Vacuum Ejector
With Valve and Switch
Series ZM

How to Order

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>For single unit</td>
</tr>
<tr>
<td>3</td>
<td>For manifold, common SUP</td>
</tr>
<tr>
<td>5</td>
<td>For manifold, individual SUP</td>
</tr>
<tr>
<td>2</td>
<td>For single unit</td>
</tr>
<tr>
<td>4</td>
<td>For manifold, common SUP</td>
</tr>
<tr>
<td>6</td>
<td>For manifold, individual SUP</td>
</tr>
<tr>
<td>Nil</td>
<td>Standard type</td>
</tr>
<tr>
<td>S</td>
<td>High noise reduction type</td>
</tr>
</tbody>
</table>

Silencer*
- Silencer is applicable to single unit style.

Vacuum port location
- Nil: Side/Bottom entry
- A: Side entry

Standard supply pressure
- H: 0.5 MPa
- M: 0.35 MPa (Except nozzle diameter "05" type)

Thread type
- Nil
- T: NPTF
- F: G

Supply valve/Release valve combination
- J: Supply valve
- K: Supply valve and release valve
- A: Supply valve (N.O.)
- B: Supply valve (N.O.) and release valve

Nozzle diameter
- 05: 0.5 mm
- 07: 0.7 mm
- 10: 1.0 mm
- 13: 1.3 mm

Body style
- H: M

Vacuum switch model
- Nil: Without switch
- E14: 1 point setting without analog output/3 rotation setting
- E15: 1 point setting without analog output/200 degrees setting
- E16: 2 point setting without analog output/3 rotation setting
- E17: 2 point setting without analog output/200 degrees setting
- E18: 1 point setting analog output/3 rotation setting
- E19: 1 point setting analog output/200 degrees setting
- M15: 1 point setting without analog output/Diaphragm (18 rotation setting)/Solid state (12 to 24 VDC)
- M21: 1 point setting without analog output/Diaphragm (18 rotation setting)/Reed (100 VAC)

Manual override
- Nil: Non-locking push type
- B: Locking slotted type

Electrical entry
- G: Grommet type, with 0.3 mm lead wire (applicable to DC)
- L: L plug connector, with 0.3 mm lead wire
- LZ: L plug connector, with 0.3 mm lead wire and light/surge voltage suppressor
- LN: L plug connector, without lead wire (applicable to DC)
- LO: L plug connector, without connector

Rated voltage
- 1: 100 VAC 50/60 Hz
- 3: 110 VAC 50/60 Hz
- 5: 24 VDC
- 6: 12 VDC
- V: 6 VDC
- S: 5 VDC
- R: 3 VDC

Pilot valve
- Nil: DC: 1 W
- (With indicator light: 1.5 W)
- AC
- Y: DC: 0.45 W
- (With indicator light: 0.5 W)
- + 24 VDC and 12 VDC are applicable to 0.45 W.

SILencer**
- Silencer is applicable to single unit style.

For details about certified products conforming to international standards, visit us at www.smcworld.com.

* Refer to page 13-4-4 for air operated style.
Table (1) How to Order Connector for Solid State Switch

- Without lead wire (A connector and 4 sockets).......... ZS - 20 - AA
- With lead wire .............................................. ZS - 20 - 5A

Note) If ordering switch with 5 m lead wire, specify both switch and lead wire with connector part numbers.
Ex.) ZM□□□□-E15CN .............................. 1 pc.
     ZS-20-5A-50 .............................. 1 pc.

Table (2) How to Order Connector for Supply Valve and Vacuum Release Valve

VJ10 — 36 — 1A — (Applicable to 100 VAC only)
VJ10 — 36 — 3A — (Applicable to 110 VAC only)
VJ10 — 20 — 4A — (Applicable to DC only)

Note) If ordering a valve with 600 mm or longer lead wire, indicate the valve without connector and connector assembly.
Ex.) Lead wire length: 1000 mm
     ZM□□□□-K1LO .............................. 1 pc.
     VJ10-36-1A-10 .............................. 2 pcs.

