

# INSTRUCTION MANUAL

## FG-Q type

Easy Preparation Finger Chuck for Automotive Wheels



### DANGER

- This instruction manual is for production engineers and maintenance personnel in charge of operation of this product. When a beginner uses this product, receive instructions from experienced personnel, the distributor or our company.
- Before installing, operating or maintaining this equipment, carefully read this manual and the safety labels attached to the equipment. Failure to follow these instructions and safety precautions could result in serious injury, death, or property damage.
- Store this manual near equipment for future reference.
- If any questions related to safety arise about this manual, please confirm them with the distributor or our company.

**Kitagawa Corporation**

77-1, Motomachi, Fuchu-shi, Hiroshima, 726-8610 Japan

TEL +81-(0)847-40-0561

FAX +81-(0)847-45-8911

# Preface

This manual provides detailed information about how to safely and correctly use the finger chuck for machining automotive wheels (FG-Q type) using lathe.

Before starting to use this finger chuck for automotive wheels, read this manual carefully and always follow the instructions and warnings in "Important Safety Precautions" and "Precautions for Use" at beginning of the manual. Failure to follow these precautions could result in a serious accident.

## Terms and Symbols Used for Safety Messages

In this manual, precautions for handling that are considered especially important are classified and displayed as shown below depending on the damage of risk including the seriousness of the harm that could result. Please sufficiently understand the meanings of these terms and follow the instructions for safe operation.

### **Safety Alert Symbol**

The triangle is the safety alert symbol used to alert you to potential safety hazards that could result in injury or death.



Indicates a hazardous situation which, if you not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if you not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if you not avoided, could result in minor or moderate injury.



Indicates instructions which, if not avoided, could result in damage to the equipment or a shortened work life.

# Liability and How to Use this Manual

This product is suitable for gripping an automotive aluminum wheel on lathe or rotary table. This product is equipped with levers to clamp the aluminum wheels and it operates by means of a rotary cylinder. For any other applications, please consult us.

Our company will not assume responsibility for injury, death, damage, or loss resulting from not following the instructions in this manual.

The contents of this document do not anticipate all the dangers that may occur when in motion, cutting operation, inspection, and maintenance in all environments. There are countless things that cannot or should not be done, and it is impossible to cover all of them in this manual.

Therefore, do not perform any actions unless they are specifically allowed in this manual. If any questions related to safety arise about operation, control, inspection and maintenance which are not specified in this manual, please confirm them with our company or distributor before performing them.


## Guarantee and Limitation of Liability

The guarantee period of this product is 1 year after delivery.

Use the parts delivered by Kitagawa Corporation for all the parts including consumable parts. We will not assume responsibility for injury, death, damage, or loss caused by usage of parts not manufactured by Kitagawa Corporation. Additionally, if parts other than genuine parts manufactured by Kitagawa Corporation are used, this guarantee will be completely invalid.

The chuck and cylinder from Kitagawa Corporation should be used together. If you must use a part not made by Kitagawa, check with us or our distributor to be sure it is safe to do so. We will not be responsible for injury, death, damage or loss caused by use of a chuck or cylinder made by another company unless this use has been approved by Kitagawa or its distributor.

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# 1. Structural Drawing and Parts List

## 1-1. Type display

Type display as shown below

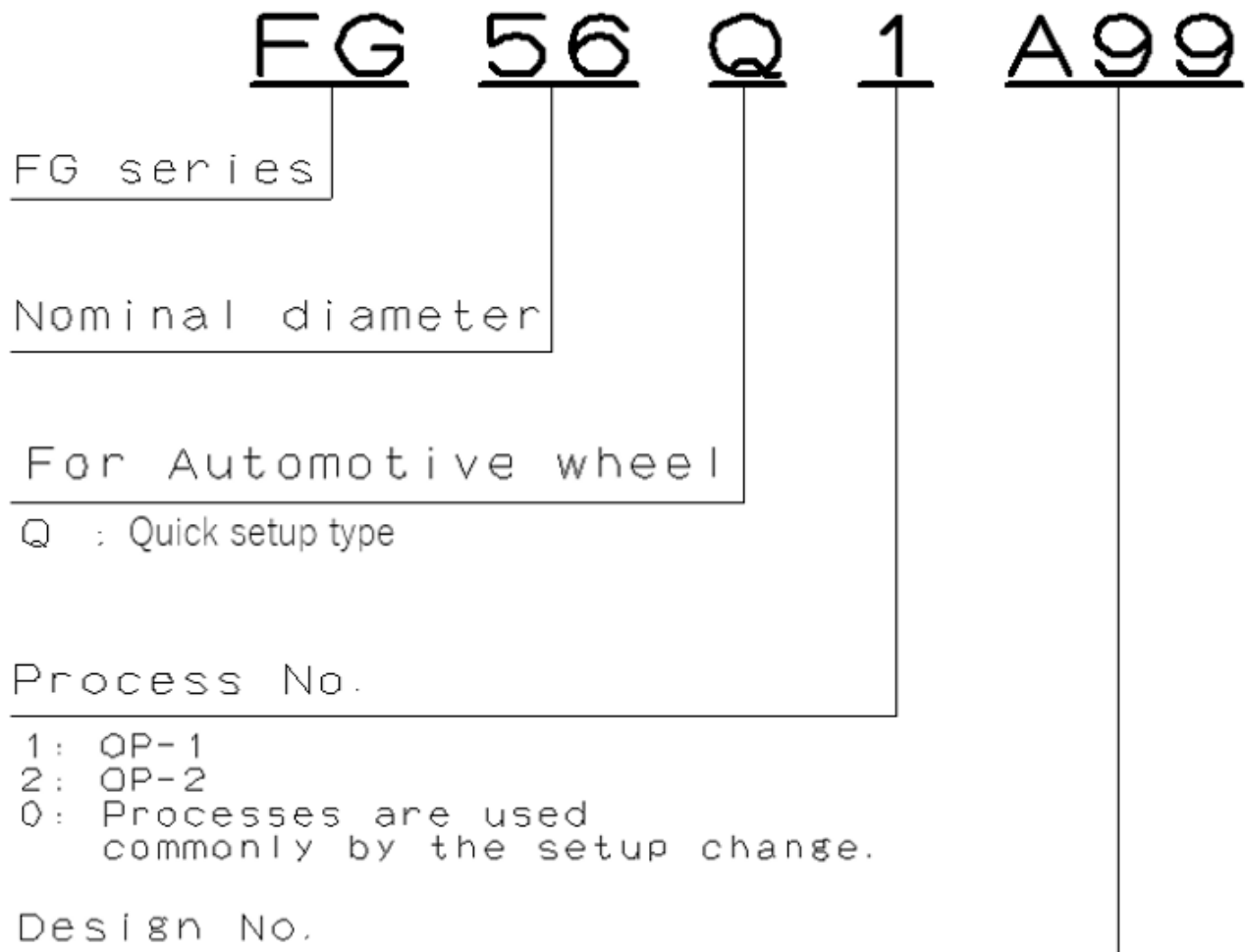


Fig.1

## 1-2. Structural drawing

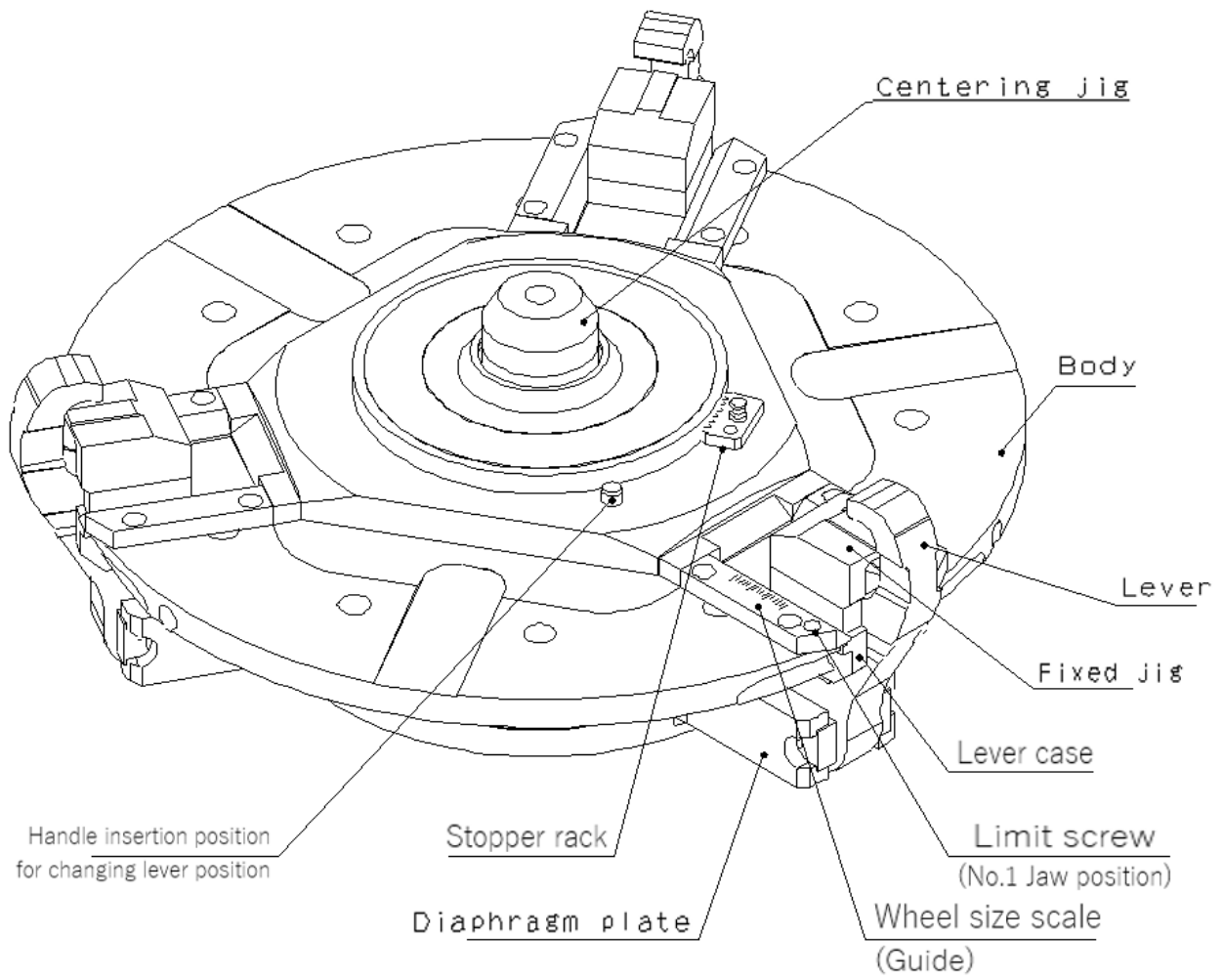


Fig.2

### 1-3. Scope of product

This instruction manual is for the chuck part.

