High Performance Mass Flow Controller

SEC-Z500X
Introducing the remarkable X, a break-through in mass flow control technology
The mass flow controller, is a key piece of semiconductor manufacturing equipment. Its quality and efficiency play a major role in the success or failure of the semiconductor manufacturing process.

HORIBA STEC, a company that has consistently introduced high-quality, highly functional products to the demanding semiconductor manufacturing market, and thereby grown its worldwide market share to over 30%*, has recently developed a new mass flow controller, one that breaks the mold completely and will change the future of mass flow control technology.

That new mass flow controller is the SEC-Z500X.

It provides all the mass flow functions customers need, including the flexibility to handle different gas types and flow volumes.

The customer him or herself can alter its specifications to suit changing needs*2.

The unit is also RoHS compliant, which makes it the perfect environmentally friendly tool for improving corporate value.

The highly functional, high added value ‘X’ is brimming with previously unknown charm.

The world is witnessing the birth of a mass flow controller that will change the future of the semiconductor industry.

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The superior dependability you expect from HORIBA STEC. Industry leader

HORIBA STEC, is a brand hailed by equipment manufacturers throughout the world, one of many indications that HORIBA STEC consistently supplies high-quality, highly dependable products that meet the toughest standards.

HORIBA STEC quickly and reliably supplies equipment to its customers through its three main bases: Kyoto, which acts as HORIBA STEC’s headquarters; Aso, the HORIBA Group’s mass production factory, which features the latest in production equipment; and two bases in the United States (CA, TX), which act as ultra-quick suppliers.

* The new Aso factory was completed in October 2005.

A reliable support system with an international network

Using a network that has branches throughout the world, HORIBA STEC’s highly skilled engineers offer complete support for all HORIBA STEC products.

Complying with all RoHS regulations

The Corporate Social Responsibility (CSR) of companies involves, among other things, working to protect the environment. As a company within the HORIBA Group, a leader in environmental analysis equipment, HORIBA STEC is always striving to develop and manufacture environmentally sound products.

RoHS regulations:
RoHS stands for “Restriction of Hazardous Substances” and is a set of regulations enforced in the EU to limit the use of six hazardous substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDE)), in electric and electronic components.
The latest high-precision standard flow rate system is installed at HORIBA STEC’s bases in the United States and Japan. This system, which uses a build-up method, can measure the flow rate of process gases, including those containing a high level of toxic substances, and volatile gases. The measured data is centrally managed through a database maintained at headquarters, which allows HORIBA STEC to continually improve process gas flow rate control precision.

Gas flow rate characteristic curve

Gases used in semiconductor processes have a variety of different properties. The flow rate calibration function used in the SEC-Z500X series uses detailed measurement data about the flow rate characteristics of each type of process gas, across different flow rate ranges, as a basis for calibration. This huge store of measurement data paired with highly reliable sensors and the latest in calibration technology ensures extremely precise process gas flow rate control.

High accuracy ±1.0% S.P.

MFC’s linearity is compensated by polynomial approximated curve. This achieves high accuracy for all flow control ranges. For the purpose of advancement of actual gas accuracy, the calibration data of various process gases are measured by HORIBA STEC standard gas measurement system.

Traceability

The National Institute of Standards and Technology (NIST, a U.S. organization) certifies the traceability of the flow rate calibration used by the SEC-Z500X series. These units use a flow rate calibration unit that meets NIST calibration standards.

High-precision standard flow rate system

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We never compromise on performance.

**High-speed response throughout the flow rate range**

**High speed response**
SEC-Z500X is installed with a newly developed "Variable PID system", which can achieve 1 second response to all setting points. Variable PID is continuously changing depending on setting flow points. This allows the PID factor to be optimized when you change full scale flow and gas.

**Response speed comparison, with and without the PID algorithm**

![Graph showing response speed comparison](image)

**SEC-Z500X 0 → 100% F.S. response characteristics**
- **Before changed full-scale**
- **After changed full-scale to 25%**

**SEC-Z500X 0 → 10% F.S. response characteristics**
- **Before changed full-scale**
- **After changed full-scale to 25%**

**SEC-Z500X 0 → 2% F.S. response characteristics**
- **Before changed full-scale**
- **After changed full-scale to 25%**
The best in quality for you

Multi-gas, multi-range solution

HORIBA STEC has made it possible for the user to change the type of gas or full-scale flow rate on site. Our special Z500 configuration software makes it possible to change these specifications at will. Best of all, the changes can be made without removing the mass flow controller from the gas panel or piping. This reduces the number of spare mass flow controllers users need to store, and helps save both time and money.

