PS100 series is developed as a new approach of a Mass flow controller, it is one of the most critical devices in the semiconductor manufacturing tool, it controls the flow-rate measured by the pressure sensor. This model has non-heated flow measurement architecture, improved Pressure-Insensitive characteristic, valiant flow response, and it meets the needs of the times.

**Pressure-based flow measurement architecture**

The non-heated flow measurement architecture results the lower reactive excrecence on the inner surface of the MFC against the thermally-degradable gas, the lower corrosion by the corrosive gas like Cl₂ or BCl₃ accelerated in case with small moisture and the heated condition to the high temperature, and the stable flow measurement and control for a long term.

**Improved Pressure Insensitive function**

The unique construction of this MFC enables stable flow control against the pressure fluctuation in the inlet and /or outlet. The mechanical regulator works for the pressure fluctuation in the upstream, the control valves work for the pressure fluctuation in the downstream, and this construction enables the high stability of the flow control against the pressure fluctuation.

**Valiant repeatability**

The valiant repeatability is achieved owing to the stable pressure condition at the laminar flow device part in case that there is not pressure at upstream and the downstream of the MFC fluctuated.

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PS100 series model and the suffix codes .... P.6
Self-diagnostic / response learning function

In case of the flow rising turn from zero, there may be a problem to have the various valve start position and the rising slope for each MFCs. The response learning function in this MFC enables the uniform and stable rising characteristics. The MFC self-diagnosis for the abnormal operation, display of the alarm and notification in the communication are in this unit.

Other functions and features

- 11 BIN size MFCs enable to control from 5 SCCM to 5 SLM
- High accuracy, ±1% S.P. @10 – 100% (N2)
- Wide flow control range, 0.5 – 100% F.S.
- High speed response 0.6 s (typical)

11 BIN size MFCs enable to control from 5 SCCM to 5 SLM in case of the Multi gas, Multi range model. The MFC with each BIN is applicable for wide flow range so that the possibility to convert the flow rate and/or gas name is high without replacing the MFC with other BIN, it means that these models are excellent in flexibility on-site.

High valve shut-off performance 0.1% F.S.

The amount of gas between the down-stream side of the MFC valve and the pneumatic valve after the flow rate setting value is set to zero may have a problem. The MFC with 0.1% F.S. as a valve shut-off performance in PS100 series (in case that the full-scale is set for each BIN) reduce its impact.

High accuracy, ±1% S.P. @10 – 100% (N2)

The flow range to guarantee the flow accuracy is ±1% S.P. owing to the construction for high stability of the pressure sensing condition.

Wide flow control range, 0.5 – 100% F.S.

The flow range is 0.5 – 100% F.S. in case that the MFC outlet pressure is less than 60 kPa (abs). The wide flow range has more possibility to control by the less MFC in the gas system instead of plural MFCs.

High speed response 0.6 s (typical)

The fast rise and fall characteristic of the flow is important in case of the fast turn-around recipe in the process tool. PS100 series satisfy excellent response time, 0.6s (typical) by applying the improved algorithm. The gas flow stops quickly after setting zero.

The dead volume is small when the valve closes.

10 million life cycle, robust diaphragm valve

The open and close cycle results a big number in the process, such as ALD to repeat the open and close frequently, PS100 series applies 10 million life cycle design with the optimized drive circuit and PIEZO element in the valve, Co-Ni alloy diaphragm.

Wide temperature range 15 – 50 °C

The small gas box in the process tool may results the high ambient temperature around the MFC against the anticipation. The design of this product applies precision, low power devices so that the temperature range of the usage is expanded to 50 °C.

DeviceNet™, RS-485 / analog, EtherCAT® are applicable

This product applies analog interface, digital interface as DeviceNet™ and the high speed communication as EtherCAT®.

