Multistage Ejector

Max. suction flow rate

3 types available:
100, 300, and 600 l/min (ANR)

+1 Branch + Port exhaust

Air consumption

<table>
<thead>
<tr>
<th>Series</th>
<th>Vacuum pressure [kPa]</th>
<th>Max. suction flow rate [l/min (ANR)]</th>
<th>Air consumption [l/min (ANR)]</th>
<th>Weight [g]</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZL1</td>
<td>~84</td>
<td>100</td>
<td>57</td>
<td>180</td>
<td>p. 7</td>
</tr>
<tr>
<td>ZL3</td>
<td>~93+4</td>
<td>300+5</td>
<td>135+4</td>
<td>390</td>
<td>p. 19</td>
</tr>
<tr>
<td>ZL6</td>
<td>~93+4</td>
<td>600+5</td>
<td>270+4</td>
<td>470</td>
<td>p. 19</td>
</tr>
</tbody>
</table>

+2 ZL212 (Existing model): 700 g ⇒ ZL3: 390 g

+3 ZL112 (Existing model): 450 g ⇒ ZL1: 180 g

Max. suction flow rate: 600 l/min (ANR)

Max. suction flow rate: 300 l/min (ANR)

Max. suction flow rate: 100 l/min (ANR)

Weight

Cuts off supply air when the pressure reaches the desired vacuum

90% reduction

A pressure switch for vacuum with an energy saving function is mounted.

10% reduction

44% reduction

Branch + Port exhaust

60% reduction

Basic type

Suction:

ZL1 Series

Suction:

ZL3 Series

Suction:

ZL6 Series

A pressure switch for vacuum with an energy saving function is mounted.

Cuts off supply air when the pressure reaches the desired vacuum

90% reduction

A pressure switch for vacuum with an energy saving function is mounted.

10% reduction

44% reduction

Branch + Port exhaust

60% reduction

Basic type

Suction:

ZL1 Series

Suction:

ZL3 Series

Suction:

ZL6 Series

A pressure switch for vacuum with an energy saving function is mounted.

Cuts off supply air when the pressure reaches the desired vacuum

90% reduction

A pressure switch for vacuum with an energy saving function is mounted.
**Energy saving**

Energy saving is possible due to the pressure switch for vacuum with energy saving function. Even when the suction signal is ON, the ON/OFF operation of the supply valve is performed automatically within the set value.

**Air consumption**

- **90% reduction\(^1\)**

\(^1\) Based on SMC's measurement conditions

When equipped with a pressure switch for vacuum with energy saving function (ZL3, ZL6)

**Air consumption**

- **10% reduction**

**Increased efficiency** (Suction flow rate/Air consumption)

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. suction flow rate</th>
<th>Air consumption</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZL1</td>
<td>100</td>
<td>57</td>
<td>1.75</td>
</tr>
<tr>
<td>ZL112 (Existing model)</td>
<td>100</td>
<td>63</td>
<td>1.59</td>
</tr>
<tr>
<td>ZL3</td>
<td>300</td>
<td>135</td>
<td>2.2</td>
</tr>
<tr>
<td>ZL212 (Existing model)</td>
<td>250</td>
<td>150</td>
<td>1.67</td>
</tr>
<tr>
<td>ZL6</td>
<td>600</td>
<td>270</td>
<td>2.22</td>
</tr>
</tbody>
</table>

\(^1\) ZL1 (Standard supply pressure: 0.33 MPa)

\(^1\) ZL3H (Standard supply pressure: 0.5 MPa)
3-stage diffuser construction

Max. suction flow rate

100/300 l/min (ANR)

Suction flow rate increased by 250%

(For the ZL1: Compared to SMC 1-stage nozzle type models with nozzle size Ø 1.3)

Applications

- For the adsorption transfer of glass for automobiles
- For the adsorption (clamping) of jigs and workpieces
- For the adsorption transfer of cardboard

ZL1/ZL3

1 built-in ejector assembly

ZL6

2 built-in ejector assemblies

Dedicated silencer

Exclusively designed silencer which secures suction flow rate and reduces exhaust noise

Vacuum pressure

Suction flow rate

ZL1

ZL3

ZL6

Q1 Q2 Q3

ZL1/ZL3

Q1 Q2 Q3

ZL6

1 stage 2 stage 3 stage

100/300 l/min (ANR) Max. suction flow rate

600 l/min (ANR)*1

*1 Branch + Port exhaust

ZL1/ZL3/Branch specificaton

ZL6
Multistage Ejector ZL1/ZL3/ZL6 Series

3 types of vacuum pressure sensors

1 With vacuum pressure switch

3-step setting

- NPN or PNP open collector 1 output/2 outputs
- NPN or PNP open collector 1 output + Analogue output (1 to 5 V or 4 to 20 mA)

Output specifications

- Power saving mode
  Power consumption is reduced by the turning off the monitor.
  (Power consumption reduced by 20 % max.)

2 With pressure gauge

Pressure range:
-100 to 100 kPa (When the fittings are metric spec.)
-30 inHg to 14 psi (When the fittings are inch spec.)

3 With vacuum pressure detection port

Port size: Rc1/8

- Can copy to up to 10 units simultaneously
  - Reduced setting time
  - Minimized risk of setting mistakes

Vacuum port: A branch specification is selectable.

- Easy connection of branch piping
- One-touch fittings can be connected without a bushing.

Standard supply pressure:
A 0.35 MPa specification has been added.

Supports the adoption of low pressure in factories
**Multistage Ejector ZL1/ZL3/ZL6 Series**

No tools are required! Maintenance labour can be reduced.

---

**Filter element**

1. Press the levers.
2. Remove the suction cover.
3. Replace the filter element.

---

**Sound absorbing material**

1. Press the “PUSH” button.
2. Remove the silencer cover.
3. Replace the sound absorbing material.

---

**Supply valve/release valve and exhaust method**

Supply valve/release valve and exhaust method for ZL1/ZL3/ZL6 Series

- **Supply valve**: N.C.
- **Release valve**: N.C.
- **Vacuum break flow adjusting needle**

---

**Option**

An adapter assembly is required for bottom mounting interchangeability with the existing model.

- The mounting holes on the top and on the side are interchangeable as standard.

**Bottom mounting for the ZL1 ↔ ZL112 (Existing model)**

**Bottom mounting for the ZL3 ↔ ZL212 (Existing model)**
### Variations

<table>
<thead>
<tr>
<th>Series</th>
<th>ZL1</th>
<th>ZL3M</th>
<th>ZL3H</th>
<th>ZL6M</th>
<th>ZL6H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal nozzle size [mm]</td>
<td>1.2</td>
<td>1.9</td>
<td>1.5</td>
<td>1.9 x 2</td>
<td>1.5 x 2</td>
</tr>
<tr>
<td>Standard supply pressure [MPa]</td>
<td>0.33</td>
<td>0.35</td>
<td>0.50</td>
<td>0.35</td>
<td>0.50</td>
</tr>
<tr>
<td>Vacuum pressure [kPa]</td>
<td>−84</td>
<td>−91</td>
<td>−93</td>
<td>−91</td>
<td>−93</td>
</tr>
<tr>
<td>Max. suction flow rate [l/min (ANR)]</td>
<td>100</td>
<td>300+²</td>
<td>135</td>
<td>300</td>
<td>270</td>
</tr>
<tr>
<td>Air consumption [l/min (ANR)]</td>
<td>57</td>
<td>150</td>
<td>135</td>
<td>300</td>
<td>270</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port size</th>
<th>Supply port</th>
<th>Vacuum port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ø 6</td>
<td>Ø 12</td>
</tr>
<tr>
<td></td>
<td>Ø 1/4”</td>
<td>Ø 1/2”</td>
</tr>
<tr>
<td></td>
<td>Ø 8</td>
<td>3/4 (Rc, NPT, G)</td>
</tr>
<tr>
<td></td>
<td>Ø 5/16”</td>
<td>2 x 1/2 (Rc, NPT, G)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With or without valve</th>
<th>With supply valve and release valve</th>
<th>Supply valve</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silencer exhaust</td>
<td>Port exhaust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure switch for vacuum with energy saving function</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vacuum pressure sensor</th>
<th>With vacuum pressure switch</th>
<th>With pressure gauge</th>
<th>With port: Rc1/8</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Without valve
*2 Branch + Port exhaust
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### Multistage Ejector

