

Control devices

FLOW, PRESSURE, AND ON/OFF

This section includes stainless needle valves, our combination on/off needle valves, high pressure prime/purge and on/off valves, and VICI pressure regulators and flow controllers.

Because cast parts can introduce porosity and contamination, every VICI control device is assembled from components which are precision-machined from bar stock. This assures that every item has the same high quality workmanship, with careful assembly and testing to rigid standards.

On/off and prime/purge valves

Valco high pressure on/off or prime/purge valves feature quality engineering, precision machining, and extremely low internal volume ($< 2 \mu\text{l}$), making them the ideal choice in the most demanding liquid or supercritical fluid chromatography or extraction systems.* The on/off function is self-explanatory; in prime/purge models, mobile phase flows around the needle when the valve is closed, relieving the back pressure from the column. When the valve opens, mobile phase vents to waste to prime the pump.

Standard models provide leak-tight operation up to 10,000 psi (690 bar) at 100°C, with high temperature versions rated up to 6,000 psi/300°C. A 1/16" fitting model with a larger bore and a 1/8" fitting model are available for high flow applications.

The valve needle is made from a special high strength alloy which is resistant even to the buffer salts which might accidentally precipitate inside the valve. Seals are fluorocarbon, with valve bodies machined from HPLC grade stainless steel, ensuring long lifetime in even the most demanding situations.

The on/off and prime/purge valves are available in manual or air/ CO_2 actuated versions. The automated valves require a single three-way solenoid: application of 50 psi opens the valve; venting the air allows the spring to return the valve to the closed position.

**Not suitable for use with gases.*



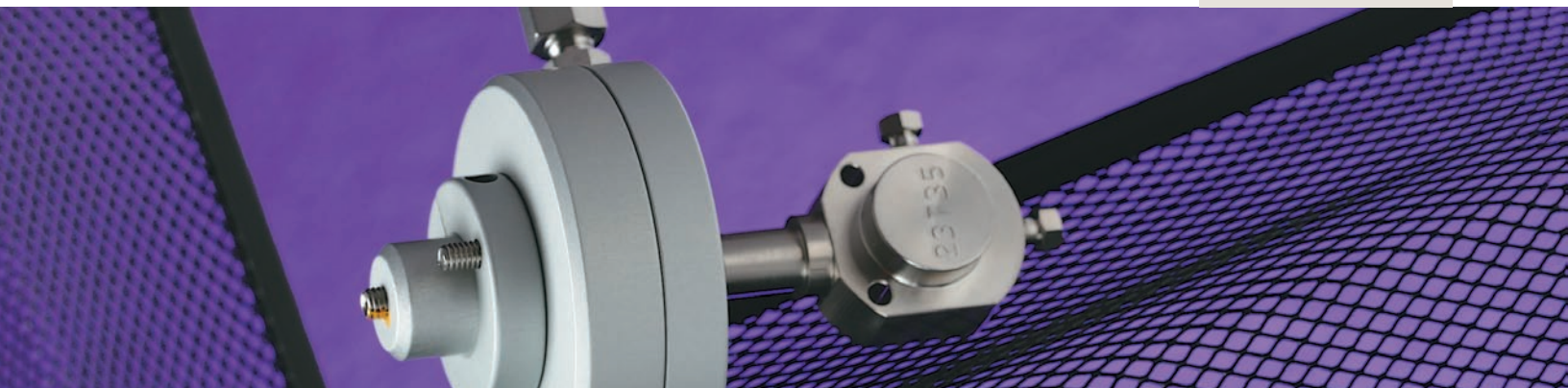
ULTRA-HIGH PRESSURE 40K ON/OFF AND PRIME/PURGE VALVES

40,000 psi valves . . . p 85



MORE INFORMATION

3-way solenoid . . . p 198



On/off valves

SPECS

Temp Pressure

Standard temperature / high pressure

1/16" 100°C 10,000 psi liq

High temperature / medium pressure

1/16" 300°C 6,000 psi liq

1/8" 300°C 2,000 psi liq

Standard temperature/ high pressure

Fitting size	Bore	Manual with 1" knob		Air actuated with 1" standoff	
		Prod No	Price	Prod No	Price
1/16"	0.50 mm	SFVO	\$165	ASFVO	\$270
	0.75 mm	SFVOL	200	ASFVOL	300

