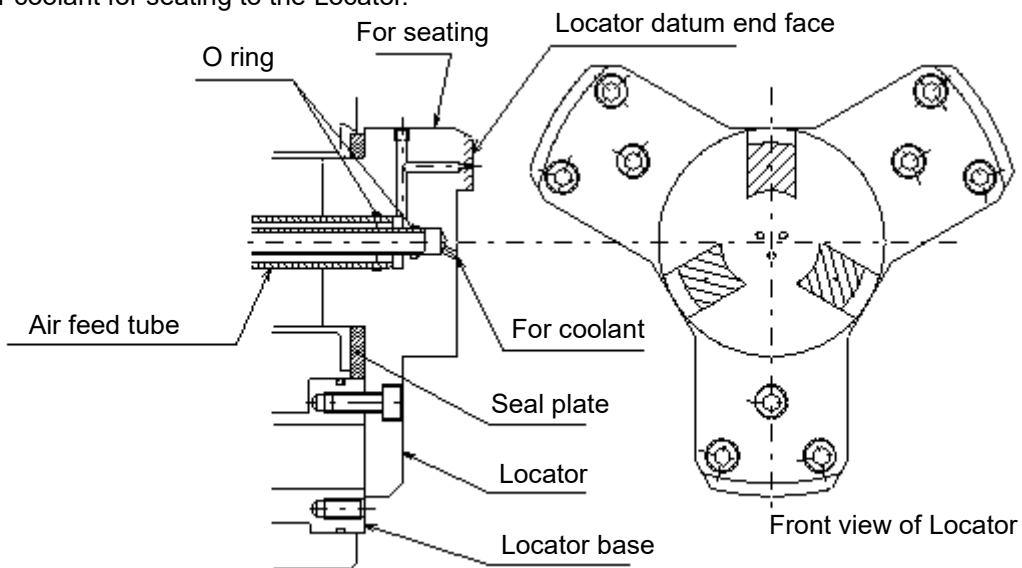


Fig. 18

#### 4.7. Adjustment of retracting action


DLR chuck can be adjusted while mounted on the Lathe machine to adjust retracting action of Jaw.

After adjusted the retracting action, forming a Jaw allows for more precise gripping.






When the retracting action is too large, it can cause damage to surface of work piece or significantly deform.

It is recommended to adjust retracting action to be optimal for gripping condition, as retracting action varies depending on the differences in gripping diameter and gripping height.

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

 • If retracting action is too large, it imposes excessive load on jaw, posing a danger of damage to Master jaw, T-nut, and mounting bolt for jaw, causing the jaws and 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.

- Even if adjustment of retracting position is the same, as gripping diameter increases, retracting action becomes larger.
- Even if adjustment of retracting position and gripping diameter are the same, if the rigidity of jaw is low, retracting action will become smaller.
-  • Even if adjustment of retracting position and gripping diameter are the same, the position of T-nut is towards the outer periphery, retracting action becomes smaller.
- Retracting action varies depending on conditions such as Gripping force, Retracting position, Rigidity and surface condition of work piece, Rigidity and surface condition of jaw, Position of gripping and locator, Material of work piece and jaw, etc.
-  • When using a new chuck, initial wear may occur in its internal components, which can lead to changes in retracting action. In such cases, it is necessary to readjust retraction.
- Extended usage of chuck can result in changes to retracting action due to long-term variations.
-  • Due to the action of jaw's retracting, work piece is pressed against Locator, causing the retracting action of work piece to become zero relative to Locator. When measuring using dial gauge, it may appear that work piece is retracted, but it is important to consider the displacement of the reference surface of locator due to the influence of thrust of cylinder and retracting action, as well as the impact of gripping distortion of workpiece.
-  • As a simple means of checking whether it is retracted or not, there is a method of placing Sim between work piece and Locator and gripping it, then judging based on whether Sim can be removed after the gripped.
-  • When gripping diameter is small, jaw is more likely to bear the burden caused by retracting power.
- When gripping position is high, jaw is more likely to bear the burden of gripping power.
-  • After performing adjustment of retracting action, there is a possibility of gripping accuracy decreasing, and there may be a need for forming a Jaw.

#### 4.7.1 The procedure to adjustment of retracting action.

Adjustment of retracting action is performed using a 4mm hexagonal key through the hole for adjust on the outer surface of Rear body. Adjustment retracting action needs to be done for each jaws, and the hole for adjust of each jaws is located on the side jaw No. marked with Front body (Figure 19). There is no specific order for adjustment, and it can be adjusted from any jaws.

- ① Move jaw to the open position and put it in a state where it is not grip work piece.
  - ② Remove the set screw of the location where retraction is adjusted using a 3mm hexagonal key.
  - ③ Insert a 4mm hexagonal key all the way into the hole for adjustment of retracting action.
  - ④ The retracting action is increased by turning a 4mm hexagonal key clockwise and reduced by turning it counterclockwise.
- Avoid rotating the hexagonal key with excessive force, as there is a risk of damaging internal components.
  - For each rotation, a click stop is applied. Keep track of adjustments based on the number of rotations.
  - If the adjustment amount becomes unknown, rotate to the right until it stops. Use that point as zero, and then count the number of left rotations.
  - Always stop at the position where there is a response from Click stop when the adjustment is completed.
- ⑤ Using a 3mm hexagonal key, tighten the set screw into the hole and secure the cover.
  - ⑥ Grip workpiece and perform operational verification using a dial gauge or similar device.
  - ⑦ If readjustment is necessary, return to step ①.

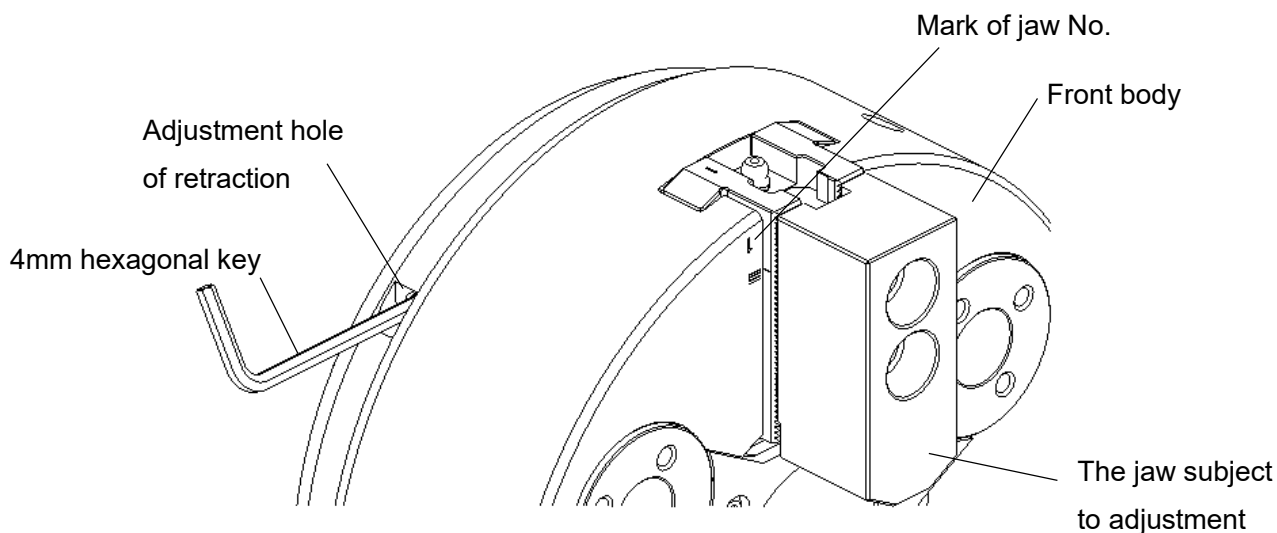


Fig.19

Type	All rotate times	Standard
		After rotating to the right until it stop...
DLR08	25 times	19 times to counterclockwise



