Vacuum Ejector

Series ZM

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

Nozzle diameter

- 05 0.5 mm
- 07 0.7 mm
- 10 1.0 mm
- 13 1.3 mm
- 15 1.5 mm

Vacuum port location

- Nil Side/Bottom entry
- A Side entry

Standard supply pressure

- M 0.35 MPa
- S 0.45 MPa
- H 0.5 MPa

Solenoid valve rated voltage

- 100 VAC 50/60 Hz
- 110 VAC 50/60 Hz

Release flow rate

- Nil Without lock nut
- L With lock nut

CE compliant

- Nil —
- L CE compliant

Made to Order

Refer to pages 1004 to 1006 for details.

Vacuum switch electrical entry

- Nil
- L Grommet type, with 0.6 m lead wire (ZSE1)
- C Connector type, with 0.6 m lead wire (ZSE1)
- CL Connector type, with 3 m lead wire (ZSE1)
- CN Connector type, without connector assembly
- Nil Grommet type, with 0.5 m lead wire (ZSM1)
- L Grommet type, with 3 m lead wire (ZSM1)

Vacuum switch model

- E14 1 output, without analog output, 3 rotation setting (ZSE1)
- E15 1 output, without analog output, 200° setting (ZSE1)
- E16 2 outputs, without analog output, 3 rotation setting (ZSE1)
- E17 2 outputs, without analog output, 200° setting (ZSE1)
- E18 1 output, analog output, 3 rotation setting (ZSE1)
- E19 1 output, analog output, 200° setting (ZSE1)
- E55 1 output, without analog output, 200° setting, PNP output (ZSE1)
- M15 1 output, without analog output, Diaphragm (18 rotation setting), Solid state(10 to 26 VDC) (ZSM1)
- M21 1 output, without analog output, Diaphragm (18 rotation setting), Reed (AC/DC 100 VAC) (ZSM1)

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

- 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.

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)

Air operated/Without valve

Combination of Nozzle Diameter and Standard Supply Pressure

- 0.5 mm
- 0.7 mm
- 1.0 mm
- 1.3 mm
- 1.5 mm

Note) CE compliant products are not available for “1” and “6”.

Note) CE compliant: For DC only.
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-051H-K5LZ-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-051H-K5LZ (-Q) - 1 pc.
+ VJ10-36-1A-10 - 2 pcs.

How to Order

ZM - Nozzle diameter - Body style - Standard supply pressure

ZM-051H-K5LZ (-Q) ZM131H-K5LZ (-Q)
ZM071H-K5LZ (-Q) ZM131M-K5LZ (-Q)
ZM101H-K5LZ (-Q) ZM131M-K5LZ-E15 (-Q)

Quick Delivery/Model

<Without valve/Single unit> - <With valve/Single unit>
- <Without valve/Single unit> - <With valve/Single unit>

*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.
Series ZM

Ejector System Circuit

JIS Symbol

Air supply port
Exhaust port
Vacuum port

Made to Order
(Refer to pages 1004 to 1006 for details.)

Model

<table>
<thead>
<tr>
<th>Nozzle dia. ø (mm)</th>
<th>Model</th>
<th>Standard supply pressure</th>
<th>Maximum suction flow rate k/min (ANR)</th>
<th>Air consumption k/min (ANR)</th>
<th>Diffuser construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>ZM05LH</td>
<td>0.5 MPa</td>
<td>15</td>
<td>15</td>
<td>Double diffuser</td>
</tr>
<tr>
<td>0.7</td>
<td>ZM07LH</td>
<td></td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>ZM10LH</td>
<td></td>
<td>50</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>ZM13LH</td>
<td></td>
<td>66</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>ZM15LH</td>
<td></td>
<td>85</td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

Vacuum Ejector Specifications

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air</th>
<th>Maximum operating pressure</th>
<th>Maximum vacuum pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply pressure range</td>
<td></td>
<td>0.2 to 0.55 MPa</td>
<td>- 84 kPa</td>
</tr>
<tr>
<td>With valve</td>
<td>0.25 to 0.55 MPa</td>
<td>5 to 60 °C</td>
<td>5 to 50 °C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air supply valve</td>
<td>Main valve: Poppet</td>
<td>Pilot valve: VJ114, VJ324M</td>
<td></td>
</tr>
<tr>
<td>Vacuum release valve</td>
<td>Electronic: ZSE1-00</td>
<td>Diaphragm: ZSM1-00</td>
<td></td>
</tr>
<tr>
<td>Vacuum pressure switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suction filter</td>
<td></td>
<td>Filteration degree: 30 μm, Material: PE (Polyethylene)</td>
<td></td>
</tr>
</tbody>
</table>

