

INSTRUCTION MANUAL

MODEL KOG5-3

3-Jaw Toggle Gripper



DANGER

- This Instruction Manual has been prepared for intended use for production engineers and maintenance persons who operate this product. When the beginners use this product, be sure to receive the guidance from skilled persons, sales agents, or us in advance.
- Before installing, using, or maintaining this product, read carefully the safety precautions given in this manual so as to understand them completely. If you do not heed given instructions or safety precautions, serious human accidents, death, or physical damage may occur.
- Store this manual with care in the specified place at hand, and reread it as necessary for correct use of the product.
- Please contact the sales agent if you have any uncertainty or doubt about this manual.

Preface

This manual provides detailed information on the toggle gripper (model KOG5-3) so that you can understand its performance and functions and use it safely and correctly.

Before using this gripper, read this manual carefully to understand how to use the gripper correctly. Always follow the instructions and warnings given in “Important Safety Precautions” and “Precautions for Use”. Failure to follow these precautions could result in serious human accidents.

Terms and Symbols Used for Safety Messages

In this manual, handling precautions that are considered especially important are classified and displayed as shown below according to the degree of risk (seriousness of harm) that could result. Please completely understand the meaning of these terms and follow the instructions for safe operation.

Safety Alert Symbol

This triangle is a safety alert symbol used to alert you to potential safety hazards. To avoid death or injuries that could occur, follow the safety messages given with this safety alert symbol.



Indicates a hazardous situation which, if you do not heed given instructions, will result in death or serious injuries.



Indicates a hazardous situation which, if you do not heed given instructions, could result in death or serious injuries.



Indicates a hazardous situation which, if you do not heed given instructions, could result in minor or moderate injuries.



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

Disclaimer and How to Use Instruction Manual

This product is suitable for gripping a workpiece by being installed on the robot or loader. The product is equipped with the jaws to grip the workpiece and they are operated by air pressure. Please contact us for other applications.

Kitagawa Iron Works Co., Ltd. shall not be held liable for human accidents, death, damage, or loss that occurred due to a failure to follow the safety precautions given in this manual.

This manual does not predict all potential hazards in operation, inspection, and maintenance under all environmental conditions. There will be an infinite number of matters that cannot or must not be done, and it is impossible for the manual to cover all of them.

Therefore, the matters, unless otherwise mentioned clearly as “can be done” or “may be done” in this manual, should be considered as “cannot be done” or “must not be done”.

Please contact us or our agents if you have an uncertainty about safety when you try to perform operation, inspection, or maintenance not mentioned in this manual.

Warranty and Disclaimer

The product is warranted for one year after the date of delivery.

All parts used shall be those delivered by Kitagawa Iron Works. Kitagawa Iron Works shall not be held liable for human accidents, death, damage, or loss that occurred due to the use of parts which are not genuine parts manufactured by Kitagawa. Also, the use of parts other than Kitagawa’s genuine parts will void the warranty.

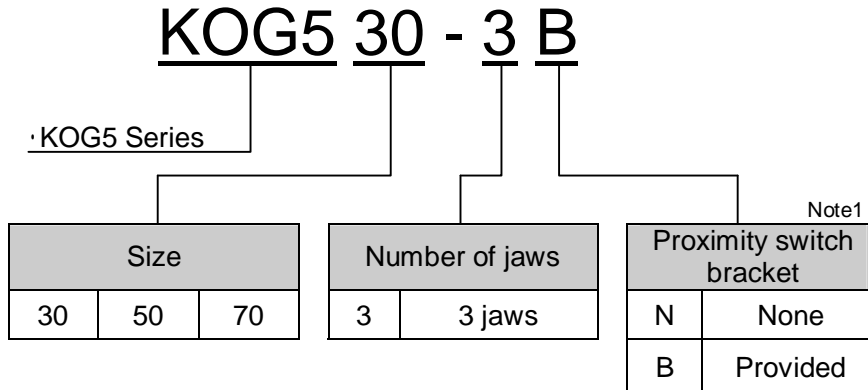
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1. Structural Drawing and Parts List

