

HICV Series



Highly Intelligent Control Valve

ADVANCE

ADVANCE ELECTRIC CO.,INC

Overview

- The HICV series (U.S. Patent No.: 6,199,582) was introduced to the Semiconductor market in 1995, and is utilized by an array of Wet Clean and CMP equipment manufacturers (installed base of over 25 thousand units worldwide). The HICV series has a dual diaphragm structure with fine-machined membranes, which allow for highly accurate pressure control of a multiplicity of fluids in wafer processing.
- The HICV series maintains a constant rate of outlet pressure/flow, regardless of incoming pressure fluctuations. The outlet pressure is adjusted by the pilot air pressure. The HICV series is constructed with a PTFE/PFA flow path.
- The HICV series is categorized into two types.
 1. First generation - low pressure type; PFA tube stub connections
 2. Second generation - high pressure type; integrated fittings; high flow capacity

Structure / Operating Principal

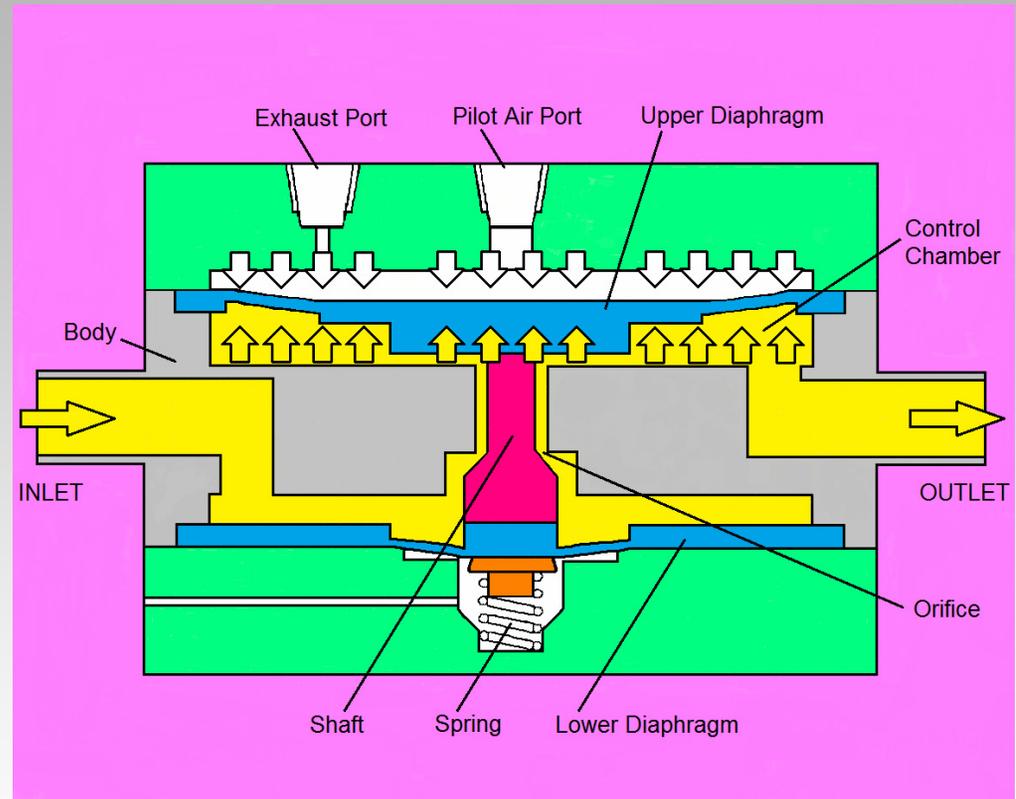
Media enters from the inlet, flows through the lower chamber up past the orifice into the upper pressure control chamber, and then flows out the outlet. Upper and lower chambers are isolated from exterior components by two diaphragms, which are joined to a shaft.

Pressure regulation is achieved when the control chamber pressure balances with the pilot air pressure, via upper diaphragm.

When the amount of media pressure (upward pressure to the bottom section of upper diaphragm) is greater than that of the pilot pressure (downward pressure to the top section of upper diaphragm), the shaft moves upward and the flow path (orifice) narrows, causing the chamber pressure to decrease. Conversely, when the amount of pilot pressure is greater than that of the media pressure, the shaft moves downward and the flow path (orifice) widens, causing the chamber pressure to increase.

