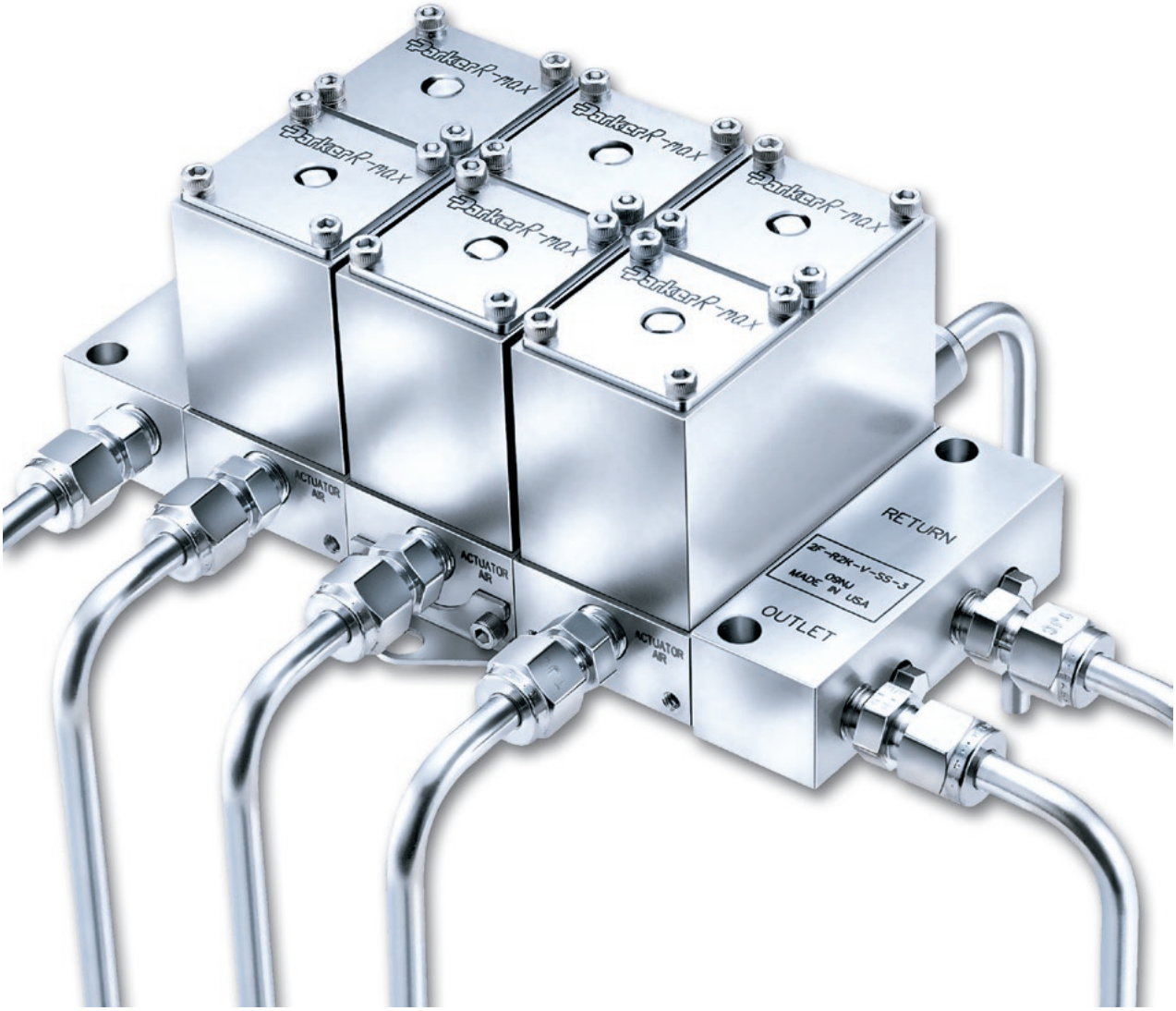


Parker *R-max*™ Stream Switching System

Catalog 4140-R

January 2010

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

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R-max™ Stream Switching System

Introduction

The Parker *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 40 psig (3 bar) actuating air pressure. The system was engineered with a focus on improved product reliability and reduced cost of ownership. The Parker *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 *R-max*™ system utilizes an internal self-purging outlet header to eliminate the need for an additional outlet loop.