High temperature/ medium pressure

Fitting size	Bore	Manual with 2" knob		Manual with 4" knob		Air actuated with 2" standoff		Air actuated with 4" standoff	
		Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
1/16"	0.50 mm	SFVOHT	\$225	SFVOHT4	\$260	ASFVOHT	\$320	ASFVOHT4	\$380
	0.75 mm	SFVOLHT	300	SFVOLHT4	340	ASFVOLHT	365	ASFVOLHT4	400
1/8"	1.50 mm	—	—	—	—	ASFVO2HT	380	ASFVO2HT4	440

Prime/purge valves

SPECS

Temp Pressure

Standard temperature / high pressure

1/16" 100°C 10,000 psi liq

High temperature / medium pressure

1/16" 300°C 6,000 psi liq

1/8" 300°C 2,000 psi liq

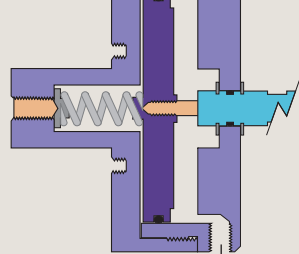
Standard temperature/ high pressure

Fitting size	Bore	Manual with 1" knob		Air actuated with 1" standoff	
		Prod No	Price	Prod No	Price
1/16"	0.50 mm	SFV	\$170	ASFV	\$270
	0.75 mm	SFVL	200	ASFVL	300

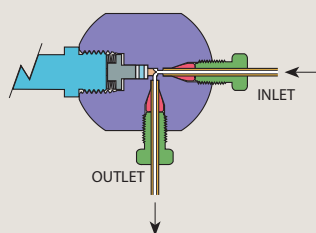
High temperature/ medium pressure

Fitting size	Bore	Manual with 2" knob		Manual with 4" knob		Air actuated with 2" standoff		Air actuated with 4" standoff	
		Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
1/16"	0.50 mm	SFVHT	\$240	SFVHT4	\$260	ASFVHT	\$320	ASFVHT4	\$380
	0.75 mm	SFVLHT	300	SFVLHT4	340	ASFVLHT	365	ASFVLHT4	400
1/8"	1.50 mm	—	—	—	—	ASFV2HT	380	ASFV2HT4	440

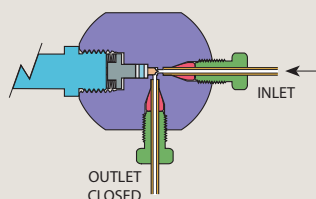
Air actuator option

MOUNTING HOLES
(1.00" CENTER)AIR INLET/OUTLET
(50 PSI ACTUATION)AN EAOR21 FITTING FOR
1/8" AIR SUPPLY TUBING
IS INCLUDED.
(SEE PAGE 216)