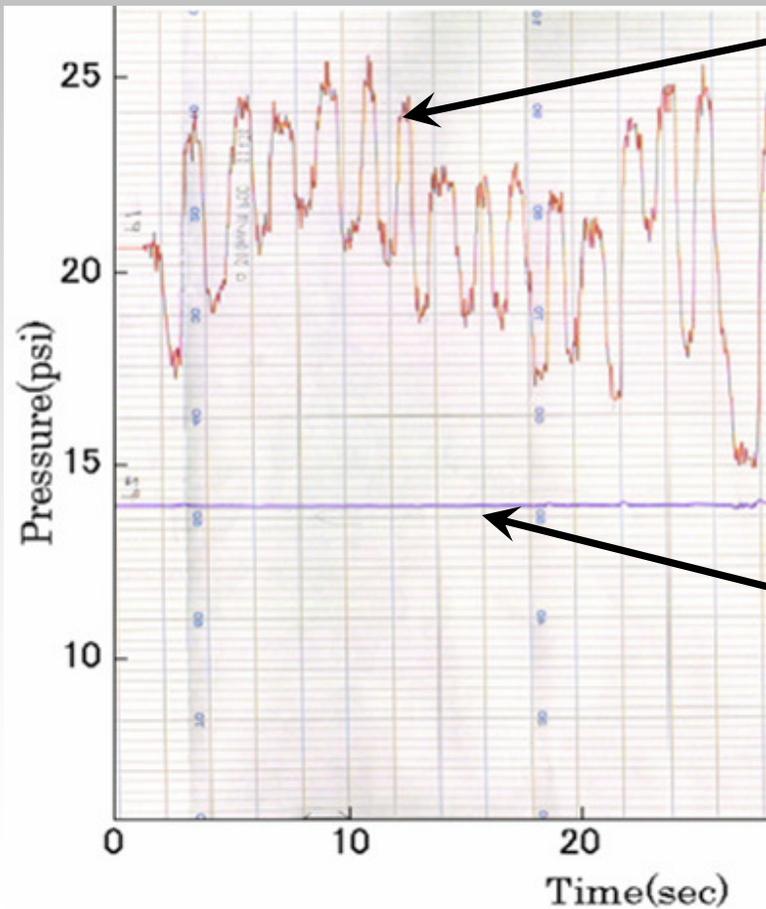
The HICV continuously works to maintain an equilibrium state of pressure by adjusting the flow path (orifice) opening via the shaft. As a result, the chamber pressure becomes fixed and outlet pressure is controlled.

The HICV requires some load (flow restriction) on the downstream for providing pressure into the control chamber. If no load exists, control chamber pressure decreases and the upper diaphragm is forced downward causing the valve to become fully open, losing control.



Control Performance

- The graph below illustrates pressure control from the HICV. Regardless of incoming pressure perturbations (see red), the HICV controls the outlet pressure (see purple).



Fluctuating Pump Pressure

HICV controls outlet pressure regardless of incoming pressure fluctuations.

Stable Outlet Pressure via HICV

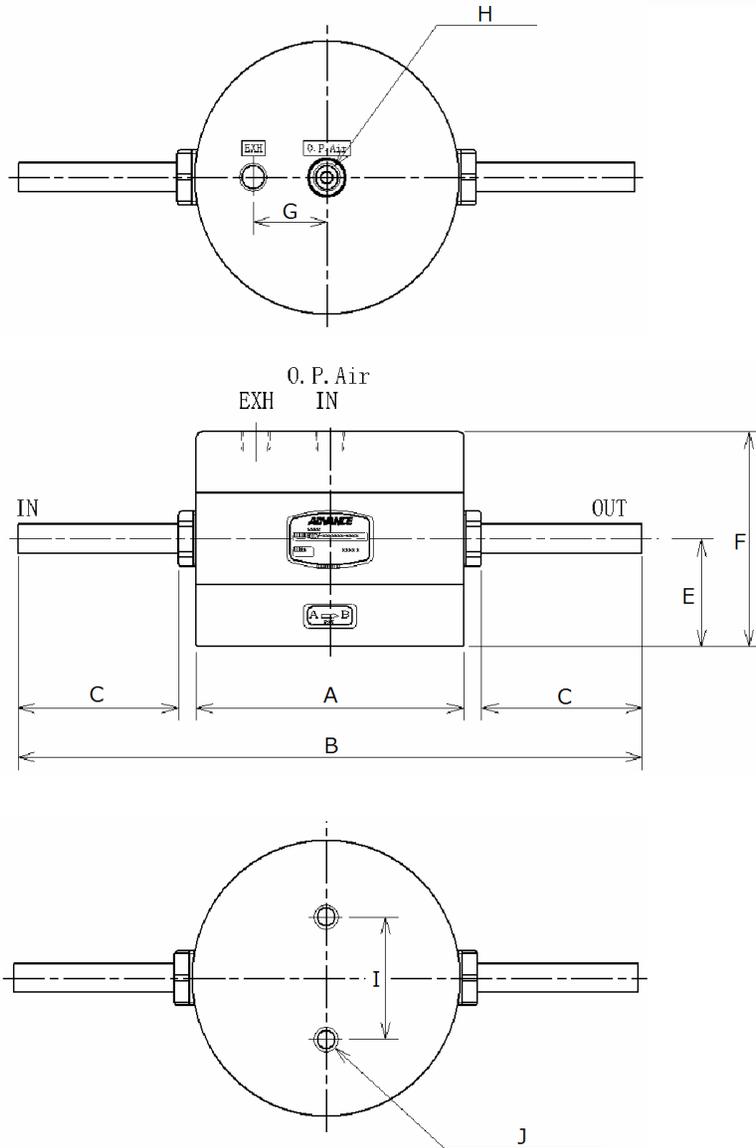
HICV Series - 1st Generation

- Widely used in Asian manufactured tools. Designed to withstand a low pressure rates.
- Features
 - Great response and accuracy
 - PFA tube stub connections (fitting type selected by user)