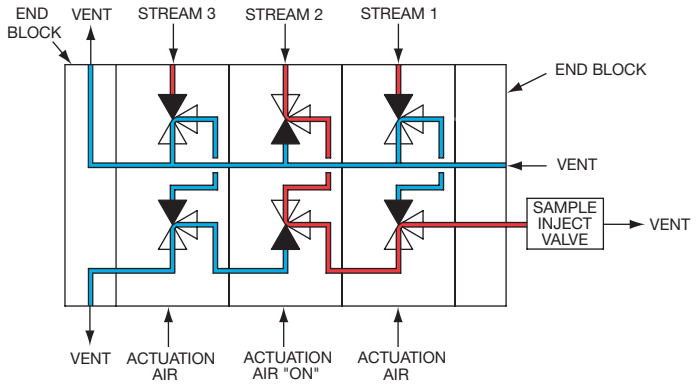
Features

- ***Surface Mount Technology*** enhances ***maximum*** system flexibility and enables the user to add additional streams to a system without interrupting installed units.
- ***PCTFE Sealing Technology*** provides ***maximum*** sealing capability for both gases and liquids to eliminate leakage often found when using elastomeric O-ring seat designs.
- ***Low Internal Volume*** insures ***maximum*** system efficiency by reducing purge time and expensive purge gas.
- ***Modular Valve Design*** offers ***maximum*** service-ability for quick and easy in-system repair and reduced downtime.
- ***Internal Loop Design*** eliminates the need for an external loop and provides ***maximum*** capability with minimum system footprint.
- ***Visual Position Indicator*** enables the user to easily determine valve position for ***maximum*** system safety.
- ***Low Actuation Pressure*** design for ***maximum*** sealing capability with minimum air supply needs.
- ***Patent Pending.***

Specifications

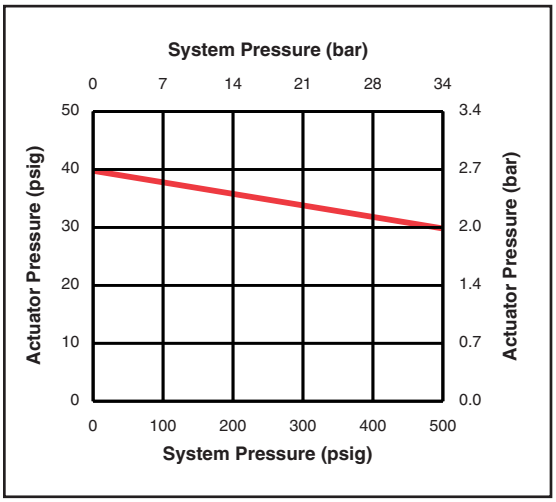
Item	Material
Pressure Rating	500 psig (34 bar) CWP
Temperature Ratings	Fluorocarbon Rubber -15°F to 400°F (-26°C to 204°C) Buna-N Rubber -30°F to 275°F (-34°C to 135°C) Ethylene Propylene Rubber -70°F to 275°F (-57°C to 135°C) Neoprene Rubber -45°F to 250°F (-43°C to 121°C) Highly Fluorinated Fluorocarbon Rubber -25°F to 200°F (-32°C to 93°C)
Flow Data (In a two stream system)	Stream 1: $C_v = 0.128$; $x_T = 0.64$ Stream 2: $C_v = 0.099$; $x_T = 0.68$ Tested in accordance with ISA S75.02. Gas flow will be choked when $P_1 - P_2 / P_1 = x_T$