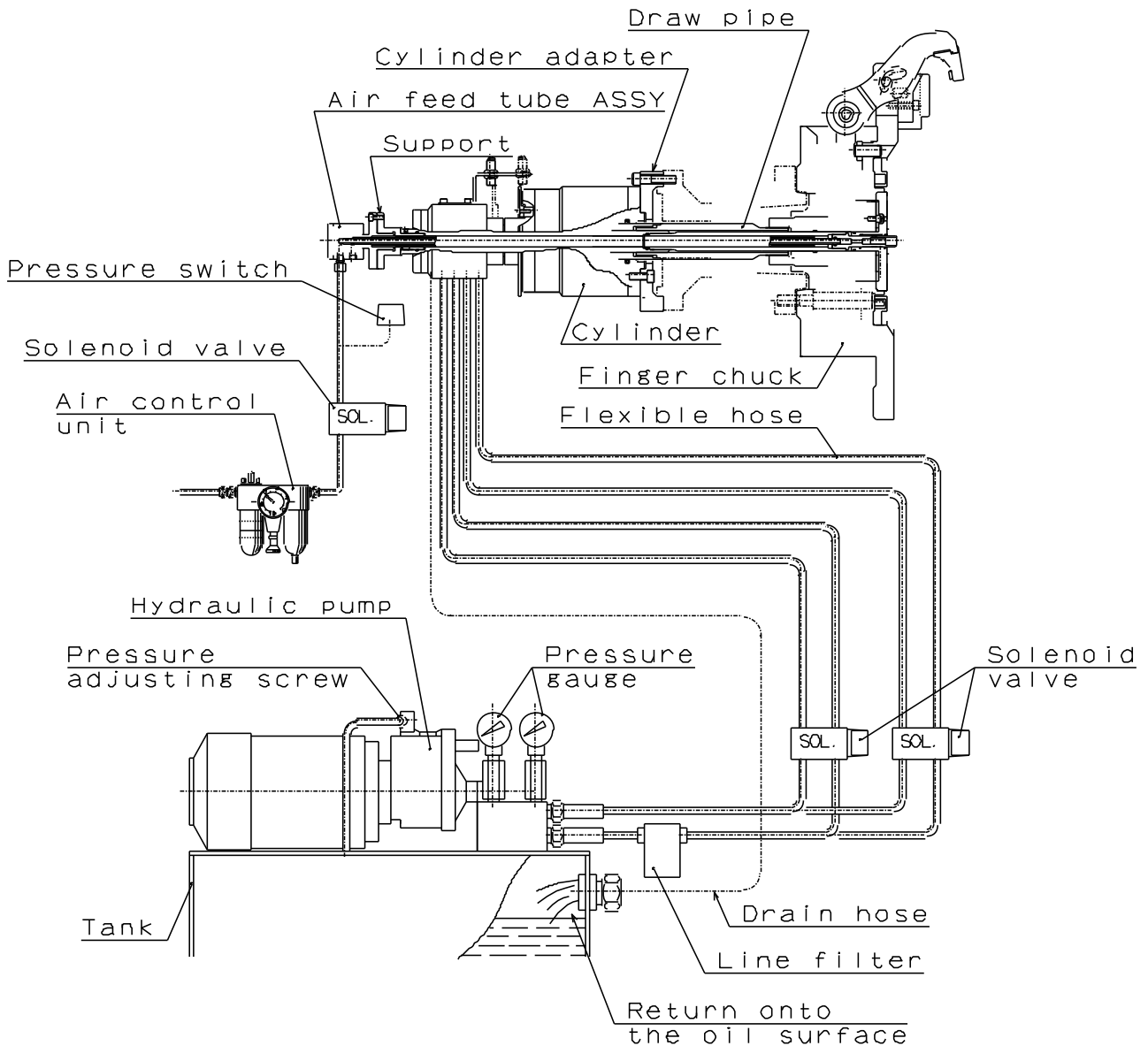


Fig.3

#### **! WARNING**

- To prevent the work from flying, safe design, maintenance and erroneous action prevention of the hydraulic system to maintain the gripping force of the chuck is extremely important. Thoroughly read the “Important Safety Precautions” on and after page 9 in this manual.
- As for the cylinder, follow the instruction manual for the cylinder.

# 1-4. Parts list

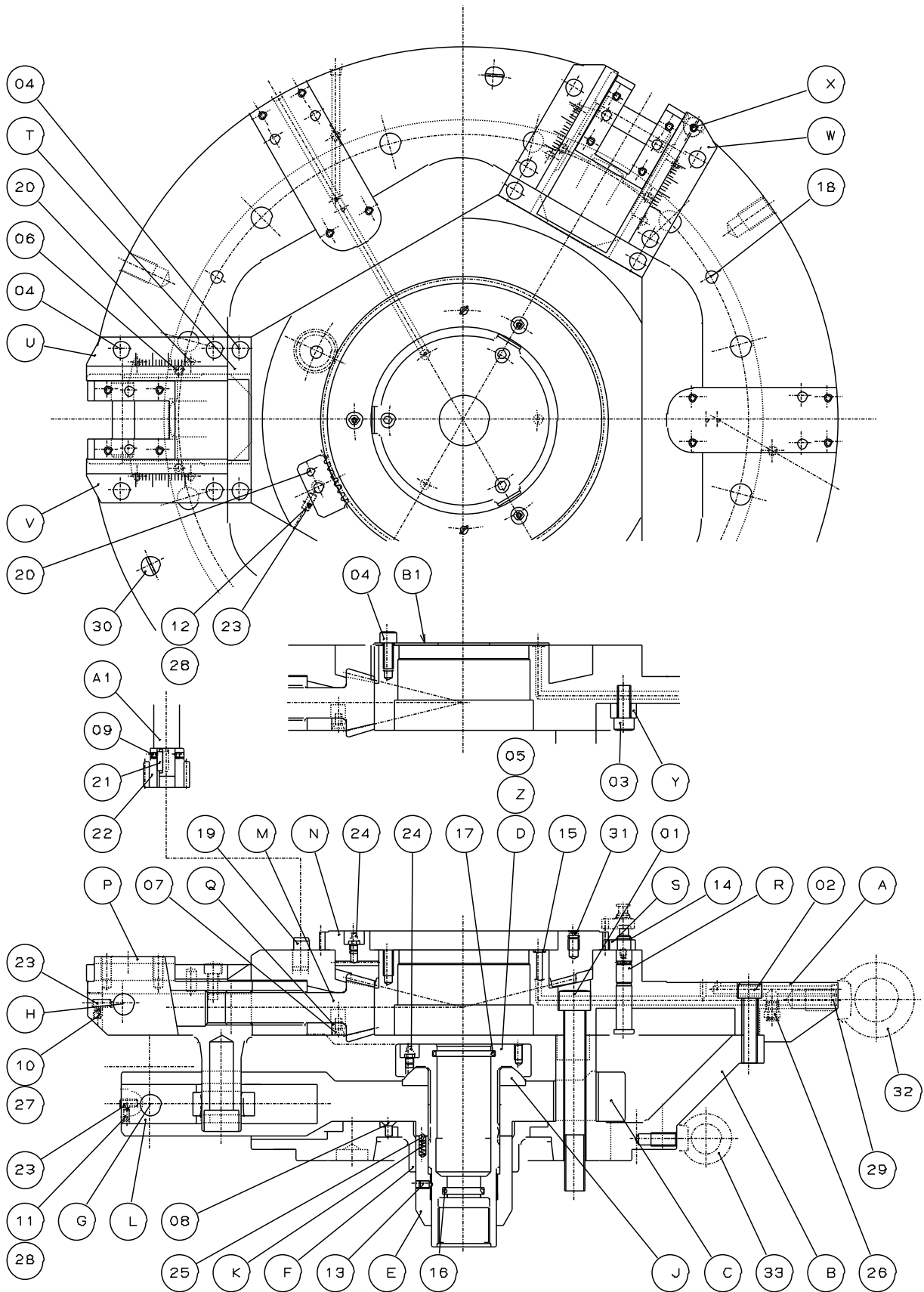


Fig.4



Table 1 Parts list

No.	Part name	Quantity	No.	Part name	Quantity
A	Body	1	09	Set screw	2
B	Rear body	1	10	Set screw	3
C	Diaphragm plate	1	11	Set screw	3
D	Plunger	1	12	Set screw	1
E	Plunger nut	1	13	Set screw	2
F	Bushing	1	14	Retaining ring	1
G	Pin	3	15	O-ring P 6	3
H	Guide pin	3	16	O-ring P 26	1
J	Spherical bushing A1	1	17	O-ring P 42	1
K	Spring	4	18	Parallel pin	3
L	Slide guide	3	19	Parallel pin	1
M	Screw pinion	3	20	Parallel pin	13
N	Center gear	1	21	Parallel key	1
P	Lever case	3	22	Gear	1
Q	Cover	3	23	Ball plunger	7
R	Stopper shaft	1	24	Grease nipple	4
S	Stopper rack	1	25	Steel ball	4
T	Guide Cover	3	26	Silencer	3
U	Guide R	2	27	Fixed plate	3
V	Guide L	3	28	Fixed plate	4
W	Guide R1	1	29	Hex. Socket head plug	6
X	Limit screw	1	30	Plug	3
Y	Spacer	3	31	Plug	2
Z	Connection handle	1	32	Eye bolt	3
A1	Handle	1	33	Eye bolt	1
B1	Gear fixed jig	1	34	Hex key	1
			35	Hex key	1
01	Socket head cap screw	6			
02	Socket head cap screw	12			
03	Socket head cap screw	3			
04	Socket head cap screw	21			
05	Socket head cap screw	2			
06	Socket head cap screw	6			
07	Socket head countersunk bolt	6			
08	Socket head countersunk bolt	6			

※ Refer to the Spec. information for supply for the top tooling.

## 2. Important Safety Precautions

Important safety precautions are summarized below. Please read this section before first starting to use this product.



### DANGER

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



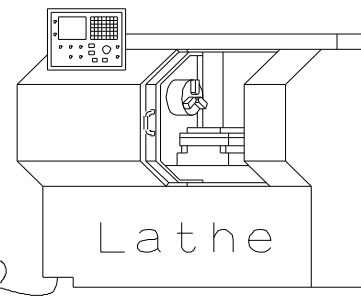
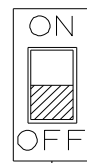
Turn off main power supply before attaching, inspecting or replacing chuck, and before adding oil.

For All Users

- The chuck may start rotation suddenly, and a part of the body or clothing may be caught.

Main power supply

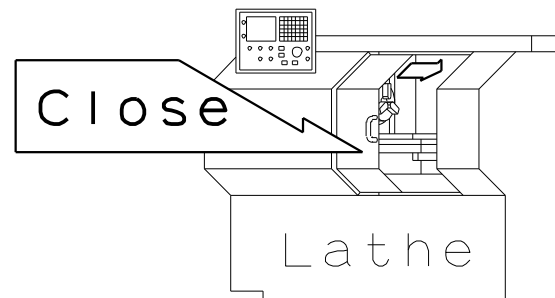
OFF



Close door before rotating spindle.

For All Users

- If the door is not closed, you may touch the rotating chuck or the work may fly out, which is very dangerous. (In general, the safety interlock function which allows rotation only when the door is the manual mode or the test mode)



During spindle rotation, do not turn off hydraulic pump power supply and do not operate switching valve.

For All Users

- Cutting off hydraulic pressure causes a drop in the gripping force which could result in the work being released and flying out.
- Operating the manual switching valve or solenoid valve will lead to a drop of hydraulic pressure.



# Important Safety Precautions



## DANGER

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



**Do not allow the rotation speed of the chuck to exceed the maximum allowable speed limit. (Refer to the Spec. information for supply and Page 14)**

**For All Users**

- If the rotation speed of the chuck exceeds the rotation speed limit, this is very dangerous as the chuck and work will fly out. Be sure to refer to the specifications given in the Delivery Specification since the rotary speed may have to be reduced than standard value depending on the top tooling.