1-1. Model Indication

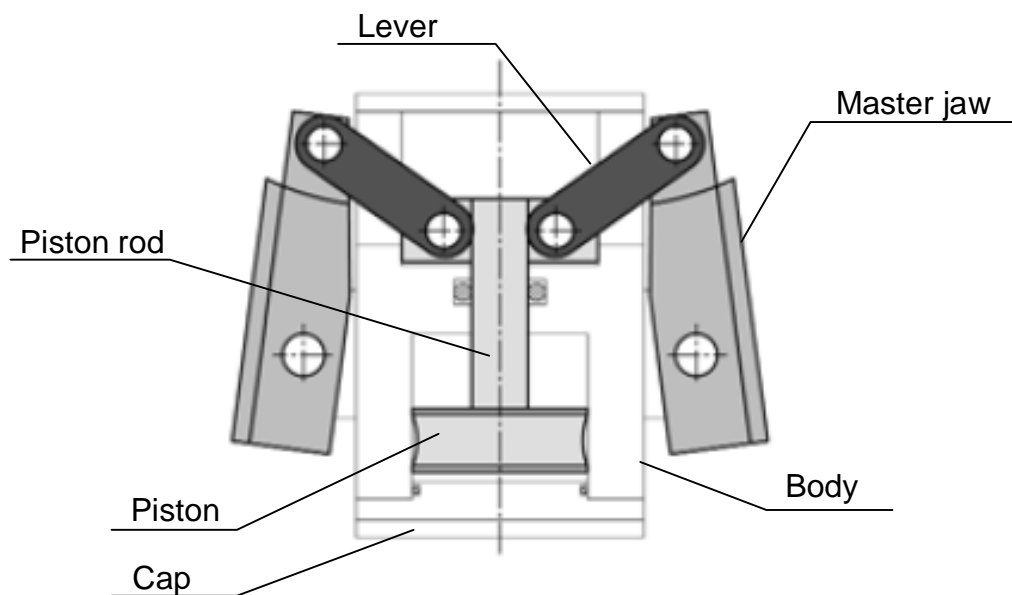
The model indication is as follows:



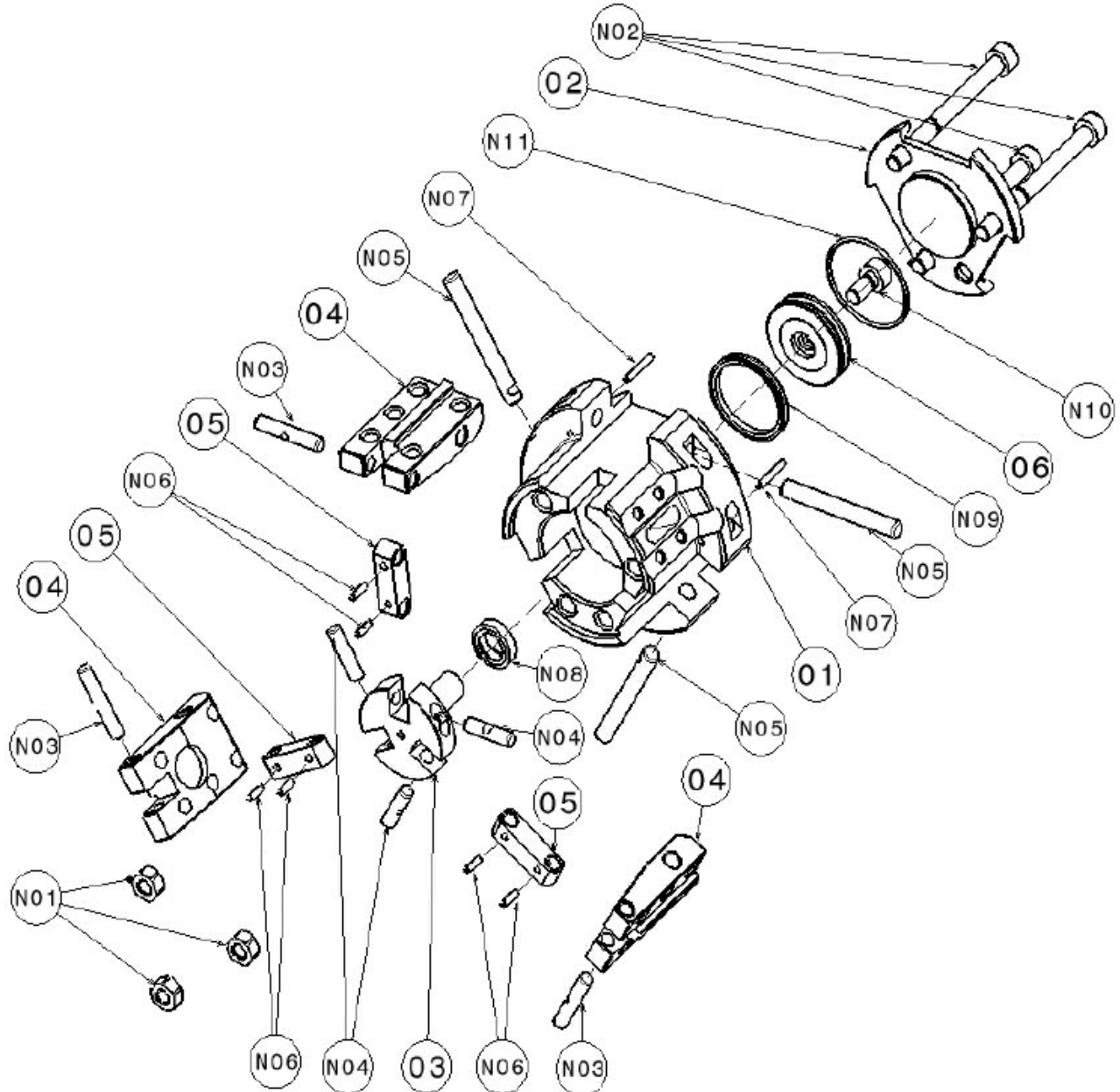
Note 1: This bracket is for mounting the proximity switch to check for jaw opening/closing.