Flow Diagram – Three Stream Switching System



System shown with Stream 2 open to the sample inject valve

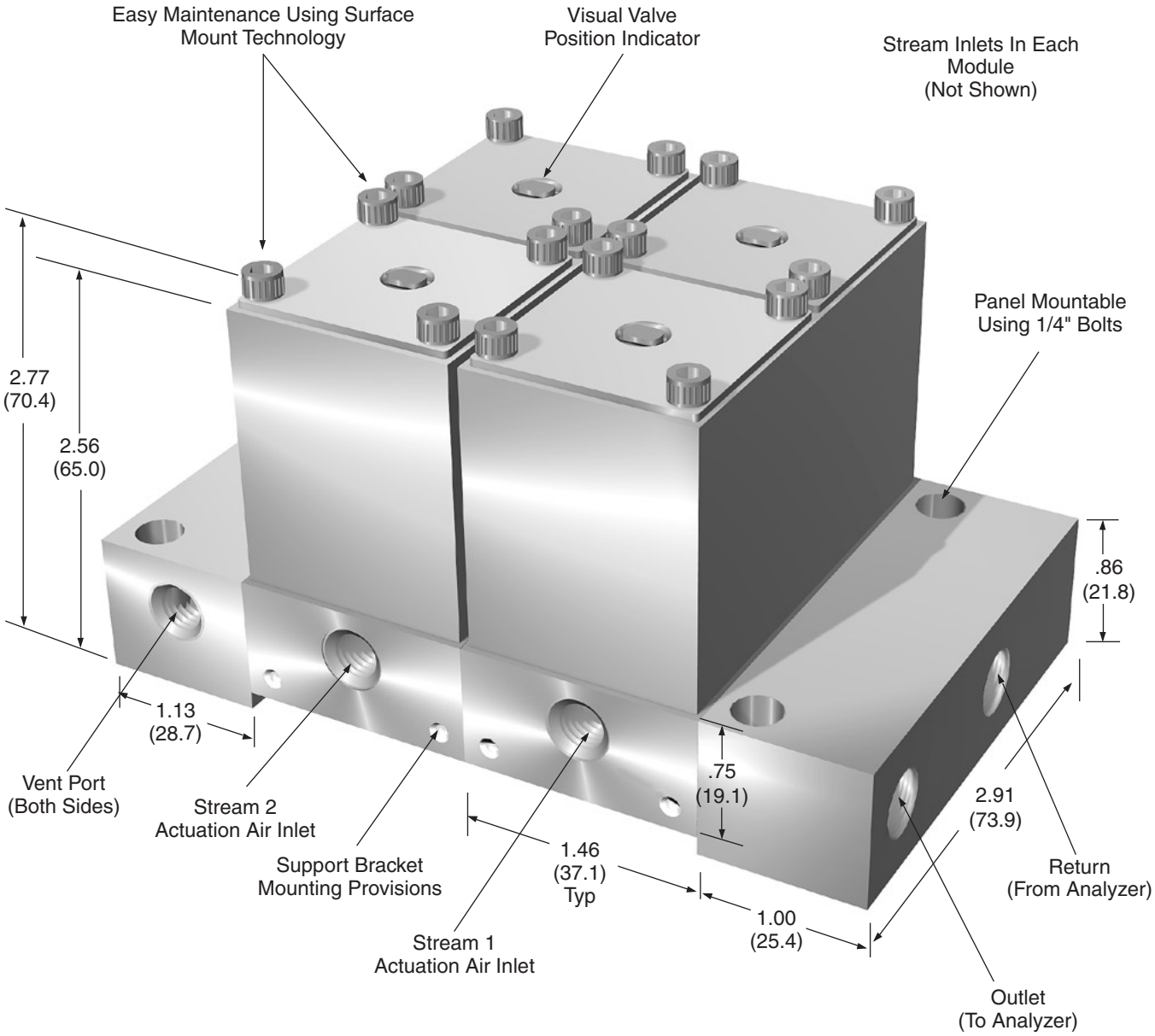
Actuation Pressure vs. System Pressure



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Valve Dimensions

( ) Denotes dimensions in millimeters

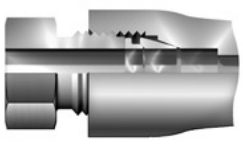


Factory Assembled Two Module Stream Switching System

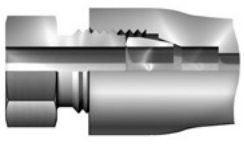
See How to Order – Page 8

Available End Connections

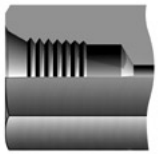
4A7 – 1/4" Inverted two ferrule A-LOK® compression port