**The input force of the chuck (piston thrust, pulling force of the draw pipe) must not exceed the allowable maximum input force. (Refer to the Spec. information for supply and Pages 14)**

**For All Users**

- Input must match the specification of the chuck.
- Adjust the hydraulic pressure to the cylinder so that the input force, which determines the gripping force of the chuck, does not exceed.
- Excessive input force can lead to breakage of the jaw attaching bolt, which is very dangerous, as the work can be damaged and fly out. Particularly for long jaws, the moment applied to the bolts becomes large, requiring the input to be reduced than standard value. Accordingly, be sure to refer to the specifications given in the Delivery Specification.



**Determine the gripping force required for processing by the machine tool manufacturer or user, and check that the required gripping force is provided before processing.**

**For All Users**

- Adjust the hydraulic pressure to the cylinder to obtain the required gripping force. If the gripping force is insufficient, this is dangerous as the work will fly out.



**Variations in height of workpiece gripping part must not exceed the fluctuations of diaphragm plate. Also, do not grip the workpiece at a burred portion or in the inclined state.**

**For All Users**

- If variations at three places in height of workpiece gripping part exceed the fluctuations of diaphragm plate, the workpiece cannot be gripped completely, causing the workpiece to fly out.
- If the burred part of workpiece or the inclined workpiece is gripped, a gripping failure will occur, causing the workpiece to fly out.



# Important Safety Precautions



## DANGER

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



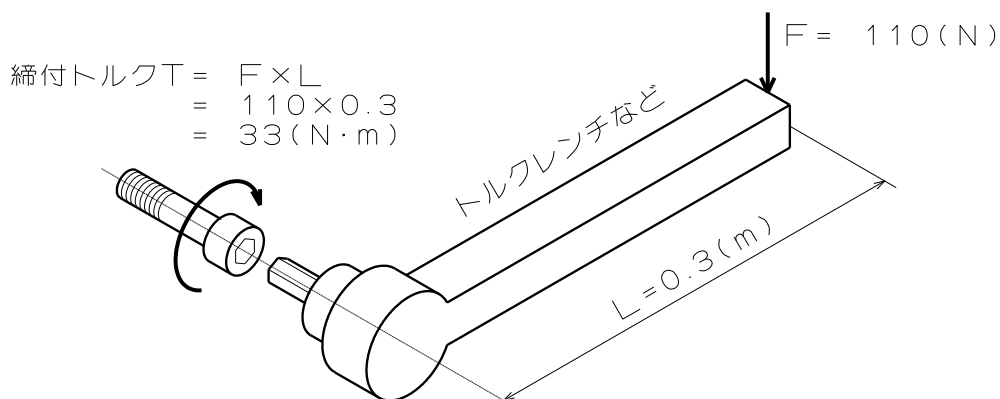
Always tighten the bolts at the specified torque. If the torque is insufficient or excessive, the bolt will break, which is dangerous as the chuck or work will fly out. Use the bolts attached to the chuck, and do not use bolts other than these.

For All Users

- If the torque is insufficient or excessive, the bolt will break, which is dangerous as the chuck or work will fly out.
- Fix the lathe spindle or the chuck when you tighten bolts. Your hand could slip and get injury when you work without fixing the spindle.
- You cannot control the torque by a hex key. You must use a torque wrench for torque control.

Specified torque for socket head cap screw

Bolt size	Tightening torque	
M5	7.5	N·m
M6	13	N·m
M8	33	N·m
M10	73	N·m
M12	107	N·m
M14	171	N·m
M16	250	N·m
M20	402	N·m



- Tightening torque is moment of force when you tighten a bolt. Tightening torque =  $F \times L$ .



# Important Safety Precautions



## DANGER

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



- Provide sufficient strength for the draw pipe.
- Provide sufficient screw depth for the draw pipe.
- Firmly tighten the draw pipe.

**For Machine Tool Manufacturers**

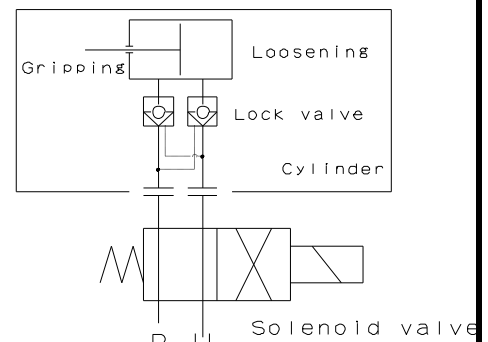
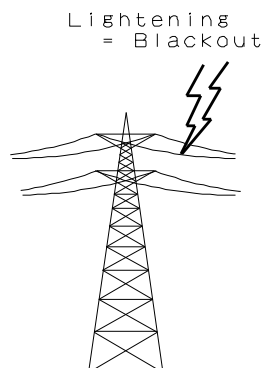
- If the draw pipe break, the gripping force is instantly lost and this is dangerous as work will fly out.
- If the screw depth of the draw pipe is insufficient, the screw will break and the gripping force will be lost instantly, and this is dangerous as work will fly out.
- If the engagement of the screw of the draw pipe is loose, vibration may occur resulting in breakage of the screw. If the screw breaks, the gripping force will be lost instantly, which is dangerous as the work will fly out.
- If the draw pipe is unbalanced, vibration occurs, the screw is broken and the gripping force will be lost instantly, which is dangerous as the work will fly out.



- Use a cylinder with a lock valve (safety valve, check valve) incorporated in case of sudden hydraulic pressure drop due to blackout, malfunction of the hydraulic pump, etc. Further, use a solenoid valve with a circuit that retains the gripping position when no current is carried.

**For Machine Tool Manufacturers**

- If the hydraulic pressure suddenly drops due to blackout or malfunction of the hydraulic pump, etc., this is dangerous as work will fly out.
- Lock valve retains the hydraulic pressure inside the cylinder temporarily, when the hydraulic pressure suddenly drops due to blackout or malfunction of the hydraulic pump, etc.



The gripping position must be retained.



# Important Safety Precautions



## WARNING

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



**Do not modify the chuck.**

**For All Users**

- Not only the chuck is damaged but also the chuck and workpiece may fly out.
- Do not install parts other than genuine parts made by Kitagawa by adding the tapping.
- Do not remove chuck parts from the chuck.



**Periodically supply adequate grease (Refer to page 24).**

**Turn off power before adding grease.**

**For All Users**

- Insufficient grease supply lowers the gripping force, causes operation failure due to lower hydraulic pressure, lowers the gripping precision, and causes abnormal wearing and seizing, etc. This is dangerous as the work could fly out.



**Do not operate the machine after drinking alcohol or taking medication.**

**For All Users**

- Dangerous since these lead to operation mistakes and misjudgment.



Alcohol

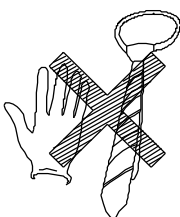
Medication



**Do not operate the machine wearing gloves, a necktie, and other loose clothing or jewelry.**

**For All Users**

- Dangerous since it will be caught.



# 3. Specifications

## 3-1. Specifications table

Table 2

Type		FG56Q	FG62Q
Jaw stroke	mm	35	35
Gripping force per a jaw	kN	9.5	9.5
Allowable maximum input force	kN	30	30
Allowable maximum rotation speed	min <sup>-1</sup>	2500	2200
Mass	kg	117.5	195
Moment of inertia	kg·m <sup>2</sup>	4.13	7.5
Matching cylinder		YG-204	YG-204
Maximum hydraulic pressure (with matching cylinder)	MPa	4.0	4.0
Fluctuation of diaphragm plate	mm	1.6	1.8
Balance quality (standard soft jaw not included)		G6.3	
Storing temperature / Operating temperature		-20 ~ +50 °C / -10 ~ +40 °C	

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



- **Allowable maximum rotary speed and allowable maximum hydraulic pressure may be different depending on the size of top tooling and workpieces. Be sure to refer to the latest Delivery Specification to use the chuck within the given specifications. Excessive hydraulic pressure or rotary speed will damage the chuck, causing the chuck and workpiece to fly out.**

## 4. Top tooling

### 4-1. Changing the lever position setup

1. Pull the stopper rack and disengage the center gear from the rack as shown in Fig.5.
2. Insert the provided handle for changing the lever position into the pin, rotate the center gear, and move the lever case to the desired wheel size position. Align the mark on the side of the fixed jig with the wheel size scale engraved on the left and right guides. Make sure that the alignment mark on the fixed jig is within the wheel size scale range. (See Fig.6)
3. Push the stopper rack in the reverse order of step 1. The stopper rack is installed with a ball plunger, so push it in completely until you feel the click.

