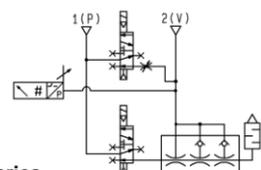




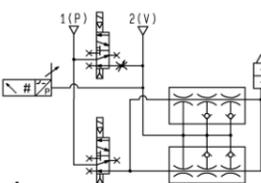
**Instruction Manual**  
**Multistage Ejector**  
**Series ZL3/ZL6**



ZL3 Series



ZL6 Series



The intended use of this product is to generate vacuum.

**1 Safety Instructions**

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC<sup>1)</sup>, and other safety regulations.

- <sup>1)</sup>ISO 4414: Pneumatic fluid power — General rules and safety requirements for systems and their components.
- ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components
- IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- ISO 10218-1: Robotics — Safety requirements — Part 1: Industrial robots
- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

	<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	<b>Danger</b>	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

**Warning**

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

**2 Specifications**

Refer to catalogue for more details.

**2.1 ZL3 Series**

Model	ZL3M□□	ZL3H□□
Nozzle diameter [mm]	1.9	1.5
Standard supply pressure	0.35 MPa	0.50 MPa
Maximum vacuum pressure *1	-91 kPa	-93 kPa
Max suction flow rate*1	280 L/min (ANR)	
Branch, Port exhaust	300 L/min (ANR)	
Air consumption*1	150 L/min (ANR)	135 L/min (ANR)
Supply pressure range	0.2 to 0.6 MPa	
Operating temperature range	-5 to 50 °C (No freezing or condensation)	
Fluid	Air	
Vibration resistance*2	20 m/s <sup>2</sup>	
Impact resistance*3	100 m/s <sup>2</sup>	

**2.2 ZL6 Series**

Model	ZL6M□□	ZL6H□□
Nozzle diameter [mm]	1.9 x 2	1.5 x 2
Standard supply pressure	Without valve 0.35 MPa With valve 0.37 MPa	0.50 MPa 0.52 MPa
Maximum vacuum pressure *1	-91 kPa	-93 kPa
Max suction flow rate*1	580 L/min (ANR)	
Branch, Port exhaust	600 L/min (ANR)	
Air consumption*1	300 L/min (ANR)	270 L/min (ANR)
Supply pressure range	0.2 to 0.6 MPa	
Operating temperature range	-5 to 50 °C (No freezing or condensation)	
Fluid	Air	
Vibration resistance*2	20 m/s <sup>2</sup>	
Impact resistance*3	100 m/s <sup>2</sup>	

NOTE \*1) Values are at the same standard supply pressure and based on SMC's measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and measurement method.

NOTE \*2) 10 to 500Hz for 2 hours in each direction of X, Y and Z (de-energised, initial value).

NOTE \*3) 3 times in each direction of X, Y and Z (de-energised, initial value).

NOTE \*4) Refer to operation manual of solenoid valve (JSY3000 series) and pressure switch (ZSE10 series) for the characteristics.

**2.3 Vacuum pressure switch specifications**

Model	ZSE10		
	Vacuum pressure switch	Compound pressure switch	Pressure switch for vacuum with energy saving function
Rated pressure range	0 to -101 kPa	-100 to 100 kPa	
Set pressure range	10 to -105 kPa	-105 to 105 kPa	
Proof pressure	500 kPa		
Minimum setting unit	0.1 kPa		
Power supply voltage	12 to 24 VDC ± 10%, Ripple (p-p) 10% or less (with power supply polarity protection)		
Current consumption	40 mA or less		
Switch output	NPN or PNP open collector 2 outputs (selectable)		NPN or PNP open collector OUT1: General purpose OUT2: Valve control
Max. load current	80 mA		
Max. applied voltage	28V (at NPN output)	26.4V (at NPN output)	
Residual voltage	2 V or less (with load current of 80 mA)		
Response time	2.5 ms or less (with anti chattering function 20,100,500,1000, 2000 ms)		
Short circuit protection	Yes		
Repeatability	±0.2% F.S. ±1 digit		
Hysteresis	Hysteresis mode	Variable (0 or above)	
	Window comparator mode	Variable (0 or above)	
Display	3 ½ digit, 7-segment LED, 1-color display (Red)		
Display accuracy	±2% F.S. ± 1 digit (Ambient temperature of 25 ± 3°C)		
Indicator light	Lights up when output is turned on. OUT1: Green, OUT2: Red		