Valve Specifications

<table>
<thead>
<tr>
<th>How to operate</th>
<th>Pilot type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main valve</td>
<td>NBR popup</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), 100VAC: 1.4 W (1.45 W), 110VAC: 1.45 W (1.5 W)</td>
</tr>
</tbody>
</table>

Mass

<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>ZM12</td>
<td>0.17</td>
<td>0.17</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.22</td>
<td>0.27</td>
</tr>
<tr>
<td>ZM14</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.22</td>
<td>0.27</td>
</tr>
<tr>
<td>ZM16</td>
<td>0.17</td>
<td>0.21</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.22</td>
<td>0.27</td>
</tr>
<tr>
<td>ZM13LH</td>
<td>0.24</td>
<td>0.28</td>
<td>0.33</td>
<td>0.34</td>
<td>0.35</td>
<td>0.39</td>
<td></td>
</tr>
<tr>
<td>ZM10LH</td>
<td>0.25</td>
<td>0.29</td>
<td>0.34</td>
<td>0.35</td>
<td>0.36</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>ZM13LH</td>
<td>0.26</td>
<td>0.3</td>
<td>0.35</td>
<td>0.36</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZM15LH</td>
<td>0.24</td>
<td>0.28</td>
<td>0.33</td>
<td>0.34</td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Station -04R/L -04B -06R/L -06B -SR/L -SB
1  0.209  0.219  0.219  0.229  0.239  0.269
2  0.214  0.224  0.224  0.234  0.244  0.274
3  0.219  0.229  0.229  0.239  0.249  0.279
4  0.224  0.234  0.234  0.244  0.254  0.284
5  0.229  0.239  0.239  0.249  0.259  0.289
6  0.234  0.244  0.244  0.254  0.264  0.294
7  0.239  0.249  0.249  0.259  0.269  0.299
8  0.244  0.254  0.254  0.264  0.274  0.304
9  0.249  0.259  0.259  0.269  0.279  0.309
10 0.254  0.264  0.264  0.274  0.284  0.314
Construction: ZM□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 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□□□□□-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 (High noise reduction: ZM-SA-O)</td>
</tr>
<tr>
<td>11</td>
<td>Pilot valve</td>
<td></td>
<td>VJ114□□□□□□□</td>
</tr>
<tr>
<td>12</td>
<td>Poppet valve assembly</td>
<td></td>
<td>ZMA-PV2-0</td>
</tr>
<tr>
<td>13</td>
<td>Vacuum pressure switch</td>
<td></td>
<td>ZSE1-00□□□□□</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>

**Precautions**

Be sure to read before handling.
Refer to front matters 38 and 39 for Safety Instructions and pages 844 to 846 for Vacuum Equipment Precautions.

**Caution**

Selection and sizing of Series ZM
Refer to the Vacuum Equipment Model Selection on pages 825 to 843.

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, trichloroethyline, 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 to 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.
Series ZM

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

**ZM05□H**

**Exhaust Characteristics**

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

**Flow Characteristics**

- Vacuum pressure (kPa)

**ZM07□H**

**Exhaust Characteristics**

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

**Flow Characteristics**

- Vacuum pressure (kPa)

**ZM10□H**

**Exhaust Characteristics**

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

**Flow Characteristics**

- Vacuum pressure (kPa)
Vacuum Ejector
With Valve and Switch  **Series ZM**

**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**
Series ZM

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: M \( \cdots 0.35 \text{ MPa} \)

**ZM07M**

Exhaust Characteristics

Flow Characteristics

**ZM10M**

Exhaust Characteristics

Flow Characteristics

**ZM13M**

Exhaust Characteristics

Flow Characteristics

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, \( P_{\text{max}} \) is max. vacuum pressure and \( Q_{\text{max}} \) 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 (\( P_{\text{max}} \)).
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 (\( Q_{\text{max}} \)), 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 absorbed, please note that vacuum pressure will not be high.
## Vacuum Pressure Switch/Solid State Switch (ZSE), Diaphragm Switch (ZSM)