How to Order

ZM—Nozzle diameter—Body style—Standard supply pressure

<table>
<thead>
<tr>
<th>Nozzle diameter</th>
<th>05 — 0.5 mm ø</th>
<th>07 — 0.7 mm ø</th>
<th>10 — 1.0 mm ø</th>
<th>13 — 1.3 mm ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body style</td>
<td>&lt;Without valve&gt;</td>
<td>2 — For single unit</td>
<td>4 — For manifold, common SUP</td>
<td>6 — For Manifold, individual SUP</td>
</tr>
<tr>
<td></td>
<td>&lt;With valve&gt;</td>
<td>1 — For single unit</td>
<td>3 — For manifold, common SUP</td>
<td>5 — For manifold, individual SUP</td>
</tr>
<tr>
<td>Standard supply pressure</td>
<td>H — 0.5 MPa</td>
<td>M — 0.35 MPa (Except nozzle diameter “05” type)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quick Delivery/Model

- <Without valve/Single unit>
  - ZM052H
  - ZM072H
  - ZM102H
  - ZM132H
- <With valve/Single unit>
  - ZM051H-K5LZ
  - ZM051H-K5LZ-E15
  - ZM101H-K5LZ
  - ZM101H-K5LZ-E15
  - ZM131H-K5LZ
  - ZM131H-K5LZ-E15
  - ZM131M-K5LZ-E15
  - ZM131M-K5LZ-E15

Caution
When using AC, the DC solenoids are operated via a rectifier. Therefore, when using this type, make sure to combine the connector assembly equipped with a rectifier with the exclusive solenoids. Using other combinations could lead to burned coils or other types of malfunctions.
All in One!
- Built-in suction filter and silencer
- Air supply valve for generating a vacuum
- Vacuum release valve (equipped with a flow volume adjustment valve)
- Vacuum pressure switch (solid state, diaphragm)

Adaptable for a manifold application
All tubing, wiring, indicators, and adjustment functions have been eliminated from the side surface, thus enabling assembly and maintenance while linked in a manifold.
- EXH system — Common
- SUP system — Common, Individual

Maximum air suction volume increased by 40%
Maximum vacuum pressure –84 kPa (~630 mmHg)
The suction volume has been increased by 40% through the adoption of a two-stage nozzle construction.

Compact and lightweight
15.5 mm width, 400 g (full system)

Ejector System Circuit
All in One!
- Built-in suction filter and silencer
- Air supply valve for generating a vacuum
- Vacuum release valve (equipped with a flow volume adjustment valve)
- Vacuum pressure switch (solid state, diaphragm)

Vacuum Ejector Specifications
<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air</th>
<th>Maximum operating pressure (MPa)</th>
<th>0.7 MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply pressure range</td>
<td>Without valve</td>
<td>0.2 to 0.55 MPa</td>
<td></td>
</tr>
<tr>
<td></td>
<td>With valve</td>
<td>0.25 to 0.55 MPa</td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Without valve</td>
<td>5 to 60 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>With valve</td>
<td>5 to 50 °C</td>
<td></td>
</tr>
<tr>
<td>Air supply valve</td>
<td>Main valve</td>
<td>Poppet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pilot valve</td>
<td>VJ114, VJ324M</td>
<td></td>
</tr>
<tr>
<td>Vacuum release valve</td>
<td>Electronic</td>
<td>ZSE1-00-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diaphragm</td>
<td>ZSM1-0</td>
<td></td>
</tr>
<tr>
<td>Suction filter</td>
<td>30 μm PE</td>
<td>Polyethylene</td>
<td></td>
</tr>
</tbody>
</table>

Valve Specifications

Air Operated Valve Specifications
Refer to page 13-4-11 for dimensions.
Precautions

Be sure to read before handling. Refer to pages 13-15-3 to 13-15-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and refer to page 13-1-5 for Precautions on every series.

Caution

Operation of an ejector equipped with a valve

When the air supply pilot valve is turned ON, air flows to the diffuser assembly, and a vacuum is created. When the pilot valve for releasing the vacuum is turned ON, air flows to the vacuum port side, immediately causing a release in the vacuum. The release speed can be adjusted by regulating the flow volume adjustment screw.

When the supply valve is turned OFF, the atmospheric pressure causes the air to flow back from the silencer, thus releasing the vacuum. However, in order to properly release a vacuum, a vacuum release valve must be used.

Operating environment

Because the filter cover is made of polycarbonate, do not use it with or expose it to following chemicals: paint thinner, carbon tetrachloride, chloroform, acetic ester, aniline, cyclohexane, trichloroethylene, sulfuric acid, lactic acid, water-soluble cutting oil (alkaline), etc. Also, do not expose it to direct sunlight. Furthermore, avoid use in direct sunlight.

Matching of the ejector to the vacuum circuit

For precautions associated with matching of the ejector to the vacuum circuit, refer to the technical data on page 13-1-10 to 13-1-19.