On/off valve

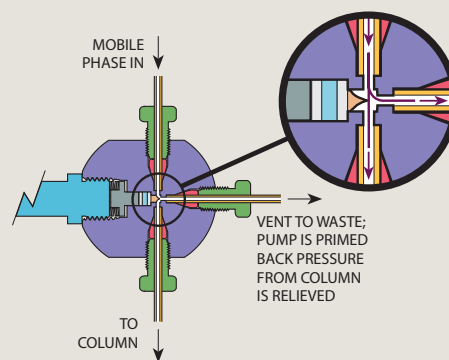


OPEN POSITION

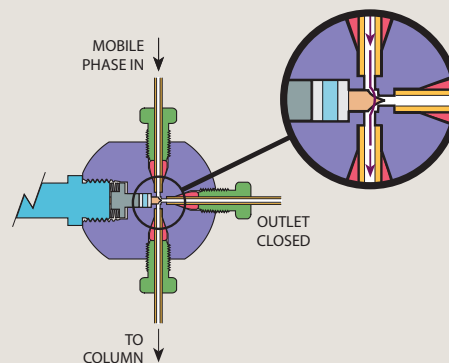


CLOSED POSITION

Prime/purge valve



OPEN POSITION



CLOSED POSITION

Combo valves

CONTROL DEVICES

A new generation needle and shut-off valve provides screwdriver-adjustable control and positive shut-off without damage to the needle. It is ideal for providing hydrogen and air to an FID, since the flow setting is not changed by turning the valve on and off. It can also be used to supply make-up or combustion gas in a wide variety of applications.

The valve body materials are anodized aluminum or stainless steel, with Viton®

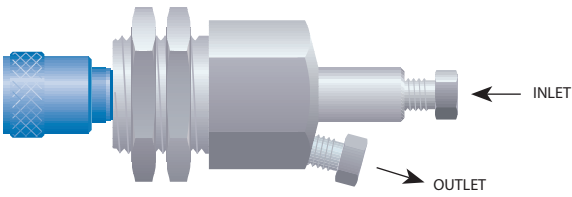
O-ring seals. Maximum temperature is 100°C, and maximum inlet pressure is 100 psig. The valve can be panel-mounted in an 11/16" or 3/4" hole, using hardware supplied, and all are supplied with Valco 1/16" ZDV fittings. Other configurations are available in OEM quantity upon request.

The standard knob is silver-colored and .62" long. Colored knobs for gas identification are available separately, in two lengths.

Combo valves

Maximum flow @ 40 psi He or N ₂	Aluminum body		Stainless body		SPECS
	Prod No	Price	Prod No	Price	
10 ml/min	CNV1A10S1	\$85	CNV1S10S1	\$135	Inlet pressure: 100 psi Maximum temperature: 100°C
50 ml/min	CNV1A50S1	85	CNV1S50S1	135	
150 ml/min	CNV1A150S1	85	CNV1S150S1	135	
250 ml/min	CNV1A250S1	85	CNV1S250S1	135	
500 ml/min	CNV1A500S1	85	CNV1S500S1	135	

Optional colored knobs	Standard (.62")		Long (1.25")	
	Prod No	Price	Prod No	Price
Green	CNVEKG	\$6	CNVEKLG	\$8
Red	CNVEKR	6	CNVEKLR	8
Blue	CNVEKU	6	CNVEKLU	8
Silver	CNVEKS	6	CNVEKLS	8
Black	CNVEKB	6	CNVEKLB	8



Very similar in function to the more recent design on the opposite page, these are the original, hex-bodied combo valves made by the Condyne division of VICI Metronics for nearly 30 years. Condyne products have been transferred to the Valco Houston location, where a number of improvements have been made.

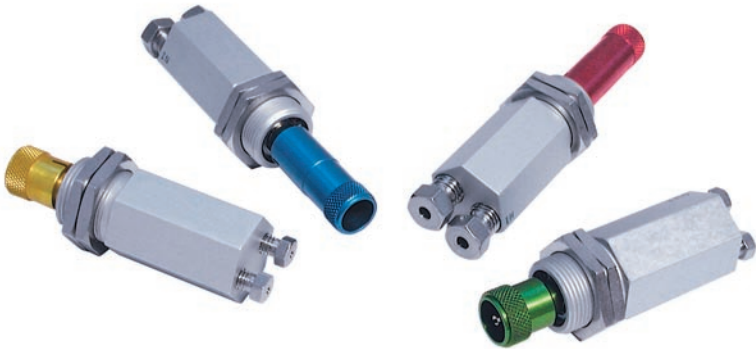
Standard construction features an anodized aluminum body with Viton® O-ring seals. Maximum inlet pressure is 100 psi, with a maximum

temperature of 100°C. The valve can be panel mounted through an 11/16" or 3/4" diameter hole. Valco 1/16" fittings are standard, but 1/8" fittings are also available. Nuts and ferrules are included.