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



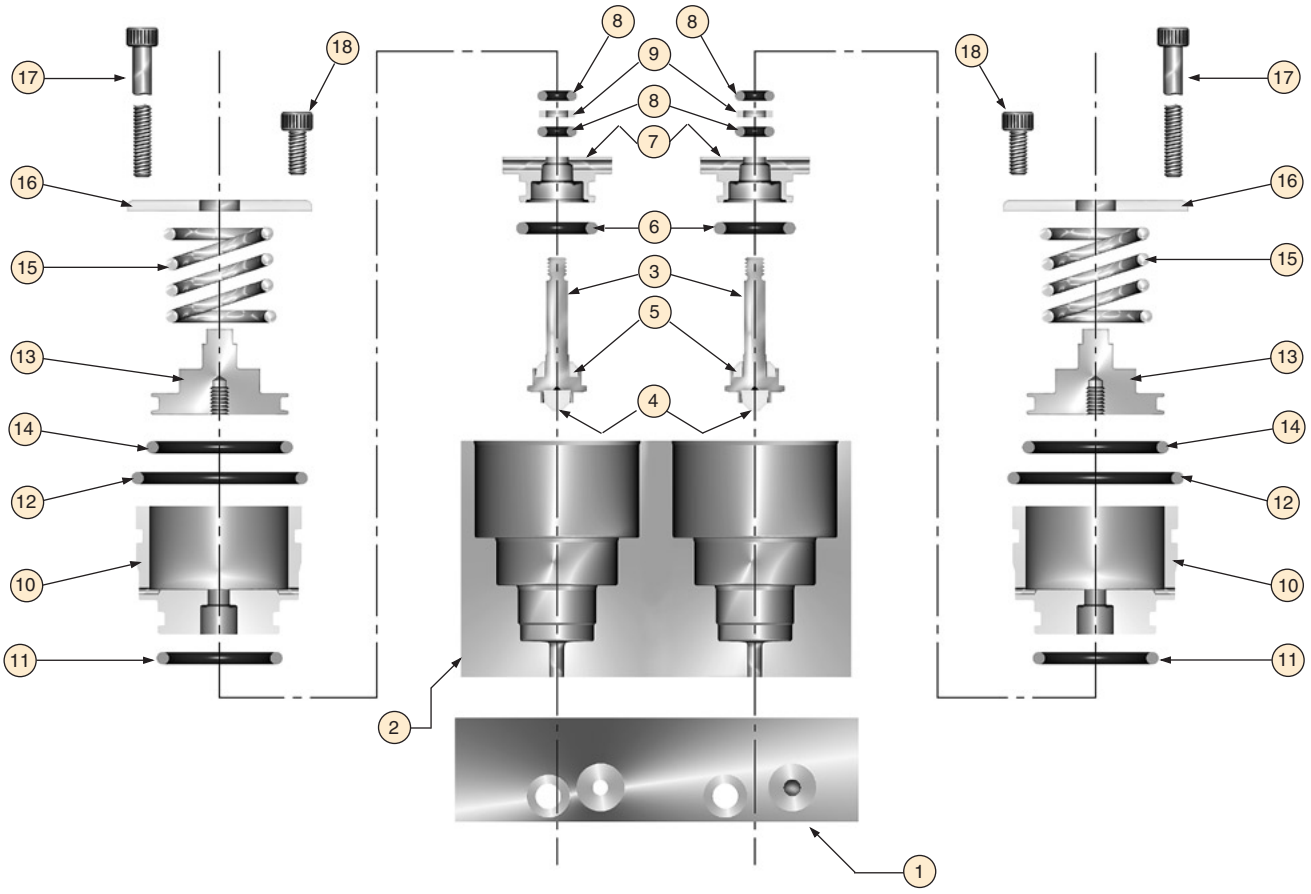
2F – 1/8" ANSI/ASME B1.20.1 Internal pipe threads



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	Stainless Steel	Alloy N04400
1	Base	ASTM A 479, Type 316	ASTM B 127, Alloy N04400
2	Valve Body	ASTM A 479, Type 316	ASTM B 127, Alloy N04400
3	Stem	ASTM A 479, Type 316	ASTM B 127, Alloy N04400
4	Lower Seat	PCTFE	
5	Upper Seat	PCTFE	
6	O-Ring 2-013	Optional Elastomers	
7	Lower Bonnet	ASTM A 479, Type 316	ASTM B 164, Alloy N04405
8	O-Ring 2-007	Optional Elastomers	
9	Back-up Ring	PTFE	
10	Upper Bonnet	ASTM A 479, Type 316	ASTM B 164, Alloy N04405
11	O-Ring 2-018	Optional Elastomers	
12	O-Ring 2-023	Optional Elastomers	
13	Piston	ASTM B 211, Alloy 6061	
14	O-Ring 2-020	Optional Elastomers	
15	Spring	ASTM A 564, Type 630	
16	Cap	ASTM A 479, Type 316	
17	Body Bolt	ASTM A 193, Grade B8	
18	Cap Bolt	ASTM A 193, Grade B8	

