

INSTRUCTION MANUAL

FG type

Finger Chuck



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.

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Preface

This manual provides detailed information about how to safely and correctly use the power chuck (FG / FGT type) for a lathe.

Before starting to use this power chuck, 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 a workpiece on the lathes or rotary tables. This product is equipped with the jaws to clamp the workpiece and they operate by means of a rotary cylinder. For any other applications, please contact us. Our company will not assume responsibility for injury, death, damage, or loss resulting from not following the instructions in this manual.


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 Iron Works 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 Iron Works. Additionally, if parts other than genuine parts manufactured by Kitagawa Iron Works are used, this guarantee will be completely invalid.

The chuck and cylinder from Kitagawa Iron Works 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

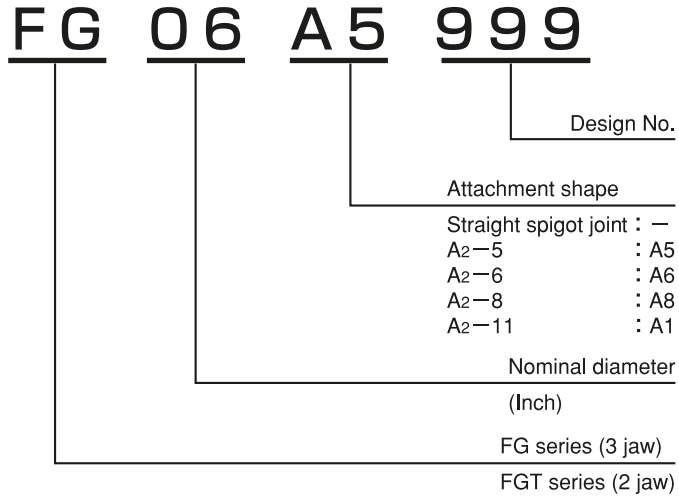


Fig.1

1-2. Structural drawing

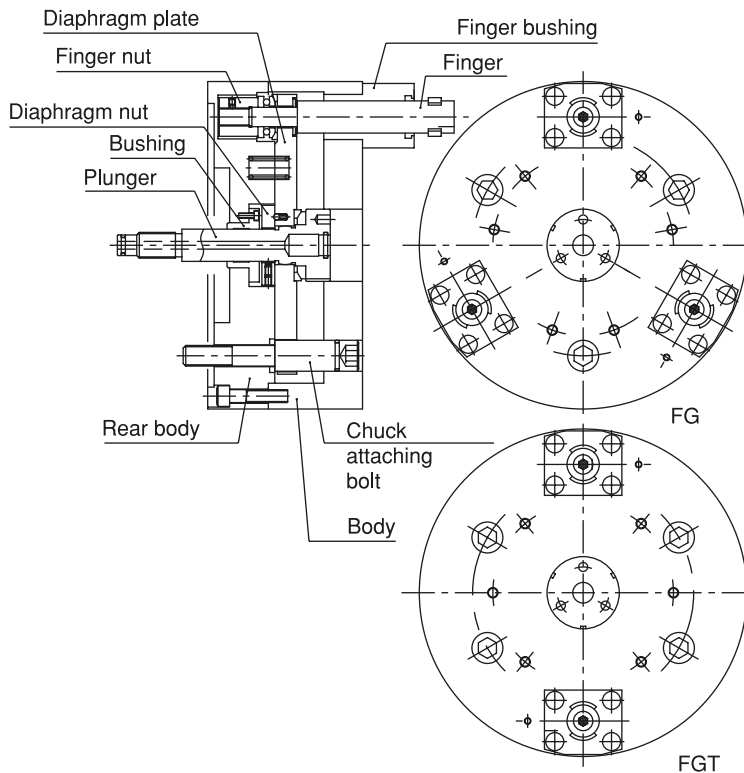


Fig.2

1-3. Scope of product

This instruction manual is for the chuck part.

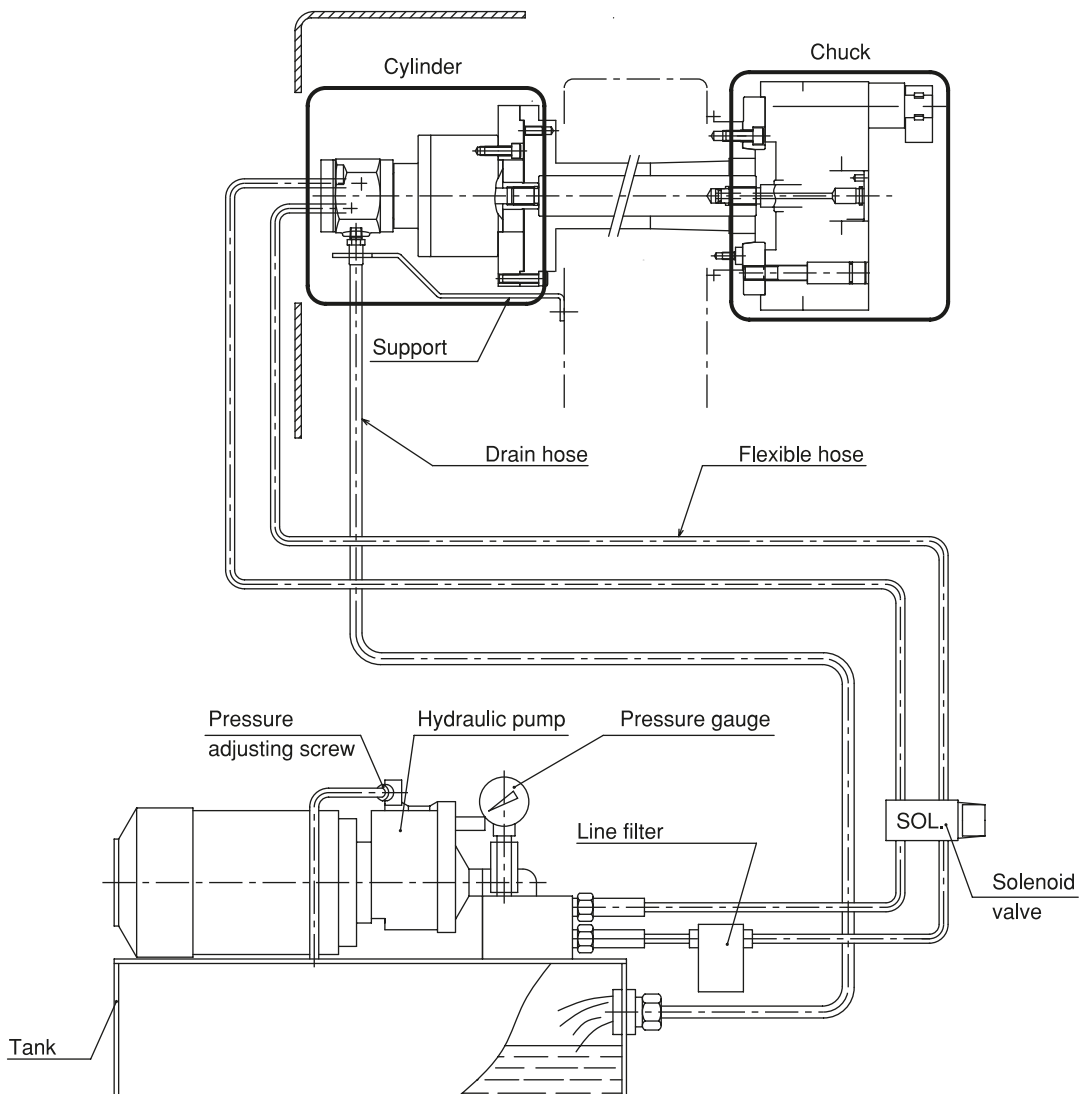


Fig.3

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 7 in this manual.
- As for the cylinder, follow the instruction manual for the cylinder.

