

3/4", 1", and 1 1/4" Integra® Plus WS Manual and Pneumatic Valves

*Excels in ultrapure bulk chemical
and CMP slurry applications*

Entegris offers a complete line of valves specifically designed for use in chemically corrosive semiconductor processing applications. The Integra® Plus weir style (WS) valves give customers another reliable option for dispensing slurry and ultrapure chemicals in chemical mechanical planarization (CMP) and bulk chemical delivery applications.

Clean Flow Path

Integra Plus WS valves have a weir-style valve body design that streamlines the flow path and eliminates dead volume. This streamlined design, combined with high-purity, chemically resistant PFA and PTFE construction, keeps the flow path clean and free from contaminants. Our single-piece PTFE diaphragm eliminates potential separation, which extends valve life and maintains a clean flow path. This is especially important in critical CMP processes that occur in the latter stages of the manufacturing process – the point where the fab has the most time and money invested in a wafer or substrate. Integra Plus WS valves provide gentle flow that minimizes slurry agglomeration.

System Design Flexibility

Integra Plus WS valves are forward and backward compatible – meaning there is not a wrong way to install the inlet and outlet ports. Offset, integrated mounting feet allow customers to nest multiple valves within a small footprint, providing quick and easy valve installation.

Entegris offers 3/4", 1", and 1 1/4" Integra Plus WS valves in 2-way configurations with either manual multi-turn or pneumatic normally closed or normally open actuators. And, they are available with fully characterized standard PrimeLock®, Flaretek®, "SpaceSaver", and PureBond® pipe port connections. This broad product offering provides system flexibility and easy installation into any fluid handling system, saving customers valuable time and money.



High flow, small footprint

Excellent Resistance to Base pH Chemistries

Entegris offers the option for Integra Plus WS valve external, nonwetted components to be made from Halar® ECTFE, ethylene-chlorotrifluoroethylene. ECTFE is a partially fluorinated polymer and considered one of the most chemically resistant. It is a high crystalline polymer with small spherulites, which make it work well in caustic environments such as TMAH, NH₄OH, KOH, and NaOH.

Integra Plus WS valves with ECTFE components are ideal for use in chemical distribution units, valve box manifolds, and wet processing equipment where there is external exposure to extreme base chemistry fumes and/or where direct external contact with the base chemistry solution is inevitable. Under severe base chemistry applications, using Integra valves with ECTFE components will extend valve life and maintain system uptime while decreasing your cost of ownership.

APPLICATIONS

- Base chemistry applications where there is external exposure to the base solution or its fumes
- Bulk chemical delivery (BCD) lines within semiconductor fabs
- Chemical mechanical planarization (CMP) slurry dispense
- Wet etch and clean (WEC) ultrapure chemical handling
- TFT/LCD corrosive chemical handling

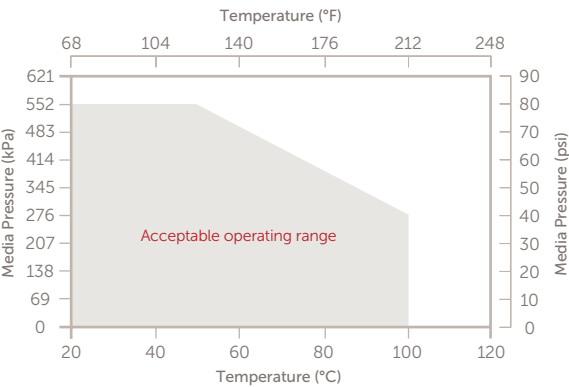
SPECIFICATIONS

Materials of construction	All wetted parts	PFA, PTFE		
	Exterior actuator parts	PVDF or ECTFE, red PVDF indicator		
	Interior actuator parts	PVDF, Viton®, EPDM, and PTFE		
	Spring (pneumatic version only)	Coated stainless steel		
Operating conditions	Media pressure at:	21°C (70°F) vacuum	Inlet/outlet	913 mbar (27" Hg) to 552 kPa (80 psig)
	PVDF actuator	100°C (212°F)	Inlet/outlet	275 kPa (40 psig)*
	ECTFE actuator	35°C (95°F)	inlet/outlet	552 kPa (80 psig)*
	Actuation pressure range (Normally closed version only)	414 – 552 kPa (60 – 80 psig)*		
	Actuation pressure (Normally open version only)	414 kPa (60 psig)		
	Temperature range:			
	Ambient (PVDF actuator)	21° – 50°C (70° – 122°F)		
	Ambient (ECTFE actuator)	21° - 35°C (70° - 95°F)		
	Fluid (PVDF actuator)	21° – 100°C (70° – 212°F)		
	Fluid (ECTFE actuator)	21° – 35°C (70° – 95°F)		
Pneumatic supply port (pneumatic version only)	1/8" FNPT (refer to dimensional drawings for the pilot supply and pilot vent port locations on normally open and normally closed valves.)			
Environmental compliance	RoHs, WEEE			