If you select "bracket provided", 2 sets (open side and close side) are supplied.

1-2. Structural drawing



1-3. Parts list



No.	Parts name	Quantity	No.	Parts name	Quantity
01	Body	1	N04	Lever pin B	3
02	Cap	1	N05	Pin	3
03	Piston rod	1	N06	Spring pin A	6
04	Master jaw	3	N07	Spring pin B	3
05	Lever	3	N08	Shaft packing	1
06	Piston	1	N09	Piston packing	1
N01	Nut	3	N10	Piston fixing bolt	1
N02	Gripper fixing bolt	3	N11	Cap packing	1
N03	Lever pin A	3			

2. Important Safety Precautions

Important safety precautions that particularly you should know or follow are summarized below. Please read them before starting to use the product.



DANGER

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

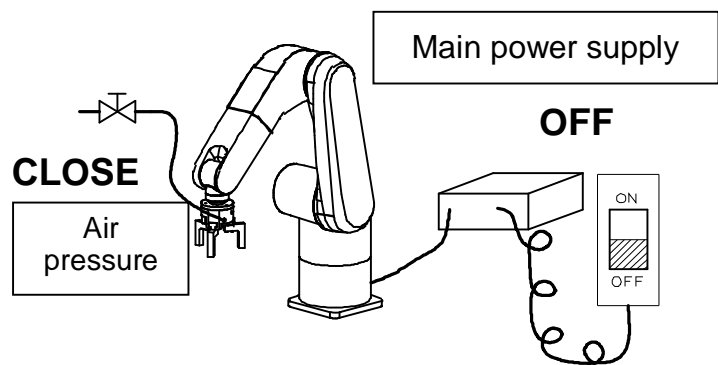


Shut down the air pressure and main power supply in the work area when installing, checking, oiling, or replacing the gripper.

During work, the gripper or robot could move abruptly.

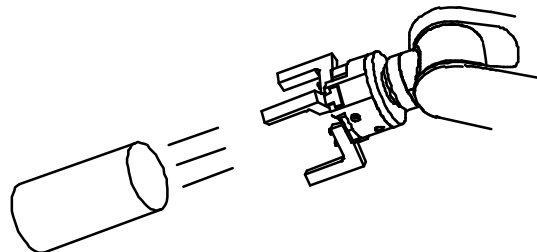
After shutting down the air pressure, release the residual pressure.

During work, preclude possible access by outsiders.



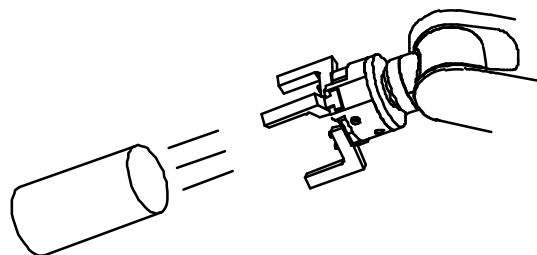
Do not use the equipment exceeding its capacity.

The gripper could be damaged or the workpiece could fly out.



Take measures so that the operator is not injured even if the workpiece fall due to the reduced air pressure.

Take measures such as installation of safeguards or fall preventive covers.





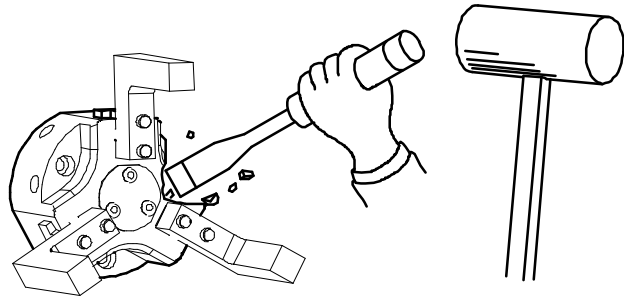
DANGER

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



Do not modify the product not mentioned in this instruction manual.

Using the modified product could cause unexpected accidents.



Be sure to tighten the bolts with the specified torque.

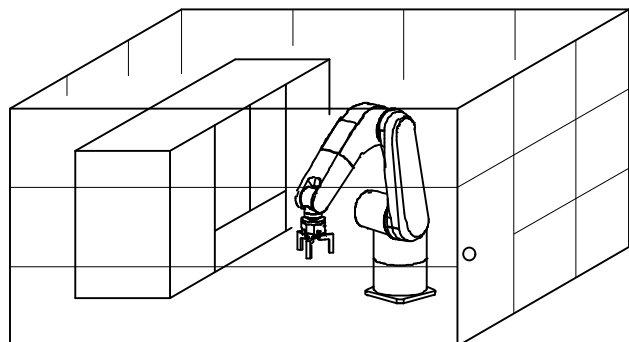
Lack of bolt quantity or tightening torque, or excessive torque could damage the bolt, causing the gripper or workpiece to fly out.