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Aluminum</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Valve cover</td>
<td>Zinc</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Adapter plate</td>
<td>Zinc</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cover</td>
<td>Zinc</td>
<td>Without switch: ZM-HCA, With switch: ZM-HCB</td>
</tr>
<tr>
<td>5</td>
<td>Tension bolt</td>
<td>Stainless</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Flow adjustment</td>
<td>Brass</td>
<td>Electroless nickel plated</td>
</tr>
</tbody>
</table>

Replacement Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Filter cover assembly</td>
<td>—</td>
<td>ZM-FCB-0</td>
</tr>
<tr>
<td>8</td>
<td>Diffuser assembly</td>
<td>—</td>
<td>ZM-0200-0</td>
</tr>
<tr>
<td>9</td>
<td>Suction filter</td>
<td>Polyethylene</td>
<td>ZM-SF</td>
</tr>
<tr>
<td>10</td>
<td>Silencer assembly</td>
<td>—</td>
<td>ZM-SA</td>
</tr>
<tr>
<td>11</td>
<td>Pilot valve</td>
<td>—</td>
<td>VJ114-0000</td>
</tr>
<tr>
<td>12</td>
<td>Poppet valve assembly</td>
<td>—</td>
<td>ZM-PV-0</td>
</tr>
<tr>
<td>13</td>
<td>Vacuum pressure switch</td>
<td>—</td>
<td>ZSE1-000-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ZSM1-015</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ZSM1-021</td>
</tr>
<tr>
<td>14</td>
<td>Check valve</td>
<td>NBR</td>
<td>ZM-CV</td>
</tr>
</tbody>
</table>
**Series ZM**

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H...0.5 MPa

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**ZM05 □ H**

**Exhaust Characteristics**

**Flow Characteristics**

---

**ZM07 □ H**

**Exhaust Characteristics**

**Flow Characteristics**

---

**ZM10 □ H**

**Exhaust Characteristics**

**Flow Characteristics**

---

**ZM13 □ H**

**Exhaust Characteristics**

**Flow Characteristics**

---

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H···0.5 MPa
### Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: M...0.35 MPa

#### ZM07M

**Exhaust Characteristics**

- Vacuum pressure (kPa)
- Suction flow rate
- Air consumption (l/min (ANR))

**Flow Characteristics**

- Supply pressure (MPa)
- Flow rate (l/min (ANR))

#### ZM10M

**Exhaust Characteristics**

- Vacuum pressure (kPa)
- Suction flow rate
- Air consumption (l/min (ANR))

**Flow Characteristics**

- Supply pressure (MPa)
- Flow rate (l/min (ANR))

#### ZM13M

**Exhaust Characteristics**

- Vacuum pressure (kPa)
- Suction flow rate
- Air consumption (l/min (ANR))

**Flow Characteristics**

- Supply pressure (MPa)
- Flow rate (l/min (ANR))

**How to Read Flow Characteristics Graph**

Flow characteristics are expressed in ejector vacuum pressure and suction flow. If suction flow rate changes, a change in vacuum pressure will also be expressed. Normally this relationship is expressed in ejector standard use. In graph, Pmax is max. vacuum pressure and Qmax is max. suction flow. The valves are specified according to catalog use. Changes in vacuum pressure are expressed in the below order.

1. When ejector suction port is covered and made airtight, suction flow is 0 and vacuum pressure is at maximum value (Pmax).
2. When suction port is opened gradually, air can flow through, (air leakage), suction flow increases, but vacuum pressure decreases. (condition P1 and Q1)
3. When suction port is opened further, suction flow moves to maximum value (Qmax), but vacuum pressure is near 0. (atmospheric pressure).

When vacuum port (vacuum piping) has no leakage, vacuum pressure becomes maximum, and vacuum pressure decreases as leakage increases. When leakage value is the same as max. suction flow, vacuum pressure is near 0. When ventitative or leaky work must be adsorbed, please note that vacuum pressure will not be high.
**Vacuum Switch**

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>ZSE-00-14</th>
<th>ZSE-00-15</th>
<th>ZSE-00-16</th>
<th>ZSE-00-17</th>
<th>ZSE-00-18</th>
<th>ZSE-00-19</th>
<th>ZSM-015</th>
<th>ZSM-021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch</td>
<td>Solid state</td>
<td>Electronic circuit</td>
<td>Solid state</td>
<td>Reed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set pressure range</td>
<td>0 to 101 kPa</td>
<td>–26.6 to –79.8 kPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>3% full span or less (Fixed)</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>17% full span</td>
<td>23% full span</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>±5% full span</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>±3% full span or less</td>
<td>±5% full span</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristics</td>
<td>Operating voltage</td>
<td>12 to 24 VDC (Ripple ±10% or less)</td>
<td>DC10 to 26V</td>
<td>AC100V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON-OFF output</td>
<td>Open collector 30 V Max. 80 mA</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting points</td>
<td>1 point</td>
<td>2 points</td>
<td>1 point</td>
<td>1 point</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation indicator light</td>
<td>Lights up when ON</td>
<td>Lights ON (Output1: Red, Output2: Green)</td>
<td>Lights up when ON</td>
<td>Lights ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting trimmer</td>
<td>3 rotations</td>
<td>200 degrees</td>
<td>3 rotations</td>
<td>200 degrees</td>
<td>3 rotations</td>
<td>200 degrees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON-OFF output</td>
<td>Open collector 30 V Max. 80 mA</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>25 mA or less (When 24 VDC is ON)</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>16 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. current</td>
<td>—</td>
<td>200 degrees</td>
<td>18 rotations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. operating pressure</td>
<td>—</td>
<td>5 to 20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* When using ejector system, instantaneous pressure up to 0.5 MPa will not damage the switch.