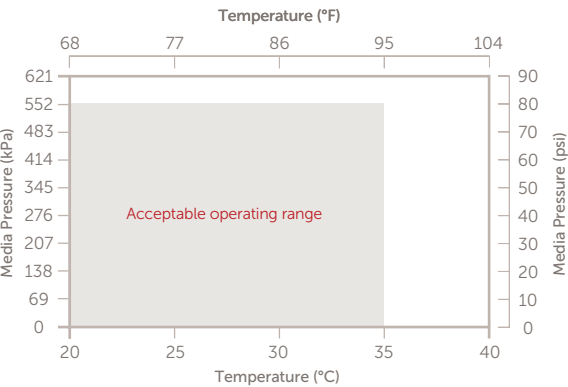
*Actual valve performance varies with pressure and temperature; refer to actual ratings in performance data.

PERFORMANCE DATA

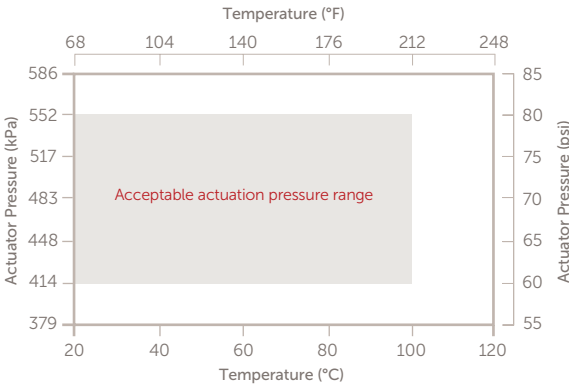
Media Temperature vs. Media Pressure (PVDF Actuator)



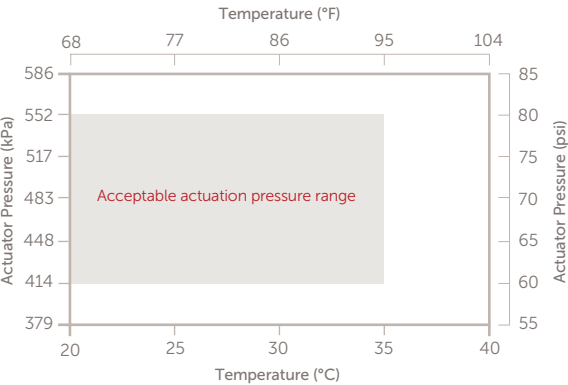
Media Temperature vs. Media Pressure (ECTFE Actuator)



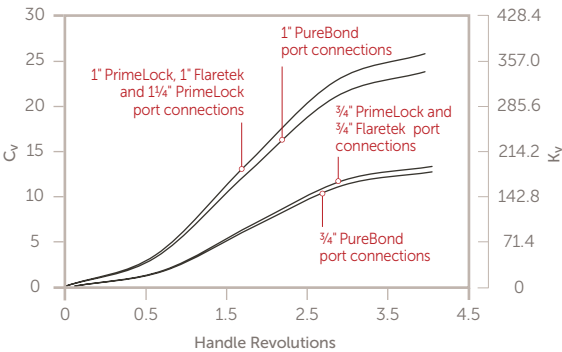
Media Temperature vs. Actuator Pressure Normally Closed Valve (PVDF Actuator)



Media Temperature vs. Actuator Pressure Normally Closed Valve (ECTFE Actuator)



Manual Multi-turn Valve
Cv/Kv vs. Number of Handle Revolutions



VALVE RELIABILITY TEST RESULTS

Valve Qualification Testing

Extensive qualification testing ensures products meet all design requirements for use in even the most demanding environments. Whenever possible, this testing is carried out in actual or simulated customer-use conditions.