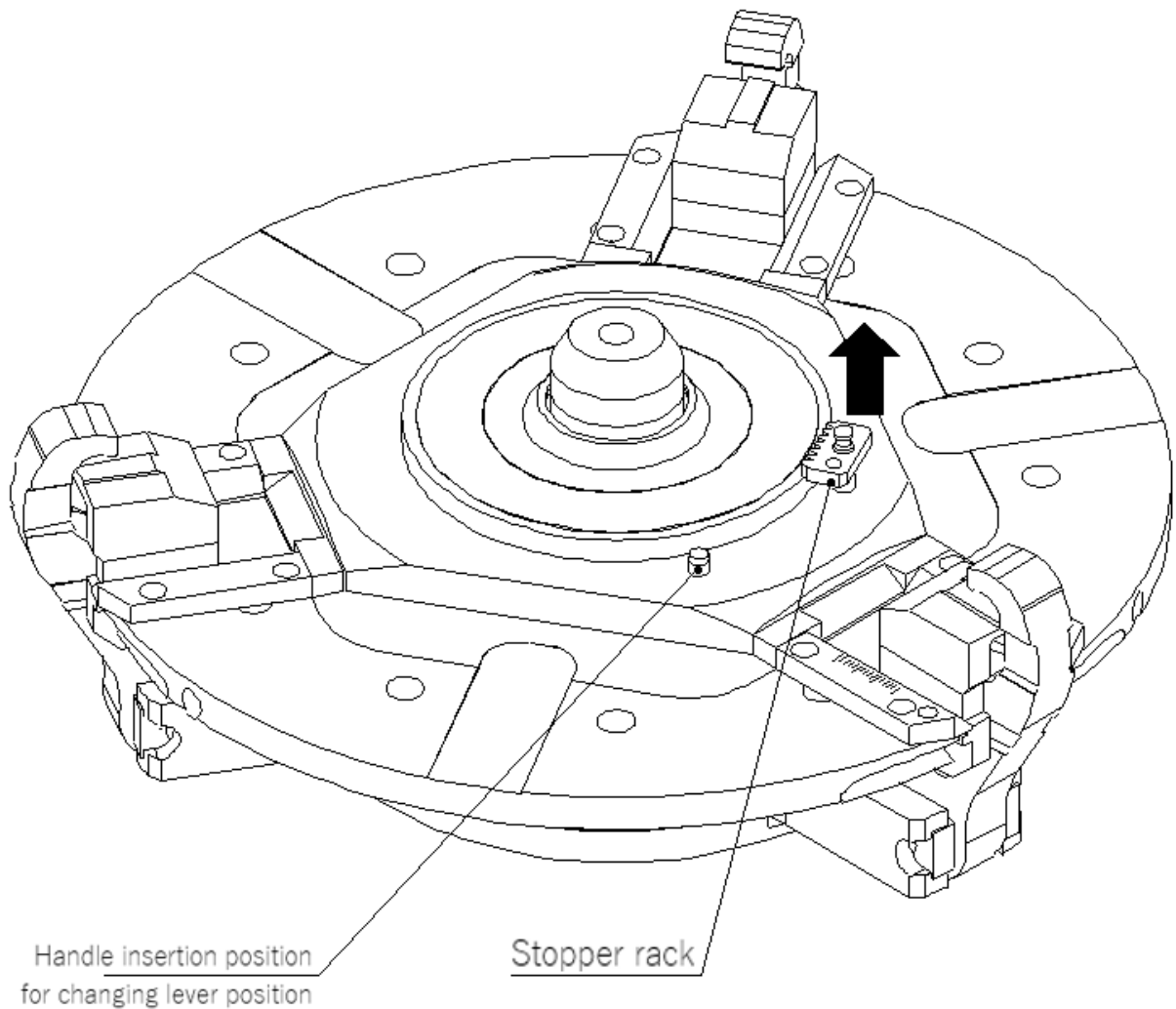


Fig.5



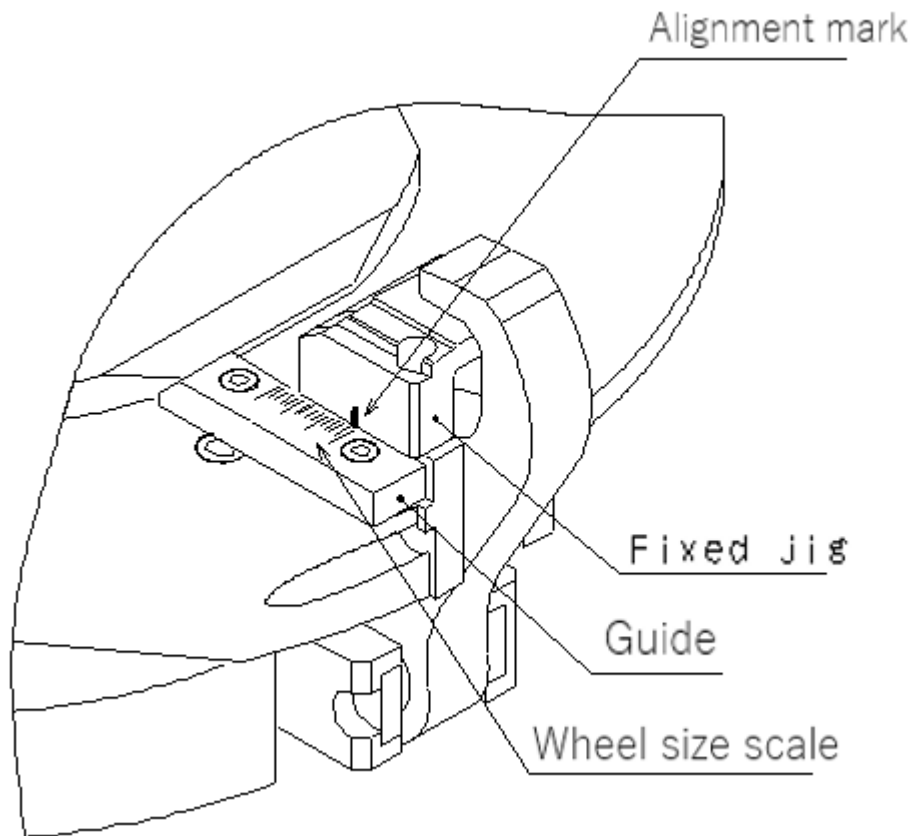
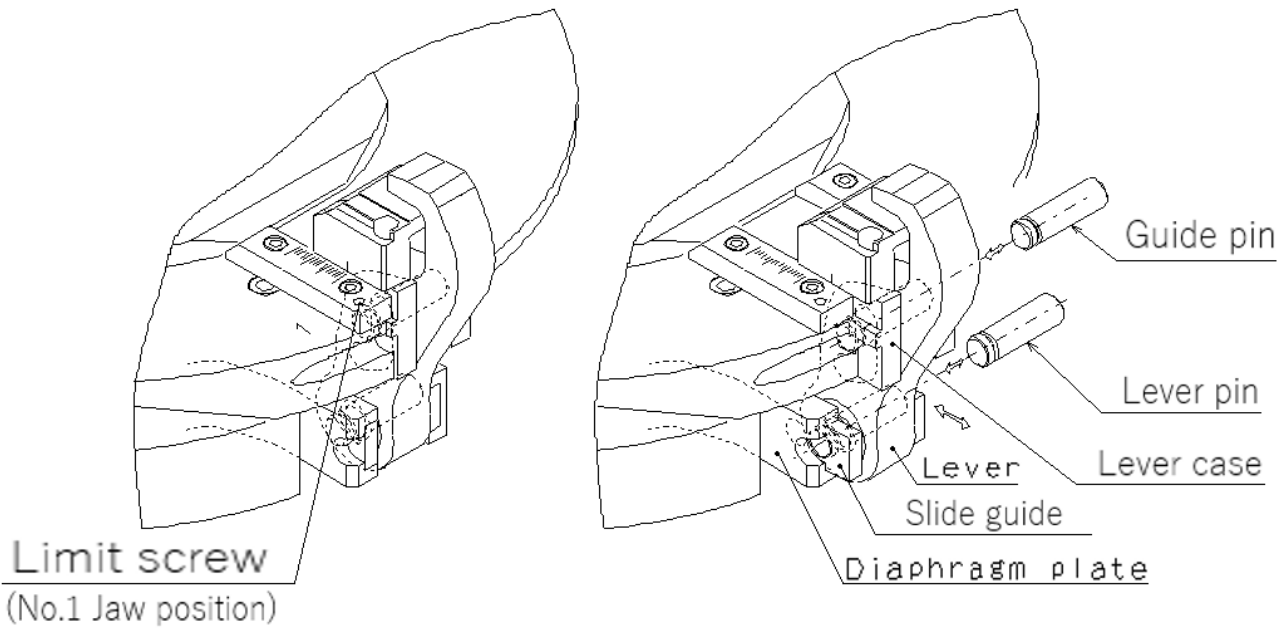


Fig. 6

## 4-2. Changing the lever and fixed jig setup

1. Pull the stopper rack and disengage the center gear from the rack as shown in Fig.5.
2. Loosen the limit screw as shown in Fig.7. If the limit screw is not loosened, the lever case will stop halfway even if the primary gear is turned, and it will not move to the lever replacement position.
3. Insert the provided handle to the handle insertion position, rotate the center gear, and move the lever case to a position where both the guide pin and lever pin are both visible.
4. Remove the guide pin and lever pin before removing the lever.
5. Replace the fixed jig with one that corresponds to the desired wheel size.
6. Attach the lever corresponding to the desired wheel size like in step 4 but do it in reverse order.
7. Turn the handle in reverse order of step 3 and move the lever case to the desired wheel size position. Make sure that the fixed jig is within the wheel size scale range.
8. Tighten the limit screw back in reverse order of step 2.
9. Push the stopper rack back as reverse to step 1. The stopper rack is installed with a ball plunger, so push it in completely until you feel the click.



The lever case will not move to the lever replacement position when the limit screw is tightened.

Lever Replacement Position

Fig.7

## **! DANGER**

- Make sure that the stopper rack is fully pushed in before gripping the workpiece. If it is not pushed in completely, there is a risk of the workpiece flying off due to poor gripping, which is dangerous.
- Make sure that the alignment mark on the fixed jig is within the wheel size scale range and that the limit screw is tightened before rotating the chuck. If the chuck is rotated where the mark is outside of the allocated scale or if the limit screw is not tightened, damage may occur to the chuck and the lever case may fly off, which is dangerous.
- Make sure that the lever and fixed jig is replaced as a set, as shown in the wheel size correspondence table in Table 3. It is dangerous if there is a mistake in the set pairing of lever and fixed jig because damage may occur and workpiece may fly off.

## **NOTICE**

- When turning the handle, etc., if it does not move smoothly or does not move, forcefully operating it may lead to damage. Please contact your local branch or sales office or refer to page 23 [6. Maintenance and Inspection]. Please disassemble and clean the malfunctioning part according to the section instruction.

Table 3-1 FG56Q Wheel Size Correspondence

Lever A1 FG56QL1A1 FG56QL2A1	Fixed Jig A	Lever B1 FG56QL1B1 FG56QL2B1	Fixed Jig B	Lever C1 FG56QL1C1 FG56QL2C1	Fixed Jig C
20"	20"-17"				
19"					
18"		18"	18"-15"		
17"		17"			
	16"	16"		16"-13"	
	15"	15"			
		14"			
		13"			

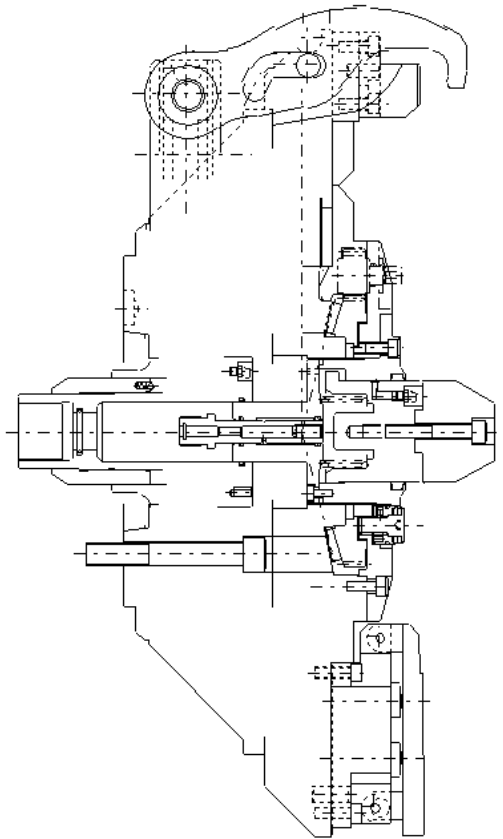
Table 3-2 FG62Q Wheel Size Correspondence

Lever A1 FG56QL1A1 FG56QL2A1	Fixed Jig A	Lever B1 FG56QL1B1 FG56QL2B1	Fixed Jig B	Lever C1 FG56QL1C1 FG56QL2C1	Fixed Jig C
22"	22"-19"				
21"					
20"		20"	20"-17"		
19"		19"			
	18"	18"		18"-15"	
	17"	17"			
		16"			
		15"			

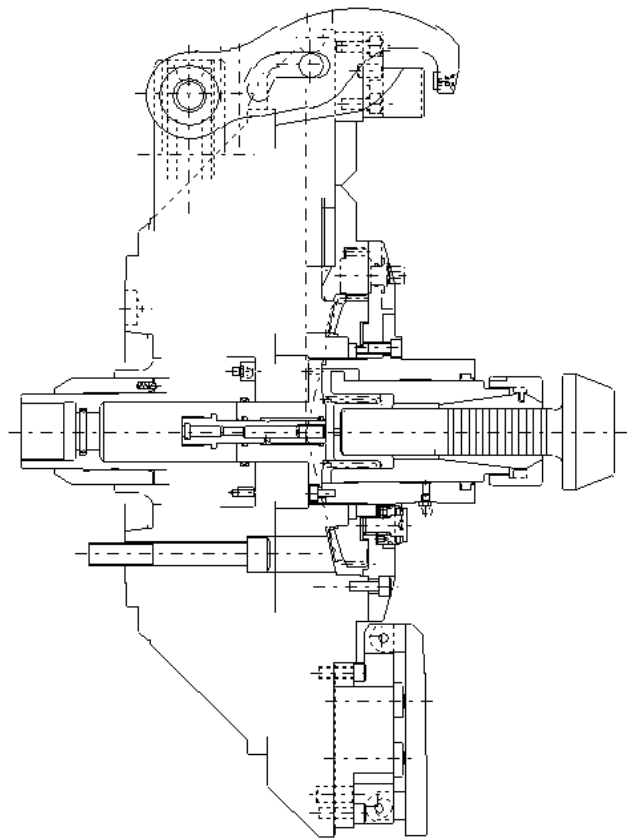
### 4-3. Centering jig

#### Function of centering jig

A centering jig is provided to center the workpiece. There is the slide ring for process-1 and the center rod for process-2 as shown in Fig.8. Please refer to the respective delivery specifications information for shape and specifications.