Typically, the knob color is used as an indicator of the rated flow, but the standard knob can be changed if desired. A longer version of the knob is also available, as is a nickel-plated all brass valve (in OEM quantities). Consult the factory regarding these options.

Condyne combo valves

SPECS Maximum inlet pressure: 100 psi Maximum temperature: 100°C	Maximum flow @ 40psi He or N2		1/16" Valco fittings		1/8" Valco fittings	
		Knob color	Prod No	Price	Prod No	Price
	10 ml/min	Green	CVA10GS1	\$100	CVA10GS2	\$100
	50 ml/min	Red	CVA50RS1	100	CVA50RS2	100
	150 ml/min	Blue	CVA150US1	100	CVA150US2	100
	500 ml/min	Black	CVA500BS1	100	CVA500BS2	100
	1 liter/min	Yellow	CVA1KYS1	100	CVA1KYS2	100



Gas flow controllers

CONTROL DEVICES

Flow controllers provide a stable flow rate under varying pressure. VICI flow controllers are precision machined from aluminum or stainless bar stock to eliminate the contamination often found in die cast parts. Positive flow

shut-off is provided by an integral Viton-sealed adjustment valve.

With all our flow controllers, the inlet pressure must exceed the outlet pressure by a minimum of 10 psi.

WHICH KIND OF CONTROLLER?

An **upstream-referenced** controller maintains the flow rate as long as the upstream (inlet) pressure is held constant.

A **downstream-referenced** controller maintains a constant flow under constant downstream (outlet) pressure.

Model 100 gas flow controller

Fixed span upstream-referenced flow controller

The Model 100 is available in a variety of preset maximum flow rates, from 150 mL/min to 10 liters/min (N₂ at 40 psi). Any flow controller in this series can be ordered with a 10-turn Spectrol digital dial (3 or 4 digits), to permit a visual indication of the flow setting.

All flow rates listed below are based on N₂ at 40 psi inlet pressure. Maximum inlet pressure is 200 psi.



SPECS

Preset max flow rates:

150 mL/min to 10 liters/min (N₂ at 40 psi).

Maximum inlet pressure:

200 psi

Maximum temperature:

100°C

Standard fittings:

■ 1/8" external tube fittings (EAOR22)

Other fittings are available. (See below.) Contact the factory for further information.

