

CR8 Manual and Pneumatic Valves

Reliable service in corrosive environments for ultrapure chemical applications

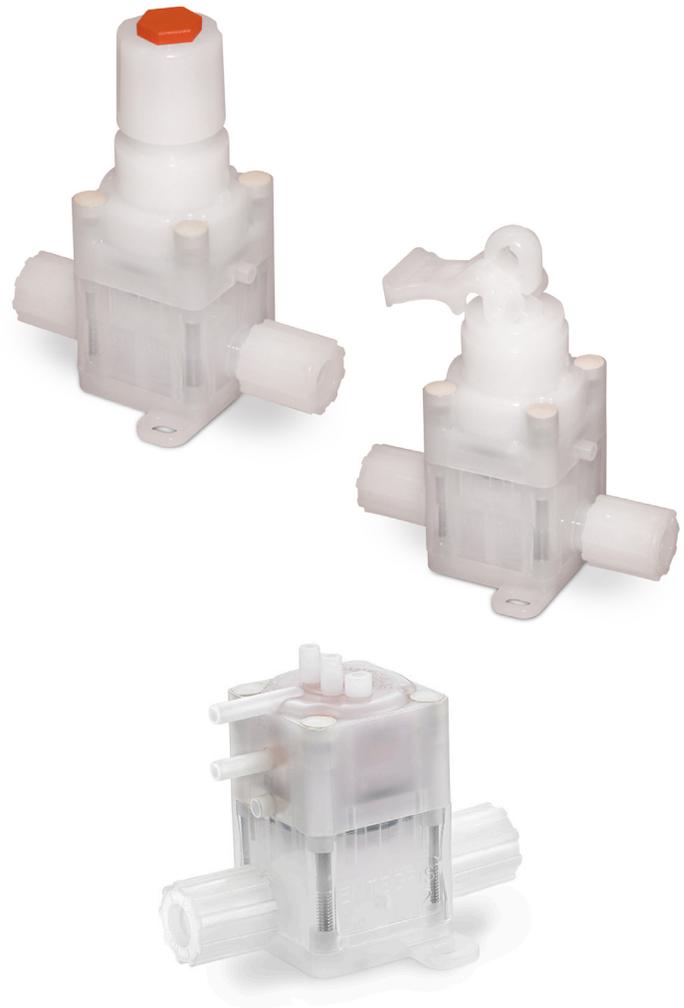
Entegris has added the CR8 to its successful line of corrosion-resistant (CR) valves. This product line offers two-way pneumatic and manual valves for low-to-medium flow applications, with flow factors (C_v) ranging from 1.8–3.4. The valves offer reliable performance and easy serviceability – with a footprint that is smaller than most ½” valves.

CR8 series pneumatic valves were tested to over four million cycles to ensure reliability and reduce cost of ownership. This proven design is available with a variety of end connection options including PrimeLock®, Flaretek®, PureBond® and Super 300 Type Pillar®. With no exposed metal hardware, the valve is completely sealed and protected from harsh chemical environments. These capabilities allow the CR8 series to solve a variety of critical issues within the fab.

Ideal for wet etch and clean (WEC) and low volume bulk chemical delivery applications, the valve line incorporates a compact modular valve design with increased temperature capabilities and maximized flow. CR8 series manual and pneumatic valves are also ideal for use with Entegris Dymension® manifolds to minimize footprint in fab equipment.

APPLICATIONS

- High-purity, corrosive chemical handling
- Semiconductor wet clean process chemicals
- Chemical line sizes in ¼” and ½” pipe, ½” and ¾” tube



FEATURES & BENEFITS

- Small footprint preserves valuable space on OEM equipment
- Available with normally closed or normally open actuators
- Able to withstand corrosive chemical environments
- Unique modular design improves serviceability
- Valve diaphragms successfully tested to over four million cycles for increased reliability
- Modular design enables manifold customization
- Valves offer a variety of connection options including PrimeLock, PrimeLock “SpaceSaver”, Flaretek, Flaretek “SpaceSaver”, PureBond and Super 300 Type Pillar

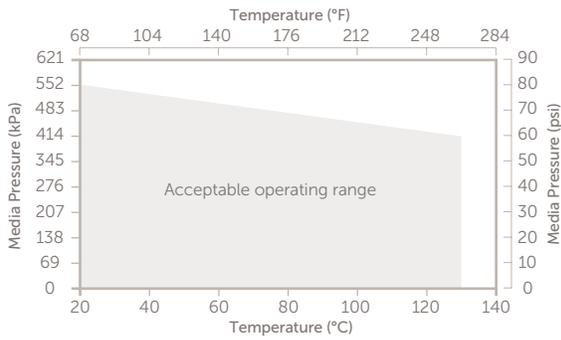
SPECIFICATIONS

| | | | | |
|---|--|--|-----------------------|--|
| Materials | All wetted parts | PFA, PTFE | | |
| | Exterior actuator parts | PVDF, Viton® | | |
| | Interior actuator parts | PVDF, SST, Viton | | |
| | Mounting base | PVDF | | |
| Operating conditions | Media pressure at | 21°C (70°F) | Inlet/outlet | 913 mbar (27" Hg) vacuum to 552 kPa (80 psig)* |
| | | 130°C (266°F) | Inlet/outlet | 414 kPa (60 psig)* |
| | Actuation pressure (pneumatic version only) | 414–552 kPa (60–80 psig)* All wetted parts | | |
| | Temperature range | Ambient | 21– 50°C (70–122°F) | |
| | | Fluid | 21– 130°C (70–266°F)* | |
| Pneumatic supply port (pneumatic version only) | ¼" tube stub or molded female Luer lug style | | | |
| Environmental compliance | RoHs, WEEE | | | |

