



ORIGINAL INSTRUCTIONS

Instruction Manual
Vacuum Ejector
Series ZM



The intended use of the vacuum ejector is to generate vacuum and control the operation of suction and release.

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)^{*)}, and other safety regulations.

- ^{*)}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.

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

2.1 Vacuum ejector specifications

Fluid		Air
Max. operating pressure		0.7MPa
Max. vacuum pressure		-84 kPa
Supply pressure range	Air pressure supply (P) port (without valve)	0.2 to 0.55 MPa
	Air pressure supply (P) port (with valve)	0.25 to 0.55 MPa
	Pilot pressure supply (PA, PB) ports for supply and release ^{Note1)}	P port pressure to 0.55 MPa
Operating temperature range	Without valve	5 to 60 °C
	With valve	5 to 50 °C
Air supply valve Vacuum release valve		Main valve: poppet Pilot valve: V114, V124
Vacuum pressure switch		Electronic: ZSE1-00-□ Diaphragm: ZSM1-□
Suction filter		Filtration degree: 30 µm, Material: PE (Polyethylene)

2 Specifications - continued

Note 1) Combination of supply valve and release valve. The supply and release valves of this product have a structure which uses the pressure of the air pressure supply (P) port to operate them. Be sure to supply a pressure that is the pressure of the air pressure supply (P) port or more and 0.55 MPa or less to the pilot pressure supply (PA, PB) ports for supply and release.

2.2 Model specifications

Nozzle dia. Ø(mm)	Model	Standard supply pressure (MPa)			Max. suction flow rate (L/min(ANR))	Air consumption (L/min (ANR))	Diffuser construction
		H	M	S			
0.5	ZM05□H	0.5	-	-	15	17	Double diffuser
0.7	ZM07□H				30	30	
1.0	ZM10□H				50	60	
1.3	ZM13□H				66	90	
0.7	ZM07□M	-	0.35	-	23	33	
1.0	ZM10□M				38	60	
1.3	ZM13□M				44	85	
1.3	ZM13□S	-	-	0.45	37	88	Single diffuser
1.5	ZM15□S				45	110	

2.3 Valve specifications

How to operate	Pilot type
Main valve	NBR poppet
Effective area	3 mm ²
Cv factor	0.17
Operating pressure range	0.25 to 0.7 MPa
Electrical entry	Plug connector, Grommet (available on DC)
Max. Operating frequency	5 Hz
Voltage	24/12/6/5/3 VDC, 100/110 VAC (50/60 Hz)
Power consumption	DC: 0.35W (With light: 0.4 W), 100 VAC: 0.78 W (0.81 W), 110 VAC: 0.86 W (0.89 W)

2.4 Vacuum pressure switch specifications

Model	ZSE1-00-14,15,18,19	ZSE1-00-55	ZSE1-00-16,17	ZSM1-015	ZSM1-021
Sensor type	Solid state			Diaphragm	
Switch	Electronic circuit			Solid state	Reed
Set pressure range	0 to –101kPa			–27 to –80kPa	
Hysteresis	1 to 10% of the set pressure (Changeable)	3% full span or less (Fixed)		Max. 15kPa	Max. 20kPa
Repeatability	±1% full span or less			±10% or less	
Temperature characteristics	±3% full span or less			±5% full span	
Operating voltage	12 to 24VDC (Ripple ±10% or less)			4.5 to 28 VDC	AC/DC 100 V
ON-OFF output	NPN open collector 30V. Max. 80mA	PNP open collector. 30V Max. 80mA	NPN open collector 30V Max. 80mA	Open collector:2 8V Max. 40mA	-
Setting points	1 point		2 points	1 point	
Operation indicator light	Lights up when ON		Lights ON (Output1: Red, Output 2: Green)	Lights up when ON	
Current consumption	17mA or less (When 24VDC is ON)	25mA or less (When 24VDC is ON)		10mA or less(24VD C)	-
Max. current	-			-	24V or less: 50mA. 48V: 40mA, 100V: 20mA
Max. operating pressure	0.2MPa			0.5MPa	