1-4. Parts list

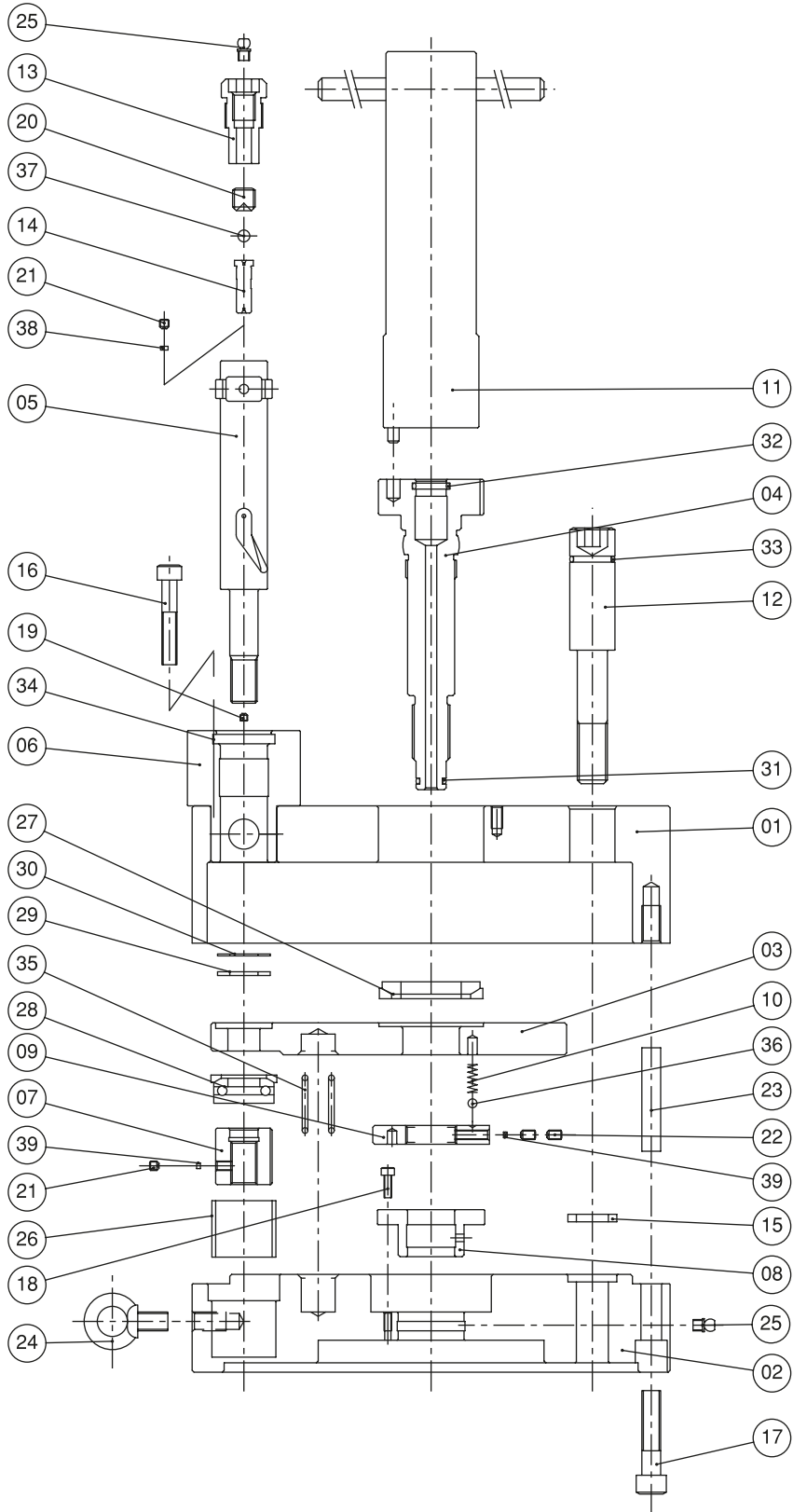


Fig.4

Table 1-1 Parts list

No.	Part name	Quantity	No.	Part name	Quantity
01	Body	1	24	Eyebolt (8"~12")	2
02	Rear body	1	25	Grease nipple	3, 4, 5 or 7
03	Diaphragm plate	1	26	Bearing	2 or 3
04	Plunger	1	27	Bearing	1
05	Finger	2 or 3	28	Bearing	2 or 3
06	Finger bushing	2 or 3	29	Bearing	2 or 3
07	Finger nut	2 or 3	30	Bearing	2 or 3
08	Bushing	1	31	O ring	1
09	Diaphragm nut	1	32	O ring	1
10	Coil spring	1	33	O ring	3 or 4
11	Handle for connection (Belong)	1	34	Dust seal	2 or 3
12	Chuck attaching bolt (Belong)	3 or 4	35	Coil spring	2 or 3
13	Spin bolt	2 or 3	36	Steel ball	1
14	Spin roller	2 or 3	37	Steel ball	2 or 3
15	Washer	3 or 4	38	Fixed plate	2 or 3
16	Head cap screw	8 or 12	39	Fixed plate	7, 9 or 12
17	Head cap screw	6, 8 or 9	40	Hex key (Belong)	1
18	Head cap screw	6	41	Hex key (Belong)	1
19	Set screw	2 or 3	42	Hex key (Belong)	1
20	Set screw	2 or 3	43	Hex key (Belong)	1
21	Set screw	4, 6, 8 or 12	44	Hex key (Belong)	1
22	Set screw	3 or 6	45	Hex key (Belong)	1
23	Parallel pin	2 or 3	46	Hex key (Belong)	1

Table 1-2 Consumable parts

No.	Part name	FG05 FGT05	FG06 FGT06	FG08 FGT08	FG10 FGT10	FG12 FGT12
31	O ring	P 6	P 9	P 12	P 12	P 12
32	O ring	P 7	P 7	P 16	P 16	P 16
33	O ring	P 12	P 12	P 15	P 20	P 20
34	Dust seal	DSI 20 28 5		DSI 25 35 4.5		

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.

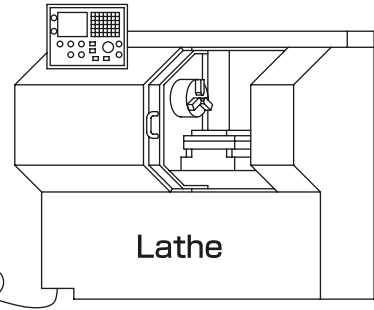
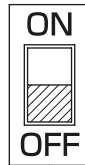


Turn off main power supply before attaching, inspecting or replacing chuck, and before adding oil.

For All Users

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

Main power supply
OFF



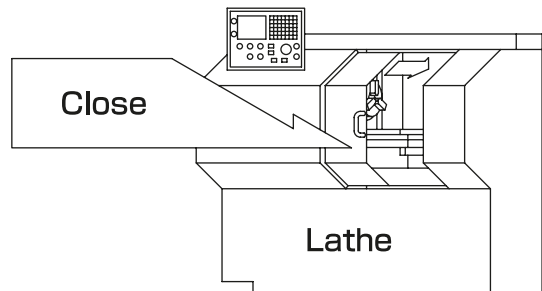
Lathe



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)



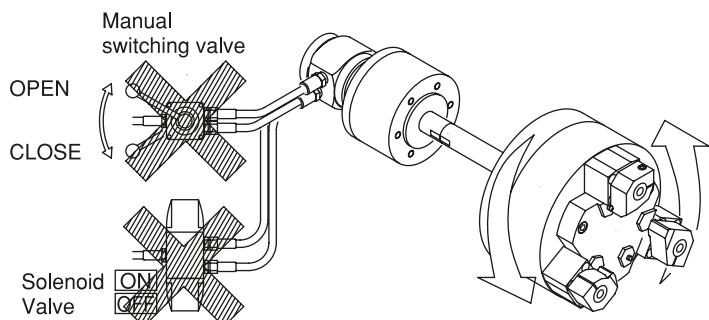
Lathe



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.





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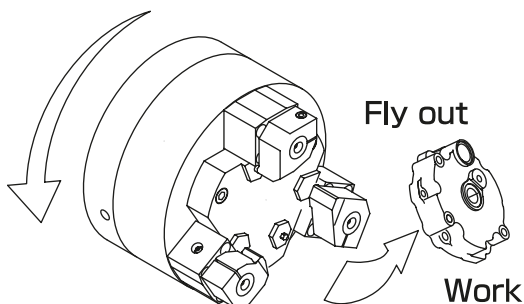
Failure to follow the safety precautions below will result in serious injury or death.