### 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>Temperature characteristics</th>
<th>Operating voltage</th>
<th>ON-OFF output</th>
<th>Setting points</th>
<th>Operation indicator light</th>
<th>Setting trimmer</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 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>12 to 24 VDC (Ripple ±10% or less)</td>
<td>NPN open collector 30 V, Max. 80 mA</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>1 point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZSE1-00-15</td>
<td>Solid state</td>
<td>Solid state</td>
<td>–27 to –80 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>4.5 to 24 VDC</td>
<td>PNP open collector 80 mA</td>
<td>Lights up when ON</td>
<td>3 rotations</td>
<td>200 degrees</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td></td>
</tr>
<tr>
<td>ZSE1-00-16</td>
<td>Solid state</td>
<td>Reed</td>
<td>–10 to –101 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>4.5 to 24 VDC</td>
<td>Open collector 80 V, Max. 40 mA</td>
<td>Lights up when ON</td>
<td>18 rotations</td>
<td>200 degrees</td>
<td>25 mA or less (When 24 VDC is ON)</td>
<td></td>
</tr>
<tr>
<td>ZSE1-00-17</td>
<td>Solid state</td>
<td>Reed</td>
<td>–27 to –80 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>4.5 to 24 VDC</td>
<td>Open collector 80 V, Max. 40 mA</td>
<td>Lights up when ON</td>
<td>18 rotations</td>
<td>3 rotations</td>
<td>10 mA or less (24 VDC)</td>
<td></td>
</tr>
<tr>
<td>ZSE1-00-18</td>
<td>Solid state</td>
<td>Reed</td>
<td>–10 to –101 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>4.5 to 24 VDC</td>
<td>Open collector 80 V, Max. 40 mA</td>
<td>Lights up when ON</td>
<td>18 rotations</td>
<td>200 degrees</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td></td>
</tr>
<tr>
<td>ZSE1-00-19</td>
<td>Solid state</td>
<td>Reed</td>
<td>–27 to –80 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>4.5 to 24 VDC</td>
<td>Open collector 80 V, Max. 40 mA</td>
<td>Lights up when ON</td>
<td>18 rotations</td>
<td>200 degrees</td>
<td>17 mA or less (When 24 VDC is ON)</td>
<td></td>
</tr>
<tr>
<td>ZSE1-00-55</td>
<td>Solid state</td>
<td>Reed</td>
<td>–10 to –101 kPa</td>
<td>1 to 10% of the set pressure (Changeable)</td>
<td>±1% full span or less</td>
<td>±3% full span or less</td>
<td>4.5 to 24 VDC</td>
<td>Open collector 100 V AC/DC</td>
<td>Lights up when ON</td>
<td>18 rotations</td>
<td>200 degrees</td>
<td>17 mA or less (When 24 VDC is ON)</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

**ZSE1-00-14, -15**
- **Brown DC (+):** Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- **Black OUT:** Black lead wire: connect to the load (PLC input or relay).
- **Blue DC (-):** Blue lead wire: connect to power supply GND terminal. (In the case of connector type, do not connect the green lead wire.)

**ZSE1-00-16, -17**
- **Brown DC (+):** Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- **Black OUT:** Black lead wire: connect to load (PLC input or relay).
- **White OUT2:** White lead wire: connect to the load (PLC input or relay).
- **Blue DC (-):** Blue lead wire: connect to power supply GND terminal.

**ZSE1-00-18, -19**
- **Brown DC (+):** Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- **Black OUT:** Black lead wire: connect to load (PLC input or relay).
- **White OUT1:** White lead wire: connect to analog load.
- **Blue DC (-):** Blue lead wire: connect to power supply GND terminal.

**ZSE1-00-55**
- **Brown DC (+):** Brown lead wire: connect to power supply terminal (+) to operate the switch main circuit.
- **Black OUT:** Black lead wire: connect to load (PLC input or relay).
- **Blue DC (-):** Blue lead wire: connect to power supply GND terminal.

### 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 lead wire
- **Polarity protection diode:** Blue lead wire

**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 screw driver 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.

Setting pressure

- 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).

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.

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 their hooks 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.
Series ZM

For Single Unit/Without Valve  Basic Type

ZM□2□□□□□□□□□□□

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

3 x ø4.5
Mounting hole

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

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

For Single Unit/Without Valve  Basic Type with Switch

ZM□2□□□□□□□□□□□

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

3 x ø4.5
Mounting hole

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

(Side entry style is equipped with plugs.)

