

Instruction Manual
for
SETOJet series Pneumatic Nozzles

SETO *** + SD AL Series

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“The Fog Engineers”
H. IKEUCHI & CO., LTD.

Preface

Thank you for purchasing this product.

This manual provides detailed instructions for basic handling and maintenance, as well as cautions.

Please be aware that due to continuing efforts to improve our products, some details in this manual may differ from the actual product.

After reading, keep this manual handy for quick reference.

Safety Precautions

Prior to use, read this manual carefully and familiarize yourself with the proper operation of the product for optimal performance.

H. Ikeuchi & Co., Ltd. takes no responsibility for any accidents and/or injuries resulting from improper handling, installation and/or operation.



CAUTION

Wear safety gloves.

Screw threads, edges and corners may be sharp and could cause injury.



CAUTION

Ensure that the nozzles are installed securely.

Loose screws, fittings, piping or wiring may cause the nozzle to come off during operation and lead to serious accidents.



Wiring

CAUTION

Wiring should be performed by a licensed electrician in accordance with local technical standards for electrical installation and related regulations to avoid burns or potential fire.



Repair, Maintenance

CAUTION

- Always turn off the power before any maintenance or repair to avoid electric shock, fire, and/or liquid leaks.
- Always clean the nozzle surface before disassembly to prevent any dirt and debris to enter the nozzle and cause potential leaks and/or irregular spray.



Power Cable

CAUTION

- Handle the power cable with care.
- DO NOT use the power cable to move the product. DO NOT unplug by pulling on the cable, unplug using the plug itself.
- DO NOT place anything on the power cable. DO NOT damage or forcefully bend/pull/twist the power cable.
- Keep the power cable away from heat sources.
- Keep the power cable away from acids, alkali, oil or other liquids.
- Keep the power cable away from corners or other sharp objects.

1. Suggestions & Cautions

- (1) Make sure to confirm specifications such as load current and temperature or it may lead to malfunctions, breakdown or burnout.
- (2) The parts which come in contact with the liquids include parts made from aluminum and stainless steel. This presents no problems when the liquids being sprayed are not conductive such as oil, but when spraying liquids conducting electricity, such as tap water, electrolytic corrosion occurs because of the potential difference that occurs between metal parts. Any liquid remaining in the nozzle after use may accelerate the aluminum precipitation and lead to malfunction. When the nozzle is not used for an extended period of time, remove the liquid from inside the nozzle by purging it with air.
If the piston does not work, clean it according to the procedure in chapter 6. Cleaning (3) Solutions for not spraying, liquid leaks.
- (3) DO NOT use this nozzle in a very humid environment, or one filled with water vapor, it can cause the wire coil in the solenoid to break. If the nozzle is to be used in such an environment, please use one of our special order nozzles with a protective coating applied to the nozzle outer surface.
- (4) Screw threads, edges and corners may be sharp. Wearing safety gloves is recommended.

