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 surfaces, thus enabling assembly and maintenance while linked to a manifold.
- EXH system —— Common
- SUP system —— Common, Individual

Maximum air suction volume increased by 40%
Maximum vacuum pressure – 84 kPa
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)

Air operated type

Series ZM Applications
Fields: Semiconductor and electrical, automobile assembly, food and medical equipment, and various types of manufacturing and assembly equipment
Machines: Robotic hand/material handling, automotive assembling machines, automatic transfer equipment, pick and place, printing machinery
Functions: Vacuum adsorption transfer, vacuum adsorption retention, vacuum generated air flow
## Vacuum Ejector With Valve and Switch
### Series ZM

#### How to Order

<table>
<thead>
<tr>
<th>ZM</th>
<th>—</th>
<th>—</th>
<th>—</th>
<th>—</th>
<th>L</th>
<th>—</th>
<th>—</th>
</tr>
</thead>
</table>

**Nozzle diameter**
- 05: 0.5
- 07: 0.7
- 10: 1.0
- 13: 1.3
- 15: 1.5

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

**Body style**
- 1: Unit valve + with standard silencer
- 1S: Unit valve + with high noise reduction silencer
- 3: Manifold: with common SUP valve
- 3S: Manifold: with individual SUP valve
- 2: Unit with standard silencer (without valve)
- 2S: Unit with high noise reduction silencer (without valve)
- 4: Manifold: without common SUP valve
- 6: Manifold: without individual SUP valve

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

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

**Supply valve/Release valve combination**
- J: Supply valve (N.C.)
- K: Supply valve (N.O.), and release valve
- A: Supply valve (N.O.)
- B: Supply valve (N.O.), and release valve
- PS: Air operated valve (supply valve), Port size connection M5 x 0.8
- QS: Air operated valve (supply/release valve), Port size connection M5 x 0.8

**Release flow rate adjusting needle**
- Nil: Without lock nut
- L: With lock nut

**Solenoid valve rated voltage**

<table>
<thead>
<tr>
<th>Solenoid valve rated voltage</th>
<th>Ce-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Note) 100 VAC 50/60Hz</td>
<td>—</td>
</tr>
<tr>
<td>3 (Note) 110 VAC 50/60Hz</td>
<td>—</td>
</tr>
<tr>
<td>5 24 VDC</td>
<td>●</td>
</tr>
<tr>
<td>6 12 VDC</td>
<td>●</td>
</tr>
<tr>
<td>V 6 VDC</td>
<td>●</td>
</tr>
<tr>
<td>S 5 VDC</td>
<td>●</td>
</tr>
<tr>
<td>R 3 VDC</td>
<td>●</td>
</tr>
<tr>
<td>Nil Air operated/Without valve</td>
<td>—</td>
</tr>
</tbody>
</table>

**Made to Order**
Refer to pages 194 to 196 for details.

**Vacuum switch electrical entry**
- Nil: Grommet type, with 0.6 m lead wire (ZSE1)
- L: Grommet type, with 3 m lead wire (ZSE1)
- C: Connector type, with 0.6 m lead wire (ZSE1)
- CL: Connector type, with 3 m lead wire (ZSE1)
- CN: Without lead wire assembly with connector
- Nil: Grommet type, with 0.5 m lead wire (ZSM1)
- L: Grommet type, with 3 m lead wire (ZSM1)

**Vacuum switch model**

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

**Light/Surge voltage suppressor**
- Nil: None
- Z: With light/surge voltage suppressor
- S: With surge voltage suppressor

**Electrical entry**
- G: Grommet type, with 0.3 m lead wire (applicable to DC)
- H: Grommet type, with 0.6 m lead wire (applicable to DC)
- L: L plug connector, with 0.3 m lead wire
- LN: L plug connector, without lead wire (applicable to DC)
- LO: L plug connector, without connector (applicable to DC)
- Nil: Air operated/Without valve

**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>0.5 (0.35)</td>
<td>—</td>
</tr>
<tr>
<td>0.7</td>
<td>—</td>
</tr>
<tr>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>1.3</td>
<td>—</td>
</tr>
<tr>
<td>1.5</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note: CE-compliant products are not available for “1” and “3.”

