Vacuum Equipment

- Slim Vacuum Ejectors
  
  Series EP (Small) ................................................. 948
  Series EM/EL (Medium) ........................................... 962
  Series ES (Subminiature) ...................................... 976

※ Specifications in this catalogue may be changed for product performance upgrade without notice. So please separately inquire to manufacturer when purchasing the product.
Series EP

EP Vacuum ejector

- COMPACT STRUCTURE-SLIM TYPE (10MM), LIGHT WEIGHT (88g).
- HIGH VACUUM VALUE (~600MMHG) AT LOW PRESSURE (3kg/cm²).
- LOW NOISE (BLOCKED IN TWO LAYERS).
- VARIOUS FUNCTIONS
  - LED 3 DIGIT VACUUM SWITCH
  - SOLENOID VALVE (VACUUM, BREAK)

How to order

1. Nozzle Diameter
   - 05: Ø0.5mm
   - 07: Ø0.7mm
   - 10: Ø1.0mm

2. Body and Exhaust Type
   - Unit type: S (Silencer exhaustion)
   - Manifold: M (Silencer collecting exhaustion at both sides)
   - Type: MA (Silencer individual exhaustion)

3. Diameter of Connecting Pipe
   - Classification: Compressed Air Supplying Port, Vacuum Generating Port
   - Unit type: S (5 individual), M (both sides)
   - Type: MA (5 individual)

4. Number of Station
   - Blank: For unit
   - 01: 1 station
   - 02: 0.5 stations
   - 03: 0.7 stations
   - 08: 1.0 stations

5. Specification of Electronic Valve
   - Classification: for supplying air, for breaking vacuum
   - V1: N.C.
   - V2: N.O.
   - V4: N.C.
   - V3: N.O.
   - V5: N.O.

6. Voltage
   - 1: AC110V
   - 5: DC24V (standard)

6. DC12V
   *For non-standard type, please contact us.

6. Vacuum Switch
   *Voltage of power supply: DC24V
   - Blank: No Switch
   - N2: NPN 2 points & analog output
   *For PNP Type, please contact us.

7. Electrical Entry
   *Connector type
   - Blank: 0.6M lead wire
   - C: 2M lead wire

8. Check Valve
   - Blank: Without check valve
   - H: With check valve
### Specification

#### Type

<table>
<thead>
<tr>
<th>Nozzle diameter (mm)</th>
<th>Type</th>
<th>Max. suction flow 1/min (ANR)</th>
<th>Air consumption 1/min (ANR)</th>
<th>Standard air pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>EP 05</td>
<td>5</td>
<td>12</td>
<td>0.45MPa (64psi)</td>
</tr>
<tr>
<td>0.7</td>
<td>EP 07</td>
<td>11</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>EP 10</td>
<td>22</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>

#### Ejector

- **Fluid**: air
- **Max. operating pressure**: 0.6MPa (87psi)
- **Max. vacuum pressure**: 85KPa (-640mmHg) (-12.3psi)
- **Supply pressure range**: 0.3 ~ 0.6MPa (43.5 ~ 87psi)
- **Operating temperature range**: 0°C ~ 60°C (32°F ~ 140°F)
- **Suction filter**: polyethylene crystalline (30μm)
- **Weight**: 228g (5lb) manifold block left and right 144g (0.317lb) unit type 88g (0.194lb)

#### Valve

- **Operating method**: N.C / N.O direct operation
- **Main valve**: poppet
- **Effective orifice (CV value)**: 0.18mm² (Cv 0.01)
- **Operating pressure**: 0.3 ~ 0.6MPa (43.5 ~ 87psi)
- **Electrical entry**: plug connector
- **Power consumption**: below 0.6 (attaching lamp)
- **Regular voltage**: DC12*, DC24V / AC110*, AC220V*

#### Vacuum switch

<table>
<thead>
<tr>
<th>Power supply</th>
<th>voltage</th>
<th>12 ~ DC24V ± 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>current consumption</td>
<td>50mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor switch output</th>
<th>setting point</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>output method</td>
<td>NPN-PNP open collector</td>
<td></td>
</tr>
<tr>
<td>setting pressure range</td>
<td>-101.2 ~ -110KPA</td>
<td></td>
</tr>
<tr>
<td>control range</td>
<td>below 2% F.S. (fixed)</td>
<td></td>
</tr>
<tr>
<td>indication of operation</td>
<td>LED/3digit red</td>
<td></td>
</tr>
<tr>
<td>precision</td>
<td>±0.25%F.S (0 ~ 50°C)</td>
<td></td>
</tr>
<tr>
<td>responding time</td>
<td>below 2.5ms</td>
<td></td>
</tr>
<tr>
<td>internal pressure</td>
<td>0.2 MPa (29.3psi)</td>
<td></td>
</tr>
</tbody>
</table>

#### Color of lead wire

- **Brown**: DC(+)
- **Black**: switch output 1
- **White**: switch output 2
- **Blue**: DC(–)
- **Orange**: analogue output
**Components**

**Solenoid valve to break vacuum**
- This part positively detaches transferred object from PAD (if electric power is on, air to break vacuum is opened).

**Vacuum pressure switch (3 Digit)**
- Set vacuum pressure, view display output screen.
- If the set vacuum is obtained, LED red (or green) light is on (N.O.) or off (N.C.) and the output power is off (Connector 4 Pin).

**Screw to adjust the quantity of breaking fluid**
- Adjust breaking air to promptly put transferred object on the right position.
  - Turn right: breaking air is decreased.
  - Turn left: breaking air is increased.

**Solenoid valve to generate vacuum**
- This part opens air supply to generate vacuum.
- There is N.C and N.O type solenoid valve and N.O. type can maintain vacuum even during power failure.

**Filter Regulator**
- Standard pressure secure fluid quantity or pressure.
- Be sure to use filter below 5μm in front of the supplying port (foreign substance is the main cause of malfunction).

**Inhalation**

**Exhaust**

**Silencer**
- This part reduces the exhausting noise of compressed air that is drained outwards through vacuum generator.
- In the case of abnormal noise, it is necessary to replace part after inspection.

**Filter for Vacuum**
- This part prevents dust inhaled through PAD from entering into vacuum generator.
- Regular inspection or replacement is necessary.

**PAD**
- This part is placed on the transferred product to secure air tight space and it can be absorbed by vacuum sucking force.

**Compressor**
Performance / Property

**EP05 exhaust property**

![Diagram showing exhaust property]

The unit of value in ( ) is mmHg.

**EP05 fluid quantity property**

![Diagram showing fluid quantity property]

How to read the diagram of fluid quantity property

The relation between vacuum pressure and inhaled fluid quantity is generally indicated by the fluid property. The vacuum pressure change is also indicated if inhaled fluid quantity changes. The indication refers to a relation of standard pressure from now on. As shown in the diagram, Pmax and Qmax represent max vacuum pressure and max inhaled fluid quantity. The above values are indicated in the catalog.