**ZL1 Series**

*Max. suction flow rate: 100 l/min (ANR)*

---

#### How to Order

**Without valve**

**ZL 112**

**With valve**

**ZL 112A**

---

1. **Supply (P), Vacuum (V) port/One-touch fitting connection size**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Supply (P) port</th>
<th>Vacuum (V) port</th>
<th>Pressure gauge unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Ø 1/4&quot; (Inch)</td>
<td>Ø 1/2&quot; (Inch)</td>
<td>inHg·psi</td>
</tr>
<tr>
<td>G</td>
<td>Ø 6 (Metric)</td>
<td>Ø 12 (Metric)</td>
<td>kPa</td>
</tr>
</tbody>
</table>

*1 When the vacuum pressure gauge (Symbol: G) is selected for G, these are the unit specifications options.

2. **Exhaust method**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Exhaust method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc1/2</td>
<td>Silencer exhaust</td>
</tr>
<tr>
<td>PF G1/2</td>
<td>G1/2 port exhaust</td>
</tr>
<tr>
<td>PN</td>
<td>1/2-1/4NPT port exhaust</td>
</tr>
</tbody>
</table>

*2 The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.

3. **Supply valve/Release valve combination**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>Supply valve (N.C.), Release valve (N.C.)</td>
</tr>
<tr>
<td>K2</td>
<td>Supply valve (N.C.)</td>
</tr>
<tr>
<td>B1</td>
<td>Supply valve (N.O.), Release valve (N.C.)</td>
</tr>
<tr>
<td>B2</td>
<td>Supply valve (N.O.)</td>
</tr>
</tbody>
</table>

4. **Rated voltage**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>24 VDC</td>
</tr>
<tr>
<td>B</td>
<td>12 VDC</td>
</tr>
<tr>
<td>V</td>
<td>6 VDC</td>
</tr>
<tr>
<td>S</td>
<td>5 VDC</td>
</tr>
<tr>
<td>R</td>
<td>3 VDC</td>
</tr>
</tbody>
</table>

5. **Vacuum pressure sensor**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>With vacuum pressure detection port (Rc1/8)</td>
</tr>
<tr>
<td>G</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>D</td>
<td>Vacuum pressure switch</td>
</tr>
</tbody>
</table>

*3 For D, the units for metric spec. fittings are in kPa. The units for inch spec. fittings are in inHg·psi.

6. **Electrical entry**

**24, 12, 6, 5, 3 VDC**

- **Grommet**
  - G: Lead wire length 300 mm
  - L: With lead wire (300 mm)
  - H: Lead wire length 600 mm
- **L plug connector**
  - L: Without lead wire
  - LN: Without connector
  - LO: Without connector
- **M plug connector**
  - M: With lead wire
  - MN: Without lead wire

**9 Output**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>NPN open collector 1 output</td>
</tr>
<tr>
<td>P</td>
<td>PNP open collector 1 output</td>
</tr>
<tr>
<td>A</td>
<td>NPN open collector 2 outputs</td>
</tr>
<tr>
<td>B</td>
<td>PNP open collector 2 outputs</td>
</tr>
<tr>
<td>C</td>
<td>NPN open collector 1 output + Analogue voltage output</td>
</tr>
<tr>
<td>D</td>
<td>NPN open collector 1 output + Analogue current output</td>
</tr>
<tr>
<td>E</td>
<td>PNP open collector 1 output + Analogue voltage output</td>
</tr>
<tr>
<td>F</td>
<td>PNP open collector 1 output + Analogue current output</td>
</tr>
</tbody>
</table>

**10 Unit**

- **With unit switching function**
  - M: SI unit only (kPa)
  - P: With unit switching/setting (Initial value psi)

**11 Lead wire**

- **Without lead wire**
  - L: Lead wire with connector (2 m)

---

*Applicable only when “D” is selected for Q. The units for metric spec. fittings are in kPa. The units for inch spec. fittings are in inHg·psi.*

*LN and MN types: With 2 sockets per valve
- Refer to page 13 for the lead wire length of L and M plug connectors.*

---

*Bottom mounting screw pitch = 28 mm (Interchangeable with the existing ZL112 model)
- 2 pcs./set, with 4 bolts
- The mounting holes on the top and on the side are interchangeable as standard.*

---

*For output types “N” and “P”, a 3-core lead wire is included. For other output types, a 4-core lead wire is included.*
Select “1” for both supply and release valve.

Select “1” for supply valve.

Select “2” for supply valve.
Select “1” for release valve.

Select “2” for supply valve.

Select “2” for supply valve.
Select “1” for release valve.

Supply Valve/Release Valve Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>SYJS-4A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time (at 0.5 MPa)</td>
<td>25 ms or less</td>
</tr>
<tr>
<td>Max. operating frequency</td>
<td>5 Hz</td>
</tr>
<tr>
<td>Manual override</td>
<td>Non-locking push type, Push-turn locking slotted type</td>
</tr>
</tbody>
</table>