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

Air Operated Type

A: Release flow rate adjusting needle with lock nut

Pilot pressure exhaust port (PE)
M5 through 1/8 (Rc, NPTF, G)

Pilot pressure supply port for release (PB)
M3 (M5)

Pilot pressure supply port for release (PB)
M3 (M5)

Supply

Vacuum

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

A: Release flow rate adjusting needle with lock nut

Release flow rate adjusting needle
1/8 (Rc, NPTF, G)
Air pressure supply port (P)

Pilot pressure supply port for release
M5 through

Pilot pressure supply for supply

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

Pilot pressure exhaust port (PE)
M5 through

2 x ø4.5 (Mounting hole)

Silencer

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

(Side entry style is equipped with plugs.)
Series ZM

For Single Unit/With Valve

Basic Type with Switch and Valve

A: Release flow rate adjusting needle with lock nut

A: Release flow rate adjusting needle

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

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

Pilot valve for release

Pilot valve for supply

3 x ø4.5 Mounting hole

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

Silencer

Vacuum

Vacuum port (V)
(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□□□□□□□□**

A: Release flow rate adjusting needle with lock nut

10
(Needle fully open)

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

1/8 (Rc, NPTF, G)
Silencer
Vacuum port (V)
### Manifold Specifications: Series ZZM

#### 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>½, ¾ (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>
</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

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

- **ZZM** 06 - 06 R - R
- **Multi-ejector** Series ZZM Manifold
- **Number of stations**
  - 01: 1 station
  - 05: 5 stations
  - 10: 10 stations (Max.)

  * By viewing the front side of vacuum port (V), stations are counted starting from station 1 on the left side.

- **Thread type**
  - Nil
  - Rc
  - T (NPTF)
  - F (G 1000)

  * G thread

- **Common air pressure supply port (P) location**
  - Nil Both sides
  - R Right side
  - L Left side

  **Common exhaust port (EXH) and silencer location**
  - R Right side
  - L Left side
  - B Both sides

- **Common exhaust port (EXH) size**
  - 04: ½
  - 06: ¾
  - S: Silencer for ZZM (ZZM-SA) Without exhaust port (Compatible with -X111)

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.
## Vacuum Ejector
### With Valve and Switch
#### Series ZM

### Manifold

**ZSM**

**Number of ejectors**

<table>
<thead>
<tr>
<th>Common EXH port</th>
<th>Port location</th>
</tr>
</thead>
</table>

### Diagram

- **A**: Release flow rate adjusting needle with lock nut

- **1/8 (Rc, NPTF, G)**
  - Individual air pressure supply port (P)

- **2 x Rc1/8 (1/8-27NPTF, G1/8)**
  - Vacuum port (V)

- **2 x M5**
  - Common pilot pressure exhaust port (PE)

- **1/4 (Rc, NPTF, G)**
  - Common air pressure supply port (P)

### 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>56±1.5</td>
<td>72±1.5</td>
<td>88±1.5</td>
<td>104±1.5</td>
<td>120±1.5</td>
<td>136±2.0</td>
<td>152±2.0</td>
<td>168±2.0</td>
<td>184±2.0</td>
<td>200±2.0</td>
</tr>
</tbody>
</table>

---

**ZM**

**Number of ejectors**

<table>
<thead>
<tr>
<th>Common EXH port</th>
<th>Port location</th>
</tr>
</thead>
</table>

---
Series ZM

Manifold/With Silencer

Manifold with Silencer Dedicated for Manifold

<Components>

- ZMZM
- Number of ejectors
- Silencer location

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

**Stations**

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>28 ±1.5</td>
<td>44 ±1.5</td>
</tr>
<tr>
<td>L2</td>
<td>40 ±1.5</td>
<td>56 ±1.5</td>
</tr>
<tr>
<td>L3</td>
<td>72 ±1.5</td>
<td>88 ±1.5</td>
</tr>
</tbody>
</table>
## Component Parts for Manifold