RoHS / CE compliant

This product is EU-RoHS and CE marking compliant.
Electrical Connection

### Analog model 9 Pin D-sub male type (M3 screw)

<table>
<thead>
<tr>
<th>No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VALVE OPEN / CLOSE</td>
<td>Connect to +15 V: OPEN Connect to -15 V: CLOSE</td>
</tr>
<tr>
<td>2</td>
<td>OUTPUT (0 – 5 VDC / 0 – 100 %F.S.)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>INPUT POWER (+15 VDC)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>POWER COMMON</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>INPUT POWER (-15 VDC)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SET POINT INPUT (0 – 5 VDC / 0 – 100 % F.S.)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>SIGNAL COMMON</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SIGNAL COMMON</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>VALVE VOLTAGE OUTPUT (0 – 4V / 0 – 100 %)</td>
<td></td>
</tr>
</tbody>
</table>

### RS-485 model 9 Pin D-sub male type (M3 screw)

<table>
<thead>
<tr>
<th>No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>INPUT POWER (+15 VDC)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>POWER COMMON</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>INPUT POWER (-15 VDC)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>SIGNAL COMMON</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RS-485+</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RS-485-</td>
<td></td>
</tr>
</tbody>
</table>

### DeviceNet™ model CM02-8DR5P-CF (D5) DDK

<table>
<thead>
<tr>
<th>No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SHIELD</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>INPUT POWER (+11 – 25 VDC)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GND(-)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CAN(H)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CAN(L)</td>
<td></td>
</tr>
</tbody>
</table>

### EtherCAT® model (Power connector) XS3M-M524-201 OMRON

<table>
<thead>
<tr>
<th>No.</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24VDC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FG</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>POWER COMMON (0V)</td>
<td></td>
</tr>
</tbody>
</table>

### EtherCAT® model (Communication connector) Cat.5 RJ45 Ethernet connector

Category 5 networking Ethernet cable is used.

Dimensions

**1.125” IGS® fitting**

1. **a) 9 Pin D-sub model Inlet side connector type**

![Diagram](image1.png)

2. **b) DeviceNet™ model Inlet side connector type**

![Diagram](image2.png)
### Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Normal pressure type</th>
<th>Low vapor pressure type (C₂F₆, C₄F₈ or similar gas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Scale Range (N₂ equivalent flow)</td>
<td>From 5 SCCM to 5 SLM (Multi-0–10)</td>
<td></td>
</tr>
<tr>
<td>Flow Sensing</td>
<td>Measurement of the differential pressure</td>
<td></td>
</tr>
<tr>
<td>Flow Calibration</td>
<td>Multi Gas, Multi Range (11 BINs)</td>
<td></td>
</tr>
<tr>
<td>Settling Time (SEMIM™ E17-91)²²</td>
<td>&lt; 0.8s (&lt; 0.6s (typical))</td>
<td></td>
</tr>
<tr>
<td>Accuracy (N₂)¹¹</td>
<td>&lt; ±1% S.P. (10–100%), &lt; ±0.1% F.S. (0.5–10%)</td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>&lt; ±0.5% F.S.</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>&lt; ±0.25% F.S.</td>
<td></td>
</tr>
<tr>
<td>Leak Integrity</td>
<td>&lt; 1 × 10⁻¹¹Pa·m³/s (He)</td>
<td></td>
</tr>
<tr>
<td>Flow control range³⁴</td>
<td>0.5–100% F.S.</td>
<td></td>
</tr>
<tr>
<td>Operating Pressure Range (Inlet)</td>
<td>230–600kPa (abs)</td>
<td>140–250kPa (abs)</td>
</tr>
<tr>
<td>Operating Pressure Range (Outlet)</td>
<td>Vacuum–60kPa (abs)</td>
<td></td>
</tr>
<tr>
<td>Leak Across Valve</td>
<td>&lt;0.5% F.S., &lt;0.1% F.S. (in case that the full-scale is set for each BIN)</td>
<td></td>
</tr>
<tr>
<td>Proof pressure</td>
<td>0.6MPaG</td>
<td></td>
</tr>
<tr>
<td>Ambient Temp. Range</td>
<td>15–50 °C [Gas temperature needs to be equal to ambient temperature.]</td>
<td></td>
</tr>
<tr>
<td>Accuracy of the internal pressure sensor</td>
<td>&lt; ±5kPa [0–500kPa (abs)]</td>
<td></td>
</tr>
<tr>
<td>Accuracy of the internal temperature sensor</td>
<td>&lt; ±1 °C [15–50 °C]</td>
<td></td>
</tr>
<tr>
<td>Control Valve Type</td>
<td>Normally-Closed Piezo Actuator</td>
<td></td>
</tr>
<tr>
<td>Materials for external seals</td>
<td>316L S.S.</td>
<td></td>
</tr>
<tr>
<td>Materials for gas wetted</td>
<td>316L S.S., PCTFE, Ni-Co alloy</td>
<td></td>
</tr>
<tr>
<td>Fittings</td>
<td>92mm 1.125” Cseal, 92mm 1.125” Wseal®</td>
<td></td>
</tr>
<tr>
<td>Surface Finish</td>
<td>Electro-polished (fitting, sensor, base) Ra=0.2μm, machine finish Ra=0.8μm</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td>Any position</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>1.1kg</td>
<td></td>
</tr>
<tr>
<td>Special function</td>
<td>Pressure Insensitive function</td>
<td></td>
</tr>
<tr>
<td>Signal interface</td>
<td>Analog, Digital (RS485, DeviceNet™, EtherCAT®)</td>
<td></td>
</tr>
<tr>
<td>Connector type</td>
<td>Analog : 9Pin D-sub</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital : RS485, DeviceNet™, EtherCAT®</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance : RS485/Φ2.5 3-pole round connector (for all model)</td>
<td></td>
</tr>
<tr>
<td>Input power</td>
<td>Analog : +15VDC ±4% 90mA, -15VDC ±4% 60mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DeviceNet™ : +11VDC 500mA, -25VDC 230mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EtherCAT® : +24VDC ±10% 120mA</td>
<td></td>
</tr>
<tr>
<td>Flow set signal (Analog model only)</td>
<td>0–5VDC / 0–100%F.S. input impedance &gt; 1MΩ</td>
<td></td>
</tr>
<tr>
<td>Flow out signal (Analog model only)</td>
<td>0–5VDC / 0–100%F.S. load impedance &gt; 2kΩ (required)</td>
<td></td>
</tr>
</tbody>
</table>