Note: Material for Stream Switching Vent and Analyzer End Plates (not shown) is ASTM A 479, Type 316 or ASTM B 127, Alloy N04400. Material for Base Plate Bolts is ASTM A 276, Type 316.
Lubrication: Perfluorinated polyether

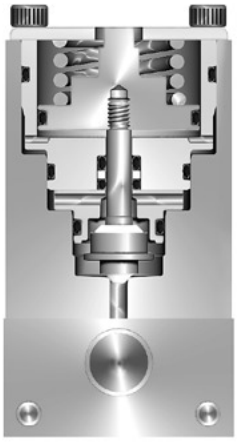
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Valve Module

The Parker *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 sample streams.

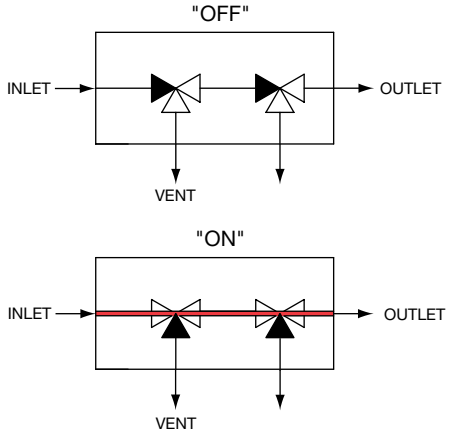
Valve Module Features

- Each Valve Module has a flow inlet and outlet (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 Cross Section

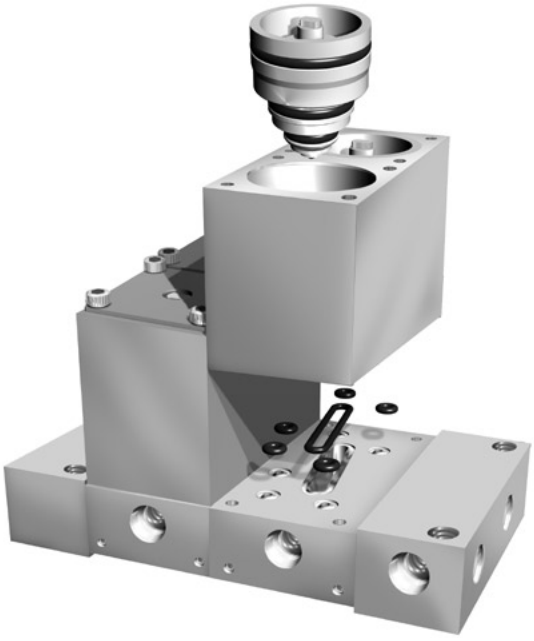
Valve Module Flow Diagram





Valve Expansion Module – R2EM

Valve Expansion Modules may be added or removed from the Parker *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 Page 8.)



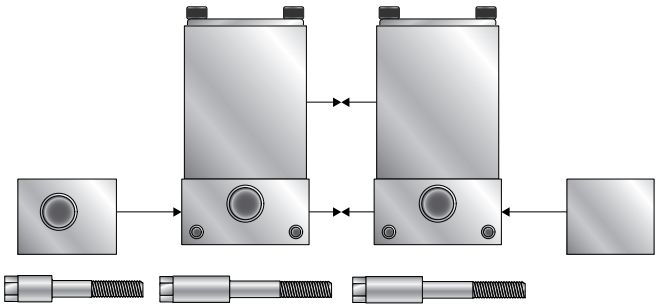
Easy Surface Mount/Module Disassembly

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

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Multi-Stream Switch – R2

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.