Burst Pressure — quantifies the maximum pressure the valve can safely contain media, providing confidence in the product design.

	Test conditions	Acceptance criteria	Test results
	Hydraulic oil pressure increased until leakage detected; test performed @ 50°C (122°F) and 100°C (212°F) for PVDF, and @ 23°C (73°F) for ECTFE	Burst pressure must be >3 times rated pressure	PASS

Safety Pressure — determines the duration the valve can safely operate under pressure, assuring long-term product performance and safety.

	Test conditions	Acceptance criteria	Test results
Pressure envelope cyclic testing	690 kPa (100 psig) oil @ 50°C (122°F) for PVDF, and @ 35°C (95°F) for ECTFE	No external media leakage for 1 million cycles @ 1.25 times rated pressure applied to each media port	PASS – PVDF PASS – ECTFE
Pressure envelope cyclic testing	344 kPa (50 psig) oil @ 100°C (212°F) for PVDF	No external media leakage for 1 million cycles @ 1.25 times rated pressure applied to each media port	PASS – PVDF N/A – ECTFE

Accelerated Life Cycle — determines how many cycles the valve can perform reliably and safely in various process environments, including high temperatures, vacuum conditions, and with corrosive chemicals.

	Test conditions	Performance target	Test results
Actuation cyclic testing	552 kPa (80 psig) water @ 50°C (122°F) for PVDF, and @ 35°C (95°F) for ECTFE	No external media leakage. Port-to-port seal <0.05 cc H ₂ O/hr for PVDF over 1.5 million cycles, ECTFE 1.25 million cycles	PASS – PVDF PASS – ECTFE
Actuation cyclic testing	275 kPa (40 psig) water @ 100°C (212°F)	No external media leakage. Port-to-port seal <0.05 cc H ₂ O/hr for up to 1.5 million cycles	PASS – PVDF N/A – ECTFE
Actuation cyclic testing with vacuum	Continuous vacuum 27" Hg water @ 23°C (73°F)	No external media leakage. Port-to-port seal <0.05 cc H ₂ O/hr for over 1.5 million cycles	PASS – PVDF N/A – ECTFE
Actuation cyclic testing with 25% TMAH	25% TMAH @ 552 kPa (80 psig) @ 23°C (73°F) for PVDF, and @ 35°C (95°F) for ECTFE	No external media leakage. Port-to-port seal <0.05 cc H ₂ O/hr for PVDF over 1.5 million cycles, ECTFE 1.0 million cycles	PASS – PVDF PASS – ECTFE
Actuation cyclic testing with slurry	Cabot Semi-Sperse® 12 slurry @ 103 kPa (15 psig) @ 23°C (73°F)	No external media leakage. Port-to-port seal <20 cc/hr for up to 950K cycles	PASS – PVDF* N/A – ECTFE

**Actuation Cyclic Testing with Slurry: In this accelerated slurry test, the Integra Plus WS valve had an average-cycles-to-failure of 1.2 million cycles. These valves cycled 40% longer before failure than the competitive weir-style valve in the same aggressive slurry testing.*

Production Performance Evaluation

One hundred percent of Integra Plus WS valves undergo manufacturing performance testing and validation to assure product performance, functionality and safety – before the product ever arrives on site.

Test	Test conditions	Acceptance criteria
External media seal	689 kPa (100 psig) CDA	Zero bubbles per minute through 1/32" ID tube immersed in DI water
Port-to-port valve seal	552 kPa (80 psig) CDA	<15 bubbles per minute through 1/32" ID tube immersed in DI water
Valve actuation test	Handle is rotated to the full open and full closed position on the manual valve. Pneumatic valves are tested for actuator air leakage using a highly restricted pneumatic supply.	The valves reach full opened and closed positions, according to stroke specifications.

