

Instruction Manual for
Solenoid-controlled Hydraulic Spray Nozzles
SD-VV, SD-V, and SD-CC Series

Product Description: VV / V / CC **** S303 + SD S304

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H. Ikeuchi & Co., Ltd.

Preface

Thank you for purchasing our 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.



WARNING

Continuous Power Supply Heat Warning

Continuous power supply causes the solenoid coil to generate heat.

Do not use in sealed containers. Install in well-ventilated areas.

Do not touch the solenoid assembly with bare hands while or immediately after power is supplied.



CAUTION

Wear safety gloves.

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



CAUTION

Ensure that the products are installed securely.

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



CAUTION

Wiring

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.



CAUTION

Maintenance and repair

- 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 from entering the nozzle and causing potential leaks and/or irregular spray.

1. Cautions

- (1) Make sure to confirm specifications such as load current and temperature, or it may lead to malfunctions, breakdown, or burnout.
- (2) Screw threads, edges and corners may be sharp. Wearing safety gloves is recommended.
- (3) Use the nozzles according to the specifications and operation range shown in chapter 3. Product Specifications on page 5.
- (4) Dust and debris stuck inside the nozzle can clog it, causing irregular spray and liquid leakage, thereby affecting nozzle performance. In case of nozzle clogging, disassemble and clean the nozzle, then flush both the nozzle and the piping to remove the clogs before use.
- (5) Avoid damaging or scratching the nozzles. When replacing a nozzle tip or disassembling the nozzle for maintenance, always use a spanner/wrench and milling vice.

(6) Operating Environment

DO NOT use in the following locations:

- Atmospheres with steam or corrosive fluids (chemicals), places where seawater or water may adhere to the product.

Even products with a protection rating of IP67 require appropriate protective measures in environments exposed to water for long periods. Moisture can penetrate through tiny gaps on the product's outer surface, leading to coil burnout or short-circuiting of the solenoid assembly.

When installing near machinery or processing equipment that uses large amounts of water or oil, ensure that no liquid or spatter from surrounding equipment scatters onto the product.

- Locations with corrosive or explosive atmospheres.
- Locations where vibration or shock occurs.
- Locations where the product is exposed to radiant heat from a heat source nearby.
- Outdoors. If outdoor use is unavoidable, implement the following protective measures:
 - (i) Install protective covers or like to prevent direct sunlight exposure.
 - (ii) Cover the product in a housing to protect it from rain and wind. Simply installing a roof-type cover on the top of the product may still allow moisture to adhere due to crosswinds or splashes from the ground. Additionally, when enclosing the product in a housing, implement ventilation measures to prevent heat from being trapped due to prolonged electrification.
 - (iii) Check if the installation location is prone to condensation. In environments with significant temperature changes around the product, condensation may occur, causing moisture to adhere to the product's outer surface. If condensation is likely, implement measures to control the ambient temperature and prevent condensation.
- Locations where freezing occurs inside the piping.

When using in cold regions or during winter, take measures to prevent fluid freezing. For potential freezing, implement measures such as draining the pipes when the equipment is stopped, and installing heaters or insulation on the piping. Note that when insulating the solenoid assembly, avoid the coil parts as it will worsen heat dissipation.

(7) Unsuitable Fluids

Do not use the following liquids:

- Liquids harmful to the human body
- Flammable liquids
- Seawater, saline solution (brine)

Note: Gases are not suitable for use.

(8) Depending on the fluid used, static electricity may occur. In such case, take measures to prevent static electricity.