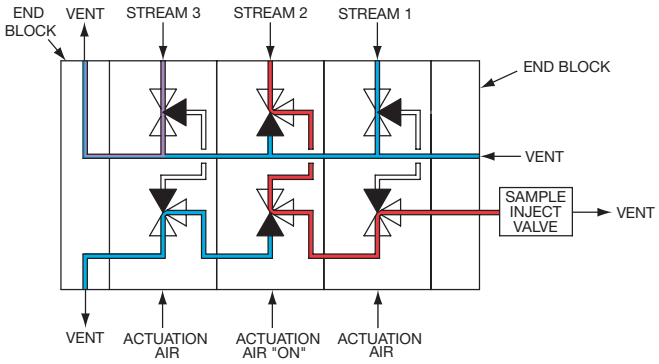


Fast Loop Options

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 (See How to Order – Page 9)

Example: 2F-R2K-BN-SS-3-**IF**

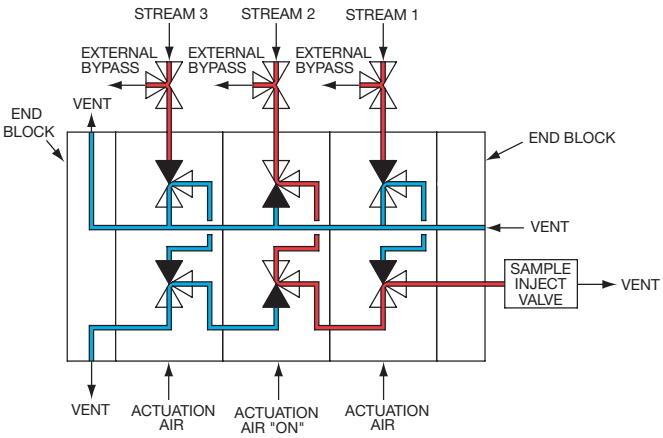


External Fast Loop Kits

Example shown is a three stream switching system with an external fast loop. External Bypass Kits are available to adapt to the standard Parker *R-max*™ Stream Switching System. The bypass option maintains the double block and bleed feature of the Parker *R-max*™ System.

Order: KIT-R2-**Fitting Part Number**-EF

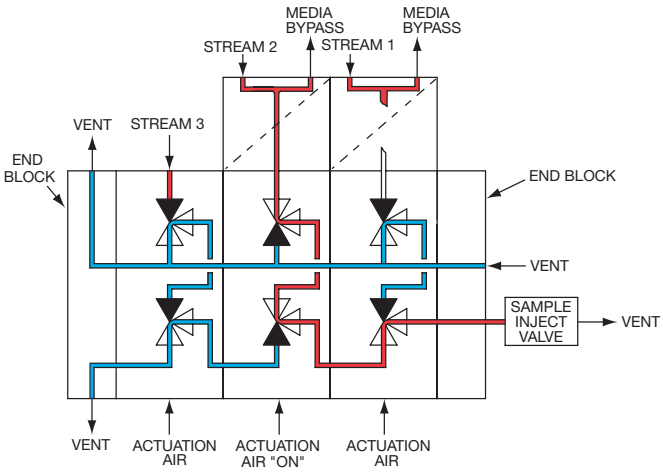
Example: KIT-R2-**2MRT2N-316**-EF



Fast Loop Filters

Example shown is a three stream switching system with two filter bypasses. Bypass Filter Kits may be incorporated into the Parker *R-max*™ Stream Switching System to enhance your system design.

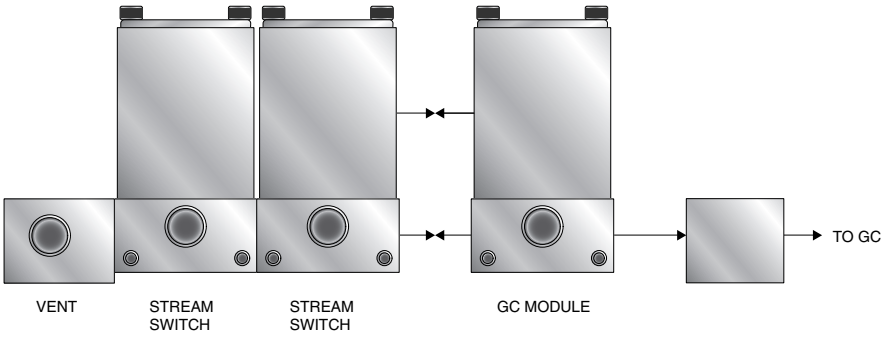
How to Order: See Page 10



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Multi-Stream Switch with GC Module – R2GC

The GC Module is positioned between the analyzer and stream switching system and is used to equilibrate the sample loop pressure to atmospheric pressure just prior to the sample injection. This insures a constant sample pressure in repetitive analyses. When the GC is actuated, the sample from the GC is routed to the low pressure vent.