Flow rate /min	Aluminum body Viton diaphragm		Aluminum body SS diaphragm		SS body Viton diaphragm		SS body SS diaphragm	
	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
With standard control knob								
0 - 150 mL	FC10AV1K	\$220	FC10AS1K	\$230	FC10SV1K	\$405	FC10SS1K	\$415
0 - 250 mL	FC10AV2K	220	FC10AS2K	230	FC10SV2K	405	FC10SS2K	415
0 - 850 mL	FC10AV3K	220	FC10AS3K	230	FC10SV3K	405	FC10SS3K	415
0 - 1.2 L	FC10AV4K	220	FC10AS4K	230	FC10SV4K	405	FC10SS4K	415
0 - 4.5 L	FC10AV5K	220	FC10AS5K	230	FC10SV5K	405	FC10SS5K	415
0 - 10.0 L	FC10AV6K	220	FC10AS6K	230	FC10SV6K	405	FC10SS6K	415
With Spectrol 3-digit dial								
0 - 150 mL	FC10AV1S3	250	FC10AS1S3	265	FC10SV1S3	435	FC10SS1S3	450
0 - 250 mL	FC10AV2S3	250	FC10AS2S3	265	FC10SV2S3	435	FC10SS2S3	450
0 - 850 mL	FC10AV3S3	250	FC10AS3S3	265	FC10SV3S3	435	FC10SS3S3	450
0 - 1.2 L	FC10AV4S3	250	FC10AS4S3	265	FC10SV4S3	435	FC10SS4S3	450
0 - 4.5 L	FC10AV5S3	250	FC10AS5S3	265	FC10SV5S3	435	FC10SS5S3	450
0 - 10.0 L	FC10AV6S3	250	FC10AS6S3	265	FC10SV6S3	435	FC10SS6S3	450
With Spectrol 4-digit dial								
0 - 150 mL	FC10AV1S4	260	FC10AS1S4	275	FC10SV1S4	450	FC10SS1S4	460
0 - 250 mL	FC10AV2S4	260	FC10AS2S4	275	FC10SV2S4	450	FC10SS2S4	460
0 - 850 mL	FC10AV3S4	260	FC10AS3S4	275	FC10SV3S4	450	FC10SS3S4	460
0 - 1.2 L	FC10AV4S4	260	FC10AS4S4	275	FC10SV4S4	450	FC10SS4S4	460
0 - 4.5 L	FC10AV5S4	260	FC10AS5S4	275	FC10SV5S4	450	FC10SS5S4	460
0 - 10.0 L	FC10AV6S4	260	FC10AS6S4	275	FC10SV6S4	450	FC10SS6S4	460

ADAPTERS USED FOR VALCO AND CONDYNE CONTROL DEVICES

Description			Prod No	Price	Used for
Valco 1/16 internal to	10-32 O-ring seal		ZAOR11	\$14	Diaphragm valve On/off valves (optional)
	5/16-24 O-ring seal		ZAOR12	14	Model 100 controller (optional) Model 300 controller (optional)
Valco 1/8" internal to	5/16-24 O-ring seal		ZAOR22	14	Model 100 controller (optional) Model 300 controller (optional)
External 1/8" to	10-32 O-ring seal		EAOR21	14	Air actuated prime/purge and on/off valves
	5/16-24 O-ring seal		EAOR22	14	Model 100 controller (standard) Model 300 controller (standard)

ALTERNATE FITTING TYPES

Models 100 and 300

The standard is the EAOR22 1/8" external tube fitting. Alternative fitting types are ZAOR22 and ZAOR12, listed at left. Order separately.

Model 202

The standard 1/8" NPT female pipe thread with pipe adapters to 1/16" OD tubing included. To use 1/8" OD tubing, order PZA22 on page 35.

Model 202 gas flow controller*Adjustable span upstream-referenced flow controller***SPECS****Flow range:**

infinitely adjustable

Min: 5 mL/min

Max: 1.6 L/min
(N₂ at 40 psi)**Maximum inlet pressure:**

200 psi

Maximum temperature:

100°C

Standard fittings:

■ 1/8" NPT female pipe threads

■ Pipe adapters to 1/16" OD tubing are included.

Other fittings are available. (See facing page.)

The Model 202 provides a user-variable span adjustment permitting it to be used for a variety of flow ranges. After the span is adjusted, the flow controller has a full 10 turns of resolution between the minimum and maximum flow rates. When equipped with a Spectrol digital dial, settings are reproducible to better than 1%.



	Aluminum body Viton diaphragm		Aluminum body SS diaphragm		SS body Viton diaphragm		SS body SS diaphragm	
	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
With standard control knob	FC22AV1K	\$240	FC22AS1K	\$250	FC22SV1K	\$440	FC22SS1K	\$455
With Spectrol 3-digit dial	FC22AV1S3	275	FC22AS1S3	285	FC22SV1S3	470	FC22SS1S3	485
With Spectrol 4-digit dial	FC22AV1S4	285	FC22AS1S4	300	FC22SV1S4	485	FC22SS1S4	500

Model 300 gas flow controller*Fixed span downstream-referenced flow controller***SPECS****Maximum flow rate:**1.6 L/min
with ambient
downstream pressure**Maximum inlet pressure:**

200 psi

Maximum temperature:

100°C

Standard fittings:

■ 1/8" external tube fittings (EAOR22)

Other fittings are available. (See facing page.) Contact the factory for further information.