---

**Note:**
- “S” is not available for AC.
- DC voltage (with surge voltage suppressor) if the polarity is incorrect at DC (surge voltage suppressor), diode or switching element may be damaged.

---

**Thread ridge shape**
- The thread ridge shape is compatible with the G thread standard (JIS B0203), but other shapes are not conforming to ISO16030 and ISO1179.

**Made to Order**
Refer to pages 194 to 196 for details.

---

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

**Supply valve/Release valve combination**
- J: Supply valve (N.C.)
- K: Supply valve (N.O.), and release valve
- A: Supply valve (N.O.)
- B: Supply valve (N.O.), and release valve
- PS: Air operated valve (supply valve), Port size connection M5 x 0.8
- QS: Air operated valve (supply/release valve), Port size connection M5 x 0.8

**Release flow rate adjusting needle**
- Nil: Without lock nut
- L: With lock nut

**Solenoid valve rated voltage**

<table>
<thead>
<tr>
<th>Solenoid valve rated voltage</th>
<th>Ce-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Note) 100 VAC 50/60Hz</td>
<td>—</td>
</tr>
<tr>
<td>3 (Note) 110 VAC 50/60Hz</td>
<td>—</td>
</tr>
<tr>
<td>5 24 VDC</td>
<td>●</td>
</tr>
<tr>
<td>6 12 VDC</td>
<td>●</td>
</tr>
<tr>
<td>V 6 VDC</td>
<td>●</td>
</tr>
<tr>
<td>S 5 VDC</td>
<td>●</td>
</tr>
<tr>
<td>R 3 VDC</td>
<td>●</td>
</tr>
<tr>
<td>Nil Air operated/Without valve</td>
<td>—</td>
</tr>
</tbody>
</table>
Table (1) How to Order Connector for Solid State Switch

• Without lead wire (A connector and 4 sockets) ........... ZS – 20 – A

• 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(-Q) .............................. 1 pc.
   + VJ10-36-1A-10 .............................. 2 pcs.

Quick Delivery/Model

<table>
<thead>
<tr>
<th>&lt;Without valve/Single unit&gt;</th>
<th>&lt;With valve/Single unit&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZM052H</td>
<td>ZM051H-K5LZ(-Q)</td>
</tr>
<tr>
<td>ZM072H</td>
<td>ZM051H-K5LZ-E15(-Q)</td>
</tr>
<tr>
<td>ZM102H</td>
<td>ZM071H-K5LZ(-Q)</td>
</tr>
<tr>
<td>ZM132H</td>
<td>ZM071H-K5LZ-E15(-Q)</td>
</tr>
<tr>
<td></td>
<td>ZM101H-K5LZ(-Q)</td>
</tr>
<tr>
<td></td>
<td>ZM101H-K5LZ-E15(-Q)</td>
</tr>
<tr>
<td></td>
<td>ZM131H-K5LZ(-Q)</td>
</tr>
<tr>
<td></td>
<td>ZM131H-K5LZ-E15(-Q)</td>
</tr>
<tr>
<td></td>
<td>ZM131M-K5LZ(-Q)</td>
</tr>
<tr>
<td></td>
<td>ZM131M-K5LZ-E15(-Q)</td>
</tr>
</tbody>
</table>

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.
### Vacuum Ejector Specifications

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating pressure</td>
<td>0.7 MPa</td>
</tr>
<tr>
<td>Maximum vacuum pressure</td>
<td>64 kPa</td>
</tr>
</tbody>
</table>