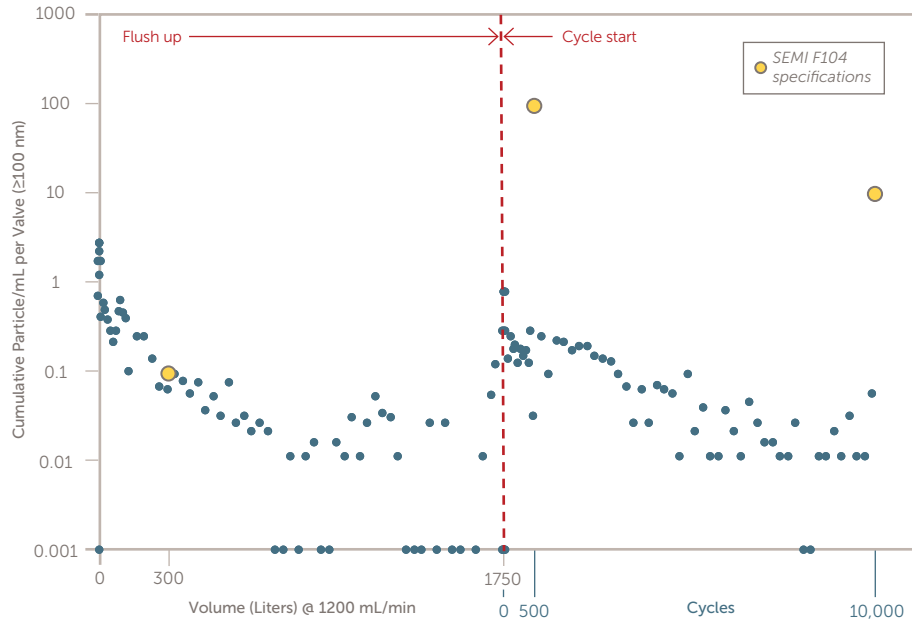
Particle Contribution Testing

Entegris has developed a more stringent method for liquid particle testing using SEMI® F104 as a guideline. This testing enables Entegris to more accurately test particle contribution from the test subjects. During this more stringent test method, valves were not removed from the system between the flush and cycle test stages. By not disconnecting the valves

after flushing (per the SEMI F104 guideline), a more accurate measurement of particle levels can be made when valve starts cycling. The SEMI F104 particle contribution specification measures particles ≥ 100 nm in size. Particles ≥ 30 nm in size were also measured.

≥ 100 nm Particle Size

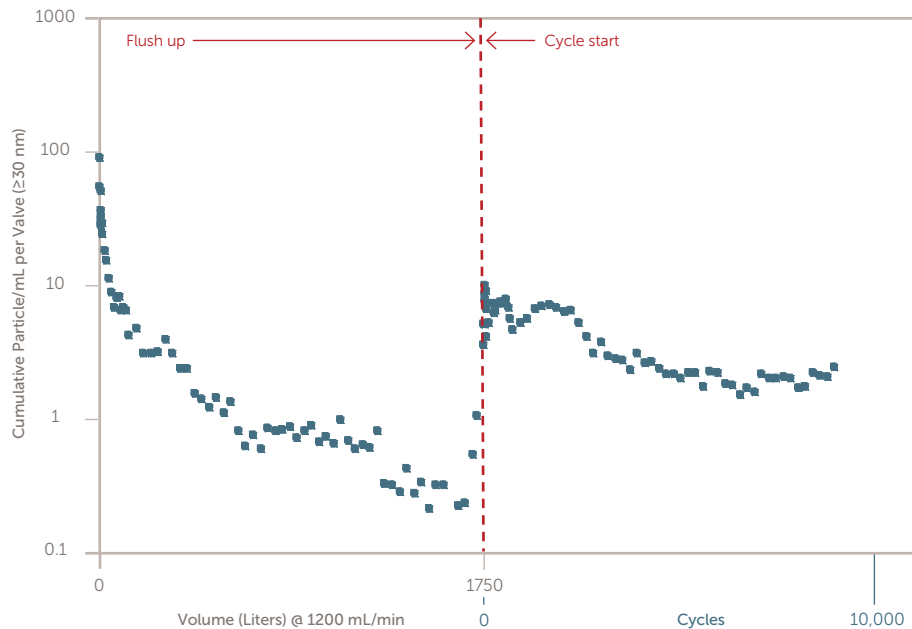
Integra Plus WS Valves; Average of Two Pairs in DI Water



Note: Per SEMI F104 particle contribution specification, during initial flushing, the device must contribute <0.1 particle/mL (particle size $\geq 0.1 \mu\text{m}$) within 300 liters of flushing. During operation, the device must release <100 particles/actuation (particle size $\geq 0.1 \mu\text{m}$) within 500 cycles and <10 particles/actuation (particle size $\geq 0.1 \mu\text{m}$) within 10,000 cycles.