**Method to change the vacuum pressure**

1. When the inhaling hole is closed, and it is air-tight, the inhaled fluid quantity could be zero and vacuum pressure reaches Pmax.
2. In the event that the inhaling hole is adjusted to gradually open so as to let air pass (air emission), resulting in the increase of the inhaled fluid quantity, and vacuum pressure drops (the state of P1 and Q1)
3. When opening all inhaling holes, inhaled fluid quantity becomes maximum(Qmax) and the vacuum pressure drops, almost 0 (atmospheric pressure). In similar method, in event that inhaled fluid quantity changes, the vacuum pressure also changes. Thus, in event that no leakage in the vacuum port (vacuum piping) occurs, the vacuum pressure is maximized, but as leakage quantity increases, it drops and in event that leakage quantity is same to maximum inhaled fluid quantity, the vacuum pressure gets almost 0.

When attaching ventilation to work with leakage, take care that vacuum pressure is not too high.

**Cautions for use**

For unsatisfactory performance or trouble, inspect the product as follows. In event that trouble still remains after this action, be sure to consult the manufacturer,

1. Low vacuum performance owing to insufficient supplying air quantity countermeasure :
   a. Confirmation of supplying air quantity is needed.
   b. Make the pipe length as short as possible.
   c. Make the fitting size as large as possible.
   d. In event that the supplied air port is one a sided type, it is necessary to use both sides
2. Low performance owing to large piping resistance countermeasure :
   a. Make the pipe length as short as possible.
   b. Make the fitting size as large as possible.
   c. Check whether exhaustion port is blocked by internal and external influence.
   d. Reduce the number of station in the manifold to use.
   e. Use individual exhaust for each station.
Series EP

Cautions for selecting vacuum equipment

To cope with power failure, select normal open or magnet retention function for the supply valve.

For break valve, select 2/3 port valve of low vacuum specification. Use needle valve to adjust broken fluid quantity.

Use a valve with a synthetic effective cross section that is 3 times large than to that of the nozzle diameter for vacuum transfer valve.

Ex) In event of nozzle 1.0
    Effective cross section
    0.52 x 0.785mm² x 3times = 2.35mm²

- Confirmation of the suction transference of work is needed by vacuum switch.
- For heavy substance or hazardous substance, confirm gauge as well.
- For unfavorable surrounding environment attach a filter before pressure switch.

Use vacuum filter to protect transfer valve and prevent mesh of ejector from being blocked. Blocking the mesh will occur faster. When only one filter is adapted for the product.

Cautions for vacuum circuit and assembled equipment

<table>
<thead>
<tr>
<th>Number of ejector and pad</th>
<th>Number of vacuum pump and pad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideal condition: one pad is provided for one ejector.</td>
<td>Ideal condition: one pad is provided for one line.</td>
</tr>
</tbody>
</table>
| When attaching several pads to one ejector, water leakage at one work allows vacuum pressure to drop all other works as well. Perform the following measures.  
  - Reduce the fluctuating pressure of suction and non suction by needle valve.  
  - Install vacuum maintaining valve at each pad in order to eliminate the influence by other pad when erroneous attachment occurs. | When attaching several pads to one vacuum line, perform the following measures.  
  - Reduce the fluctuating pressure of suction and non suction by the needle valve.  
  - Stabilize the setting by installing a tank and vacuum decreasing/increasing valve (vacuum control valve).  
  - Install and attach vacuum maintaining valve at each pad. |

952
### Components

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>sector body</td>
<td>nylon</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>operator body</td>
<td>nylon</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>tension bolt</td>
<td>C3604</td>
<td>nickel plating</td>
</tr>
<tr>
<td>4</td>
<td>screw to adjust fluid quantity</td>
<td>AL</td>
<td>nickel plating</td>
</tr>
<tr>
<td>5</td>
<td>filter cover Ass’y</td>
<td>AL</td>
<td>alumite</td>
</tr>
<tr>
<td>6</td>
<td>vacuum valve</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>break valve</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>poppet valve Ass’y</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>check valve</td>
<td>NBR</td>
<td></td>
</tr>
</tbody>
</table>

### Bolt size for mounting manifold

<table>
<thead>
<tr>
<th>Number of station</th>
<th>M Type(ID)</th>
<th>MA Type(ID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 stations</td>
<td>25L</td>
<td>18L</td>
</tr>
<tr>
<td>2 stations</td>
<td>35L</td>
<td>30L</td>
</tr>
<tr>
<td>3 stations</td>
<td>45L</td>
<td>40L</td>
</tr>
<tr>
<td>4 stations</td>
<td>55L</td>
<td>50L</td>
</tr>
<tr>
<td>5 stations</td>
<td>65L</td>
<td>60L</td>
</tr>
<tr>
<td>6 stations</td>
<td>75L</td>
<td>70L</td>
</tr>
<tr>
<td>7 stations</td>
<td>85L</td>
<td>80L</td>
</tr>
</tbody>
</table>

### Manifold block only

**EPM – 08 – M**

<table>
<thead>
<tr>
<th>1</th>
<th>Manifold station</th>
<th>2</th>
<th>Body and exhaustion type</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1 station</td>
<td>02</td>
<td>Classification</td>
</tr>
<tr>
<td>02</td>
<td>2 station</td>
<td></td>
<td>Supply &amp; Exhaust</td>
</tr>
<tr>
<td>08</td>
<td>8 station</td>
<td></td>
<td>Type of Mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Series EP

Dimensions / Unit type

Switch type

Circuit Diagram EX1

Vacuum Valve

V1 type
- Supplying Valve : N.C Type
- Brake Valve : N.C Type

Brake Valve

Screw to adjust the broken fluid quantity
(wedge type)

Vacuum suction port
(min. 30)

Unit:mm

33
23
6.8

3.5

9.8

2-40.5 Hole
(Mount hole)

Vaccum pressure switch

Air supply valve

Vacuum brake valve

Non-switch type

Circuit Diagram EX1

Vacuum Valve

V2 type
- Supplying Valve : N.C Type
- Brake Valve : N.C Type

Brake Valve

Screw to adjust the broken fluid quantity
(wedge type)

Vacuum suction port
(min. 30)

Unit:mm

33
23
6.8

3.5

9.8

2-40.5 Hole
(Mount hole)

Vacuum brake valve

Air supply valve

Pilot

Exhaustion port
(min. 30)

Air supply port
(min. 30)
Dimensions / Manifold type

Collective exhaust (for silencer at both sides)

Circuit Diagram EX0

V1 Type

Vacuum Valve

Brake Valve

Screw to adjust the broken fluid quantity

 Vacuum suction port

Dimensions

<table>
<thead>
<tr>
<th>Number of Station</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>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>27</td>
<td>37</td>
<td>47</td>
<td>57</td>
<td>67</td>
<td>77</td>
<td>87</td>
<td>97</td>
</tr>
<tr>
<td>L2</td>
<td>44</td>
<td>54</td>
<td>64</td>
<td>74</td>
<td>84</td>
<td>94</td>
<td>104</td>
<td>114</td>
</tr>
</tbody>
</table>