#### Supply pressure range

- **Without Valve**: 0.2 to 0.55 MPa
- **With Valve**: 0.25 to 0.55 MPa

#### Operating temperature range

- **Without Valve**: 5 to 60 °C
- **With Valve**: 5 to 50 °C

### Valve Specifications

<table>
<thead>
<tr>
<th>How to operate</th>
<th>Pilot Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Valve</td>
<td>NBR poppet</td>
</tr>
<tr>
<td>Effective area</td>
<td>3 mm²</td>
</tr>
<tr>
<td>Cv factor</td>
<td>0.17</td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>0.25 to 0.7 MPa</td>
</tr>
<tr>
<td>Electrical entry</td>
<td>Plug connector, Grommet (available on DC)</td>
</tr>
<tr>
<td>Max. operating frequency</td>
<td>5 Hz</td>
</tr>
<tr>
<td>Voltage</td>
<td>24/12/6/5/3 VDC, 100/110 VAC (50/60 Hz)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>DC: 1 W (With light: 1.05 W), 100 VAC: 1.4 W (1.45 W), 110 VAC: 1.45 W (1.5 W)</td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>Without Switch</th>
<th>-04R/L</th>
<th>-04B</th>
<th>-06R/L</th>
<th>-06B</th>
<th>-SR/L</th>
<th>-SB</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZM05</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
<td>0.32</td>
</tr>
<tr>
<td>ZM07</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
<td>0.32</td>
</tr>
<tr>
<td>ZM10</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
<td>0.32</td>
</tr>
<tr>
<td>ZM13</td>
<td>0.24</td>
<td>0.28</td>
<td>0.33</td>
<td>0.34</td>
<td>0.39</td>
<td>0.24</td>
<td>0.39</td>
</tr>
<tr>
<td>ZM15</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.4</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM17</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.4</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM20</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.4</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM25</td>
<td>0.26</td>
<td>0.3</td>
<td>0.35</td>
<td>0.36</td>
<td>0.41</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM30</td>
<td>0.26</td>
<td>0.3</td>
<td>0.35</td>
<td>0.36</td>
<td>0.41</td>
<td>0.26</td>
<td>0.41</td>
</tr>
</tbody>
</table>

### Made to Order

- **Symbol Specifications**
  - Double check valve/For manifold
  - With individual exhaust spacer
  - Double solenoid supply valve (With release valve)
  - Double solenoid supply valve (Without release valve)

- **Weight**
  - Made to Order (Refer to pages 194 to 196 for details.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Without Switch</th>
<th>-04R/L</th>
<th>-04B</th>
<th>-06R/L</th>
<th>-06B</th>
<th>-SR/L</th>
<th>-SB</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZM05</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
<td>0.32</td>
</tr>
<tr>
<td>ZM07</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
<td>0.32</td>
</tr>
<tr>
<td>ZM10</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
<td>0.32</td>
</tr>
<tr>
<td>ZM13</td>
<td>0.24</td>
<td>0.28</td>
<td>0.33</td>
<td>0.34</td>
<td>0.39</td>
<td>0.24</td>
<td>0.39</td>
</tr>
<tr>
<td>ZM15</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.4</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM17</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.4</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM20</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.4</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM25</td>
<td>0.26</td>
<td>0.3</td>
<td>0.35</td>
<td>0.36</td>
<td>0.41</td>
<td>0.26</td>
<td>0.41</td>
</tr>
<tr>
<td>ZM30</td>
<td>0.26</td>
<td>0.3</td>
<td>0.35</td>
<td>0.36</td>
<td>0.41</td>
<td>0.26</td>
<td>0.41</td>
</tr>
</tbody>
</table>