Pressure Gauge Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ZL112A-PG1-A</th>
<th>ZL112A-PG2-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Air</td>
<td>Air</td>
</tr>
<tr>
<td>Pressure range</td>
<td>-100 to 100 kPa</td>
<td>-30 inHg to 14 psi</td>
</tr>
<tr>
<td>Scale range (Angular)</td>
<td>±3 % F.S. (Full span)</td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Class 3</td>
<td>Class 3</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 to 50 °C</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Housing: Polycarbonate/ABS resin</td>
<td></td>
</tr>
</tbody>
</table>
Vacuum Pressure Switch Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ZL-ZSE30A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated pressure range</td>
<td>0.0 to -101.0 kPa</td>
</tr>
<tr>
<td>Set pressure range</td>
<td>10.0 to -105.0 kPa</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>500 kPa</td>
</tr>
<tr>
<td>Smallest settable increment</td>
<td>0.1 kPa</td>
</tr>
<tr>
<td>Applicable fluid</td>
<td>Air, Non-corrosive gas, Non-flammable gas</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10 % (with power supply polarity protection)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>40 mA (at no load)</td>
</tr>
<tr>
<td>Switch output</td>
<td>NPN or PNP open collector 1 output</td>
</tr>
<tr>
<td>Max. load current</td>
<td>80 mA</td>
</tr>
<tr>
<td>Max. applied voltage</td>
<td>28 V (at NPN output)</td>
</tr>
<tr>
<td>Residual voltage</td>
<td>1 V or less (with load current of 80 mA)</td>
</tr>
<tr>
<td>Response time</td>
<td>2.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000 ms)</td>
</tr>
<tr>
<td>Short-circuit protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.2 % F.S. ±1 digit</td>
</tr>
<tr>
<td>Hysteresis mode</td>
<td>Variable (0 to variable)</td>
</tr>
<tr>
<td>Window comparator mode</td>
<td>Variable (0 to variable)</td>
</tr>
<tr>
<td>Output voltage (Rated pressure range)</td>
<td>1 to 5 V ±2.5 % F.S.</td>
</tr>
<tr>
<td>Linearity</td>
<td>±1 % F.S. or less</td>
</tr>
<tr>
<td>Output impedance</td>
<td>Approx. 1 kΩ</td>
</tr>
<tr>
<td>Output current (Rated pressure range)</td>
<td>4 to 20 mA ±2.5 % F.S.</td>
</tr>
<tr>
<td>Linearity</td>
<td>±1 % F.S. or less</td>
</tr>
<tr>
<td>Load impedance</td>
<td>Maximum load impedance: Power supply voltage 12 V: 300 Ω, Power supply voltage 24 V: 600 Ω Minimum load impedance: 50 Ω</td>
</tr>
<tr>
<td>Display</td>
<td>4-digit, 7-segment, 2-colour LCD (Red/Green) Sampling cycle: 5 times/s</td>
</tr>
<tr>
<td>Display accuracy</td>
<td>±2 % F.S. ±1 digit (Ambient temperature of 25 °C)</td>
</tr>
<tr>
<td>Indicator light</td>
<td>Lights up when switch output is turned ON. (OUT1: Green, OUT2: Red)</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP40</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: 0 to 50 °C (No freezing or condensation) Stored: -10 to 60 °C</td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>Operating/Stored: 35 to 85 % RH (No condensation)</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC for 1 minute between terminals and housing</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>50 MΩ or more (500 VCC measured via megohmmeter) between terminals and housing</td>
</tr>
<tr>
<td>Temperature characteristics</td>
<td>±2 % F.S. (25 °C standard)</td>
</tr>
<tr>
<td>Lead wire</td>
<td>Oilproof heavy-duty vinyl cable, 3 cores Ø 3.5, 2 m 4 cores Conductor area: 0.15 mm² (AWG26) Insulator O.D.: 1.0 mm</td>
</tr>
<tr>
<td>Standards</td>
<td>CE, RoHS compliant</td>
</tr>
</tbody>
</table>

Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>ZL1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic type</td>
<td>180</td>
</tr>
<tr>
<td>Port exhaust</td>
<td>+70</td>
</tr>
<tr>
<td>Vacuum pressure switch (Excluding lead wire)</td>
<td>+25</td>
</tr>
<tr>
<td>Vacuum pressure switch (Including 3 cores lead wire)</td>
<td>+56</td>
</tr>
<tr>
<td>Vacuum pressure switch (Including 4 cores lead wire)</td>
<td>+60</td>
</tr>
<tr>
<td>With supply valve and release valve</td>
<td>+105</td>
</tr>
<tr>
<td>With supply valve and without release valve</td>
<td>+65</td>
</tr>
</tbody>
</table>
Vacuum Pressure Switch/Internal Circuits and Wiring Examples

Output specification “N”
NPN (1 output)

Output specification “P”
PNP (1 output)

Output specification “A”
NPN (2 outputs)

Output specification “B”
PNP (2 outputs)

Output specification “C”
NPN (1 output) + Analogue voltage output

Output specification “D”
NPN (1 output) + Analogue current output

Output specification “E”
PNP (1 output) + Analogue voltage output

Output specification “F”
PNP (1 output) + Analogue current output

* Refer to the Web Catalogue for details on pressure switches.
**How to Read the Flow Rate Characteristics**

The flow rate characteristics indicate the relationship between the vacuum pressure and the suction flow rate of the ejector. They also show that when the suction flow rate changes, the vacuum pressure also changes. In general, this indicates the relationship at the ejector’s standard operating pressure.

1. If the ejector’s suction port is closed and sealed tight, the suction flow rate becomes “0,” and the vacuum pressure increases to the max (Pmax).
2. If the suction port is opened and air is allowed to flow (the air leaks), the suction flow rate increases, and the vacuum pressure decreases. (The condition of P1 and Q1)
3. If the suction port is opened completely, the suction flow rate increases to the max (Qmax), while the vacuum pressure then drops almost to “0” (atmospheric pressure). When adsorbing workpieces which are permeable, subject to leakage, etc., caution is required as the vacuum pressure will not be very high.

**How to Read the Time to Reach Vacuum**

The graph indicates the time required to reach a vacuum pressure determined by adsorption conditions for workpieces, etc., starting from atmospheric pressure in a 1 L sealed tank. For the ZL1, approximately 7.0 seconds are necessary to attain a vacuum pressure of -80 kPa.
Construction

Without valve or pressure switch, Silencer exhaust

<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>PBT</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Nozzle</td>
<td>POM</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Diffuser</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Attachment</td>
<td>POM</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>Check valve</td>
<td>FKM</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Suction cover</td>
<td>PBT</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>7</td>
<td>Filter element</td>
<td>Non-woven fabric</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>8</td>
<td>Silencer case assembly</td>
<td>PBT/Stainless steel</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>9</td>
<td>Sound absorbing material 1</td>
<td>Resin</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>10</td>
<td>Sound absorbing material 2</td>
<td>Resin</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>11</td>
<td>Valve plate</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>12</td>
<td>Knob</td>
<td>POM</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>13</td>
<td>Needle</td>
<td>Brass (Electroless nickel plating)</td>
<td>—</td>
</tr>
<tr>
<td>14</td>
<td>Port block assembly</td>
<td>Aluminium alloy/NBR/Stainless steel</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>15</td>
<td>Supply valve, Release valve</td>
<td>—</td>
<td>Refer to 13 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>16</td>
<td>Vacuum pressure switch</td>
<td>—</td>
<td>Refer to 13 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>17</td>
<td>Adapter assembly for bottom mounting</td>
<td>Brass (Electroless nickel plating)</td>
<td>Refer to 13 on page 14 for replacement parts.</td>
</tr>
<tr>
<td></td>
<td>Seal material (O-ring, etc.)</td>
<td>HNBR/NBR</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Screws for assembly</td>
<td>Steel</td>
<td>—</td>
</tr>
</tbody>
</table>

With valve and pressure switch, Port exhaust

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>PBT</td>
<td>—</td>
</tr>
<tr>
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<td>—</td>
</tr>
<tr>
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<td>POM</td>
<td>—</td>
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<td>—</td>
</tr>
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</tr>
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</tr>
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<td>12</td>
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</tr>
<tr>
<td>14</td>
<td>Port block assembly</td>
<td>Aluminium alloy/NBR/Stainless steel</td>
<td>Refer to 1 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>15</td>
<td>Supply valve, Release valve</td>
<td>—</td>
<td>Refer to 13 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>16</td>
<td>Vacuum pressure switch</td>
<td>—</td>
<td>Refer to 13 on page 14 for replacement parts.</td>
</tr>
<tr>
<td>17</td>
<td>Adapter assembly for bottom mounting</td>
<td>Brass (Electroless nickel plating)</td>
<td>Refer to 13 on page 14 for replacement parts.</td>
</tr>
<tr>
<td></td>
<td>Seal material (O-ring, etc.)</td>
<td>HNBR/NBR</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Screws for assembly</td>
<td>Steel</td>
<td>—</td>
</tr>
</tbody>
</table>
How to Order Replacement Parts

How to Order Supply Valve/Release Valve


1 Type of actuation
1 Normally closed
2 Normally open (Supply valve only)

2 Rated voltage
DC
5 24 VDC
6 12 VDC
V 6 VDC
S 5 VDC
R 3 VDC

3 Electrical entry
24, 12, 6, 5, 3 VDC/100, 200, 220 VAC

Grommet | L plug connector | M plug connector
---|---|---
G: Lead wire length 300 mm | L: With lead wire (300 mm) | M: With lead wire (300 mm) | MN: Without lead wire
H: Lead wire length 500 mm | LN: Without lead wire | LO: Without connector | MO: Without connector

* LN and MN types: With 2 sockets
* For the lead wire length of the L and M plug connectors, refer to the lead wire with connector assembly for supply valves and release valves.