#### 4.8. Fine-tuning of gripping accuracy by a retraction adjustment mechanism.

DLR chuck can fine-tune the gripping accuracy by a retraction adjustment mechanism. Using it in the following scenarios improves gripping accuracy.

- Fine-tune the gripping accuracy just a bit more right after forming soft jaw.
- There are errors in tasks such as gripping work pieces, gripping accuracy has slightly deteriorated.
- The gripping surface of soft jaws, that has been used for a long time has become worn out.

##### 4.8.1 Fine-tuning of gripping accuracy by a retraction adjustment mechanism.

The task of adjusting gripping accuracy, necessary tools and the location where the adjustments are made are the same as retraction adjustment.

- ① To place a dial indicator against the outer surface of the griped work-piece, measure the amount of circumferential runout of the workpiece, and identify in which direction among the jaw's No.1 to No.3 the circumferential runout is the biggest.
  - ② Release the workpiece from chuck.
  - ③ Insert a hexagonal key into the adjustment hole in the direction where the deviation of the workpiece outer surface is biggest, and rotate it to the left one full turn. This will reduce a retracting action.
  - ④ Grip the work piece again and measure the amount of circumferential runout.
  - ⑤ If there is no change, return to Step ② and rotate the hex wrench for one more full turn.
- It is also possible to insert the hex wrench into the adjustment hole in the direction of the smallest deviation of the workpiece outer surface and rotate it to the right for adjustment.



### **Danger**

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



- When forcibly adjusted under conditions of poor accuracy due to factors like Un-formed jaw and jaw has gripping surface that significantly offset from the center of chuck, retracting action becomes excessively large, chuck become to unbalance, may damage the chuck, causing the work piece to fly out.
- The difference in position resulting from the retraction adjustment between No. 1, No. 2, and No. 3 should be within two positions. When there is a significant deviation among the positions of the three locations, may damage the chuck, causing the work piece to fly out.

## 5. Additional Machining to surface of Front body

Front body of DLR chuck, along with top jaws and Master jaw, moves as soon as it grips a work piece, therefore any additional machining on Front body is prohibited.

For the installation of Locator, use the screw holes on the upper surface of Locator base.

For the installation of Balance weight and other components, perform it using Locator or similar items attached to Locator base.

## 6. Maintenance and Inspection

### 6.1. Periodic Inspection

Table 10 Periodic inspection

Interval	Contents
Every day	<ul style="list-style-type: none"> <li>● Supply grease. When using high speed rotation or a large quantity of water soluble coolant, shorten the greasing interval according to the operating conditions.</li> <li>● 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 23.)</li> <li>● Upon completion of the work, clean the chuck using an air gun.</li> </ul>
Every 3 months	<ul style="list-style-type: none"> <li>● Check the bolts of each part for looseness.</li> </ul>
Every 6 months or 100,000 strokes (Cast machining: every 2 months)	<ul style="list-style-type: none"> <li>● Disassemble and clean the chuck.(Refer to page 34.)</li> </ul>

### 6.2. Grease Supply

#### 6.2.1. Specified grease

Table 11 Specified grease

Type	Specified grease	Grease nipple	Grease amount per one point [g]
DLR08	CHUCK GREASE PRO	JIS B 1575 : 2000 type 1 (M6×0.75)	4

#### 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 11 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 12 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. Disassemble and Clean and Reassemble

Read the following disassembling procedure referring to page 6 and 7.

#### 6.3.1 Disassemble procedure

- ① Before start of work, be sure to turn off the main power of the machine.
- ② Performing position confirmation and recording of Block [14] of a retraction adjustment mechanism before removing chuck will facilitate smooth restoration of work when reattaching.
- ③ Inside chuck, there are small components such as Coil spring [13] and Steal ball [24]. Please be cautious not to lose them.
- ④ Loosen the Jaw mounting bolts [21] and remove Soft jaw [11] and T-nut [10].
- ⑤ Remove Locator from Locator base [6].
- ⑥ Remove Seal plate [16], after that loosen the Cover mounting bolts [22] and remove Cover [9].
- ⑦ Loosen the Chuck mounting bolts [20], rotate Draw nut [7] on Plate wrench for draw nut [31] to unscrew the screw, and then remove chuck from Spindle.
- ⑧ Loosen the Rear body mounting bolts [19] and remove Rear body [2].
- ⑨ Remove Block [14] and Screw pin [12] and Coil spring [13] from Rear body [2].
- ⑩ Loosen the Spring plate mounting bolts [23], and remove Spring plate [5] and Coil spring [13] and Steal ball [24] from Front body [6].
- ⑪ Loosen the Plunger nut mounting bolts [18], and remove Plunger nut [8] and Draw nut [7] and Steal ball [24] and Coil spring [13] from Wedge plunger [4].
- ⑫ Remove Wedge plunger [4] from Front Body [1].
- ⑬ Remove Master jaw [3] to the inside of Chuck, remove Spring pin [15] and Coil spring [26]. Due to the spring force applied to Spring pin [15], press down on Spring pin [15] from the top while removing Master jaw [3] to prevent Spring pin [15] from springing out.
- ⑭ Remove Locator Base [6] from Front Body [1].



**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.

### 6.3.2 Reassembly procedure

#### ① Assembly procedure for Spring plate and Locator base.

- Place Front body [1] on the workbench with the back side facing upward.
- For positioning during installation of Spring plate [5], insert Wedge plunger [4] into Front body [1].
- Perform the alignment between the mark 1 on Spring plate [5] and jaw No. mark on Front body [1]. Be aware that Spring plate [5] has a front side and back side.
- Temporarily tighten Spring Plate [5] to Front body [1] using Flange cap mounting bolts for Spring plate [23]. After temporarily tightening all bolts, secure them with the specified torque.