### (1) Stations

<table>
<thead>
<tr>
<th>Stations</th>
<th>Manifold part no.</th>
<th>Clamp rod part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ZZM01-00</td>
<td>ZZM-CR-01</td>
</tr>
<tr>
<td>2</td>
<td>ZZM02-00</td>
<td>ZZM-CR-02</td>
</tr>
<tr>
<td>3</td>
<td>ZZM03-00</td>
<td>ZZM-CR-03</td>
</tr>
<tr>
<td>4</td>
<td>ZZM04-00</td>
<td>ZZM-CR-04</td>
</tr>
<tr>
<td>5</td>
<td>ZZM05-00</td>
<td>ZZM-CR-05</td>
</tr>
<tr>
<td>6</td>
<td>ZZM06-00</td>
<td>ZZM-CR-06</td>
</tr>
<tr>
<td>7</td>
<td>ZZM07-00</td>
<td>ZZM-CR-07</td>
</tr>
<tr>
<td>8</td>
<td>ZZM08-00</td>
<td>ZZM-CR-08</td>
</tr>
<tr>
<td>9</td>
<td>ZZM09-00</td>
<td>ZZM-CR-09</td>
</tr>
<tr>
<td>10</td>
<td>ZZM10-00</td>
<td>ZZM-CR-10</td>
</tr>
</tbody>
</table>

### (2) Manifold part no.

<table>
<thead>
<tr>
<th>Manifold part no.</th>
<th>Adapter A</th>
<th>Adapter B</th>
<th>Silencer</th>
<th>Blanking plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZM-04R-01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-04L-02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-049-03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-06R-04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-06L-05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-068-06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-068-07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-068-08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-068-09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZM-068-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### (3) No.

<table>
<thead>
<tr>
<th>No.</th>
<th>Model</th>
<th>Description</th>
<th>Quantity</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ZZM-SA</td>
<td>Silencer assembly</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ZZM-BP</td>
<td>Blanking plate assembly</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ZZM-ADA</td>
<td>Adapter A assembly</td>
<td>*</td>
<td>Note 1)</td>
</tr>
<tr>
<td>4</td>
<td>ZZM-ADB</td>
<td>Adapter B assembly</td>
<td>*</td>
<td>Note 1)</td>
</tr>
<tr>
<td>5</td>
<td>ZZM-GE</td>
<td>Gasket E</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>ZZM-EPL</td>
<td>End plate L</td>
<td>1</td>
<td>Note 1)</td>
</tr>
<tr>
<td>7</td>
<td>ZZM-GBL</td>
<td>Gasket BL</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ZZM-GBB</td>
<td>Gasket BB</td>
<td></td>
<td>Station: 1</td>
</tr>
<tr>
<td>9</td>
<td>ZZM-GBR</td>
<td>Gasket BR</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>ZZM-EPR</td>
<td>End plate R</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>ZZM-CR</td>
<td>Clamp rod</td>
<td>1</td>
<td>Note 2)</td>
</tr>
</tbody>
</table>

*The used quantity varies depending on the part number.

Note 1) □: Symbol corresponding to the port thread type.

Note 2) 2pcs. are included in one set.
## 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</th>
<th>Voltage</th>
<th>Electrical entry</th>
<th>X107</th>
<th>CE compliant</th>
</tr>
</thead>
</table>

**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.

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

### Construction

![Diagram of check valve and manifold](image)
With Individual Exhaust Spacer

Single: ZM

<table>
<thead>
<tr>
<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>
</tr>
</tbody>
</table>

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 valve and a switch.

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

Stations

Without exhaust ports on both sides

Exhaust spacer assembly: ZM — SP —

NIT Rc

T NPTF

F G

Construction

<table>
<thead>
<tr>
<th>Gasket</th>
<th>Spacer E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round head combination screw</td>
<td></td>
</tr>
</tbody>
</table>

Individual exhaust port (EXH) 1/8 (Rc, NPTF, G)
**3 Double Solenoid Supply Valve**

<table>
<thead>
<tr>
<th>Single: ZM</th>
<th>Nozzle diameter</th>
<th>Body</th>
<th>Supply pressure</th>
<th>Valve</th>
<th>Voltage</th>
<th>Electrical entry</th>
<th>X126</th>
<th>CE compliant</th>
</tr>
</thead>
</table>

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

This is an air supply pilot valve that is made with double solenoids.

> It is possible to manufacture it with a switch.

