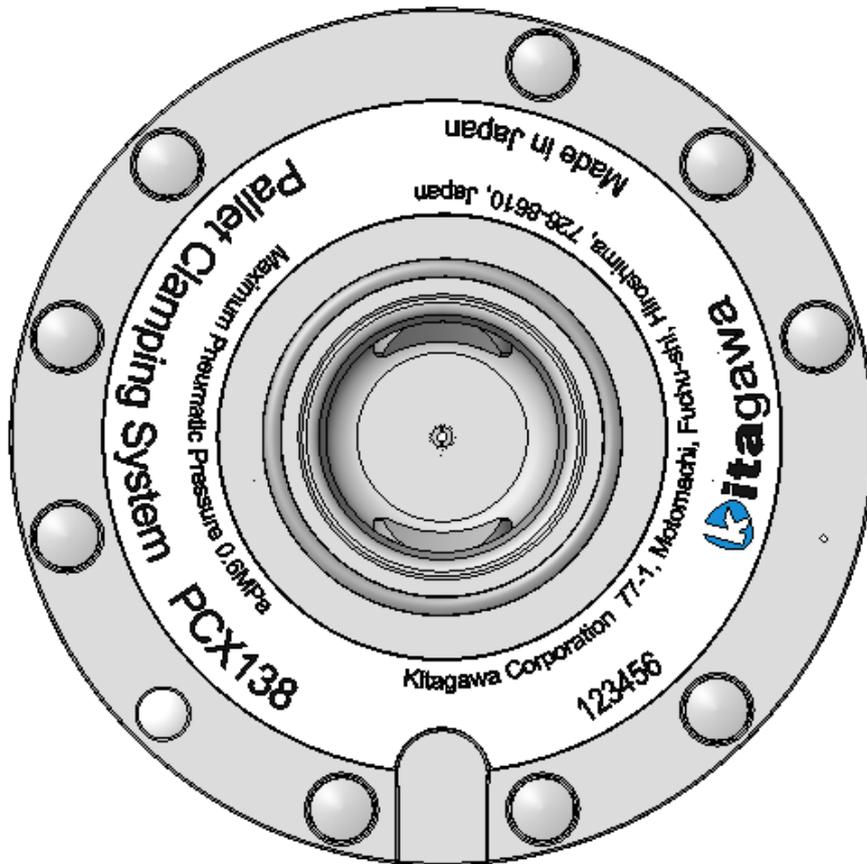


INSTRUCTION MANUAL

PCX138

Pallet Clamping System



Kitagawa Corporation

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

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1. Preface

1.1. How to Use This Manual

- This manual provides detailed information on this product so that you can understand its performance and functions and use it safely and correctly. Before using this product, be sure to read this manual carefully to understand how to use it correctly.
- This manual has been prepared for intended use for persons in charge of installation, operation, inspection, and maintenance of this product. When the beginners use this product, be sure to receive the guidance from skilled persons, sales agents, or us in advance.
- Store this manual with care in the specified place at hand, and reread it as necessary for correct use of the product.
- This manual is a part of the product. Do not sell or transfer the product to a third party without attaching this manual.
- Read the section "Important Safety Precautions" at Chapter 2 of this manual especially carefully, which summarizes precautions that particularly you should know or follow.
- Failure to follow the instructions and warnings in this manual could result in serious human accidents. Kitagawa shall not be held liable for human accidents, death, damage, or loss that occurred due to a failure to follow this manual.
- This manual does not predict all potential hazards in installation, operation, maintenance, and inspection under all environmental conditions. Therefore, the matters, unless otherwise mentioned clearly as "can be done" or "may be done" in this manual, should be considered as "cannot be done" or "must not be done".
- Please contact us or our agents if you have an uncertainty about safety when you try to perform installation, operation, inspection, or maintenance of the product.
- The information and product specifications described in this manual are subject to change without notice for the purpose of improvement.

1.2. Signal Word Definition

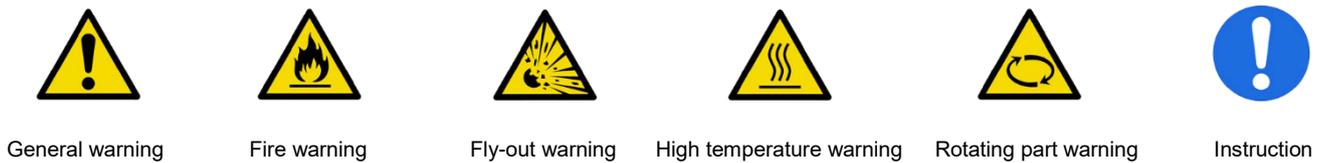


The triangle shown on the left indicates warning. The warning signs are used to alert you to potential safety hazards. To avoid death or injuries that could occur, follow all the instructions given with the warning signs.

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

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

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



1.3. Type Designation

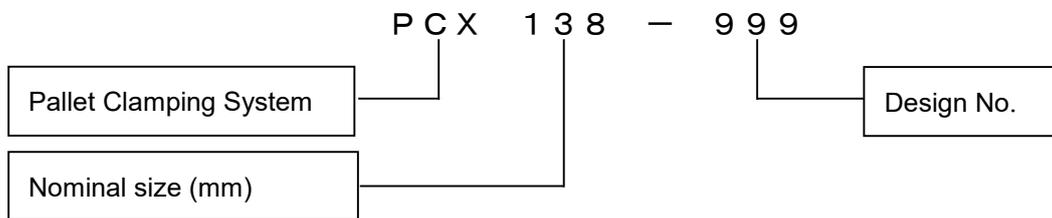


Figure 1 Type designation

1.4. Application Purpose of This Product

The pallet clamping system is mounted on machine tools such as a machining center, and can quickly secure and position jigs and workpieces installed to pallets. The pallet clamping system has clamping jaws to secure pallets and are operated by a built-in air cylinder. For any other applications, please contact us.

1.5. Unacceptable Application Example

The pallet clamping system is not designed for the applications mentioned below for example.