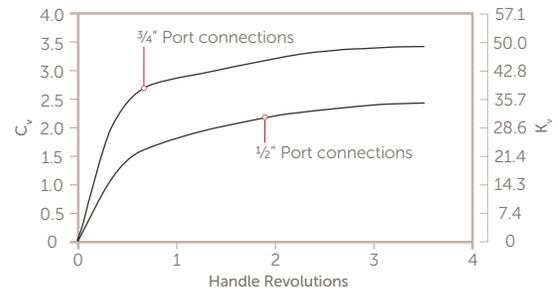
*Actual valve performance varies with pressure and temperature; refer to actual ratings in performance data.

PERFORMANCE DATA

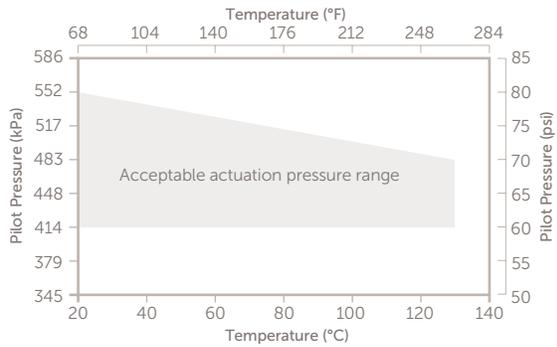
Media Temperature vs. Media Pressure



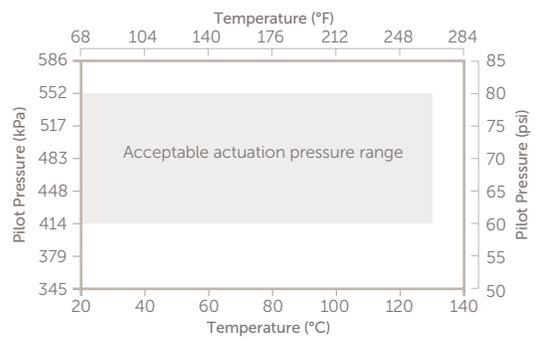
CR8 Manual Multi-turn Valve
 C_v/K_v vs. Number of Handle Revolutions



Media Temperature vs. Actuator Pilot Pressure –
 Normally Open Valve



Media Temperature vs. Actuator Pilot Pressure –
 Normally Closed Valve



VALVE RELIABILITY TEST RESULTS

Valve qualification testing

| Test type | Test conditions | Acceptance criteria | Test results |
|--------------------------|--|---|---|
| Burst pressure | Hydraulic oil pressure increased until leakage detected | Burst pressure must be >2 times rated pressure | PASS |
| Accelerated life testing | 37% HCl acid at 552 kPa (80 psig) @ 22°C (71°F) for 2 million cycles | No leakage in functional performance up to 2 million cycles | PASS No external or port-to-port leakage <0.05 cc H ₂ O/hr |
| | Cabot Semi-Sperse® 12 slurry at 241 kPa (35 psig) @ 22°C (71°F) for 1.5 million cycles | No leakage in functional performance for up to 1.5 million cycles | PASS No external or port-to-port leakage <20 mL/hr |
| Pressure envelope | 827 kPa (120 psig) water @ 23°C (73°F) | No external leakage failures for 1 million cycles @ 1.5 times rated pressure | PASS No external leakage |
| | 621 kPa (90 psig) hydraulic oil @ 130°C (266°F) | No external leakage failures for 1 million cycles @ 1.5 times rated pressure | PASS No external leakage |
| Actuation cycle testing | 552 kPa (80 psig) water @ 23°C (73°F) for 4 million cycles | No leakage in functional performance for: <ul style="list-style-type: none"> • Pneumatic up to 4 million cycles • Manual up to 5,000 cycles | PASS No external or port-to-port leakage <0.050 cc H ₂ O/hr |
| | 414 kPa (60 psig) hydraulic oil @ 130°C (266°F) for 1 million cycles | No leakage in functional performance for up to 500K cycles in normally open valves | PASS No external or port-to-port leakage <0.050 cc H ₂ O/hr |
| | 414 kPa (60 psig) hydraulic oil @ 130°C (266°F) for 1 million cycles | No leakage in functional performance in normally closed valves for: <ul style="list-style-type: none"> • Pneumatic up to 1 million cycles • Manual up to 5,000 cycles | PASS No external or port-to-port leakage <0.050 cc H ₂ O/hr |