**Construction**

- Solenoid for vacuum generating
- Pilot valve for air supply
- Pilot valve for vacuum release
- Solenoid for vacuum stopping

Please contact SMC for detailed specifications, dimensions, and delivery.
Vacuum Ejector with Solid State Timer

Series ZMA

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

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>

Timer period: 20 to 2,000 ms

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

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)
Vacuum Ejector
With Solid State Timer
Series ZMA

How to Order

ZMA 07 1 H -K 5 - T14 C - L

**Nozzle diameter**

- 05: 0.5 mm
- 07: 0.7 mm
- 10: 1.0 mm
- 13: 1.3 mm
- 15: 1.5 mm

**Body type**

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

**Standard supply pressure**

- M: 0.35 MPa
- S: 0.45 MPa
- H: 0.5 MPa

**Switch model**

- T14: 1 point setting, No analog output available
- T54: 1 point setting, No analog output available

**Valve**

- K: With air supply valve, Vacuum release valve

**Thread type**

- Nil
- Rc
- T
- NPTF
- F
- G

**Electrical entry of vacuum switch**

- (Connector type)
  - C: Lead wire length 0.6 m
  - CL: Lead wire length 3 m
  - CN: Without lead wire

**Release flow rate adjusting needle**

- Nil: Without lock nut
- L: With lock nut

**Solenoid valve rated voltage**

- 5: 24 VDC

**Note**

When the product is used for the manifold, the exhaust air of the operating ejector may enter the vacuum port (V) of the non-operating ejector and be released if there are an operating and non-operating ejector. In order to reduce the exhaust intrusion, consider using a special double check valve (-X107).

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

### Table (1)

<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>0.5 mm</td>
<td>—</td>
</tr>
<tr>
<td>0.7 mm</td>
<td>●</td>
</tr>
<tr>
<td>1.0 mm</td>
<td>●</td>
</tr>
<tr>
<td>1.3 mm</td>
<td>●</td>
</tr>
<tr>
<td>1.5 mm</td>
<td>—</td>
</tr>
</tbody>
</table>

### Table (2)

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

**G thread**

The thread ridge shape is compatible with the G thread standard (JIS B0202), but other shapes are not conforming to ISO16030 and ISO1179.
Vacuum Ejector
With Solid State Timer

Series ZMA

Model

<table>
<thead>
<tr>
<th>Nozzle diameter (mm)</th>
<th>Model</th>
<th>Standard supply pressure</th>
<th>Suction filter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td>0.5</td>
<td>ZMA05</td>
<td>0.5 MPa</td>
<td>—</td>
</tr>
<tr>
<td>0.7</td>
<td>ZMA07</td>
<td>0.5 MPa</td>
<td>—</td>
</tr>
<tr>
<td>1.0</td>
<td>ZMA10</td>
<td>0.5 MPa</td>
<td>—</td>
</tr>
<tr>
<td>1.3</td>
<td>ZMA13</td>
<td>0.5 MPa</td>
<td>—</td>
</tr>
<tr>
<td>0.7</td>
<td>ZMA07</td>
<td>0.35 MPa</td>
<td>—</td>
</tr>
<tr>
<td>1.0</td>
<td>ZMA10</td>
<td>0.35 MPa</td>
<td>—</td>
</tr>
<tr>
<td>1.3</td>
<td>ZMA13</td>
<td>0.35 MPa</td>
<td>—</td>
</tr>
<tr>
<td>1.3</td>
<td>ZMA13</td>
<td>0.45 MPa</td>
<td>—</td>
</tr>
<tr>
<td>1.5</td>
<td>ZMA15</td>
<td>0.45 MPa</td>
<td>—</td>
</tr>
</tbody>
</table>

Vacuum Ejector Specifications

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

Valve Specifications

<table>
<thead>
<tr>
<th>How to operate</th>
<th>Main valve</th>
<th>Effective area (Cv factor)</th>
<th>Operating pressure range</th>
<th>Electrical entry</th>
<th>Max. operating frequency</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot type</td>
<td>Poppet</td>
<td>3 mm² (0.17)</td>
<td>0.25 to 0.6 MPa</td>
<td>Plug connector</td>
<td>5 Hz</td>
<td>24 VDC</td>
</tr>
</tbody>
</table>

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>
<th>Number of output</th>
<th>Setting trimmer</th>
<th>Operation indicator light</th>
<th>Temperature characteristics</th>
<th>Hysteresis</th>
<th>Timer period</th>
<th>Setting trimmer</th>
<th>Temperature characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC ±10%</td>
<td>1.1 W (at switch output OFF)</td>
<td>1</td>
<td>NPN/PNP open collector</td>
<td>Red LED lighting</td>
<td>±3% FS or less (fixed)</td>
<td>±3% FS or less</td>
<td>20 to 2,000 ms</td>
<td>3 turns</td>
<td>±3% FS or less</td>
<td></td>
</tr>
</tbody>
</table>