## Ejector System Circuit

- **Air supply port**
- **Exhaust port**
- **Vacuum port**

### Model

<table>
<thead>
<tr>
<th>Nozzle dia. ø (mm)</th>
<th>Model</th>
<th>Standard supply pressure (MPa)</th>
<th>Vacuum suction flow rate (L/min (ANR))</th>
<th>Air consumption (L/min (ANR))</th>
<th>Diffuser construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>ZM05H</td>
<td>0.5</td>
<td>15</td>
<td>17</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>0.7</td>
<td>ZM07H</td>
<td>0.5</td>
<td>30</td>
<td>30</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>1.0</td>
<td>ZM10H</td>
<td>0.5</td>
<td>50</td>
<td>60</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>1.3</td>
<td>ZM13H</td>
<td>0.5</td>
<td>66</td>
<td>90</td>
<td>Single diffuser</td>
</tr>
<tr>
<td>0.7</td>
<td>ZM07LM</td>
<td>0.35</td>
<td>23</td>
<td>33</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>1.0</td>
<td>ZM10LM</td>
<td>0.35</td>
<td>38</td>
<td>60</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>1.3</td>
<td>ZM13LM</td>
<td>0.35</td>
<td>44</td>
<td>85</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>1.3</td>
<td>ZM13S</td>
<td>0.45</td>
<td>37</td>
<td>88</td>
<td>Single diffuser</td>
</tr>
<tr>
<td>1.5</td>
<td>ZM15S</td>
<td>0.45</td>
<td>45</td>
<td>110</td>
<td>Single diffuser</td>
</tr>
</tbody>
</table>
**Precautions**

Be sure to read before handling. Refer to back page 1 for Safety Instructions and back page 2 to 4 for Vacuum Equipment Precautions.

**Caution**

Selection and sizing of Series ZM
Refer to the Vacuum Equipment Model Selection on front mater 18 to 39.

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 the 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.

Release flow rate adjusting screw
Turning the vacuum release flow rate adjusting screw 4 full turns from the fully closed position renders the valve fully open. Do not turn more than four times since turning excessively may cause the screw fall off.

In order to prevent the screw from loosening and falling out, the release flow rate adjusting needle with lock nut is also available.

---

**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 or resin</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>Without switch: ZM-HCA, With switch: ZM-HCB</td>
</tr>
<tr>
<td>5</td>
<td>Tension bolt</td>
<td>Stainless steel/Polyacetal</td>
<td></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>6</td>
<td>Release flow rate adjusting needle</td>
<td>Brass/Electroless nickel plated</td>
<td>ZM-NA (With lock nut: ZM-ND-L)</td>
</tr>
<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-10 (Refer to page 176)</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 (High noise reduction: ZM-SA-D)</td>
</tr>
<tr>
<td>11</td>
<td>Pilot valve</td>
<td>—</td>
<td>VJ114-M-00000</td>
</tr>
<tr>
<td>12</td>
<td>Poppet valve assembly</td>
<td>—</td>
<td>ZM-PAV2-0</td>
</tr>
<tr>
<td>13</td>
<td>Vacuum pressure switch</td>
<td>—</td>
<td>ZSE1-00-0</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>
Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H ··· 0.5 MPa

### ZM05\(\square\)H

#### Exhaust Characteristics

![Graph of Vacuum Pressure vs Supply Pressure]

#### Flow Characteristics

![Graph of Vacuum Pressure vs Flow Rate]

### ZM07\(\square\)H

#### Exhaust Characteristics

![Graph of Vacuum Pressure vs Supply Pressure]

#### Flow Characteristics

![Graph of Vacuum Pressure vs Flow Rate]

### ZM10\(\square\)H

#### Exhaust Characteristics

![Graph of Vacuum Pressure vs Supply Pressure]

#### Flow Characteristics

![Graph of Vacuum Pressure vs Flow Rate]
Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H ... 0.5 MPa

ZM13□H

Exhaust Characteristics

Flow Characteristics

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

ZM13□S

Exhaust Characteristics

Flow Characteristics

ZM15□S

Exhaust Characteristics

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

**ZM07□M**

**Exhaust Characteristics**

- Vacum pressure (kPa)
- Supply pressure (MPa)

**Flow Characteristics**

- Vacuum pressure
- 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 supply pressure.

In graph, P_max is max. vacuum pressure and Q_max is max. suction flow. The values are specified according to catalog use.

Changes in vacuum pressure are expressed in the order below.

1. When ejector suction port is covered and made airtight, suction flow is 0 and vacuum pressure is at maximum value (P_max).
2. When suction port is opened gradually, air can flow through (air leakage), suction flow increases, but vacuum pressure decreases (condition P_1 and Q_1).
3. When suction port is opened further, suction flow moves to maximum value (Q_max), 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 adsorbed, please note that vacuum pressure will not be high.

