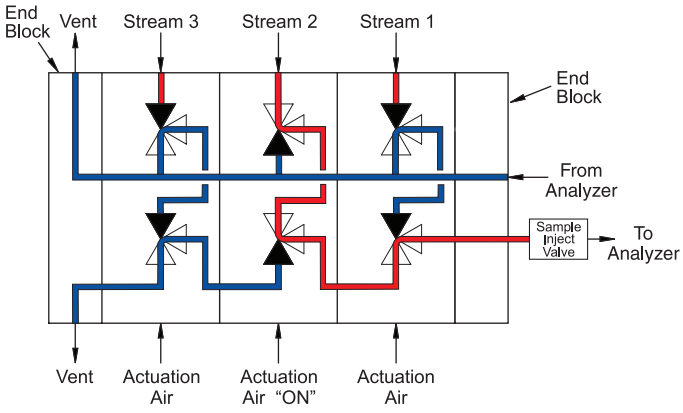
Parker Gen II *R-max*™ Stream Switching System

Introduction

The Parker Gen II *R-max*™ is a multi-functional system capable of integrating both stream switching and filtering into one unique compact assembly. The system is designed to control both gases and liquids in analytical systems ranging from vacuum to 500 psig (34 bar) while requiring only 65 psig (5 bar) actuating air pressure. The system was engineered with a focus on improved product reliability and reduced cost of ownership. The Parker Gen II *R-max*™ Stream Switching System utilizes state-of-the-art surface mount technology to reduce leak paths, internal volume, and dead volume. With surface mounting, system components may be easily removed and replaced without breaking process connections. In addition, the Parker Gen II *R-max*™ system utilizes an internal self-purging outlet header to eliminate the need for an additional outlet loop.

Features

- ***Captured vent*** provides a low pressure header that separates sample stream from actuation air preventing cross contamination.
- ***Enhanced position indicator*** enables easy recognition of valve position for ***maximum*** system safety.
- ***Backward compatibility*** allows the enhanced features to be added to existing units.
- ***Surface mount technology*** enhances ***maximum*** system flexibility and enables the user to add additional streams to a system without interrupting installed units.
- ***Low internal volume*** insures ***maximum*** system efficiency by reducing purge time and expensive purge gas.
- ***Modular valve design*** offers ***maximum*** serviceability for quick and easy in-system repair and reduced downtime.
- The Gen II *R-max*™ is available for **ANSI/ISA-76.00.02 (NeSSI) mounting**.
- ***US Patent 6619321***



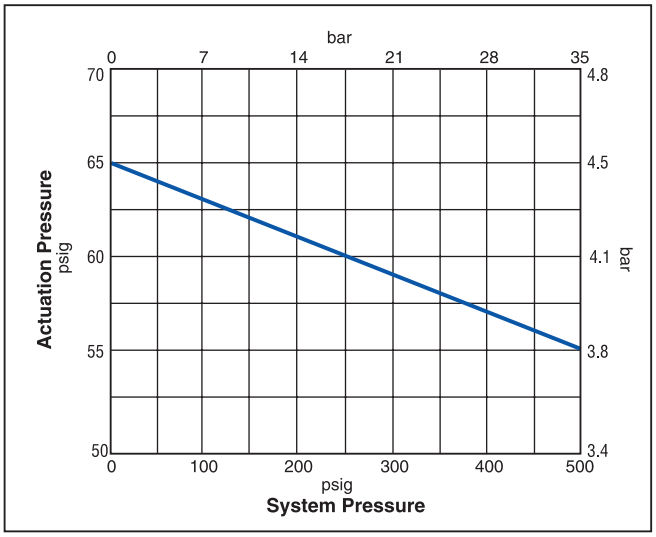
Specifications

Pressure Rating
500 psig (34 bar) CWP

Temperature Rating
Fluorocarbon Rubber –
-15°F to 400°F (-26°C to 204°C)
Buna-N Rubber –
-30°F to 275°F (-34°C to 135°C)
Ethylene Propylene Rubber –
-70°F to 275°F (-57°C to 135°C)
Neoprene Rubber –
-45°F to 250°F (-43°C to 121°C)
Highly Fluoronated Fluorocarbon Rubber –
-25°F to 300°F (-32°C to 150°C)

Flow Data (in a two stream system)
Stream 1: $C_v = 0.154$
Stream 2: $C_v = 0.104$