Do not allow the rotation speed of the chuck to exceed the maximum allowable speed limit. (Refer to page 14)

For All Users

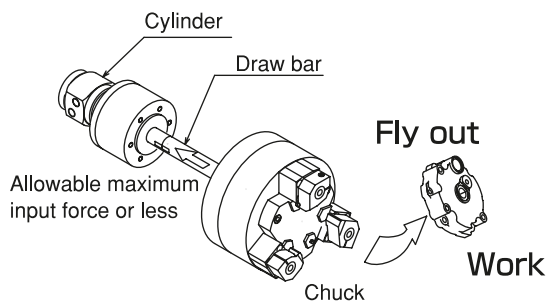
- If the rotation speed of the chuck exceeds the rotation speed limit, this is very dangerous as the chuck and work will fly out.



The input force of the chuck (piston thrust, pulling force of the draw bar) must not exceed the allowable maximum input force. (Refer to page 14)

For All Users

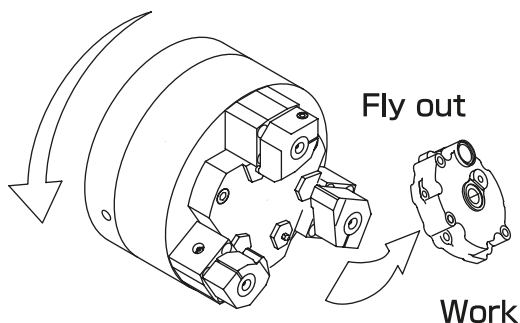
- Input must match the specification of the chuck.
- Adjust the hydraulic pressure to the cylinder so that the input force, which determines the gripping force of the chuck, does not exceed.
- Excessive input force can lead to breakage of the chuck, which is very dangerous, as the chuck and work can be damaged and fly out.



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. (Refer to page 14 and cylinder manual)

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.





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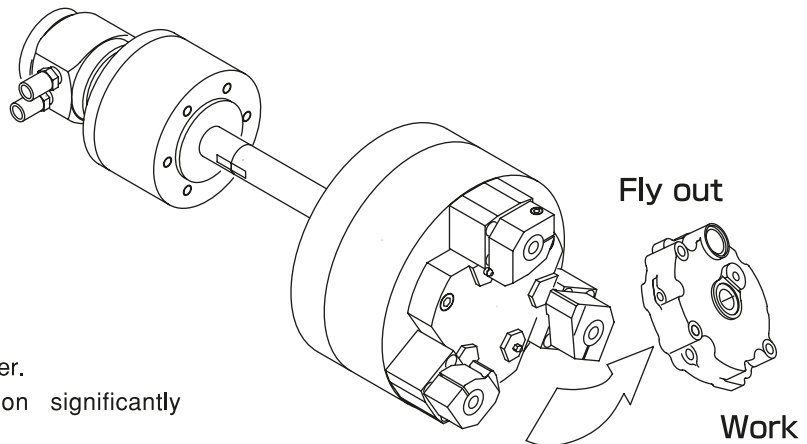
Failure to follow the safety precautions below will result in serious injury or death.



Use of a chuck and cylinder that cannot be used together safely may cause the cylinder to break at high pressure resulting in the chuck and work flying out.

For All Users

- Check that the chuck and the cylinder are in the “safe combination” when using at high pressure with our company or the distributor. Especially when the cylinder of our company and a high pressure chuck of other company are combined, confirmation is necessary.
- If one of the abnormal events shown below occurs during operation, immediately stop the machine and consult with our company or the distributor.



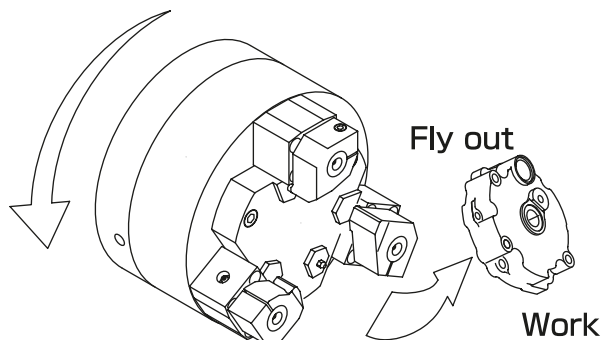
- The work slips.
- Loss of accuracy.
- The work begins to chatter.
- The machine's vibration significantly increases.
- The gripping force does not rise even if hydraulic pressure is raised.



In the case of processing a significant unbalanced work, lower the rotation speed.

For All Users

- Unbalanced work generates dangerous centrifugal forces and the work could fly out.





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

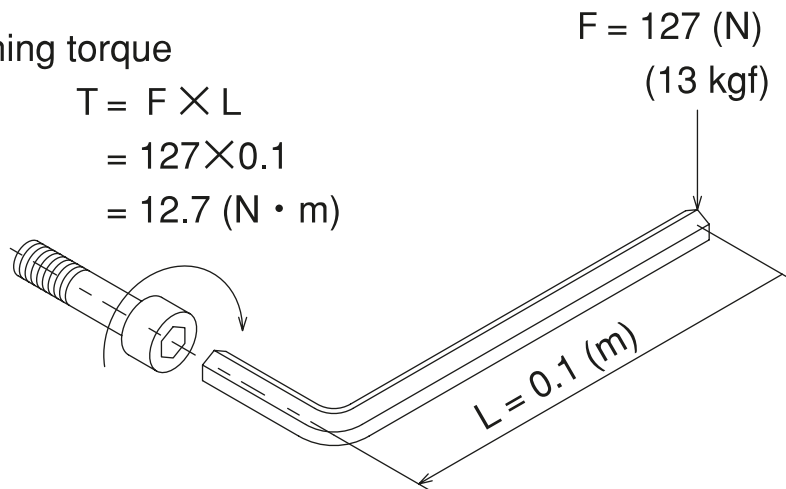
- If the torque is insufficient or excessive, the bolt will break, which is dangerous as the chuck or work will fly out.
- Fix the lathe spindle or the chuck when you tighten bolts. Your hand could slip and get injury when you work without fixing the spindle.
- You cannot control the torque by a hex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

Specified torque for socket head cap screw

Bolt size	Tightening torque
M5	8 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

$$\begin{aligned}
 T &= F \times L \\
 &= 127 \times 0.1 \\
 &= 12.7 \text{ (N} \cdot \text{m)}
 \end{aligned}$$



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



DANGER

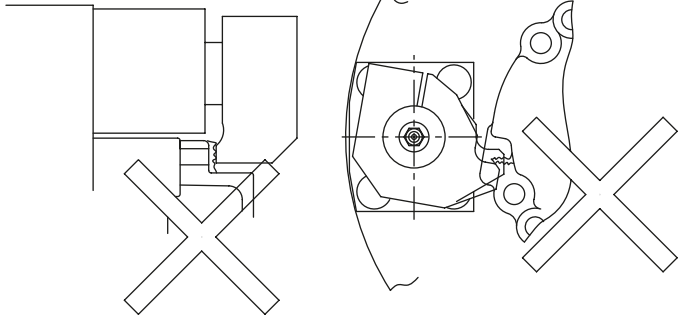
Failure to follow the safety precautions below will result in serious injury or death.



Do not grip a workpiece portion having burrs.

For All Users

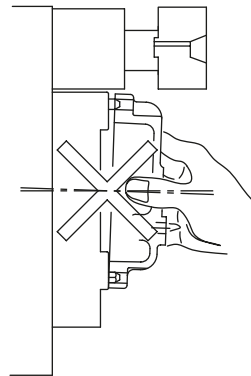
- Do not grip a workpiece portion having burrs. Otherwise, a gripping failure occurs, causing the workpiece to fly out. It also causes a chuck operation failure.



Do not grip the inclined workpiece.

For All Users

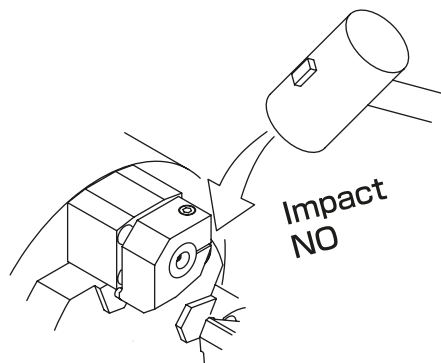
- Gripping the inclined workpiece results in a gripping failure, causing the workpiece to fly out.