- To be used for turning or installed on the spindle of a lathe.
- To use for grinding and electrical discharge machining.
- To use as a tool holder
- To suspend or transfer an object

1.6. Structural and Function

- The pallet clamping system can be mounted on a machining center table, etc. via an adapter. The clamping jaws, which are opened and closed by the built-in air cylinder, secure the pallet by pulling in the clamping pin installed on the end face of the pallet.
- The pallet can be positioned with high precision by being restrained by two surfaces: the end face and the taper.
- The built-in air cylinder has spring force applied to the clamp side, so it can be used separately from the air source during machining. It is also possible to increase the pull down force (turbo grasp) by supplying air to the clamp side.
- When using only one pallet clamping system, a torque pin (or key) installed on the end face of the pallet takes care of the moment around the center axis generated from machining load, etc. It is also possible to secure a larger pallet by using multiple at the same time.

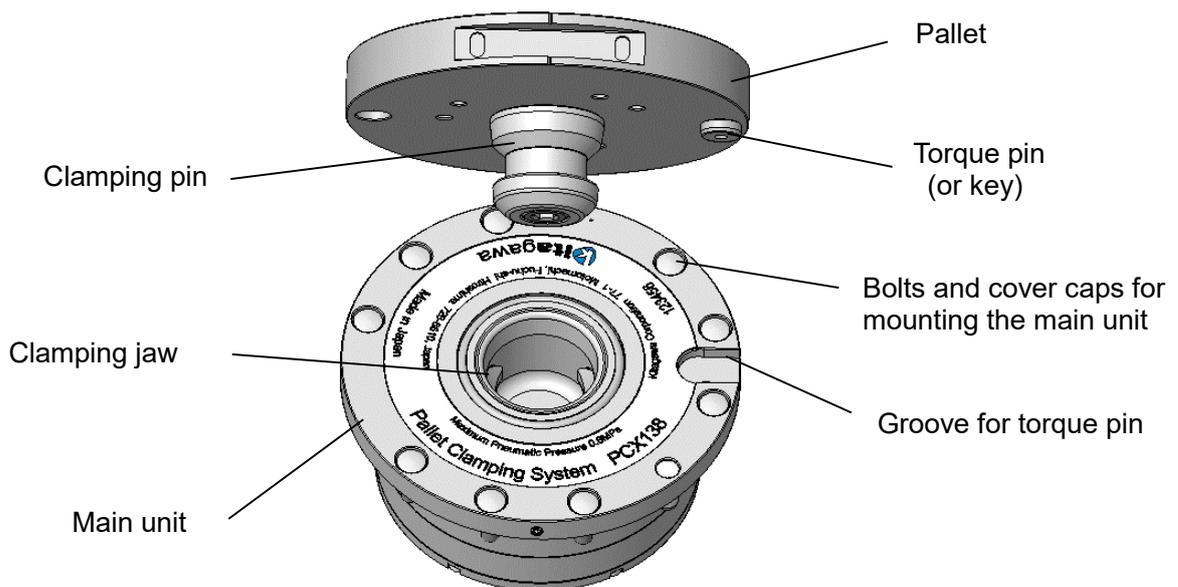


Figure 2 Structural drawing

1.7. Product Range

- This is the instruction manual for the pallet clamping system.

For other peripheral devices, refer to their respective instruction manuals.

1.8. Warranty

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

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

1.9. Parts List

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

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

Table 1 Standard delivery range

No.	Parts name	Quantity	No.	Parts name	Quantity
1	Main unit (Body)	1	6	O-ring G 45 *1	1
2	L (Clamping jaw)		7	O-ring P 6 *1	3
3	L (Cover) ★ Disassembly Prohibited		8	Knock pin $\phi 8 \times 20$	1
4	Orifice set screw	1	9	Hex. socket head cap screw	9
5	Set screw M5×5	1	10	Cover cap *1	9

Table 2 Main optional parts (Paid item)

No.	Parts name	No.	Parts name
21	Clamping pin A	24	Torque pin
22	Clamping pin B	25	Protection cover
23	Clamping pin C		
31	Pallet (for additional machining, round, S45C)	33	Pallet (for additional machining, square, S45C)
32	Pallet (for additional machining, round, A2017)	34	Pallet (for additional machining, square, A2017)

*1 : Consumables

*2 : Optional pallets for additional machining have thickness variation of about 0.05 mm. If accuracy is required, additional machining should be performed.

Refer to the website and the respective outside view drawings for details.