Suitable for multiple types of gas
Freely change types of gas

Example: SEC-Z500X MR.MG-02
ψ N₂ 100 SCCM  Ar 110 SCCM  H₂ 65 SCCM

Suitable for multiple ranges
Freely change the full scale

Example: SEC-Z500X MR.MG-04
ψ N₂ 1000 SCCM  Flow rate control range 20 to 1000 SCCM
ψ N₂ 250 SCCM  Flow rate control range 5 to 250 SCCM

Specifications can easily be changed on site

Changing the full-scale flow rate

Even when the same full-scale values are used, the MR/MG numbers associated with the full-scale flow rate values for the calibration gas may vary, due to variations in the thermal conductivity of the different process gases. To increase flow rate calibration precision, HORIBA STEC offers the following lineup of MR/MG numbers.

List of full-scale flow rates for different gases

<table>
<thead>
<tr>
<th>Gas type</th>
<th>SEC-Z51_X series</th>
<th>SEC-Z52_X series</th>
</tr>
</thead>
<tbody>
<tr>
<td>N₂</td>
<td>R01</td>
<td>3 – 10</td>
</tr>
<tr>
<td>Ar</td>
<td>R1.5</td>
<td>4 – 11</td>
</tr>
<tr>
<td>H₂</td>
<td>01</td>
<td>3 – 11</td>
</tr>
<tr>
<td>SF₆</td>
<td>1.5</td>
<td>5 – 9</td>
</tr>
<tr>
<td>HBr</td>
<td>02</td>
<td>2 – 9</td>
</tr>
<tr>
<td>WF₆</td>
<td>2.5</td>
<td>25 – 50</td>
</tr>
<tr>
<td>N₂</td>
<td>03</td>
<td>75 – 300</td>
</tr>
<tr>
<td>Ar</td>
<td>3.5</td>
<td>44 – 86</td>
</tr>
<tr>
<td>H₂</td>
<td>04</td>
<td>79 – 150</td>
</tr>
<tr>
<td>SF₆</td>
<td>3.5</td>
<td>19 – 37</td>
</tr>
<tr>
<td>HBr</td>
<td>05</td>
<td>60 – 110</td>
</tr>
<tr>
<td>WF₆</td>
<td>4.5</td>
<td>110 – 200</td>
</tr>
<tr>
<td>N₂</td>
<td>06</td>
<td>2 – 10</td>
</tr>
<tr>
<td>Ar</td>
<td>5.5</td>
<td>900 – 3000</td>
</tr>
<tr>
<td>H₂</td>
<td>07</td>
<td>1700 – 3300</td>
</tr>
<tr>
<td>SF₆</td>
<td>6.5</td>
<td>2500 – 10000</td>
</tr>
<tr>
<td>HBr</td>
<td>08</td>
<td>30000 – 50000</td>
</tr>
<tr>
<td>WF₆</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Minimum flow rate — maximum flow rate
Unit: SCCM
Configuration software that allows the user to alter specifications on-site

The SEC-Z500X offers multi-gas, multi-range functionality, thanks to its configuration software. This software makes it possible to select MR/MG numbers simply by entering the type of gas being used and the flow rate range, and also features a handy N₂ gas conversion feature for flow rate measurements using N₂ gas during receipt inspections. To ensure that the software is used without error, HORIBA STEC offers software operation trainings. For information on these trainings, please contact your HORIBA STEC representative.

The customer can supply all the system components listed above, if desired, except for the software, which must be provided by HORIBA STEC. Please consult your HORIBA STEC representative for further information.