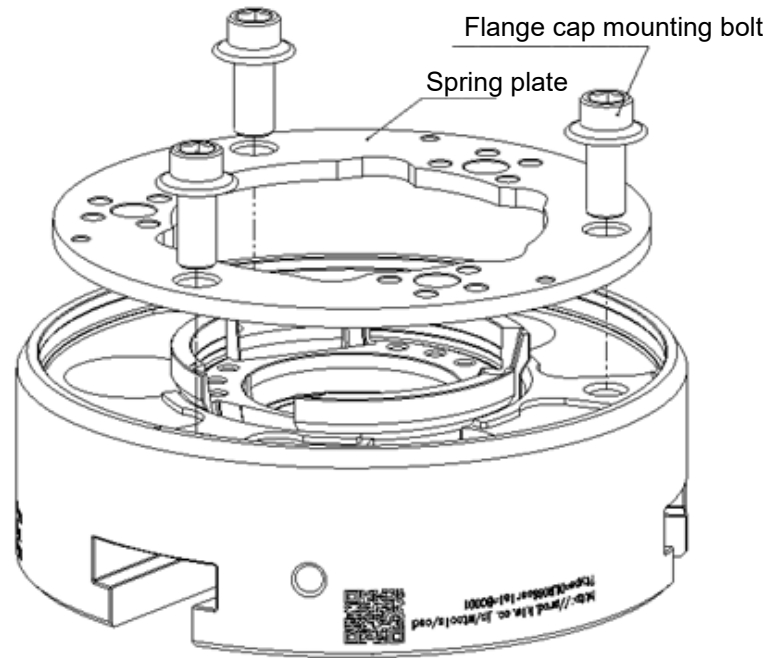


Fig.20

- Place Front body [1] on the workbench with the front side facing upward.
- Mount a O ring [25] on the groove of Locator base [6].
- Apply Grease to sliding surface of Locator base [6] and Front body [1]. (also, O ring surface)
- Locator has mark that is 1-2 and 2-3 and 3-1 on side surface. Mount each Locator base [6] into the holes between jawNo.1 and No.2 of Front body [1], between 2 and 3, and between 3 and 1.
- After standing Front body [1] upright using its side surface and being careful to prevent it from rolling, align the hole for passing Spring plate's bolt and the screw hole on the back surface of Locator base.

#### ② Assembly procedure for Screw pin and Block

- Screw pin [12] into Block [14] until fully tightened. During this process, make sure that the notch on Screw pin [12] is facing towards the top surface of Block [14].
- Apply Grease to Sliding surface of Block [14].
- Insert Coil spring [13] into the tip hole of Screw pin [12].
- There are markings of 1 to 3 on each of the three Blocks [14]. Align each of them with the corresponding jaw No. marking on Front body [1] and attach them to the grooves of Rear body [2].

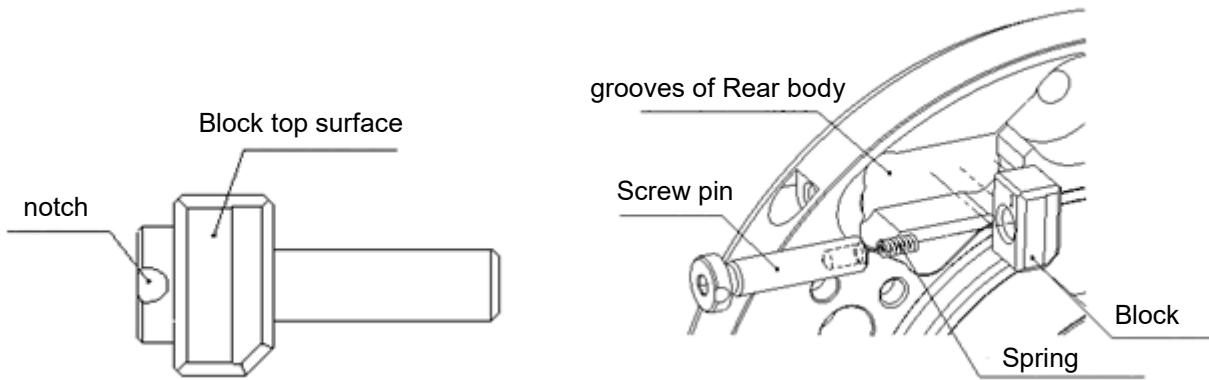


Fig. 21

③ Assembly procedure for Rear body

- Place Front body [1] with the surface facing downwards on a straight workbench, such as a rigid surface plate. Then, ensure that the weight of Front body [1] is supported by three points of Locator base [6].
- Insert Coil spring [13] and Steal ball [24] into the three holes formed by Front body [1] and Spring plate [5].

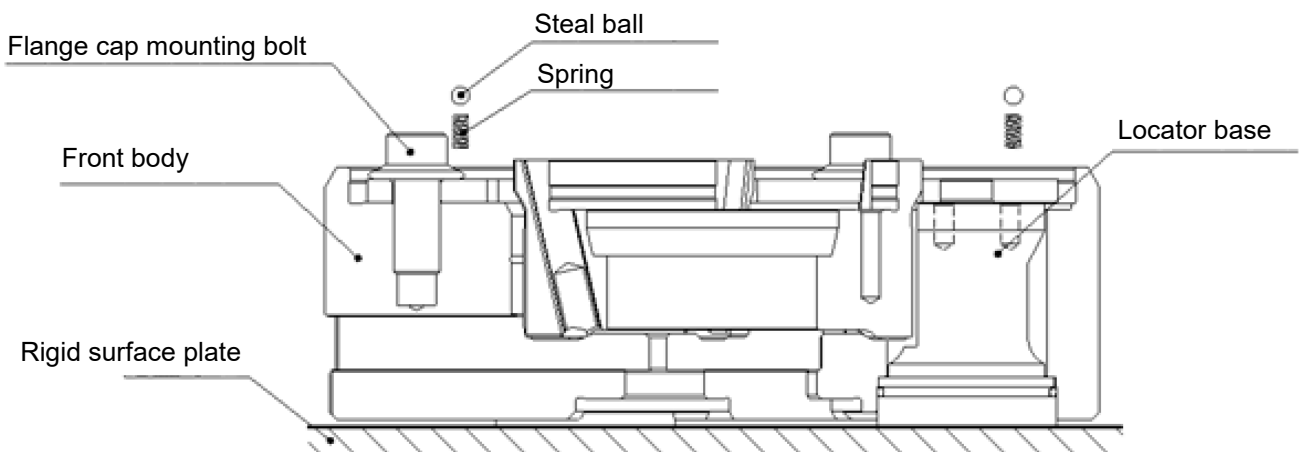


Fig.22

- Align the notches of Front body [1] and Rear body [2].
- Place Rear body [2] onto Front body [1] and while pressing down on Rear body [2] from above, ensuring that Coil spring [13] and Steal ball [24] are pressed against each other, align the position of Rear body [2] to allow Rear body mounting bolt [19] to be smoothly screwed in.
- First, loosely tighten the Rear body mounting bolt [19] with a ★1 to ★3 mark, and then loosely tighten the remaining bolts in numerical order. The Bolts with the star mark is a positioning bolt.
- After that, tighten all the bolts in the specified torque order, following the same numerical sequence.