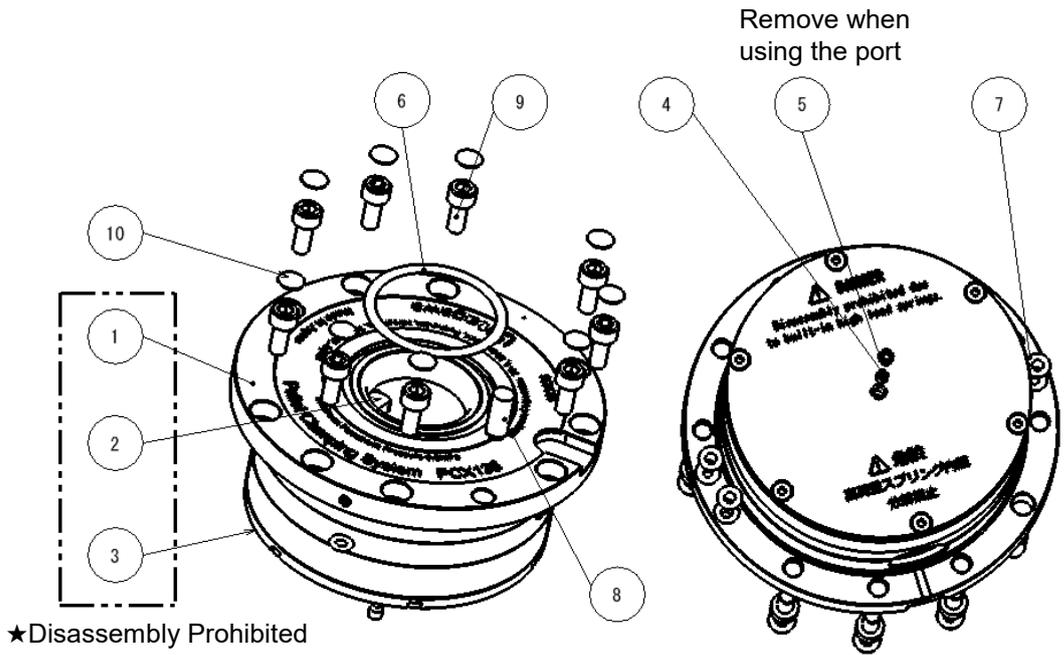


Figure 3 Standard delivery range

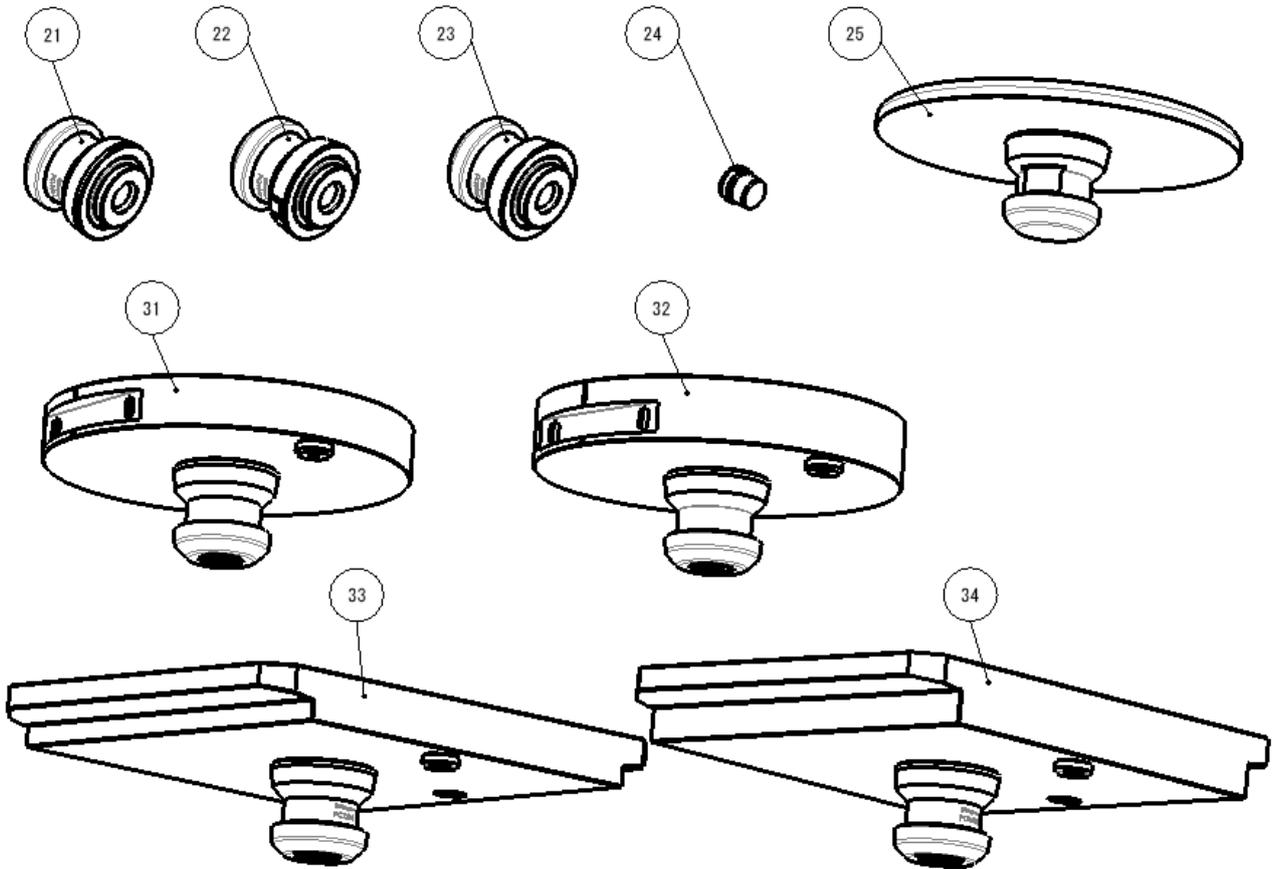


Figure 4 Main optional parts



2. Important Safety Precautions

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

Please read them before starting to use the product.



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



Turn off the main power supply of the machine when mounting, inspecting or replacing.

- If the machine operates unintentionally, it is dangerous if your body or clothes are caught in it.



Do not rotate the tool with the door open.

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

- If the door is not closed, it is dangerous for your body or clothing to get caught in the rotating tool.



If the clamping pin axis is horizontal or used overhead, use appropriate lifting equipment or take measures to prevent the pallet from falling off before unclamping.

- Danger of being crushed by a falling pallet.



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



When installing and removing the pallet, be careful not to get your fingers caught. Provide handles, etc. on the pallet so that it can be installed and removed in a safe position. Also, do not insert your fingers into the center hole of the clamping pin.

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



If a tool collides due to malfunction or programming error, immediately stop operation, carefully inspect each part for damage or cracks, and repair or replace if necessary.

- The impact may have caused damage or cracks in the parts. Continuing to use a defective product can lead to damage, resulting in the pallet falling off and being crushed, or the workpiece flying off, creating a danger.



Do not use for turning. When mounting on an NC rotary table, use it at 200min⁻¹ or less.

- Danger due to damage and scattering of workpiece or product.



Do not open the back cover. (Disassembly prohibited)

- There is a danger that the cover will fly out due to the highly preloaded springs.
- Contact us or our agents for repair at a charge.



Do not perform additional machining on the main unit.

- Danger due to damage and scattering of workpiece or product.



Wear protective equipment appropriate for each task. Especially helmets, safety shoes, safety glasses, etc.

- There are risks of bruises from flying or falling workpiece, and loss of eyesight from flying chips.



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

- Otherwise, your body or clothing may be entangled.



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

- Impaired judgment or operation mistake may cause serious hazards.



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

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

- If insufficient bolts are installed, bolt length is wrong, or tightening torque is improper, the bolts may be damaged, causing the products and workpiece to fly out.

Table 3-1 Specified torque (Female thread material is steel)

Bolt	Strength classification	Specified torque [N·m]
Hex. socket head cap screw M6×14 [9]	A2-70	8
Clamping pin installing bolt M10	12.9	73
Clamping pin installing bolt M12	12.9	107

Table 3-2 Specified torque (Female thread material is aluminum)

Bolt	Strength classification	Specified torque [N·m]
Clamping pin installing bolt M10	12.9	58



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



Do not touch machined workpiece with bare hands.