≥ 30 nm Particle Size

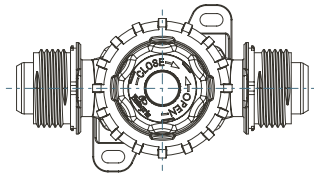
Integra Plus WS Valves; Average of Two Pairs in DI Water



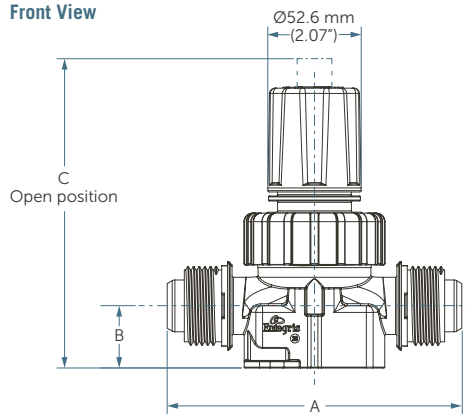
DIMENSIONS

Integra Plus WS 2-way, Manual Multi-turn

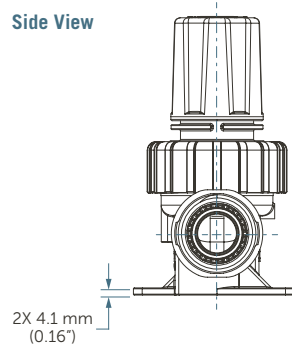
Top View



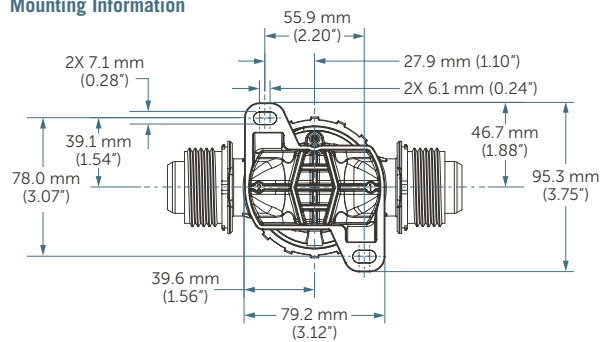
Front View



Side View



Mounting Information

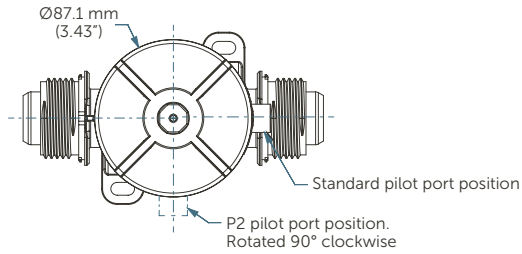


Port connection	Flow factor C _v	Flow factor K _v	DIMENSIONS		
			A (without nuts)	B	C
¾" PrimeLock	13.7	195.6	156.5 mm (6.16")	28.4 mm (1.12")	164.6 mm (6.48")
¾" Flaretek	13.7	195.6	149.6 mm (5.89")	28.4 mm (1.12")	164.6 mm (6.48")
¾" PureBond	13.1	187.1	155.4 mm (6.12")	28.4 mm (1.12")	164.6 mm (6.48")
1" PrimeLock	25.8	368.4	166.1 mm (6.54")	35.1 mm (1.38")	174.2 mm (6.86")
1" Flaretek	25.8	368.4	164.1 mm (6.46")	35.1 mm (1.38")	174.2 mm (6.86")
1" PureBond	23.8	339.9	155.4 mm (6.12")	35.1 mm (1.38")	174.2 mm (6.86")
1¼" PrimeLock	25.8	368.4	182.9 mm (7.20")	35.1 mm (1.38")	174.2 mm (6.86")

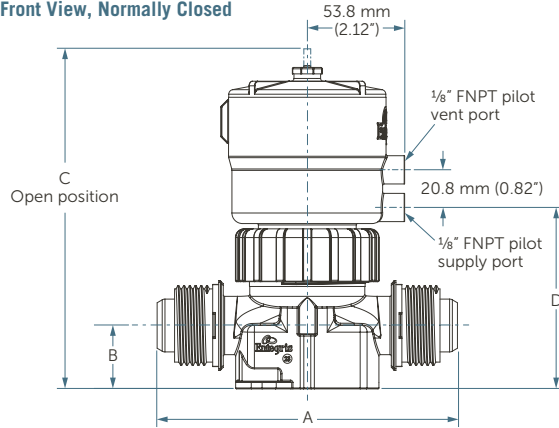
Note: Dimensions are the same regardless of actuator material (PVDF or ECTFE).

