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HIGH INTELLIGENT CONTROL VALVE

The HICV Series of self control valves are highly accurate, maintaining a constant rate of outlet pressure and flow regardless of variations in pressure at the point of entry.
Before the advent of the HICV series, the flow rate was unstable due to pressure fluctuations, constantly affecting product yield...

The HICV Series valves are highly accurate valves that maintain stable outlet pressure and flow rate, that are not affected by pressure fluctuations on the inlet side.

Ultra high performance valve that and flow rate, independent of inlet
After the advent of the HICV series, stable pressure and flow rate can be maintained, resulting in the greatly improved product reliability.

- Liquid-contact surface material is PTFE and PFA. O-rings and metal parts are free from contact fluid.
- The pressure and flowrate can be maintained at the desired preset value by the setting air pressure.
- There are no restrictions on installation configurations.

maintain stable outlet pressure
pressure fluctuation
Features

- All wetted path are made of PTFE or PFA. This valve is appropriate for high purity ultra pure water and high purity chemical which are often used in semiconductor industry.
- The HICV Series valves are control valves that maintain stable outlet pressure, that are not affected by inlet pressure fluctuations.
- HICV valve is the control valve which can adjust the pressure of the output by the set air pressure.
- Other existing valves are not able to keep constant flow rate when the pressure of input side is not constant, however, it is possible to maintain constant flow rate by using the HICV valve.

The chart on the left shows the HICV control capability. Pulsation is created by operating the MV-1 manual valve in the lower part of the system to vary the HICV inlet pressure (P1). Notice that the HICV’s outlet pressure (P2) remains stable, and is not affected by pulsation.

Internal Structure and Operation Principle

When the pressure of the input side is increased and the pressure in the chamber is higher than the set air, the diaphragm is pushed upward. At the same time, the shaft is pull up and the flow path will be narrower. It will cause the pressure in the chamber to be lower. On the other hand, when the pressure in the chamber is lower than the pressure of the set air, the shaft is pushed down and the flow path will be wider. The shaft of the HICV valve moves up and down to keep the pressure in the chamber (the pressure of the output) constant. (Self-control)

However, the flow rate varies when any change occurs in the pressure loss on the outlet side.

Notes Metal parts are free from contact with fluid. And HICV does not have rubbing parts.
HICV's Effective Application Examples

1. General Use

**Before**

The flow rate decreases as the manual type regulator pressure is lowered.

**After**

Once installed, the required quantity can be consistently supplied. Without the HICV installed, pressure fluctuation in the utility line is large. This prevents fluids being supplied to the point of use at a constant rate. However, constant supply cannot be realized by the constant supply pump and pulse damper because pulsation cannot be removed completely.

Once the HICV is installed to the utility line, pressure on the outlet side becomes consistent, regardless of pressure fluctuation on the inlet side, thus the required quantity can be supplied consistently. This simple combination achieves a high level of control, enhancing equipment performance and accuracy.

**Note**

Boiling fluid or air bubbles may adversely affect control.

2. Changing flow rate externally

Utilizing this characteristic, the amount of fluid supplied to the use point can be adjusted by pre-determining the required flow rate and pressure for several locations, and changing the output signal from the sequencer or computer as necessary.

The HICV is capable of not only supplying a fixed amount of fluid but also performing feedback control for flow rate, pressure, concentration, temperature, etc. While measuring them. When controlling the flow rate, for instance, the value measured by the flowmeter is input to the controller, the difference between the actual flow rate and the required flow rate is calculated, and output is fed back to the HICV via the electro-pneumatic regulator.
Ultra pure water and Chemical Fluid Stable Supply

When HICVs are installed in Ultra pure water and chemical fluid utility lines, these can be stably supplied to the point of use (U.P.) without being affected by mutual interference among points of use. For example, when there are four points of use, as in the illustration above, the line pressure P1 when only one U.P. is activated is higher than when all four U.P.s are activated, resulting in more Ultra pure water and chemical fluid than necessary being supplied. Further, even when all points of use are activated, the pressure of the point of use closest to the utility supply source is higher. This hampers stable supply of Ultra pure water and chemical fluid to the far end of the utility. To solve these problems, HICVs are installed at the inlet of each point of use, making pressure on the outlet side constant, regardless of pressure fluctuation on the inlet side. Ultra pure water and chemical fluid can therefore be supplied stably to the far end of the utility line, resulting in improved utility efficiency. Moreover, the flow rate at each point of use can be set as desired. This can save unnecessary flow, resulting in a reduction in the total consumption in the plant.