Do not give an impact to the chuck, jaws, and workpiece.

For All Users

- Giving an impact results in a gripping failure, causing the workpiece to fly out.
- Giving an impact to the gripped workpiece with a hammer impairs the accuracy and function and shortens the life extremely.





DANGER

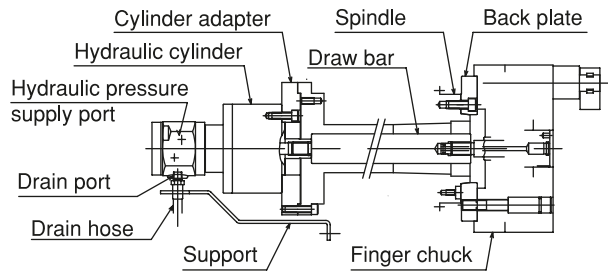
Failure to follow the safety precautions below will result in serious injury or death.



- Provide sufficient strength for the draw bar (Refer to pages 25-26).
- Provide sufficient screw depth for the draw bar.
- Firmly tighten the draw bar.

For Machine Tool Manufactures

- If the draw bar break, the gripping force is instantly lost and this is dangerous as work will fly out.
- If the screw depth of the draw bar 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 bar 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 bar 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.

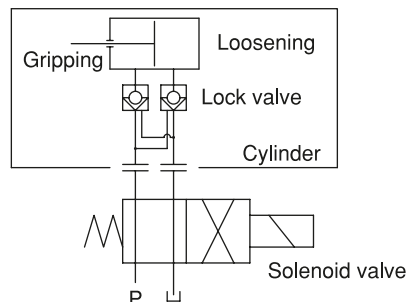
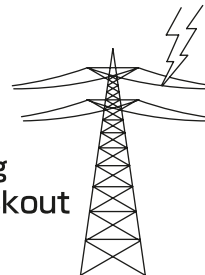


- Use a cylinder with a lock valve (safety valve, check valve) incorporated in case of sudden hydraulic pressure drop due to blackout, malfunction of the hydraulic pump, etc. Further, use a solenoid valve with a circuit that retains the gripping position when no current is carried.

For Machine Tool Manufactures

- 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.

Lightening = Blackout



The gripping position must be retained.

⚠ Important Safety Precautions



WARNING

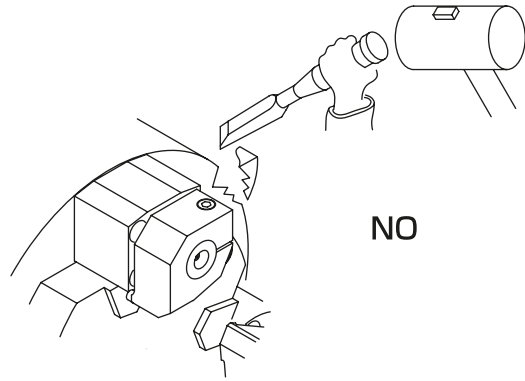
Failure to follow the safety precautions below could result in serious injury or death.



Do not modify the chuck in a way not permitted by the manufacturer.

For All Users

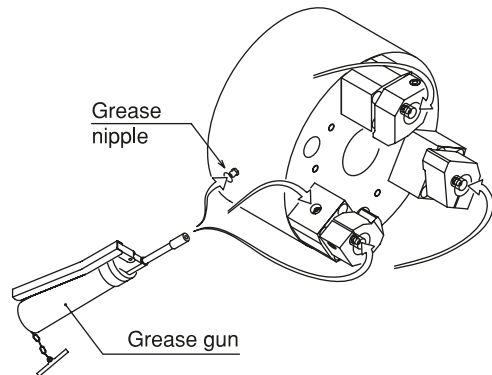
- It may not only break the chuck but the chuck and the work may fly out, which is dangerous.
- If you attach a locator or jig on the chuck body surface, only process work in an acceptable range (Refer to pages 19-20).



Periodically supply adequate grease (Refer to page 21). Turn off power before adding grease.

For All Users

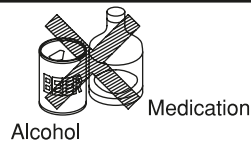
- Insufficient grease supply lowers the gripping force, causes operation failure due to lower hydraulic pressure, lowers the gripping precision, and causes abnormal wearing and seizing, etc.
- This is dangerous as the work could fly out from a drop in the gripping force.



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 2-1

Type		FG05	FGT05	FG06	FGT06	FG08	FGT08
Plunger stroke	mm	20	20	20	20	20	20
Jaw stroke (Turning / Clamping)	mm	12/8	12/8	12/8	12/8	12/8	12/8
Allowable maximum input force	kN (kgf)	7.5 (765)	5 (510)	9 (918)	6 (612)	18 (1835)	12 (1224)
Gripping force per a jaw	kN (kgf)	2 (204)	2 (204)	2.5 (255)	2.5 (255)	5.5 (561)	5.5 (561)
Allowable maximum rotation speed	min ⁻¹	4000	4000	4000	4000	3500	3500
Chuck outer diameter	mm	φ 135	φ 135	φ 165	φ 165	φ 210	φ 210
Maximum gripping diameter	mm	φ 52	φ 52	φ 78	φ 78	φ 105	φ 105
Mass	kg	12	10	13	11	24	22
Moment of inertia	kg · m ²	0.03	0.025	0.05	0.045	0.14	0.13
Matching cylinder		Y1020R	Y1020R	Y1020R	Y1020R	Y1020R	Y1020R
Maximum hydraulic pressure (with matching cylinder)	MPa (kgf/cm ²)	1.2 (12.2)	0.9 (9.2)	1.4 (14.3)	1.0 (10.2)	2.5 (25.5)	1.76 (17.9)
Balance quality (standard soft jaw not included)		G6.3					
Storing temperature / Operating temperature		-20~+50°C / -10~+40°C					

Table 2-2

Type		FG10	FGT10	FG12	FGT12
Plunger stroke	mm	20	20	20	20
Jaw stroke (Turning / Clamping)	mm	12/8	12/8	12/8	12/8
Allowable maximum input force	kN (kgf)	18 (1835)	12 (1224)	18 (1835)	12 (1224)
Gripping force per a jaw	kN (kgf)	5.5 (561)	5.5 (561)	5.5 (561)	5.5 (561)
Allowable maximum rotation speed	min ⁻¹	3500	3500	3000	3000
Chuck outer diameter	mm	φ 254	φ 254	φ 304	φ 304
Maximum gripping diameter	mm	φ 150	φ 150	φ 200	φ 200
Mass	kg	36	34	48	46
Moment of inertia	kg · m ²	0.31	0.29	0.59	0.57
Matching cylinder		Y1020R	Y1020R	Y1020R	Y1020R
Maximum hydraulic pressure (with matching cylinder)	MPa (kgf/cm ²)	2.5 (25.5)	1.76 (17.9)	2.5 (25.5)	1.76 (17.9)
Balance quality (standard soft jaw not included)		G6.3			
Storing temperature / Operating temperature		-20~+50°C / -10~+40°C			

Reference : 1kN = 101.97kgf 1MPa = 10.197kgf/cm²

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

4 . Exchange of jaw

4-1. Exchanging procedure

Removing the jaw

Read the following disassembling procedures with reference to Fig.5..

1. Turn off the main power of the machine

- Before start of work, be sure to turn off the main power of the machine.

2. Removing the jaw

- Loosen socket head cap screws and a setscrew with a hexagonal wrench key attached.
- As the alignment mark is drawn on the jaw and finger, turn the jaw 90° on the basis of alignment mark, and then remove the jaw.

Installing the jaw

1. Installing the jaw

- Insert the jaw on the basis of alignment mark on the finger.

2. Positioning of Jaws

- Insert the jaw and then turn it 90° .
- Tighten a socket head setscrew lightly to position the jaw in rotary direction.
- After that, tighten the socket head cap screws and tighten additionally the setscrew.

⚠ DANGER

- Insert jaws No.1, 2, 3 meeting the No.1, 2, 3 stamped on the body surface. Inserting a jaw in wrong position results in a workpiece gripping failure, causing the workpiece to fly out.