Actuation Pressure vs. System Pressure



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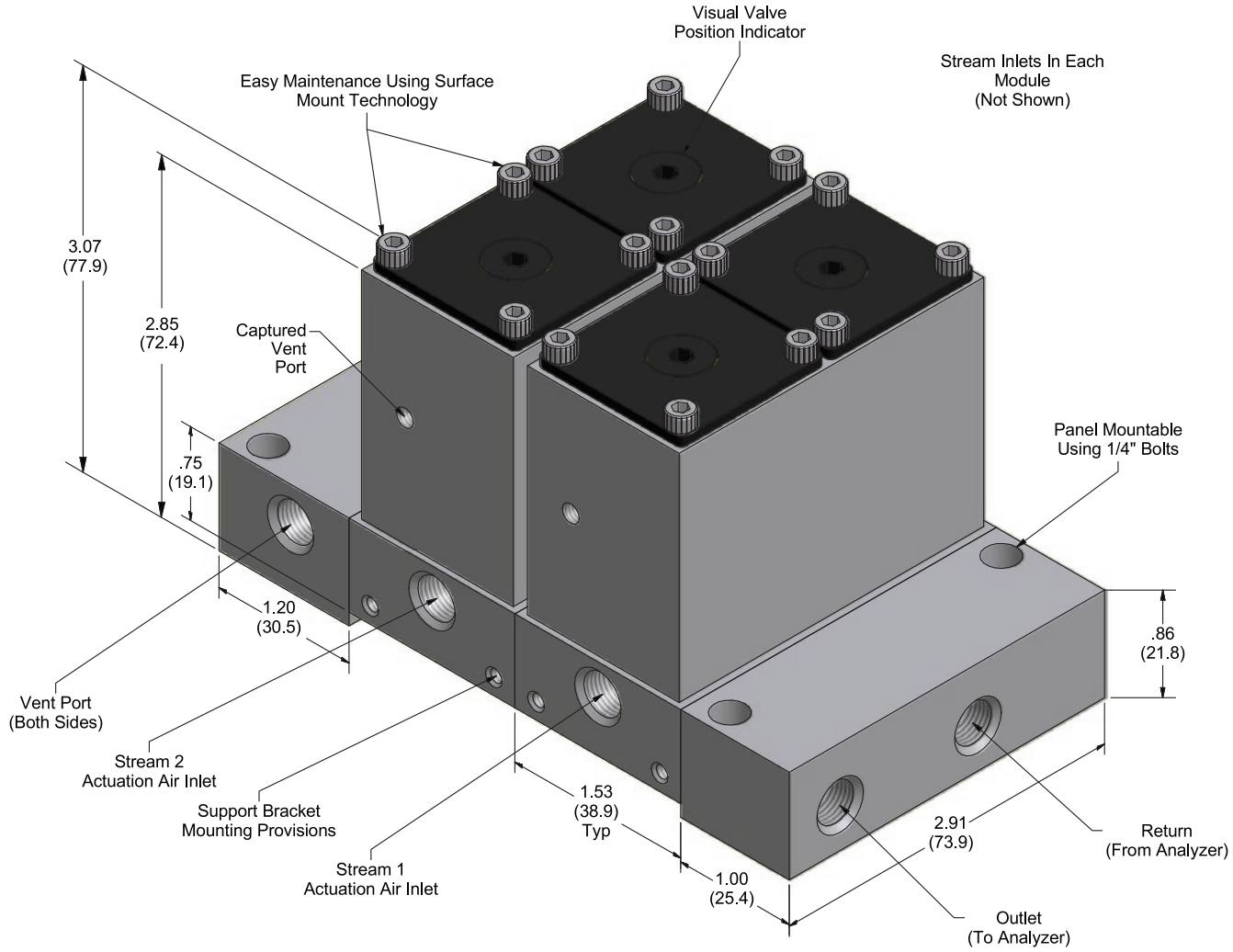
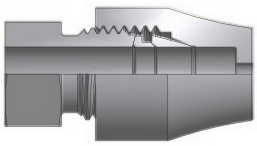
Exterior Dimensions

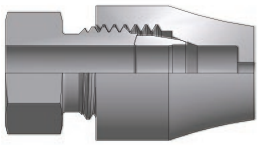


Available End Connections

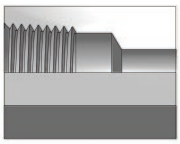
4A7 – 1/4" inverted two ferrule A-LOK® compression port



4Z7 – 1/4" inverted single ferrule CPI™ compression port



2F – 1/8" ANSI/ASME B1.20.1 internal pipe threads



Note: Actuator air porting and vent porting is always 1/8" FNPT.