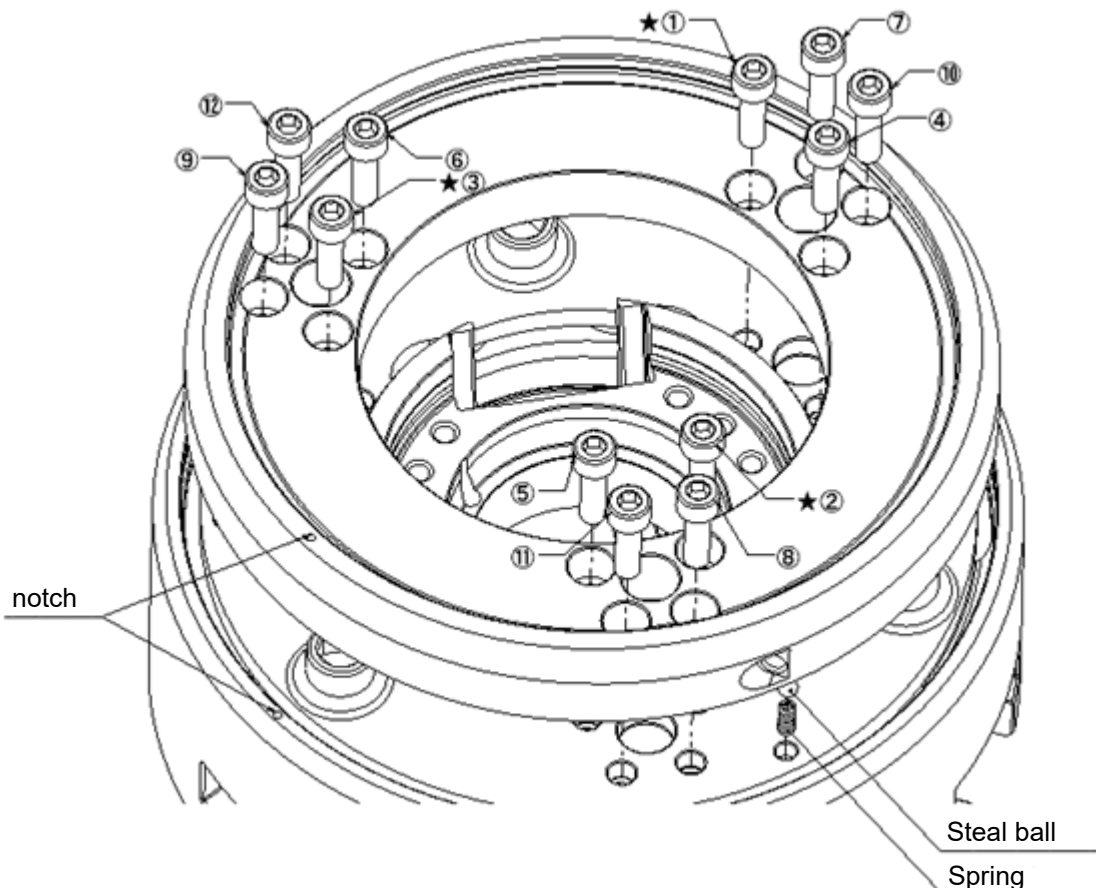


Fig. 23

④ Assembly procedure for Master jaw and Wedge plunger

- Place Front body [1] on the workbench with the Rear body [2] upward. Then, place raising block under Locator base [6].
- Remove Wedge plunger [4] from Front body [1] temporarily.
- Mount a Coil spring [26] and Spring pin [15] on Master jaw [3].
- Apply Grease to sliding surface of Front body's groove for Master jaw [3] and hole for Wedge plunger [4], also sliding surface of Master jaw [3] and upper surface of Spring pin [15].

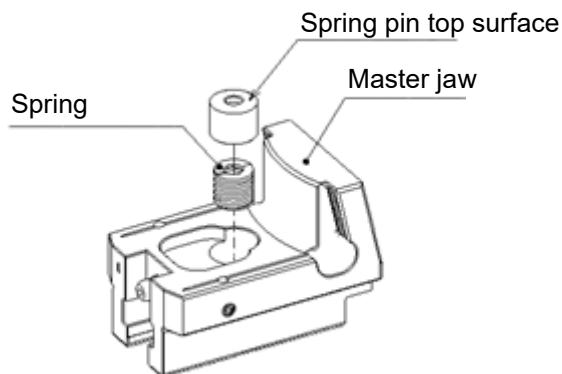


Fig. 24

- There are markings of 1 to 3 on each of the three Master jaws [3]. Align each of them with the corresponding jaw No. marking on Front body [1] and attach them to the grooves. Then, use the rounded end of a Hexagonal spanner or similar tool to hold down the spring pin.

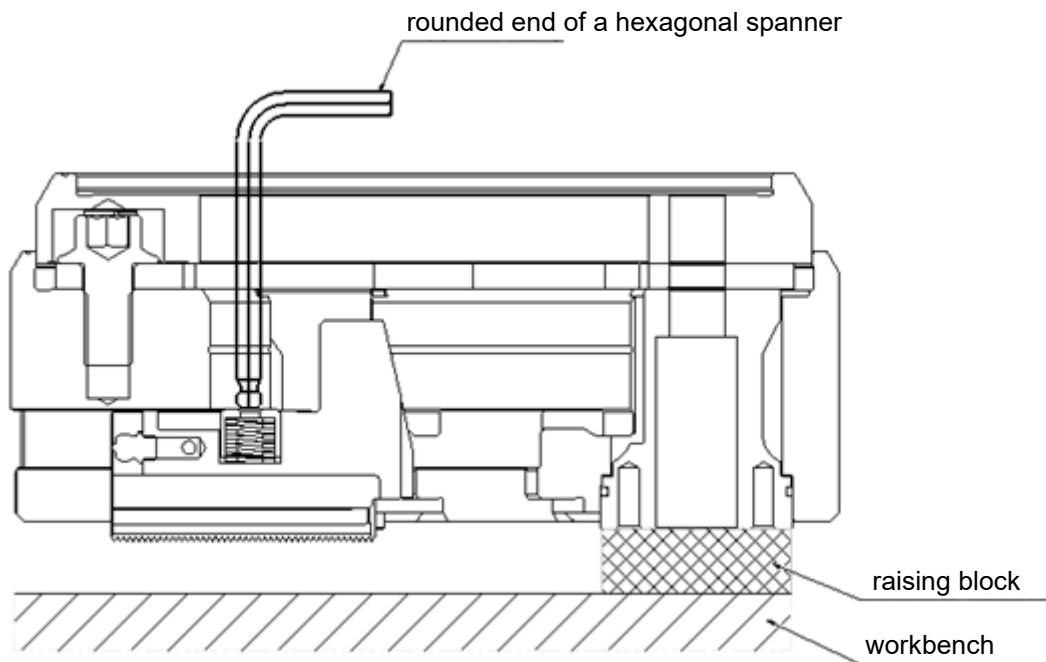


Fig. 25

- Apply Grease to sliding surface of Wedge plunger [4]. Wedge plunger [4] has mark that is No.1. Insert to Front body [1], aligning it with the marking on Master jaw [3].
- ⑤ Assembly procedure for Plunger nut and Draw nut
- Insert Steel ball [24] and Coil spring [13] into the Wedge plunger [4].
  - Insert Draw nut [7] into Wedge plunger [4] while they are combined with Plunger nut [8].
  - Pressing down on Plunger nut [8] from above, ensuring that Steel ball [24] and Coil Spring [13] are pressed against each other, align the position of Plunger nut [8] to allow Plunger nut mounting bolt [18] to be smoothly screwed in.
  - Tighten the Plunger nut mounting bolt [18] at the specified torque.