Valve test procedure in production

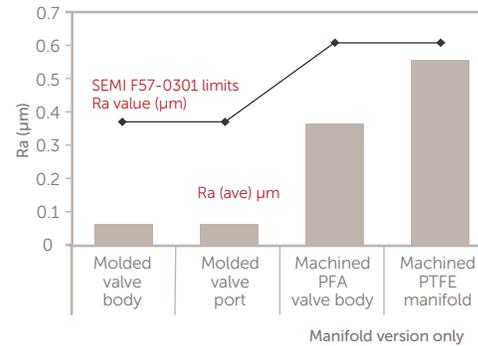
| Test type | Test conditions | Acceptance criteria |
|-------------------------|---------------------------------------|---|
| External media leak | 552 kPa (80 psig) CDA | Zero bubbles per minute through 1/32" ID tube immersed in DI water |
| Port-to-port valve test | 552 kPa (80 psig) CDA to valve outlet | Less than 4 bubbles per minute through 1/32" ID tube immersed in DI water |
| Valve actuation | Pressure decay 552 kPa (80 psig) CDA | Less than 7 kPa (1 psig/min) pressure drop |

SURFACE ROUGHNESS SPECIFICATION

Surface roughness specification

| Component description | SEMI® F57-0301 limits Ra value | Typical Entegris test results Ra value |
|-----------------------------|--------------------------------|--|
| Injection molded valve body | ≤0.38 μm (≤15 μin) | 0.07 μm (2.6 μin) |
| Machined PTFE diaphragm | ≤0.38 μm (≤15 μin) | 0.03 μm (1.3 μin) |
| Injection molded valve port | ≤0.38 μm (≤15 μin) | 0.07 μm (3.0 μin) |
| Machined PFA valve body | ≤0.62 μm (≤25 μin) | 0.37 μm (14.4 μin) |
| Machined PTFE manifold body | ≤0.62 μm (≤25 μin) | 0.57 μm (22.4 μin) |

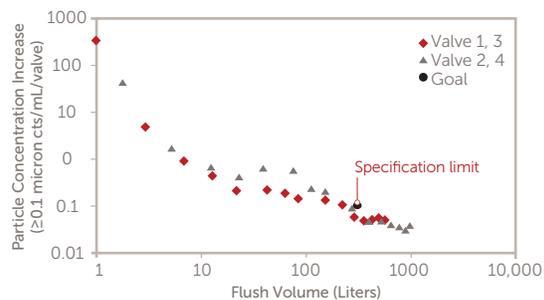
Surface Roughness



PARTICLE CONTRIBUTION SPECIFICATION

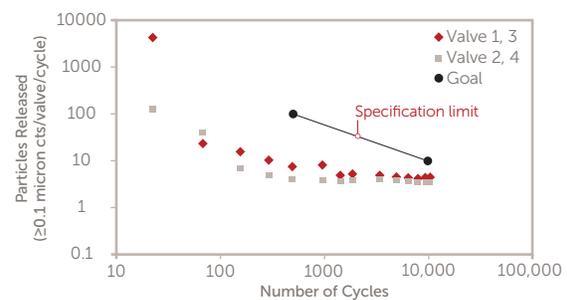
Because the SEMI F57-0301 particle contribution specification is still in development, Entegris has worked with several OEMs to establish a test method and particle contribution limits. Testing has verified the CR8 series valve in both standalone and manifolded configurations comply with the following particle contribution specification.

Flushing Particle Contribution



Note: During initial flushing, the device must contribute <0.1 particle/mL (particle size ≥0.1 μm) within 300 liters of flushing. During operation, the device must release <100 particles/actuation (particle size ≥0.1 μm) within 500 cycles and <10 particles/actuation (particle size ≥0.1 μm) within 10000 cycles.

Post-cyclic Particle Contribution



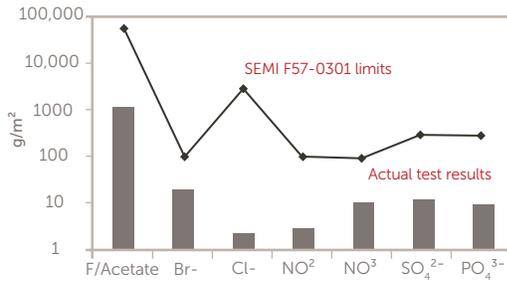
SURFACE EXTRACTABLE SPECIFICATION

Entegris, Inc. certifies that the CR8 series valves comply with the SEMI F57-0301 specification for Extractable Ionic and Metallic Contamination, Total Organic Carbon Contamination and Surface Roughness. Per SEMI F40 (section 12.1), the following test parameters were used:

- Test fluid used was ultrapure water and the tests were carried out at 85°C (185°F).
- Parts were leached after the prescribed rinse pretreatment
- Volumes of the test fluids used were 16.2 mL (0.54 oz)
- Soak time was seven days
- Calculated wetted surface areas were 0.0077 m²