Bolt Size	Tightening torque		Bolt Size	Tightening torque	
M3	1.0	N·m	M10	36.0	N·m
M4	2.0	N·m	M12	58.5	N·m
M5	4.5	N·m	M14	68.4	N·m
M6	7.65	N·m	M16	115.0	N·m
M8	18.0	N·m	M18	116.0	N·m



Use the gripper in accordance with the legal safety standards.

Use the gripper in accordance with the legal safety standards of each country, such as installation of safeguards or safety covers.





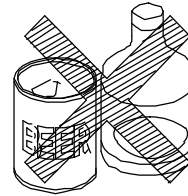
WARNING

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



Do not operate the machine after drinking alcohol or taking medicine.

Impaired judgment or operation mistake may cause serious hazards.



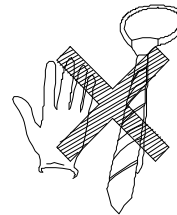
Alcohol

Medicine



Do not wear clothing or accessories such as a necktie, necklace, etc. which are easy to be caught in.

You may be caught in the gripper.



3. Specifications

3-1. Specification table

Model	KOG		
	530-3	550-3	570-3
Fluid used	Air		
Operating pressure (MPa)	0.2 to 0.8		
Lubrication	Oilless		
Operating temperature range ()	5 to 60		
Opening angle (both sides) (°)	15	15	17
Internal volume (reciprocating) (cm ³)	8.5	19	76.5
Repeatability (mm)	± 0.05		
Body Mass (kg)	0.5	0.9	3.8
Operating humidity range (%)	30 to 95		
Storage temperature range ()	-10 to 60		
Noise level (dB)	79		

*Noise level is measured at a distance of 1m from the gripper in front, rear, left, and right four positions of the gripper.

3-2. Gripping force

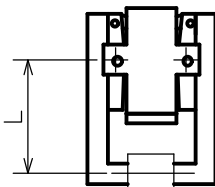
(1) Standard for selecting a model

Select the model that provides a gripping force 10 to 20 times the workpiece weight, though a gripping force varies depending on the shape or friction coefficient between jaws and workpiece. Also, select a model having larger gripping force if large acceleration or shock acts.

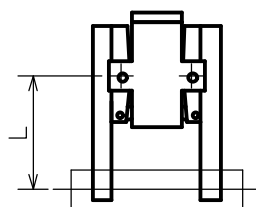
(2) Gripping force

The specified gripping force could be output when gripping the workpiece at 1 ° open position of the master jaw due to the toggle mechanism of this product. If gripping the workpiece at more than 1 ° open position of the master jaw, the gripping force should be significantly smaller than specified. Also, be reminded that the installing side is different according to external gripping or internal gripping.

External gripping



Internal gripping

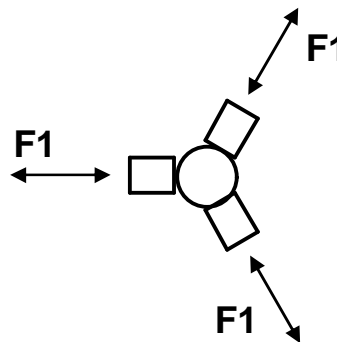


L : Distance up to a grip point(mm)

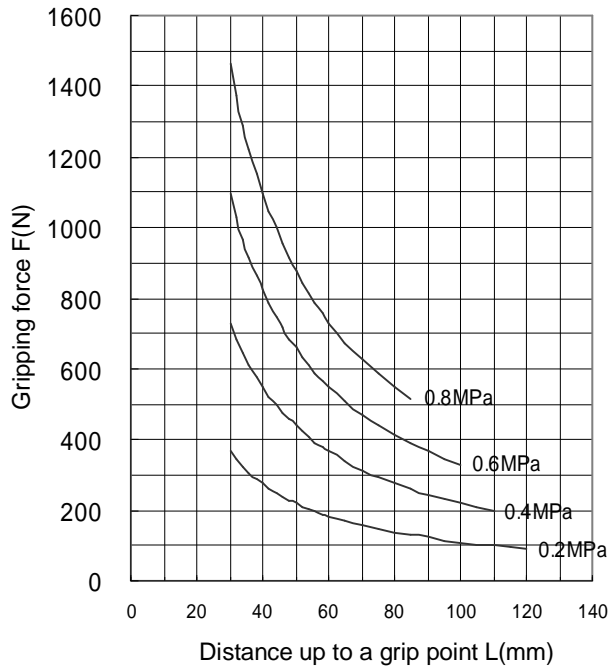
Expression of gripping force

The gripping force F on the graph on the next page shows actual measured gripping force per jaw × the number of jaw when gripping the workpiece at 1 ° open position.