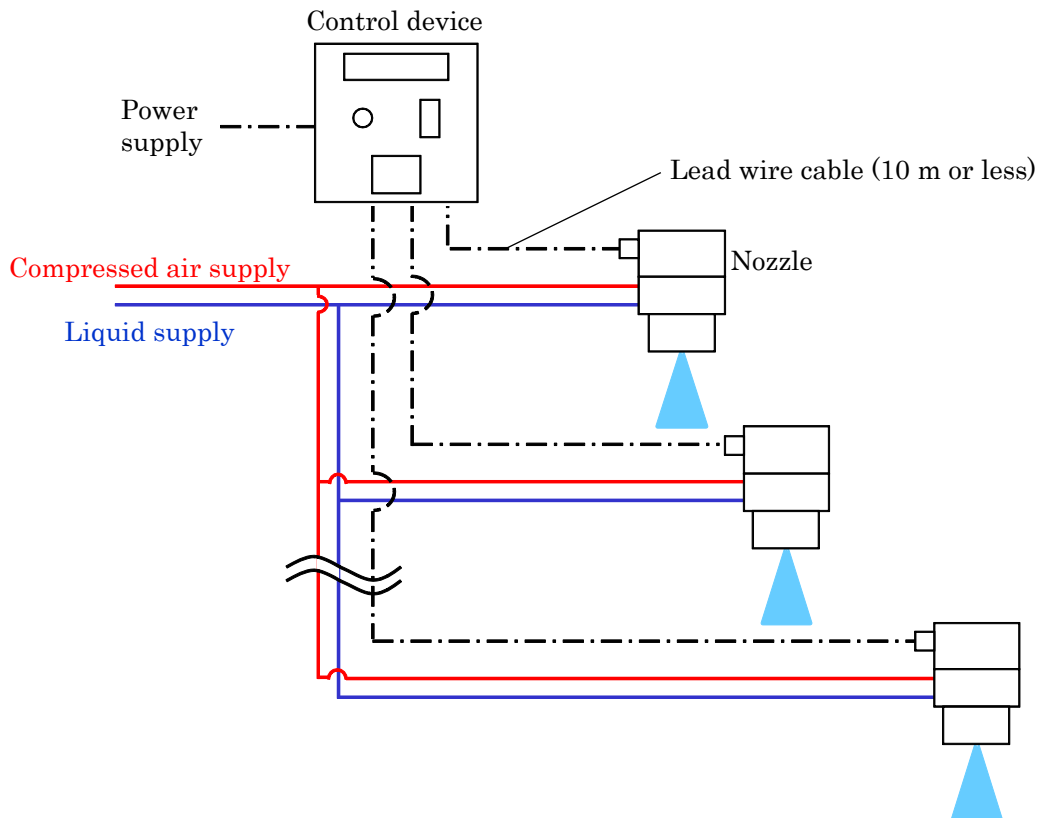
- (5) Use the nozzles according to the nozzle specifications and operation range shown in chapter 3. Nozzle Specifications.
- (6) Dust and debris stuck inside the nozzle clog the nozzle, causing irregular spray, liquid leakage, and affect the nozzle performance. In this case, disassemble and clean the nozzle, then flush it and the piping to remove clogs. (See chapter 6. Cleaning (2) How to clean the inside of the nozzle).
- (7) Avoid damaging or scratching the nozzles. When replacing a nozzle tip or disassembling the nozzle for maintenance, always use a spanner and milling vice.
- (8) Air and liquid piping
- Use piping and valves large enough to prevent the pressure from dropping.
 - Use new stainless steel pipes, as dust and debris in old pipes may clog the nozzles. Never use pipes that can rust.
 - Even new pipes may have chips, seal tape or other debris inside. ALWAYS flush pipes thoroughly before installing nozzles to remove any debris that could cause clogging.
 - Install pressure gauges just before the nozzle to adjust air and liquid pressures appropriately. Installation of a valve is also recommended.
 - If a nozzle is clogged, its performance is impacted. Installing strainers help prevent nozzle clogging.