The Model 300 flow controller provides a stable flow rate when upstream pressure conditions vary, providing the downstream pressure remains constant.

All flow rates listed below are based on N₂ at 40 psi inlet pressure. Maximum inlet pressure is 200 psi.



	Aluminum body Viton diaphragm		Aluminum body SS diaphragm		SS body Viton diaphragm		SS body SS diaphragm	
	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
With standard control knob								
Flow rate /min								
0 - 200 mL	FC30AV1K	\$220	FC30AS1K	\$230	FC30SV1K	\$405	FC30SS1K	\$415
0 - 300 mL	FC30AV2K	220	FC30AS2K	230	FC30SV2K	405	FC30SS2K	415
0 - 800 mL	FC30AV3K	220	FC30AS3K	230	FC30SV3K	405	FC30SS3K	415
0 - 1.6 L	FC30AV4K	220	FC30AS4K	230	FC30SV4K	405	FC30SS4K	415
With Spectrol 3-digit dial								
0 - 200 mL	FC30AV1S3	250	FC30AS1S3	260	FC30SV1S3	435	FC30SS1S3	450
0 - 300 mL	FC30AV2S3	250	FC30AS2S3	260	FC30SV2S3	435	FC30SS2S3	450
0 - 800 mL	FC30AV3S3	250	FC30AS3S3	260	FC30SV3S3	435	FC30SS3S3	450
0 - 1.6 L	FC30AV4S3	250	FC30AS4S3	260	FC30SV4S3	435	FC30SS4S3	450
With Spectrol 4-digit dial								
0 - 200 mL	FC30AV1S4	260	FC30AS1S4	275	FC30SV1S4	450	FC30SS1S4	460
0 - 300 mL	FC30AV2S4	260	FC30AS2S4	275	FC30SV2S4	450	FC30SS2S4	460
0 - 800 mL	FC30AV3S4	260	FC30AS3S4	275	FC30SV3S4	450	FC30SS3S4	460
0 - 1.6 L	FC30AV4S4	260	FC30AS4S4	275	FC30SV4S4	450	FC30SS4S4	460
With screwdriver adjustable operator								
0 - 750 mL	FC31AV1	220						

MORE INFORMATION

Male pipe adapters

Internal..... page 35

External..... 36

Micrometering valves

CONTROL DEVICES

Micrometering (needle) valves combine the ease of connection associated with Valco zero dead volume fittings with convenient bulkhead mounting. Very low internal volume and precision design make this valve ideal for use as a gas control valve in chromatographic systems.

The Viton® model is rated at 225°C, while a version with Kalrez™ seals is capable of continuous operation at 315°C. This allows a needle valve to be mounted directly within a heated oven, facilitating control of flow

switching in multidimensional systems while keeping the gases at oven temperature.

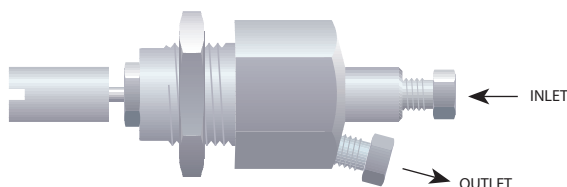
Valves are rated for maximum of 1000 psi gas. They are individually tested on a mass spectrometer leak detector to a helium leak rate specification of $< 1 \times 10^{-8}$ atm cc/sec.

An unlubricated version with a specially polished seat was designed to be used with our pulsed discharge detectors, and should be used upstream of any ultrapure gas system. There is also a 1/16" tube version.