<table>
<thead>
<tr>
<th>Name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>OK: Japanese or English, ‘Windows® 2000 / XP / Vista / 7 / 8</td>
</tr>
<tr>
<td>Software</td>
<td>HORIBA STEC offers trainings detailing the use of the software.</td>
</tr>
<tr>
<td>Communications converter (ser)</td>
<td>RS-485 Please consult your HORIBA STEC representative for further information</td>
</tr>
<tr>
<td>Conversion adapter</td>
<td>Dedicated adapter CA-EDP110E5</td>
</tr>
<tr>
<td>RS485 communication cable</td>
<td>Dedicated cable SC-EBR</td>
</tr>
<tr>
<td>USB cable</td>
<td>Cable for label printer and communication converter</td>
</tr>
<tr>
<td>Label printer</td>
<td>Please consult your HORIBA STEC representative for further information</td>
</tr>
</tbody>
</table>

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### Digital/Analog communication models

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-scale flow rate (N2)</td>
<td>1/2 SCCM</td>
<td>MR/MG number</td>
<td>MR/MG number</td>
<td>MR/MG number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#01: 10 SCCM</td>
<td>#01: 10 SCCM</td>
<td>#01: 10 SCCM</td>
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<tr>
<td></td>
<td></td>
<td>#1:5: 17.5 SCCM</td>
<td>#02: 100 SCCM</td>
<td>#02: 100 SCCM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#2:5: 175 SCCM</td>
<td>#03: 300 SCCM</td>
<td>#03: 300 SCCM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#3:5: 550 SCCM</td>
<td>#04: 1 SLIM</td>
<td>#04: 1 SLIM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#4:5: 1.7S LM</td>
<td>#05: 3 SLIM</td>
<td>#05: 3 SLIM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>#5:5: 5.5S LM</td>
<td>#06: 10 SLIM</td>
<td>#06: 10 SLIM</td>
</tr>
</tbody>
</table>

### Product specifications

**SCCM and SLM are notations indicating the gas flow rate (mL/min, L/min, at 0°C and 101.3 kPa).**

- **Mounting orientation**
  - Standard Fitting
  - Option: 1.125 inch IGS, 1.5 inch IGS

- **Power supply**
  - Conforming to ODVA standards, DC 24 V, 4.0 VA

- **Wetted materials**
  - 316L Stainless Steel (polished surface)

- **Signal response**
  - Analog: D-Sub 9-pin (TOP) Digital: 2 LAN jacks (TOP)

- **Leak Integrity**
  - ≤ 5 x 10^-12 Pa.m^3/s

- **Pressure resistance**
  - ≤ 2% F.S.

- **Accuracy**
  - ±0.2% F.S.

- **Response**
  - ≤ 1 second: over full flow range

- **Linearity**
  - ≤ 0.5% F.S.

- **Repeatability**
  - ≤ 0.2% F.S.

- **Operating differential pressure**
  - 50 to 300 kPa (d)
  - 50 to 300 kPa (d)
  - 5 to 50°C (recommended temperature range: 15 to 45°C)

- **Repeatability**
  - ≤ 1% F.S.

- **Response**
  - ≤ 1 second: over full flow range

- **Linearity**
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- **Linearity**
  - ≤ 0.5% F.S.