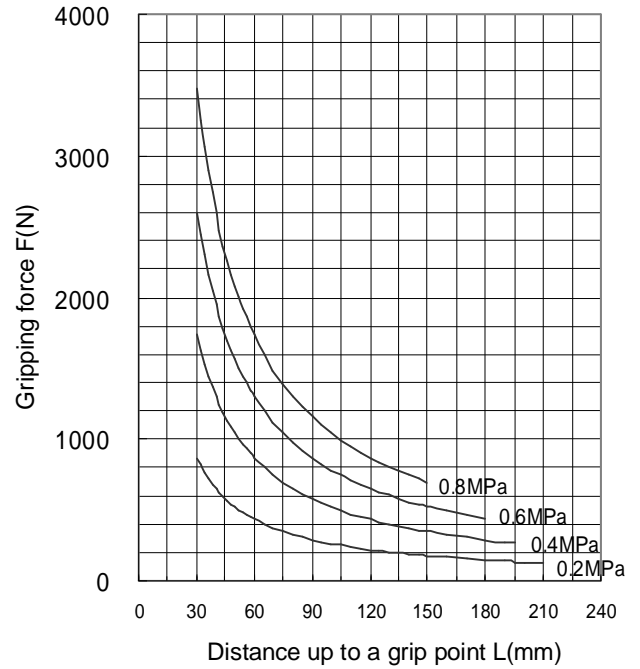
$$(F=F1 \times 3)$$



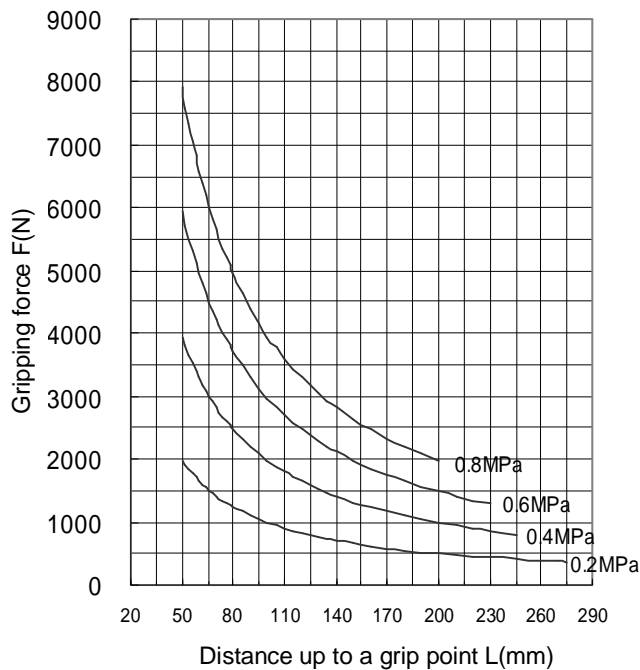
KOG530-3



KOG550-3



KOG570-3



NOTICE

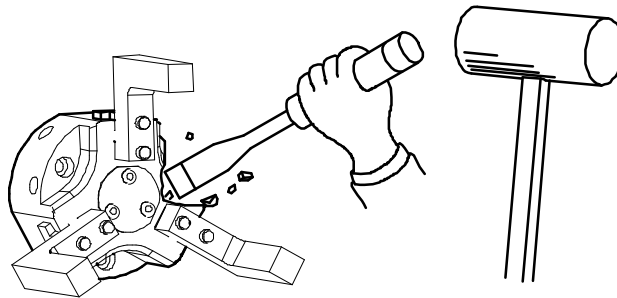
Determine the distance up to a grip point L as short as possible when designing the jaws. Also, the distance up to a grip point L should be used within a range shown in graph. If it is used out of the range, the specified gripping force may not be obtained or the wear of sliding parts may be increased.

4. Use

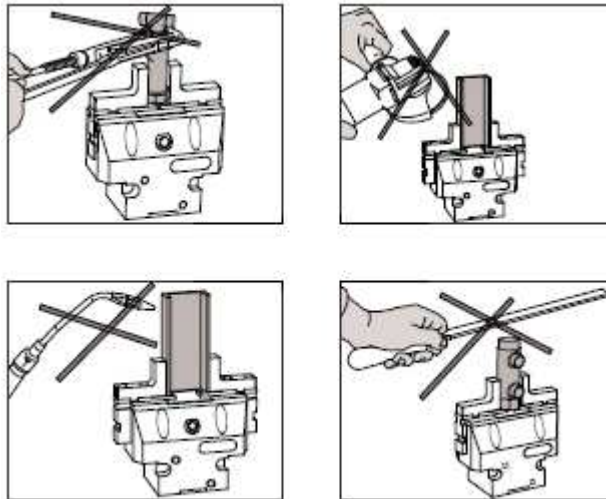
This product supplies pneumatic pressure to the unit to move the jaws to close side or open side for gripping the workpiece and transfers the workpiece up to any location. After transfer, the jaws are moved to open side or close side for removing the workpiece.