**Solid State Switch (ZSE)**

**Circuit/Connection**

**ZSE-00-14, -15**
- Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- Black lead wire: connect to the load (PLC input or relay).
- Blue lead wire: connect to supply GND terminal.

**ZSE-00-16, -17**
- Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- Black lead wire: connect to load (PLC input or relay).
- Blue lead wire: connect to supply GND terminal.
- Gray lead wire: connect to load (PLC input or relay).

**ZSE-00-18, -19**
- Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- Black lead wire: connect to load (PLC input or relay).
- Blue lead wire: connect to analog load.
- Gray lead wire: connect to power supply terminal.

**Diaphragm Switch (ZSM)**

**Solid State Switch: ZSM-015**
- Red lead wire: Connect the power supply to operate the main switch circuit (to the terminal of the power source).
- White lead wire: Connect the load (to the input or output relay of the PLC).
- Black lead wire: Connect the power supply to the GND terminal of the power supply.

**Reed Switch: ZSM-021**
- Light emitting diode
- Polarity protection diode
- Black lead wire

**Connection with PLC**

**Negative COM**

**Positive COM**

**Contact protection box**

The switch does not have a built-in contact protection circuit. Use this box if an induction load is applied or if the lead wire is longer than 5 meters.

**Internal Circuit of Contact Protection Box**
**Mounting Direction of Silencer**

- Mounting direction of silencer is located away from the diffuser.
- At this time, make sure that the window of the exhaust port is not covered by the wall or the board.
- A hole is provided in one side of the window of the silencer's exhaust port. Therefore, if the silencer is to be attached against a wall or a board, make sure that the window of the exhaust port is not covered by the wall or the board. To reverse the position, apply your finger to the hook with a thin tip (about 1 mm). If the silencer case itself does not become damaged, it could damage the internal switch and cause it to malfunction.

**Silencer**

A hole is provided in one side of the window of the silencer’s exhaust port. Therefore, if the silencer is to be attached against a wall or a board, make sure that the window of the exhaust port is not covered by the wall or the board. To reverse the position, apply your finger to the hook with a thin tip (about 1 mm). If the silencer case itself does not become damaged, it could damage the internal switch and cause it to malfunction.

**How to Use Connector**

1. **Attaching and detaching connectors**
   - When assembling the connector to the switch housing, push the connector straight onto the pins until the level locks into the housing slot.
   - When removing the connector from the switch housing, push the lever down to unlock it from the slot and then withdraw the connector straight off of the pins.

2. **Crimping of lead wires and sockets**
   - Strip 3.2 to 3.7 mm of the lead wire ends, insert each stripped wire into a socket and crimp contact it using special crimping tool. Be careful that the outer insulation of the lead wires does not interfere with the socket contact part.
   - (Crimping tool: DXT170-75-1)

3. **Attaching and detaching of socket to connector with lead wire**
   - Insert the sockets into the square holes of the connector (with +, 1, 2, – indication), and continue to push the sockets all the way in until they lock by hooking into the seats in the connector. (When they are pushed in their hooks open and they are locked automatically.) Then confirm that they are locked by pulling lightly on the lead wires.
   - To detach a socket from a connector, pull out the lead wire while pressing the socket’s hook with a stick having a thin tip (about 1 mm). If the socket will be used again, first spread the hook outward.

**Silencer’s exhaust port**

The performance is not affected even if a momentary pressure of approximately 0.5 MPa is applied (during a vacuum break). However, make sure that a constant pressure that is higher than 0.2 MPa is applied (during a vacuum break). However, make sure that a constant pressure that is higher than 0.2 MPa is applied (during a vacuum break). However, make sure that a constant pressure that is higher than 0.2 MPa is applied (during a vacuum break).

**Warning**

1. Do not drop or bump. When handling the switch, do not apply an excessive impact (1000 m/s²) by dropping or striking the switch. Even if the switch case itself does not become damaged, it could damage the internal switch and cause it to malfunction.