Timing Chart

<table>
<thead>
<tr>
<th>Suction command</th>
<th>OFF</th>
<th>ON</th>
<th>Suction output</th>
<th>OFF</th>
<th>ON</th>
<th>Release output</th>
<th>OFF</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer period</td>
<td>20 to 2,000 ms</td>
<td>20 to 2,000 ms</td>
<td>Timer period</td>
<td>20 to 2,000 ms</td>
<td>20 to 2,000 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Wiring

<table>
<thead>
<tr>
<th>Brown</th>
<th>Black</th>
<th>White</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC (+)</td>
<td>Suction command</td>
<td>Switch output</td>
<td>DC (–)</td>
</tr>
</tbody>
</table>

Connection Example

T14

Max. 45.8 mA

Brown 24 VDC

Black

White

Blue

T54

Max. 45.8 mA

Brown 24 VDC

Black

White

Blue
Series ZMA

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>Resin</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Adapter plate</td>
<td>Resin</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>Release flow rate adjusting needle</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-10-0</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>SY114-5L0Z</td>
</tr>
<tr>
<td>12</td>
<td>Poppet valve assembly</td>
<td></td>
<td>ZMA-PV</td>
</tr>
<tr>
<td>13</td>
<td>Vacuum switch with timer</td>
<td></td>
<td>ZMA-T14CN #1 (NPN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ZMA-T54CN #1 (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 #1</td>
</tr>
</tbody>
</table>
Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H \( \cdots 0.5 \) MPa

**ZMA05□H**

**Exhaust Characteristics**

Vacuum pressure kPa

Supply pressure MPa

Suction flow rate l/min (ANR)

Air consumption l/min (ANR)

**Flow Characteristics**

Vacuum pressure kPa

Flow rate l/min (ANR)

**ZMA07□H**

**Exhaust Characteristics**

Vacuum pressure kPa

Supply pressure MPa

Suction flow rate l/min (ANR)

Air consumption l/min (ANR)

**Flow Characteristics**

Vacuum pressure kPa

Flow rate l/min (ANR)

**ZMA10□H**

**Exhaust Characteristics**

Vacuum pressure kPa

Supply pressure MPa

Suction flow rate l/min (ANR)

Air consumption l/min (ANR)

**Flow Characteristics**

Vacuum pressure kPa

Flow rate l/min (ANR)
Series ZMA

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: H \(\cdots 0.5 \text{ MPa}\)

**ZMA13\(\text{-}H\)**

Exhaust Characteristics

Flow Characteristics

Exhaust Characteristics/Flow Characteristics, Standard Supply Pressure: S \(\cdots 0.45 \text{ MPa}\)

**ZMA13\(\text{-}S\)**

Exhaust Characteristics

Flow Characteristics

**ZMA15\(\text{-}S\)**

Exhaust Characteristics

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

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, Pmax is max. vacuum pressure and Qmax 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 (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 adsorbed, please note that vacuum pressure will not be high.
Series ZMA

Dimensions

A: Release flow rate adjusting needle with lock nut

Supply

Pilot pressure exhaust port (PE)

Vacuum

Vacuum port (V)

Air pressure supply port (P)

3 x 1/8 (Rc, NPTF, G)

10

(Needle fully open)

Release flow rate adjusting needle

Dimensions

Series ZMA (ZMA1S-K5-T14C)

S: Vacuum pressure switch trimmer

T: Release period adjustment trimmer

Pilot valve for supply

Pilot valve for release

Pilot pressure exhaust port (PE)

M5 through

Mounting hole

Vacuum port (V)
### Manifold Specifications: Series ZZMA

#### 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>1/4 (Rc, NPTF, G)</td>
</tr>
<tr>
<td>Individual air pressure supply port (P) *</td>
<td>1/8 (Rc, NPTF, G)</td>
</tr>
<tr>
<td>Common exhaust port</td>
<td>1/2, 3/4 (Rc, NPTF, G)</td>
</tr>
<tr>
<td>Position of common exhaust port (EXH)</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>Ejector model</th>
<th>ZMA053</th>
<th>ZMA054</th>
<th>ZMA073</th>
<th>ZMA074</th>
<th>ZMA103</th>
<th>ZMA104</th>
<th>ZMA133</th>
<th>ZMA134</th>
<th>ZMA153</th>
<th>ZMA154</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZMA06stations—06</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZMA06S—06B</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZMA04stations—04</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZMA04S—04B</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Effective area of external silencer is 160 mm².