**2 Specifications - continued**

Enclosure	IP40	
Ambient temperature	Operation: -5 to 50°C (No condensation or freezing) Storage: -10 to 60°C (No condensation or freezing)	
Ambient humidity	Operation/Storage: 35 to 85% RH (No condensation)	
Withstand voltage	1000 VAC for 1 minute between terminals and housing	
Insulation resistance	50MΩ or more (500 VDC measured via megohmmeter) between terminals and housing	
Temperature characteristics	±2% F.S. ±1 digit (at 25°C in an ambient temperature of -5 and 50°C)	
Lead wire	Oil proof heavy-duty vinyl cable 5 core Conductor area: 0.15 mm <sup>2</sup> (AWG26) Insulator O.D.: 1.0 mm	

**2.4 Vacuum Pressure Switch with IO-Link**

Model	ZL3-VP□-1-EL□□-A	ZL3-VP□-1-FL□□-A
Rated pressure range	0 to -101kPa	100 to -100 kPa
Set pressure range	10 to -105 kPa	105 to -105 kPa
Proof pressure	500 kPa	
Minimum setting unit	0.1 kPa	
Power supply voltage	24 VDC ± 10%, Ripple (p-p) 10% or less (with power supply polarity protection)	
Current consumption	40 mA or less	
Switch output	PNP open collector 2 outputs (For valves)	
Residual voltage	2 V or less (at 80mA load current)	
Short circuit protection	Provided	

Repeatability	±0.2% F.S. ±1 digit	
Hysteresis	Variable from 0.1	
Display type	3 ½ digit, 7-segment LED, 1-color display (Red)	
Display accuracy	±2% F.S. ± 1 digit (Ambient temperature of 25 ± 3°C)	
Indication LED	Lights up when the valve is turned on. Release valve (OUT1): Green Supply valve (OUT2): Red	
Digital filter	Variant from 0 to 10s (0.01s steps)	
Environmental resistance	Enclosure	IP40
	Ambient temperature	Operation: -5 to 50°C (No condensation or freezing) Storage: -10 to 60°C (No condensation or freezing)
	Ambient humidity	Operation/Storage: 35 to 85% RH (No condensation)
	Withstand voltage	1000 VAC for 1 minute between terminals and housing
Insulation resistance	50MΩ or more (500 vdc measured via megohmmeter) between terminals and housing	
Temperature characteristics	±2% F.S. (25°C standard)	
Lead wire	Cable: 3 wires, φ3.4, 300 mm, Insulator O.D.: 1.0 mm Valve connector lead wire: 100 mm, Insulator O.D.: 1.5 mm	

**3 Installation**

**3.1 Installation**

**Warning**

- Do not install the product unless the safety instructions have been read and understood.
- When mounting the product, tighten with the recommended tightening torque of the following screws.
  - Top surface and side surface mounting: 0.56 to 0.76 N·m
  - Bottom mounting: 0.29 to 0.30 N·m

- When installing the product, secure the space required for maintenance and inspection of the product.
- Do not drop, hit, or apply excessive impact to the product.

**3.2 Environment**

**Warning**

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- This product does not have a built-in suction filter. If there is dust in the usage environment of the product, consider using a vacuum filter (AFJ series)
- Do not use in place where static electricity build-up can occur.
- Do not use in an environment where surges occur.

**3.3 Air Supply**

**Caution**

- Do not use air containing chemicals, synthetic oils containing organic solvents, salts, or corrosive gases.
- Recommended quality of the supplied air be equivalent to the compressed air cleanliness grade "2: 6: 3" according to ISO8573-1: 2010.
- Do not supply the pressure in excess of the product's specifications.

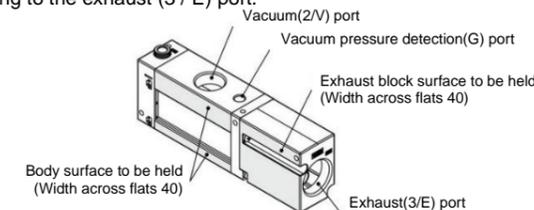
**3.4 Piping**

**Caution**

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping and fittings, make sure that no sealing material gets inside the port. When using sealing tape, wind it with one thread left.
- Tighten fittings to the specified tightening torque shown in the table below.

Port type	Port size	Recommended tightening torque
Vacuum (2/V) port	1/2 or 3/4 (Rc, G, NPT)	28 to 30 N·m
Exhaust (3/E) port	1 (Rc, G, NPT)	36 to 38 N·m
Vacuum pressure detection (G) port	1/8 (Rc, NPT)	3 to 5 N·m

- Fix the side of the body when piping to the vacuum (2 / V) port and pressure detection (G) port and fix the side of the port block when piping to the exhaust (3 / E) port.