| Series | Connection Size | Connection Type | Flow Range (recommended) | Max Inlet Pressure | Max Outlet Pressure | Max Pilot Pressure | Media Temp |
|----------|---------------------|------------------|--------------------------|--------------------|---------------------|--------------------|------------|
| HICV-065 | 1/4" | PFA Tube Stub | 0.1 to 0.8 L/min | 0.3 MPa | 0.1 MPa | 0.1 MPa | 10 to 90 C |
| HICV-090 | 1/4"; 3/8"; 1/2" | | 1 to 5 L/min | | | | |
| HICV-110 | 1/2" | | 2 to 10 L/min | | | | |
| HICV-130 | 3/4" | | 5 to 30 L/min | | | | |
| HICV-170 | 1" | | 15 to 45 L/min | | | | |

Dimensions



HICV Series – 1st generation

| Dim. | HICV-065 | HICV-090 | HICV-110 | HICV-130 | HICV-170 |
|------|------------------------|------------------------|------------------------|------------------------|------------------------|
| A | φ 65 | φ 90 | φ 110 | φ 130 | φ 170 |
| B | 210 | 210 | 300 | 300 | 350 |
| C | 66.5 | 54 | 85 | 76 | 79 |
| D | 66.5 | 54 | 85 | 76 | 79 |
| E | 28 | 35 | 38 | 45 | 60 |
| F | 53 | 70 | 76 | 90 | 120 |
| G | 2 - Rc1/8 or 1/8NPT |
| H | 30 | 40 | 60 | 60 | 80 |
| I | 2 - M6 Depth 10 | 2 - M8 Depth 12 | 2 - M8 Depth 12 | 2 - M8 Depth 12 | 4 - M8 Depth 16 |

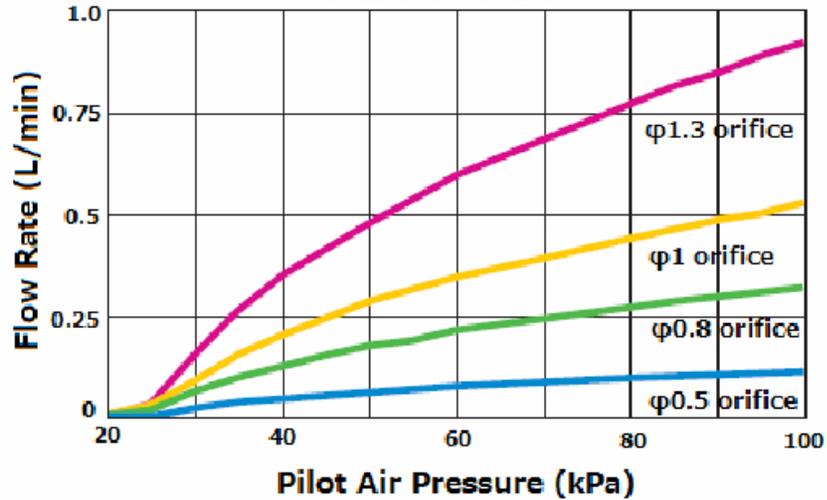
Note:

Dimensions in millimeters.

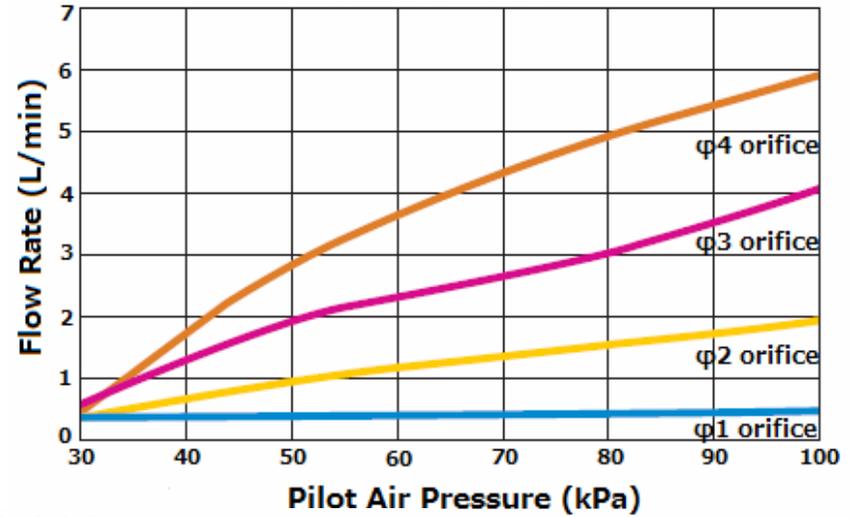
HICV-170 series is dual pilot type (no built-in spring). The second pilot air port is located on the side of the base (not shown in drawing). Inquire with Advance for product drawings/spec sheets.