2. Installation, Operation

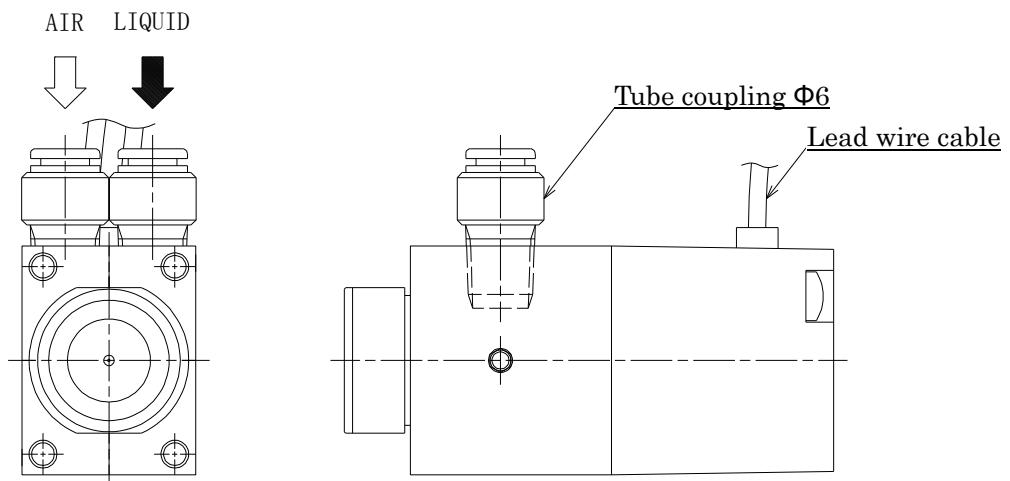
Connect the cable from the nozzle to the control device. The cable has no polarity.

Keep each cable connecting the nozzles to the control device under 10 m to prevent a voltage drop.

For operational control, use IKEUCHI's SD control box or prepare a separate control device. When using the IKEUCHI control box a maximum of 5 SETO+SD nozzles can be connected. When using another control system, make sure to use a surge protector (rectifier diodes) for safety.



Nozzle (SETO+SD)



Precautions to prevent liquids from back-flowing

To start operation: Open the air supply first, then the liquid.

To stop operation: Shut off the liquid first, then the air.

Function Timing Chart					
Compressed air	ON				
Solenoid	OFF	ON	OFF	ON	OFF
Liquid	STOP	SPRAY	STOP	SPRAY	STOP

Spray ON/OFF time must be set to 0.02 seconds or more for each.

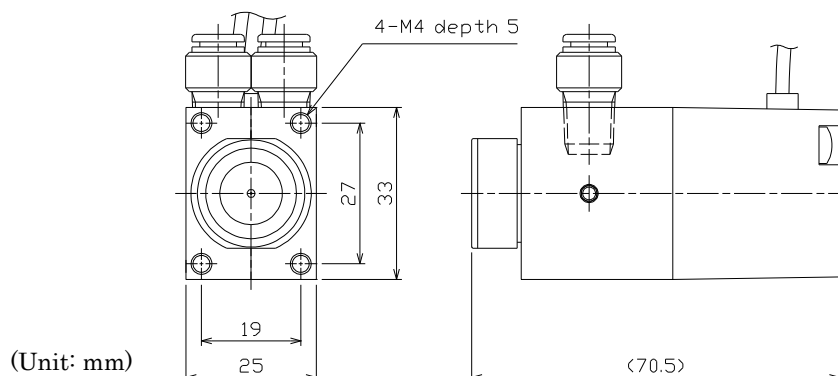
3. Nozzle Specifications

Description	SETO *** + SD AL
Function of Valve	Single solenoid valve, normally closed (it only sprays when activated)
Pipe Connection Sizes	Rc1/8 for both air and liquid
Operating Pressure Range (Compressed air pressure: Pa, Liquid pressure: Pw)	SETO07503R-I: Pa ≤ 0.5 MPa, Pw ≤ 0.4 MPa SETO0405R: Pa ≤ 0.5 MPa, Pw ≤ 0.05 MPa SETO07507R: Pa ≤ 0.5 MPa, Pw ≤ 0.05 MPa SETO2210R: Pa ≤ 0.5 MPa, Pw ≤ 0.05 MPa
Voltage	24 VDC
Current	0.26A
Min. Operating Time	ON: 20 ms, OFF: 20 ms
Max. Operating Temperature	50°C (120°F)
Weight	Approx. 180 g