- **Repeatability**
  - ≤ 0.2% F.S.
<table>
<thead>
<tr>
<th>Mass Flow Controller Model</th>
<th>Mass Flow Meter Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEC-Z532MGX</td>
<td>SEF-Z532MGXN</td>
</tr>
<tr>
<td>MR/MG number</td>
<td>MR/MG number</td>
</tr>
<tr>
<td>#09: 100 SLM</td>
<td>#10: 200 SLM</td>
</tr>
<tr>
<td>Full-scale flow rate</td>
<td></td>
</tr>
<tr>
<td>(No conversion flow rate)</td>
<td></td>
</tr>
<tr>
<td>≤ 2% F.S.</td>
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<tr>
<td>2-100% of F.S.</td>
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<tr>
<td>≥ 0-100% of F.S.</td>
<td></td>
</tr>
<tr>
<td>±1% S.P. (flow rate &gt; 35% F.S.)</td>
<td>±1% S.P. (flow rate &gt; 35% F.S.)</td>
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<tr>
<td>±0.3% S.P. (flow rate &gt; 35% F.S.)</td>
<td>±0.3% S.P. (flow rate &gt; 35% F.S.)</td>
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<tr>
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<tr>
<td>±1% S.P. (flow rate &gt; 50% F.S.)</td>
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<tr>
<td>±0.5% F.S.</td>
<td></td>
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<tr>
<td>±0.2% F.S.</td>
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<tr>
<td>±0.1% F.S.</td>
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<tr>
<td>±0.05% F.S.</td>
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<tr>
<td>±0.01% F.S.</td>
<td></td>
</tr>
<tr>
<td>±1 second: over full flow rate range</td>
<td>±1 second: over full flow rate range</td>
</tr>
<tr>
<td>≤ ±0.5% F.S.</td>
<td>≤ ±0.2% F.S.</td>
</tr>
<tr>
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<td>≤ ±0.05% F.S.</td>
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<tr>
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<td>≤ ±0.005% F.S.</td>
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<td>≤ ±0.2% F.S.</td>
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<td>≤ ±0.05% F.S.</td>
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<tr>
<td>≤ ±0.01% F.S.</td>
<td>≤ ±0.005% F.S.</td>
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<td>200 to 300 kPa (d)</td>
</tr>
<tr>
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<tr>
<td>≤ 300 kPa (d)</td>
<td>≤ 300 kPa (d)</td>
</tr>
<tr>
<td>450 kPa (g)</td>
<td>1000 kPa (g)</td>
</tr>
<tr>
<td>≤ 5 x 10^-12 Pa m^3/s (He)</td>
<td>≤ 10^12 Pa m^3/s (He)</td>
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<tr>
<td>1/2 inch VCR equivalent</td>
<td>Free</td>
</tr>
<tr>
<td>Option: 1. 5 inch IGS</td>
<td>Mounting orientation</td>
</tr>
<tr>
<td>1/2 inch VCR equivalent</td>
<td>Free</td>
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<tr>
<td>Option: 1. 5 inch IGS</td>
<td>Mounting orientation</td>
</tr>
<tr>
<td>±2% S.P. (flow rate &gt; 35% F.S.)</td>
<td>±2% S.P. (flow rate &gt; 35% F.S.)</td>
</tr>
<tr>
<td>±1% S.P. (flow rate &gt; 50% F.S.)</td>
<td>±1% S.P. (flow rate &gt; 50% F.S.)</td>
</tr>
<tr>
<td>±0.5% F.S.</td>
<td>±0.2% F.S.</td>
</tr>
<tr>
<td>±0.1% F.S.</td>
<td>±0.05% F.S.</td>
</tr>
<tr>
<td>±0.01% F.S.</td>
<td>±0.005% F.S.</td>
</tr>
<tr>
<td>±1 second: over full flow rate range</td>
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</tr>
<tr>
<td>≤ ±0.5% F.S.</td>
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</tr>
<tr>
<td>Option: 1. 5 inch IGS</td>
<td>Mounting orientation</td>
</tr>
</tbody>
</table>
Product specifications

**EtherCAT® communication model**

|----------------------------|-------------|--------------|---------------|-------------|

- **Full-scale flow rate**
  - (N: conversion flow rate)
  - 1/2 SCCM

- **Valve Type**
  - O: Normally open
  - C: Normally close

- **Flow rate at fully closed control valve**
  - < 2% F.S.

- **Flow rate control range**
  - 2-100% of F.S.

- **Flow rate measuring range (SEF)**
  - ±1.0% F.S.
  - ±1.0% S.P. (Flow rate > 25% F.S.)
  - ±0.25% F.S. (Flow rate ≤ 25% F.S.)

- **Accuracy**
  - ±0.2% F.S.

- **Operating temperature**
  - 5 to 50°C (recommended temperature range: 15 to 45°C)

- **Response**
  - < 1 second: over full flow rate range

- **Linearity**
  - < ±0.5% F.S.

- **Repeatability**
  - < ±0.2% F.S.

- **Operating differential pressure**
  - 50 to 300 kPa (d)

- **Operating differential pressure (SEF)**
  - ≤ 300 kPa (d)

- **Max. Operating pressure**
  - 450 kPa(g)

- **Pressure resistance**
  - 1500 kPa(g)

- **Leak Integrity**
  - ≤ 10⁻¹² Pa·m³/s (He)

- **Digital interface**
  - EtherCAT® Protocol

- **Wetted materials**
  - 316L Stainless Steel (polished surface)

- **Power supply**
  - DC 24 V, 6.8 VA

- **Standard Fitting**
  - 1/4 inch VCR equivalent
  - Option: 1.125 inch IGS

- **Mounting orientation**
  - Free

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**Digital/Analog communication models**

**DeviceNet™ communication models**

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**EtherCAT® communication model**
## Selecting a Model

### Model Selection

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MR/MG number</td>
<td>O: Normally open</td>
<td>C: Normally close</td>
<td>Full-scale flow rate (No conversion flow rate)</td>
<td>MR/MG number</td>
<td>O: 100 SLM</td>
</tr>
</tbody>
</table>