Flow Characteristics

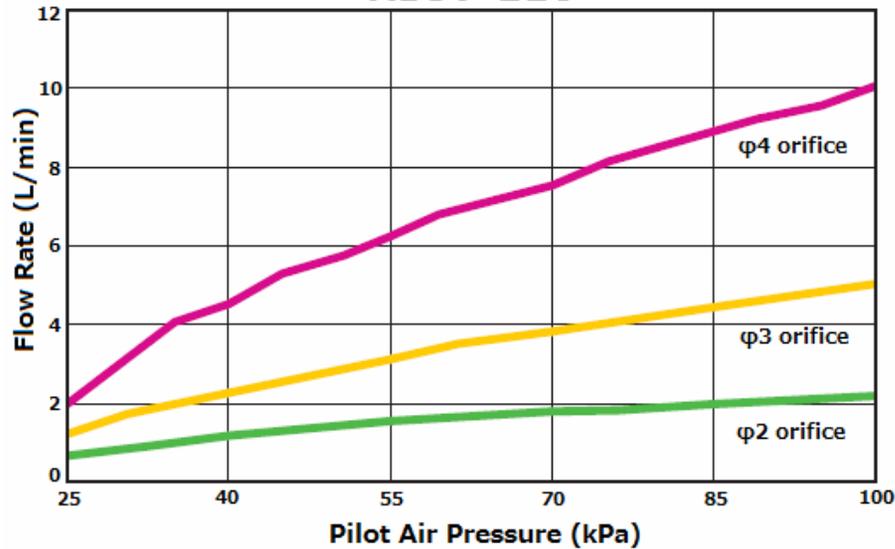
HICV-065



HICV-090

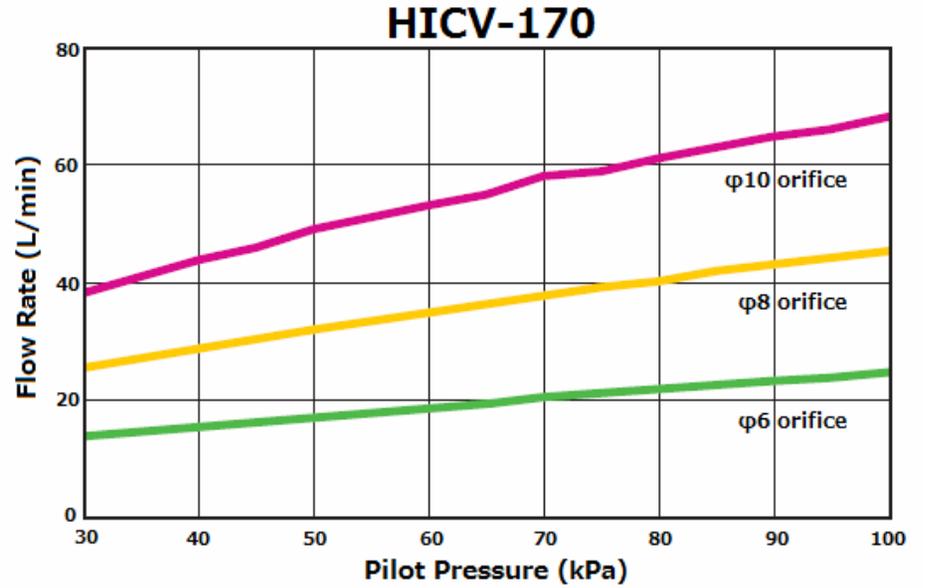
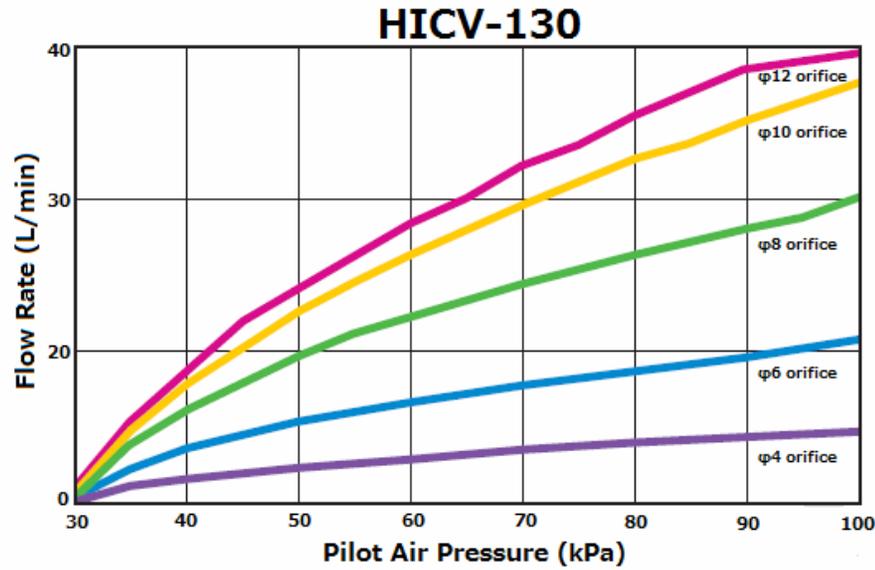


HICV-110



- 7 -

Flow Characteristics



Model Code Selection

HICV Series - 1st generation

| Model | Valve Size | | Fitting Type | | Fitting Size | | Flow Path | | Option | |
|-------|------------|------------|--------------|-----------|------------------|----------|-----------|------------|--------|----------|
| | HICV | 065 | φ 65mm | Ti | PFA tube stub | 4 | 1/4" | 131 | PTFE | N |
| | 090 | φ 90mm | | | 5 | 3/8" | | | | |
| | 110 | φ 110mm | | | 6 | 1/2" | | | | |
| | 130 | φ 130mm | | | 7 | 3/4" | | | | |
| | 170 | φ 215mm | | | 8 | 1" | | | | |

HICV Series – 2nd Generation

- Widely used in U.S. and European manufactured tools. Designed to withstand a high pressure rates.