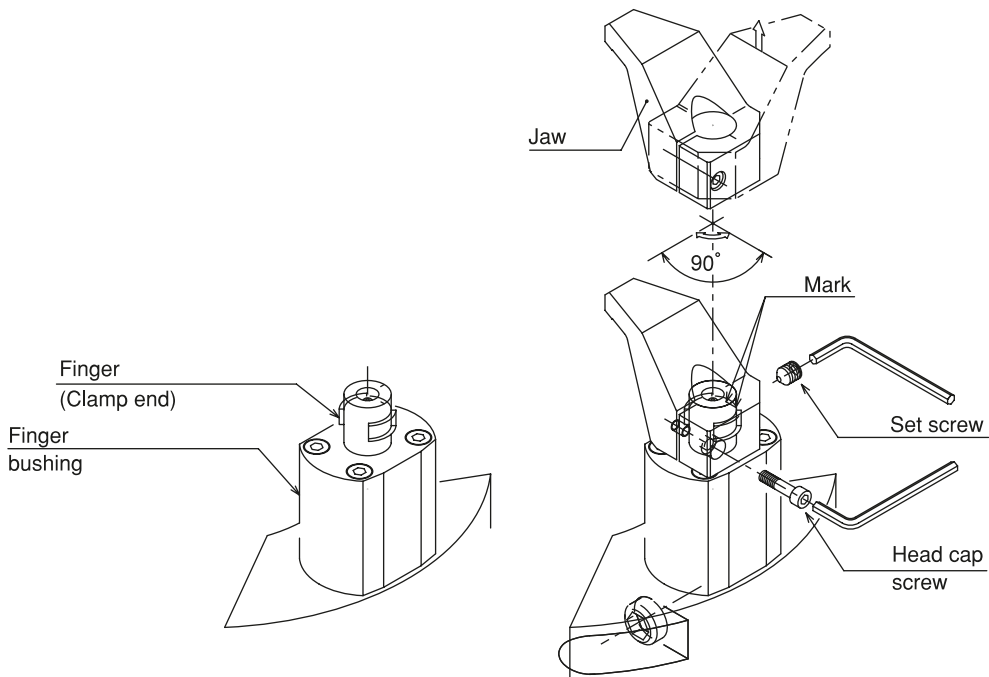


Fig.5



DANGER

- 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 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 are long enough.

Table 3-1

Bolt size (Head cap screw)	Tightening torque
M5	8 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

Table 3-2

Bolt size (Set screw)	Tightening torque
M4	2 N·m
M5	4 N·m
M6	6 N·m
M8	15 N·m
M10	28 N·m
M12	48 N·m

5 . Exchange of spin roller

5-1. Exchanging procedure

Disassembling procedures

Read the following disassembling procedures with reference to Fig.6..

1. Turn off the main power of the machine

- Before start of work, be sure to turn off the main power of the machine.

2. Disassembly of spin bolt

- Loosen the set screw on the chuck body surface.
- Remove the spin bolt on the chuck body outer peripheral.

3. Disassembly of spin roller

- Loosen the set screw on the spin bolt, then remove the steel ball and the spin roller. At this point, pay attention not to lose the steel ball (rigid sphere of $\phi 5$ or $\phi 6$).

Assembling procedures

1. Assembly of spin bolt

- Apply the specified grease into the spin bolt adequately and then assemble the spin roller.
- Insert a steel ball, and apply a little the adhesive to the socket head setscrew and screw it into the spin bolt. At this time, make sure that the spin roller rotates smoothly.

2. Assembly of spin roller

- Tighten the spin bolt into the chuck body circumference.
- Insert the fixed plate from the chuck body surface and tighten the socket head setscrew.

NOTICE

- Tighten the spin bolt completely into the chuck body, and then set the socket head setscrew from the chuck body surface.

WARNING

- If the jaws touch the workpiece in the middle of rotation, an excessive force is applied to the spin roller and it is damaged, and then the finger may not operate smoothly, causing a gripping failure. Check the spin roller every three months, and replace if faulty.

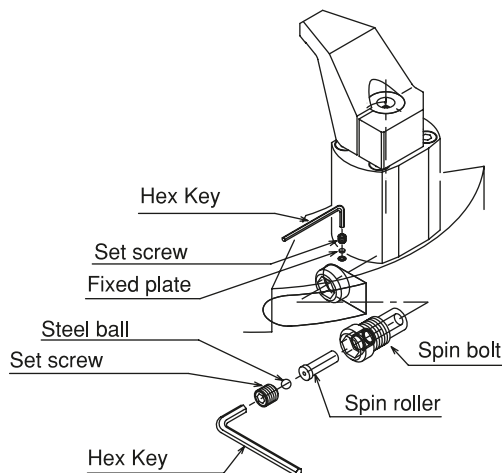


Fig.6

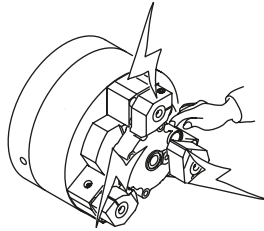
6 . Usage

This product is a device to fix a work-piece when it is processed by the lathe machine or the rotary table. The rotary cylinder closes the jaw and fixes a work-piece so that it does not move during processing. The chuck opens the jaw after having processed it and remove a work-piece.

6-1. Precautions during gripping work with chuck

DANGER

- When gripping a work with the chuck, do not get fingers or hands become caught. This could cause crushed or cut fingers and hands.



6-2. Precautions related to usage of jaw

DANGER

- If a soft jaw other than one made by Kitagawa Iron Works is used, the engagement will be inferior, and the finger will be deformed, the gripping precision will worsen, and the work will fly out due to gripping failure, which is dangerous.
- Do not use the soft jaw by welding to join for extension. The jaw will break due to insufficient strength and the engagement part of jaw will become distorted due to welding. As a result, the engagement will worsen, the serration crests will break, and this is dangerous as the work will fly out.
- Do not use other than standard jaws. If the length of jaws is longer in radial direction than standard jaws, or if the weight of jaws is heavier than standard jaws, the jaws will be damaged, causing the workpiece to fly out.

6-3. Precautions related to processing

DANGER

<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 finger, jaw, locator, 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, jaw, 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 finger, jaw 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.

NOTICE

- When replacing the jaw, carefully clean the engagement part of the finger. Failure to do this may cause a precision failure.
- Set the hydraulic pressure according to the shape of the work and the cutting conditions. Thin workpieces or aluminum workpieces may be deformed if they are tightened with a strong gripping force.

6-4. Attachment of locator and jig

The locator is required for the FG chuck. For the FG chuck, grip the workpiece in axial direction and push it against the locator. Prepare the locator that has the dimensions, accuracy, materials and quenching suitable for processing the work-piece.

⚠ DANGER

- Grip the work-piece after having pushed it to the locator. You can't grip the work-piece stably when you use without locator, this is dangerous as the work will fly out.
- Since the runout of the locator datum end face remarkably influences the finishing accuracy of the work-piece, the datum end face requires that it has sufficient hardness and accuracy. To improve the accuracy of the datum end face, we recommend that the locator is finished with it attached to the chuck after quenching.
- In the case of attaching the locator and the jig on the chuck body surface, tap or drill a hole in the additional process range specified in Fig. 7-8 and Table 4-5.