Integra Plus WS 2-way, Pneumatic

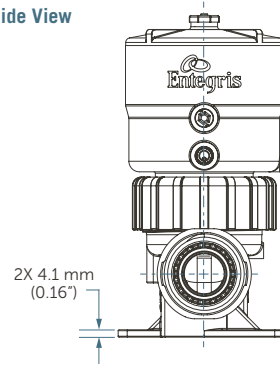
Top View



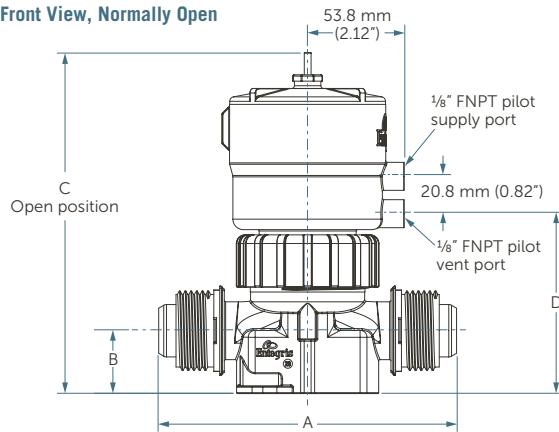
Front View, Normally Closed



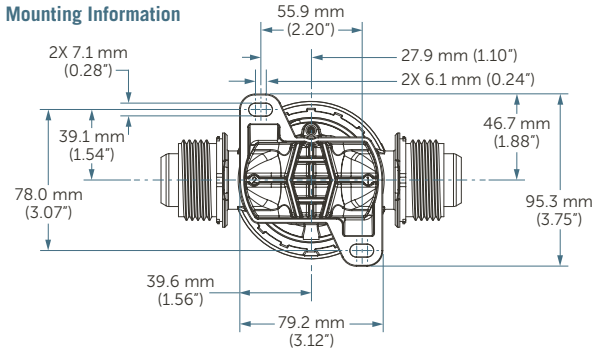
Side View



Front View, Normally Open



Mounting Information

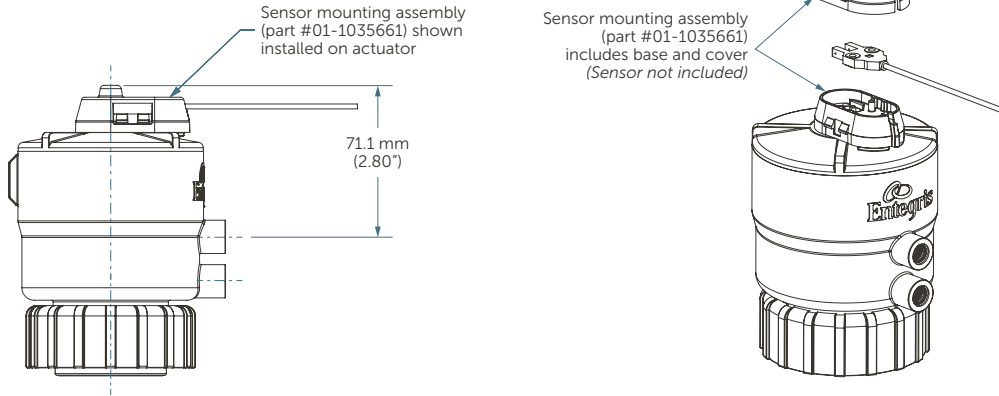


Port connection	Flow factor C _v	Flow factor K _v	DIMENSIONS			
			A (without nuts)	B	C	D
3/4" PrimeLock	13.7	195.6	156.5 mm (6.16")	28.4 mm (1.12")	180.1 mm (7.09")	90.4 mm (3.56")
3/4" Flaretek	13.7	195.6	149.6 mm (5.89")	28.4 mm (1.12")	180.1 mm (7.09")	90.4 mm (3.56")
3/4" PureBond	13.1	187.1	155.4 mm (6.12")	28.4 mm (1.12")	180.1 mm (7.09")	90.4 mm (3.56")
1" PrimeLock	25.8	368.4	166.1 mm (6.54")	35.1 mm (1.38")	189.7 mm (7.47")	100.1 mm (3.94")
1" Flaretek	25.8	368.4	164.1 mm (6.46")	35.1 mm (1.38")	189.7 mm (7.47")	100.1 mm (3.94")
1" PureBond	23.8	339.9	155.4 mm (6.12")	35.1 mm (1.38")	189.7 mm (7.47")	100.1 mm (3.94")
1 1/4" PrimeLock	25.8	368.4	182.9 mm (7.20")	35.1 mm (1.38")	189.7 mm (7.47")	100.1 mm (3.94")

Note: Dimensions are the same regardless of actuator material (PVDF or ECTFE).