DANGER

Do not modify the product not mentioned in this instruction manual. Using the modified product could cause unexpected accidents. Kitagawa shall not be held liable for human accidents, death, damage, or loss that occurred due to the modification.



Do not use the gripper as a workpiece fixture when the workpiece is drilled, deburred, welded, or modified additionally.



WARNING

Wear appropriate clothing suitable for the work and wear gloves, safety glasses, safety shoes, and helmet.

- Wearing inappropriate clothing causes the clothing to be stuck, resulting in danger.
- Appropriate clothing will be preventive measures to prevent hazards due to the carelessness or unexpected accidents during work.

NOTICE

Do not use the product in the environment of corrosive chemicals, corrosive gas, dust, and vibration, avoiding high temperature or direct sunlight.

When storing the product, apply antirust treatment and then store it in a place free from water leakage, dew condensation, or freeze.

5. Installation

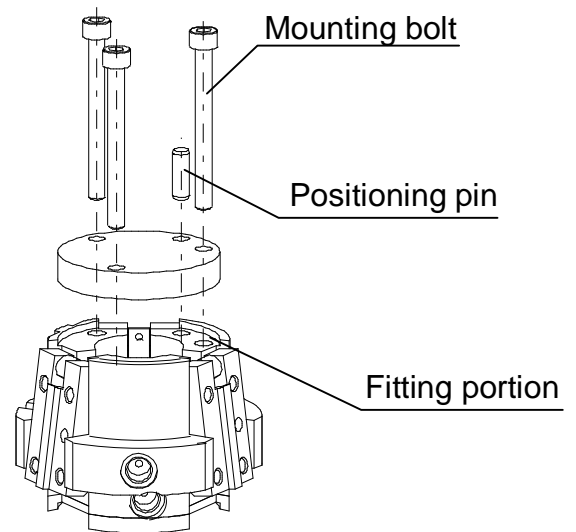
5-1. Installing the gripper body

(1) External gripping

Install the gripper body using three mounting bolt holes, one positioning pin hole, and fitting portion.

Use the provided mounting bolts for installing the gripper body.

The positioning pin is to be prepared by the customer.



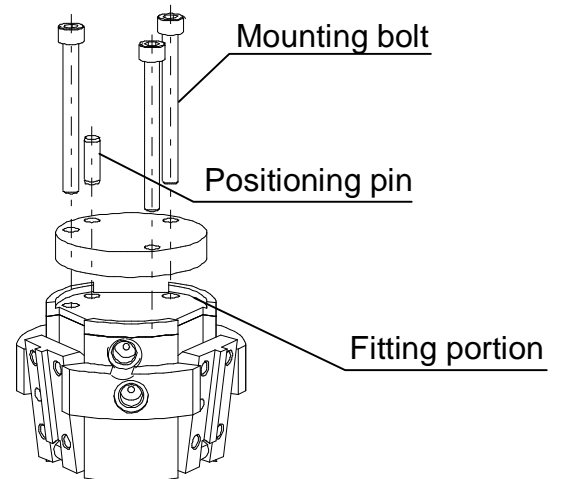
Model	KOG	530-3	550-3	570-3
Mounting bolt size		M5	M6	M8
Positioning pin hole	Diameter (mm)	5	6	8
	Depth (mm)	6	10	12

(2) Internal gripping

Install the gripper body using three mounting bolt holes, one positioning pin hole, and fitting portion.

Use the provided mounting bolts for installing the gripper body.

The positioning pin is to be prepared by the customer.



Model	KOG	530-3	550-3	570-3
Mounting bolt size		M5	M6	M8
Positioning pin hole	Diameter (mm)	5	6	8
	Depth (mm)	6	10	12

! DANGER

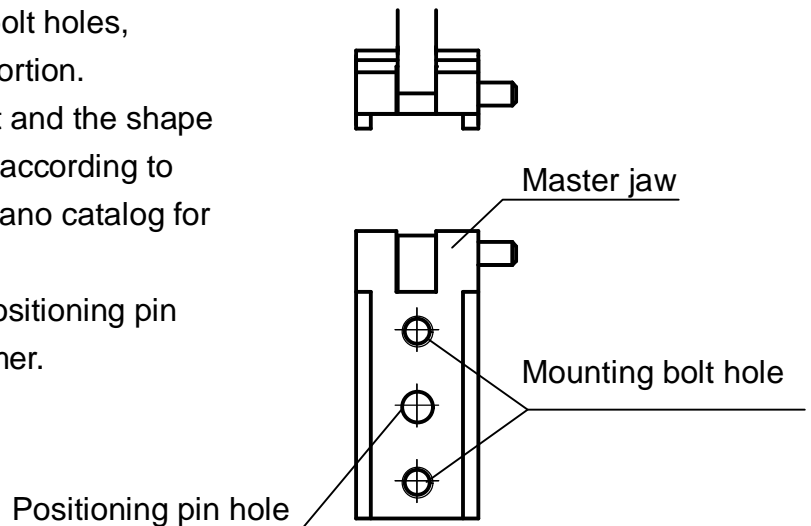
Be sure to tighten the bolts with the specified torque. Lack or tightening torque or excessive torque could break the bolt, causing the gripper or workpiece to fly out.