---

**ZM10□M**

**Exhaust Characteristics**

- Vacum pressure (kPa)
- Supply pressure (MPa)

**Flow Characteristics**

- Vacuum pressure
- Suction flow rate, L/min (ANR)
- Air consumption, L/min (ANR)

---

**ZM13□M**

**Exhaust Characteristics**

- Vacum pressure (kPa)
- Supply pressure (MPa)

**Flow Characteristics**

- Vacuum pressure
- Suction flow rate, L/min (ANR)
- Air consumption, L/min (ANR)
**Vacuum Switch**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensor type</th>
<th>Switch</th>
<th>Set pressure range</th>
<th>Hysteresis</th>
<th>Repeatability</th>
<th>Operating voltage</th>
<th>ON-OFF output</th>
<th>Setting points</th>
<th>Operation indicator light</th>
<th>Setting trimmer</th>
<th>Current consumption</th>
<th>Max. current</th>
<th>Max. operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZSE1-00-14</td>
<td>Solid state</td>
<td>Electronic circuit</td>
<td>0 to –101 kPa</td>
<td>±1% full span or less</td>
<td>±1% full span or less</td>
<td>12 to 24 VDC</td>
<td>NPN open collector 30 V, Max. 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
</tr>
<tr>
<td>ZSE1-00-15</td>
<td></td>
<td>Solid state</td>
<td>–27 to –50 kPa</td>
<td>3% full span or less (Fixed)</td>
<td>±10% or less</td>
<td>1.5 to 3 VDC</td>
<td>Open collector 80 mA</td>
<td>2 points</td>
<td>Lights up when ON</td>
<td>200 degrees</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
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<tr>
<td>ZSE1-00-16</td>
<td></td>
<td>Reed</td>
<td>1 to 10 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±3% full span or less</td>
<td>1.5 to 3 VDC</td>
<td>10 mA or less (24 VDC)</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
</tr>
<tr>
<td>ZSE1-00-17</td>
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<td>Reed</td>
<td>–100 kPa</td>
<td>10% of the set pressure (Changeable)</td>
<td>±10% or less</td>
<td>4.5 to 28 VDC</td>
<td>Open collector 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
</tr>
<tr>
<td>ZSE1-00-18</td>
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<td>Reed</td>
<td>–100 kPa</td>
<td>10% of the set pressure (Changeable)</td>
<td>±3% full span or less</td>
<td>4.5 to 28 VDC</td>
<td>Open collector 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
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<tr>
<td>ZSE1-00-19</td>
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<td>–100 kPa</td>
<td>10% of the set pressure (Changeable)</td>
<td>±3% full span or less</td>
<td>4.5 to 28 VDC</td>
<td>Open collector 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
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<tr>
<td>ZSE1-00-55</td>
<td></td>
<td>Reed</td>
<td>–100 kPa</td>
<td>10% of the set pressure (Changeable)</td>
<td>±3% full span or less</td>
<td>4.5 to 28 VDC</td>
<td>Open collector 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
</tr>
<tr>
<td>ZSM1-015</td>
<td>Diaphragm</td>
<td>Solid state</td>
<td>–27 to –50 kPa</td>
<td>3% full span or less (Fixed)</td>
<td>±10% or less</td>
<td>4.5 to 28 VDC</td>
<td>PNP open collector 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
</tr>
<tr>
<td>ZSM1-021</td>
<td>Diaphragm</td>
<td>Solid state</td>
<td>–27 to –50 kPa</td>
<td>3% full span or less (Fixed)</td>
<td>±10% or less</td>
<td>4.5 to 28 VDC</td>
<td>PNP open collector 80 mA</td>
<td>1 point</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td>3 rotations</td>
<td>200 degrees</td>
</tr>
</tbody>
</table>

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

Note) For details about wiring, refer to the Operation Manual that can be downloaded from our website (http://www.smcworld.com).