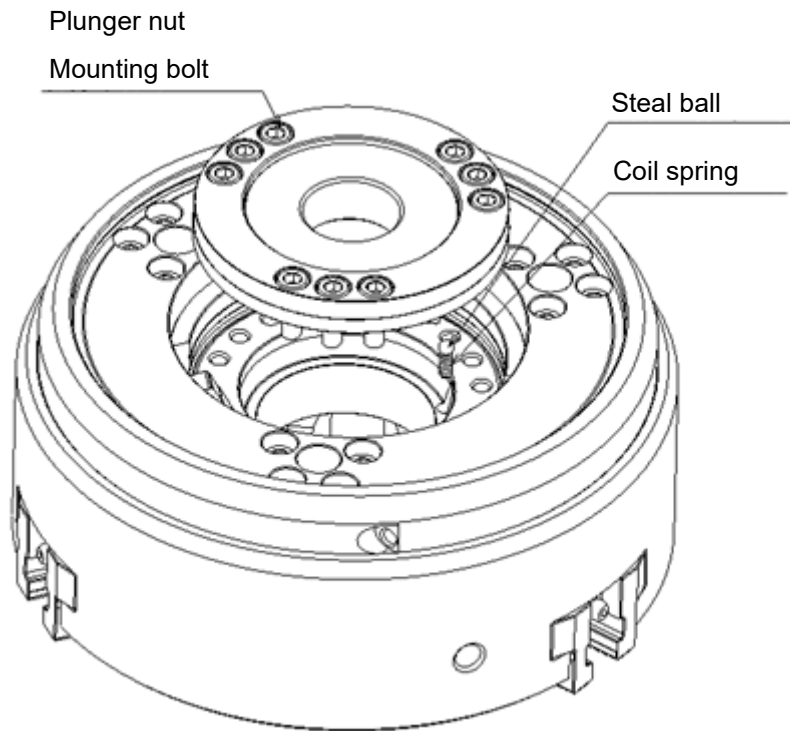


Fig. 26

- Reassemble the product through reverse procedure of disassembly while applying the specified grease sufficiently.
- When reinstalling the chuck to the machine, refer to "8.5 Chuck Installation Procedure" on page 46.
- After reassembly, it is recommended to confirm that the specified gripping force is obtained according to the procedure on page 13.

## 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 13 again and take necessary measures.

Table 13 Troubleshooting

Problem	Cause	Countermeasure
Jaws do not move	Parts are damaged	Disassemble and clean the chuck. Replace damaged parts. (Refer to page 34.)
	Slideways get seized	Disassemble and clean the chuck. Correct the seized part with an oilstone or replace the part. (Refer to page 34.)
	Cylinder does not operate	Check the piping and electric system, and if normal, repair or replace the cylinder.
Stroke is insufficient	Chips accumulate inside	Disassemble and clean the chuck. (Refer to page 34.)
	Draw pipe loosened	Remove the draw pipe from the cylinder and retighten it.
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 23.)
	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 33.)
	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 9.)
	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. In such a case, please check the URLs marked on the outer circumference of the body, as they also contain information on the type and serial numbers.

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 34. 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

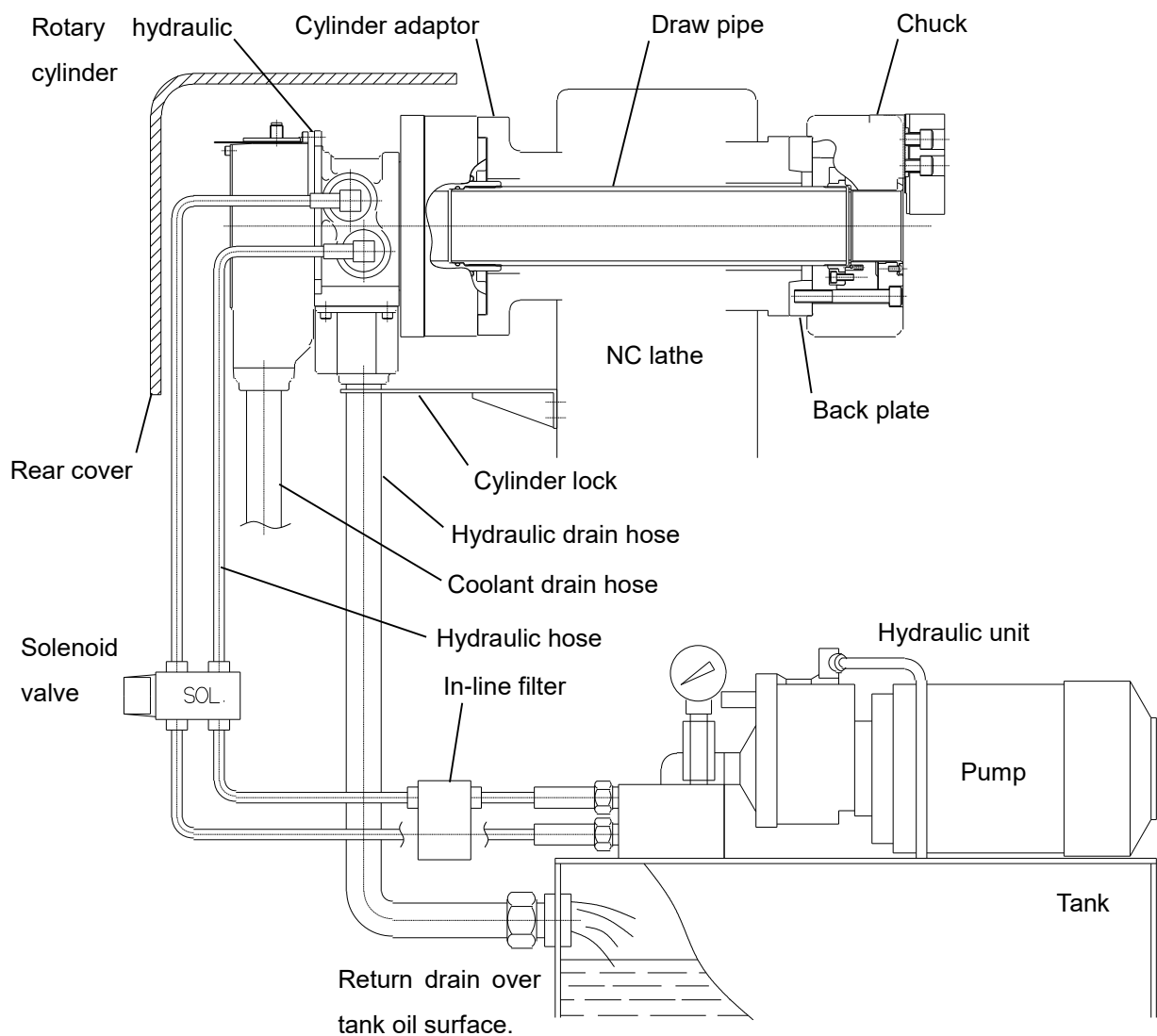


Figure 27 Installation conceptual diagram



## 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.



**Provide the drain hose so that drain flows smoothly without stagnation.**

**The drain must be returned over the oil surface in the hydraulic unit to prevent back pressure.**

- If drain does not flow smoothly, the cylinder may cause oil leakage, resulting in fire.