Maximum Number of Station for Nozzle Diameter

<table>
<thead>
<tr>
<th>Nozzle Diameter</th>
<th>Maximum Number of Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø0.5</td>
<td>8 Station</td>
</tr>
<tr>
<td>Ø0.7</td>
<td>6 Station</td>
</tr>
<tr>
<td>Ø1.0</td>
<td>4 Station</td>
</tr>
</tbody>
</table>

www.TPCpage.com
www.TPCpage.co.kr
**Dimensions / Manifold type**

**Individual exhaust (for Silencer)**

**V1 Type**

![Circuit Diagram](image)

- **Vacuum Valve**
- **Brake Valve**

**Dimensions**

<table>
<thead>
<tr>
<th>Number of Stand</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>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>25</td>
<td>35</td>
<td>45</td>
<td>55</td>
<td>65</td>
<td>75</td>
<td>85</td>
<td>95</td>
</tr>
<tr>
<td>L2</td>
<td>32</td>
<td>42</td>
<td>52</td>
<td>62</td>
<td>72</td>
<td>82</td>
<td>92</td>
<td>102</td>
</tr>
</tbody>
</table>

*The number of station can be increased upon request.
Your inquire is welcomed anytime.*
Vacuum Equipment

When the ejector and vacuum pumps are adapted, and work is sucked, during the suction procedure, the suction (exhaustion) responding time and vacuum pressure are changed based on the piping condition and kinds of work. In this case, it is preferred that the product could be used as vacuum system provided with high efficiency as appropriate vacuum equipment is selected.

Order to select

1. To select pad:
   1) Get the diameter of the pad
   2) Get the theoretical Lift force.

2. To select the vacuum transfer valve of an ejector
   1) Get the responding time
   2) Quantity of water leakage in suction work
   3) Size of vacuum supplying valve of ejector (with water leakage)
   4) Size of vacuum supplying valve of ejector (without water leakage)

1. Pad selection
   1) How to get the diameter of pad
      Lift calculation of pad is adapted so as to obtain the diameter of pad,
      Confirm by actual suction test if necessary.
      The calculation value is just for reference,
      Things which will be checked,
      • What pad diameter is usable,
      → It is preferred to select size less than pad diameter and terminal of work attaching surface by more than 10, so that air leakage during suction can be prevented,
      • Is there air leakage caused by tolerance of work suction surface?
      → To get the tolerance of suction surface or work, so that air passes, set the fluid quantity at the side of vacuum,
      • What about the transference direction and attachment direction of work?
      → Consider the following safety rate when calculating impellent force based on the horizontal and vertical attaching position,

Ex) Work mass 1kg 1 unit standard type
Horizontal movement can be performed with 5 Pads
If it is calculated by the diameter of pad (vacuum pressure? 60kpa)

※ Calculation expression-based method

$\text{ØD} = \sqrt{\frac{4}{\pi} \times \frac{1}{60} \times \frac{10}{5} \times 4 \times 1000} = 13\text{mm}$

$\text{ØD} = \sqrt{\frac{4}{\pi} \times \frac{760}{P \times 1.033} \times \frac{W}{n} \times s \times 1000}$

2. Selection of vacuum transfer valve of ejector
   How to get the suction responding time for suction and transferring work by pad, getting the suction responding time is needed (after the operation of supplying valve, the time required for vacuum pressure in the pad to reach vacuum pressure necessary for suction)

Vacuum System Circuit

supplying valve  transfer valve
Series EP

- Vacuum pressure and responding time after the operation of supplying valve (transference valve)

\[ P_v \] : Final vacuum pressure
\[ T_1 \] : Time required to reach the 63% of final vacuum pressure \( P_v \)
\[ T_2 \] : Time required to reach the 95% of final vacuum pressure \( P_v \)

**Calculating by expression method**

It is possible to obtain the suction response time \( T_1, T_2 \) based on expression.

- Suction response time \( T_1 = \frac{V \times 60}{Q} \)
- Suction response time \( T_2 = 3 \times T_1 \)
- Pipe volume

• For ejector, \( Q_1 = \text{(''), (''), (''), (''), (''), (''), ('')} \) H maximum inhaled fluid quantity of ejector

\[ D \] : Inner diameter of pipe (mm)
\[ L \] : Length from ejector and transfer valve to Pad
\[ V \] : Pipe volume from ejector and transfer valve to Pad
\[ Q_2 \] : Maximum fluid quantity by piping system from ejector and transfer valve to Pad.

Among \( Q, Q_1, Q_2 \), the least fluid quantity.

**Selective graph method**

- Get the pipe volume of tube.
- Get the pipe volume from ejector, and transfer valve of vacuum pump to pad by selective graph.

**How to**

Ex) How to get the volume of the tube with a diameter of 4mm and a length of 1m.

Select order

At the extended line of left axis, horizontal pipe volume of nearly 0.015L is obtained based on the intersection of tube with vertical length of 1m and inner diameter of 4mm.

- Get the effective cross section of pipe.

**Select order**

Ex) For the tube size \( \varnothing 4 \), 1m

Select order

At the extended line of left axis, horizontal effective cross section of nearly 6.1mm² is obtained based on the intersection of the tube with a vertical length of 1m and an inner diameter of 4mm.

- The suction responding time:
  - With a selective graph, obtain the suction responding time \( T_1, T_2 \) which indicates the duration from operation of supplying valve (transfer valve) which controls the ejector to reach a designated vacuum pressure.
**How to**

Maximum suction fluid quantity of vacuum ector 07 is 12L/min(ANR). Pipe volume of the pipe system is 0.015L. Under this condition, getting the suction responding time required to drain the pressure in the pipe system up to 63% of final vacuum pressure (T1) is needed.

**Select order**

With the intersection of maximum inhaling quantity of vacuum ector, 12L/min(ANR) and pipe volume, 0.015L , it is needed to obtain the suction responding time T1 required to reach 63% of maximum vacuum pressure. (1) in the selected graph → (2) T1, approximately 0.23 second

Ex) By using valve with effective cross section of 18mm² and intersection of 3L, it is possible to obtain the exhaustion responding time T2 required to reach 95% of final vacuum pressure. (3) in the selected graph → (4)

**Select order**

By using valve with effective cross section of 6.1mm² and intersection of pipe volume 3L, it is possible to obtain the exhaustion responding time T2 required to reach 95% of final vacuum pressure. (T2, approximately 22 seconds)

---

**Quantity of water leakage when the suction of work is performed**

Get the quantity of water leakage:

For a sucking ector, because pad sucks work and inhales atmosphere based on varying kinds of work, it is impossible to obtain the vacuum pressure in the pad drops and pressure required for suction.

To suck work in this specification, considering the quantity of water leakage from work and selecting the size of vacuum transfer valve of the ector.

---

**How to set the quantity of water leakage**:

Use the ector pad, vacuum gauge and suck ector as seen in the following drawing. With the suction inhaled fluid quantity obtained by specific graph of fluid quantity of ector from vacuum pressure P1, the quantity of water leakage of work is obtained.