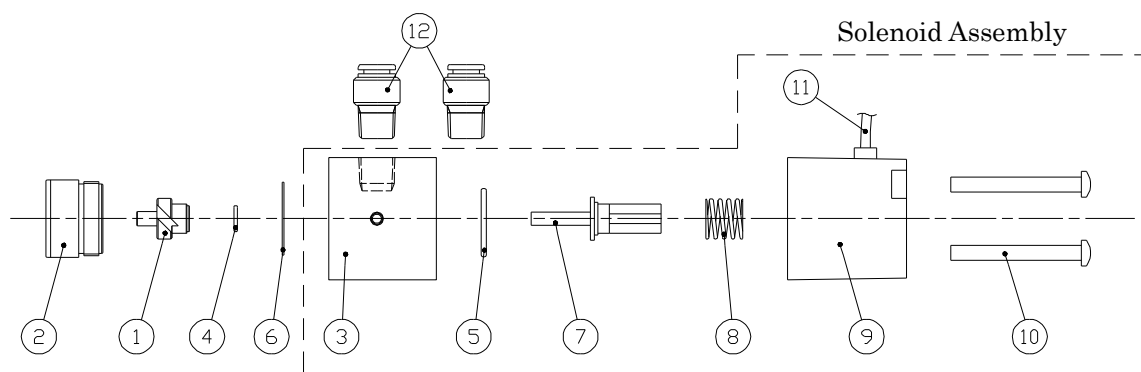
Note: “***” in the above description indicates the nozzle code including 07503R-I, 0405R, 07507R, and 2210R.

4. Components of Nozzle

(1) Complete Assembly



(2) Component Parts and Materials



No.	Component	Material	Remark	No.	Component	Material	Remark
1	Nozzle Tip	S303	Consumable	7	Piston	*1	
2	Nozzle Body	A5052	Consumable	8	Spring	S304	
3	Adaptor	A2017		9	Solenoid	*2	
4	O-ring (SS5.5)	FKM	Consumable	10	Bolt (M4)	S304	
5	O-ring (S16)	FKM	Consumable	11	Cable (L=900, Y-terminal (1.25Y-3N))	—	
6	Packing	PTFE	Consumable	12	Tube Coupling	—	

*1: A2017, Electromagnetic stainless steel, FKM

*2: Polyamide resin, S303, Electromagnetic stainless steel

Note:

(1) Consumables

The lifetime of a nozzle varies, depending on the operational conditions.

Replace consumable parts when corrosion or pitting corrosion of a nozzle tip, nozzle body or other parts is found and/or nozzle performance significantly deteriorates.

(2) Parts 3, 5, and 7-11 in the solenoid assembly are only sold as set and cannot be purchased separately.

(3) In our material code, “S” represents “stainless steel”.

For example, S303 stands for stainless steel 303.

5. Disassembly

Prior to disassembly, thoroughly clean the outside of the nozzle to prevent any dust or debris from entering the nozzle. Disassemble the nozzle in a clean, dust-free environment.

(1) Nozzle assembly

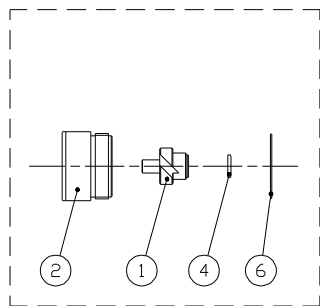
Secure the adaptor (part# 3) with a milling vice and unscrew the nozzle body (# 2) with a 21 mm spanner.

Take out the nozzle tip (# 1) from the nozzle body (# 2), and remove the O-ring (# 4) and packing (# 6) from the adaptor (# 3). Line them up on a clean cloth or piece of paper.

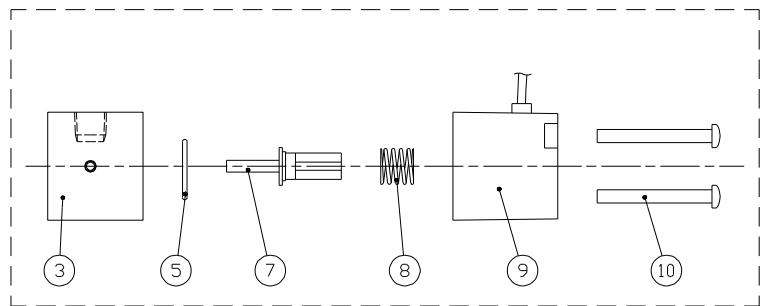
Be sure not to lose the O-ring (# 4) and packing (# 6) as they are very small.