**Diaphragm Switch (ZSM)**

**Solid State Switch: ZSM1-015**

- **Brown lead wire:** Connect the + power supply to operate the main switch circuit (to the + terminal of the power source).
- **Black lead wire:** Connect the load (to the input or output relay of the PLC).
- **Blue lead wire:** Connect the - power supply (to the GND terminal of the power supply).

**Reed Switch: ZSM1-021**

- **Light emitting diode:** Brown
- **Polarity protection diode:** Blue

**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**

- **Contact protection box**
- **Surge absorber**
- **Choke coil**
- **Brown lead wire**
- **Black lead wire**
How to Set the Pressure

• The ON pressure is set with the pressure setting trimmer. The high pressure/high vacuum pressure can be set turning it clockwise.
• When setting, use a flat head screwdriver which fits the groove in the trimmer, and turn it gently with your fingertips.

ZSE1(L)-□□-14/-15/-18/-19
• Hysteresis can be set using the hysteresis setting trimmer. The setting is increased by turning it clockwise, and the range is 1 to 10% of the set pressure range.
• When the hysteresis setting trimmer is moved after setting the ON pressure, it must be set again.

OUT1 (black lead wire, red LED) can be set with the pressure setting trimmer 1 (SET1).
OUT2 (white lead wire, green LED) can be set with the pressure setting trimmer 2 (SET2).

• When using the switch to confirm correct adsorption, the vacuum pressure is set to the minimum value to reliably adsorb. If the value is set below the minimum, the switch will be turned ON even when adsorption has failed or is insufficient. If the pressure is set too high, the switch may not turn ON even though it may adsorb correctly.

Hysteresis

Hysteresis is the difference in pressure when the output signal is ON and OFF. The pressure to be set is the ON pressure. It turns ON at the set pressure.

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
• Attaching
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 to be set open and they are locked automatically.) Then confirm that they are locked by pulling lightly on the lead wires.
• Detaching
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.

Caution
Observe the following precautions for setting the vacuum pressure: Use your fingertips to gently turn the screwdriver. Do not use a screwdriver with a large grip or with a tip that does not fit into the trimmer groove because this could damage the groove.
For Single Unit/Without Valve  **Basic Type**

**ZM**

For Single Unit/Without Valve  **Basic Type with Switch**

**ZM**

---

**Components**

- **1/8 (Rc, NPTF, G)**
  - Air pressure supply (P) port
  - Vacuum (V) port
  (Side entry style is equipped with plugs.)

- **3 x ø4.5**
  - Mounting hole

- **Silencer**
  - Dimensions of model with high noise reduction silencer assembly is the same as standard.
Vacuum Ejector
With Valve and Switch Series ZM

Air Operated Type

ZM□□□□□□-□□□5

A: Release flow rate adjusting needle with lock nut

Supply

Pilot pressure supply port for supply (PA)

Vacuum

Pilot pressure supply port for release (PB)

Pilot pressure supply port for release (PB)

M5 x 0.8

M5 x 0.8

44.8

25

1/8 (Rc, NPTF, G)

Air pressure supply (P) port

1/8 (Rc, NPTF, G)

Vacuum (V) port

Note 1) This is a hole for using the manifold and single unit bodies in common, and it is not used for the single unit.
Series ZM

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

ZM□HMK□□□E□

<Components>

A: Release flow rate adjusting needle with lock nut

10  
(Needle fully open)

1.5

1/8 (Rc, NPTF, G)  
Vacuum (V) port

1/8 (Rc, NPTF, G)  
Air pressure supply (P) port

2 x ø4.5 mounting hole

Pilot valve for release

Pilot valve for supply

Pilot pressure exhaust (PE) port

20 30

103

Silencer

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

111

Note 1) This is a hole for using the manifold and single unit bodies in common, and it is not used for the single unit.
Single/With Air Supply Valve (N.O.) and Vacuum Release Valve

A: Release flow rate adjusting needle with lock nut

1/8 (Rc, NPTF, G)
Vacuum (V) port

Pilot valve for release
Pilot valve for supply

Pilot pressure exhaust (PE) port

2 x ø4.5 mounting hole

2 x ø4.5 mounting hole

Note 1) This is a hole for using the manifold and single unit bodies in common, and it is not used for the single unit.