Ex) The pressure of vacuum gauge indicates ~53kPa (~400mmHg) when supplied pressure is 0.45MPa and work with water leakage of ector is sucked. To get the quantity of water leakage, With the graph of fluid quantity property, the inhaled fluid quantity for ~53kPa (~400mmHg) is 5L/min(ANR).

Quantity of water leakage = inhaled fluid quantity (5L/min) (ANR)
Vacuum Digital pressure switch

**Specification**

<table>
<thead>
<tr>
<th>Type</th>
<th>VPS-N2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Air</td>
</tr>
<tr>
<td>Range of applied temperature °C (°F)</td>
<td>-20 ~ 80°C (-4~176°F) (automatic temperature)</td>
</tr>
<tr>
<td>Range of set pressure</td>
<td>0 ~ 100kPa (0~14.5psi)</td>
</tr>
<tr>
<td>Internal Pressure</td>
<td>0.2MPa (28psi)</td>
</tr>
<tr>
<td>Voltage</td>
<td>DC 24V ± 10%</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Below 17mA (DC24V ON)</td>
</tr>
<tr>
<td>Output set</td>
<td>Open Collector 30V, 80mA</td>
</tr>
<tr>
<td>Signal</td>
<td>–</td>
</tr>
<tr>
<td>Width of control</td>
<td>Below 3% F.S. (fixed)</td>
</tr>
<tr>
<td>number of set points</td>
<td>2 point</td>
</tr>
<tr>
<td>Operation indicating lamp</td>
<td>Lit when on (Out 1: red, 2: green)</td>
</tr>
<tr>
<td>setting method</td>
<td>Variable type by push button</td>
</tr>
<tr>
<td>precision</td>
<td>±0.5% F.S. (based on 0<del>60°C (32</del>122°F), 25°C (77°F) standard)</td>
</tr>
<tr>
<td>Display</td>
<td>LED (3Digit)</td>
</tr>
</tbody>
</table>

**Example of wiring in the internal circuit**

VPS-N2

**How to set pressure**

1. **Step 1**
   - Press Model Key + Up key (longer than 3 seconds)
   - Display screen: “A-L”

2. **Step 2**
   - Press down or up key (convert to desired set pressure, range 0 ~ 100)
   - Display screen: “–60”

3. **Step 3**
   - Press Model Key (Setting pressure)
   - Input completed: “–60”

4. **Step 4**
   - Press Model Key + Up key
   - Output mode 2: “A-H”

5. **Step 5**
   - Repeat step 2, 3
   - Return to the initial screen: “–90”

6. **Step 6**
   - Press Up key + Down key
   - Initial state: “–0”

- Explanation on program mode function besides pressure setting mode (A-L, A-H)
  - “dp” : setting control speed
  - “dp’” : setting display speed

**How to Order**

- Switch of Vacuum Pressure: VPS
- Output Method: N1
- Method to Pull out Switch Lead Wire: C

**Dimensions**

- Vacuum sensor rod
- Button to set pressure
- Mode button
- Connector (4Pin)

TPC
Common cautions for installing vacuum equipment

1. Perform a safety check to prepare against a possible accident caused by a reduction of vacuum pressure due to power failure or trouble of air source, in event that vacuum pad loses suction force because of reduction of vacuum power, failure could result during transportation.
2. Vacuum specification is needed for vacuum transfer valve and vacuum break valves. Always use valve with vacuum specification.
3. Select ejector with appropriate inhaIing quantity, (when water leakage occurs). Defective suction may occur due to insufficient inhaled fluid quantity.
4. Difficulty could occur when setting vacuum switch when inhaled fluid quantity is larger than necessary. Select appropriate ejector.
5. When more than 2 pads are adapted and piped to one ejector, and in addition when one pad is separated from work, detach the other pad from work because vacuum pressure could decrease.
6. Make sure to pipe tube using enough effective cross section. In addition, for vacuum piping, select pipe with effective cross section through which maximum inhaled fluid quantity of ejector, Pay attention so as to prevent any unnecessary tube parts or water leakage in the piping.

Cautions

Move to for related equipments such as direction control equipment, driving equipment, etc., (refer to the cautions in each catalog).
Series EM

- COMPACT LARGE FLUX (2 STEP NOZZLE)
- FLAT TYPE AND MANIFOLD (CONCENTRATED AND INDIVIDUAL SUPPLY & EXHAUST)
- DIGITAL EJECTOR (VACUUM GENERATION, ELECTRIC EXHAUST VALVE AND VACUUM SWITCH ATTACHED)
- VARIOUS VACUUM FLUX (OPTIMUM HIGH SPEED RESPONSE)
- EM SERIES (MAX. VACUUM FLUX 70NL/MIN, 4 TYPES)
- EL SERIES (MAX. VACUUM FLUX 100NL/MIN, 4 TYPES)
- VARIOUS EXHAUST METHODS
- SINGLE PRODUCT: OPEN EXHAUST, PIPE PORT EXHAUST
- MANIFOLD: INDIVIDUAL, OPEN EXHAUST, CONCENTRATED EXHAUST

How to Order

1. EM : Nozzle Diameter (mm) / EL : Vacuum Flux (Nl/min)
   - EM 05 : 50.0mm
   - EM 07 : 70.0mm
   - EM 10 : 100.0mm
   - EL 10 : 81.3mm
   - EM 15 : 100.0mm
   - EL 10 : 81.3mm
   - EM 20 : 150.0mm

2. Body & Exhaust Type
   - Index Indication Type SUP/EXH Type Remark
     - Single product
       - S Individual SUP Individual EXH Air Open Type, Pipe Port EXH
       - M Concentrated SUP Individual EXH Air Open Type, Pipe Port EXH
       - MB Concentrated SUP Individual EXH Both side port EXH
       - MR Concentrated SUP Individual EXH Right Side Port EXH (V-Port Front Base)
   - Manifold
     - MA Concentrated SUP Individual EXH PC/PT1/8, Ø10 Pitting Selection
     - MB Concentrated SUP Individual EXH Re/PT1/8, Air Open Type
     - MR Concentrated SUP Individual EXH Re/PT1/4 Concentrated
     - ML Concentrated SUP Individual EXH Right Side Port EXH (V-Port Front Base)

3. Diameter of Connecting Pipe
   - Index Indication Type Contact Pipe Diameter
     - Single product
       - S Re/PT1/8 (Individual)
       - M Re/PT1/8 (Individual)
       - MB Re/PT1/8 (Individual)
       - MR Re/PT1/4 Concentrated
       - ML PC/PT1/8, Ø10 Pitting Selection

4. Electric Valve Specification
   - Index for SUP for Destroy Electric Voltage
     - Blank N.E. N.E. DC 24V
     - V1 N.C. N.C.
     - V2 N.O. N.C.
     - V3 N.O. N.E.
     - V4 N.C. N.E.