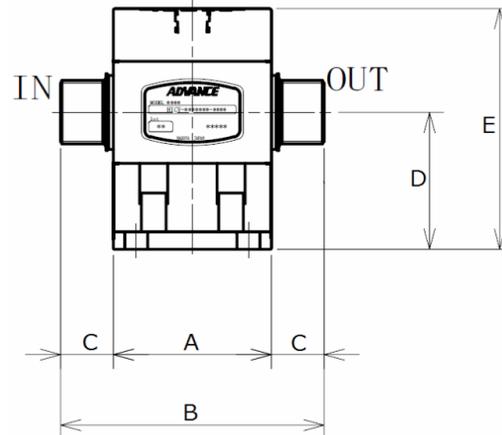
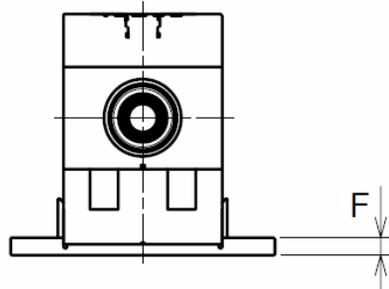
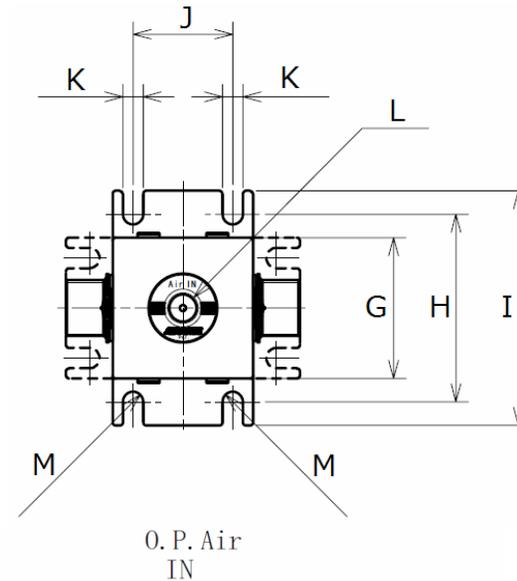
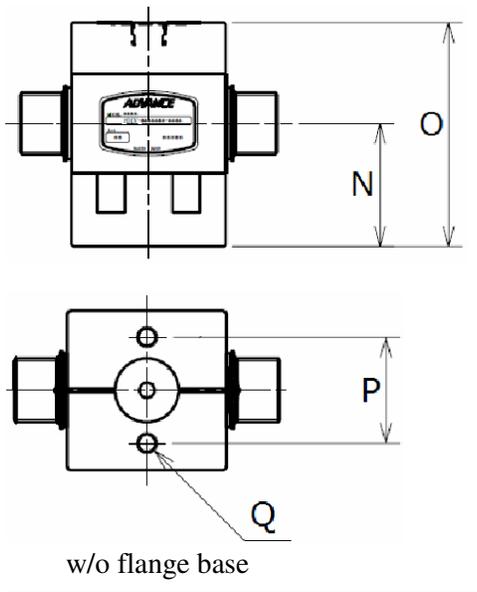


- Features
 - Wide range of pressure control
 - High flow capacity
 - Integrated fittings
 - Multiple fitting sizes per each model



| Series | Fitting Size | Fitting Type | Flow Range (recommended) | Max Inlet Pressure | Max Outlet Pressure | Max Pilot Pressure | Media Temp |
|----------|-----------------------|--|--------------------------|--------------------|---------------------|--------------------|------------|
| HICV-045 | 1/4", 3/8" or 1/2" | Nippon Pillar S-300; Flare; etc. | 0.1 to 5 L/min | 0.5 MPa | 0.5 MPa | 0.3 MPa | 10 to 90 C |
| HICV-065 | 3/8" or 1/2" | | 2 to 10 L/min | | | | |
| HICV-090 | 1/2" or 3/4" | | 5 to 20 L/min | | | | |
| HICV-110 | 3/4" or 1" | | 10 to 30 L/min | | | | |
| HICV-130 | 3/4 or 1" | | 10 to 45 L/min | | | | |
| HICV-215 | 1 1/2" | | 10 to 100 L/min | | | | |