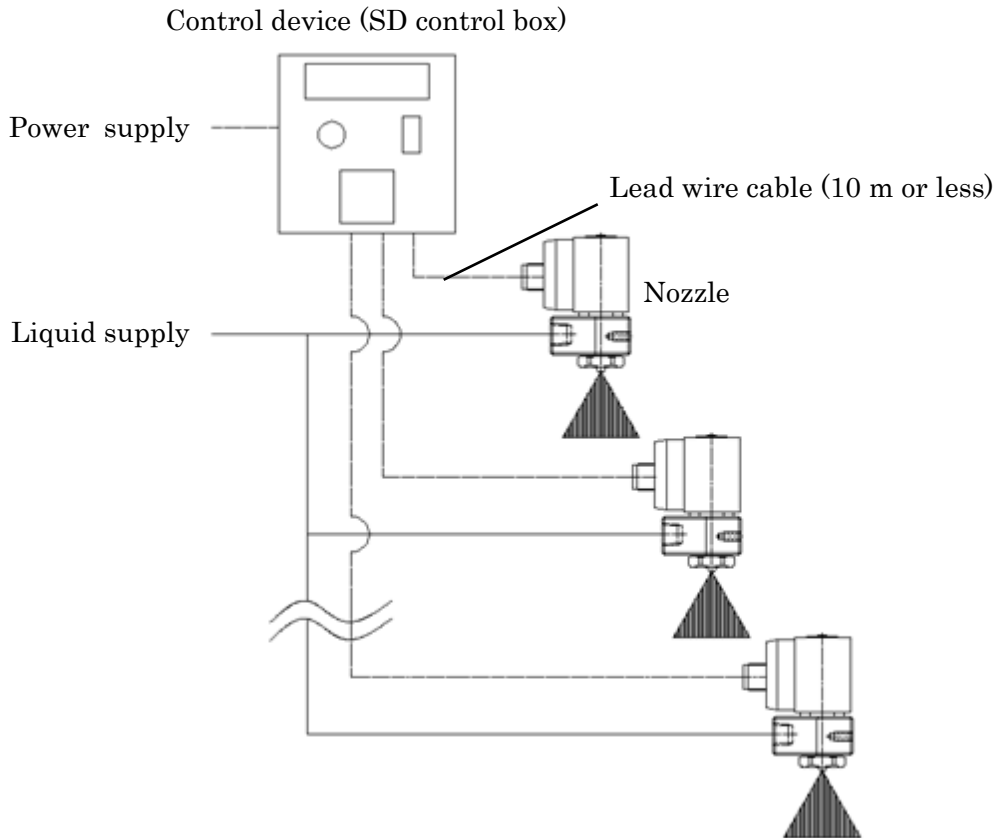
(9) Piping

- 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 a pressure gauge just before the nozzle to adjust liquid pressure appropriately. Installation of a valve is also recommended.
- Clogging can negatively affect nozzle performance. Install strainers (#200 mesh size recommended) to prevent clogged nozzles.

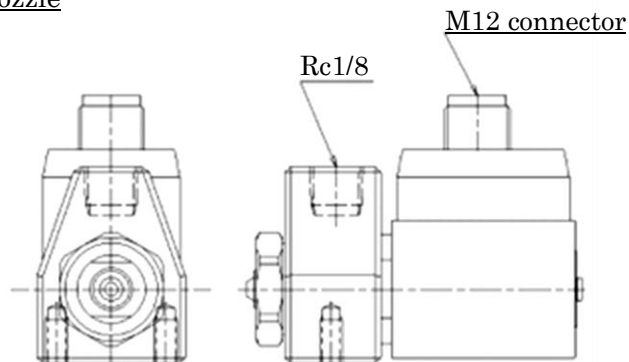
(10) Avoid sudden and/or drastic changes in liquid pressure to prevent the water hammer.

2. Installation, Operation

- Connect the nozzle to the control device using an M12 connector cable. Cables are not included, prepare them according to the specifications described on page 5. 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 our control box, a maximum of five SD-VV/V/CC Series nozzles can be connected.



SD-VV/V/CC Series Nozzle



Operation Time Chart

Operation Time Chart					
Solenoid	OFF	ON	OFF	ON	OFF
Liquid	STOP	SPRAY	STOP	SPRAY	STOP

3. Product Specifications

Valve Structure	Direct acting poppet
Valve Type	Normally closed (N.C.)
Min. Operating Time	ON: 0.05 seconds, OFF: 0.05 seconds
Operating Liquid Temperature	Water: 1–60°C (No freezing) Oil: -5–60°C (w/ dynamic viscosity of 50mm ² /s or less)
Pressure Resistance	2.0 MPa
Max. Operating Pressure Difference	0.9 MPa
Ambient Temperature	-20–60°C
Protection Structure*1	IP67
Operating Environment	Location without the presence of corrosive gases, explosive gases, or constant water adhesion.
Liquid Supply Connection Size	Rc1/8
Lead Wire Connection*2	M12 connector
Weight	220 g
Rated Voltage	24 VDC
Allowable Voltage Fluctuation	± 10% of rated voltage
Allowable Leakage Voltage	Less than 2% of rated voltage
Power Consumption*3	4W
Temperature Rise*4	65°C

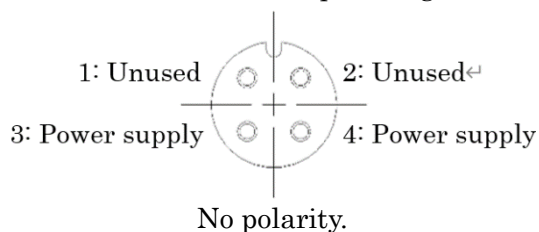
*1 Although it has an IP67 protection rating, if water enters the coil, it may cause malfunction or failure. When used outdoors or in an environment where moisture is constantly present, take waterproofing measures.