Shaded part additional process possible range

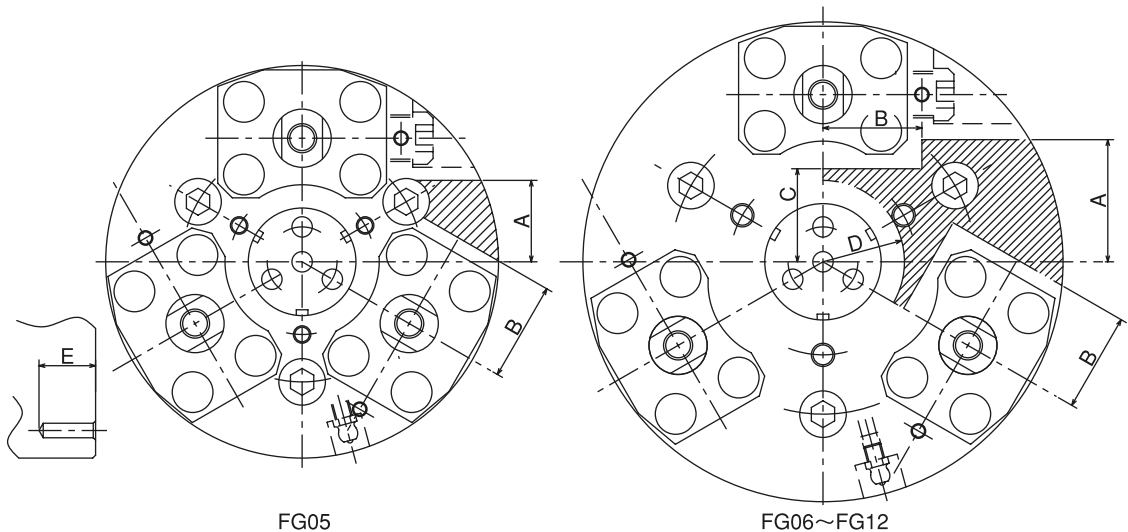


Fig.7

Table 4

Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
FG05	28	34	-	-	20
FG06	42	34	32	28	20
FG08	58	35	48	40	20
FG10	80	35	70	40	20
FG12	105	35	95	40	20

E: Processible depth of tapping or drilling a hole.

Shaded part additional process possible range

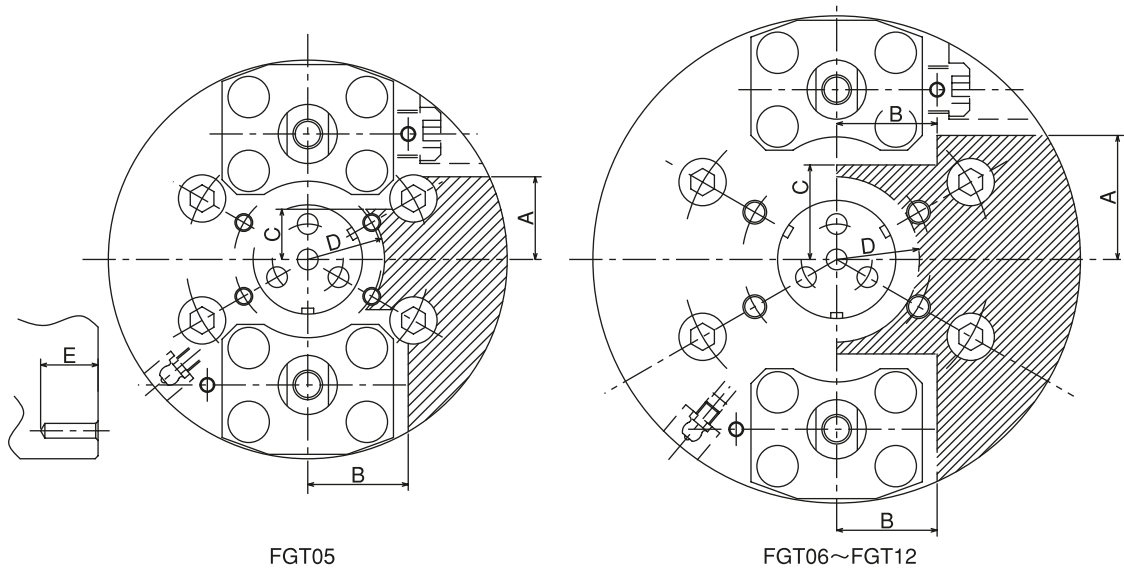


Fig.8

Table 5

Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
FGT05	28	34	17	26	20
FGT06	42	34	32	28	20
FGT08	58	35	48	40	20
FGT10	80	35	70	40	20
FGT12	105	35	95	40	20

E: Processible depth of tapping or drilling a hole.

⚠ DANGER

- The chuck can be modified only in the manufacturer permissible range. This will not only break the chuck but the chuck and work may fly out, which is dangerous.
- Provide a countermeasure against flying out (dwell pin, etc.) due to centrifugal force to the locator or the jig, and attach with bolts which have sufficient strength. The locator or the jig may fly out, and this is dangerous.

7 . Maintenance and Inspection

7-1. Periodic Inspection

- Add grease once 2 or 3 days.
- Fully stroke the jaw before starting work and check the specified stroke.
- Always clean the chuck body or the sliding surface using an air gun, etc., at the end of work.
- At least once per three months, check if the finger stroke is normal, spin roller is normal, hydraulic pressure of cylinder is normal, and respective bolts are tight.
- Disassemble and clean at least once every 6 months or every 100,000 strokes (once every 2 months or more for cutting cast metal).

7-2. Grease lubrication

1. Position to lubricate

- From the grease nipples in the finger section, finger bushing section, and chuck circumference, supply grease using a grease gun. After supplying the grease, open and close the jaws several times without gripping the workpiece.

2. Grease to use

- Use the designated grease specified in Table 6. If grease other than the designated grease is used, sufficient effect may not be obtained.

Table 6

Genuine product	CHUCK GREASE PRO	Kitagawa genuine product (Kitagawa distributor of each country)
	Kitagawa chuck grease	Conventional product
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

- Add grease once 2 or 3 days.
- Standard amount of grease to be supplied is 5 grams per grease nipple.
- In the case of high rotation or in the case of using a large amount of water soluble coolant, increase the frequency of lubrication according to the usage conditions.

WARNING

- To keep the chuck running in the best condition for a long time, adequate grease lubrication is necessary. Insufficient grease lubrication causes a drop in the gripping force, operation failure at low hydraulic pressure, drop in gripping precision, abnormal wearing, seizing, etc. The work will fly out due to a drop in the gripping force and this is dangerous.

4. Safety information about grease and anti-rust oil

Applicable range

- Designated grease
- Antirust agent applied to the product at the delivery.

First aid measures

After inhalation: Remove victim to fresh air. If symptoms persist, call a physician.

After contact with skin: Wash off with mild cleaners and plenty of water. If symptoms persist, call a physician.

After contact with eyes: Rinse with plenty of water. If symptoms persist, call a physician.

After ingestion: If large amounts are swallowed, do not induce vomiting. Obtain medical attention.

- Please refer to each MSDS about the grease and the anti-rust oil which you prepared.

7-3. Disassembling

Disassembling procedures

Read the following disassembling procedures with reference to pages 5-6.

1. Disassembly of chuck

- Before start of work, be sure to turn off the main power of the machine.
- Remove all jaws, locators or jigs on the chuck surface.
- Remove the chuck attaching bolt [12], then turn the plunger [04] with the handle [11] and remove the chuck from the spindle.

2. Disassembly of spin bolt

- Remove the spin bolt [13] on the body [01] outer peripheral. (Refer to page 17)

3. Disassembly of rear body

- Loosen the head cap screw [17] and remove the rear body [02].

4. Disassembly of finger nut

- Remove the set screw [21] that secures each finger nut [07] from the side, and the fixed plate [39], and rotate the finger nut to remove.

5. Disassembly of finger (Shaft)

- Remove the finger (shaft) [05] to the chuck front side.

6. Disassembly of plunger and diaphragm plate

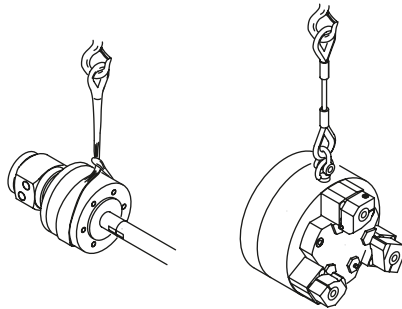
- Remove the plunger [04] and the diaphragm plate [03] to the chuck rear side.

7. Reassembling

- Assemble again while sufficiently coating the recommended grease in the reverse procedures of disassembling.
- Refer to page 27 about the installation procedure. (9-3. Attachment of chuck).

CAUTION

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



Chuck size (Inch)	Eyebolt
5,6	None
8,10,12	M10

WARNING

- Remove the eyebolt or the belt without fail after using. If the chuck is rotated with the eyebolt, etc., attached, they may fly out and this is dangerous.
- Disassemble and clean the chuck at least once every 6 months or every 100,000 strokes (once every 2 months or more for cutting cast metal). If cutting powder or other substances stagnate inside the chuck, it will lead to insufficient stroke and a drop in the 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, apply sufficient grease in the designated areas and reassemble.
- If you stop the machine for a long period of time, remove the work from the machine. If you don't, the work can drop due to a drop in the hydraulic pressure or the cylinder can stop or malfunction.
- If you stop the machine or store the chuck for a long period of time, add grease to prevent rust.