4 Light/Surge voltage suppressor
(Electrical entry: G, H, L, or M)
— Without light/surge voltage suppressor
S With surge voltage suppressor
Z With light/surge voltage suppressor
U With light/surge voltage suppressor (Non-polar type)

5 Manual override
— Non-locking push type
D Push-turn locking slotted type

6 CE-compliant
Q CE-compliant

How to Order Connector and Socket for Supply Valve/Release Valve

SY100 — 30 — A
* With connector and 2 sockets only

How to Order Lead Wire with Connector Assembly for Supply Valve/Release Valve

SY100 — 30 — A — 6

1 Power supply voltage
DC

2 Lead wire length
6 600 mm
10 1000 mm
15 1500 mm
20 2000 mm
25 2500 mm
30 3000 mm
50 5000 mm

How to Order Suction Cover Assembly

ZL — ZSE30A — 00 — B — M — L

1 Vacuum port size
— Applicable tubing O.D. Ø 12
N Applicable tubing O.D. Ø 1/2’’

2 Unit
— With unit switching function
M SI unit only *1
P With unit switching function (Initial value psi)

*1 Fixed unit: kPa

3 Connector/Lead wire
— Without lead wire
L Lead wire with connector (Length: 2 m)

* For output types “N” and “P,” a 3-core lead wire is included. For other output types, a 4-core lead wire is included.

How to Order Lead Wire Assembly with Connector

ZS — 38 — 3 L

1 Number of cores
3 3 cores, 1 output
4 4 cores, 2 outputs

How to Order Suction Cover Assembly

ZL112A — FC1 — A

1 Vacuum port size
— Applicable tubing O.D. Ø 1/2”
N Applicable tubing O.D. Ø 1/2’’

* With connector and 2 sockets only
How to Order Replacement Parts

4 How to Order Silencer Case Assembly
ZL112A – SC1 – A

Silencer case assembly
(including sound material assembly and a clip)

5 How to Order Port Block Assembly
ZL112A – EP1 F – A

1 Thread type

<table>
<thead>
<tr>
<th></th>
<th>Rc thread</th>
<th>F</th>
<th>G thread</th>
<th>N</th>
<th>NPT thread</th>
</tr>
</thead>
</table>

Port block assembly
(including a clip)

6 How to Order Ejector Assembly
ZL112A – EJ1 – A

Ejector assembly

7 How to Order Valve Plate Assembly∗1
ZL112A – VP 1 – A

1 Supply valve/Release valve combination

<table>
<thead>
<tr>
<th></th>
<th>Supply valve + Release valve</th>
<th>Supply valve only</th>
</tr>
</thead>
</table>

Valve plate assembly

∗1 It is not possible to switch between models with valves and models without valves.

8 How to Order Filter Element
ZL112A – FE1 – A

Filter element
+ 1 pc.

9 How to Order Sound Absorbing Material Assembly
ZL112A – SE1 – A

Sound absorbing material 1
and 2, 1 pc. each/set

10 How to Order Adapter Assembly for Bottom Mounting
ZL112A – AD1 – A

Adapter assembly for bottom mounting
+ 2 pcs./set, with 4 bolts

How to Order Vacuum Port Adapter Assembly∗2
ZL112A – AD2 – A

Vacuum port adapter assembly

∗2 A vacuum port adapter cannot be installed when “—” is selected for the pressure sensor.

How to Order Pressure Gauge Assembly∗3
ZL112A – PG 1 – A

Pressure gauge assembly

∗3 A pressure gauge cannot be installed when “—” is selected for the pressure sensor.

How to Order O-ring for Suction Cover
ZL112A – OR1 – A

O-ring for suction cover
+ 5 pcs./set
ZL1 Series

Dimensions

ZL112A(N)(-B) Valve (Without supply valve or release valve)

Port Size

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZL112A</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>ZL112AN</td>
<td>1/4&quot;</td>
<td>1/2&quot;</td>
</tr>
</tbody>
</table>

Release Button

<table>
<thead>
<tr>
<th></th>
<th>P port</th>
<th>V port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Type</td>
<td>Colour</td>
</tr>
<tr>
<td>ZL112A</td>
<td>Light grey Oval</td>
<td>Light grey Round</td>
</tr>
<tr>
<td>ZL112AN</td>
<td>Orange Round</td>
<td>Orange Round</td>
</tr>
</tbody>
</table>

ZL112A(N)-B With adapter assembly for bottom mounting

- Tighten to the recommended torque to mount the body. Tightening with excessive force may damage the product.
The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.

Use a male thread with a length of 9 or less for connection.

ZL112AP Port exhaust

* Hold the exhaust when connecting piping to the exhaust port. (Recommended tightening torque: 20 to 25 N-m)

ZL112A-D With vacuum pressure switch

* Tighten to the recommended torque to mount the body. Tightening with excessive force may damage the product.
**ZL1 Series**

**Dimensions**

**ZL112A-GN With vacuum pressure detection port**

*Tighten to the recommended torque on pages 15 and 16 to mount the body. Tightening with excessive force may damage the product.*

1. Hold across the flats (18) when mounting a fitting to the vacuum pressure detection port.
   (Recommended tightening torque: 3 to 5 N·m)

**Circuit diagram**

**ZL112A-G With pressure gauge**

*Circuit diagram*
ZL112A-K1 □ □ □ Valve (With supply valve and release valve)

ZL112A-K2 □ □ □ Valve (With supply valve)

Dimensions

Tighten to the recommended torque on pages 10 and 11 to mount the body. Tightening with excessive force may damage the product.
Multistage Ejector

ZL3/ZL6 Series

Max. suction flow rate:
- ZL3: 300 l/min (ANR)
- ZL6: 600 l/min (ANR)

- ZL3/ZL6 Series

- Standard supply pressure
  - M: 0.35 MPa
  - H: 0.50 MPa

- Max. suction flow rate
  - ZL3: 300 l/min (ANR)
  - ZL6: 600 l/min (ANR)

- Exhaust method
  - P: Port exhaust

- Vacuum pressure sensor
  - G: With vacuum pressure detection (G) port
  - F: Vacuum pressure switch (Vacuum 2 outputs)

- Electrical entry
  - L: Lead wire length 0.3 m
  - M: Lead wire length 0.3 m

- Manual override
  - D: Push-turn locking slotted type
  - E: Push-turn locking lever type

- Rated voltage
  - 24 VDC

- Option
  - B: Adapter assembly for bottom mounting

- How to Order

Without valve

With valve

Pressure switch with energy saving function

1. Max. suction flow rate
   - 3: 300 l/min (ANR)
   - 6: 600 l/min (ANR)

2. Standard supply pressure
   - M: 0.35 MPa
   - H: 0.50 MPa

3. Vacuum (2/V) port size/
   Supply (1/P) port applicable tubing O.D.

4. Exhaust method
   - P: Port exhaust

5. Supply valve/Release valve combination
   - K1: Supply valve (N.C.), Release valve (N.C.)
   - K2: Supply valve (N.C.)
   - B1: Supply valve (N.O.), Release valve (N.C.)
   - B2: Supply valve (N.O.)

