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 : ø0.5 mm
   - EM 07 : ø0.7 mm
   - EM 10 : ø1.0 mm
   - EM 13 : ø1.3 mm
   - EL 50 : 50NL / min
   - EL 70 : 70NL / min
   - EL 90 : 90NL / min
   - EL 100 : 100NL / min

2. Body & Exhaust Type
   - **Index** | **Specification Type** | **Remark**
   - S | Individual SUP/Individual EXH | Air Open Type, Pipe Port EXH
   - M | Individual 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)
   - ML | Concentrated SUP/Individual EXH | Right side Port EXH (V-Port Front Base)

3. **Manifold Number of Station**
   - **Blank** : For Unit
   - **02** : 2 Station
   - **10** : 10 Station
   - In Case of Order for All Single Product Models

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

5. Vacuum Switch Type
   - **Model Name** | **Index** | **Contents**
   - Blank | No Switch
   - VPS- | NL | LED 3Digit indicating, NPN 2-point Analog output, Ground type
   - VMS- | N1 | LED 3Digit indicating, NPN 2-point Analog output, Connector type
   - N2 | LED turned ON, NPN 1-point output + Differential setting Analog output, Connector type

6. Switch lead track specifications
   - **Blank** | Lead Track Length 0.6M
   - C | Lead Track Length 2M
   - Only 2M is produced for ground type lead track

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

8. Vacuum (V) Port Type
   - **Blank** | Rc(P1) 1/8
   - F | Φ10 Fitting

* Contact separately for AC110V and DC 12V.
* Inquire in advance for ordering PNP type.

* Diameter of Connecting Pipe

<table>
<thead>
<tr>
<th><strong>Index</strong></th>
<th><strong>Indication Type</strong></th>
<th><strong>SUP/EXH Type</strong></th>
<th><strong>Contact Pipe Diameter</strong></th>
<th><strong>Vacuum/Port</strong></th>
<th><strong>EXH Port</strong></th>
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</thead>
<tbody>
<tr>
<td>Single product S</td>
<td>Rc(P1)(Individual)</td>
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<td></td>
<td>Vacuum/Port</td>
<td>EXH Port</td>
</tr>
<tr>
<td>MA</td>
<td>Rc(P1)(Individual)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>MB</td>
<td>Rc(P1)(Individual)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR</td>
<td>Rc(P1)(4)(Concentrated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML</td>
<td>Rc(P1)(4)(Concentrated)</td>
<td></td>
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</tbody>
</table>

* Please additionally 10 S1, MA1 and M1 for ordering single product pipe port EXH type.
* Manifold concentrated EXH slinger (model name: SN50C~50R 34/4) may be purchased separately.

* In Case of Order Along Nozzle Diameter

<table>
<thead>
<tr>
<th><strong>Model</strong></th>
<th><strong>MA</strong></th>
<th><strong>MB</strong></th>
<th><strong>MR</strong></th>
<th><strong>ML</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EM05</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>EM07</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>EM10</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>EM13</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>3</td>
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<tr>
<td>EL50</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>EL70</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EL90</td>
<td>5</td>
<td>3</td>
<td>3</td>
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</tr>
<tr>
<td>EL100</td>
<td>5</td>
<td>2</td>
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</table>
**Specifications**

### Flux Features

<table>
<thead>
<tr>
<th>Basic Type</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>96</td>
<td>46</td>
<td>66</td>
<td>92</td>
<td>141</td>
</tr>
<tr>
<td>Target Vacuum Level</td>
<td>$\approx -84$ kPa ($\approx -630$ mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Ejector

- **Fluid**: Air
- **Max. Pressure Applied**: 0.7 MPa (7 kgf/cm²)
- **Rated Supply Pressure (Range)**: 0.5 MPa (4.9 kgf/cm²) ~ 5.5 kgf/cm²
- **Applied Temperature Range**: 5 ~ 50°C
- **Filter Opening Width**: PE, 30 μm
- **Contact Pipe Diameter**:
  - SUP Port: Rc (PT) 1/8
  - Absorbing Port: R(FPT) 1/8, Ø10 Fitting
- **Product Weight**: 350 g
- **Attaching Direction**: Free

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

- **Applied Pressure Range**: 0.25 ~ 0.7 MPa (7 kgf/cm²)
- **Operating Method**: N.C./N.O Direct Action Type
- **Rated Voltage**: DC 24 V
- **Allowable Voltage**: Within Rated Voltage ± 10%
- **Effective Sectional Area**: 0.18 mm²
- **Lead track Extraction Method**: Plug Connector
- **Power Consumption (W)**: Less than DC 0.6 W
- **Lead Track Color**: Red (+), Black (–)
- **Lamp & surge voltage protecting circuit**: LED & Protecting Circuit Built-in