8 . Malfunction and Countermeasures

8-1. In the case of malfunction

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

Table 7

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 jaw.	A large amount of cutting powder is inside.	Disassemble and clean.
	The draw bar loosened.	Remove the draw bar and retighten it again.
The Work slips.	The stroke of the jaw is insufficient.	Adjust so that the jaw is near the center of the stroke when gripping the work.
	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.
	Insufficient grease lubrication	Supply grease from the grease nipple, and open and close the jaw several times without gripping a work.
	The rotation speed is too high. Swinging occurs due to incorrect alignment of cores of work feeder, steady rest, tail stock, etc.	Lower the rotation speed to a speed at which the required gripping force can be obtained. Align the cores sufficiently to eliminate such swinging.
Precision failure.	The outer periphery of the chuck is running out.	Check the end surface run-out and the outer periphery, and retighten the chuck attaching bolts.
	Dust is attached on the attaching part of the jaw.	Remove the jaw, and clean the attaching part thoroughly.
	The attaching bolt of the top jaw is not tightened sufficiently.	Tighten the top jaw attaching bolt at the specified torque.
	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.



- If the chuck failed due to a seizure or breakage, remove the chuck from the machine, following the disassembly steps in page 22. 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.

8-2. 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.

9 . Attachment

9-1. Outline drawing of attachment

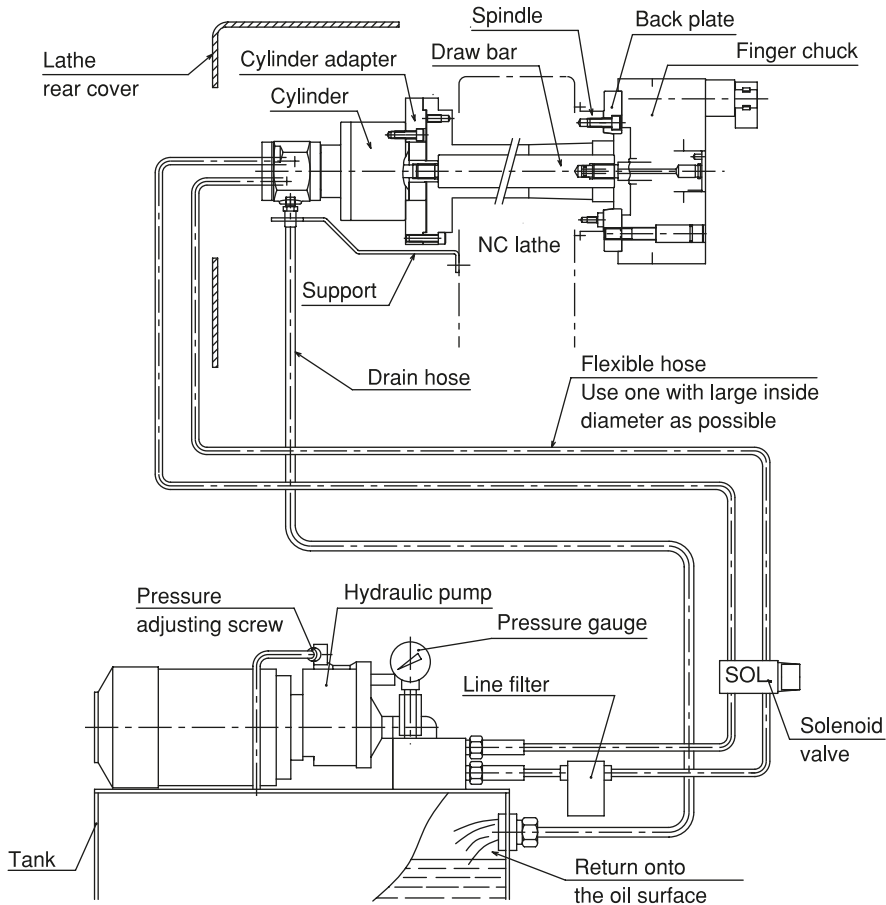


Fig.9

- 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.9)
- 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 gets 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.

9-2. Manufacturing of draw bar and back plate

1. Production of draw bar

Determine the length of the draw bar as shown below.

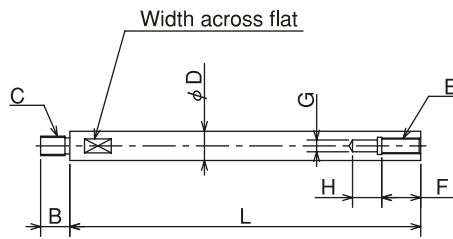


Fig.10

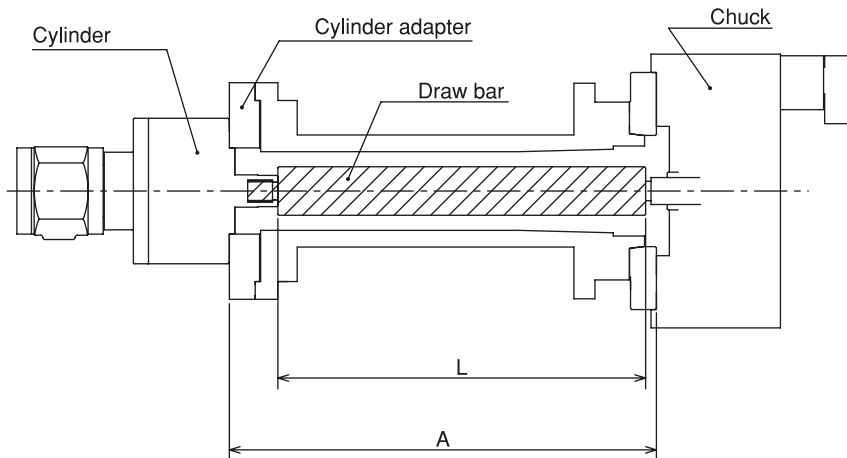


Fig.11

Table 8

Type	Cylinder	B	C	D (min)	E	F	G	H	L
FG05 FGT05	Y1020R	32	M20	30	M12	35	$\phi 9^{+0.2}$ $\phi 9^{+0.1}$	20	A-60
FG06 FGT06	Y1020R	32	M20	30	M16	35	$\phi 12^{+0.2}$ $\phi 12^{+0.1}$	20	A-55
FG08 FGT08	Y1020R	32	M20	30	M20	35	$\phi 16^{+0.2}$ $\phi 16^{+0.1}$	20	A-55
FG10 FGT10	Y1020R	32	M20	30	M20	35	$\phi 16^{+0.2}$ $\phi 16^{+0.1}$	20	A-55
FG12 FGT12	Y1020R	32	M20	30	M20	35	$\phi 16^{+0.2}$ $\phi 16^{+0.1}$	20	A-55

The dimension L in Fig.10-11 is determined from the distance A between the cylinder adapter and the back plate.
 (Example) In the combination of FG05, Y1020R, and when A=500mm, the draw bar length L is to be $L = A - 60 = 500 - 60 = 440\text{mm}$.

At the time of the screw process of the dimension C, the precision is to be JIS 6H and 6h, 6g matching the screw of the piston of the cylinder. Pay attention so that the thread parts on both ends and the outer periphery do not swing or become unbalanced.

⚠ DANGER

- Provide sufficient strength for the draw bar. If the draw bar is broken due to insufficiency of the strength, the gripping force will be lost instantly, which is dangerous as the work will fly out.
- A material with the tensile strength 380MPa (38kgf/mm²) or more must be used.
- The personnel who designed draw bar must judge whether the strength of the draw bar is sufficient for the usage conditions.
- The dimensions and materials specified in this manual do not guarantee that the draw bar will not break under every usage condition.
- If the screw-in depth of the draw bar to the draw screw 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 bar 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 bar 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.

2. Production of back plate

NOTICE

- Process the engagement diameter of the back plate after measuring the actual spindle.
- Run-out of the back plate directly affects the process precision. The end surface run-out of the back plate, spigot joint diameter run-out must be 0.005 mm or less.
- The precision of the processing of the chuck attachment end surface of the back plate and the spigot joint diameter can be raised by processing them after mounting to the installed machine.
- Process the chuck attachment spigot joint diameter of the back plate at the target value A-0.01 in the dimension A of Table 9.
- Fig.12 shows the case of the JIS short taper standard.