Optional Remote Electronic Position Indication

Side View



Omron® position sensor part number (EE-SX770R or EE-SX770A), which is sold separately.

ORDERING INFORMATION

Integra Plus WS 2-way, Manual, and Pneumatic Valves: part number

WSPXX – XX – XXXX – XX

Port configuration

- 12FF = Ports 1 and 2 = 3/4" Flaretek
- 12FS = Port 1 = 3/4" Flaretek, Port 2 = 3/4" Flaretek "SpaceSaver"
- 12KK = Ports 1 and 2 = 3/4" PrimeLock
- 12KV = Port 1 = 3/4" PrimeLock, Port 2 = 3/4" PrimeLock "SpaceSaver"
- 12PF = Port 1 = 3/4" PureBond pipe, Port 2 = 3/4" Flaretek
- 12PK = Port 1 = 3/4" PureBond pipe, Port 2 = 3/4" PrimeLock
- 12PP = Ports 1 and 2 = 3/4" PureBond® pipe
- 12PS = Port 1 = 3/4" PureBond pipe, Port 2 = 3/4" Flaretek "SpaceSaver"
- 12PV = Port 1 = 3/4" PureBond pipe, Port 2 = 3/4" PrimeLock "SpaceSaver"
- 12SS = Ports 1 and 2 = 3/4" Flaretek "SpaceSaver"
- 12VV = Ports 1 and 2 = 3/4" PrimeLock "SpaceSaver"
- 16FF = Ports 1 and 2 = 1" Flaretek
- 16FS = Port 1 = 1" Flaretek, Port 2 = 1" Flaretek "SpaceSaver"
- 16KK = Ports 1 and 2 = 1" PrimeLock
- 16KV = Port 1 = 1" PrimeLock, Port 2 = 1" PrimeLock "SpaceSaver"
- 16PF = Port 1 = 1" PureBond pipe, Port 2 = 1" Flaretek
- 16PK = Port 1 = 1" PureBond pipe, Port 2 = 1" PrimeLock
- 16P20K = Port 1 = 1" PureBond pipe, Port 2 = 1 1/4" PrimeLock
- 16PP = Ports 1 and 2 = 1" PureBond pipe
- 16PS = Port 1 = 1" PureBond pipe, Port 2 = 1" Flaretek "SpaceSaver"
- 16PV = Port 1 = 1" PureBond pipe, Port 2 = 1" PrimeLock "SpaceSaver"
- 16P20V = Port 1 = 1" PureBond pipe, Port 2 = 1 1/4" PrimeLock "SpaceSaver"
- 16SS = Ports 1 and 2 = 1" Flaretek "SpaceSaver"
- 16VV = Ports 1 and 2 = 1" PrimeLock "SpaceSaver"
- 20KK = Ports 1 and 2 = 1 1/4" PrimeLock
- 20KV = Port 1 = 1 1/4" PrimeLock, Port 2 = 1 1/4" PrimeLock "SpaceSaver"
- 20VV = Ports 1 and 2 = 1 1/4" PrimeLock "SpaceSaver"

Actuator

- 2C = Pneumatic normally closed
- 2U = Pneumatic normally open
- 2M = Manual multi-turn

Port size

- 12 = 3/4"
- 16 = 1"
- 20 = 1 1/4"

Options

- (Blank) = N/A
- 3 = PFA nut (Flaretek ports only)
- 6 = CPFA nut (Flaretek ports only)
- P2 = Pilot port rotated 90°
- EC = ECTFE external actuator components and PFA nuts

Optional Accessories

- 01-1035661 Remote position indication sensor mounting assembly for Integra Plus WS pneumatic valves
- 01-1030870 Safety lock out device for Integra Plus WS manual valves

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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