**Valve Type**
- O: Normally open
- C: Normally close

**Flow rate at fully closed control valve**
- ≤ 2% F.S.
- 2-100% of F.S.

**Flow rate control range**
- 0-100% of F.S.

**Flow rate measuring range (SEF)**
- ±1.0% S.P. (Flow rate > 35% F.S.)
- ±0.35% S.P. (Flow rate ≤ 35% F.S.)

**Accuracy**
- ±0.5% F.S.
- ±1% F.S.

**Operating temperature**
- 5 to 50°C (recommended temperature range: 15 to 45°C)

**Operating differential pressure**
- 100 to 300 kPa (d)

**Operating differential pressure (SEF)**
- 450 kPa (d)

**Pressure resistance**
- 1000 kPa (d)

**Leak Integrity**
- ≤ 5 x 10⁻¹² Pa m³/s (He)

**Digital Interface**
- EtherCAT® Protocol

**Power Supply**
- DC 24 V, 6.8 VA

**Standard Fitting**
- 1/2 inch VCR equivalent

**Mounting orientation**
- 1/2 inch VCR equivalent

### Full-scale Flow Rate

- 10 SLM (N2 equivalent flow rate)
- 50 SLM (N2 equivalent flow rate)
- 100 SLM (N2 equivalent flow rate)
- 200 SLM (N2 equivalent flow rate)
- 300 SLM (N2 equivalent flow rate)
- 500 SLM (N2 equivalent flow rate)

### Valve Type

- O: Normally open
- C: Normally close

### Connector Position

- With Digital-Analog “T”
  - T: Top of case
  - S: Side of case
  - With EtherCAT® “S”

### Number of Calibration Curves

- 1: Standard (Digital-Analog, DeviceNet™)
  - 5: EtherCAT®

### DeviceNet™ output range

- Blank: Not a DeviceNet™ model
  - 1: Full-scale flow rate output 100% F.S. (compatible with SEC-Z5_4MGX)
  - 3: Full-scale flow rate output 133% F.S. (compatible with SEC-Z5_4MGX)
  - 5: Full-scale flow rate output 133.329% F.S. (compatible with SEC-Z5_4MGX)

### Distance between Joints

- B: 106 mm
- J: 150.4 mm
- E: 156 mm
- L: 124 mm
- G: 177 mm
- S: 132 mm

**IGS Joint distance between down ports**
- 2: 79.8 mm
- 3: 92 mm
- 5: 96 mm

### Internal Surface Polish

- SUC: Standard for all models

### Types of Gas

- Blank: Type of gas is not specified by MR/MG compatibility Gas name

### MR/MG Numbers

- Please specify MR/MG numbers. For details, please see the specifications.

### Full-scale Flow Rate

- 4CR: 1/4 inch VCR male type fitting
- 8CR: 1/2 inch VCR male type fitting
- 14C: 1.125 inch C-seal, i.d. 1/4 inch
- 14W: 1.125 inch W-seal, i.d. 1/4 inch
- 24W: 1.5 inch, W-seal, i.d. 1/4 inch
- 24S: 1.5 inch, CS-seal, i.d. 1/4 inch
- 24B: 1.5 inch, B-seal, i.d. 1/4 inch

### Joint

- 4CR: 1/4 inch VCR male type fitting
- 8CR: 1/2 inch VCR male type fitting
- 14C: 1.125 inch C-seal, i.d. 1/4 inch
- 14W: 1.125 inch W-seal, i.d. 1/4 inch
- 24W: 1.5 inch, W-seal, i.d. 1/4 inch
- 24S: 1.5 inch, CS-seal, i.d. 1/4 inch
- 24B: 1.5 inch, B-seal, i.d. 1/4 inch

### Distance between Joints

- B: 79.8 mm
- J: 92 mm
- S: 96 mm

### Types of Gas

- Blank: Type of gas is not specified by MR/MG compatibility Gas name

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*For 557MGX models, please specify MR/MG numbers. For details, please see the specifications.*
DeviceNet™ communication

DeviceNet™ is an open and global field network that was developed by the ODVA (Open DeviceNet™ Vendor Association, Inc.) as a unique means for supporting standardization worldwide. The ODVA offers EDS (Electronic Data Sheet) specifications, which are designed to allow shared operability and programming in a multi-vendor environment. The ODVA also carries out conformance testing. Devices that have passed the ODVA’s conformance testing can display the logo.