### Vacuum Switch

- **Indication Type**: VMS - [ ] [ ] [ ]
- **Display Type**: LED (Red, Green) ON
- **Set vacuum Level in Delivery**: $\approx -53.3$ kPa (≈ -400 mmHg)/1 Point
- **Power Supplied**: DC12 ~ 24 V
- **Output Method**:
  - NPN/PNP Open Collector 30V, 200 mA
  - NPN/PNP Open Collector 30V, 80 mA
- **Output Point**:
  - 1 Point Output + Differential Setting [Analogue Output] or 2 Point Output
  - 2 Point Output + Analogue Output
- **Power Consumption**: 30 mA
- **Set Pressure Range**: 0 kPa ~ 101 kPa
- **Guaranteed Pressure-Resistant**: 0.2 MPa (Double of Rated Pressure)
- **Gas Applied**: Air and Non-Corrosive Air
- **Applied Temperature Range**: 0 ~ 60°C
- **Temperature Feature**: ± 5% F.S. or Less
- **Differential Setting**: Set Pressure 0.5 ~ 10% F.S. 3% F.S (Fixed)
- **Response Term**: 2.5 ms or Lower 2.0 ms or Lower
- **Repeat Error**: Within ± 1% F.S. ± 0.2% F.S.
- **Lead Track Extraction Method**: Connector Type
- **Function (VMS)**:
  - Differential Setting Trimmer (210°)
  - Pressure Setting Trimmer (210°)

### Color of Lead Wire

**VMS**
- **Brown**: DC (+)
- **Black**: Output 1
- **White**: Output 2 (or Analogue Output)
- **Blue**: DC (–)

**VPS**
- **Brown**: DC (+)
- **Black**: Output 1
- **White**: Output 2
- **Blue**: DC (–)
- **Yellow**: Analogue Output
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

Waiting Status

Vacuum Generating Status

Vacuum Maintaining Status

Vacuum Exhaust Status

Time for Vacuum Achieved (sec/\(\times\))

<table>
<thead>
<tr>
<th>Name of Model</th>
<th>Reached Vacuum level [\text{hPa}]</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>1.0</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>3.0</td>
<td>3.8</td>
<td>5.0</td>
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<tr>
<td>EL70</td>
<td></td>
<td>1.2</td>
<td>1.6</td>
<td>2.0</td>
<td>2.6</td>
<td>4.0</td>
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<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>
Series EM

Ejector Structure Map and Component Table

![Diagram of Ejector Structure]

### 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>2</td>
<td>Operator Body (Lower)</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Operator Body (Upper)</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Valve Unit Body</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Propet Valve Assy’</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Electric Exhaust Vacuum</td>
<td>Normal Close</td>
<td>DV100=5H(Horizontal) DV100=5V(Vertical)</td>
</tr>
<tr>
<td>7</td>
<td>Vacuum Destroy Electric Valve</td>
<td>Normal Close</td>
<td>DV100=5H(Horizontal) DV100=5V(Vertical)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal Open</td>
<td>DV120=5H(Horizontal) DV120=5V(Vertical)</td>
</tr>
<tr>
<td>8</td>
<td>Diffuser</td>
<td>All(Color Plating)</td>
<td>0.5(Yellow), 0.7(Red), 1.0(Green), 1.3(Silver)</td>
</tr>
<tr>
<td>9</td>
<td>Nozzle</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Flux Control Screw</td>
<td>AI</td>
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</tr>
<tr>
<td>11</td>
<td>Vacuum Stop Pad</td>
<td>NBR</td>
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<tr>
<td>12</td>
<td>Filter Cover</td>
<td>PA</td>
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</tr>
<tr>
<td>13</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—N—LC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VMS—N+</td>
</tr>
<tr>
<td>2</td>
<td>Sound-attaching Material (Port, Both Side Surface)</td>
<td>PVA Sponge</td>
<td>ET—064—001</td>
</tr>
<tr>
<td>3</td>
<td>Vacuum Filter</td>
<td>PE</td>
<td>ET—033—001</td>
</tr>
</tbody>
</table>
Series EM

External Dimension Drawings / Single Product Type

Standard Type

Non-Vacuum Switch
Series EM

External Dimension Drawings / Single Product Type

LED Turn-on Type Vacuum Switch

EM(EL)□□□□□□□□□

LED 3 Digit Indicating Type Vacuum Switch

EM(EL)□□□□□□□□□
Series EM

External Dimension Drawings / Manifold

Individual Supply / Individual Exhaust

<table>
<thead>
<tr>
<th>Dimensions</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>
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<tr>
<td>L1</td>
<td>33.6</td>
<td>54.4</td>
<td>75.2</td>
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<td>116.8</td>
<td>137.6</td>
<td>158.4</td>
<td>179.2</td>
<td>200</td>
<td>220.8</td>
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</table>
Series EM

External Dimension Drawings / Manifold

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>
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</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>
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<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>
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</tbody>
</table>
Series EM

External Dimension Drawings / Manifold

Concentrated 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>
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</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>
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<td>127</td>
<td>147.5</td>
<td>168</td>
<td>188.5</td>
<td>209</td>
<td>229.5</td>
</tr>
</tbody>
</table>
**Series EM**

**Assembly/Disassembly of Equipment**

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**Notices for Ejector Utilization**

- **Trouble shooting:**
  
  1. **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.
  