2. Hold the product from the body side when handling.
   - To handle the product, hold it by its body. The tensile strength of the power supply cord is 49 N (5 kgf). If the cord is pulled with a greater force, it could lead to a malfunction. When handling the product, make sure to hold it by its body.

3. Never move the switch assembly or loosen the switch assembly mounting screws.

**Power Supply**

1. Vacuum pressure switch:
   - The performance is not affected even if a momentary pressure of approximately 0.5 MPa is applied (during a vacuum break). However, make sure that a constant pressure that is higher than 0.2 MPa is not applied.

**Operating Environment**

1. It cannot be used in a magnetic region. In the case of ZSM1-021

**Warning**

- Operate the product within the specified operating amperage range. If the product is used below the specified operating amperage, the indicator light will not turn ON. If the product is used above the specified operating amperage, the indicator light will become damaged.
- A parallel connection of the switches does not cause any problem. However, be careful with a series connection because the voltage drop will increase due to the internal resistance of the light-emitting diodes (approximately 2 V per switch).

**In the case of ZSM1-015**

**Warning**

- Make sure to connect the 3 lead wires correctly. If they are interchanged, they could lead to a malfunction or damage.
- Although an output signal is emitted immediately after the power is turned ON, this is not a malfunction.
Series ZM

For Single Unit/Without Valve  Basic Type

ZM□2HM

- Dimensions of model with high noise reduction silencer assembly is the same as standard.

(Side entry style is equipped with plugs.)

<Components>

For Single Unit/Without Valve  Basic Type with Switch

ZM□2HM

- Dimensions of model with high noise reduction silencer assembly is the same as standard.

(Side entry style is equipped with plugs.)
Air Operated Type

Vacuum Ejector: With Valve and Switch Series ZM

- Pilot port for release valve
  - M3 x 0.5 (M5 x 0.8)

- Pilot port for supply valve
  - M3 x 0.5 (M5 x 0.8)

- Flow adjustment screw
  - Rc ⅛
  - SUP. port

- Silencer assembly

Dimensions of model with high noise reduction silencer assembly is the same as standard.

- (Side entry style is equipped with plugs.)

This dimension shows Q3 (M3 x 0.5). Dimension in parentheses shows Q5 (M5 x 0.8).
Series ZM

For Single Unit/With Valve  Basic Type with Switch and Valve

Components:

- SUP. port
- Release flow adjusting needle
- Release valve
- 2 ø4.5 Mounting hole
- Supply valve
- Pilot valve
- Pilot exhaust / M5 x 0.8 through
- Vacuum pressure switch
- Silencer assembly

Dimensions of model with high noise reduction silencer assembly is the same as standard.

(Side entry style is equipped with plugs.)
Vacuum Ejector: With Valve and Switch Series ZM

Single/With Air Supply Valve (N.O.) and Vacuum Release Valve Basic Type with Valve

ZM□1□M-B□□

Components

Pilot valve for vacuum release
Pilot valve for air supply

Silencer assembly
Dimensions of model with high noise reduction silencer assembly is the same as standard.

Rc 1/8
SUP. port

VAC. port

ZX ZR ZM ZH ZU ZL ZY ZQ ZF ZP ZCU AMJ Misc.

13-4-13
1. Double Check Valve/For Manifold

When a manifold is used, the exhaust that is discharged to the silencer could flow out to the vacuum port side. To prevent this from occurring, a check valve is used.

⚠️ Warning

1. It cannot be used for maintaining a vacuum.
2. Use a vacuum release valve (the workpiece cannot be released without a vacuum release valve.)

Construction
Series **ZM**

**Made to Order Specifications:**
Please consult with SMC for detailed specifications, dimensions, and delivery.

2. **With Individual Exhaust Spacer**

When using an individual ejector in a clean room, the exhaust can be discharged outside of the clean room by attaching an individual exhaust spacer. (The spacer can also be installed when using a manifold. Please contact SMC for mounting dimensions.)

+ It is possible to manufacture it with a switch.

⚠️ **Warning**
To connect a pipe to the exhaust port, do not use an elbow joint because it creates resistance and prevents the system from attaining a sufficient vacuum.

---

### Construction

![Diagram of ZM Series with Individual Exhaust Spacer](image)

<table>
<thead>
<tr>
<th>Single: ZM</th>
<th>Nozzle diameter</th>
<th>Body</th>
<th>Supply pressure</th>
<th>X111</th>
</tr>
</thead>
</table>

Individual exhaust port:
- Rc 1/8

Individual exhaust spacer:
- M2.5 x 36 (2 pcs.)