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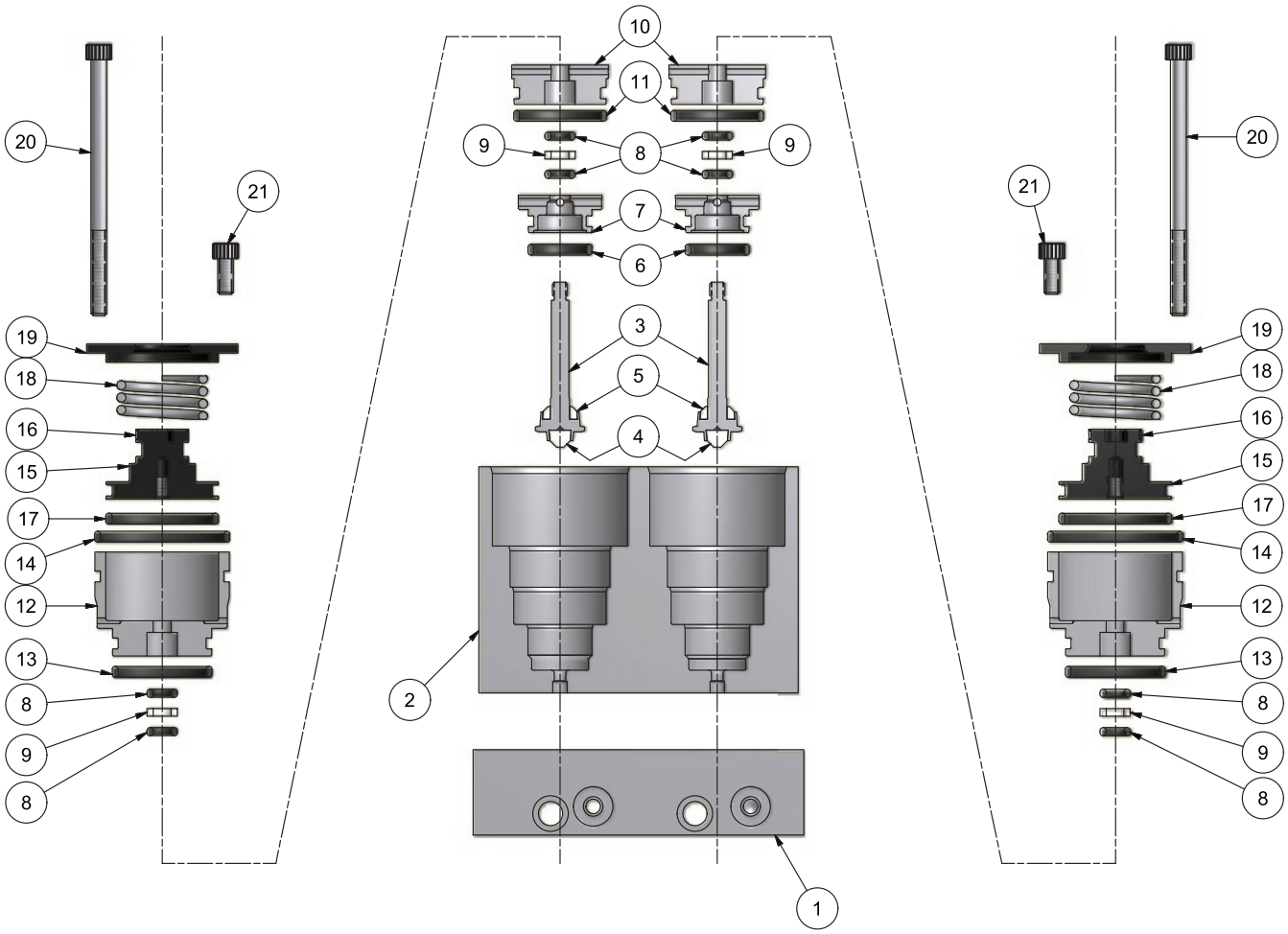
Valve Module Exploded View



Materials of Construction

Item	Part Description	Material
1	Base	ASTM A 479, type 316
2	Valve Body	ASTM A 479, type 316
3	Stem	ASTM A 479, type 316
4	Seat	PCTFE
5	Backseat	PCTFE
6	2-013 O-Ring	Optional elastomers
7	Lower Bonnet	ASTM A 479, type 316
8	2-007 O-Ring	Optional elastomers
9	Backup Ring	PTFE
10	Center Bonnet	ASTM A 479, type 316
11	2-017 O-Ring	Optional elastomers

Item	Part Description	Material
12	Upper Bonnet	ASTM A 479, type 316
13	2-018 O-Ring	Optional elastomers
14	2-023 O-Ring	Optional elastomers
15	Piston	ASTM B 611, Alloy 6061
16	Indicator	Flexible polyolefin
17	2-020 O-Ring	Optional elastomers
18	Spring	ASTM A 546, type 630
19	Cap	ASTM B 211, Alloy 6061
20	Bolt (6-32 x 2.25)	Stainless steel
21	Bolt (6-32 x 5/16)	Stainless steel

Note: Material for Stream Switching Vent and Analyzer End Plates (not shown) is ASTM A 479, type 316. Material for Base Plate Bolts is ASTM A 276, type 316.