Dimensions of model with high noise reduction silencer assembly is the same as standard.
Manifold Specifications: Series ZM

Manifold Specifications

<table>
<thead>
<tr>
<th>Manifold style</th>
<th>Stacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common air pressure supply port (P)*</td>
<td>¼ (Rc, NPTF, G)</td>
</tr>
<tr>
<td>Individual air pressure supply port (P)*</td>
<td>⅛ (Rc, NPTF, G)</td>
</tr>
<tr>
<td>Common exhaust port (EXH)</td>
<td>(Rc, NPTF, G)</td>
</tr>
<tr>
<td>Common exhaust port (EXH) 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>

* The common air pressure supply port (P) and individual air pressure supply port (P) can be mounted together.
** Right and left sides are viewed from the front side of vacuum port (V).

Maximum Ejector Stations (Max. operable nos. simultaneously)

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>ZZM053</th>
<th>ZZM073</th>
<th>ZZM103</th>
<th>ZZM133</th>
<th>ZZM153</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZM Stations</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Manifold model</th>
<th>ZZM Stations</th>
<th>B</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

* Effective area of external silencer is 160 mm².

How to Order Ejector Manifold

**Note**

The thread ridge shape is compatible with the G thread standard (JIS B0203), but other shapes are not conforming to ISO16030 and ISO 1179.

The asterisk (*) indicates the ejector model no. below the manifold base no. Prefix it to the vacuum ejector part numbers to be mounted. When it is not added, products are shipped separately.

Example)

ZZM06-06R ····················· 1 pc.
+ ZM103H-J5LZ(-Q) ··········· 3 pcs.
+ ZM133H-J5LZ(-Q) ··········· 3 pcs.
<Components>

Manifold/With Silencer  Manifold with Silencer Dedicated for Manifold

<table>
<thead>
<tr>
<th>ZZM</th>
<th>Number of ejectors</th>
<th>S</th>
<th>Silencer location</th>
</tr>
</thead>
</table>

Manifold/With Silencer

- 1/8 (Rc, NPTF, G)
- Individual air pressure supply (P) port
- Vacuum (V) port
- 2 x M5 x 0.8

Series ZM

Vacuum port electrical entry (in the case of side entry/With plug at the bottom)

- vacancy

A: Release flow rate adjusting needle with lock nut

1/4 (Rc, NPTF, G)

Common air supply (P) port

2 x M5 x 0.8

Common pilot pressure exhaust (PE) port

Hexagon socket head cap plug

Vacuum port electrical entry (in the case of side entry/With plug at the bottom)

- vacuum

<table>
<thead>
<tr>
<th>Stations</th>
<th>ZZM 02B</th>
<th>ZZM 02C</th>
<th>ZZM 04B</th>
<th>ZZM 04C</th>
<th>ZZM 06B</th>
<th>ZZM 06C</th>
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<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>
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<td>56±1.5</td>
<td>72±1.5</td>
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<td>104±1.5</td>
<td>120±2.0</td>
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<td>104±1.5</td>
<td>120±1.5</td>
<td>136±1.5</td>
<td>152±1.5</td>
<td>168±1.5</td>
<td>184±2.0</td>
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<tr>
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<td>200±2.0</td>
<td>216±2.0</td>
<td>232±2.0</td>
<td>248±2.0</td>
<td>156±2.0</td>
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<td>48±1.5</td>
<td>64±1.5</td>
<td>80±1.5</td>
<td>96±1.5</td>
<td>112±1.5</td>
<td>128±2.0</td>
</tr>
</tbody>
</table>