Dimensions – HICV-045



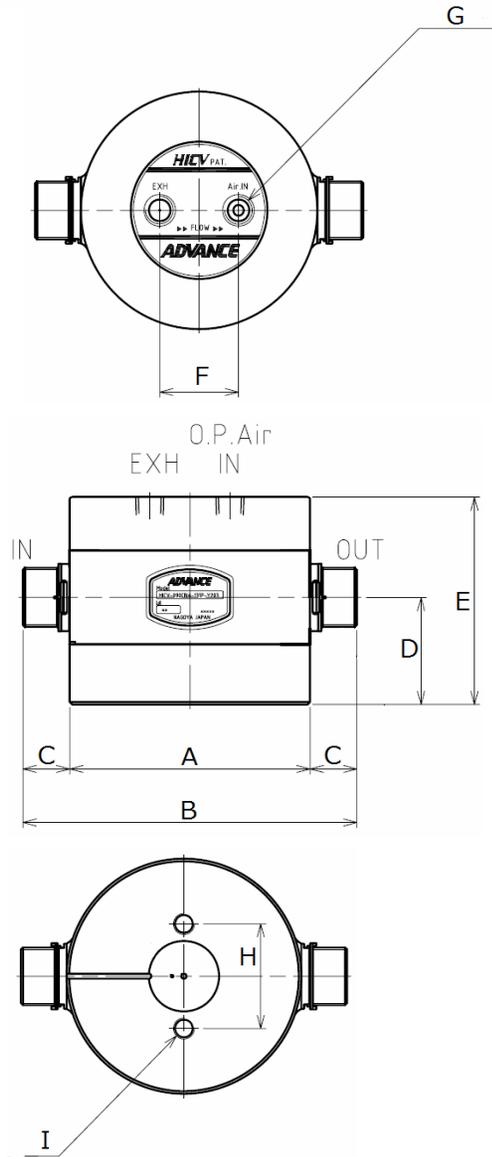
| HICV Series – 2 nd generation | |
|--|-----------------|
| Dim. | HICV-045 |
| A | □45 |
| B | 75 |
| C | 15 |
| D | 39 |
| E | 68.5 |
| F | 5 |
| G | 45 |
| H | 60 |
| I | 75 |
| J | 32 |
| K | 6.5 |
| L | * |
| M | R3.25 |
| N | 36 |
| O | 65.5 |
| P | 30 |
| Q | 2 - M6 Depth 10 |

Note:

Dimensions in millimeters. Valve body dimensions reflect 3/8" Nippon Pillar S-300 fittings. Inquire with Advance on dimensions for 1/4" & 1/2", as well as dimensions per other fitting types.

* 2 – 1/8 multi tap (applicable to both 1/8NPT & Rc1/8)

Dimensions – HICV-065 ~ HICV-215



| HICV Series – 2 nd generation | | | | | |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|
| Dim. | HICV-065 | HICV-090 | HICV-110 | HICV-130 | HICV-215 |
| A | □65 | φ 90 | φ 110 | φ 130 | φ 215 |
| B | 95 | 125 | 154 | 184 | 289 |
| C | 15 | 17.5 | 22 | 27 | 37 |
| D | 32 | 40 | 45 | 53 | 90 |
| E | 60.5 | 77.5 | 88 | 98 | 160 |
| F | 25 | 30 | 30 | 30 | 45 |
| G | * | * | * | * | * |
| H | 30 | 40 | 60 | 60 | 80 |
| I | 2 – M6 Depth 12 | 2 – M8 Depth 12 | 2 – M8 Depth 12 | 2 – M8 Depth 12 | 4 – M8 Depth 20 |

Note:

Dimensions in millimeters. Valve body dimensions reflect Nippon Pillar S-300 fittings for the following sizes and models:

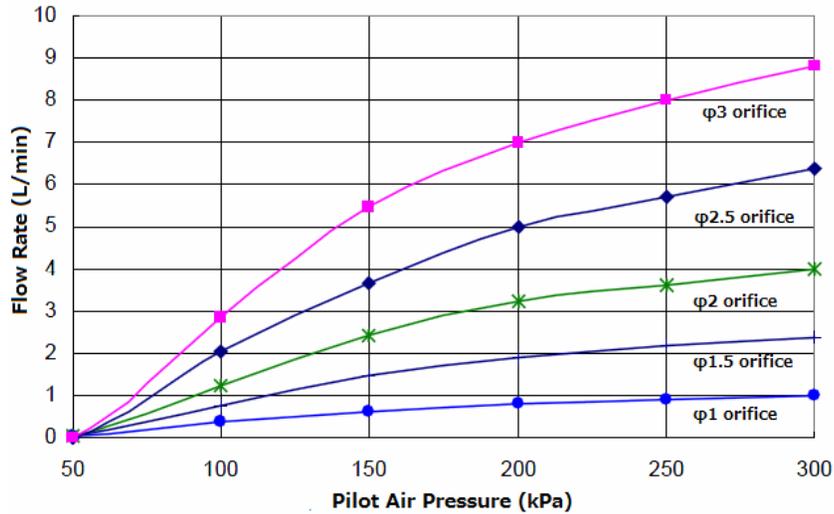
- 3/8" for HICV-065
- 1/2" for HICV-090
- 3/4" for HICV-110
- 1" for HICV-130
- 1 1/2" for HICV-215

Inquire with Advance on dimensions for other fitting sizes of each model, as well as dimensions per other fitting types.