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



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

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

3. Specifications

Table 4 Specification table

Type		PCX138
Pull down force (spring grasp)	kN	7
Pull down force (0.6MPa / turbo grasp)	kN	24
Air pressure required for unclamping	MPa	0.5 or more
Maximum allowable air pressure	MPa	0.6
Repeatability	μm	5
Mass	kg	3.9
Storage temperature / operating temperature *1	°C	-20~+50 / -10~+40
Allowable moment of the pallet *2 (Rotation direction around central axis F×L)	N · m	130
Allowable moment of the pallet *2 (Toppling direction of pallet F×H) *3	N · m	440

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

*2 : Refer to Figure 5 and set the machining conditions taking into consideration the appropriate safety factor. External load F is machining load, gravity, load applied to the clamp jig, etc.

*3 : Even if it is below the allowable value, the displacement of the workpiece on the pallet will increase as the moment applied to the pallet increases, so determine the machining conditions through trial machining.

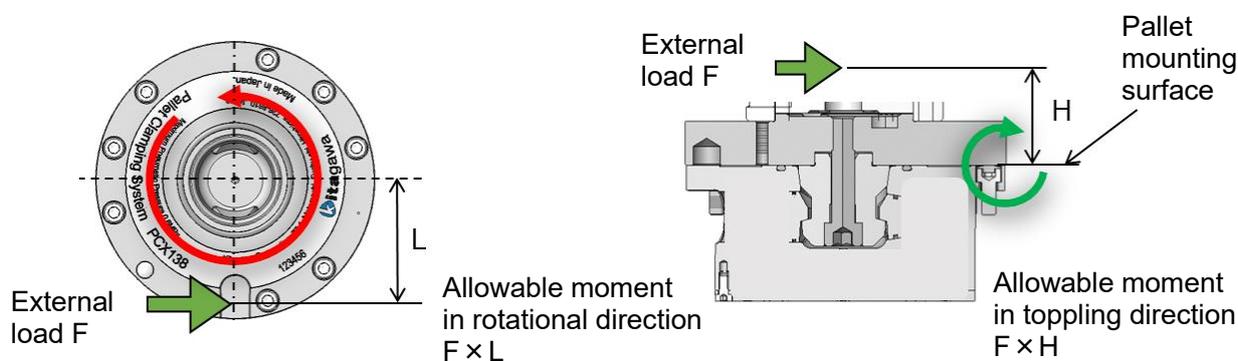


Figure 5 Allowable moment model of the pallet

Notice

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



Do not use clamping pins made by other companies.

- It causes poor accuracy.



When replacing pallets using lifting equipment or robots, lift perpendicular to the surface to install the pallet.

- If the pallet is tilted when lifting, the clamping pins will interfere with the pallet clamping system, resulting in damage to parts and poor accuracy.

4. Maintenance and Inspection

4.1. Periodic Inspection

Table 5 Periodic inspection

Interval	Contents
Every day	<ul style="list-style-type: none"> ● Before starting work, confirm that the clamping jaws move smoothly. ● Before starting work, visually check for any damage or other abnormalities. ● Clean up with an air gun after work is completed.
Every 3 months	<ul style="list-style-type: none"> ● Check that all bolts are not loose.

4.2. Grease Used

Chuck Grease Pro is applied before shipping. There is no need to apply grease to the inside of the product.

4.3. Safety Information on Grease and Antirust Oil

Applicable range

- Antirust oil and grease applied to the product before shipping.

For antirust oil prepared by the customer, refer to the safety data sheet (SDS) prepared for antirust oils.

Table 6 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.

5. Troubleshooting and Countermeasure

5.1. Troubleshooting and Countermeasure

- If a failure is suspected, check the contents in Table 7 again and take countermeasure.
It is not a failure if the pallet moves slightly away from the surface of the pallet clamping system when unclamping.
- The pallet clamping system has a built-in springs with a high preload, so do not disassemble it yourself.
contact us or our agents as we will overhaul it for a fee.

Table 7 Troubleshooting and countermeasure

Problem	Cause	Countermeasure
Do not move	Air pressure is low.	Supply at least 0.5MPa.
	The turbo grasp port is closed with air pressure applied.	When unclamping, use an air circuit that exhausts air from the turbo grasp port.
	Part is damaged.	Call for repair.
	The O-ring on the surface of the pallet clamping system has been damaged, causing the pallet to not separate.	Hit the pallet with a plastic hammer to remove it and replace the O-ring.
Stroke is insufficient	Air pressure is low.	Supply at least 0.5MPa.
	The turbo grasp port is closed with air pressure applied.	When unclamping, use an air circuit that exhausts air from the turbo grasp port.
	Chips have accumulated inside.	The O-ring is suspected to be damaged, so call for repaired.
Accuracy failure	Dust accumulates on the surface where the pallet is installed and taper.	Clean it and repair any scratches.
	The bolts is loose.	Replace the bolts and tighten them to the specified torque. (Refer to page 3.)
	Large gap between torque pin and groove.	Use the optional torque pin. If higher precision is required, measure the groove dimension and fabricate torque pin in kind.
	The moment applied to the pallet is large.	Reduce the external load applied to the pallet (e.g., machining load) or the height at which the external load is applied (e.g., height of the machining area).



Warning

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



If there are signs of failure or abnormality, stop using the product immediately and have it repaired or replaced.

- Continuous use of faulty parts may causing the pallet to fly out.

5.2. Contact Information In Case Problem Occurs

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

6. Installation

6.1. Adapter Design

- An example of an adapter design is shown in Figure 6-1. The ports for unclamping and turbo grasp are necessary, and the other two ports can be used as needed. When using the center port, remove the set screw [5].
- When mounting multiple pallet clamping systems, the tolerance of the mounting pitch X must be within ± 0.015 mm as shown in Figure 6-2. In addition, the mutual difference from the table top surface to the surface of each pallet clamping system must be 0.020 mm or less.