5-2. Installing the jaws

Install the jaws using mounting bolt holes, positioning pin hole, and fitting portion.

The number of the mounting bolt and the shape of the fitting portion are different according to the model, and refer to the Promano catalog for details.

The jaws, mounting bolts, and positioning pin are to be prepared by the customer.



! DANGER

Be sure to tighten the bolts with the specified torque. Lack or tightening torque or excessive torque could break the bolt, causing the jaw or workpiece to fly out.

Before installing the jaws, disconnect the air piping.

5-3. Installing the switches

(1) Installing the proximity switch

Install the proximity switch bracket on the side face of the body and install the proximity switch into the bracket.

Adjustment of close position

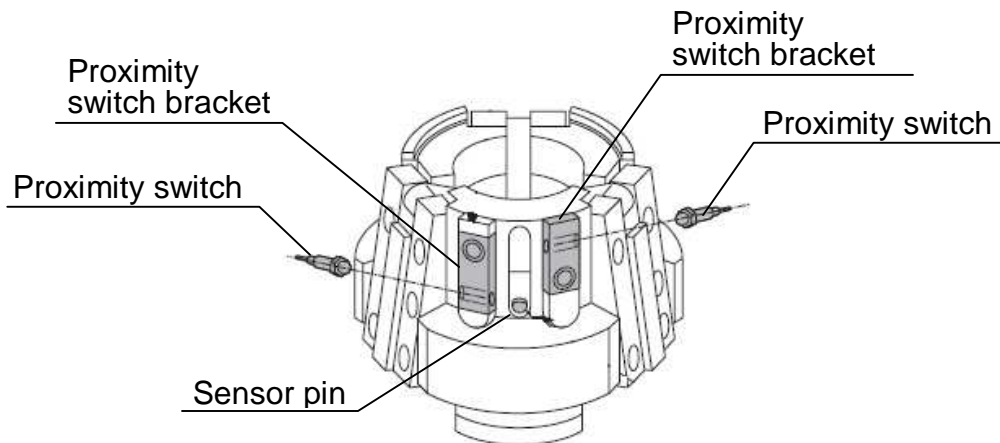
- Move the master jaw to the close position.
- Adjust the positions of the proximity switch bracket so that the switch detects the sensor pin.
- Open and close the master jaw to confirm that the switch detects it.

*In the case of workpiece external gripping, make the above-mentioned adjustment with the workpiece gripped.

Adjustment of open position

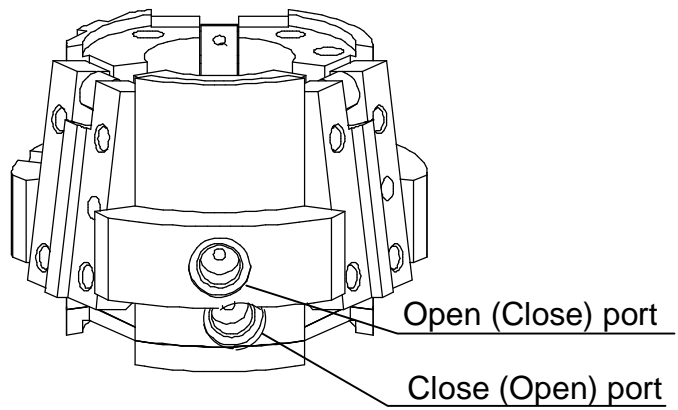
- Move the master jaw to the open position.
- Adjust the positions of the proximity switch bracket so that the switch detects the sensor pin.
- Open and close the master jaw to confirm that the switch detects it.

*In the case of workpiece internal gripping, make the above-mentioned adjustment with the workpiece gripped.



5-4. Air pipe connection

Connect the air pipes to the open and close ports shown in the right figure.



Model	KOG	530-3	550-3	570-3
Port size		M5	G1/8	G1/8



Shut off the air piping paths when the air pipes are connected.

6. Maintenance and Checking

6-1. Periodic checking

- Before work or at the grease supply, move the jaws over full stroke to check that the jaws are within the full stroke range.
- At the end of work, clean the gripper body and sliding surfaces with an air gun.
- At least every three months, check that respective bolts have been tightened.