Lubrication: Perfluorinated polyether

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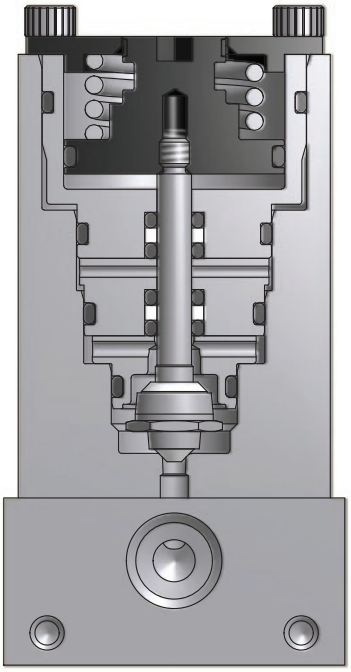
Valve Module

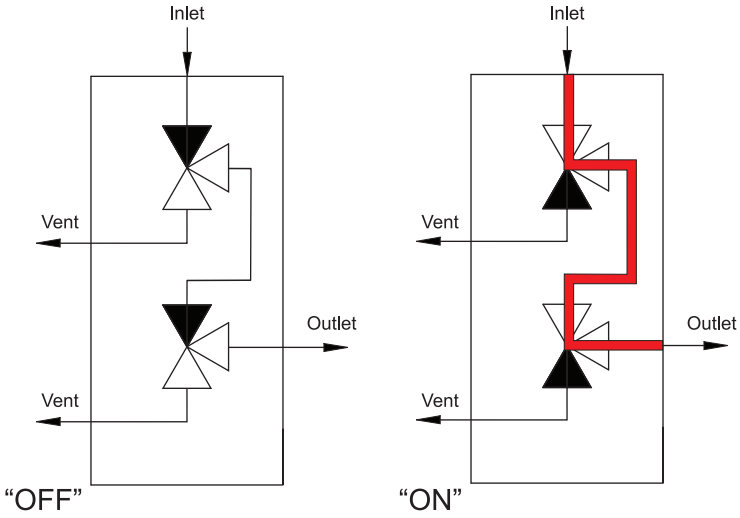
The Parker Gen II *R-max*™ Stream Switching System centers around the Valve Module, which contains two 3-way valves. Each Valve Module is factory mounted to a base plate configured to provide the desired function. The Stream Switching Valve Module provides a double block and bleed arrangement preventing cross contamination of the sample streams.

Valve Module Features

- Each Valve Module has a flow inlet (1/8" FNPT or 1/4" Inverted Compression) and a 1/8" FNPT valve air actuation port.
- Each Valve Module employs two valves.



Valve Module Flow Diagram



Valve Expansion Module – R3EM

Valve Expansion Modules may be added or removed from the Parker Gen II *R-max*™ Stream Switching System. The Valve Expansion Module consists of a Valve Module plus two base plate bolts. They may be inserted between the vent and analyzer end plates to add one or more streams to a system. (See How to Order on pages 10-12.)

Note: Valve Modules may only be added to an existing stream switching system.