Chemical Mixing and Spiking Application

1. Applicable to chemical mixing and H₂O₂ spiking application

- Dilution of HF
  When diluting HF to the desired concentration, install the HICV in the Ultra pure water line and HF line and set the appropriate mixing rate.

- H₂O₂ spiking application using the HICV enables supply of a fixed amount of H₂O₂ when required. Integrating a concentration sensor makes automatic concentration control possible.
Setting Air Pressure and Flow-rate (PA-Q)

HICV-065

HICV-090-Tm10,TiS

HICV-110

HICV-130

HICV-170

Measurement Method

- Setting orifice at the lower stream
- Controlled fluid: Ultra pure water
- Data is for reference.

<table>
<thead>
<tr>
<th>Connection (Piping)</th>
<th>PFA Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled Fluid</td>
<td>Ultra pure water, Liquid chemical</td>
</tr>
<tr>
<td>Fluid Pressure</td>
<td>Inlet-Pressure: 0.3 MPa MAX</td>
</tr>
<tr>
<td></td>
<td>Outlet-Pressure: 0.1 MPa MAX</td>
</tr>
<tr>
<td>Fluid Temperature</td>
<td>10~40 [℃] (HICV-065,130)</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>0~40 [℃]</td>
</tr>
<tr>
<td>Setting Air Pressure Range</td>
<td>0.1 MPa MAX</td>
</tr>
<tr>
<td>Liquid-contact Surface Material</td>
<td>Body:PTFE, Diaphragm:PTFE, Shaft:PTFE, Tube:PFA</td>
</tr>
<tr>
<td>Note</td>
<td>Enough difference pressure (0.05MPa) is necessary</td>
</tr>
<tr>
<td></td>
<td>Difference pressure: Between the inlet-pressure and the outlet-pressure</td>
</tr>
<tr>
<td></td>
<td>Use the precision regulator for setting out pressure</td>
</tr>
<tr>
<td>Related Law and Regulations</td>
<td>To export this product falls under law of trading control</td>
</tr>
</tbody>
</table>
### Outline Drawing

**HIGH INTELLIGENT CONTROL VALVE**

**HICV**

<table>
<thead>
<tr>
<th>Model</th>
<th>Base Size</th>
<th>Connection</th>
<th>Body</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>HICV-065</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-090</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-110</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-130</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-170</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
</tbody>
</table>

**Connection**

- **Metric Size Tube**
  - Tm6: 6/4
  - Tm8: 8/6
  - Tm10: 10/8
  - Tm12: 12/10
  - Tm25: 25/22
- **Inch Size Tube**
  - Ti4: 1/4/5/32
  - Ti8: 1/4/0.35mm
  - TIS8: 3/8/1/4
  - TISSS: 3/8/0.75mm
  - TIT6: 1/2/3/8
  - TIT7: 3/4/5/8
  - TIT8: 1/2/7/8

**Addition**

- **P**: Base, Cap PP
- **N**: Air Piping 1/8NPT
- **Y**: Special Order

**Seal**

- **T**: PFA Tube
- **PTFE**: PFA Tube

**Body**

- **D**: Dual Pilot Type

**Footnotes**

1. We have Rc1/8 air piping type (portion F).

---

**Table: Flow Range**

<table>
<thead>
<tr>
<th>Model</th>
<th>Flow Range</th>
<th>Connection</th>
<th>Body</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>HICV-065</td>
<td>100-800L/min</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-090</td>
<td>5-10L/min</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-110</td>
<td>2-10L/min</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-130</td>
<td>4-20L/min</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>HICV-170</td>
<td>15-45L/min</td>
<td>[Image]</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
</tbody>
</table>

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**Diagram: Flow Range**

- **HICV-170**: Only HICV-170
- **HICV-130**: Only HICV-170
- **HICV-090**: Only HICV-170

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**Footnotes**

1. We have Rc1/8 air piping type (portion F).