Necessary tools: Milling vice, 21 mm spanner

Tightening torque: 18 Nm



Nozzle assembly



Solenoid assembly

(2) Solenoid assembly

Unscrew the bolt (# 10) with a Phillips-head screwdriver. Position the adaptor (# 3) on the lower side and remove the solenoid (# 9), making sure not to drop the O-ring (# 5), piston (# 7), and spring (# 8).

Necessary tool: Phillips-head screwdriver

Tightening torque: 0.4 Nm

Note: Make sure not to drop, damage or lose any of the small parts.

6. Cleaning

After the disassembly inspect each part for damages of any kind.

The nozzle has an O-ring (# 4) and packing (# 6), the solenoid assembly has an O-ring (# 5) and a piston (#7, tip indicated by ☆ below).

Any damage or surface scratches on these parts may cause the nozzle to malfunction. Remove any dirt on the surface with a soft cloth.

Using a brush, carefully remove dirt and debris from the other metal parts.

Take special care to not scratch or damage the nozzle orifice when cleaning the nozzle tip.

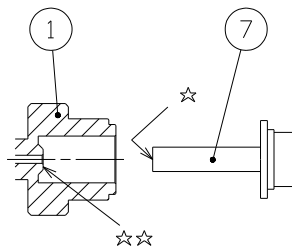
(1) How to clean the shut-off part

The most important parts of the shut-off mechanism and seal are the parts indicated on the nozzle tip (# 1) with ☆☆ and on the piston (# 7) with ☆ in the drawing below.

Any flaw, dust or debris on these parts can cause a malfunction of the shut-off mechanism.

Inspect for any signs of damage and then remove any dirt with a cotton swab and soft cloth.

Please contact your supplier with any questions or problems.



Shut-off part

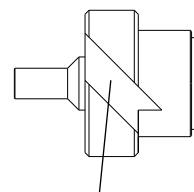
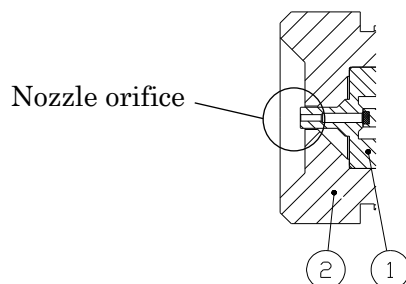
(2) How to clean the inside of the nozzle

2-a. Impurities are most likely to adhere to the orifice of the nozzle tip (# 1).

Pay special attention to check the condition of this part.

2-b. If you find any dust or debris in the orifice or groove in the nozzle tip (# 1) and/or nozzle body (# 2), carefully remove them with a brush, toothpick, bamboo skewer, or pin.

Clean the nozzle tip (# 1) and nozzle body (# 2) thoroughly from any dirt and debris to maintain performance.



Groove in the nozzle tip (# 1)

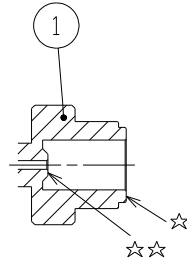
(3) Solutions for not spraying, liquid leaks

3-a. Follow the disassemble instructions as explained in chapter 5. Disassembly (1) Nozzle assembly. Check the nozzle tip (# 1) for any blockage.

3-b. If there is a blockage, try to blow it out with an air blower or remove it with a pin.

Make sure not to lose the nozzle tip (# 1) when trying to blow out the blockage.

If using a pin, be careful not to damage the surface of the seals in the nozzle tip (# 1), indicated by ☆ and ☆☆ in the drawing below.