5. Vacuum Switch Type
   - Electric Voltage: DC 24V
   - Model Name Index Contents
     - Blank No Switch
     - VPS-1 NL LED 3 Digit indicating, NPN 2-point + Analogue output, Grommet type
     - VPS-2 NL LED 3 Digit indicating, NPN 2-point + Analogue output, Connector type
     - VPS-3 N1 LED turned ON, NPN 2-point output + Differential setting Analogue output, Connector type
     - VPS-4 N2 LED turned ON, NPN 2-point output, Connector type

6. Switch lead track specifications
   - Blank Lead Track Length 0.8M
     - C Lead Track Length 2M
   - Only 2M is produced for grommet type lead track.

7. Check Valve
   - Blank No Check Valve
     - H Check Valve

8. Vacuum (V) Port Type
   - Blank Re/PT1/8
     - F Ø10 Fitting

* Please additionally fill S1, M1 and M1 for ordering single product pipe port EXH type.
* Manifold concentrated EXH silencer (model name: SN500-06R 3/4) may be purchased separately.

Manifold Number of Station

<table>
<thead>
<tr>
<th>Blank</th>
<th>For Unit</th>
<th>In Case of Order for all Single Product Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>2 Station</td>
<td>In Case of Ordering Manifold Only</td>
</tr>
<tr>
<td>10</td>
<td>10 Station</td>
<td></td>
</tr>
</tbody>
</table>

Manifold Number of Station

<table>
<thead>
<tr>
<th>Model</th>
<th>MA</th>
<th>MB</th>
<th>MR, ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM05</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>EM07</td>
<td>10</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>EM10</td>
<td>10</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>EM13</td>
<td>10</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>EL50</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>EL70</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EL90</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EL100</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
## Specifications

### Flux Features

<table>
<thead>
<tr>
<th>Index</th>
<th>EM05</th>
<th>EM07</th>
<th>EM10</th>
<th>EM13</th>
<th>EL50</th>
<th>EL70</th>
<th>EL90</th>
<th>EL100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Vacuum Flux [N l/min]</td>
<td>15</td>
<td>30</td>
<td>60</td>
<td>70</td>
<td>55</td>
<td>75</td>
<td>95</td>
<td>105</td>
</tr>
<tr>
<td>Air Consumption [N l/min]</td>
<td>12</td>
<td>23</td>
<td>46</td>
<td>95</td>
<td>46</td>
<td>66</td>
<td>92</td>
<td>141</td>
</tr>
<tr>
<td>Target Vacuum Level</td>
<td>-84kPa (~630mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Ejector

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Pressure Applied</td>
<td>0.7MPa (7.1kgf/cm²)</td>
</tr>
<tr>
<td>Rated Supply Pressure (Range)</td>
<td>0.5MPa (4.5kgf/cm²~5.5kgf/cm²)</td>
</tr>
<tr>
<td>Applied Temperature Range</td>
<td>5 ~ 50°C</td>
</tr>
<tr>
<td>Filter Opening Width</td>
<td>PE, 30μm</td>
</tr>
<tr>
<td>Contact Pipe Diameter</td>
<td>SUP Port: Rc (PT) 1/8</td>
</tr>
<tr>
<td>Absorbing Port</td>
<td>Rc (PT) 1/8, Ø10 Fitting</td>
</tr>
<tr>
<td>Product Weight</td>
<td>350g</td>
</tr>
<tr>
<td>Attaching Direction</td>
<td>Free</td>
</tr>
</tbody>
</table>

### Electric Valve (Vacuum Generating, Vacuum Destroy)

| Applied Pressure Range | 0.25~0.7MPa (7.1kgf/cm²) |
| Operating Method       | N.C/N.O Direct Action Type |
| Rated Voltage          | DC24V |
| Allowable Voltage      | Within Rated Voltage +/- 10 |
| Effective Sectional Area | 0.18mm² |
| Lead track Extraction Method | Plug Connector |
| Power Consumption [W]  | Less than DC 0.6W |
| Lead Track Color       | Red (+), Black (-) |
| Lamp & surge voltage protecting circuit | LED & Protecting Circuit Built-in |

### Vacuum Switch

<table>
<thead>
<tr>
<th>Indication Type</th>
<th>VMS</th>
<th>VPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Type</td>
<td>LED (Red, Green) ON</td>
<td>LED 3 Digit</td>
</tr>
<tr>
<td>Set vacuum Level in Delivery</td>
<td>-53.3kPa (~400mmHg) / 1 Point</td>
<td></td>
</tr>
<tr>
<td>Power Supplied</td>
<td>DC12~24V</td>
<td></td>
</tr>
<tr>
<td>Output Method</td>
<td>NPN/PNP Open Collector 30V, 200mA</td>
<td></td>
</tr>
<tr>
<td>Output Point</td>
<td>1 Point Output + Differential Setting (Analogue Output) or 2 Point Output</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>30mA</td>
<td></td>
</tr>
<tr>
<td>Set Pressure Range</td>
<td>(0kPa ~ 101kPa)</td>
<td></td>
</tr>
<tr>
<td>Guaranteed Pressure~Resistant</td>
<td>0.2MPa (Double of Rated Pressure)</td>
<td></td>
</tr>
<tr>
<td>Gas Applied</td>
<td>Air and Non-Corrosive Air</td>
<td></td>
</tr>
<tr>
<td>Applied Temperature Range</td>
<td>0~60°C</td>
<td></td>
</tr>
<tr>
<td>Differential Setting</td>
<td>Set Pressure 0.5~10% F.S</td>
<td></td>
</tr>
<tr>
<td>Response Term</td>
<td>2.5ms or Lower</td>
<td></td>
</tr>
<tr>
<td>Repeat Error</td>
<td>Within ±1% F.S</td>
<td></td>
</tr>
<tr>
<td>Lead Track Extraction Method</td>
<td>Connect or Grommet Type</td>
<td></td>
</tr>
<tr>
<td>Function [VMS]</td>
<td>Differential Setting Trimmer(210°)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure Setting Trimmer(210°)</td>
<td></td>
</tr>
</tbody>
</table>

### Color of Lead Wire

#### VMS

<table>
<thead>
<tr>
<th>Color</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>DC(+)</td>
</tr>
<tr>
<td>Black</td>
<td>Output 1</td>
</tr>
<tr>
<td>White</td>
<td>Output 2 (or Analogue Output)</td>
</tr>
<tr>
<td>Blue</td>
<td>DC(--)</td>
</tr>
</tbody>
</table>

#### VPS

<table>
<thead>
<tr>
<th>Color</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>DC(+)</td>
</tr>
<tr>
<td>Black</td>
<td>Output 1</td>
</tr>
<tr>
<td>White</td>
<td>Output 2</td>
</tr>
<tr>
<td>Blue</td>
<td>DC(--)</td>
</tr>
<tr>
<td>Yellow</td>
<td>Analogue Output</td>
</tr>
</tbody>
</table>
Series EM

Flux & Exhaust Features

**EM Series**

- **EM05 Exhaust Feature**
- **EM05 Flux Feature**
- **EM07 Exhaust Feature**
- **EM07 Flux Feature**

- **EM10 Exhaust Feature**
- **EM10 Flux Feature**
- **EM13 Exhaust Feature**
- **EM13 Flux Feature**