Surface Extractable Specification

Extractable Ionic Contamination

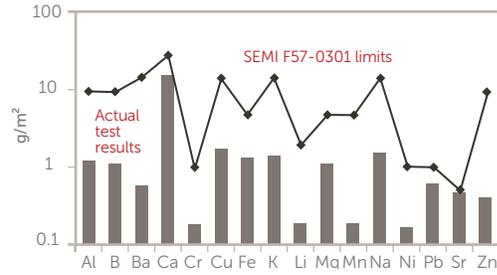


Surface extractable ionic contamination

| Aqueous leachate anions (IC) | SEMI F57-0301 limits static value at 85 ±5°C for 7 days | Actual test results molded PFA CR8 valves |
|---|---|---|
| Fluoride (F-/Acetate) | ≤60,000 µg/m ² | 1550.0 µg/m ² |
| Bromide (Br-) | ≤100 µg/m ² | 38.0 µg/m ² |
| Chloride (Cl-) | ≤3000 µg/m ² | 4.2 µg/m ² |
| Nitrate (NO ₂) | ≤100 µg/m ² | 5.4 µg/m ² |
| Nitrate (NO ₃) | ≤100 µg/m ² | 13.5 µg/m ² |
| Sulphate (SO ₄ ₂) | ≤300 µg/m ² | <21.0* µg/m ² |
| Phosphate (PO ₄ ₃) | ≤300 µg/m ² | <10.0* µg/m ² |

* Below detection limit

Extractable Metallic Contamination



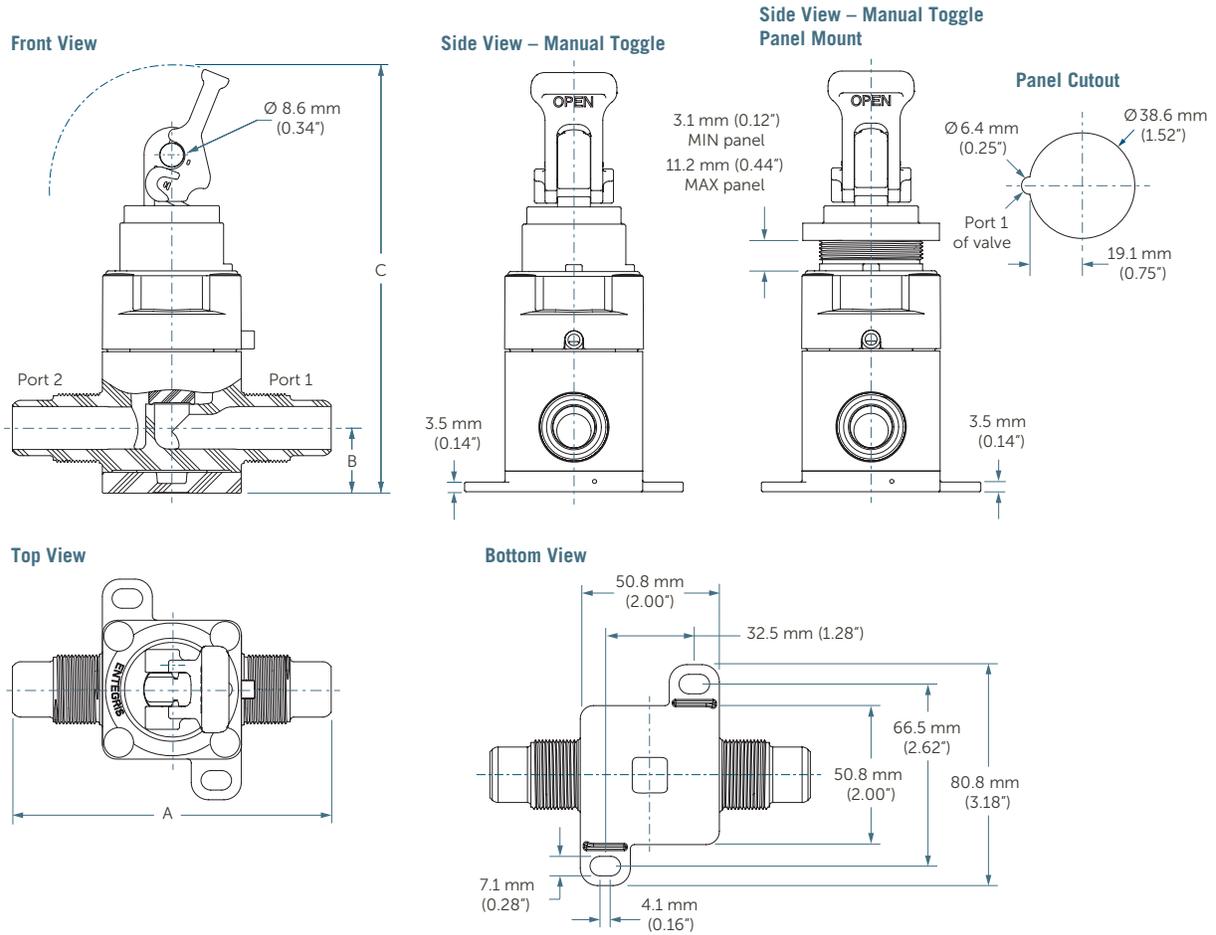
Surface extractable metallic contamination