Round head combination screw
- P31829-01
- P31829-02
- Gasket
- Spacer E

Standard model + 14.5

EXH.
3. Double Solenoid Supply Valve

This is an air supply pilot valve that is made with double solenoids.
* It is possible to manufacture it with a switch.

Note) The -X126 model cannot be manufactured with an L plug connector for electrical entry. Therefore, use a grommet type or an M plug connector.

**Construction**

![Diagram of the double solenoid supply valve]
Vacuum Ejector
With Solid State Timer
Series ZMA

Incorporates solid state timer function for release valve control (Timer setting with PLC is unnecessary)

Allows sharing of switch/valve power supply, and single line for suction signal (Valve wiring is unnecessary)

Timer can be easily adjusted without programming (Reduction of the load of PLC)

Timing Chart

<table>
<thead>
<tr>
<th>Suction command</th>
<th>OFF</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction output</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Release output</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

Note) When power is supplied, release output is performed once for the time period only.
Montage

**Warning**

1. Do not drop or bump.
   
   Do not drop, bump or apply excessive impact (1,000 m/s²) when handling. Even if the switch body is not damaged, the switch may suffer internal damage that will lead to malfunction.

2. Hold the product from the body side when handling.
   
   The tensile strength of the power cord is 49 N, and pulling it with a greater force can cause failure.

3. When handling the product, never move or loosen the switch assembly or the switch assembly mounting screws.

Raccordement

**Warning**

1. Do not allow repeated bending or stretching forces to be applied to lead wires.

   Wiring arrangements in which repeated bending stress or stretching force is applied to the lead wires can cause broken wires.

Source de Pression

**Warning**

1. Vacuum pressure switches

   There will be no change in performance if a pressure of approximately 0.5 MPa is applied momentarily (when releasing vacuum), but care should be taken that pressures of 0.2 MPa or more are not applied on a regular basis.

Environnement de Fonctionnement

**Warning**

1. The product cannot be used in a strong magnetic field.
Vacuum Ejector
With Solid State Timer

Series ZMA

How to Order

ZMA 07 1 H K 5 T14 C

Nozzle diameter
- ø0.5 mm
- ø0.7 mm
- ø1.0 mm
- ø1.3 mm
- ø1.5 mm

Body type
- 1: For single unit
- 3: Common SUP for manifold
- 5: Individual SUP for manifold

Standard supply pressure
- H: 0.5 MPa
- M: 0.35 MPa
- S: 0.45 MPa

Refer to Table (1) for selection of standard supply pressure and nozzle diameter.

Thread type
- NIL: Rc
- T: NPTF
- F: G

Electrical entry of vacuum switch (Connector type)
- C: Lead wire length 0.6 m
- C: Lead wire length 3 m
- CN: No lead wire

Switch model
- T14: 1 point setting, No analog output available
- T54: 3 turns, NPN output

Rated voltage
- 5: 24 VDC

Valve
- K: With air supply valve, Vacuum release valve

Table (1) Combination of Nozzle Diameter and Standard Supply Pressure

<table>
<thead>
<tr>
<th>Nozzle diameter</th>
<th>Standard supply pressure (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (0.35)</td>
</tr>
<tr>
<td>ø0.5</td>
<td>—</td>
</tr>
<tr>
<td>ø0.7</td>
<td>●</td>
</tr>
<tr>
<td>ø1.0</td>
<td>●</td>
</tr>
<tr>
<td>ø1.3</td>
<td>●</td>
</tr>
<tr>
<td>ø1.5</td>
<td>—</td>
</tr>
</tbody>
</table>

Table (2) Lead wire with 4-wire connector

| Lead wire with 4-wire connector | P5022-6-1 (0.6 m) | P5022-6-2 (3 m) |

* Refer to Table (1) for selection of standard supply pressure and nozzle diameter.

* Refer to Table (2) for lead wire with 4-wire connector.
### Vacuum Ejector Specifications

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. operating pressure</td>
<td>0.7 MPa</td>
</tr>
<tr>
<td>Max. vacuum pressure</td>
<td>–84 kPa</td>
</tr>
<tr>
<td>Supply pressure range</td>
<td>0.25 to 0.55 MPa</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>5 to 50°C</td>
</tr>
<tr>
<td>Suction filter</td>
<td>Polyethylene sintered metal (30 µm)</td>
</tr>
</tbody>
</table>

### Valve Specifications

- **Model**: ZMA05/L50132H, ZMA07/L50132H, ZMA10/L50132H, ZMA13/L50132H, ZMA07/L50132M, ZMA10/L50132M, ZMA13/L50132M, ZMA13/L50132S, ZMA15/L50132S

### Vacuum Switch with Timer Specifications (for controlling solenoid valve)

<table>
<thead>
<tr>
<th>Power source</th>
<th>Operating voltage</th>
<th>Consumption current per one unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC ± 10%</td>
<td>24 VDC ± 10%</td>
<td>1.1 W (at switch output OFF)</td>
</tr>
</tbody>
</table>

### Timing Chart

- **Suction command**: OFF
- **Suction output**: OFF
- **Release output**: OFF

Note: When power is supplied, release output is performed once for the time period only.