**For the cylinder and other peripheral devices, follow their respective instruction manuals.**

- If not, serious human accidents may occur.



## Warning

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



**Eliminate dust in the hydraulic circuit completely. In addition, incorporate an in-line filter.**

- If foreign substances enter the cylinder, the rotary valve may get seized and the cylinder may rotate while tearing the hose. Moreover, the hydraulic pressure may be blocked, causing the workpiece to fly out.



**Use a flexible hose to prevent bending stress and tension from being applied to the cylinder.**

- If the cylinder is rotated with an external force applied to it, the cylinder rotary valve may get seized and the cylinder may rotate while tearing the hose. Moreover, the hydraulic pressure may be blocked, 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.



Use a hydraulic hose with the inside diameter as large as possible and with a piping length as short as possible.

- If the inner diameter is too small or the piping length is too long, the jaw opening/closing speed may become slow.



Provide the drain hose with a slight flow gradient to avoid any air pocket.

- If air is mixed in drain, noise caused by the hydraulic unit may increase or the service life of the hydraulic unit may be shorten.

## 8.2. Back plate

- Prepare a back plate corresponding to the spindle end shape and chuck mounting dimensions.
- Use the Back plate that is attached to the Spindle first. (refer to Figure 28)
- Ensure that the end face of Back plate is within 0.005mm or less in parallelism compared to the Spindle surface. If parallelism is larger, please lathe machining the end face of Back plate while it is attached to the Spindle of Lathe.
- The chuck mounting dimensions conform to JIS B 6109-2: 2005.

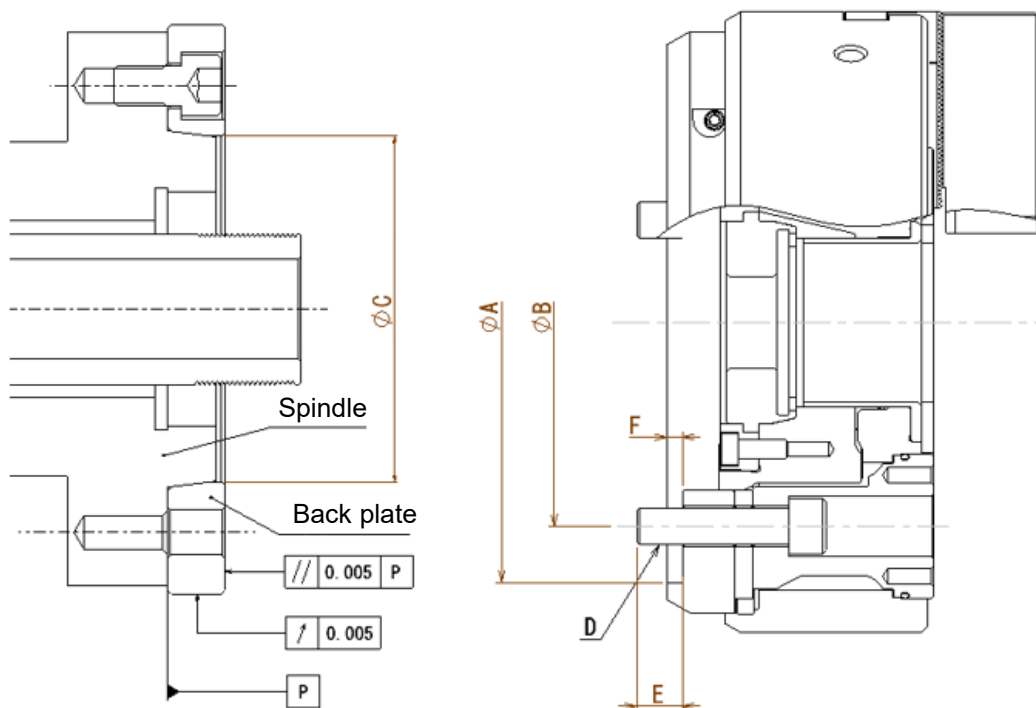


Figure 28 Mounting dimensions

Table 14

Type	DLR08			
A (H6)	170			
B	133.4			
C (max)	104			
D	3×M12			
E	15			
F	5			

(mm)

## 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.



Ensure that the end face of Back plate is within 0.005mm or less in parallelism compared to the Spindle surface. If parallelism is larger, machining the end face of Back plate while it is attached to the Spindle of Lathe.

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



If you use type Back plate which is attached to chuck first, you may not adjust centering.

Dimension C must be equal to or less than the value in Table 14 so that the plunger stroke is restricted by the back plate.



- If the plunger stroke is not restricted, the master jaws may interfere with the cover and be damaged when the chuck is combined with a cylinder having a stroke longer than the chuck specifications.

### 8.3. Draw Pipe

Determine the draw pipe length  $L$  according to the distance  $X$  between the chuck mounting face and cylinder mounting face. Whether sufficient strength is obtained with respect to the operating conditions must be judged by the designer of the draw pipe. The dimensions provided in this manual do not guarantee that the draw pipe will not be damaged under every condition.

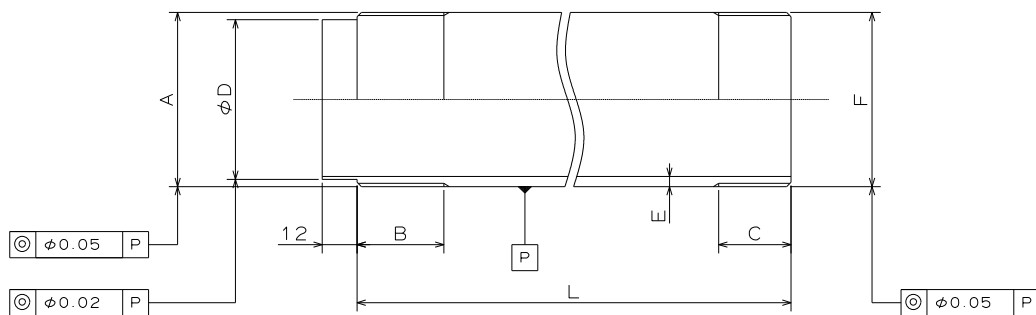


Figure 29 Draw pipe

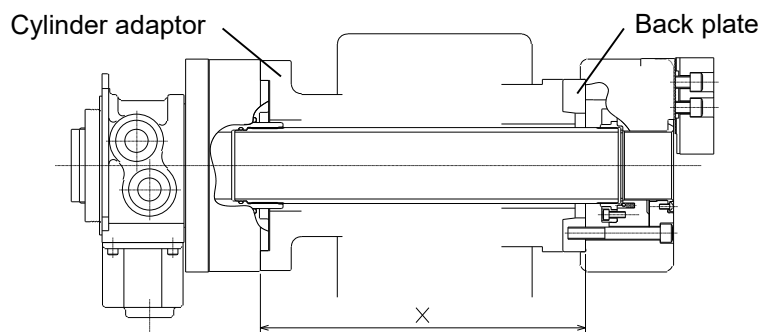


Figure 30 Distance between chuck mounting face and cylinder mounting face

Table 15 Draw pipe dimensions

Type	Cylinder	A	B	C	D (f7)	E (min)	F(max)	L
DLR08	SR1453C	M60×2	30	25	55	4	M60×2	X+42
	SS1452K							X+42
	S1552							X+39

(mm)

## 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 connect Cylinder and Chuck by connecting multiple draw pipes.

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

## 8.4. Disassembly of Draw Nut and Threading

Read the following procedure referring to page 5 and 6.