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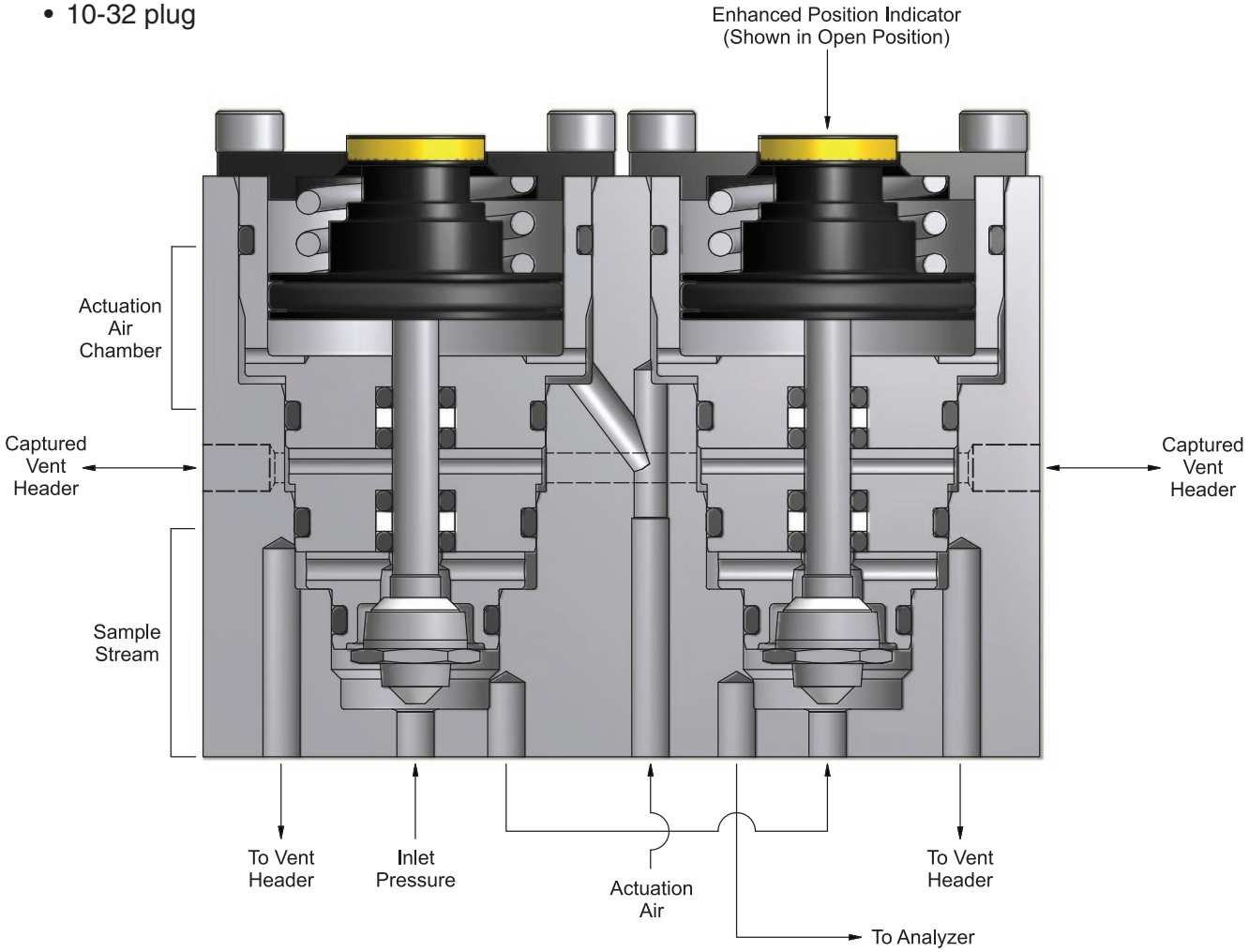
Captured Vent

The Parker Gen II *R-max*™ is designed with a captured vent header which isolates the sample stream from the actuation air preventing cross contamination. The Captured Vent has 10-32 threads which allows the captured vent to be directed to a containment device.

Porting options include fittings for use with:

- 1/8" plastic tubing
- 1/8" SS tubing
- 1/8" pipe
- 10-32 plug



Enhanced Position Indicator

The Parker Gen II *R-max*™ is designed with an enhanced position indicator. The cap and piston are black anodized aluminum. The visual indicator, when actuated open, shows bright yellow against the black background giving easy indication for the open stream.

The visual indicator is also backwards compatible with the R2 Series *R-max*™ Stream Select System. Any *R-max*™ Stream Select Systems in service can easily be retrofitted with the enhanced indication.

The position indicator can be color coded. Contact the factory for more information.

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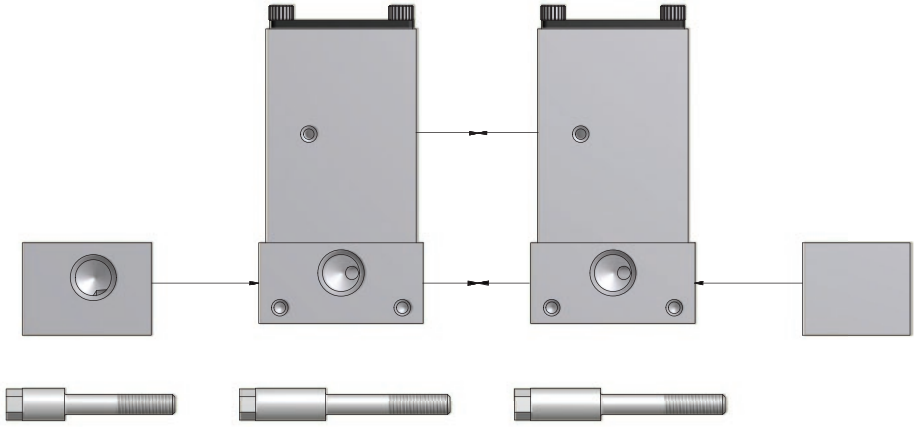
Multi-Stream Switch – R3

A Multi-Stream Switch consists of individual Valve Modules bolted together between vent and analyzer end plates to create an internal, self-purging system with an integral outlet header. This unique design eliminates dead volume and the need for an external loop.