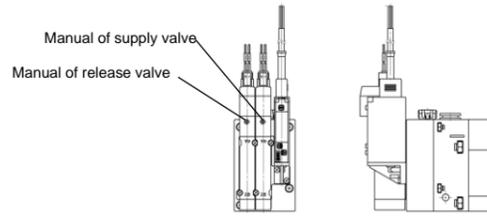


**3.5 Wiring to the solenoid valve and pressure switches**

Refer to the operation manual of solenoid valve (JSY3000 series), pressure switch (ZSE10 series), and IO-Link compatible digital pressure switch.

## 4 Settings

### 4.1 Manual Override (With supply valve and release valve)



Refer to the operation manual of the solenoid valve JSY3000 series for the manual operation method.

### 4.2 Release flow adjusting needle

When the release valve is turned on, vacuum break air is let out. The release flow adjusting needle allows to control the vacuum break air flow rate.

To adjust the break air flow, pull the push-locking handle to unlock it. Then, turn the push-locking handle clockwise to reduce the vacuum break flow, and turn the handle anti-clockwise to increase the flow.

## 5 How to Order

Refer to the catalogue for 'How to Order'.

## 6 Outline Dimensions (mm)

Refer to the catalogue for outline dimensions.

## 7 Maintenance

### 7.1 General Maintenance

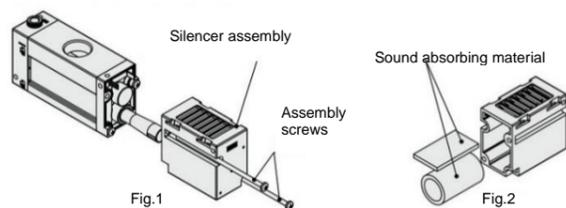
#### Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.

- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly, and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Implement the maintenance and check shown below to use the multistage ejector safely and in an appropriate way for a long period of time.
- Drain the air filter and mist separator regularly.
- Replace the sound absorbing material (silencer) built into the ejector regularly.
- Refer to the online operation manual for replacement parts.
- Do not use benzene or thinner for cleaning.

### 7.2 Replacement method of sound absorbing material (ZL3)

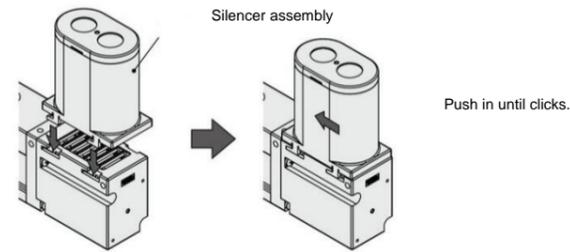
- 1) Loosen the two mounting screws of the silencer assembly and remove the silencer case (Fig.1)
- 2) Replace the sound absorbing material inside the silencer case (Fig.2)
- 3) Attach the silencer assembly using the mounting screws.  
(Recommended tightening torque: 0.76 to 0.84 Nm)



## 7 Maintenance - continued

### 7.3 Silencer assembly (ZL6)

- 1) Align the hook of the silencer assembly with the groove of the body, break it, and push it in the direction of the arrow until it clicks.
- 2) When removing, slide the silencer assembly in the direction opposite to the mounting direction to remove it.



## 8 Limitations of Use

### 8.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

#### Caution

#### • Exhaust from Multistage ejector

- 1) For the silencer exhaust type, make sure that there is no obstruction around the exhaust port.
- 2) In the case of port exhaust type, exhaust resistance may be affected depending on the pipe diameter and length, so make sure that the back pressure is 1 kPa or less.
- 3) Do not block the exhaust port.

#### • Ejector exhaust noise

When the vacuum ejector generates a vacuum, an intermittent noise (abnormal noise) may be generated from the exhaust section near the standard supply pressure where the vacuum pressure peaks, and the vacuum pressure may not be constant. There is no problem in use as

long as the vacuum pressure range is sufficient for adsorption, but if you are concerned about the sound or affect the setting of the pressure switch, slightly change the supply pressure and reduce the range of the intermittent sound. Please avoid it.

#### • About the breaking flow rate adjusting needle

- 1) Leakage cannot be reduced to zero when the needle is fully closed.
- 2) Check that the push lock handle is locked.
- 3) When unlocking the push lock handle, do not pull it with excessive force.
- 4) This release flow adjustment needle does not rotate more than 12 rotations from fully closed. If you try to rotate the needle any further, it may be damaged.
- 5) Do not tighten the handle with tools such as pliers.

#### • About solenoid valve and pressure switch

For the solenoid valve (JSY3000 series) and pressure switch (ZSE10 series), refer to each instruction manual.

## 9 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

## 10 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for your local distributor/importer.

## SMC Corporation

URL : <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)  
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Specifications are subject to change without prior notice from the manufacturer.  
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