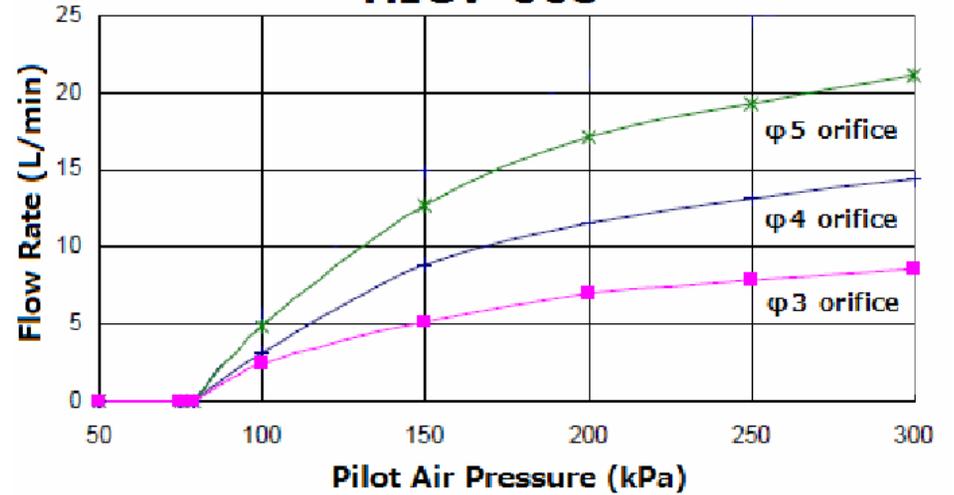
* 2 – 1/8 multi tap (applicable to both 1/8NPT & Rc1/8)