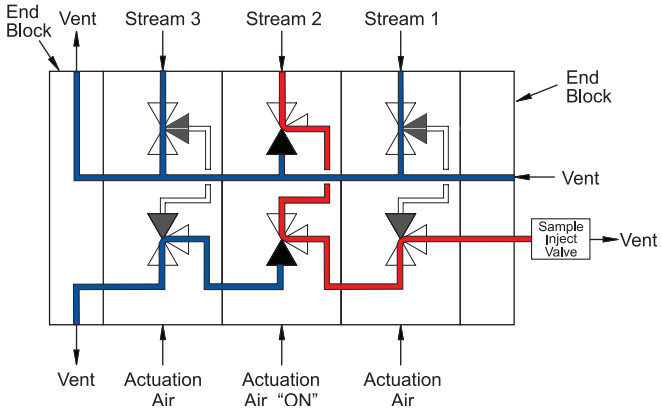


Fast Loop Options

Internal Fast Loop

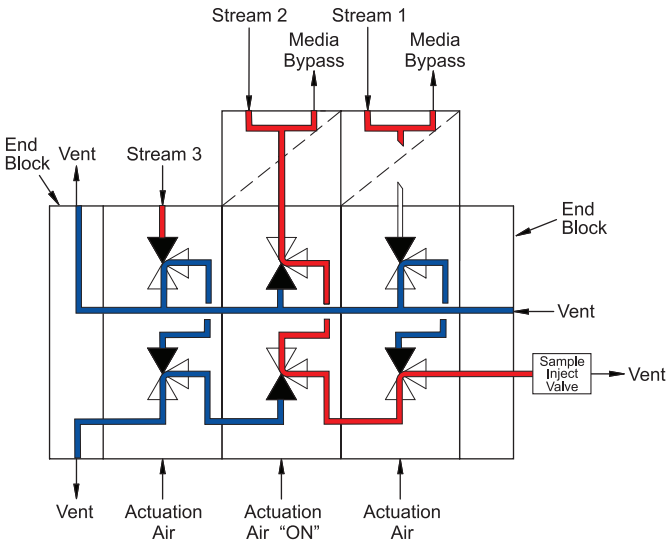
Example shown is a three stream switching system with an internal fast loop that maintains the double block and bleed feature. Illustrates Streams 1 and 3 in the “off” position, with these two streams flowing to the common vent. Stream 2 is illustrated in the “on” position, closing the bypass and directing the flow to the analyzer. To order, add the suffix -IF to the end of the Stream Switching System part number. (How to Order; see pages 10-12.)

Example: 2F-R3K-BN-SS-3-**IF**



Fast Loop Filters

Example shown is a three stream switching system with two filter bypasses. Bypass Filter Kits may be incorporated into the Parker Gen II *R-max*™ Stream Switching System to enhance your system design. (How to Order; see pages 10-12 and 20-21.)