Cv value: 8.8

#### How to Order Ejector Manifold

**ZZMA06**—[**06**]—R—R

**Number of stations**

- 01: 1 station
- 10: 10 stations (max.)

**Thread type**

- Nil
- T: NPTF
- F: G *

* G thread
  - The thread ridge shape is compatible with the G thread standard (JIS B 0202), but other shapes are not conforming to ISO16030 and ISO1179.

**Common air pressure supply port (P) location **

<table>
<thead>
<tr>
<th>Nil</th>
<th>Both Sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Right Side</td>
</tr>
<tr>
<td>L</td>
<td>Left Side</td>
</tr>
</tbody>
</table>

**Common exhaust port (EXH) and silencer location**

- R: Right Side
- L: Left Side

Note) Right and left side are viewed from the front side of vacuum port (V).

**Common exhaust port (EXH) Size**

<table>
<thead>
<tr>
<th>Station</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>1/2</td>
</tr>
<tr>
<td>06</td>
<td>3/4</td>
</tr>
<tr>
<td>S</td>
<td>Silencer dedicated for ZZMA (ZZM-SA)</td>
</tr>
<tr>
<td>00</td>
<td>Without exhaust port (Compatible with ~X111)</td>
</tr>
</tbody>
</table>

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

Example) Manifold model no.: ZZMA04-SR (1 pc.)
Ejector model no.: * ZMA073H-K5-T14C (4 pcs.)
Series ZMA

Manifold

<table>
<thead>
<tr>
<th>ZZMA</th>
<th>Number of ejectors</th>
<th>Common EXH port</th>
<th>Port position</th>
</tr>
</thead>
</table>

A: Release flow rate adjusting needle with lock nut

(needle fully open)

L1 1/8 (Rc, NPTF, G) Individual air pressure supply port (P)

L2 1/2, 3/4 (Rc, NPTF, G) Common exhaust port (EXH)

L3 1/4 (Rc, NPTF, G) Common air pressure supply port (P)

108 ± 1.5 124 ± 1.5 140 ± 1.5 156 ± 1.5 172 ± 1.5

10 ± 1.5 20 ± 1.5 30 ± 1.5 40 ± 1.5 50 ± 1.5

Pitch

A: Release flow rate adjusting needle with lock nut

(Needle fully open)

<table>
<thead>
<tr>
<th>L</th>
<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>
<td></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>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>56 ± 1.5</td>
<td>72 ± 1.5</td>
<td>88 ± 1.5</td>
<td>104 ± 1.5</td>
<td>120 ± 1.5</td>
<td>136 ± 2.0</td>
<td>152 ± 2.0</td>
<td>168 ± 2.0</td>
<td>184 ± 2.0</td>
<td>200 ± 2.0</td>
<td></td>
</tr>
</tbody>
</table>
Vacuum Ejector With Solid State Timer Series ZMA

Manifold/With Silencer  Manifold with Silencer Dedicated for Manifold

ZZMA | Number of ejectors | S | Position of silencer

<table>
<thead>
<tr>
<th>L1</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>

A: Release flow rate adjusting needle with lock nut

(Pitch 14, P = 16)

(Mounting hole)

1/4 (Rc, NPTF, G)

(Individual air pressure supply port (P))

1/8 (Rc, NPTF, G)

(Common air pressure supply port (P))

2 x ø 5.6

(4 x ø 5.6 Mounting hole)

2 x Rc1/8 (1/8-27NPTF, G1/8)

(Vacuum port (V))

2 x M5 x 0.8

(Common air pressure exhaust port (PE))

Silencer dedicated for manifold

(ZZM-SA)
Series ZMA
Specific Product Precautions
Be sure to read before handling. Refer to front matters 38 and 39 for Safety Instructions and pages 844 to 846 for Vacuum Equipment Precautions.

Mounting

⚠️ 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.

Wiring

⚠️ 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.

Pressure Source

⚠️ 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.

Operating Environment

⚠️ Warning
1. The product cannot be used in a strong magnetic field.