| Aqueous Leachate Trace Metals (ICP-MS) | SEMI F57-0301 Limits Static Value at 85 ±5°C for 7 days | Actual Test Results Molded PFA CR8 Valves |
|--|---|---|
| Al | ≤10.0 µg/m ² | 1.80 µg/m ² |
| B | ≤10.0 µg/m ² | <1.40* µg/m ² |
| Ba | ≤15.0 µg/m ² | <0.79* µg/m ² |
| Ca | ≤30.0 µg/m ² | 26.50 µg/m ² |
| Cr | ≤1.0 µg/m ² | <0.34* µg/m ² |
| Cu | ≤15.0 µg/m ² | 3.10 µg/m ² |
| Fe | ≤5.0 µg/m ² | 2.15 µg/m ² |
| K | ≤15.0 µg/m ² | 2.27 µg/m ² |
| Li | ≤2.0 µg/m ² | <0.36* µg/m ² |
| Mg | ≤5.0 µg/m ² | 1.40 µg/m ² |
| Mn | ≤5.0 µg/m ² | <0.36* µg/m ² |
| Na | ≤15.0 µg/m ² | 2.70 µg/m ² |
| Ni | ≤1.0 µg/m ² | <0.30* µg/m ² |
| Pb | ≤1.0 µg/m ² | <0.81* µg/m ² |
| Sr | ≤0.5 µg/m ² | <0.71* µg/m ² |
| Zn | ≤10.0 µg/m ² | <0.65* µg/m ² |