- ① Loosen the Plunger nut mounting bolts [18] and remove the Plunger nut [8] and Draw nut [7].  
At this time, be careful not to lose the Steel ball [24] and Coil spring [13].
- ② Cut threads in the Draw nut [7] corresponding to the Draw pipe thread diameter.
- ③ Assemble the Draw nut [7] in the Plunger nut [8], and tighten the Plunger nut mounting bolts [18].



## Danger

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

**Do not cut threads exceeding the dimension F in Table 14 in the draw nut.**

**The thread accuracy must be 6H / 6g.**



- If not, the draw nut is damaged due to its insufficient strength and the gripping force is lost instantaneously, causing the workpiece to fly out.

## 8.5. Chuck Installation Procedure

For the cylinder mounting procedure, also read the instruction manual of the cylinder.

- ① Before start of work, be sure to turn off the main power of the machine.
- ② Apply adhesive to the thread part of the draw pipe and screw the draw pipe in the cylinder piston rod.  
For the tightening torque to be applied at this time, refer to “2.Important Safety Precautions” on the instruction manual of the cylinder.
- ③ Install the cylinder on the spindle.
- ④ Check the run-out of the cylinder. If normal, connect the hydraulic hose and the drain hose.
- ⑤ Turn on the machine power, and operate the cylinder several times at 0.5 MPa. If it is normal, move the piston to the forward end and turn off the machine main power.
- ⑥ Remove the Soft jaws and Cover of the chuck.

- ⑦ Insert the Handle wrench for draw nut into the chuck center hole as shown in figure 31, and connect the Draw nut to the Draw pipe while rotating the Draw nut. If it cannot be screwed in smoothly, do not screw forcibly and check the thread for inclination.
- ⑧ Rotate the Draw nut until the chuck is completely fitted to the spindle installation surface.
- ⑨ 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.
- ⑩ Rotate the Draw nut until the Master jaw base line is aligned with the outer line of the stroke mark. (Refer to page 23.)  
A click stop (locking mechanism) is provided for the Draw nut. Finish the adjustment at a position where you feel it click.
- ⑪ Operate the cylinder at 0.5 MPa and confirm that the Master jaw base line moves within the full stroke range. (Refer to page 23.)
- ⑫ If the chuck or cylinder is replaced from another type, calculate and change the hydraulic pressure to obtain the same gripping force as the previous chuck. (Refer to “3.2. Calculation of Operating Condition”.)

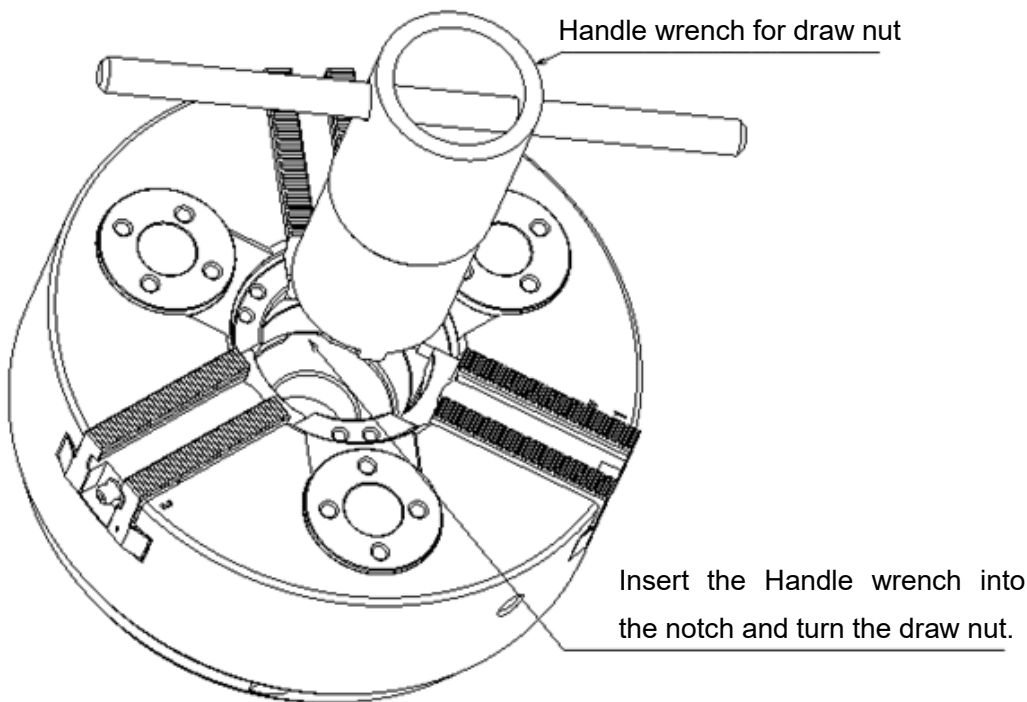


Figure 31

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



**If the chuck or cylinder is replaced from another type, calculate and change the hydraulic pressure to obtain the same gripping force as the previous chuck. (Refer to “3.2. Calculation of Operating Condition”.)**

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



## 9. Others

### 9.1. Standard or Directive to Conform

This product conforms to the following EN standards and EU directive:

- Machinery Directive:2006/42/EC Annex I
- EN ISO 12100:2010
- EN1550:1997+A1:2008