*2 M12 connector cables are not included. Use SMC Corporation's "JSX022-30-1-length" cable (length options: 1m, 2m, or 5m) or cables with equivalent specifications.

The protection structure (IP67) of the solenoid nozzle can be achieved by using IP67-rated female connectors (with cables). Do not use underwater.

To attach the connector, using tools may cause damage, so always tighten it securely by hand (recommended tightening torque: 0.39–0.49 N·m).

Cable's socket connector pin assignment:

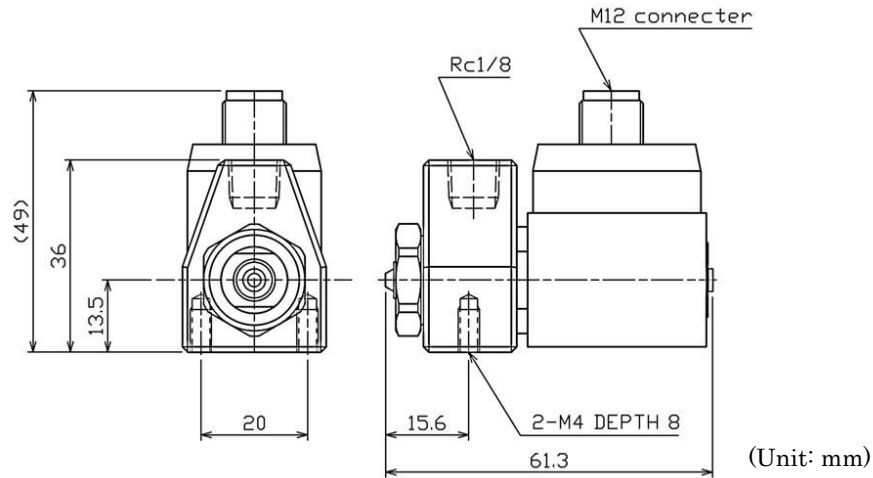


*3 Power consumption value is based on an ambient temperature of 20°C and rated voltage. (Variation range: ±10%)

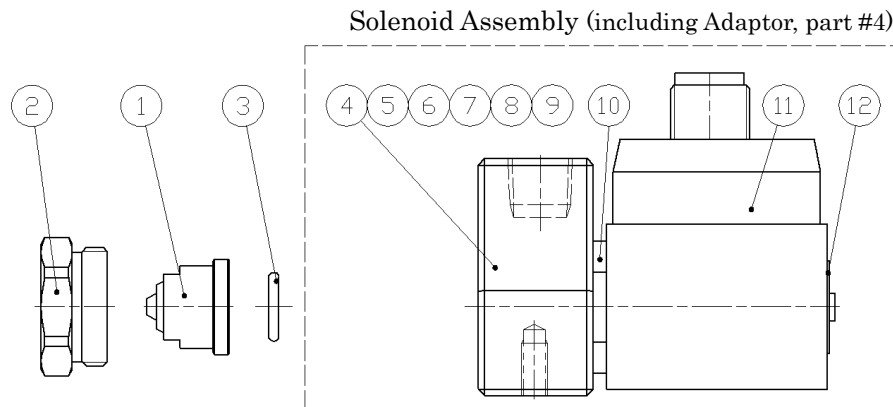
*4 The temperature rise value is based on an ambient temperature of 20°C and the rated voltage. However, it is a reference value as it varies depending on the surrounding environment.

4. Components of Nozzle

(1) Complete Assembly



(2) Components and Materials



No.	Component	Material	Remark	No.	Component	Material
1	Nozzle Tip	S303	Consumable	7	Movable Iron Core Assembly	S316 equiv., etc.
2	Cap	S304		8	Spring	S304 equiv.
3	O-ring (S8)	FKM	Consumable	9	Packing	S304 equiv.
4	Adaptor	S304		10	Set Nut	S304 equiv.
5	O-ring (S16)	FKM		11	Solenoid Coil	S430 equiv., etc.
6	Tube Assembly	S316 equiv., etc.		12	Clip	S304 equiv.

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 is found and/or nozzle performance significantly deteriorates.

(2) Parts 4–12 in the solenoid assembly are only sold as set and cannot be purchased separately.

(3) Dimensions and materials may differ depending on product codes.

(4) 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 Tip

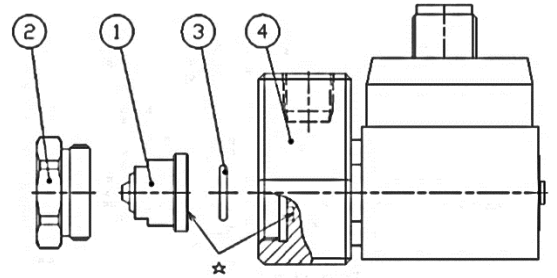
Hold the adaptor (part #4) in a milling vice and unscrew the cap (#2) with a 19 mm spanner. Take out the nozzle tip (#1) and O-ring (#3), and line them up on a clean cloth or piece of paper.