Slide Ring



Center Rod

Fig. 8

## 4-4. Balance pins for seating confirmation

### Balance pin function

Balance pins for seating confirmation can be installed at three places on the chuck surface. As shown in Fig.9, when there is no-load, the balance pin is in a raised position due to the built-in spring, and the air supplied to the balance pin is discharged out of the chuck via the silencer. When a workpiece is gripped, the balance pin lowers its position causing the air circuit to closed and the air pressure increases. This pressure fluctuation is detected by the pressure switch on the machine side. If even one of the three balance pins is detached from the workpiece, the air pressure will not increase.

The standard balance pin has a structure that can accommodate all wheel sizes without any setup changes, and usually does not require adjustment. If malfunction occurs due to wear etc., please adjust the tightness of the M8 hexagon socket set screw, repair or replace it.

The pressure switch will always be in a state detected by the pressure switch if the balance pins remain in the lower position due to a broken spring or stuck chips or if the silencers is clogged and air cannot be discharged out of the chuck. Inspect the balance pins periodically and repair or replace as necessary.

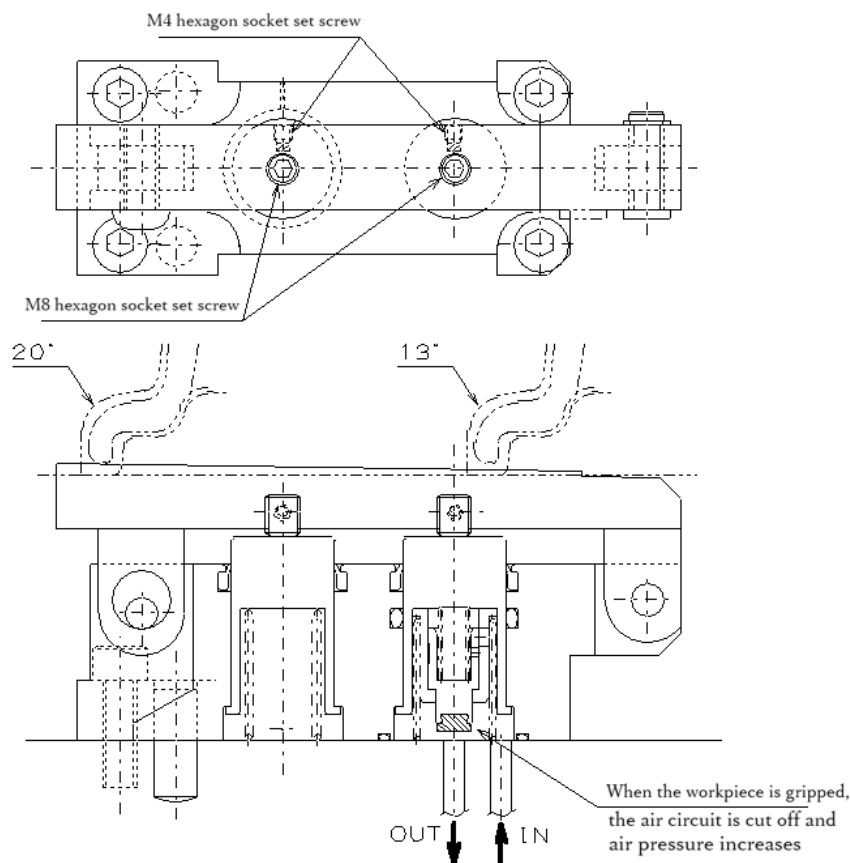


Fig.9

## 5. Usage

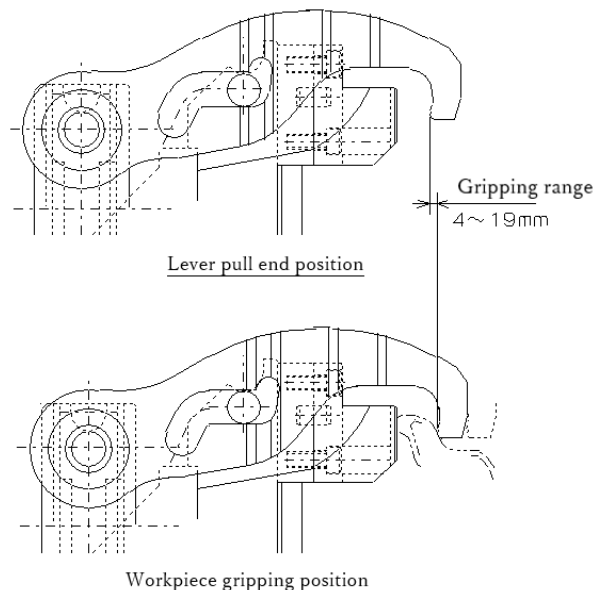
This product is a device to fix an automotive aluminum wheel when it is processed by the lathe machine or the rotary table.

The rotary cylinder closes the levers and fixes an automotive aluminum wheel so that it does not move during processing. The chuck opens the lever after having processed it and remove a wheel.

### 5-1. Precautions when gripping a workpiece with a chuck



- This chuck is intended for machining automotive aluminum wheel, and it must not be used for other type of workpiece. Otherwise, the workpiece may fly off.
- When gripping a workpiece with the chuck, be careful not to get your fingers or hands caught. This could cause crushed or amputated fingers and hands.
- If the height variations of the three places of the workpiece grip exceeds the fluctuations of the diaphragm plate, the workpiece cannot be gripped completely and may cause the workpiece to fly out. Also, if workpiece is gripped at places that have burrs or gripped at an angle, the workpiece may fly off due to poor gripping.
- The gripping distance should be within the range of 4 to 19 mm. When gripping near the stroke end, the workpiece may be gripped poorly because of fluctuations in the tolerance of the workpiece gripping part and may cause workpiece to fly off.



## 5-2. Precautions related to processing



### <1> Unbalance

- In the case of processing largely unbalanced work, lower the rotation speed. The work will fly out and this is dangerous.
- Vibrations are generated if there is unbalance owing to the work or the jig, etc. Vibration not only will impart a negative influence on the process precision but also the endurance of the chuck being remarkably shortened, and the chuck may break. Correct the unbalance using balance weights, etc., or lower the rotation speed for use.
- Heavy cutting at high rotation speed easily generates vibration in the same manner as chuck unbalance, therefore, set cutting conditions appropriate for the dynamic gripping force and machine rigidity.

### <2> Interference, contact, impact

- Before starting work, check that the levers, fixed jigs, work, etc., and the tool and the tool post, etc., do not interfere at low rotation and then start processing.
- Do not allow anything to impact the chuck, lever, and the work. The chuck will break and this is dangerous as the chuck and work will fly out.
- If the tool and the tool post contact the chuck or the work due to malfunction or tape mistake, etc., and impact is given, immediately stop the rotation, and check that there are no abnormalities in the body, lever, diaphragm plate and bolts of each part, etc.

### <3> Coolant

- Unless coolant with a rust preventive effect is used, rust will occur inside the chuck and gripping force drop may result. The work will fly out due to the gripping force drop and this is dangerous.

# 6. Maintenance and Inspection

## 6-1. Periodic Inspection

### Daily check

- Clean the guide groove of the lever to prevent chips from accumulating.
- Check that the balance pins stroke normally. If it does not move smoothly or does not move, disassemble and clean the chuck.
- Replace the pad pieces when worn out.
- When using a slide ring (centering jig in process 1) or center rod (centering jig in process 2), supply grease from the grease nipple.
- Lubricate the lubricator installed in the air piping system at appropriate times to maintain the appropriate oil level. Use the turbine oil class 1 additive free (ISO VG32).
- Periodically check and drain the water in the air filter of the air unit to prevent rust.

### Monthly check

- Without gripping a workpiece, check if the air is discharged from the balance pin silencer. If the seating pressure increases even when the workpiece is not gripped, the silencer may be clogged and would need to be replaced.

### Check every 3 months

- Check if the specified stroke is obtained when the chuck is moved over the stroke. Remove the centering jig in the center of chuck and check the stroke at the top surface of the plunger. If the stroke is short, chips may accumulate inside the lever or chuck, or chuck internal parts may be damaged. Disassemble and clean the chuck.
- Check for any loose bolt, including the chuck mounting bolts and jaw mounting bolts.
- Supply grease from the grease nipple on the top surface of the plunger.

### Check every 6 months or 100-thousand strokes

- Disassemble the chuck main body or balance pin assembly, floating assembly, etc. to check respective parts for a crack or damage using the color check, and repair or replace as necessary. Also, replace the O-rings and seals as necessary.



## 6-2. Grease lubrication

### 1. Lubrication position

- Slide ring (Centering jig for process-1)
- Center rod (Centering jig for process-2)
- Plunger top surface

### 2. Applicable grease

- Use the designated grease specified in Table 4. If grease other than the designated grease is used, sufficient effect may not be obtained.

Table 4

Genuine product	CHUCK GREASE PRO	Kitagawa genuine product (Kitagawa distributor of each country)
Conventional product	Kitagawa chuck grease	Conventional product
	Molykote EP Grease	TORAY Dow Corning (only inside Japan)
	Chuck EEZ grease	Kitagawa-Northtech Inc. (North American region)
	MOLYKOTE TP-42	Dow Corning (Europe, Asian region)
	Klüberpaste ME31-52	Klüber lubrication (worldwide)

### 3. Frequency of lubrication

Please lubricate through the grease nipple on the plunger's upper surface once every 3 months. For all other grease nipples, please grease them once daily. After greasing, rotate the center gear and move the lever case from the innermost to the outermost position to ensure the grease is evenly distributed between the screw pinion and the center gear. Please use approximately 10g of grease per lubrication point.

## **4. Safety information about grease and anti-rust oil**

### **Scope of application**

- Designated grease
- Anti-rust agent applied to the product at the time of delivery.

### **First aid measures**

In case of inhalation: If inhaled in large quantities, immediately move the inhaler to a place with fresh air, keep warm and rest. Consult a physician/doctor if necessary.

In case of skin contact: Wipe off the adhered substance and wash thoroughly with water and soap. If you experience symptoms such as itching or inflammation, call a physician immediately.

In case of eye contact: Rinse with clean water for at least 15 minutes, then seek medical attention.

If ingested/swallowed: Do not try to induce vomiting. Seek medical attention immediately.

- For greases other than those specified or rust preventive agents prepared separately by the customer, please prepare and refer to the respective safety information.

## **6-3. Disassembling**

When turning the handle, if it does not move smoothly or does not move, please disassemble and clean the malfunctioning part, as forcefully turning the handle may cause damage. Please read the following disassembling procedures while also referring to pages 7-8.

Disassembly procedure of lever case sliding part

1. Turn off the main power before starting disassembly process
2. Loosen the socket head cap screw [04] and remove the guides [U, V, W]
3. Clean the sliding part of the lever case [P] and reassemble it in the reverse order of disassembly

Center gear disassembly procedure

1. Turn off the main power before starting disassembly process
2. Remove the center gear stopper and remove the center gear [N]
3. Clean each gear (Screw pinion [M], center gear [N], stopper rack [S]) and reassemble by reversing the disassembly procedure. Be careful not to turn the screw pinion carelessly. Also, adjust the gap between the center gear stopper and the center gear to 0.2mm by using a thickness gauge. If the center gear stopper and the center gear are in contact, the movement of the center gear may be impaired.