(mm)
Component Parts for Manifold

(1) Stations | Manifold part no. | Clamp rod part no.
--- | --- | ---
1 | ZZM01-04R-01 | ZZM-CR-01
2 | ZZM02-04L-01 | ZZM-CR-02
3 | ZZM03-04B-01 | ZZM-CR-03
4 | ZZM04-04R-01 | ZZM-CR-04
5 | ZZM05-06L-01 | ZZM-CR-05
6 | ZZM06-06B-01 | ZZM-CR-06
7 | ZZM07-06R-01 | ZZM-CR-07
8 | ZZM08-06L-01 | ZZM-CR-08
9 | ZZM09-00R-01 | ZZM-CR-09
10 | ZZM10-00L-01 | ZZM-CR-10

(2) Manifold part no. | Adapter A | Adapter B | Silencer | Blanking plate
--- | --- | --- | --- | ---
ZZM01-04R-01 | | | | 
ZZM02-04L-01 | | | | 
ZZM03-04B-01 | | | | 
ZZM04-04R-01 | | | | 
ZZM05-06L-01 | | | | 
ZZM06-06B-01 | | | | 
ZZM07-06R-01 | | | | 
ZZM08-06L-01 | | | | 
ZZM09-00R-01 | | | | 
ZZM10-00L-01 | | | | 

(3) No. | Model | Description | Quantity | Note
--- | --- | --- | --- | ---
1 | ZZM-SA | Silencer assembly | * | 
2 | ZZM-BP | Blanking plate assembly | * | 
3 | ZZM-ADA-04 | Adapter A assembly | * | Common exhaust (EXH.) port size: (4 mm)
4 | ZZM-ADB-04 | Adapter B assembly | * | Common exhaust (EXH.) port size: (6 mm)
5 | ZZM-GE | Gasket E | 2 | 
6 | ZZM-EPL-04 | End plate L | 1 | Note 1)
7 | ZZM-GBL | Gasket BL | 1 | 
8 | ZZM-GBB | Gasket BB | Station: 1 | 
9 | ZZM-GBR | Gasket BR | 1 | 
10 | ZZM-EPRL-04 | End plate R | 1 | 
11 | ZZM-CR-01 | Clamp rod | 1 | Refer to Table (1), Note 2.

* The used quantity varies depending on the part number.
Note 1) □ Symbol corresponding to the port thread type.
Note 2) Clamp rods consist of a set of 2 pcs.
Series ZM
Made to Order Specifications 1
Please contact SMC for detailed specifications, dimensions, and delivery.

Double Check Valve/For Manifold

<table>
<thead>
<tr>
<th>Single: ZM</th>
<th>Nozzle diameter</th>
<th>Body</th>
<th>Supply pressure</th>
<th>Valve voltage</th>
<th>Electrical entry</th>
<th>Double check valve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZM</td>
<td></td>
<td></td>
<td>X107</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When a manifold is used, the exhaust that is discharged to the silencer could flow out to the vacuum (V) port side. To reduce this, a check valve is used.

⚠️ Warning

1. It cannot be used for maintaining a vacuum.
2. Use a vacuum release valve. (Compatible with valve K and B types only.) (The workpiece cannot be released without a vacuum release valve.)
3. Compatible with the manifold specifications only.

Construction
2 With Individual Exhaust Spacer

<table>
<thead>
<tr>
<th>Single: ZM</th>
<th>Nozzle diameter</th>
<th>Body</th>
<th>Supply pressure</th>
<th>X111</th>
<th>CE-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 valve and a switch.

Exhaust spacer assembly: ZM — SP —

<table>
<thead>
<tr>
<th>Thread Type</th>
<th>Nil</th>
<th>Rc</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td></td>
<td>NPTF</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>G</td>
</tr>
</tbody>
</table>

Caution

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.

When the product is used to prevent the manifold exhaust intrusion, exhaust intrusion may occur if exhaust pipes are put together.

When this special product is used for all manifold stations, the following part number can be used.

ZZM — 00 —

Exhaust ports and stations:

- Without exhaust ports on both sides

Construction

- Gasket
- Spacer E
- Round head combination screw
- Individual exhaust (EXH) port 1/8 (Rc, NPTF, G)
- Exhaust

Made to Order Specifications Series ZM
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.

Construction

- Double solenoid supply valve:
  - X126: With release valve (Valve K type only)
  - X135: Without release valve (Valve J type only)