* Below detection limit

DIMENSIONS

Manual Toggle and Manual Toggle Panel Mount



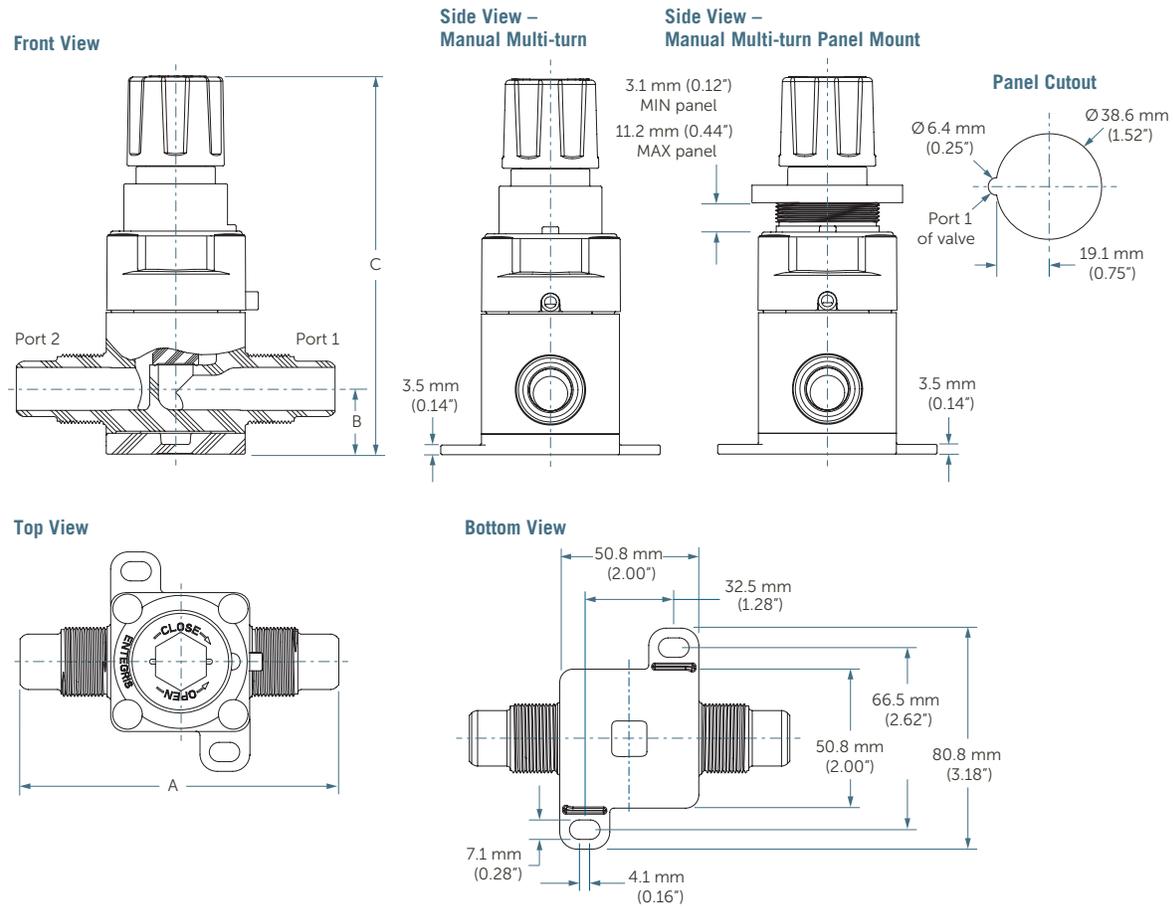
DIMENSIONS

| Port connection | Flow factor C_v | Flow factor K_v | A | B | C |
|-----------------------------|-------------------|-------------------|------------------|-----------------|------------------|
| 1/4" PureBond | 1.8 | 25.7 | 120.9 mm (4.76") | 17.5 mm (0.69") | 151.1 mm (5.95") |
| 1/2" Flaretek | 2.4 | 34.3 | 110.5 mm (4.35") | 17.5 mm (0.69") | 151.1 mm (5.95") |
| 1/2" Super 300 Type Pillar* | 2.4 | 34.3 | 103.1 mm (4.06") | 17.5 mm (0.69") | 151.1 mm (5.95") |
| 1/2" PrimeLock | 2.4 | 34.3 | 107.2 mm (4.22") | 17.5 mm (0.69") | 151.1 mm (5.95") |
| 1/2" PureBond | 3.2 | 45.7 | 120.9 mm (4.76") | 23.9 mm (0.94") | 157.5 mm (6.20") |
| 3/4" Flaretek | 3.4 | 48.6 | 116.6 mm (4.59") | 23.9 mm (0.94") | 157.5 mm (6.20") |
| 3/4" Super 300 Type Pillar* | 3.4 | 48.6 | 112.8 mm (4.44") | 23.9 mm (0.94") | 157.5 mm (6.20") |
| 3/4" PrimeLock | 3.4 | 48.6 | 121.0 mm (4.76") | 23.9 mm (0.94") | 157.5 mm (6.20") |

*Pillar nuts, inserts and gauge rings are supplied separately.

DIMENSIONS (CONTINUED)

Manual Multi-turn and Manual Multi-turn Panel Mount



DIMENSIONS

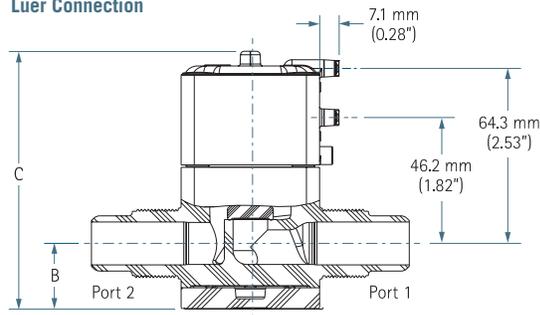
| Port connection | Flow factor C_v | Flow factor K_v | A | B | C |
|-----------------------------|-------------------|-------------------|------------------|-----------------|------------------|
| 1/4" PureBond | 1.8 | 25.7 | 120.9 mm (4.76") | 17.5 mm (0.69") | 135.9 mm (5.35") |
| 1/2" Flaretek | 2.4 | 34.3 | 110.5 mm (4.35") | 17.5 mm (0.69") | 135.9 mm (5.35") |
| 1/2" Super 300 Type Pillar* | 2.4 | 34.3 | 103.1 mm (4.06") | 17.5 mm (0.69") | 135.9 mm (5.35") |
| 1/2" PrimeLock | 2.4 | 34.3 | 107.2 mm (4.22") | 17.5 mm (0.69") | 135.9 mm (5.35") |
| 1/2" PureBond | 3.2 | 45.7 | 120.9 mm (4.76") | 23.9 mm (0.94") | 142.2 mm (5.60") |
| 3/4" Flaretek | 3.4 | 48.6 | 116.6 mm (4.59") | 23.9 mm (0.94") | 142.2 mm (5.60") |
| 3/4" Super 300 Type Pillar* | 3.4 | 48.6 | 112.8 mm (4.44") | 23.9 mm (0.94") | 142.2 mm (5.60") |
| 3/4" PrimeLock | 3.4 | 48.6 | 121.0 mm (4.76") | 23.9 mm (0.94") | 142.2 mm (5.60") |

*Pillar nuts, inserts and gauge rings are supplied separately.

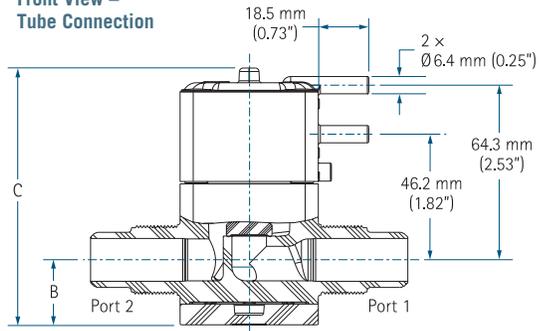
DIMENSIONS (CONTINUED)