6-2. Maintenance interval

- The interval between maintenance is 1 million cycles. After 1 million times open and close, disassemble the gripper, and clean, inspect, replace the seals, apply grease, and reassemble the gripper.

6-3. Grease supply

(1) Filling location

- Supply grease from the front face. After that, open and close the jaws several times without gripping the workpiece.

(2) Grease used

- Be sure to use the specified grease listed below. If unspecified grease is used, adequate effect may not be obtained.

Brand	Manufacturer
CHUCK GREASE PRO	Kitagawa genuine grease (Kitagawa sales agents in each country)
Kitagawa Chuck Grease	Former Kitagawa genuine grease (not available at present)
Molykote EP Grease	Toray Dow Corning: Japan domestic only
Chuck-EEZ Grease	Kitagawa-NorthTech Inc. : North America territory
Molykote TP-42	Dow Corning: Europe and Asia territories
Klueber Paste ME31-52	Klueber Lubrication: Whole world

(3) Supply frequency

- Supply the grease once per 1 million cycles.
- Increase the supply frequency according to the operating conditions such as the use of large quantity of water-soluble coolant.



Grease supply is important to use the grease for a long period of time under best condition. Lack of grease supply will cause reduced gripping force, operation failure due to low pressure, reduced gripping accuracy, abnormal wear, or seizure. Reduced gripping force causes the workpiece to fly out.

(4) Safety information on grease and antitrust oil

Scope of application

- Specified grease
- Antitrust oil applied to the product at delivery

First-aid treatment

- **Aspiration:** In case of much aspiration, go to a place where there is fresh air, and cover your body with a blanket to keep your body warm. Consult a doctor if necessary.
- **Sticking to your skin:** Wipe off the oil, and wash your skin with water and soap. If you feel itchy or you get inflamed, consult a doctor immediately.
- **Entering your eye:** Wash your eye with fresh water for at least 15 minutes, and then consult a doctor.
- **Accidental drinking:** Consult a doctor immediately without vomiting forcibly.
- **For the grease other than the specified one and antitrust oil prepared by the customer,** refer to the safety information prepared for respective oils.

6-4. Disassembly

Disassembly procedure

By referring to the parts list on page 5, disassemble the product through the procedure below:

- (1) Disconnect the air piping.
- (2) Loosen the gripper fixing bolt (No.N02) and remove the cap (No.02).
- (3) Loosen the piston fixing bolt (No.N10) and remove the piston (No.N06).
- (4) Remove the spring pin B (No.N07) and remove the pin (No.N05).
- (5) Remove the piston rod (No.03), master jaw (No.04), and lever (No.05).
- (6) Remove the spring pin A (No.N06) and remove the lever pin A (No.N03) and lever pin B (No.N04).
- (7) Remove the master jaw (No.04) and lever (No.05).

Reassemble the product through reverse procedure of disassembly while applying the grease.



Be sure to tighten the bolts with the specified torque. Lack or tightening torque or excessive torque could break the bolt, causing the workpiece to fly out.

7. Troubleshooting

7-1. Gripper is faulty

Check the following, and take corrective actions.

Symptom	Cause	Corrective actions
Gripper does not operate	Gripper internal part is broken	Disassemble, and replace broken part
	Slideways get seized	Disassemble, and correct the seized part with an oilstone, or replace the part
	Cylinder does not operate	Check if the air pressure is within the operating pressure range
		Check for air leakage
	Check the piping and solenoid valve, and if normal, disassemble and clean the cylinder	
Switch is faulty or mounting failure	Check if the switch operates normally	
Lack of master jaw stroke	Much dust exists in master jaws	Disassemble and clean the gripper
Low gripping force	Air pressure is low	Set the air pressure within operating pressure range
	Air leaks from the seal	Disassemble and replace the seal
	Master jaw movements are not smooth	Supply grease from grease nipple, and open and close the master jaws several times without gripping the workpiece
		Disassemble and clean the gripper



WARNING

If the gripper failed due to a seizure or damage, disassemble the gripper following the disassembly procedure. If the gripper is in the state that you cannot disassemble, do not disassemble it forcibly but please contact us or our agents.

Stop using the gripper immediately if the situations are not improved though corrective actions given in above table were taken. Continuous use of faulty product or part could cause serious human accidents due to flying gripper or workpiece.

The gripper must be repaired only by skilled persons who have received the training course. Repair by unskilled persons or persons other than us or our agents could cause serious human accidents.

7-2. Contact address in case of trouble

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

8. Others

8-1. Standards and directives to which the gripper conforms

This product conforms to the following standards and directives:

- Machinery Directive:2006/42/EC Annex I
- EN ISO 12100-1:2003+A1:2009
- EN ISO 12100-2:2003+A2:2009

8-2. Disposal of gripper

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



<http://www.mta.kiw.co.jp>

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2012.08.