**EL Series**

- **EL50 Exhaust Feature**
- **EL50 Flux Feature**
- **EL70 Exhaust Feature**
- **EL70 Flux Feature**

- **EL90 Exhaust Feature**
- **EL90 Flux Feature**
- **EL100 Exhaust Feature**
- **EL100 Flux Feature**
Series EM

Operation Principle Diagram

<table>
<thead>
<tr>
<th>Waiting Status</th>
<th>Vacuum Generating Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound-absorbing materials</td>
<td>Vacuum pressure switch</td>
</tr>
<tr>
<td>Filter</td>
<td>Sound-absorbing materials</td>
</tr>
<tr>
<td>Electric valve</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vacuum Maintaining Status</th>
<th>Vacuum Exhaust Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Time for Vacuum Achieved (sec/ℓ)

<table>
<thead>
<tr>
<th>Name of Model</th>
<th>Reached Vacuum Level kPa (mmHg)</th>
<th>53 (400)</th>
<th>60 (450)</th>
<th>67 (500)</th>
<th>73 (550)</th>
<th>80 (600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM05</td>
<td></td>
<td>8.3</td>
<td>9.9</td>
<td>12.4</td>
<td>15.1</td>
<td>20.1</td>
</tr>
<tr>
<td>EM07</td>
<td></td>
<td>3.1</td>
<td>4.2</td>
<td>5.5</td>
<td>6.9</td>
<td>9.3</td>
</tr>
<tr>
<td>EM10</td>
<td></td>
<td>1.6</td>
<td>2.1</td>
<td>2.7</td>
<td>3.5</td>
<td>5.4</td>
</tr>
<tr>
<td>EM13</td>
<td></td>
<td>1</td>
<td>1.3</td>
<td>1.7</td>
<td>2.3</td>
<td>3.5</td>
</tr>
<tr>
<td>EL50</td>
<td></td>
<td>1.7</td>
<td>2.2</td>
<td>3</td>
<td>3.8</td>
<td>5</td>
</tr>
<tr>
<td>EL70</td>
<td></td>
<td>1.2</td>
<td>1.6</td>
<td>2</td>
<td>2.6</td>
<td>4</td>
</tr>
<tr>
<td>EL90</td>
<td></td>
<td>0.9</td>
<td>1.2</td>
<td>1.5</td>
<td>1.9</td>
<td>3.2</td>
</tr>
<tr>
<td>EL100</td>
<td></td>
<td>0.7</td>
<td>0.9</td>
<td>1.2</td>
<td>1.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>
### Components

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of components</th>
<th>Material</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diffuser Body</td>
<td>Zn(Painting)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Operator Body (Lower)</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Operator Body (Upper)</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Valve Unit Body</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Propet Valve Ass'y</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Electric Exhaust Vacuum</td>
<td>Normal Close</td>
<td>DV100<del>5H(Horizontal) DV100</del>5V(Vertical)</td>
</tr>
<tr>
<td>12</td>
<td>Vacuum Destroy Electric Valve</td>
<td>Normal Close</td>
<td>DV100<del>5H(Horizontal) DV100</del>5V(Vertical)</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Normal Open</td>
<td>DV120<del>5H(Horizontal) DV120</del>5V(Vertical)</td>
</tr>
<tr>
<td>14</td>
<td>Diffuser</td>
<td>Al(Color Plating)</td>
<td>0.5(Yellow), 0.7(Pink), 1.0(Green), 1.3(Silver)</td>
</tr>
<tr>
<td>15</td>
<td>Nozzle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Flux Control Screw</td>
<td>Al</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Vacuum Stop Pad</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Filter Cover</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Filter Body</td>
<td>PA</td>
<td></td>
</tr>
</tbody>
</table>

### Replacement Components

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Components</th>
<th>Material</th>
<th>Style Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vacuum Pressure Switch</td>
<td>–</td>
<td>VPS<del>N</del>LC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VMS<del>N</del></td>
</tr>
<tr>
<td>2</td>
<td>Sound-absorbing Material (Front, Both Side Surfaces)</td>
<td>PVA Sponge</td>
<td>ET<del>664</del>001</td>
</tr>
<tr>
<td>3</td>
<td>Vacuum Filter</td>
<td>PE</td>
<td>ET<del>633</del>001</td>
</tr>
</tbody>
</table>
External Dimension Drawings / Manifold

Individual Supply / Individual Exhaust

Dimensions

<table>
<thead>
<tr>
<th>Number of Connection</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>33.6</td>
<td>54.4</td>
<td>75.2</td>
<td>96</td>
<td>116.8</td>
<td>137.6</td>
<td>158.4</td>
<td>179.2</td>
<td>200</td>
<td>220.8</td>
</tr>
<tr>
<td>L2</td>
<td>45.6</td>
<td>66.4</td>
<td>87.2</td>
<td>108</td>
<td>128.8</td>
<td>149.6</td>
<td>170.4</td>
<td>191.2</td>
<td>212</td>
<td>232.8</td>
</tr>
</tbody>
</table>
### Series EM

**External Dimension Drawings / Manifold**

**Concentrated Supply / Individual Exhaust**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Number of Connection</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><strong>L1</strong></td>
<td></td>
<td>33</td>
<td>53.5</td>
<td>74</td>
<td>94.5</td>
<td>115</td>
<td>135.5</td>
<td>156</td>
<td>176.5</td>
<td>197</td>
<td>217.5</td>
</tr>
<tr>
<td><strong>L2</strong></td>
<td></td>
<td>45</td>
<td>65.5</td>
<td>86</td>
<td>106.5</td>
<td>127</td>
<td>147.5</td>
<td>168</td>
<td>188.5</td>
<td>209</td>
<td>229.5</td>
</tr>
</tbody>
</table>

(Unit: mm)
Concentrated Supply / Individual Exhaust

Dimensions (Unit : mm)

<table>
<thead>
<tr>
<th>Number of Connection</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>33</td>
<td>53.5</td>
<td>74</td>
<td>94.5</td>
<td>115</td>
<td>135.5</td>
<td>156</td>
<td>176.5</td>
<td>197</td>
<td>217.5</td>
</tr>
<tr>
<td>L2</td>
<td>45</td>
<td>65.5</td>
<td>86</td>
<td>106.5</td>
<td>127</td>
<td>147.5</td>
<td>168</td>
<td>188.5</td>
<td>209</td>
<td>229.5</td>
</tr>
</tbody>
</table>
Notices for Ejector Utilization

- **Trouble shooting:**

**Vacuum function degradation owing to insufficient supply air**

*Measure:*
1. Check supply air flux.
2. Make pipe length as short as possible.
3. Make fitting size as big as possible.
4. If supply air port specifies one side, use both sides.

**Vacuum performance degradation owing to insufficient exhaust air capacity**

*Silencer attaching type:* If exhaust resistance becomes bigger owing to lack of silencer capacity, function is degraded.