6. Electrical entry
   - L: Lead wire length 0.3 m
   - M: Lead wire length 0.3 m
   - LO: Without connector
   - MO: Without connector

7. Rated voltage
   - 5: 24 VDC

8. Manual override
   - D: Push-turn locking slotted type
   - E: Push-turn locking lever type

9. Vacuum pressure sensor
   - G: Pressure gauge
   - E: Vacuum pressure switch (Vacuum 2 outputs)
   - F: Vacuum pressure switch (Compound pressure 2 outputs)

10. Electrical entry
    - L: Lead wire length 0.3 m
    - M: Lead wire length 0.3 m
    - LO: Without connector
    - MO: Without connector

11. Output
    - A: NPN open collector
    - B: PNP open collector

12. Unit
    - M: SI unit only (kPa)
    - P: With unit switching function

13. Lead wire
    - G: Lead wire with connector
    - W: Lead wire for switch with energy saving function

14. Option
    - B: Adapter assembly for bottom mounting

- Applicable only when “E,” “F,” or “V” is selected for 9 Vacuum pressure sensor

- Only applicable to ZL3
Ejector Specifications

### ZL3

<table>
<thead>
<tr>
<th>Specification</th>
<th>ZL3M</th>
<th>ZL3H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nozzle size [mm]</td>
<td>1.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Standard supply pressure [MPa]</td>
<td>0.35</td>
<td>0.50</td>
</tr>
<tr>
<td>Max. vacuum pressure [kPa]*1</td>
<td>-91</td>
<td>-93</td>
</tr>
<tr>
<td>Max. suction flow rate [l/min (ANR)]</td>
<td>280</td>
<td></td>
</tr>
<tr>
<td>Branch/Port exhaust</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Air consumption [l/min (ANR)]</td>
<td>150</td>
<td>135</td>
</tr>
<tr>
<td>Supply pressure range [MPa]</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Operating temperature range [°C]</td>
<td>-5 to 50 (No freezing or condensation)</td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance [m/s²]*2</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Impact resistance [m/s²]*3</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

*1 Values are at the standard supply pressure and based on SMC’s measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and the measurement method.
*2 10 to 500 Hz for 2 hours in each direction of X, Y, and Z (De-energised, Initial value)
*3 3 times in each direction of X, Y, and Z (De-energised, Initial value)

### ZL6

<table>
<thead>
<tr>
<th>Specification</th>
<th>ZL6M</th>
<th>ZL6H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nozzle size [mm]</td>
<td>1.9 x 2</td>
<td>1.5 x 2</td>
</tr>
<tr>
<td>Standard supply pressure [MPa]</td>
<td>Without valve</td>
<td>0.35</td>
</tr>
<tr>
<td>With valve</td>
<td>0.37</td>
<td>0.52</td>
</tr>
<tr>
<td>Max. vacuum pressure [kPa]*1</td>
<td>-91</td>
<td>-93</td>
</tr>
<tr>
<td>Max. suction flow rate [l/min (ANR)]</td>
<td>580</td>
<td></td>
</tr>
<tr>
<td>Branch/Port exhaust</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Air consumption [l/min (ANR)]</td>
<td>300</td>
<td>270</td>
</tr>
<tr>
<td>Supply pressure range [MPa]</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Operating temperature range [°C]</td>
<td>-5 to 50 (No freezing or condensation)</td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance [m/s²]*2</td>
<td>20</td>
<td></td>
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<tr>
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</table>

*1 Values are at the standard supply pressure and based on SMC’s measurement standards. They depend on atmospheric pressure (weather, altitude, etc.) and the measurement method.
*2 10 to 500 Hz for 2 hours in each direction of X, Y, and Z (De-energised, Initial value)
*3 3 times in each direction of X, Y, and Z (De-energised, Initial value)

### Supply Valve/Release Valve Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>ZL3-JSY3140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time (at 0.5 MPa)</td>
<td>27 ms or less*1</td>
</tr>
<tr>
<td>Max. operating frequency</td>
<td>5 Hz</td>
</tr>
<tr>
<td>Manual override</td>
<td>Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type</td>
</tr>
<tr>
<td>Rated coil voltage</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Allowable voltage range</td>
<td>Rated voltage ±10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.4 W</td>
</tr>
</tbody>
</table>

*1 Based on JIS B 8419: 2010 dynamic performance test (Coil temperature 20 °C, at rated voltage)
*2 Refer to the Web Catalogue for details on the JSY3000 series

### Pressure Gauge Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>GZ33-K1K-01-X56</th>
<th>GZ33-P1C-N01-X55</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure unit</td>
<td>kPa</td>
<td>nHg/psi dual scale</td>
</tr>
<tr>
<td>Pressure range</td>
<td>-100 to 100 kPa</td>
<td>-30 inhg to 14 psi</td>
</tr>
<tr>
<td>Connection thread</td>
<td>R1/8</td>
<td>NPT1/8</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Vacuum ±3 % F.S., Positive pressure ±5 % F.S.</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>30 g</td>
<td></td>
</tr>
</tbody>
</table>
Vacuum Pressure Switch Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ZSE10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated pressure range</td>
<td>0 to -101 kPa -100 to 100 kPa</td>
</tr>
<tr>
<td>Set pressure range/Display pressure range</td>
<td>10 to -101 kPa -105 to 105 kPa</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>500 kPa</td>
</tr>
<tr>
<td>Smallest settable increment</td>
<td>0.1 kPa</td>
</tr>
<tr>
<td>Applicable fluid</td>
<td>Air, Non-corrosive gas, Non-flammable gas</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10 %, Ripple (p-p) 10 % or less (with power supply polarity protection)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>40 mA or less</td>
</tr>
<tr>
<td>Switch output</td>
<td>NPN or PNP open collector (selectable) OUT1: General purpose OUT2: Valve control</td>
</tr>
<tr>
<td>Max. load current</td>
<td>80mA</td>
</tr>
<tr>
<td>Max. applied voltage</td>
<td>28 V (at NPN output) -26.4 V (at NPN output)</td>
</tr>
<tr>
<td>Residual voltage</td>
<td>2 V or less (with load current of 80 mA)</td>
</tr>
<tr>
<td>Response time</td>
<td>2.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000 ms)</td>
</tr>
<tr>
<td>Short-circuit protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.2 % F.S. ±1 digit</td>
</tr>
<tr>
<td>Hysteresis mode</td>
<td>Variable (0 or above)††</td>
</tr>
<tr>
<td>Window comparator mode</td>
<td>Variable (0 or above)††</td>
</tr>
<tr>
<td>Display</td>
<td>3 1/2 digit, 7-segment LED, 1-colour display (Red)</td>
</tr>
<tr>
<td>Display accuracy</td>
<td>±2 % F.S. ±1 digit (Ambient temperature of 25 ±3 °C)</td>
</tr>
<tr>
<td>Indicator light</td>
<td>Lights up when switch output is turned ON. OUT1: Green, OUT2: Red</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP40</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Operating: -5 to 50 °C Stored: -10 to 60 °C</td>
</tr>
<tr>
<td>Operating humidity range</td>
<td>Operating/Stored: 35 to 85 % RH (No condensation)</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC for 1 minute between terminals and housing</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing</td>
</tr>
<tr>
<td>Temperature characteristics</td>
<td>±2 % F.S. ±1 digit (at 25 °C in an ambient temperature of -5 and 50 °C)</td>
</tr>
<tr>
<td>Lead wire</td>
<td>Oilproof heavy-duty vinyl cable 5 cores Conductor area: 0.15 mm² (AWG26) Insulator O.D.: 1.0 mm</td>
</tr>
<tr>
<td>Standards</td>
<td>CE, RoHS compliant</td>
</tr>
</tbody>
</table>