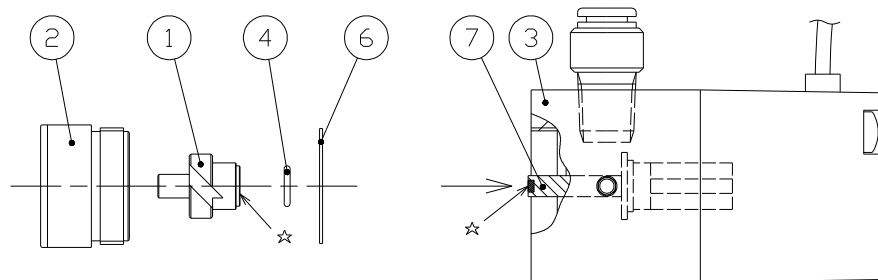


3-c. Test the tip of the piston (# 7) with the pad of a finger to see if it moves back and forth. It should move about 1 mm or so.

After making sure the piston (# 7) moves manually, test if the solenoid valve moves the piston back by applying voltage to the solenoid valve.

After confirming the electromagnetic drive of the piston (# 7), attach the O-ring (# 4) and packing (# 6) to the adaptor (# 3), and the nozzle tip (# 1) to the nozzle body (# 2). Then screw the nozzle body (# 2) with the nozzle tip (# 1) into the adaptor (# 3).

If the piston (# 7) does not move, follow the instructions under 3-e on the next page. Be careful not to damage the seal indicated by ☆ in the drawing below.

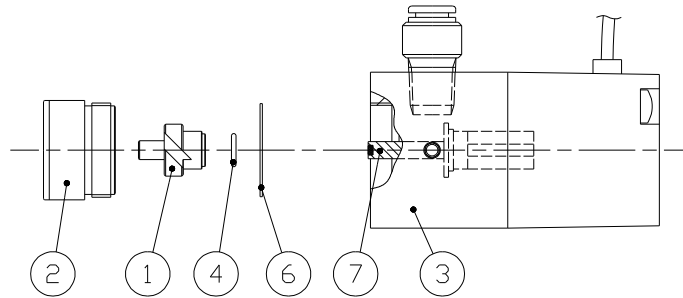


3-d. If moving the piston (# 7) loosens any stuck dirt or foreign particles, it could cause the orifice of the nozzle tip (# 1) to clog after assembly. In this case repeat steps 3-a to 3-c.

3-e. If the piston (# 7) does not move, follow the instructions for disassembly under chapter 5. Disassembly (2) Solenoid Assembly.

After the solenoid assembly is disassembled, flush the inside of the adaptor (# 3), as well as the piston (# 7), spring (# 8), and solenoid (# 9), then remove any dirt and debris from the inside with a soft cloth.

If the dirt is stuck and cannot be wiped off, please contact your supplier or IKEUCHI.

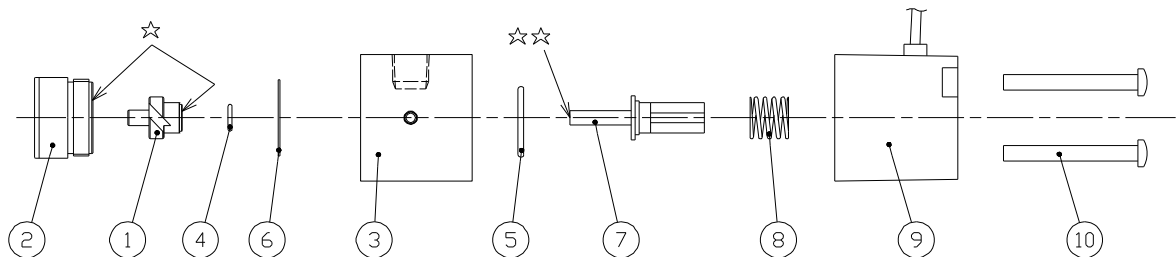


7. Assembly

Assemble in the reverse order of 5. Disassembly.