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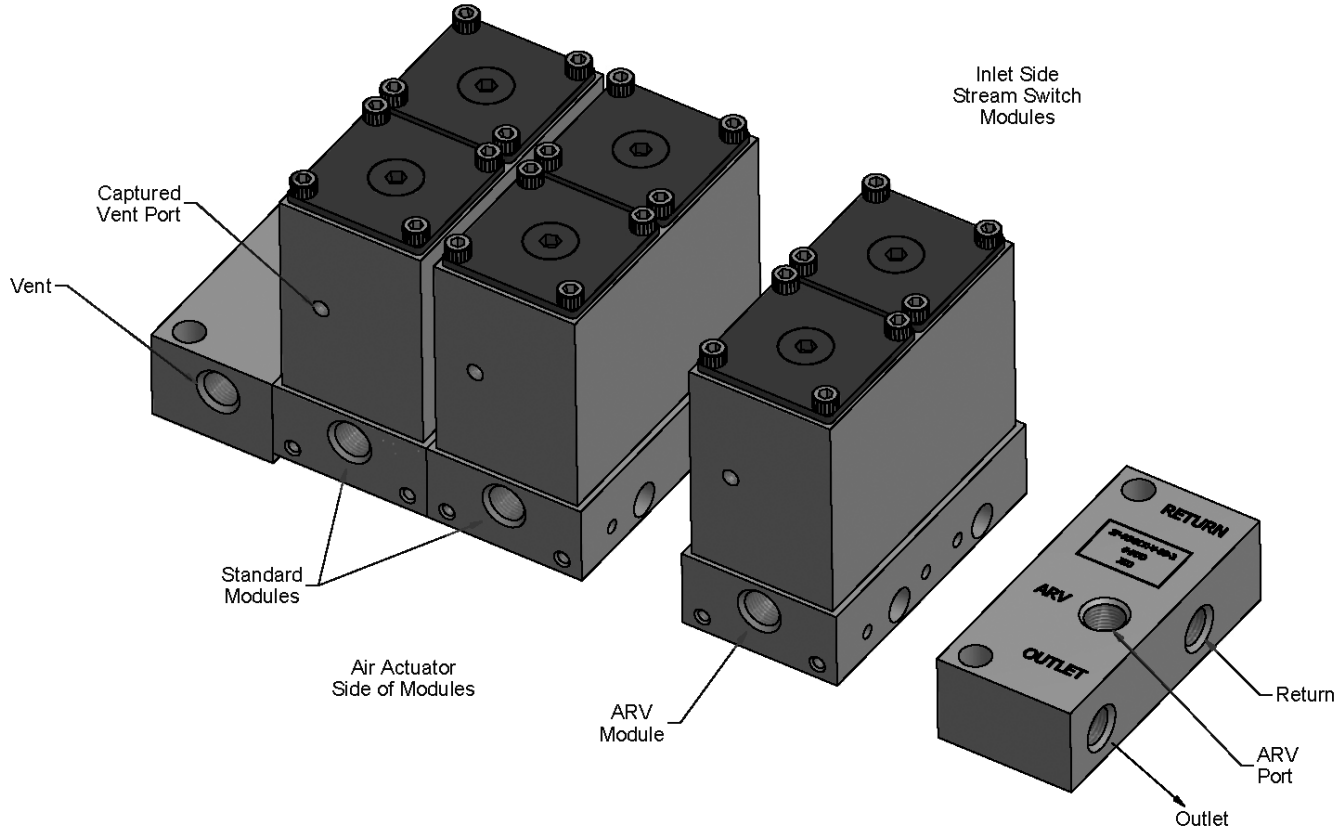
Atmospheric Reference Vent (ARV) Module

The Atmospheric Reference Vent Module provides many advantages and benefits within a modular footprint. It can be installed inline with existing Stream Switching Modules or act as a stand alone unit.

When the ARV Module is positioned between the analyzer and stream switching units it allows for sample shut-off and equilibration of the sample loop pressure to atmosphere. This insures a consistent sample volume in repetitive analysis. When the ARV Module is actuated, the sample flows from the actuated (open) stream, through the GC analyzer and is routed to the low pressure header.



The improved features on the Stream Switching Units are included on the ARV Modules. This includes the Captured Vent and Enhanced Position Indicator. It is provided with a new end block which has a dedicated atmosphere reference port. Also, the re-designed ARV Modules can be used with Fast Loop Filtration.

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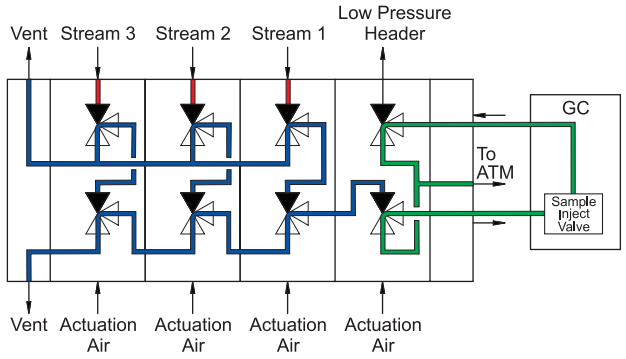
Stream Switch with ARV Module Function – Three Stream Examples

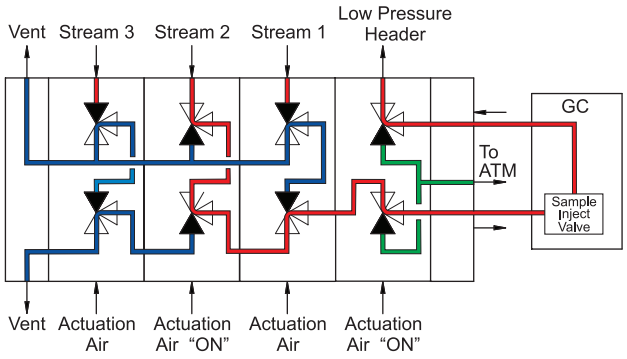
Example 1

All valves are in the “off” position. The system is “open” to vent.