*†† If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the fluctuating width. Otherwise, chattering will occur.

Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>ZL3</th>
<th>ZL6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic type</td>
<td>390</td>
<td>470</td>
</tr>
<tr>
<td>Port exhaust</td>
<td>+80</td>
<td>+25</td>
</tr>
<tr>
<td>Vacuum pressure switch (Excluding lead wire)</td>
<td>+20</td>
<td>+20</td>
</tr>
<tr>
<td>Vacuum pressure switch (Including lead wire)</td>
<td>+60</td>
<td>+60</td>
</tr>
<tr>
<td>With supply valve and release valve</td>
<td>+120</td>
<td>+120</td>
</tr>
<tr>
<td>With supply valve and without release valve</td>
<td>+80</td>
<td>+80</td>
</tr>
<tr>
<td>With pressure gauge</td>
<td>+30</td>
<td>+30</td>
</tr>
<tr>
<td>With adapter assembly for bottom mounting</td>
<td>+60</td>
<td>—</td>
</tr>
</tbody>
</table>
**Internal Circuits and Wiring Examples**

**Vacuum pressure switch**

NPN (2 outputs)

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (-)

Max. 28 V, 80 mA
Residual voltage 2 V or less

* The FUNC terminal is connected when using the copy function. (Refer to the Operation Manual.)

**PNP (2 outputs)**

- Brown DC (+)
- Black OUT1
- White OUT2
- FUNC
- Blue DC (-)

Max. 28 V, 80 mA
Residual voltage 2 V or less

**Pressure switch for vacuum with energy saving function**

NPN (1 output)

- Brown
- OUT1
- OUT2
- FUNC
- Blue
- Grey

Supply valve
Release valve

Connector cord assembly (ZL3-LW1-N-A)

24 VDC

*1 The grey wire (FUNC) is connected when operating the supply valve by energy saving control (for workpiece adsorption). (Refer to the Operation Manual.)

**PNP (1 output)**

- Brown
- OUT1
- OUT2
- FUNC
- Grey
- Blue

Supply valve
Release valve

Connector cord assembly (ZL3-LW1-P-A)

24 VDC

Max. 28 V, 80 mA
Residual voltage 2 V or less
ZL3/ZL6 Series

Exhaust Characteristics (Representative value)

ZL3H

ZL3M

ZL6H

ZL6M

ZL6H (With valve)

ZL6M (With valve)

Flow Rate Characteristics (Representative value)

ZL3H (04P)  Supply pressure: 0.5 MPa

ZL3M (04P)  Supply pressure: 0.35 MPa
Flow Rate Characteristics (Representative value)

ZL6H (04P)  
Supply pressure: 0.5 MPa/0.52 MPa (With valve)

ZL6M (04P)  
Supply pressure: 0.35 MPa/0.37 MPa (With valve)

Time to Reach Vacuum (Representative value)

ZL3 (Tank capacity: 1 L)

ZL6 (Tank capacity: 1 L)

Break Flow Rate Characteristics (Representative value)

Break flow rate supplied to vacuum area at different needle openings and at each supply pressure

Vacuum Breaking Time (Representative value)

Max. vacuum pressure → Time to reach -10 kPa  
(Tank capacity: 1 L)

How to Read the Flow Rate Characteristics

The flow rate characteristics indicate the relationship between the vacuum pressure and the suction flow rate of the ejector. They also show that when the suction flow rate changes, the vacuum pressure also changes. In general, this indicates the relationship at the ejector's standard operating pressure.

How to Read the Time to Reach Vacuum

The graphs indicate the time required to reach a vacuum pressure determined by adsorption conditions for workpieces, etc., starting from atmospheric pressure in a 1 L sealed tank. For the ZL3H, approximately 4.0 seconds are necessary to attain a vacuum pressure of -90 kPa.
ZL3/ZL6 Series

Construction

ZL3
Without valve or pressure switch, Silencer exhaust

ZL3
With valve and pressure switch, Port exhaust

ZL6
Without valve or pressure switch, Silencer exhaust

ZL6
With valve and pressure switch, Port exhaust

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>Aluminium alloy (Anodised)</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Nozzle</td>
<td>POM</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Diffuser</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Attachment</td>
<td>POM</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>Check valve</td>
<td>FKM</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Front adapter</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>End adapter</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>8</td>
<td>Silencer case</td>
<td>PBT</td>
<td>Refer to 1 or 2 on page 26 for replacement parts.</td>
</tr>
<tr>
<td>9</td>
<td>Silencer cap</td>
<td>POM</td>
<td>—</td>
</tr>
<tr>
<td>10</td>
<td>Sound absorbing material 1</td>
<td>Resin</td>
<td>Refer to 1 or 2 on page 26 for replacement parts.</td>
</tr>
<tr>
<td>11</td>
<td>Sound absorbing material 2</td>
<td>Non-woven fabric</td>
<td>—</td>
</tr>
<tr>
<td>12</td>
<td>Silencer exhaust</td>
<td>—</td>
<td>(Disassembly is not possible. The silencer assembly must be replaced.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Pressure gauge</td>
<td>—</td>
<td>Refer to 1 on page 26 for replacement parts.</td>
</tr>
<tr>
<td>14</td>
<td>Valve plate</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>Knob</td>
<td>POM</td>
<td>—</td>
</tr>
<tr>
<td>16</td>
<td>Needle</td>
<td>PBT</td>
<td>—</td>
</tr>
<tr>
<td>17</td>
<td>Needle guide</td>
<td>Brass (Electroless nickel plating)</td>
<td>—</td>
</tr>
<tr>
<td>18</td>
<td>Port block</td>
<td>Aluminium alloy (Chromated, Painted)</td>
<td>Refer to 1 on page 26 for replacement parts.</td>
</tr>
<tr>
<td>19</td>
<td>Supply valve, Release valve</td>
<td>—</td>
<td>Refer to 1 on page 26 for replacement parts.</td>
</tr>
<tr>
<td>20</td>
<td>Vacuum pressure switch</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>21</td>
<td>Adapter assembly for bottom mounting</td>
<td>Brass (Electroless nickel plating)</td>
<td>Refer to 1 on page 26 for replacement parts.</td>
</tr>
<tr>
<td></td>
<td>Seal material (O-ring, etc.)</td>
<td>HNBR/NBR</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Screws for assembly</td>
<td>Steel (Trivalent chromated)</td>
<td>—</td>
</tr>
</tbody>
</table>
How to Order Replacement Parts