### 9.2. Marking of Product

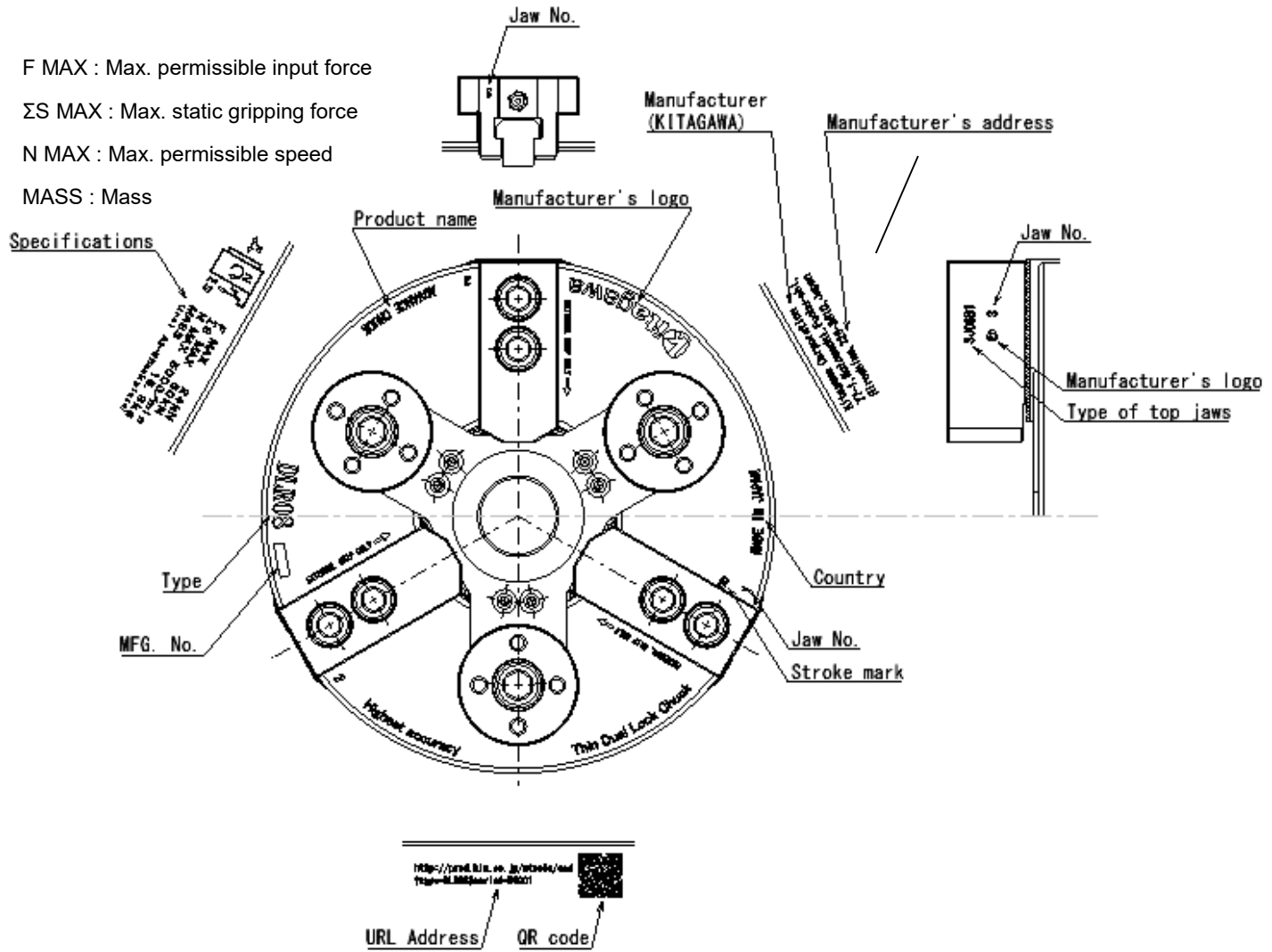


Figure 32 Marking

The mass stamped on the chuck is the value when the standard back plate is included.

Table 16

Type	DLR08			
Back plate	A2-6			
Spindle end shape				
Stamp	18.9 kg			



## **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 input force may damage the chuck, causing the workpiece to fly out.

### 9.3. Disposal

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

**DECLARATION OF INCORPORATION**  
of partly completed machinery  
Copy of original

We hereby declare that the following our product conform with the essential health and safety requirements of the EC Machinery Directive so that the product is to be incorporated into end-machinery. The product must not be put into service until end-machinery has been declared in conformity with the provisions of the EC Machinery Directive 2006/42/EC Annex II part 1.A.

We also declare that the specific technical documentation for this partly completed machinery was drawn up according to the EC Machinery Directive 2006/42/EC Annex VII part B.

Product : Advanced chuck

Model : DLR series  
(Models DLR08)

Serial number : See original declaration

Manufacturer : Kitagawa Corporation  
77-1, Motomachi, Fuchu-shi,  
Hiroshima 726-8610, Japan

Authorized compiler : Peter Soetebier / Prokurist  
in the community Kitagawa Europe GmbH  
Borsigstr.3 D-40880 Ratingen, GERMANY

The essential health and safety requirements in accordance with the EC Machinery Directive 2006/42/EC Annex I were applied and fulfilled:  
1.1.2, 1.1.3, 1.1.5, 1.1.6, 1.3.1, 1.3.2, 1.3.4, 1.5.4, 1.5.8, 1.5.9, 1.5.13, 1.6.1, 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2

The following harmonized standards were applied:  
EN ISO 12100:2010, EN 1550:1997+A1: 2008

Signature : See original declaration

Place / Date : See original declaration

Name / Title : Yuki Kawakita / Manager, Dvelopment Section  
Technical department  
Kitagawa Global hand Company

Being the responsible person appointed and employed the manufacturer.

**UK DECLARATION OF INCORPORATION**  
of partly completed machinery  
Copy of original

We hereby declare that the following our product conform with the essential health and safety requirements of the Supply of Machinery (Safety) Regulations 2008 so that the product is to be incorporated into end-machinery. The product must not be put into service until end-machinery has been declared in conformity with the provisions of the Supply of Machinery (Safety) Regulations 2008 Annex II part 1.A.

We also declare that the specific technical documentation for this partly completed machinery was drawn up according to the Supply of Machinery (Safety) Regulations 2008 Annex VII part B.

Product : Standard chuck

Model : DLR series  
(Models DLR08)

Serial number : See original declaration

Manufacturer : Kitagawa Corporation  
77-1, Motomachi, Fuchu-shi,  
Hiroshima 726-8610, Japan

Authorized complier : Mark Jones / Financial Director  
in the community : UNIT 1 THE HEADLANS, DOWNTON,  
SALISBURY, WILTSHIRE, SP5 3JJ, UNITED  
KINGDOM

The essential health and safety requirements in accordance with the Supply of Machinery (Safety) Regulations 2008 Annex I were applied and fulfilled:  
1.1.2, 1.1.3, 1.1.5, 1.1.6, 1.3.1, 1.3.2, 1.3.4, 1.5.4, 1.5.8, 1.5.9, 1.5.13, 1.6.1, 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2

The following harmonized standards were applied:  
EN ISO 12100:2010, EN 1550:1997+A1: 2008

Signature : See original declaration

Place / Date : See original declaration

Name / Title : Yuki Kawakita / Manager, Dvelopment Section  
Technical department  
Kitagawa Global hand Company

Being the responsible person appointed and employed the manufacturer.

**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**

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<b>Hiroshima office</b>	77-1, Motomachi, Fuchu-shi, Hiroshima, 726-8610, Japan Tel. +81-847-40-0541      Fax. +81-847-46-1721
<b>Kyushu office</b>	7-6-39, Itazuke, Hakata-ku, Fukuoka-shi, Fukuoka, 812-0888, Japan Tel. +81-92-501-2102      Fax. +81-92-501-2103
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■ OVERSEAS

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