Pneumatic

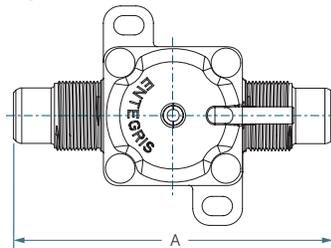
Front View –
Luer Connection



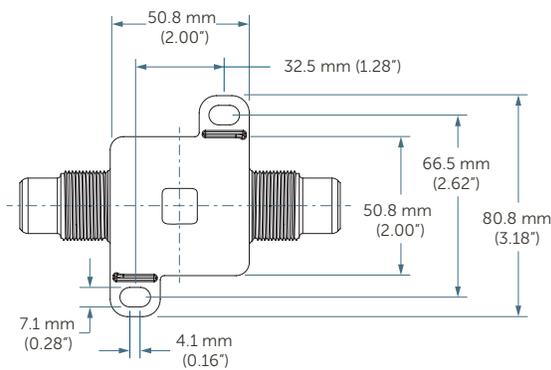
Front View –
Tube Connection



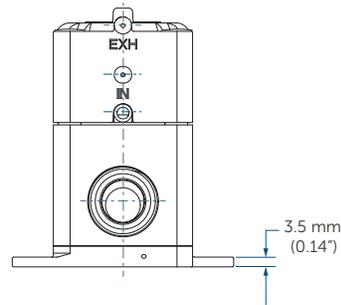
Top View



Bottom View



Side View



DIMENSIONS

| Port connection | Flow factor C_v | Flow factor K_v | A | B | C |
|---------------------------------|-------------------|-------------------|-------------------|-----------------|-----------------|
| 1/4" PureBond* | 1.8 | 25.7 | 120.9 mm (4.76") | 17.5 mm (0.69") | 88.1 mm (3.47") |
| 1/2" Flaretek | 2.4 | 34.3 | 110.5 mm (4.35") | 17.5 mm (0.69") | 88.1 mm (3.47") |
| 1/2" Super 300 Type Pillar** | 2.4 | 34.3 | 103.1 mm (4.06") | 17.5 mm (0.69") | 88.1 mm (3.47") |
| 1/2" PrimeLock | 2.4 | 34.3 | 107.2 mm (4.22") | 17.5 mm (0.69") | 88.1 mm (3.47") |
| 1/2" PureBond* | 3.2 | 45.7 | 120.9 mm (4.76")* | 23.9 mm (0.94") | 94.5 mm (3.72") |
| 3/4" Flaretek | 3.4 | 48.6 | 116.6 mm (4.59") | 23.9 mm (0.94") | 94.5 mm (3.72") |
| 3/4" Super 300 Type Pillar** | 3.4 | 48.6 | 112.8 mm (4.44") | 23.9 mm (0.94") | 94.5 mm (3.72") |
| 3/4" PrimeLock | 3.4 | 48.6 | 120.9 mm (4.76") | 23.9 mm (0.94") | 94.5 mm (3.72") |

*For PureBond CR8 valves with tube pilot port configurations, PureBond weld lengths less than standard weld lengths need to consider rotated tube pilot ports orientations not over the inlet or outlet ports.

**Pillar nuts, inserts and gauge rings are supplied separately.

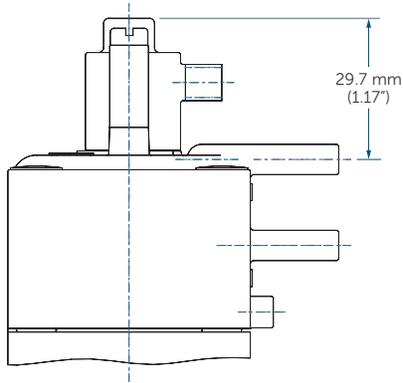
SENSING OPTION DIMENSIONAL INFORMATION

Remote Position Indication Option

Electronic valve position sensing for monitoring valve open and closed positions.

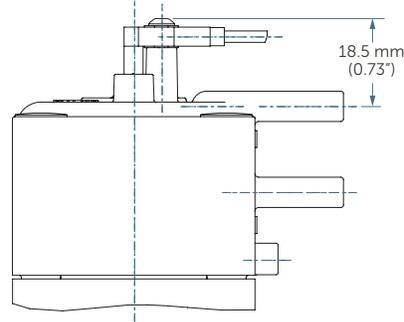
NOTE: To enable the remote position indication option you must special order the Espy® sensor (-ES) or the Omron® sensor (-OM) on the valve. In addition, order the Espy Position Indication Mounting Adapter (ES-IN-01) or Omron Position Sensor Indicator (EE-SX771R or EE-SX771A), which are sold separately.

CR8 with Espy Sensor



Entegris Espy part number ES-IN-01

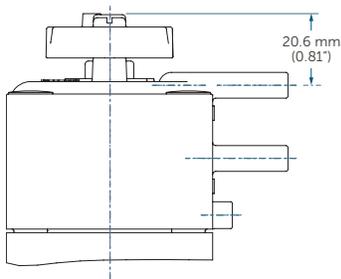
CR8 with Omron Sensor



Omron part number EE-SX771R or EE-SX771A

Restricted Open/Closed Dimensional Information

CR8 with Restricted Open or Restricted Closed



Note: Height dimension includes stem in open position.