  2. **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.
  
  3. **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.
  
  4. **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.
Series EM

Vacuum Pressure Switch

Vacuum Switch Order Form

1. V: Vacuum
2. P: Indicating LED 3 Digits
3. S: Indicator Light 3 LEDs

Output Contact Point
- 1: 2-point Output, Analog Output
- 2: 2-point Output, Red Output (Green)

Wiring Method
- L: Grommet Type
- VPS

Base Type
- P: EP Exlector Attached Only (Base Inclusive)
- B: EM/EL Exlector Attached Only (Base Inclusive)

Specification

VPS Series (LED 3Digits Method)

<table>
<thead>
<tr>
<th>Type</th>
<th>VPS-C-C-C-1</th>
<th>VPS-C-C-C-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Pressure Range</td>
<td>0.0—100 kPa</td>
<td>0.0—101 kPa</td>
</tr>
<tr>
<td>Set Pressure Range</td>
<td>10.1—110 kPa</td>
<td>5.1—101 kPa</td>
</tr>
<tr>
<td>Max. Pressure Range</td>
<td>2 Times of Rated Pressure</td>
<td></td>
</tr>
<tr>
<td>Voltage Applied</td>
<td>12—24VDC ±10%</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>50mA or Less</td>
<td></td>
</tr>
<tr>
<td>Control Output Setting</td>
<td>Open Collector, 100mA or Less</td>
<td></td>
</tr>
<tr>
<td>Response Time</td>
<td>Select 2.5ms, 5ms, 100ms, 500ms</td>
<td></td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>Built-in</td>
<td></td>
</tr>
<tr>
<td>Analogue Output</td>
<td>Output Voltage: 1—5VDC ±1% ±F.S.</td>
<td></td>
</tr>
<tr>
<td>Control Output Feature</td>
<td>±2% F.S. or Lower</td>
<td></td>
</tr>
<tr>
<td>Set Point</td>
<td>2 Point</td>
<td></td>
</tr>
<tr>
<td>Operation Indicating Lamp</td>
<td>Turned On When ON</td>
<td></td>
</tr>
<tr>
<td>Setting Method</td>
<td>Variable Method by Button Press</td>
<td></td>
</tr>
<tr>
<td>Display Method</td>
<td>Indication by 3½ Line and LED 7 Segments</td>
<td></td>
</tr>
</tbody>
</table>

VMS Series (LED Lighting Method)

<table>
<thead>
<tr>
<th>Type</th>
<th>VMS-N1 [P1—C]</th>
<th>VMS-N2 [P2—C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Pressure Range</td>
<td>0.0—100 kPa</td>
<td>0.0—101 kPa</td>
</tr>
<tr>
<td>Set Pressure Range</td>
<td>10.1—110 kPa</td>
<td>5.1—101 kPa</td>
</tr>
<tr>
<td>Max. Pressure Range</td>
<td>2 Times of Rated Pressure</td>
<td></td>
</tr>
<tr>
<td>Voltage Applied</td>
<td>12—24VDC ±10%</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>30mA</td>
<td></td>
</tr>
<tr>
<td>Control Output Setting</td>
<td>1 Point</td>
<td></td>
</tr>
<tr>
<td>Repeated Error</td>
<td>1—10% F.S. Varied, 1% F.S. Fixed</td>
<td></td>
</tr>
<tr>
<td>Response Time</td>
<td>Lower than 2.5ms</td>
<td></td>
</tr>
<tr>
<td>Short Circuit Protection</td>
<td>Built-in</td>
<td></td>
</tr>
<tr>
<td>Analogue Output</td>
<td>Output Voltage: 1—5VDC Linearly: ±1% ±F.S.</td>
<td></td>
</tr>
<tr>
<td>Operation Indicating Lamp</td>
<td>Out 1: Red LED</td>
<td></td>
</tr>
<tr>
<td>Setting Method</td>
<td>Trimmer Method</td>
<td></td>
</tr>
<tr>
<td>Setting Adjustment Range</td>
<td>1 Turn (210°)</td>
<td></td>
</tr>
</tbody>
</table>

Connecting Circuit Diagram

VPS Connecting Circuit Diagram

- 1 point output + Analogue output

VMS Connecting Circuit Diagram

- 1 point output + Analogue output

- 2 point output
Series EM

External Dimension Drawing

VPS Series

- Connector Type
  - 2-Ø2.3 Penetration (Ø2.5 Ø3.0 Ø1.8)

- Grommet Type
  - 2-M2x0.4 Tap
  - Pressure Port

※ Refer to manual for pressure setting method.

VMS Series

- Indicating Lamp

※ 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.