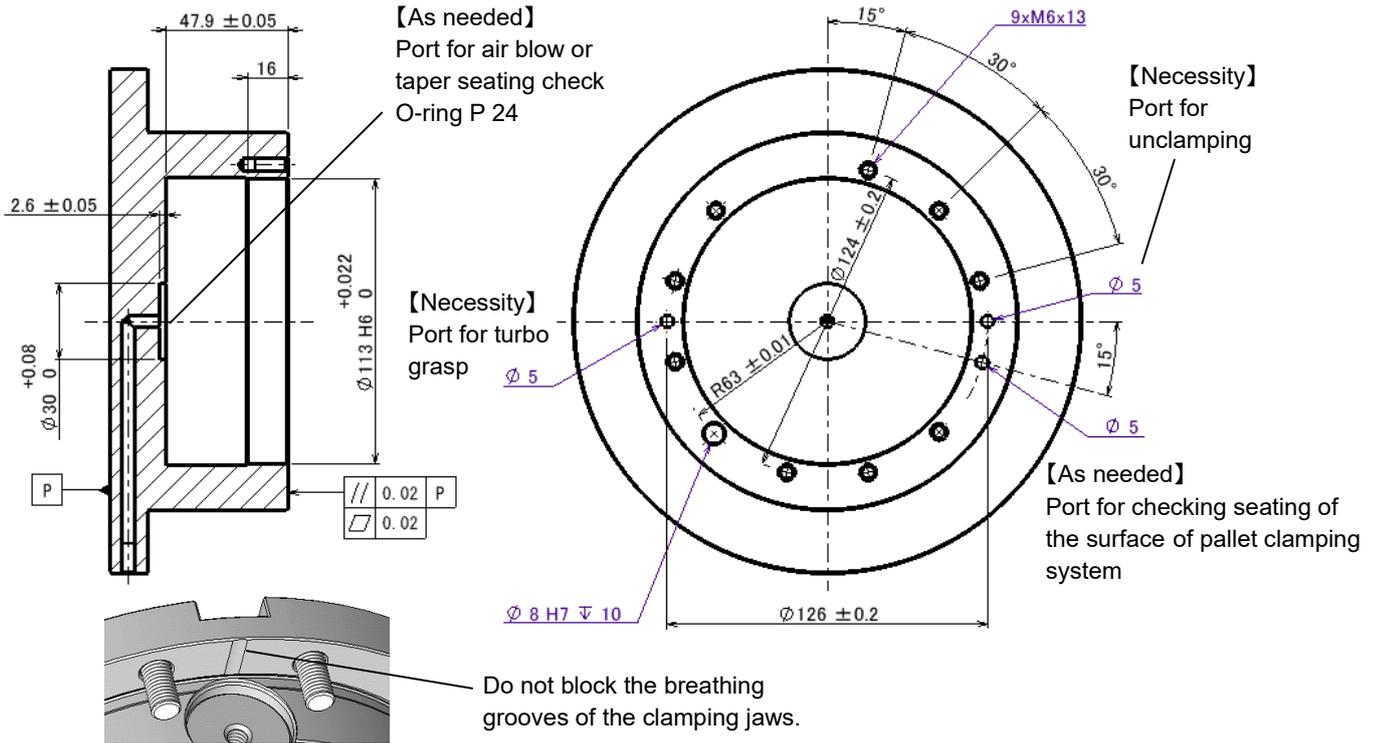


Figure 6-1 Adapter Design Example

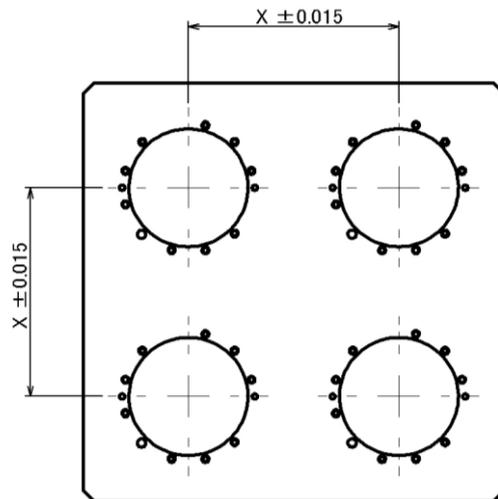


Figure 6-2 Adapter for use with multiple units

6.2. Air Circuit Design

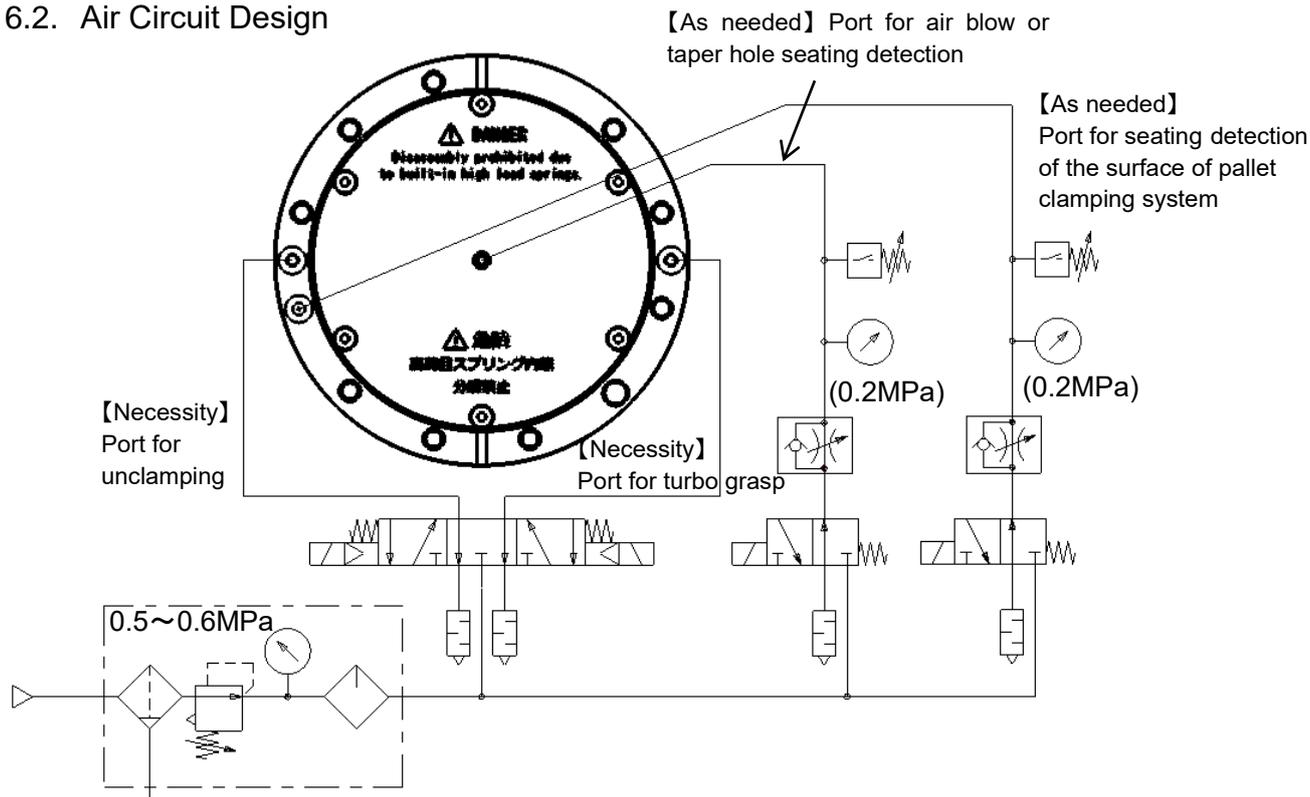


Figure 7 Air Circuit Example

Warning

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



When using a solenoid valve, make sure that the circuit does not supply air to the unclamping port when de-energized.

- In the event of a power outage, the machine may unintentionally unclamp, causing the pallet to fall off or the workpiece to fly out, creating a danger.

Notice

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



Compressed air must be supplied through an air combination (air filter, regulator, lubricator).

- Using air contaminated with moisture or foreign matter can cause rust, reducing accuracy and damage to seals, resulting in air leaks.



Even if you are only using spring grasp, you must pipe to the port for turbo grasp (boosting). Or provide a breathing hole.

- When using spring grasp, the turbo grasp port functions as a breathing hole, so closing the port of turbo grasp may cause the clamping jaws to not move or to move slowly.



Do not place your face near the exhaust port of the valve.

- When the valve is in operation, the grease from inside the product may be mixed into the exhaust air.

6.3. Installation Procedure

- ① Be sure to turn off the main power of the machine before starting work.
- ② Mount the adapter on the machine.