*Measure:
1. If silencer specifies one side, use both sides.
2. Carry out individual exhaust along each station.
3. Do not install exhaust port at blocked places owing to external influence.
4. Reduce the number of manifold connections.

*Pipe exhaust type:* Function is degraded as pipe resistance becomes bigger.

*Measure:*
1. If pipe exhaust specifies one side, use both sides.
2. Make pipe length as short as possible.
3. Carry out individual exhaust along each station.
4. Reduce the number of manifold connections.

**Failure owing to excessive supply pressure**

*Max. utilization pressure (7.1kgf/cm²):* Supplying over max. utilization pressure may cause inability of valve switching or leakage.

*Measure:*
1. Attach filter regulator at front side of ejector.
2. Operation is restored to normal with restoration of valve response if adjusting pressure applied under 7.1kgf/cm².
3. Use after re-assembly of gasket if leakage occurs.
Vacuum Pressure Switch

Vacuum Switch Order Form

![Vacuum Switch Image]

<table>
<thead>
<tr>
<th>V</th>
<th>P</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

1. V: Vacuum
2. P: Series Name
3. S: Pressure Type

Output Contact Point

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>VPS</th>
<th>VMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-point Output + Analogue Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2-point Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1-point Output + Differential Setting, Analogue Output</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wiring Method

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connector Type</td>
</tr>
<tr>
<td>2</td>
<td>Grommet Type</td>
</tr>
</tbody>
</table>

Wire Length

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic Type (No Base)</td>
</tr>
<tr>
<td>2</td>
<td>EP: Ejector Attached Only (Base Inclusive)</td>
</tr>
<tr>
<td>3</td>
<td>EM/EL: Ejector Attached Only (Base Inclusive)</td>
</tr>
</tbody>
</table>

Base Type

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VPS</td>
</tr>
</tbody>
</table>

 Specification

**VPS Series (LED 3Digits Method)**

- **Type**: VPS-C□□□□, VPS-□□□□
- **Rated Pressure Range**: -100.0~101.3kPa
- **Set Pressure Range**: -101.3kPa
- **Max. Pressure Range**: 2 Times of Rated Pressure
- **Voltage Applied**: 12~24VDC ±10%
- **Power Consumption**: 50mA or Less
- **Control Output Setting**: Open Collector 30V, 100mA or Less
- **Response Time**: Select 2.5ms, 5ms, 100ms, 500ms
- **Short-Circuit Protection**: Built-in
- **Analogue Output**: Output Voltage: 1~5VDC ±2% F.S., ±2% F.S. or Lower
- **Control Output Feature**: Turned on When ON (Out 1 : Red, Out 2 : Green)
- **Set Point**: 2 Point
- **Operation Indicating Lamp**: Turned on When ON (Out 1 : Red, Out 2 : Green)
- **Setting Method**: Variable Method by Button Press
- **Level**: ±0.2% F.S., ±2 Digits
- **Display Method**: Indication by 3½ Line and LED 7Segments

**VMS Series (LED Lighting Method)**

- **Type**: VMS-N1(P1)□□□□, VMS-N2(P2)□□□□
- **Rated Pressure Range**: 0.0~101.3kPa
- **Set Pressure Range**: 10.0~101.3kPa
- **Max. Pressure Range**: 2 Times of Rated Pressure
- **Voltage Applied**: 12~24VDC ±10%
- **Power Consumption**: 30mA
- **Control Output Setting Point**: 1 Point, 2 Point
- **Differential (HYS)**: 1~10% F.S. Varied, 1% F.S. Fixed
- **Repeated Error**: ±1% F.S.
- **Response Time**: Lower than 2ms
- **Short-Circuit Protection**: Built-in
- **Analogue Output**: Output Voltage: 1~5VDC, Linearity: ±2.2% F.S.
- **Operation Indicating Lamp**: Out 1 : Red LED, Out 2 : Green LED
- **Setting Method**: Trimmer Method
- **Setting Adjustment Range**: 1 Turn(210°)

Connecting Circuit Diagram

**VPS Connecting Circuit Diagram**

- 1 point output + Analogue output

**VMS Connecting Circuit Diagram**

- 1 point output + Analogue output

**2 point output**

973

www.TPCpage.com
www.TPCpage.co.kr
**Series EM**

**External Dimension Drawing**

**VPS Series**

![Diagram of VPS Series](image1)

- Vacuum Absorbing Port (MS x 0.6)
- Connector Type

![Diagram of Connector Type](image2)

- 2-0.5 Penetration
- 2 x 0.5 13.5

- Grommet Type

![Diagram of Grommet Type](image3)

- Pressure Port

- 2-M2 x 0.4 Tap

*Refer to manual for pressure setting method.*

**VMS Series**

![Diagram of VMS Series](image4)

- Pressure Port

- Differential Setting Trimmer

- Indicating Lamp

- Indicating LED (Red, Green)

- Indicating LED (Red)

*Refer to manual for pressure setting method.*

**Notices for Handling**

1. Do not put sharp materials into pressure port such as needle, etc., which may destroy sensor, causing system failure.
2. Do not allow direct contact with organic solvents such as thinner, water, oil or fat.
3. Avoid excessive condition (within 3 seconds) for electrical pressure.
4. In case of using switching regulator by power, make grounding of frame ground (F, G) circuit of power device.
5. Do not wire with power cable and high voltage cable together, which may cause error owing to noise.
6. Do not press each setting button with sharp materials such as needle, etc.
7. Do not excessively press inside of product for adjustment of setting trimmer, and do not rotate more if it reaches a minimum or maximum location.
Valve for vacuum generation

Comfortable flux control

Reacting on long term power supply

Vacuum sensor

Comfortable fitting replacement
(For vacuum supply)

Small work flying prevention in case of Vacuum exhaust (Supply line not included)
(For vacuum exhaust)

Decent exterior and compact structure in width direction

Actualization of light weight (500g for 8-connection)

Actualization of high speed stable response (ON:4ms, OFF:7ms 0[8])

Body

Fittings for vacuum absorption

Sensor Adapter

www.TPCpage.com
www.TPCpage.co.kr
**Vacuum Ejector (ES Series)**

- COMPACT DESIGN
- SUPERB LONG TERM POWER SUPPLY FEATURE
- ACTUALIZATION OF HIGH SPEED STABLE RESPONSE
- ACTUALIZATION OF LIGHT WEIGHT (500G FOR 8-CONNECTION)
- SMALL WORK FLYING PREVENTION IN CASE OF VACUUM EXHAUST (SUPPLY LINE NOT INCLUDED)

## How to Order

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ES</td>
<td>05</td>
<td>8L</td>
<td>8L</td>
<td>3</td>
<td>M</td>
<td>05</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

1. **Nozzle Diameter**
   - 05: 0.5mm
   - 07: 0.7mm

2. **Vacuum Generating Supply Port**
   - 6: Ø6 Straight one-touch fitting
   - 8: Ø8 Straight one-touch fitting
   - 8L: Ø8 Elbow one-touch fitting (Responding for order)