### Chuck body disassembly procedure

1. Turn off the main power and make sure that the piston is at its forward end position before the disassembly process.
2. Remove the lever, balance pin, and centering jig beforehand.
3. Remove the center gear [N]
4. Attach the gear fixed jig [B1] with the socket head cap screw [04] to prevent the screw pinion [M] from turning accidentally during work.
5. Attach the connection handle [Z] to the plunger [D] using the socket head cap screw [05]
6. Loosen the socket head cap screw [01], turn the connection handle [Z], and remove the chuck from the machine
7. Remove the socket head cap screw [02]
8. Hang the body [A] using eye bolts [32] and remove it by hitting the backside with a plastic hammer
9. Remove the diaphragm plate assembly
10. Clean each parts and check for a crack or damage.

### CAUTION

- Use an eyebolt when attaching or detaching the chuck to the machine, as there is a risk of injury or damage if the chuck falls.

### WARNING

- Be sure to remove the eyebolt after use. Rotating the chuck as it is can cause the eyebolts to become dislodged and scatter, which is dangerous.
- Disassemble and clean the chuck at least once every 6 months or every 100,000 strokes. If chips or other substances accumulate inside the chuck, it may cause insufficient stroke or loss of gripping force, and this is dangerous as the work will fly out. Check each part carefully and replace any part that is worn or cracked.
- After inspection, reassemble the machine while lubricating it thoroughly with the specified grease.
- If you stop the machine for a long period of time, remove the workpiece from the chuck. If you don't, the workpiece may fall due to loss of hydraulic pressure or the cylinder can stop or malfunction.
- If you stop the machine or store the chuck for a long period of time, apply grease and anti-corrosion treatment in advance.

## Assembling procedures

### Chuck body assembly procedure

1. Turn off the main power and make sure that the piston is at its forward end position before the assembly process.
2. Place the diaphragm plate assembly between the body [A] and the rear body [B], and temporarily fix it with the socket head cap screw [02]
3. Attach the connection handle [Z] to the piston [D] using the socket head cap screw [05]
4. Turn the connection handle [Z] and tighten the piston [D] into the draw pipe
5. Temporarily fix the chuck with the socket head cap screw [01]. Adjust the chuck so that the diameter runout is 0.02mm T.I.R or less as shown in Fig.10, then tighten the socket head cap screw [01] and [02] to the specified torque.
6. Adjust the position of the plunger [D] using the connection handle [Z] as shown in Fig.10. Note that the plunger is equipped with a ball plunger (to stop plunger from rotating), so be sure to complete the adjustment at the position where you feel this response. Then verify that the specified amount of stroke has been achieved by fully stroking the chuck.
7. Install the center gear [N] and the centering jig, and adjust the runout of the centering jig
8. Install the lever and balance pin
9. Lubricate with the specified grease after assembly. (Refer to P-24)



- **If the screw pinion is rotated during disassembly, the misalignment of the three lever case positions will cause imbalance, resulting in vibration that may damage the chuck and it may also cause chuck and workpiece to fly off, which is dangerous. During assembly, the positions of the three lever cases must be measured and aligned.**
- **Always tighten the bolts at the specified torque. If the torque is insufficient or excessive, the bolt will break, causing the chuck and workpiece to fly off, which is dangerous.**
- **Use the bolts attached to the chuck, and do not use other bolts. However, if you must use other bolts not provided by Kitagawa, use bolts that have at least a strength classification of 12.9 (10.9 for M22 or more) and be sure they have sufficient length.**

Table 5

Bolt size	Tightening torque	
M5	7.5	N·m
M6	13	N·m
M8	33	N·m
M10	73	N·m
M12	107	N·m
M14	171	N·m
M16	250	N·m
M20	402	N·m

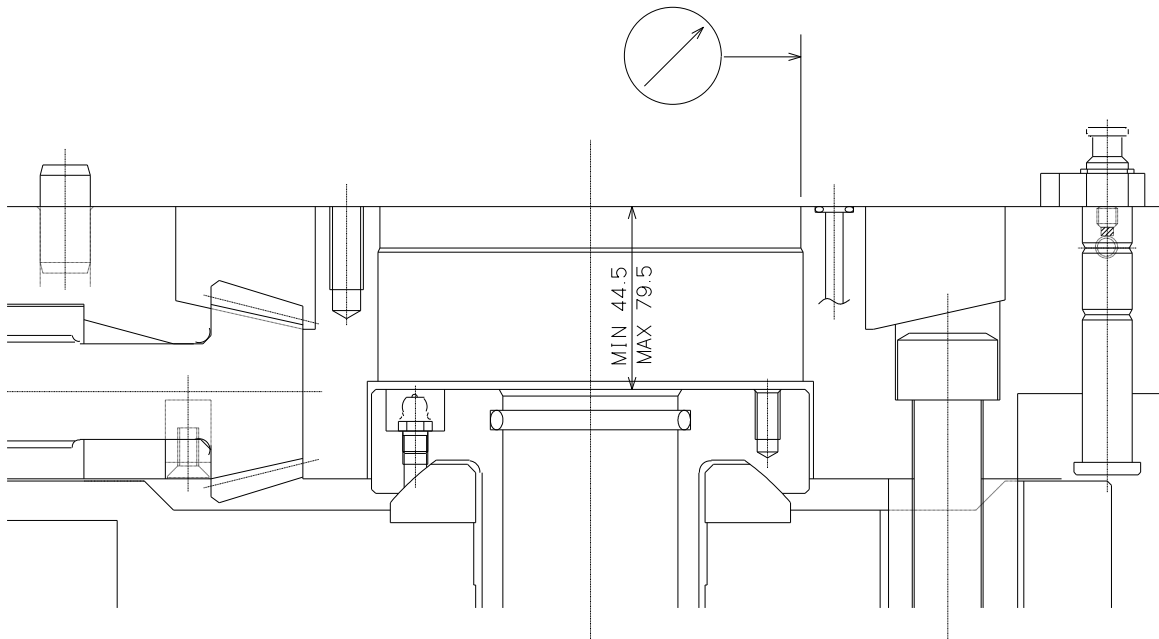


Fig.10

# 7. Malfunction and Countermeasures

## 7-1. In the case of malfunction

Check the points specified in the table below and take the appropriate countermeasure.

Table 6

Defective	Cause	Countermeasure
The chuck does not operate.	The chuck inside will break.	Disassemble and replace the broken part.
	The sliding surface is seized.	Disassemble, correct the seized part with oilstone, etc., or replace the part.
	The cylinder is not operating.	Check the piping and the electric system, and if there is no abnormality, disassemble and clean the cylinder.
Insufficient stroke of the lever.	Chips accumulate in guide groove of the lever.	Remove the lever and clean it.
The Work slips.	The stroke of the lever is insufficient.	Remove the lever and clean it.
	The gripping force is insufficient.	Check that the correct hydraulic pressure is obtained.
	The cutting force is too large.	Calculate the cutting force and check that it is suitable for the specification of the chuck.
	The rotation speed is too high.	Slow down to appropriate rotary speed.
Precision failure.	Centering jig or chuck body runs out.	Check respective parts for diameter runout and end face runout.
	Contact surface of centering jig to the workpiece has worn.	Correct the centering jig or replace the parts.
	The gripping force is too large leading to the work being deformed.	Lower the gripping force in the range possible to process to prevent deformation.

 **WARNING**

- If the chuck failed due to a seizure or breakage, remove the chuck from the machine, following the disassembly steps in page 26. When the chuck cannot be removed due to a blockage of workpiece, do not disassemble forcibly but please contact us or our agent.
- If these countermeasures do not correct the problem or improve the situation. Immediately stop using the machine. Continuous use of a broken product or a defective product may cause a serious accident by the chuck or the work flying out.
- Only experienced and trained personnel should do repairs and fix malfunctions. Repair of a malfunction by a person who has never received instruction from an experienced person, the distributor or our company may cause a serious accident.

## **7-2. Where to contact in the case of malfunction**

In the case of malfunction, contact the distributor where you purchased the product or our branch office listed on the back cover.

# For Machine Tool Manufactures

Following pages are described for machine tool manufacturers (personnel who attach a chuck to a machine). Please read following instruction carefully when you attach or detach a chuck to machine, and please sufficiently understand and follow the instructions for safe operation.

## 8. Attachment

### 8-1. Outline drawing of attachment

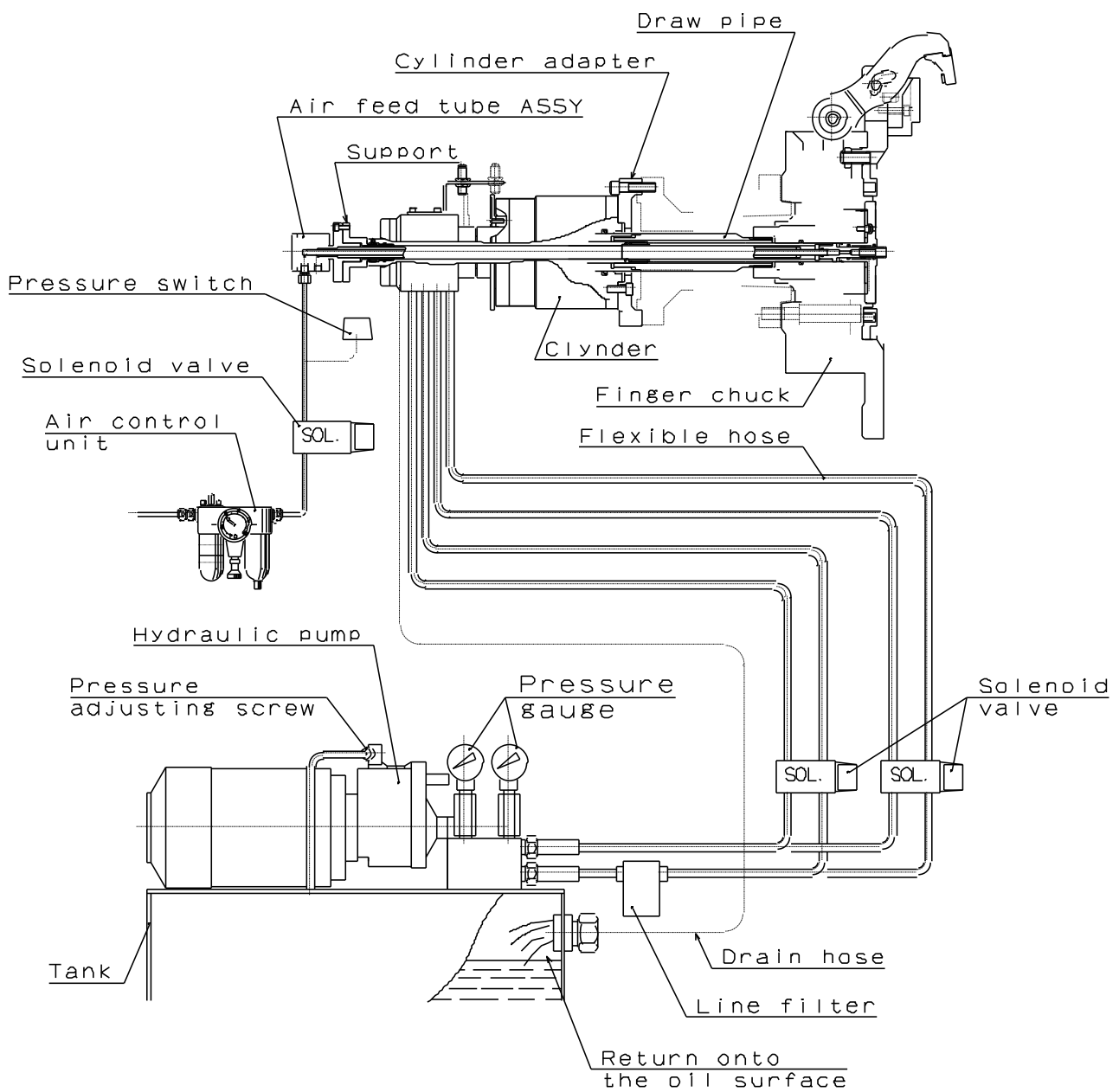


Fig.11



- Attach the manual switching valve at a position where it is easy to operate for the attaching equipment.
- Install the hydraulic unit at a position where the drain hose is not kinked and the needle of the pressure gauge is easily read.