1 How to Order Supply Valve/Release Valve (For ZL3/ZL6)

ZL3 – JSY3140 – 5 L Z
Rated voltage 24 VDC
With light/surge voltage suppressor

1 Electrical entry

<table>
<thead>
<tr>
<th>L plug connector</th>
<th>L: With lead wire (300 mm)</th>
<th>LO: Without connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>M plug connector</td>
<td>M: With lead wire (300 mm)</td>
<td>MO: Without connector</td>
</tr>
</tbody>
</table>

2 Manual override

D: Push-turn locking slotted type
E: Push-turn locking lever type

3 Supply valve/Release valve

X12 Supply valve
A Release valve

How to Order Port Block Assembly (For ZL3/ZL6)

ZL3 – EP1 – 1 F – A

How to Order Connector and Socket for Supply Valve/Release Valve (For ZL3/ZL6)

SY100 – 30 – 4 A – 6

1 Power supply voltage

DC

2 Lead wire length

<table>
<thead>
<tr>
<th>Lead wire assembly with connector for supply valve and release valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 600 mm</td>
</tr>
<tr>
<td>10 1000 mm</td>
</tr>
<tr>
<td>15 1500 mm</td>
</tr>
<tr>
<td>20 2000 mm</td>
</tr>
<tr>
<td>25 2500 mm</td>
</tr>
<tr>
<td>30 3000 mm</td>
</tr>
<tr>
<td>50 5000 mm</td>
</tr>
</tbody>
</table>

How to Order Silencer Assembly (With sound absorbing material) (For ZL3)

ZL3 – SE1 – A

How to Order Silencer Assembly (With sound absorbing material) (For ZL6)

ZL6 – SC1 – A

How to Order Port Block Assembly (For ZL3/ZL6)

ZL3 – AD3 – A

1 Thread type

Rc thread
F G thread
N NPT thread

Note that the vacuum pressure switch cannot be replaced.
To connect piping to the vacuum port and vacuum pressure detection port, hold the aluminium alloy body, then connect the piping.

Hold the exhaust block when connecting piping to the exhaust port. It is recommended that piping with an inner diameter of 21.7 or more be used.

Tighten to the recommended torque to mount the body. Tightening with excessive force may damage the product.

These holes are required for the forming of the product. They are not exhaust ports.

The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179. Use a male thread with a length of 10.5 or less for the vacuum port and 11.5 or less for the exhaust port for connection.

Air pressure supply (1/P) port applicable tubing O.D.

Vacuum (2/V) port

Vacuum pressure detection (G) port

With vacuum pressure detection port

Air pressure supply (1/P) port applicable tubing O.D.

With pressure gauge

Release button colour

ZL3 / ZL6 Series

Dimensions

ZL3 / ZL6 Series (Without supply valve or release valve)
Multistage Ejector **ZL3/ZL6 Series**

Dimensions

**ZL3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□** (With supply valve, release valve and vacuum pressure switch)

![Diagram of Multistage Ejector ZL3/ZL6 Series](image)

**Circuit diagram**

<table>
<thead>
<tr>
<th><strong>ZL3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□</strong></th>
<th><strong>ZL3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□</strong></th>
<th><strong>ZL3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□</strong></th>
<th><strong>ZL3□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>With supply valve and vacuum pressure switch</td>
<td>With supply valve</td>
<td>With supply valve and release valve</td>
<td>With pressure switch for vacuum with energy saving function</td>
</tr>
</tbody>
</table>

![Diagram of Multistage Ejector ZL3/ZL6 Series with valve](image)
∗ 1. To connect piping to the vacuum port and vacuum pressure detection port, hold the aluminium alloy body, then connect the piping.

∗ 2. Hold the exhaust block when connecting piping to the exhaust port.
It is recommended that piping with an inner diameter of 21.7 or more be used.

∗ 3. Tighten to the recommended torque to mount the body.
Tightening with excessive force may damage the product.

∗ 4. These holes are required for the forming of the product.
They are not exhaust ports.

∗ 5. The thread ridge shape is in compliance with G thread standard ISO 228-1, but the other shapes are not in compliance with ISO 16030 or ISO 1179.
Use a male thread with a length of 10.5 or less for the vacuum port and 11.5 or less for the exhaust port for connection.

---

ZL3/ZL6 Series

Dimensions

ZL6 Without valve (Without supply valve or release valve)

Circuit diagram

Port exhaust

Exhaust port thread type symbol
—: Rc thread
F: G thread
N: NPT thread

Exhaust (3/E) port:
Rc1, G1/8, NPT1
(Recommended tightening torque: 36 to 38 N·m)

Vacuum (2/V) port:
Rc3/4, G3/4, NPT3/4
(Recommended tightening torque: 28 to 30 N·m)

Vacuum pressure detection (G) port:
Rc1/8, G1/8, NPT1/8
(Recommended tightening torque: 3 to 5 N·m)

Air pressure supply (1/P) port:
Applicable tubing O.D. A

Vacuum pressure switch

Release button colour

<table>
<thead>
<tr>
<th>ZL6 L1/L</th>
<th>8</th>
<th>Light grey</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZL6 L N</td>
<td>5/16</td>
<td>Orange</td>
</tr>
</tbody>
</table>

29
Handling of Products

**Caution**

1. Do not drop, hit, or apply excessive impact to the product when handling it. Even if the body looks undamaged, the internal components may be damaged, leading to a malfunction.
2. Use the product within the specified supply pressure range. Operation at a pressure which exceeds the specified supply pressure range can cause damage to the product.
3. Load to the ejector body
   The ejector body is made of resin; therefore, do not apply load to the port after mounting. Prevent any kind of operation which generates moment as this may cause reduced performance or damage to the body.
4. The exhaust resistance should be as small as possible to obtain max. ejector performance.
   There should be no shield around the exhaust port for the silencer exhaust specification. Note that exhaust resistance may occur depending on the piping diameter and length for the port exhaust specification. DO NOT block the exhaust port. Doing so will cause the product to crack or break.
5. If the sound absorbing material is clogged, it will cause reduced ejector performance.
   In particular, if the product is used in a dusty environment, not only the filter element but also the sound absorbing material will become clogged. It is recommended that the sound absorbing material be replaced periodically.

Piping

**Caution**

1. When mounting or removing the fitting to or from the vacuum port adapter, hold the vacuum port adapter.
   Recommended tightening torque: 3 to 5 N·m
   The product may break if it is held directly during mounting or removal.

2. When mounting or removing the piping to or from the exhaust port, hold the exhaust block.

**Warning**

1. When using the branch port specification to adsorb and transfer multiple workpieces using branch piping, if one workpiece detaches, the vacuum pressure will decrease and the other workpieces will also detach. When connecting branch piping, please take measures to prevent the dropping of workpieces.