- ③ Install the O-rings [7] on each air supply port.
- ④ Insert the pallet clamping system into the positioning hole of the adapter.
- ⑤ Insert the knock pin [8] and tighten the Hex. socket head cap screw [9] to the specified torque of 8 N·m.
- ⑥ Supply 0.5 MPa air and confirm that the clamping jaws move smoothly.
- ⑦ When mounting multiple pallet clamping systems, make sure that the mutual difference between the table surface and the surface of each pallet clamping system is within 0.020 mm.

6.4. Pallet Design

6.4.1 Installing the Clamping Pin

- Design the pallet so that clamping pin can be installed with the dimensions shown in Figure 8 and Table 8. Refer to Table 3 for tightening torque.
- There are three types of clamping pins as shown in Table 9.

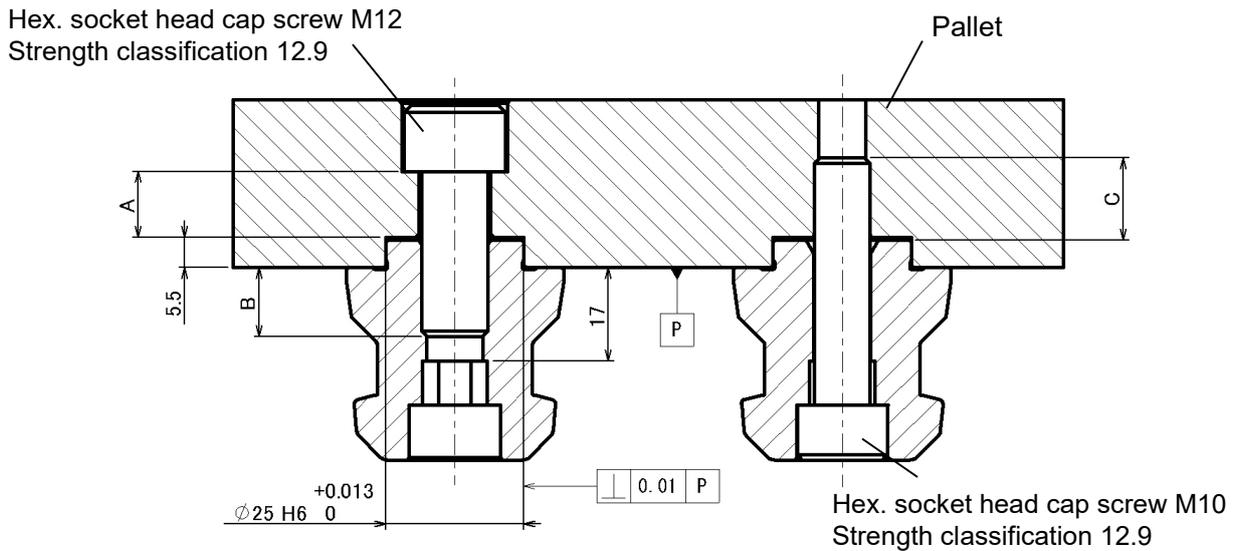
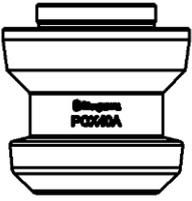
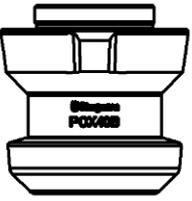
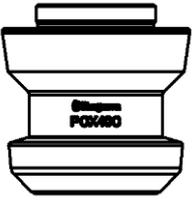


Figure 8 Installing the clamping pin

Table 8 Recommended dimensions [mm]

Dimension	Steel Pallet	Aluminum Pallet
A	≥ 12	≥ 17
B	≥ 12	≥ 12
C	≥ 15	≥ 20

Table 9 Clamping pin types and usage

Type	Clamping pin A	Clamping pin B	Clamping pin C
Shape			
Usage	The reference pin allows positioning in two directions (XY). When using only one pallet clamping system, it is used in combination with the torque pin.	The diamond pin allows positioning in one direction only. Used in combination with the clamping pin A.	No positioning function. Used in combination with the clamping pins A and B.