Advantages
- Reduces costs, since AD/DA converters and I/O boards are not required.
- The user simply connects the devices through network cables and makes address settings. This reduces both the number of processes required and the time involved.
- No special accessories are necessary for the devices. Users can simply choose DeviceNet™ conforming products, which reduces costs.

EtherCAT® communication

What is EtherCAT® communication?
Open field bus system based on Ethernet. ETG (EtherCAT® Technology Group) has been established as an international forum to promote support and diffusion of EtherCAT®, and maintain mutual compatibility. ETG specifies functional requirements, conformance tests and its certification procedure, and permits only devices which satisfy conditions specified by ETG to use the EtherCAT logo.

Features
- High bus efficiency and high-speed data scan is realized by simultaneously communicating with many devices.
- The master can use the standard Ethernet interface when connecting to devices, and does not require expensive dedicated hardware.

VCR male type

<table>
<thead>
<tr>
<th>Model</th>
<th>Size</th>
<th>Fittings</th>
<th>H</th>
<th>T</th>
<th>W</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tbody>
<tr>
<td>SEC(SEF)-Z512KX</td>
<td>1/4 inch</td>
<td>4CRL</td>
<td>126±1</td>
<td>28.5±0.5</td>
<td>63.8</td>
<td>106±1</td>
<td>124±1</td>
<td>115±1</td>
<td>12.7</td>
<td>12.7</td>
<td>21.1</td>
<td>63.8</td>
</tr>
<tr>
<td>SEC(SEF)-Z512MGX</td>
<td>4CRL</td>
<td>126±1</td>
<td>28.5±0.5</td>
<td>63.8</td>
<td>106±1</td>
<td>124±1</td>
<td>115±1</td>
<td>12.7</td>
<td>12.7</td>
<td>21.1</td>
<td>63.8</td>
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<tr>
<td>SEC(SEF)-Z512MGXD</td>
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<td>28.5±0.5</td>
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<td>106±1</td>
<td>124±1</td>
<td>115±1</td>
<td>12.7</td>
<td>12.7</td>
<td>21.1</td>
<td>63.8</td>
<td></td>
</tr>
</tbody>
</table>

Surface mount type

<table>
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<tr>
<th>Model</th>
<th>Size</th>
<th>Fittings</th>
<th>H</th>
<th>T</th>
<th>W</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<td>SEC(SEF)-ZS12KX</td>
<td>1.125 inch</td>
<td>C-seal</td>
<td>14C3</td>
<td>126±1</td>
<td>28.5±0.5</td>
<td>63.8</td>
<td>106±1</td>
<td>124±1</td>
<td>115±1</td>
<td>12.7</td>
<td>12.7</td>
<td>21.1</td>
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<tr>
<td>SEC(SEF)-ZS12MGX</td>
<td>W-seal</td>
<td>14W2</td>
<td>126±1</td>
<td>28.5±0.5</td>
<td>63.8</td>
<td>106±1</td>
<td>124±1</td>
<td>115±1</td>
<td>12.7</td>
<td>12.7</td>
<td>21.1</td>
<td>63.8</td>
</tr>
<tr>
<td>SEC(SEF)-ZS12MGX</td>
<td>W-seal</td>
<td>14W3</td>
<td>126±1</td>
<td>28.5±0.5</td>
<td>63.8</td>
<td>106±1</td>
<td>124±1</td>
<td>115±1</td>
<td>12.7</td>
<td>12.7</td>
<td>21.1</td>
<td>63.8</td>
</tr>
</tbody>
</table>

Dimensions

* Please contact HORIBA other than above table.