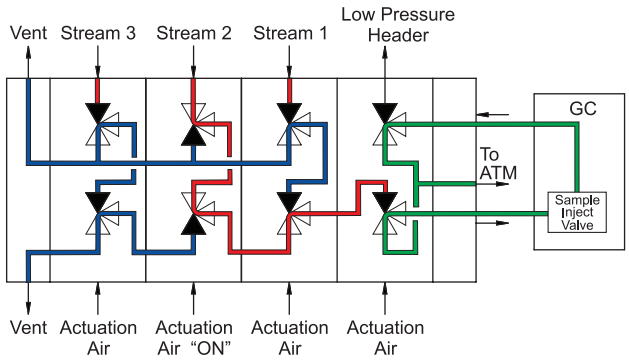
Example 2

Stream 2 and the ARV Module are in the “on” position, purging the sample loop to the low pressure header.



Example 3

Stream 2 is in the “on” position and the ARV Module is in the “off” position, equilibrating the sample loop pressure to vent pressure.



Backwards Compatibility

Aspects of the R3 Series Gen II *R-max*™ can be applied for use with existing R2 Series units. Retrofitting the existing R2 Series *R-max*™ is easily accomplished by following the provided instructions.

Valve Modules: The valve modules are maintained using four 6-32 bolts. Removing these allows the existing R2 Series Module to be removed and the new R3 Series Module to be installed with new 6-32 bolts.

Position Indicator: The Enhanced Position Indicator used on the R3 Series Gen II *R-max*™ provides a yellow indicator that is easily identifiable against a black background. This Indicator can be fitted onto the R2 Series *R-max*™ for the same easy identification of valve position.

Redesigned ARV (Atmospheric Reference Vent) Option: R2 Series Stream Select Units can be installed with the redesigned ARV End Plate. Note, this also requires a special stream select module to block the ARV Port from the Vent Port.

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How to Order Stream Switching Systems and Accessories

The correct part number is easily derived by following the sequence shown below. The eight product characteristics required are coded as shown below.

End Connection	–	Valve Series	Base Options	Seat Material	–	Seal Material	–	Body Material	–	Number of Modules	–	Captured Vent Fittings
Example: 2F	–	R3		K	–	V	–	SS	–	2	–	A E

The example above describes a two stream switching system having 1/8" female NPT inlet and outlet ports, PCTFE valve seats, fluorocarbon rubber seals, stainless steel construction, a fitting for 1/8" plastic tubing on the captured vent port (inlet side) and a 10-32 plug on the other captured vent port.

End Connection [1]	Valve Series	Base Options [2]	Seat Material	Seal Material	Body Material [3]	Number of Modules	Captured Vent Fittings [4]
2F **4A7** **4Z7**	**R3**	**Blank** None **GC** ARV Module **EM** Valve Expansion Module **NO** Normally Open	**K** PCTFE **PK** Virgin PEEK **VE** Vespel	**V** Fluorocarbon Rubber **BN** Buna-N Rubber **EPR** Ethylene Propylene Rubber **NE** Neoprene Rubber **KZ** Highly Fluorinated Fluorocarbon Rubber	**SS** Stainless Steel	**Numeric value** **Blank** EM Base Options	**A** 1/8" plastic tubing **B** 1/8" CPI™ compression **C** 1/8" A-LOK® compression **D** 1/8" FNPT **E** 10-32 plug **F** No fitting

[1] See page 3.

[2] The expansion module (EM) option allows for adding additional modules to existing stream switching units. A sample part number for an ARV expansion module is 2F-R3EMK-V-SS-ARV-FF. When adding an ARV expansion module, the base to the adjoining module must be changed for proper function.

[3] Contact Customer Service for availability of exotic alloys such as Monel® and Hastelloy®.

[4] In the part numbering scheme, the first captured vent letter designator is for the inlet side of the *R-max*™ Module. All captured vent fittings have a 10-32 thread for assembly into the valve body.

How to Order Additional Options

Oxygen Cleaning: Add the suffix **–C3** to the end of the part number to receive stream switching systems or accessories cleaned and assembled for oxygen service in accordance with Parker specification ES8003.

Add the suffix **–RTK** to the end of the part number to receive stream switching systems or accessories coated with the inert, silicon-based chemical coating Silconert™ 1000 (formerly Silcosteel®).

Add the suffix **–SUL** to the end of the part number to receive stream switching systems or accessories coated with the inert, silicon-based chemical coating Silconert™ 2000 (formerly Sulfinert®).

NACE: Add the suffix **–NC** to the end of the part number to receive stream switching systems or accessories that meet the material requirements of ANSI/NACE MR0175/ISO 15156-1.

Internal Fast Loop: Add the suffix **–IF** to the end of the part number to receive an internal fast loop on all modules. To designate a portion of the total number of modules contact Customer Service.

Low Pressure Actuators: Available factory assembled or as kits for field assembly. Refer to pages 13 and 14 for part number configuration.

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