6.4.2 Installing the Torque Pin

- When using only one unit, design the pallet with reference to Figure. 9.

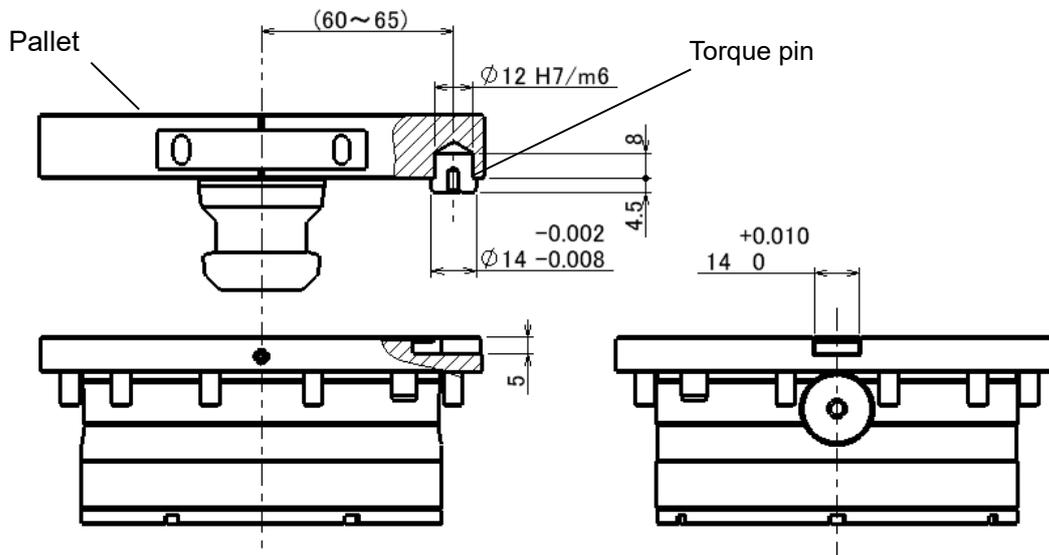


Figure 9 Installing the torque pin

6.4.3 Examples of Using Clamping Pins and Torque Pin

- As shown in Figure 10, determine the type and position of the clamping pin according to the number of pallet clamping systems to be used. In particular, note that clamping pin B (diamond pin) has an orientation relative to clamping pin A (reference pin).

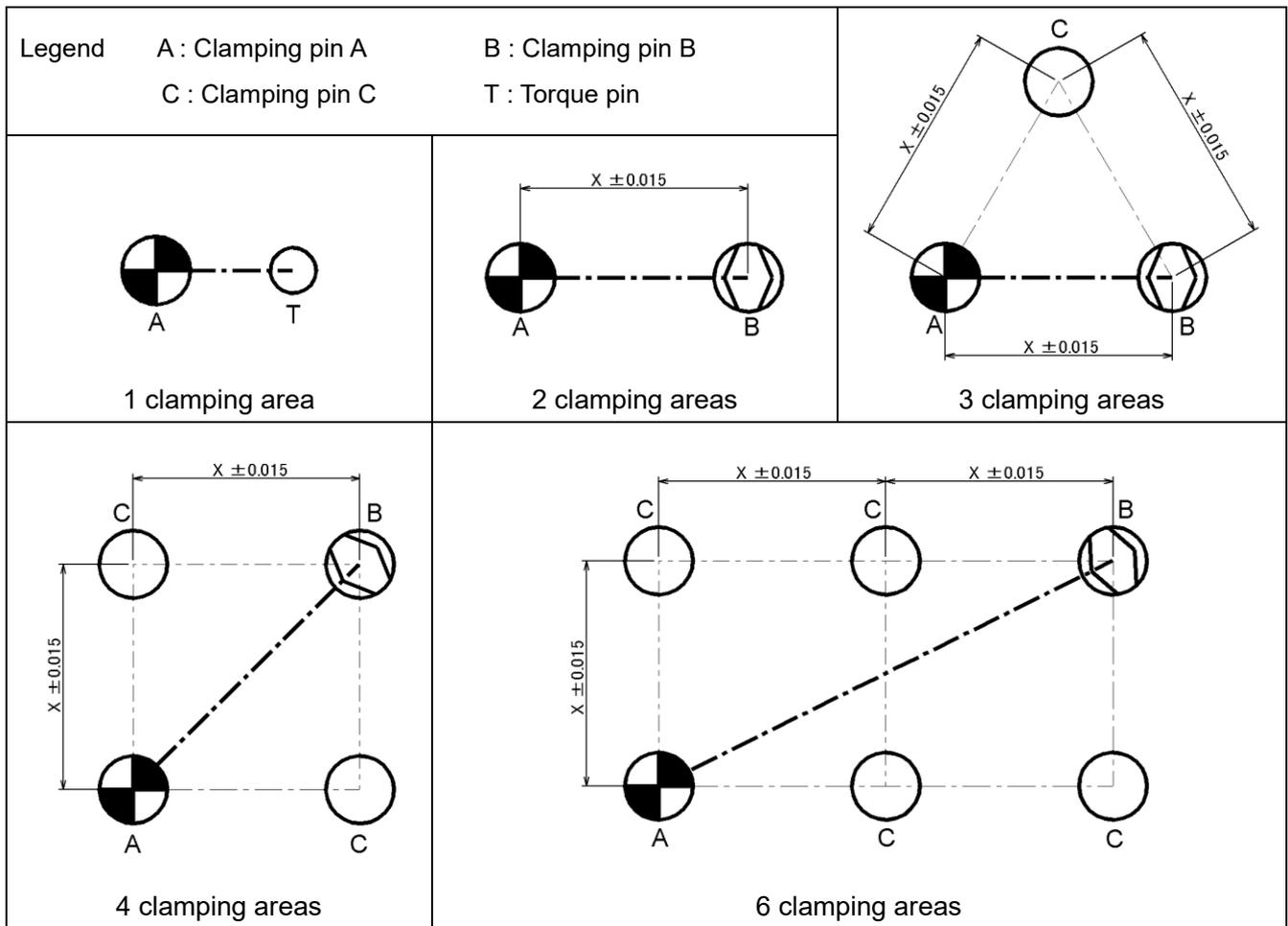


Figure 10 Examples of using clamping pins and torque pin

Notice

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

When using only one pallet clamping system, install a torque pin to support the moment around the center axis applied to the pallet.