## **DANGER**

- **When other actuators are operated by the same hydraulic pressure source as the cylinder for chuck, be sure that a pressure drop of the cylinder does not occur during use. A hydraulic pressure drop leads to a drop in the gripping force which could allow the work to fly out.**
- **As to the drain hose**
  - **Use a transparent vinyl hose for visualization.**
  - **Provide a stream slope, without air pocket. This will ensure no back pressure.**
  - **The end of the hose is physically above the oil level. (Refer to Fig.12)**
- **If the hydraulic oil stagnates inside the cylinder, oil leakage occurs, which may cause a fire.**

## **WARNING**

- **Install after removing the dust inside the pipe completely.**
- **Add a filter to the pressure supply line. If foreign matters get inside the cylinder, this is dangerous since the rotation valve of the cylinder will seize, the hose will tear off, and the cylinder will rotate. This is also dangerous as the work will fly out.**
- **Always use a flexible hose for the hydraulic piping to the cylinder, and the bending force or tensile force of the pipe must not be applied to the cylinder. Use a pipe inside diameter as large as possible and keep the piping length as short as possible.**

## **NOTICE**

- Especially, when a large sized hydraulic unit is used, excessive surge pressure is generated and the gripping force becomes large, therefore, it may result in breakage of the chuck or the lowering of endurance. Restrain the surge pressure by adopting a throttle valve, etc.

## 8-2. Design of chuck open/close hydraulic circuit

- Fig.12 shows an example of chuck open/close hydraulic circuit.
- Use the solenoid valve having 4 ports, 2 positions, and the circuit must hold the gripping port position when current is not applied.
- Use the hydraulic pipes having the inside diameter over  $\phi 9$  mm.

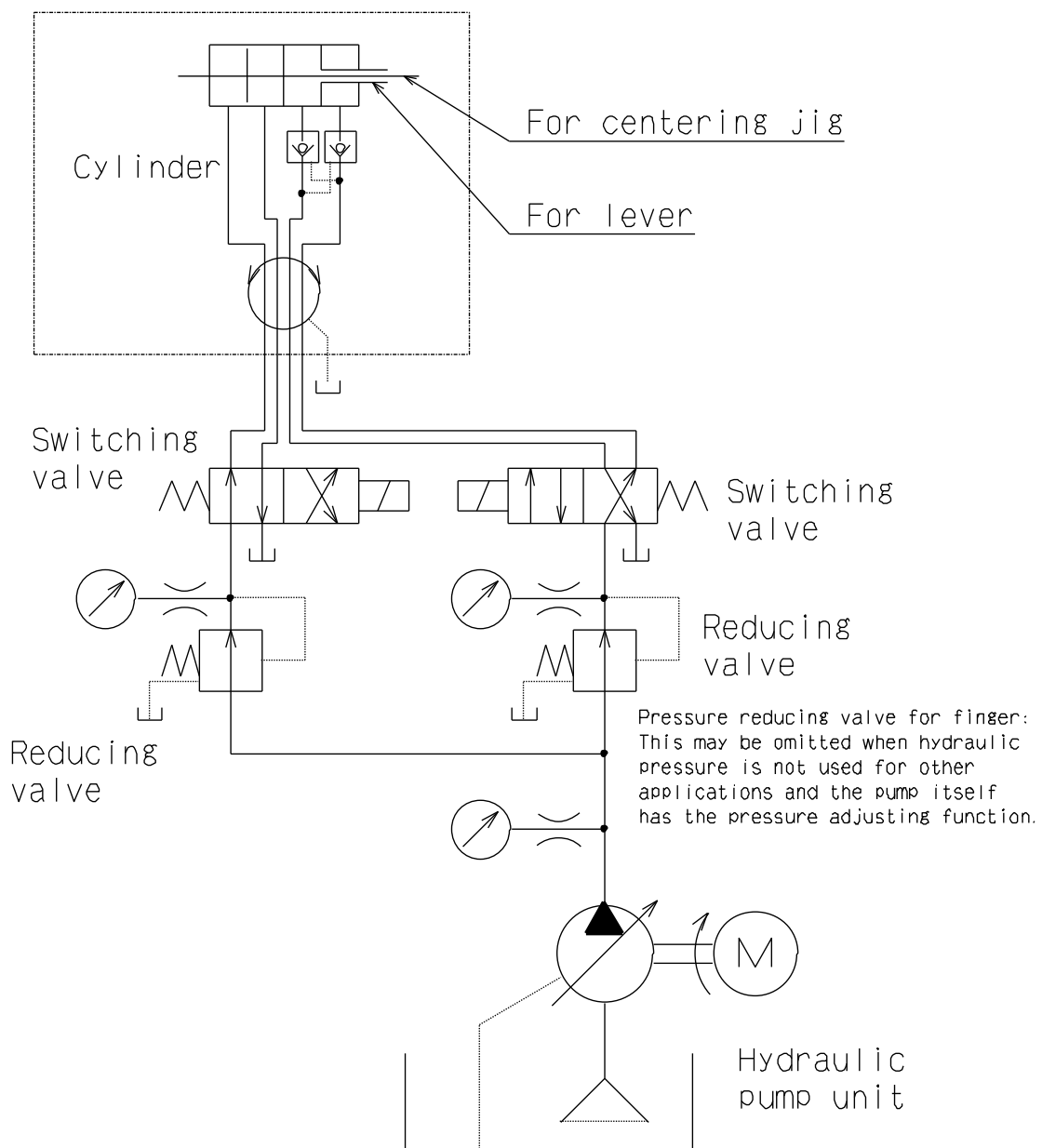


Fig.12

### 8-3. Design of seating confirmation air circuit

Fig.13 shows an example of seating confirmation air circuit.

- The solenoid valve for seating confirmation must be in detected state when current is applied.
- Use the air pipes having the inside diameter over  $\phi 4$  mm.

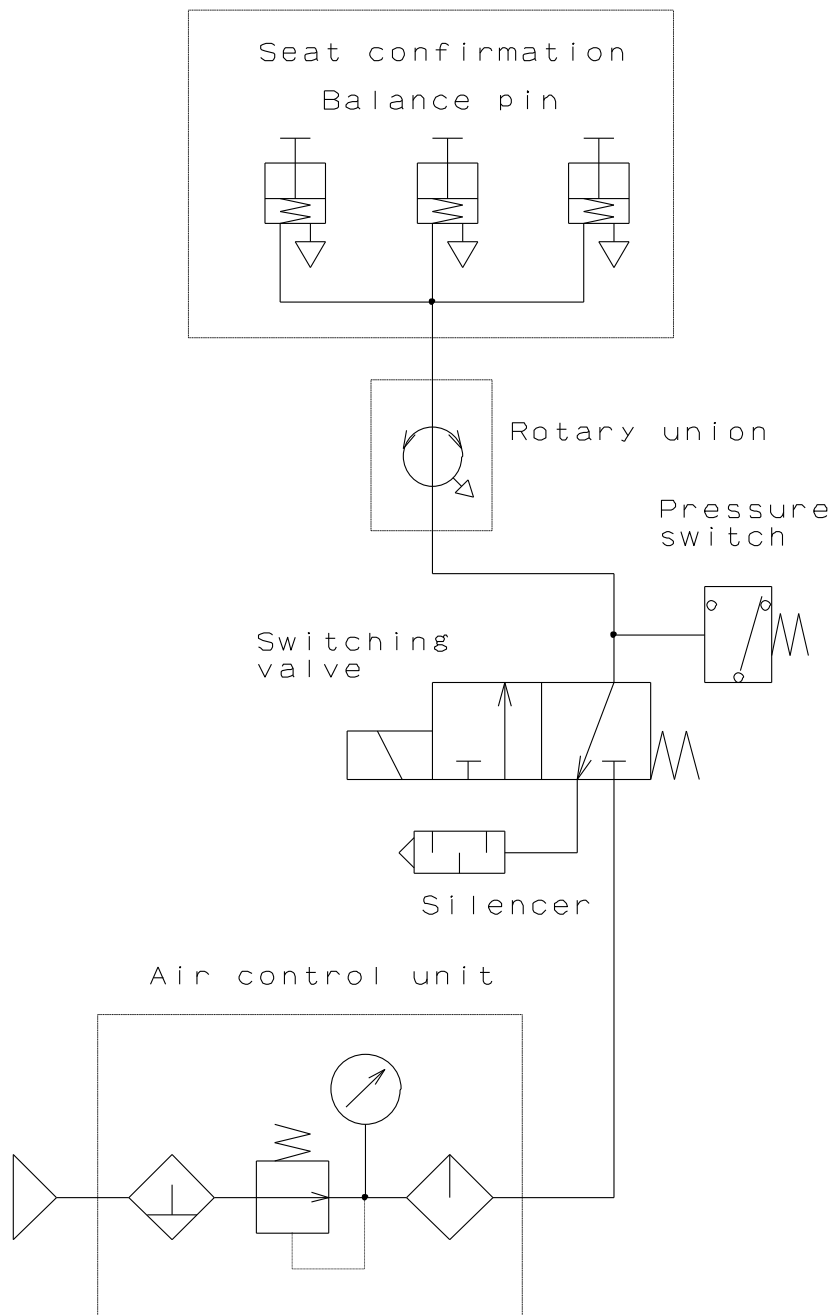


Fig.13

## 8-4. Design of the draw pipe

- If you design the draw pipe, refer to the Spec. information for supply for the shape and specification.

### **DANGER**

- **Provide sufficient strength for the draw pipe.** If the draw pipe is broken due to insufficiency of the strength, the gripping force will be lost instantly, which is dangerous as the work will fly out.
  - The personnel who designed draw pipe must judge whether the strength of the draw pipe is sufficient for the usage conditions.
- **If the screw-in depth of the draw pipe to the draw nut is insufficient,** the screw will break and the gripping force will be lost instantly, which is dangerous as the work will fly out.
- **If the engagement of the screw of the draw pipe is loose,** vibration may occur resulting in breakage of the screw. If the screw breaks, the gripping force will be lost instantly, which is dangerous as the work will fly out.
- **If the draw pipe is unbalanced, vibration occurs,** the screw is broken and the gripping force will be lost instantly, which is dangerous as the work will fly out.

## 8-5. Attachment of chuck

Please read the following installation procedure while also referring to P7-8.

### **1. Attaching the draw pipe to the cylinder**

- Apply adhesive onto the screw part of the draw pipe, and screw it into the piston rod of cylinder. At this time, refer to the instruction manual for the cylinder for tightening torque.

### **NOTICE**

- When the draw-pipe is attached to the cylinder, if it is tightened in middle position of piston stroke, the piston locking pin may be broken. For the YG-204 type cylinder, with small and large piston rod pulled in fully, screw in the draw-pipe on small piston side, and then with large piston rod pushed out fully, screw in the draw-pipe on large piston side. For other cylinders, refer to the Cylinder Instruction Manual.