---

¹¹. This specification is defined based on our standard test condition with single MFC. The performance with the different condition may not satisfy this specification, and we do not guarantee this specification under the condition with all combination of the configuration.

²². From 0% to 5%S.P. or greater, ambient temperature is 22°C±10°C

³³. Digital mode, ambient temperature is 22°C±3°C

⁴⁴. Valve closes if the set point applies less than 0.5%S.F.

SCCM, SLM are the unit indicates the gas flow-rate as mL/min, L/min at 0°C, 101.3kPa (abs) condition.

F.S. = full scale, S.P. = set point
### PS100 Series Model and the Suffix Codes

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
<th>Suffix code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Measurement of the differential pressure</td>
<td>PS100</td>
</tr>
<tr>
<td>Interface</td>
<td>Analog (9Pin D-sub)</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>DeviceNet™</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>L Protocol RS-485 (9 Pin D-sub)</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>EtherCAT®</td>
<td>E</td>
</tr>
<tr>
<td>Connector location</td>
<td>Top L Protocol (RS-485) model is excluded.</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Inlet side</td>
<td>U</td>
</tr>
<tr>
<td>External seals</td>
<td>Metal seal</td>
<td>M</td>
</tr>
<tr>
<td>Valve type</td>
<td>Normally closed</td>
<td>C</td>
</tr>
<tr>
<td>Fitting</td>
<td>92mm 1.125” Wseal®</td>
<td>BW1</td>
</tr>
<tr>
<td></td>
<td>92mm 1.125” Cseal</td>
<td>BA1</td>
</tr>
<tr>
<td>Fixed code</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Optional code</td>
<td>NNN</td>
<td></td>
</tr>
<tr>
<td>Full scale range</td>
<td>5 to 12 SCCM Multi-0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 to 20 SCCM Multi-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 to 40 SCCM Multi-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41 to 60 SCCM Multi-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>61 to 100 SCCM Multi-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>101 to 200 SCCM Multi-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>201 to 300 SCCM Multi-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>301 to 500 SCCM Multi-7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>501 to 1000 SCCM Multi-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1001 to 2500 SCCM Multi-9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2501 to 5000 SCCM Multi-10</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td>PS100ATMCBA10NNN Multi-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure-based MFC, Analog control, Top connector, 9Pin D-sub connector, metal seal, Normally closed piezo valve, 1.125” 92mm Cseal, no option, Full scale 200SCCM</td>
<td></td>
</tr>
</tbody>
</table>

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### Safety Precaution

Before using any of the products introduced in this catalog, please read the respective user manuals thoroughly.

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