- Without the torque pin, external load applied to the pallet (e.g., machining load) cause the pallet to shift around the center axis, resulting in poor accuracy.
- Even when the torque pin are used, there is room for misalignment due to the gap between the torque pin and the groove. By measuring the groove dimension and manufacturing the torque pin to match the actual product, more accurate positioning can be achieved.

7 Others

7.1 Standard or Directive to Conform

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

- Machinery Directive:2006/42/EC Annex I
- EN ISO 12100:2010

7.2 Marking of Product

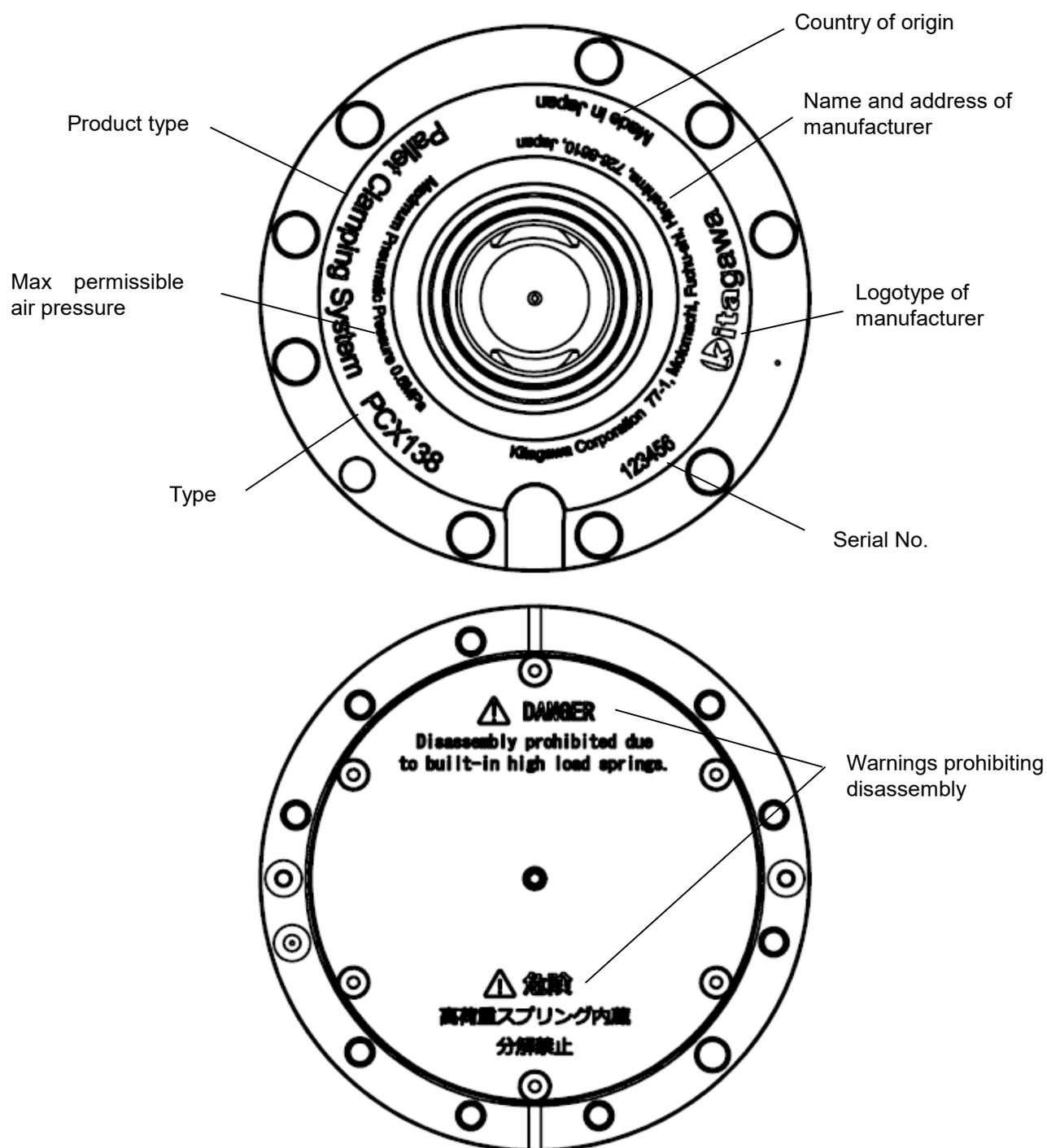


Figure 11 Marking

7.3 Disposal

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

DECLARATION OF INCORPORATION
of partly completed machinery
Copy of original

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

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

Product : Pallet Clamping System

Model : PCX138

Serial number : See original declaration

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

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

The essential health and safety requirements in accordance with the EC Machinery Directive 2006/42/EC Annex I were applied and fulfilled:
1.1.2, 1.1.3, 1.1.5, 1.1.6, 1.3.1, 1.3.2, 1.3.4, 1.5.3, 1.5.4, 1.5.8, 1.5.9, 1.5.13, 1.6.1, 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3

The following harmonized standards were applied: EN ISO 12100:2010

Signature : See original declaration

Place / Date : See original declaration

Name / Title : Yuki Kawakita / Manager, Development section
Technical department
Kitagawa Global hand Company

Being the responsible person appointed and employed the manufactu

UK DECLARATION OF INCORPORATION
of partly completed machinery
Copy of original

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

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

Product : Pallet Clamping System

Model : PCX138

Serial number : See original declaration

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

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

The essential health and safety requirements in accordance with the Supply of Machinery (Safety) Regulations 2008 Annex I were applied and fulfilled:
1.1.2, 1.1.3, 1.1.5, 1.1.6, 1.3.1, 1.3.2, 1.3.4, 1.5.3, 1.5.4, 1.5.8, 1.5.9, 1.5.13, 1.6.1, 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.4.1, 1.7.4.2, 1.7.4.3

The following harmonized standards were applied: EN ISO 12100:2010

Signature : See original declaration

Place / Date : See original declaration

Name / Title : Yuki Kawakita / Manager, Development section
Technical department
Kitagawa Global hand Company

Being the responsible person appointed and employed the manufacturer.

Kitagawa Corporation Kitagawa Global hand Company

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