### Wiring

- **Brown**: DC (+)
- **Black**: Suction command
- **White**: Switch output
- **Blue**: DC (−)
Construction: ZMA□1□-K□L-E□

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Aluminum die-casted</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Valve cover</td>
<td>Zinc die-casted</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Adapter plate</td>
<td>Zinc die-casted</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Cover</td>
<td>Zinc die-casted</td>
<td>ZMA-HCB</td>
</tr>
<tr>
<td>5</td>
<td>Tension bolt</td>
<td>Stainless steel/Polyacetal</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Flow adjustment screw</td>
<td>Brass</td>
<td>Electroless nickel plated</td>
</tr>
</tbody>
</table>

Replacement Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Filter cover assembly</td>
<td>—</td>
<td>ZMA-FCB-0</td>
</tr>
<tr>
<td>8</td>
<td>Diffuser assembly</td>
<td>—</td>
<td>ZMA□□□□0□□□0</td>
</tr>
<tr>
<td>9</td>
<td>Suction filter</td>
<td>Polyethylene</td>
<td>ZM-SF</td>
</tr>
<tr>
<td>10</td>
<td>Silencer assembly</td>
<td>—</td>
<td>ZM-SA</td>
</tr>
<tr>
<td>11</td>
<td>Pilot valve</td>
<td>—</td>
<td>SY114-5LOZ</td>
</tr>
<tr>
<td>12</td>
<td>Poppet valve assembly</td>
<td>—</td>
<td>ZM-PV-0</td>
</tr>
<tr>
<td>13</td>
<td>Vacuum switch with timer</td>
<td>—</td>
<td>ZMA-T14CN (NPN) ZMA-T54CN (PNP)</td>
</tr>
<tr>
<td>14</td>
<td>Check valve</td>
<td>NBR</td>
<td>ZM-CV</td>
</tr>
<tr>
<td>15</td>
<td>Connector assembly</td>
<td>—</td>
<td>ZMA-VC-1A</td>
</tr>
</tbody>
</table>
Series ZMA

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H—0.5 MPa

<table>
<thead>
<tr>
<th>ZMA05□H</th>
<th>Exhaust Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ZMA07□H</th>
<th>Exhaust Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ZMA10□H</th>
<th>Exhaust Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ZMA13□H</th>
<th>Exhaust Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: S—0.45 MPa

<table>
<thead>
<tr>
<th>ZMA13□S</th>
<th>Exhaust Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ZMA15□S</th>
<th>Exhaust Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vacuum pressure (kPa)  Max. suction flow rate (l/min (ANR))  Air consumption (l/min (ANR))
Vacuum Ejector: With Solid State Timer Series ZM

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: M...0.35 MPa

**ZM07□M**

### Exhaust Characteristics

- Vacuum pressure (kPa)
- Suction flow rate
- Air consumption

### Flow Characteristics

- Vacuum pressure (kPa)
- Max. suction flow rate (l/min (ANR))
- Air consumption (l/min (ANR))

**ZM10□M**

### Exhaust Characteristics

- Vacuum pressure (kPa)
- Suction flow rate
- Air consumption

### Flow Characteristics

- Vacuum pressure (kPa)
- Max. suction flow rate (l/min (ANR))
- Air consumption (l/min (ANR))

**ZM13□M**

### Exhaust Characteristics

- Vacuum pressure (kPa)
- Suction flow rate

### Flow Characteristics

- Vacuum pressure (kPa)
- Max. suction flow rate (l/min (ANR))
- Air consumption (l/min (ANR))

---

**How to Read Flow Characteristics Graph**

Flow characteristics are expressed in ejector vacuum pressure and suction flow. If suction flow rate changes, a change in vacuum pressure will also be expressed. Normally, this relationship is expressed in ejector standard use. In graph, Pmax is max. vacuum pressure and Qmax is max. suction flow. The valves are specified according to catalog use. Changes in vacuum pressure are expressed in the below order.