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

Necessary tools:

Milling vice

19 mm spanner/wrench



6. Cleaning

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

The O-ring (#3) is a sealing part. 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 not to scratch or damage the nozzle orifice when cleaning the nozzle tip (#1).

(1) How to Clean the Inside of Nozzle Tip

Impurities are most likely to adhere to the orifice of the nozzle tip (#1). Pay special attention to checking the condition of this part. If you find any dust or debris in the nozzle orifice, carefully remove them with a brush, toothpick, or bamboo skewer. Clean the nozzle tip (#1) thoroughly from any dirt and debris to maintain performance.

7. Assembly

Hold the adaptor (#4) in a milling vise. Insert the O-ring (#3) and nozzle tip (#1) into the adaptor (#4).

SD-CC Series: Tighten the cap (#2) with a 19 mm spanner.

(Tightening torque: 20 N·m)

SD-VV, SD-V Series: Tighten the cap (#2) with a 19 mm spanner at a torque of 20 N·m while securing the nozzle tip by holding its milled surface with a 10 mm spanner to prevent it from rotating.

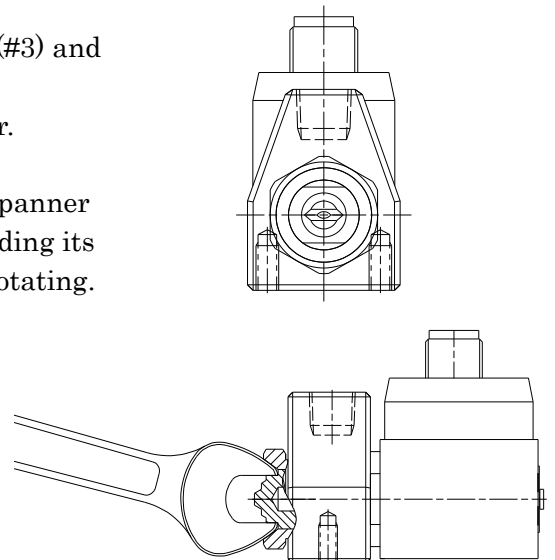
When attaching the SD-VV and SD-V Series nozzle tips, pay attention to the orifice groove direction (or surface milling direction) of the nozzle tip. The flat spray spread direction is parallel to the milled surface.

Necessary tools:

Milling vice

10 mm spanner/wrench

19 mm spanner/wrench



Note: Before assembly, ensure that the sealing surfaces, indicated with ☆ in the drawing in chapter 5. Disassembly, and the orifice, are clean and undamaged.

8. Maintenance

Check	Item	Check points
Daily	Spray	Visually check the spray pattern. If the nozzles are inside the equipment and cannot be seen, confirm that the spray pressure is normal.
	Operation	Confirm that the shut-off mechanism works correctly.
	Pressure gauges and flow meters	Confirm that the liquid pressure and flow rate are correct during operation.
Periodically	Spray	Visually check 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 open. 	<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. The movable iron core does not function properly. 	<ul style="list-style-type: none"> Clean the nozzle and pipe. Replace the damaged part. Contact your supplier or IKEUCHI for repairs. Measure the resistance between the terminals to check if the coil is broken ($\infty\Omega$) or short-circuited (0Ω). 	The resistance value at room temperature (around 20°C) is 150Ω for reference only.
Liquid leaks	Liquid leakage from the tip of nozzle	<ul style="list-style-type: none"> Foreign materials clog between the movable iron core and sealing part. Damage or wear on the movable iron core or the sealing surface. 	<ul style="list-style-type: none"> Contact your supplier or IKEUCHI for disassembly maintenance. (For damage or wear on the internal parts, the entire solenoid assembly will be replaced.) 	
	Liquid leaks around the cap/nozzle tip	<ul style="list-style-type: none"> Foreign materials clog the nozzle tip, O-ring, or their sealing surface. Damage or wear on the nozzle tip or O-ring. 	<ul style="list-style-type: none"> Disassemble and clean the O-ring (#3) and inside of nozzle tip (#1). Replace the nozzle tip (#1) and/or O-ring (#3). 	See page 7.
	Connection	<ul style="list-style-type: none"> Connections 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. 	
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:

H. IKEUCHI & CO., LTD.

Email: overseas@kirinoikeuchi.co.jp

<https://www.kirinoikeuchi.co.jp/eng/contact/>