2 Specifications - continued

Note 2) When using ejector system, instantaneous pressure up to 0.5 MPa will not damage the switch
Note 3) For details about wiring, refer to the Operation Manual that can be downloaded from our website (<http://www.smcworld.com>). Refer to the catalogue for further details on the Vacuum Switch

Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.
- Do not install the product unless the safety instructions have been read and understood.
- When mounting the product, tighten it with the recommended tightening torque (M4: 0.7~0.9Nm, M5: 1.4~1.6Nm).
- 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
- The suction filter used in this product is a simple one. If there is a lot of dust in the usage environment, please consider using a suction filter (ZFC series, etc.).
- 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 piping a joint to each port, fix the part where the port is attached and recommend torque (M5: 1.0 to 1.5 Nm, 1/8: 3 to 5 Nm, 1/8: 8 to 12 Nm)

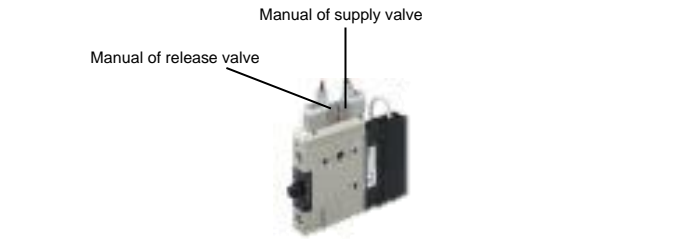
3.5 Wiring to the solenoid valve and pressure switches

Refer to the operation manual of solenoid valve (V100 series) and pressure switch (ZSE1/ZSM series). Manuals can be found by the links below:

V100: <https://www.smcworld.com/manual/en-jp/?k=V100>
ZSE1: <https://www.smcworld.com/manual/en-jp/?k=ZSE1>
ZSM: <https://www.smcworld.com/products/en/global.do?kw=ZSM>

4 Settings

4.1 Manual Override (With supply valve and release valve)



Refer to the operation manual of the solenoid valve V100 series for the manual operation method.

4.2 Release flow adjusting needle

When the release valve is turned on, vacuum release air is let out. The release flow adjusting needle allows to control the vacuum break air flow rate.
For products with locknut, loosen the lock nut and use a flat-blade screwdriver to adjust the release flow rate adjustment needle at the back of the lock nut.
The breaking flow rate adjustment needle can be turned clockwise to reduce the release flow rate, and counterclockwise to increase the release flow rate.
For products with locknut after adjusting the release flow rate adjustment needle, tighten the lock nut to fix the adjustment position.

5 How to Order

Refer to catalogue for 'How to Order'.

6 Outline Dimensions

Refer to 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 space saving vacuum unit 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 Sound absorbing material replacement method

- Single Unit:
 - Remove the silencer assembly from the side of the product by pushing it out with your finger.
 - Replace the sound absorbing material in the silencer case.
 - Insert the silencer assembly with the replace sound absorbing material from the side of the product.

- Manifold
 - Replace the silencer assembly that is assembled with the two assembly screws (recommended torque: 1.4 to 1.6 Nm).

7 Maintenance - continued

7.3 Filter element replacement method

- Loosen the tension bolt and remove the filter case.
- Replace the filter element built into the filter case.
- Assemble the filter case with tension bolts.

8 Limitations of Use

8.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.



Caution

- **Exhaust from vacuum ejector**
 - For the silencer exhaust type, make sure that there is no obstruction around the exhaust port.
 - 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.
 - 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 release flow rate adjusting needle**
 - Leakage cannot be reduced to zero when the needle is fully closed.
 - The breaking flow rate adjustment needle is fully opened after 4 rotations from fully closed. If turned more than that, it may come off so do not turn more than 4 times.
 - For products with locknut, when tightening the lock nut, tighten it by hand to about 15 to 30 degrees, and be careful not to damage it due to overtightening.
- **About solenoid valve and pressure switch**

For the solenoid valve (V100 series) and pressure switch (ZSE1, ZSM series), refer to each instruction manual.

9 Product Disposal

This product shall 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 or www.smc.eu for your local distributor/importer.

SMC Corporation

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