1. When ejector suction port is covered and made airtight, suction flow is 0 and vacuum pressure is at maximum value (Pmax).
2. When suction port is opened gradually, air can flow through (air leakage), suction flow increases, but vacuum pressure decreases. (condition P1 and Q1)
3. When suction port is opened further, suction flow moves to maximum value (Qmax), but vacuum pressure is near 0. (atmospheric pressure)

When vacuum port (vacuum piping) has no leakage, vacuum pressure becomes maximum, and vacuum pressure decreases as leakage increases. When leakage value is the same as max. suction flow, vacuum pressure is near 0.

When ventilative or leaky work must be absorbed, please note that vacuum pressure will not be high.
Release flow adjustment screw

VAC.

3-Rc 1/8 SUP.

VAC.

15.5

Dimensions

Series ZMA

13-4-28
Manifold Specifications: Series ZZMA

### Manifold Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Stacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manifold style</td>
<td>Stacking</td>
</tr>
<tr>
<td>Common SUP port*</td>
<td>Rc 1/4</td>
</tr>
<tr>
<td>Individual SUP port*</td>
<td>Rc 1/4</td>
</tr>
<tr>
<td>Common EXH port</td>
<td>Rc 1/2, 3/4</td>
</tr>
<tr>
<td>EXH port location</td>
<td>Right side/Left side/Both sides**</td>
</tr>
<tr>
<td>Max. number of stations</td>
<td>Max. 10 stations</td>
</tr>
<tr>
<td>Silencer</td>
<td>ZZM-SA (With bolts)</td>
</tr>
</tbody>
</table>

* Mixed mounting of common SUP and individual SUP types possible.

** Right or left to the VAC port.

### Maximum Ejector Stations (Max. operable nos. simultaneously)

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>Ejector model</th>
<th>ZM053</th>
<th>ZM073</th>
<th>ZM103</th>
<th>ZM133</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZMA</td>
<td>06R</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>ZZMA</td>
<td>06B</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>ZZMA</td>
<td>04L</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>ZZMA</td>
<td>04B</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

* Effective area of external silencer is 160 mm².

### How to Order Ejector Manifold

ZZMA **06** [ ] **06** [ ] **R**

- **Number of stations**
  - 01: 1 station
  - ...: ...
  - 10: 10 stations (max.)

- **Port and silencer location**
  - R: Right side
  - L: Left side
  - B: Both sides

Note) Right and left side are viewed from the front side of VAC port.

- **Thread type**
  - Nil
  - Rc
  - T
  - NPTF
  - F
  - G

- **Common EXH port size**
  - 04: 1/2
  - 06: 3/4
  - S: Silencer dedicated for ZZMA (ZZM-SA)

* Indicate the ejector model no. below the manifold base no.

Example) Manifold model no.: ZZMA04-SR (1 pc.)

Ejector model no.: +ZMA073H-K5-T14C (4 pcs.)
Manifold/With Silencer
Manifold with Silencer Dedicated for Manifold

ZZMA  Number of ejectors — S  Position of silencer

<Components>
Manifold/With Silencer

Components:
- Manifold with Silencer Dedicated for Manifold

Series ZM

Vacuum Ejector: With Solid State Timer

Manifold/With Silencer

ZZMA

- Number of ejectors
- Position of silencer

Diagram:
- Mounting hole
- Pitch
- Individual SUP. port
- VAC. port
- Silencer dedicated for manifold (ZZM-SA)
- 2-Rc 1/4 Common SUP. port
- 2-M5 x 0.8 Common pilot EXH. port

Table:

<table>
<thead>
<tr>
<th>Stations</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>28 ± 1.5</td>
<td>44 ± 1.5</td>
<td>60 ± 1.5</td>
<td>76 ± 1.5</td>
<td>92 ± 1.5</td>
<td>108 ± 2.0</td>
<td>124 ± 2.0</td>
<td>140 ± 2.0</td>
<td>156 ± 2.0</td>
<td>172 ± 2.0</td>
</tr>
<tr>
<td>L2</td>
<td>40 ± 1.5</td>
<td>56 ± 1.5</td>
<td>72 ± 1.5</td>
<td>88 ± 1.5</td>
<td>104 ± 1.5</td>
<td>120 ± 2.0</td>
<td>136 ± 2.0</td>
<td>152 ± 2.0</td>
<td>168 ± 2.0</td>
<td>184 ± 2.0</td>
</tr>
<tr>
<td>L3</td>
<td>72 ± 1.5</td>
<td>88 ± 1.5</td>
<td>104 ± 1.5</td>
<td>120 ± 1.5</td>
<td>136 ± 1.5</td>
<td>152 ± 2.0</td>
<td>168 ± 2.0</td>
<td>184 ± 2.0</td>
<td>200 ± 2.0</td>
<td>216 ± 2.0</td>
</tr>
</tbody>
</table>

Dimensions (mm)