*1: SEC(SEF)-ZS23MGX/ZN 4.4±0.1
*2: SEC(SEF)-ZS24MGX/ZN 4.4±0.1
*3: SEC(SEF)-ZS27MGX/ZN 4.4±0.1
The importance of preventative maintenance for production equipment in semiconductor device manufacturing plants is widely acknowledged. In fact, preventative maintenance is considered a critical factor for increasing productivity. HORIBA STEC offers a preventative maintenance system for its mass flow controllers, which are considered key devices in the semiconductor manufacturing process. The mass flow controller’s preventative maintenance system monitors the flow rate control conditions and the position of the valve, and determines the status of overall flow rate control in the mass flow controller. The system informs the user of what sort of maintenance is required before the mass flow controller becomes unable to control the flow rate. It is considered difficult to predict the maintenance required for a mass flow controller’s functioning by monitoring its flow control status alone. HORIBA STEC’s mass flow controller monitoring system collects information on the control status of the digital mass flow controllers (analogue control) in semiconductor manufacturing equipment using digital communications, and monitors whether or not there is a need for any preventative maintenance. This system is compatible with LAN (TCP/IP) networks, and a single superior Surveillance Server can be used to monitor the mass flow controllers in each semiconductor manufacturing system. It’s also relatively easy to create a wide area network for this monitoring system. The logging unit can be used to log the flow rate control status of digital mass flow controller in each semiconductor manufacturing system. The Surveillance Server is connected to the logging unit through a LAN. The logging unit monitors the flow rate control conditions and the position of the flow control valve, and determines whether any preventative maintenance is necessary. This data can be used to investigate the reasons for problems or to review changes in the gas pressure, in addition to determining whether or not preventative maintenance is required.

Digital mass flow controller monitoring software; compatible with RS-485 and DeviceNet™ communication

HORIBA STEC also offers monitoring software that is compatible with HORIBA STEC’s digital mass flow controller protocol (F-Net protocol) and is able to monitor all mass flow controller related transmissions. This software makes it easy to check the status of transmissions between control units such as the PLC or PC and the SEC-Z500X series units. In addition to checking if the digital transmission cable and signal converter are installed correctly, it can use the digital mass flow controller’s address transmissions to monitor control installation information and valve operating status. When DeviceNet™ transmission is used, the software operates using digital transmission information only. In fact, with DeviceNet™, it is possible to monitor the control status of the digital mass flow controller using just this software, a PC, and the DeviceNet™ transmission unit; there is no need for a special, additional control unit mounted on the equipment.

Easy-to-use digital mass flow controller monitoring software

The digital mass flow controller monitoring system uses eDiagnostic monitoring software. The mass flow controller’s control status is monitored through digital transmissions, and then logged and saved in a PC. The eDiagnostic software also features a function that outputs alarms as necessary based on the monitored flow rate control status and valve aperture information. Real-time monitoring makes it possible to go back and review the circumstances surrounding changes in the control status and gas supply conditions. The monitoring information is also extremely useful in investigating the causes of any malfunctions that arise.

Digital mass flow controller control software

HORIBA STEC also offers control software that is compatible with HORIBA STEC’s digital mass flow controller protocol (F-Net protocol). In addition to offering digital mass flow controller flow rate control (step control, loop control functions, etc.), it is also designed to output the aperture control signal for valves mounted on the same gas line. Thanks to these features, this software offers optimal small-scale gas supply system control.

Structure and operating principles

The general structure of the SEC-Z500X series of mass flow controllers is shown in the diagram to the right. These mass flow controllers have a flow rate measurement section that includes a sensor, bypass, flow rate control valve, and special circuitry. A CPU is part of the circuitry, which makes it both multi-functional and highly efficient. The gas is input from an Inlet joint, and is divided so that it flows over both the flow rate sensor and a bypass. The sensor measures the mass flow rate of the gas, and the flow rate control valve modifies the flow rate so that the difference between the measured flow rate and the flow rate received from the external flow rate setting signal is 0 (zero). The units feature a loop circuit, so even if there is a secondary pressure change or ambient temperature change that could affect the supply pressure of the introduced gas, the flow rate is instantaneously corrected, which ensures stable flow rate control.
To respond to product needs in markets related to the high-tech industry, HORIBA Technology Center was established in Silicon Valley. Its aim is to promote joint development with partners in the US and deliver optimum solutions.

The Fukuchiyama Technology Center is permanently equipped with high accuracy gas flow measurement equipment and experimental equipment for development of products, so as to build up functions of basic research on flow rate control devices for high-tech materials.

The HORIBA Aso Plant manufactures semiconductor-related products and products for the medical industry, in addition to flagship mass flow controllers, and engages in mass production as a key manufacturer for the HORIBA group companies.

Development and manufacture of HORIBA, Ltd. semiconductor sensors are integrated with HORIBA STEC, Co., Ltd. fluid control technologies to realize speedy development, downsizing, and stable quality of products.
High Performance Mass Flow Controller

SEC-Z500X

http://www.sec500.com

Please read the operation manual before using this product to ensure safe and proper handling of the product.