## **2. Attaching the air feed tube to the cylinder**

- Install the air feed tube (rotary joint) from the cylinder rear side, and then install the relay draw-pipe at the leading end of the draw-pipe on the small piston side.

## **3. Attach the cylinder to the spindle (or the cylinder adapter)**

- Check the run-out of the cylinder, and if it is normal, attach the hydraulic pipe.
- Move 2 to 3 times at low pressure (0.4 MPa-0.5 MPa, 4 - 5 kgf/cm<sup>2</sup>) and set the piston at the forward end and turn off the power supply.

### **CAUTION**

- Use an eyebolt when attaching and detaching the chuck to and from the machine, as there is a danger of injury or damage if the chuck drops.

### **WARNING**

- Remove the eyebolt without fail after using. If the chuck is rotated with the eyebolt, etc., attached, they may fly out and this is dangerous.

## **4. Remove the centering jig and center gear from the chuck**

- Remove the center gear [N] so that the top surface of the plunger [D] is visible.
- Install the gear fixed jig [B1] to prevent screw pinion [M] from turning accidentally during operation.

### **DANGER**

- If the screw pinion is rotated during disassembly, the misalignment of the three lever case positions will cause imbalance, resulting in vibration that may damage the chuck and it may also cause chuck and workpiece to fly off, which is dangerous. During assembly, the positions of the three lever cases must be measured and aligned.

## **5. Connect the chuck to the drawpipe**

- Turn the plunger [D] with the connection handle [Z] to connect the chuck to the draw pipe.
- When connecting the plunger and the draw pipe, if the plunger cannot be screwed in smoothly, do not force the plunger into the draw pipe and check the inclination of the screw center



- If the draw pipe is not screwed deep enough into the plunger, the screw will break and the gripping force will be lost in an instant, causing the workpiece to scatter, which is dangerous.
- Loose engagement of the draw pipe screw may cause vibration and breakage of the screw. If the screw breaks, the gripping force will be lost instantly and the workpiece will scatter, which is dangerous.

#### **6. Align the chuck with the spindle (or backplate) mounting surface**

- Turn the connection handle [Z] so that the chuck is in perfect contact with the spindle mounting surface of the lathe
- When adjusting the centering of the chuck, tap the side of the body lightly with a plastic hammer
- Tighten the socket head cap screw [01] evenly. Tighten the bolts to the specified torque



- Always tighten the bolts at the specified torque. If the torque is insufficient or excessive, the bolt will break, causing the chuck and workpiece to fly off, which is dangerous.
- Use the bolts attached to the chuck, and do not use other bolts. However, if you must use other bolts not provided by Kitagawa, use bolts that have at least a strength classification of 12.9 (10.9 for M22 or more) and be sure they have sufficient length.

Table 7

Bolt size	Tightening torque	
M5	7.5	N·m
M6	13	N·m
M8	33	N·m
M10	73	N·m
M12	107	N·m
M14	171	N·m
M16	250	N·m
M20	402	N·m

## **7. Adjust the plunger position**

- Adjust the position of the plunger [D] using the connection handle [Z] as shown in Fig.14. Note that the plunger is equipped with a ball plunger (to stop plunger from rotating), so be sure to complete the adjustment at the position where you feel this response.
- Verify that the specified stroke is achieved by fully stroking the chuck
- Remove the gear fixed jig [B1] and install the center gear [N] and centering jig. Then adjust the concentricity of the centering jig.

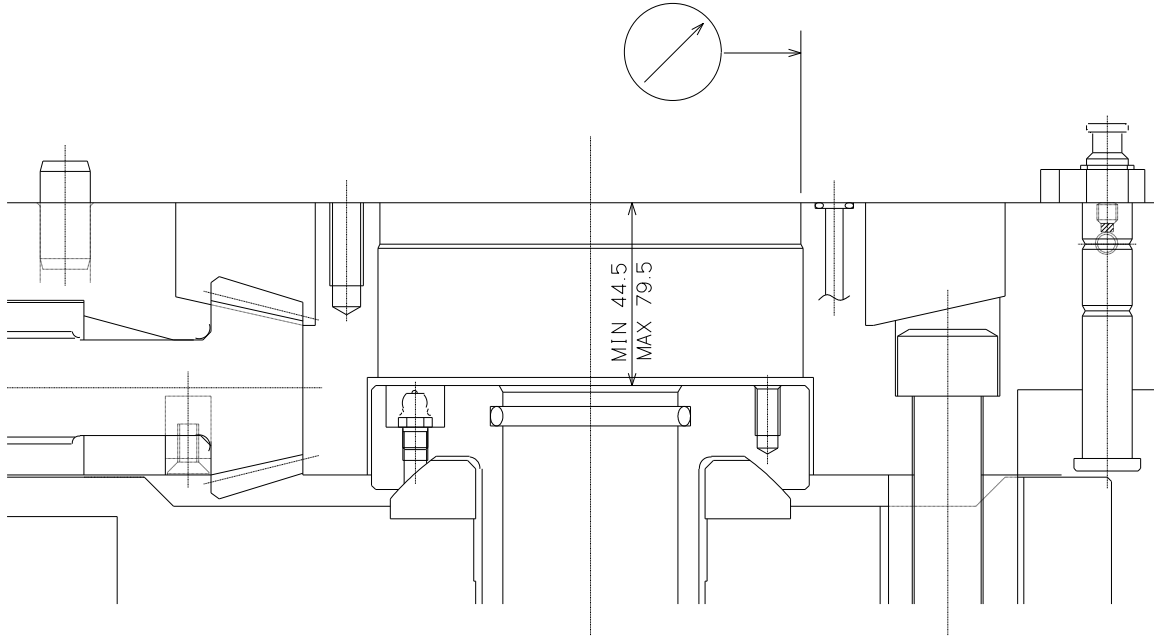


Fig.14

## **9. Other information**

### **9-1. About disposal**

Ultimate disposal of this product should be handled according to all national laws and regulations.

**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

<b>Tokyo office</b>	1-405-1, Kita-ku, Yosino-cho, Saitama-shi, Saitama, 331-9634, JAPAN Tel. +81-48-667-3469 Fax. +81-48-663-4678
<b>Sendai office</b>	4-15-13, Yamatomachi, Wakabayashi-ku, Sendai-shi, Miyagi, 984-0042, Japan Tel. +81-22-232-6732 Fax. +81-22-232-6739
<b>Nagoya office</b>	2-62, Kamitakabata, Nakagawa-ku, Nagoya-shi, Aichi, 454-0873, Japan Tel. +81-52-363-0371 Fax. +81-52-362-0690
<b>Osaka office</b>	3-2-9, Kitakagaya, Suminoe-ku, Osaka-shi, Osaka, 559-0011, Japan Tel. +81-6-6685-9065 Fax. +81-6-6684-2025
<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
<b>Overseas office</b>	77-1, Motomachi, Fuchu-shi, Hiroshima, 726-8610, Japan Tel. +81-847-40-0526 Fax. +81-847-45-8911

■ OVERSEAS

<b>America Contact</b>	<b>KITAGAWA-NORTHTECH INC.</b> <a href="https://www.kitagawa-usa.com">https://www.kitagawa-usa.com</a> 301 E. Commerce Dr, Schaumburg, IL. 60173 USA Tel. +1 847-310-8787 Fax. +1 847-310-9484
	<b>KITAGAWA MEXICO S.A. DE C.V.</b> Circuito Progreso No. 102, Parque Industrial Logistica Automotriz, Aguascalientes, Ags., C.P.20340 Tel. +52 449-917-8825 Fax. +52 449-971-1966
<b>Europe Contact</b>	<b>KITAGAWA EUROPE LTD.</b> <a href="https://www.kitagawa.global/en">https://www.kitagawa.global/en</a> Unit 1 The Headlands, Downton, Salisbury, Wiltshire SP5 3JJ, United Kingdom Tel. +44 1725-514000 Fax. +44 1725-514001
	<b>KITAGAWA EUROPE GmbH</b> <a href="https://www.kitagawa.global/de">https://www.kitagawa.global/de</a> Borsigstrasse 3, 40880, Ratingen Germany Tel. +49 2102-123-78-00 Fax. +49 2102-123-78-69
	<b>KITAGAWA EUROPE GmbH Poland Office</b> <a href="https://www.kitagawa.global/pl">https://www.kitagawa.global/pl</a> 44-240 Zory, ul. Niepodleglosci 3 Poland Tel. +48 607-39-8855
	<b>KITAGAWA EUROPE GmbH Czech Office</b> <a href="https://www.kitagawa.global/cz">https://www.kitagawa.global/cz</a> Purkynova 125, 612 00 Brno, Czech Republic Tel. +420 603-856-122 Fax. +420 549-273-246
	<b>KITAGAWA EUROPE GmbH Romania Office</b> <a href="https://www.kitagawa.global/ro">https://www.kitagawa.global/ro</a> Strada Heliului 15, Bucharest 1, 013991, Romania Tel. +40 727-770-329
	<b>KITAGAWA EUROPE GmbH Hungary Office</b> <a href="https://www.kitagawa.global/hu">https://www.kitagawa.global/hu</a> Dery T.u.5, H-9024 Győr, Hungary Tel. +36 30-510-3550
<b>Asia Contact</b>	<b>KITAGAWA INDIA PVT LTD.</b> <a href="https://www.kitagawa.global/in">https://www.kitagawa.global/in</a> Plot No 42, 2nd Phase Jigani Industrial Area, Jigani, Bangalore – 560105, Karnataka, India Tel. +91-80-2976-5200 Fax. +91-80-2976-5205
	<b>KITAGAWA TRADING (THAILAND) CO., LTD.</b> <a href="https://www.smri.asia/jp/kitagawa/">https://www.smri.asia/jp/kitagawa/</a> 9th FL, Home Place Office Building, 283/43 Sukhumvit 55Rd. (Thonglor 13), Klongton-Nua, Wattana, Bangkok 10110, Thailand Tel. +66 2-712-7479 Fax. +66 2-712-7481
	<b>Kitagawa Corporation(Shanghai)</b> <a href="https://www.kitagawa.com.cn">https://www.kitagawa.com.cn</a> Room308 3F Building B. Far East International Plaza, No.317 Xian Xia Road, Chang Ning, Shanghai, 200051, China Tel. +86 21-6295-5772 Fax. +86 21-6295-5792
	<b>Kitagawa Corporation(Shanghai) Guangzhou Office</b> B07, 25/F, West Tower, Yangcheng International Trading Centre, No.122 East Tiyu Road, Tianhe District, Guangzhou, China Tel. +86 20-2885-5276
	<b>DEAMARK LIMITED</b> <a href="https://www.deamark.com.tw">https://www.deamark.com.tw</a> No. 6, Lane 5, Lin Sen North Road, Taipei, Taiwan Tel. +886 2-2393-1221 Fax. +886 2-2395-1231
<b>KITAGAWA KOREA AGENT CO., LTD.</b> <a href="http://www.kitagawa.co.kr">http://www.kitagawa.co.kr</a> 803 Ho, B-Dong, Woolim Lion's Valley, 371-28 Gasan-Dong, Gumcheon-Gu, Seoul, Korea Tel. +82 2-2026-2222 Fax. +82 2-2026-2113	
<b>Oceania Contact</b>	<b>DIMAC TOOLING PTY. LTD.</b> <a href="https://www.dimac.com.au">https://www.dimac.com.au</a> 69-71 Williams Rd, Dandenong South, Victoria, 3175 Australia Tel. +61 3-9561-6155 Fax. +61 3-9561-6705