**Other Tubing Brands**

**Caution**

1. When using tubing from a manufacturer other than SMC, be careful of the tolerance of the tubing O.D.
   1) Nylon tubing: Within ±0.1 mm
   2) Soft nylon tubing: Within ±0.1 mm
   3) Polyurethane tubing: Within +0.15 mm, within -0.2 mm
   Do not use tubing which does not satisfy the specified tubing O.D. accuracy. It may cause difficulty when connecting the tubing, air leakage after connection, or the disconnection of the tubing.
Replacement Procedure for Filter Element (ZL1)

**Caution**

1. The suction cover can easily be attached or detached.

   The suction cover can be removed by pushing the suction cover levers (2 pcs.) on the side. (It can be removed from the opposite side as well.)

   Replace the filter element assembled in the filter case.

   Check that the gasket is sitting correctly in the groove before mounting the suction cover.

   Check that the lever hook is locked in the correct position when mounting the suction cover. If the hook or the lever is damaged or deformed, replace the suction cover assembly.

Suction cover assembly
(Filter element included)
ZL112A-FC1-A

Filter element
ZL112A-FET-A

Wiring and Connection of Solenoid Valves and Vacuum Pressure Switches

**Caution**

3. Malfunctions stemming from noise may occur if the wire is installed in the same route as that of the power cable or another high-voltage cable. Wire the switch independently.

4. Be sure to ground the frame ground (FG) terminal when using a commercially available switching power supply. (Pressure switch)

5. The tensile force of the solenoid valve and vacuum pressure switch lead wire is 30 N. Exceeding this value can cause breakage. Hold the body when handling the product.

6. Avoid repeatedly bending or stretching the lead wire of the solenoid valve or vacuum pressure switch. Lead wires will break if bending stress or tensile force is applied to them repeatedly.

   If the lead wire moves around, secure it near the body of the product. The recommended bending radius is 40 mm or more. Please contact SMC for further details.

Mounting or Removal of the Vacuum Pressure Switch Connector (ZL1)

**Caution**

1. Before the mounting or removal of the vacuum pressure switch connector, it is necessary to remove the silencer case assembly (port block assembly). Remove the silencer case assembly (port block assembly) following the procedure below before mounting or removing the pressure switch connector.

   Remove the clip using a flat blade screwdriver from the bottom of the product. Remove the silencer case assembly (port block assembly) from the body. Mount or remove the pressure switch connector.

Mounting or Removal of the Vacuum Pressure Switch Connector (ZL3/ZL6)

**Caution**

- When mounting the connector to the switch housing, push the connector straight onto the pins until the lever locks into the housing slot.

- When removing the connector from the switch housing, push the lever (section A) down with your thumb to unlock it from the slot, and then lift the connector straight off of the pins.
**Solenoid Valve / Pressure Switch**

### Environment

**Warning**
1. The solenoid valve and vacuum pressure switch are not designed to be explosion proof, dustproof, or drip proof. Never use in atmospheres which contain flammable or explosive gases.

**Caution**
1. The vacuum pressure switch and solenoid valve (DC type) are CE-compliant but not immune to lightning strikes. Take measures against lightning strikes in your system.
2. Do not use the product in places where static electricity is a problem. Doing so may result in system failure or malfunction.

### Design

**Caution**
1. Avoid energising the solenoid valve for long periods of time.
   - If a solenoid valve is continuously energised for an extended period of time, the heat generated by the coil assembly may reduce the performance and life of the valve or have adverse effects on peripheral equipment. Therefore, if the solenoid valve is to be continuously energised for an extended period of time or if the energised period per day will be longer than the de-energised period, use a N.O. (normally open) type product.
   - When the valve is mounted onto a control panel, take measures to radiate heat in order to keep the product temperature within the specified range.
2. Note that the vacuum pressure switch for the ZL3/ZL6 cannot be replaced.
3. For specific product precautions on solenoid valves, refer to the solenoid valve catalogue.
   - ZL1: SYJ500 Series
   - ZL3/ZL6: JSY3000 Series
4. For specific product precautions on vacuum pressure switches, refer to the pressure switch catalogue.
   - ZL1: ZSE30A Series
   - ZL3/ZL6: ZSE10 Series

---

**Exhaust Air and How to Replace Sound Absorbing Material (ZL1)**

### Caution
1. Air is exhausted from the connecting part between the silencer case and the silencer cover. This does not affect the performance of the product.
2. The sound absorbing material can be easily replaced.
   - Push the area where the word “PUSH” is printed on the silencer cover in the direction shown in Fig. 1.
   - Remove sound absorbing material 1 and 2, and replace them. (Refer to Fig. 3.)
   - After replacing the sound absorbing material, align the end surface of sound absorbing material 1 with the end surface of the diffuser while engaging the hooks with the hook holes, and push the silencer cover back into place. (Refer to Fig. 4.)

---

If the product is mounted with the silencer cover side facing a wall, the maintenance method shown in the figures above will not be possible. Move the product away from the wall before conducting maintenance.
**Ejector Exhaust**

**How to Replace Sound Absorbing Material (ZL3)**

Loosen the assembly screws as shown in Fig. 1 to remove the silencer assembly. Replace the sound absorbing material in the silencer assembly in the direction shown in Fig. 2. Assemble the silencer assembly using the assembly screws.

Recommended tightening torque: 0.76 to 0.84 N·m

**Vacuum Break Flow Adjusting Needle**

**Caution**

1. The flow rate characteristics show the representative values of the product itself. They may change depending on piping, circuit and pressure conditions, etc. The flow rate characteristics and the number of needle rotations will vary due to the range of the specifications of the product.

2. When fully closed, leakage cannot be prevented completely. There is an allowance for a certain amount of leakage in the product's specifications. Tightening the needle to reduce leakage to zero may result in equipment damage.

**Operation of Vacuum Break Flow Adjusting Needle (ZL1)**

**Warning**

1. After pushing the knob down to lock, confirm that it is locked. It should not be possible to rotate the knob to the right or to the left. If the knob is pulled with force, it may break. Do not pull the knob with excessive force.

2. Check the number of rotations of the needle valve. The needle valve has a retaining mechanism, so it will not continue to rotate any further. Turning the needle too far may cause damage.

3. Do not use tools, such as pliers, to rotate the knob. This can cause the idle rotation of the knob or damage.

**Operation of Vacuum Break Flow Adjusting Needle (ZL3/ZL6)**

**Caution**

1. The needle has a retaining mechanism, so it will not continue to rotate after it reaches the rotation stop position. Turning the needle too far may cause damage.

2. Do not use tools, such as pliers, to rotate the knob. This can cause the idle rotation of the knob or damage.

3. Do not overtighten the lock nut. It is possible to tighten the lock nut (hexagon) manually. When tightening further with tools, tighten by approximately 15° to 30°. Overtightening may cause breakage.

**Exhaust Noise**

**Caution**

- When the vacuum ejector generates vacuum, noise can be heard from the exhaust port when the standard supply pressure is close to the pressure that generates peak vacuum pressure, making the vacuum pressure unstable. If the vacuum pressure range is adequate for adsorption, there should be no problem. If the noise causes a problem or affects the setting of the pressure switch, change the supply pressure slightly to avoid the pressure range of the noise.
Safety Instructions

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

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

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

1. The product is provided for use in manufacturing industries. The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the product. Please consult your nearest sales branch.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
   1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
   2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
   3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions:
   1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
   2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
   3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
   4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

4. Vacuum pads are excluded from this 1 year warranty.
   A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

SMC products are not intended for use as instruments for legal metrology. Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - Safety.
etc.
Revision History

Edition B
- The ZL3 and ZL6 have been added.
- Errors in text have been corrected.
- Number of pages has been increased from 20 to 37.

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