Note:

- (1) Before assembling, ensure that the sealing surfaces, indicated by ☆ and ☆☆ in the drawing below, and the orifice are clean and undamaged.
- (2) Pay attention to the assembly direction of the nozzle tip (# 1) and the nozzle body (# 2).
- (3) Tighten the nozzle body (# 2) with a torque of 18 Nm.



8. Maintenance

Check	Item	Check points
Daily	Spray	Have a visual check of the spray pattern. If you cannot see the spray pattern because nozzles are in an equipment, confirm that the spraying pressure is normal.
	Operation	Confirm that the shut-off mechanism works correctly.
	Pressure gauges and flow meters	Confirm that the air and liquid pressures and flow rate are correct during operation.
Periodically	Spray	Have a visual check of the spray pattern.
	Appearance	Confirm that there is no corrosion or dust adhesion to the nozzle tip and orifice.
	Connection	Confirm that the nozzle tip and adaptor are screwed together tightly.

9. Troubleshooting

Problems		Probable Causes	Solutions	Remarks
Nozzle is not spraying	Control	<ul style="list-style-type: none"> • The controller is not switched on. • Valves are not opened. 	<ul style="list-style-type: none"> • Switch it on. • Open the valves. 	
	Nozzle	<ul style="list-style-type: none"> • Nozzle or pipe is clogged. • Nozzle or pipe is clogged due to damage. • Liquid orifice and/or air orifice is clogged. • The piston does not function properly. 	<ul style="list-style-type: none"> • Clean the nozzle and pipe. • Replace the damaged part. • Clean them. • Check the wiring. Disassemble and clean, the solenoid assembly. • Measure the resistance between the terminals to check if the coil is broken ($\infty \Omega$) or short-circuited (0Ω). 	<p>See <u>6. Cleaning (2) How to clean the inside of the nozzle</u> on page 8.</p> <p>See <u>6. Cleaning (3) Solutions for not spraying, liquid leaks</u> on page 8–9.</p> <p>The resistance value at room temperature (around 20) is 86Ω for reference only.</p>
Air and/or liquid leaks	Liquid leak from the tip of nozzle	<ul style="list-style-type: none"> • Foreign materials clogs piston and sealing parts. • Damage or wear on the piston or the sealing surface. • The spring is missing. 	<ul style="list-style-type: none"> • Clean the inside of nozzle. • Replace the damaged parts. • Set the spring. 	See <u>6. Cleaning (1) How to clean the shut-off parts</u> on page 8.
	Connection	<ul style="list-style-type: none"> • Some parts are loose or not tightened. 	<ul style="list-style-type: none"> • Tighten the connections. 	
	Handling	<ul style="list-style-type: none"> • Nozzle or pipe is cracked. • Nozzle or pipe is corroded. 	<ul style="list-style-type: none"> • Replace the cracked part. • Replace the corroded part. 	
Intermittent spray		<ul style="list-style-type: none"> • Air leaks due to the damage and/or foreign particles adhered on the sealing surface. • Either air pressure is too high or liquid pressure is too low. 	<ul style="list-style-type: none"> • Clean the sealing surface or replace the part. • Adjust the pressures. 	
Spray pattern is irregular		<ul style="list-style-type: none"> • Nozzle or pipe is clogged. • Nozzle tip is deformed. • Nozzle tip is corroded. • Dust or foreign particles adhered on the orifices. 	<ul style="list-style-type: none"> • Clean the nozzle and pipe. • Replace the deformed part. • Replace the corroded part. • Clean the part. 	

10. Disposal

Disposal should be practiced according to the regulations and codes of local authorities, or ask a disposal professional.

11. Inquiries

For spare parts or any trouble, contact your supplier or the following:

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Osaka 550-0011 JAPAN

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