- Restricted open option allows for a manual variable limit control on the open travel of a pneumatically controlled valve
- Restricted closed option allows for a manual variable limit control on the closed travel of a pneumatically controlled valve
- Both options are offered in a normally closed and normally open pneumatic actuators

ORDERING INFORMATION

CR8 Manual and Pneumatic Valves: part number

CR8-

Port configuration

4P8F = Port 1 (1/4" PureBond), port 2 (1/2" Flaretek)
4P8W = Port 1 (1/4" PureBond), port 2 (1/2" Super 300 Type Pillar)
4P8K = Port 1 (inlet) 1/4" PureBond, port 2 (outlet) 1/2" PrimeLock
4PP = Port 1/port 2 (1/4" PureBond)
8FF = Port 1/port 2 (1/2" Flaretek)
8FS = Port 1 (1/2" Flaretek), port 2 (1/2" Flaretek "SpaceSaver")
8SF = Port 1 (1/2" Flaretek "SpaceSaver"), port 2 (1/2" Flaretek)
8F4P = Port 1 (1/2" Flaretek), port 2 (1/4" PureBond)
8FP = Port 1 (1/2" Flaretek), port 2 (1/2" PureBond)
8TT = Port 1/port 2 (1/2" tube stub, no nuts)
8WW = Port 1/port 2 (1/2" Super 300 Type Pillar)
8W4P = Port 1 (1/2" Super 300 Type Pillar), port 2 (1/4" PureBond)
8WP = Port 1 (1/2" Super 300 Type Pillar), port 2 (1/2" PureBond)
8KK = Port 1 (inlet), port 2 (outlet) 1/2" PrimeLock
8KV = Port 1 (inlet) 1/2" PrimeLock, port 2 (outlet) 1/2" PrimeLock "SpaceSaver"
8K4P = Port 1 (inlet) 1/2" PrimeLock, port 2 (outlet) 1/4" PureBond
8KP = Port 1 (inlet) 1/2" PrimeLock, port 2 (outlet) 1/2" PureBond
8VV = Port 1 (inlet), port 2 (outlet) 1/2" PrimeLock "SpaceSaver"
8VK = Port 1 (inlet) 1/2" PrimeLock "SpaceSaver", port 2 (outlet) 1/2" PrimeLock
8PF = Port 1 (1/2" PureBond), port 2 (1/2" Flaretek)
8PK = Port 1 (inlet) 1/2" PureBond, port 2 (outlet) 1/2" PrimeLock
8P12K = Port 1 (inlet) 1/2" PureBond, port 2 (outlet) 3/4" PrimeLock
8PP = Port 1/port 2 (1/2" PureBond)
8P12F = Port 1 (1/2" PureBond), port 2 (3/4" Flaretek)
8PW = Port 1 (1/2" PureBond), port 2 (1/2" Super 300 Type Pillar)
8P12W = Port 1 (1/2" PureBond), port 2 (3/4" Super 300 Type Pillar)
12FF = Port 1/port 2 (3/4" Flaretek)
12FS = Port 1 (3/4" Flaretek), port 2 (3/4" Flaretek "SpaceSaver")
12F8P = Port 1 (3/4" Flaretek), port 2 (1/2" PureBond)
12SF = Port 1 (3/4" Flaretek "SpaceSaver"), port 2 (3/4" Flaretek)
12TT = Port 1/port 2 (3/4" tube stub, no nuts)
12KK = Port 1 (inlet), port 2 (outlet) 3/4" PrimeLock
12KV = Port 1 (inlet) 3/4" PrimeLock, port 2 (outlet) 3/4" PrimeLock "SpaceSaver"
12K8P = Port 1 (inlet) 3/4" PrimeLock, port 2 (outlet) 1/2" PureBond
12VV = Port 1 (inlet), port 2 (outlet) 3/4" PrimeLock "SpaceSaver"
12VK = Port 1 (inlet) 3/4" PrimeLock "SpaceSaver", port 2 (outlet) 3/4" PrimeLock
12WW = Port 1/port 2 (3/4" Super 300 Type Pillar)
12W8P = Port 1 (3/4" Super 300 Type Pillar), port 2 (1/2" PureBond)

Actuator

2T = 2-way manual toggle
2M = 2-way manual multi-turn
2CT = 2-way normally closed tube pilot port
2UT = 2-way normally open tube pilot port
2CL = 2-way normally closed Luer pilot port
2UL = 2-way normally open Luer pilot port

Special order

3 = PFA Flaretek nut*
6 = CPFA Flaretek nut*
II = FlareLock® II*
N = Pillar nuts, inserts and gauge rings included**
P1 = Rotated actuator positions
L = LOTO options***
PM = Panel-mount options
RO = Restricted open
RC = Restricted closed
OM = Omron sensor
= NA

Note: Not all configurations are permitted. Consult Entegris if multiple special order features are required.

Contact factory if "SpaceSaver" port connections are to be used in media containing a fluorinated surfactant.

*Available for Flaretek port connections only.

**Available for Super 300 Type Pillar port connections only.

***Available for 2-way manual multi-turn (M) only.

FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit entegris.com and select the Contact Us link to find the customer service center nearest you.

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