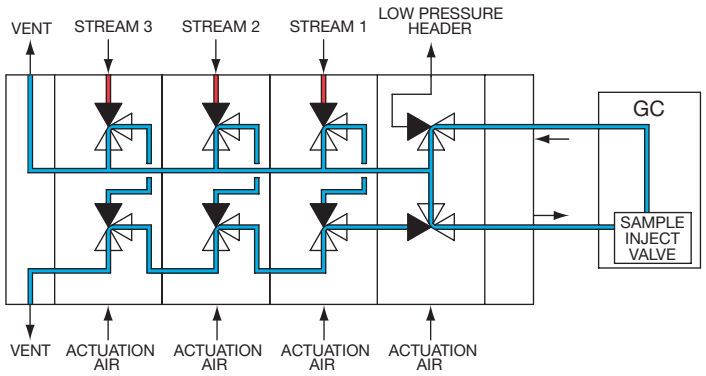


Example Shown: Two streams with GC Module

GC Module Function – Three Stream Examples

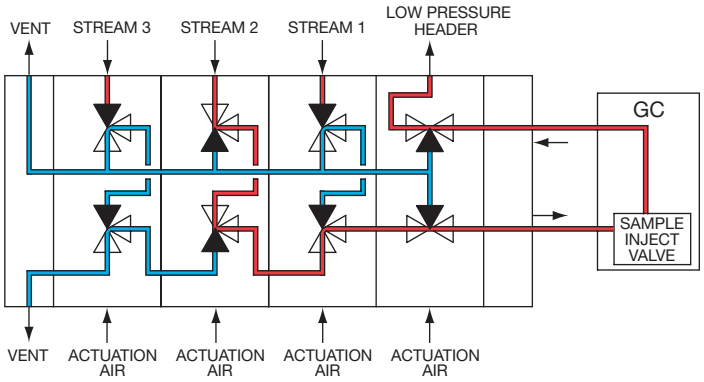
Example 1

All valves are in the "Off" position. The system is "Open" to vent.



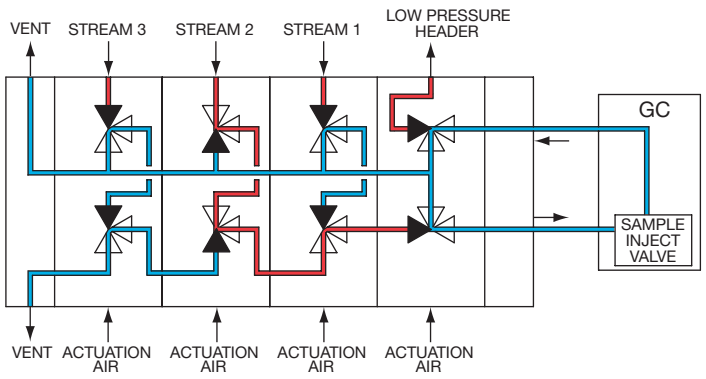
Example 2

Stream 2 and the GC 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 GC Module is in the "Off" position, equilibrating the sample loop pressure to vent pressure.



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Lab Sample Switch – R2LS

Process stream samples are often collected and analyzed by laboratory personnel to calibrate or verify the accuracy of the process analyzer. The Laboratory Sample Switch is installed in the sample stream on the outlet of the analyzer. The switch is used to route the sample flow to and from a sample container without disturbing or interrupting the analyzer sample flow. Complete Lab Sample Station Kits are also available.