Flow Characteristics

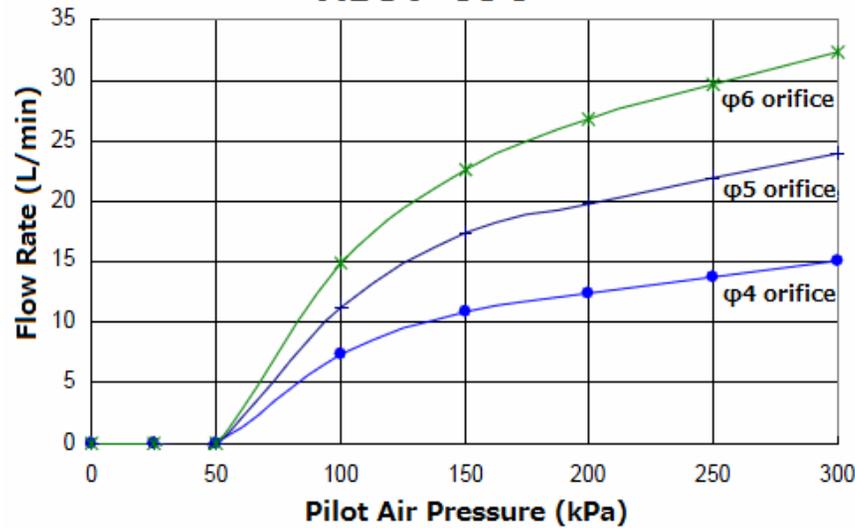
HICV-045



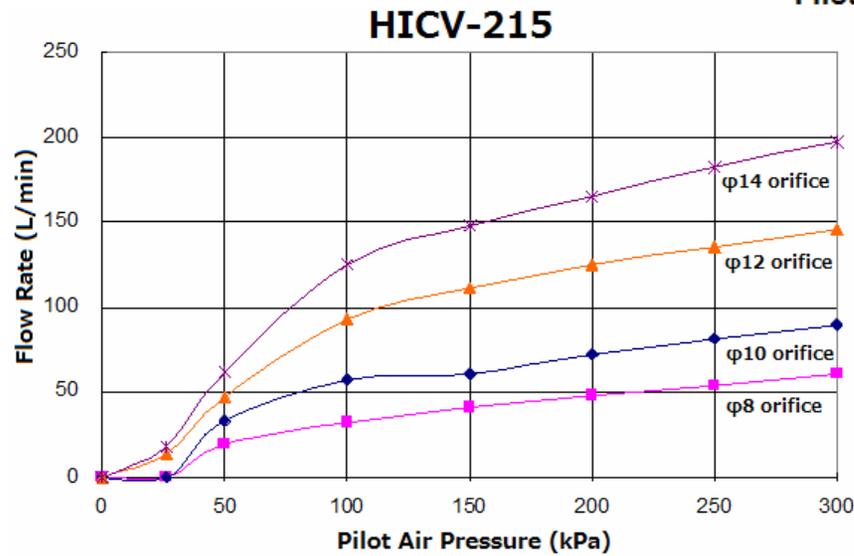
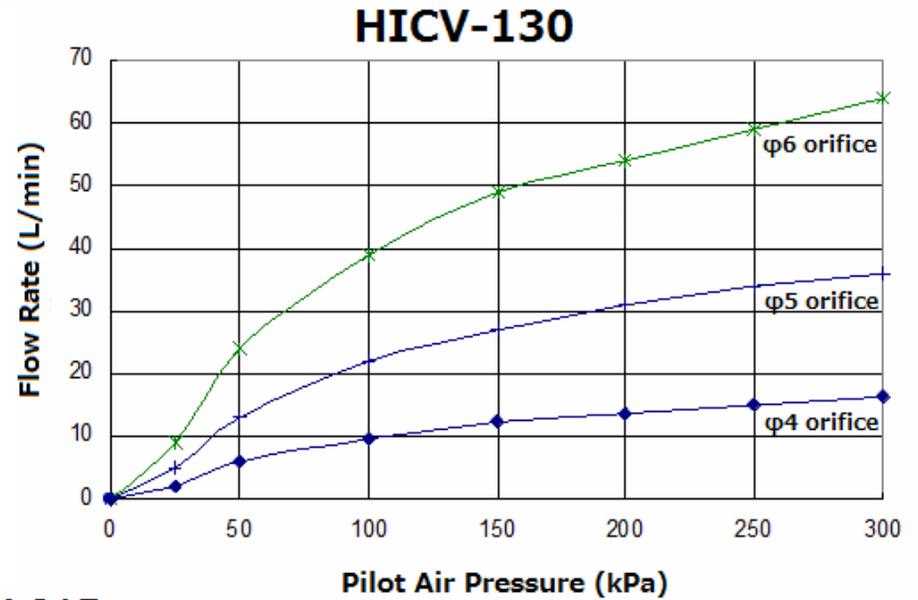
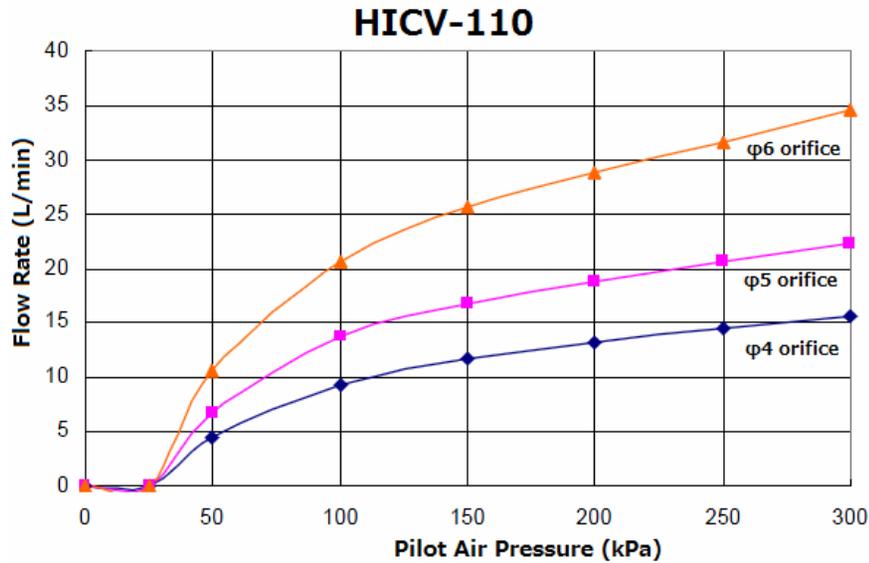
HICV-065



HICV-090



Flow Characteristics



Model Code Selection

HICV Series - 2nd generation

| Model | Valve Size | | Fitting Type | | Fitting Size | | Flow Path | | Spec Code | |
|-------|------------|-------|--------------|------------------------|--------------|----------------------|-----------|------|-----------|---------------------------|
| HICV | 045 | □45mm | C <i>B</i> i | Nippon Pillar S-300 | 4 | 1/4" | 131 | PTFE | Y*** | Standard / Custom spec |
| | | | | | F <i>v</i> i | Flare (PVDF nuts) | | | | |
| | | | 6 | 1/2" | | | | | | |

| Model | Valve Size | | Fitting Type | | Fitting Size | | Flow Path | | Cap/Base | | Spec Code | | | | | | | | | | | |
|-------|------------|-------|--------------|------------------------|--------------|------|-----------|------|----------|---------------|-----------|---------------------------|--------------|----------------------|---|------|---|------|---|------|---|----|
| HICV | 065 | □65mm | C <i>B</i> i | Nippon Pillar S-300 | 4 | 1/4" | 131 | PTFE | P | Polypropylene | Y*** | Standard / Custom spec | | | | | | | | | | |
| | | | | | | | | | | | | | F <i>v</i> i | Flare (PVDF nuts) | 5 | 3/8" | | | | | | |
| | | | | | | | | | | | | | | | | | 6 | 1/2" | | | | |
| | | | | | | | | | | | | | | | | | | | 7 | 3/4" | | |
| | | | | | | | | | | | | | | | | | | | | | 8 | 1" |
| | | | | | | | | | | | | | | | | | | | | | | |

Technical Support / Ordering

Advance Electric America – for technical support (drawings, spec sheets etc.)

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