1/16" micrometering valves

with Valco fittings

Seal	Lubrication	Prod No	Price
Standard: 2–225 ml/min@ 15 psig N ₂ inlet			
Viton	Lubricated	ZBNV1	\$130
Viton	Non-lubricated	ZBNV1-D	155
Kalrez	Non-lubricated	ZBNV1-KZ	180
Fine control: 2–175 ml/min@ 15 psig N ₂ inlet			
Viton	Lubricated	ZBNV1F	145
Viton	Non-lubricated	ZBNV1F-D	175
Kalrez	Non-lubricated	ZBNV1F-KZ	195
Low flow: 2–90 ml/min@ 40 psig N ₂ inlet			
Viton	Lubricated	ZBNV1LF	135
Viton	Non-lubricated	ZBNV1LF-D	160
Kalrez	Non-lubricated	ZBNV1LF-KZ	185



1/16" micrometering valves

with 18" tubes

Seal	Lubrication	Prod No	Price
Fine control: 2–175 ml/min@ 15 psig N ₂ inlet			
Viton	Lubricated	BNV1	\$130
Viton	Non-lubricated	BNV1-D	155
Kalrez	Non-lubricated	BNV1-KZ	180
Low flow: 2–90 ml/min@ 40 psig N ₂ inlet			
Viton	Lubricated	BNV1LF	135
Viton	Non-lubricated	BNV1LF-D	160
Kalrez	Non-lubricated	BNV1LF-KZ	185



VICI regulators are machined from aluminum bar stock and then hard-anodized to provide contamination-free service. They feature a stainless steel diaphragm and Viton®-sealed stainless poppet. The compact size (1.125" diameter by 2" long for regulator, 3" long for combo version) saves panel space and permits installation anywhere that an 11/16" hole can be located. Mounting hardware is supplied.

While the outward appearance is unchanged, a recent redesign has enhanced thermal stability, linearity, and shock resistance.

The VICI combo regulator is a combination regulator and shut-off valve. The pressure is set using the

screwdriver adjustment in the center of the on/off knob. Turning the knob counterclockwise provides positive shutoff, while clockwise rotation restores gas pressure to within 0.05 psi of the setpoint.

Available with outlet pressure ranges of 0-15 psi, 0-30 psi, or 0-60 psi, VICI regulators can be ordered with 1/16" or 1/8" Valco internal fittings or 1/8" external fittings. Other configurations are available in OEM quantities.

Maximum operating temperature is 100°C, and maximum supply pressure is 250 psig. The influence of supply pressure on outlet pressure is less than 0.1 psi per 10 psi change in supply pressure.



Pressure regulators

NEW

SPECS

Maximum inlet pressure:
250 psi

Maximum temperature:
100°C

Wetted materials:

- Anodized aluminum
- Stainless steel
- Viton

Pressure range:	Valco internal fittings 1/16"		Valco internal fittings 1/8"		External fittings 1/8"	
	Prod No	Price	Prod No	Price	Prod No	Price
0-15 psi	PR51A15Z1	\$185	PR51A15Z2	\$185	PR51A15E2	\$185
0-30 psi	PR51A30Z1	185	PR51A30Z2	185	PR51A30E2	185
0-60 psi	PR51A60Z1	185	PR51A60Z2	185	PR51A60E2	185

Combo pressure regulators

SPECS

Maximum inlet pressure:
250 psi

Maximum temperature:
100°C

Wetted materials:

- Anodized aluminum
- Stainless steel
- Viton

Pressure range:	Valco internal fittings 1/16"		Valco internal fittings 1/8"		External fittings 1/8"	
	Prod No	Price	Prod No	Price	Prod No	Price
0-15 psi	PR50A15Z1	\$215	PR50A15Z2	\$215	PR50A15E2	\$215
0-30 psi	PR50A30Z1	215	PR50A30Z2	215	PR50A30E2	215
0-60 psi	PR50A60Z1	215	PR50A60Z2	215	PR50A60E2	215



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