3. **Vacuum Destroy Supply Port**
   - 6: Ø6 Straight one-touch fitting
   - 8: Ø8 Straight one-touch fitting
   - 8L: Ø8 Elbow one-touch fitting (Responding for order)

4. **Vacuum Absorbing Port**
   - 3: Ø3 Straight one-touch fitting
   - 4: Ø4 Straight one-touch fitting
   - 3L: Ø3 Elbow one-touch fitting (Responding for order)
   - 4L: Ø4 Elbow one-touch fitting (Responding for order)

5. **Number of Valve Connection**
   - 02: 2-connection
   - 08: 8-connection

6. **Valve Supply Voltage**
   - 5: 24 VDC

7. **Electric Valve Specification**
   - Type | Blank | V1 |
   - ES05 | N.C  |   |
   - ES07 | N.C  | N.C|

8. **Vacuum Sensor Specifications**
   - Blank: Vacuum sensor not attached
   - M5: Analogue output type (M5 universal)
   - P4: Analogue output type (Ø4 Plug)

9. **Length of Lead Wire**
   - Blank: 300mm (standard)
   - XWL01: 100mm
   - XWL02: 200mm
   - XWL20: 2000mm

* Please contact a manufacturer for additional specification.
* For longer length of wire, please contact us.
### Product Specifications

#### Vacuum Ejector Specifications

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>ES05</th>
<th>ES07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nozzle Diameter (mm)</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Max. Absorbing Flux ℓ /min (ANR)</td>
<td>Over 5</td>
<td>Over 11</td>
</tr>
<tr>
<td>Max. Flux Consumption ℓ /min (ANR)</td>
<td>Less than 12</td>
<td>Less than 22</td>
</tr>
<tr>
<td>Max. Vacuum Pressure kPa(mmHg)</td>
<td>Over –85(–638)</td>
<td>Over –85(–638)</td>
</tr>
<tr>
<td>Destroy Flux ℓ /min (ANR)</td>
<td>Over 10 Max.</td>
<td></td>
</tr>
<tr>
<td>Nozzle Structure</td>
<td>Single Nozzle</td>
<td></td>
</tr>
<tr>
<td>Exhaust Method</td>
<td>Silencer Built–in (Open to the Air), Individual Exhaust</td>
<td></td>
</tr>
<tr>
<td>Fluid Applied</td>
<td>Air</td>
<td></td>
</tr>
<tr>
<td>Range of Pressure Applied</td>
<td>0.2 ~ 0.55 MPa</td>
<td></td>
</tr>
<tr>
<td>Range of Temperature Applied</td>
<td>5 ~ 50 ℃</td>
<td></td>
</tr>
<tr>
<td>Refueling</td>
<td>No Need</td>
<td></td>
</tr>
</tbody>
</table>

#### Valve Specifications

<table>
<thead>
<tr>
<th>Equipment Members</th>
<th>Supply Valve, Destroy Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Method</td>
<td>N/C Type(Basic), N/O Type</td>
</tr>
<tr>
<td></td>
<td>N/C Type, N/O Type(Basic)</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>DC24V ± 10%</td>
</tr>
<tr>
<td>Handling Method</td>
<td>Electric Valve</td>
</tr>
<tr>
<td>Effective Sectional Area m²(Cv)</td>
<td>0.42 m² (0.025)</td>
</tr>
</tbody>
</table>

#### Contact Diameter

<table>
<thead>
<tr>
<th>Air Supply Port</th>
<th>Ø6, Ø8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum Absorbing Port</td>
<td>Ø3, Ø4</td>
</tr>
</tbody>
</table>

*Max. Ejector Connection Number

- Nozzle Diameter Ø0.5: 8–connection
- Nozzle Diameter Ø0.7: 8–connection

#### Vacuum Feature Graph

The graph shows the relationship between supply pressure (MPa) and vacuum level (kPa). Two lines are plotted for different ejector models:

- **ES05(Ø0.5)**
- **ES07(Ø0.7)**

The graph can be used to determine the vacuum level for a given supply pressure and to select the appropriate model based on the required vacuum level and supply pressure.
Exterior Dimension Drawing (ES07 : mm)

- Vacuum Generating Air Supply Port (TUBE O.D. : Ø6, Ø8)
- Vacuum Exhaust Air Supply Port (TUBE O.D. : Ø6, Ø8)
- No Vacuum Sensor
- Vacuum Sensor P4 Type Attached (SPSB–V01–P4)
- Vacuum Generating Valve
- Vacuum Exhaust Valve
- Vacuum Absorbing Port (TUBE O.D. : Ø3, Ø4)
### Series ES

※ Read before utilization.

#### 1. Common Notices for Vacuum Equipment Design

**Warning**

1. Conduct safety check to prevent accident caused by vacuum pressure degradation owing to power failure or air source trouble.
   If absorptive power of vacuum pad is lost owing to vacuum pressure degradation, load may be dropped during transportation, or may occure injury damage to human equipment.

2. Apply vacuum specification for vacuum switch and vacuum exhaust valve.
   Application of valve which does not have vacuum function may cause leakage of vacuum.

3. Select an ejector with proper absorption.
   When there is leakage from the load or a pipe: Insufficient absorbing flux may cause adhesion failure.
   A long pipe has a big pipe diameter may cause delay of absorption response.
   Select an ejector with suitable absorbing flux in reference of technical data.

4. Excessive absorbing flux may cause difficulty with vacuum switch setting.
   When selecting a large ejector, difficulty in the vacuum switch setting may occur due to lack of pressure difference during non-adhesion.

5. Conduct piping with sufficient effective sectional area.
   Select pipes with maximum effective sectional area to allow maximum absorbing flux through ejector. Moreover, do not allow unnecessary pipe components or leakage during piping works.
   Suitable piping design is needed for air consumption of each ejector for air supply side.
   Make sufficient effective sectional area of tube, conduit and valve to derive the least pressure drop for ejector.
   Conduct air source design in consideration of maximum air consumption of ejector and air consumption of other air circuits.

### Design · Selection

#### 1. Warning

For Attachment

**Warning**

1. Conduct all vacuum side and supply side piping with the shortest and straightest piping line.
2. Make large effective sectional area for exhaust pipe of ejector. Reduction of exhaust may degrade ejector performance.
3. Do not allow loss caused by damage or curve of pipes.

### For Attachment

#### 1. Warning

Environment

**Warning**

1. Do not use in corrosive area where corrosive gas, chemical, seawater, water or steam exist.
2. Do not use in explosive area.
3. Do not use where vibrations or impacts exist. Check specification of each series.
4. Avoid a beam with protecting cover.
5. Block radiant heat if heat source exists around equipment.
6. Set a measure for attachment of water, oil or welding spatter.
7. With a long term power supply to the vacuum unit, please make heat-radiation measure to keep vacuum unit in specified temperature.

### Repair and Inspection

#### 1. Warning

1. Carry out regular removal of foreign materials from suction filter, silencer and PAD. Clogging of suction filter, silencer and PAD degrades performance of ejector. Use a large scale filter with a large flux processing for the area where a large quantity of dust exists.