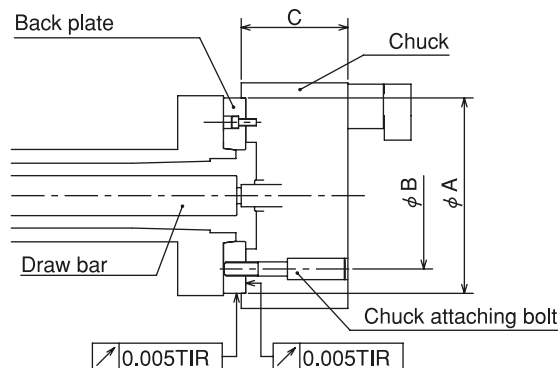


Fig.12

Table 9

Unit: mm

Type	FG05 FGT05	FG06 FGT06	FG08 FGT08	FG10 FGT10	FG12 FGT12
ϕA (G7)	110	140	170	220	220
ϕB	82.6	104.8	133.4	171.4	171.4
C	110	110	120	120	120

Dimension A (spigot joint diameter) conforms to the DIN standard.

! DANGER

- 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 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 are long enough.

Table 10

Bolt size	Tightening torque
M5	8 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

9-3. Attachment of chuck

1. Attaching the draw bar to the cylinder

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

NOTICE

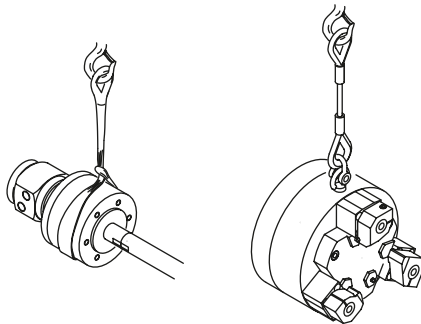
- When attaching the draw bar to the cylinder, the stopper pin of the piston may break if tightened at the stroke middle position of the piston. In the case of a Y type cylinder, screw it in so that the piston rod is fully in. Follow the explanation of the instruction manual for the cylinder for other items about the cylinder.

2. 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/cm²) and set the piston at the forward end and turn off the power supply.

! CAUTION

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



Chuck size (Inch)	Eyebolt
5,6	None
8,10,12	M10

! WARNING

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

3. Connect the chuck to the draw bar

- Clean the chuck mounting surface, and rotate the plunger using the handle attached to screw into the draw bar. At this time, take care not to damage the O-ring at the leading end of the plunger. Also, install the cylinder with the piston rod protruded fully (forward end).
- When connecting the draw screw and the draw bar, do not forcibly screw them in if they cannot be screwed smoothly, but check the inclination of the core of the screw, etc.

! DANGER

- If the screw-in depth of the draw bar to the draw screw is insufficient, the screw will break and the gripping force will be lost instantly, which will the work to fly out.
- If the engagement of the screw of the draw bar is loose, vibration may occur resulting in breakage of the screw, loss of gripping force and the work flying out.

4. Attach the chuck matching to the attaching surface of the spindle (or the back plate).

- Turn the handle for connection to make a state that the chuck closely contacts the spindle attaching surface of the lathe.
- In the case of adjusting the centering of the chuck, lightly hit the body side face with a plastic hammer.
- Tighten the chuck attaching bolts evenly. At this time, tighten the bolts at the specified torque.

! DANGER

- 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 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 are long enough.

Table 11

Bolt size	Tightening torque
M5	8 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

5. Adjust the position of the plunger

- The appropriate position of the plunger at the cylinder forward end is the position when the dimension MIN 5 in Fig.13 becomes as shown in the table below.
- A click stop (rotation stopper) is also attached to the plunger, so complete adjustment at the position where this response is felt.

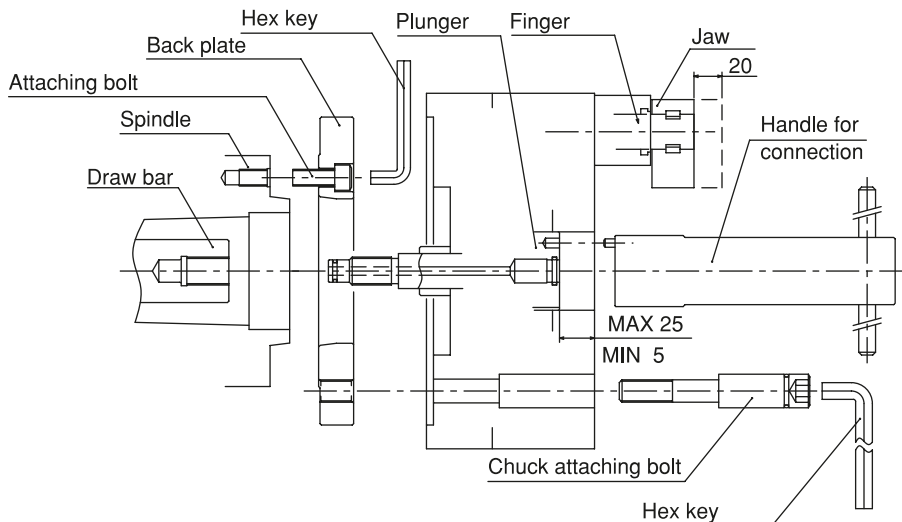


Fig.13

6. Check the run-out of the chuck

- Keep the periphery run-out and the end surface run-out of the chuck at 0.02mm T.I.R or less.
- Stroke the jaw fully and confirm whether to obtain a regulated stroke.
- Check that the strokes of all fingers are same.

10. Other information

10-1. About standards and orders

This product is based on the following standards or orders.

- Machinery directive:2006/42/EC Annex I
- EN ISO 12100-1:2003+A1:2009
- EN ISO12100-2+A1:2009
- EN ISO14121-1:2007
- EN1550:1997+A1:2008

10-2. Information about markings of product

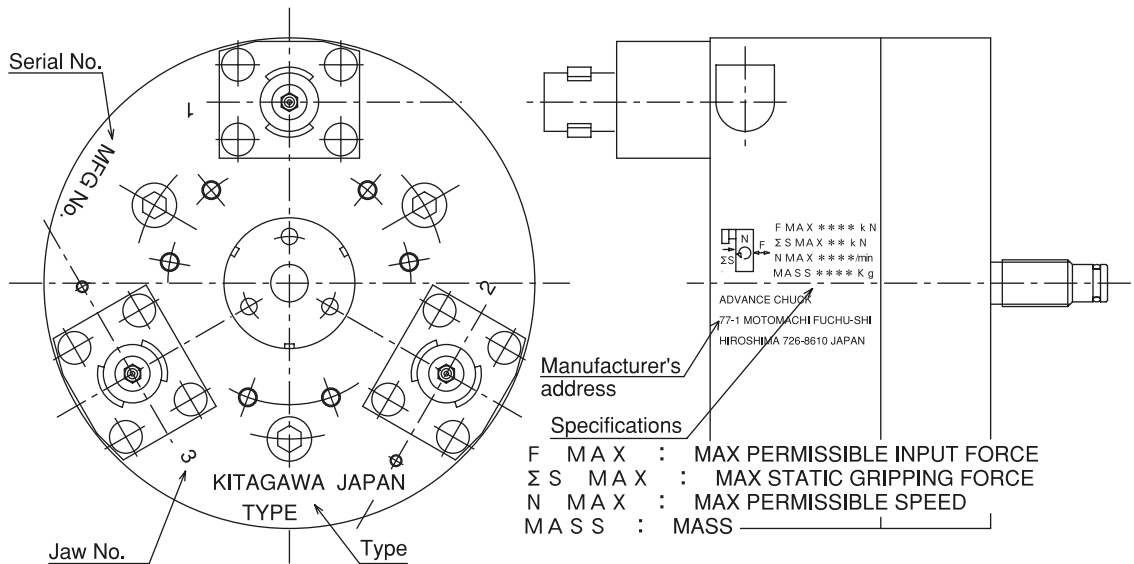


Fig.14

10-3. About disposal

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

MEMO

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