How to Order

Lab Sample Switch

Order: 2F-R2LSK-Seal Material-Body Material

Consists of:

One Parker *R-max*™ Lab Station Switch

Example: 2F-R2LSK-V-SS

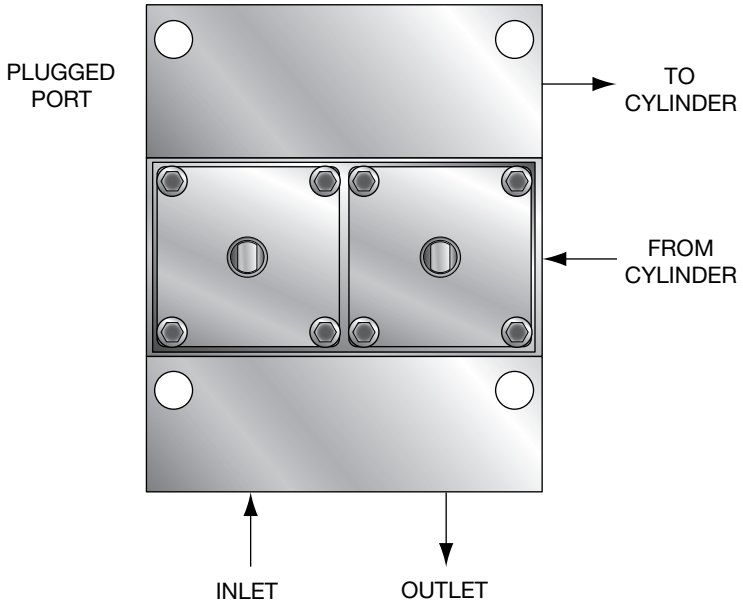
Complete Lab Sample Station Kit

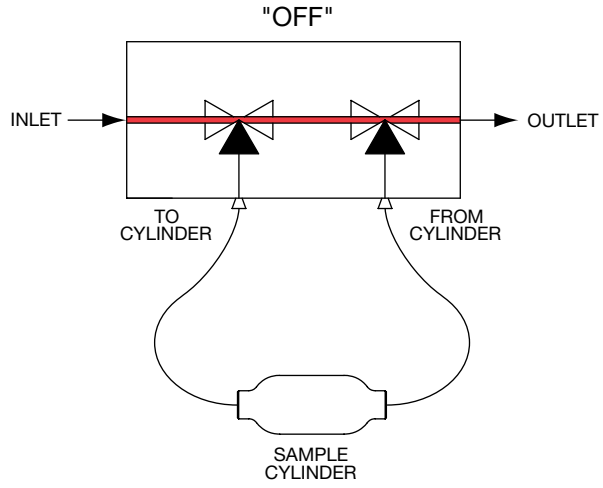
Order: KIT-R2LS-Cylinder Size and Material-Hose Material

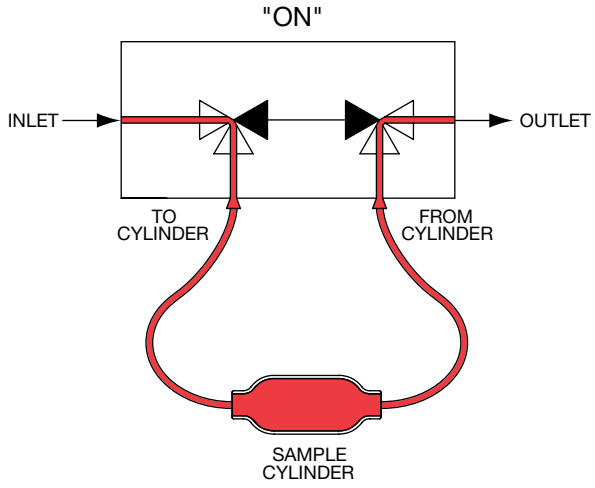
Consists of:

- Two Connectors
- Two 3-way Ball Valves with PTFE Seats and Seals
- Two Quick Disconnect Couplers with Fluorocarbon Seals
- Two Quick Disconnect Nipples with Fluorocarbon Seals
- One Gauge Port Tee;
- One Sample Cylinder Isolation Needle Valve with PTFE Packing;
- One Sample Cylinder Isolation Needle Valve with integral Rupture Disc and PTFE Packings and Seals;
- One Sample Cylinder (150, 300, or 1000cc) in Aluminum **(A)** or Stainless Steel **(SS)**;
- One Hose Assembly in Stainless Steel **(SS)** or PTFE **(T)**.

Example: KIT-R2LS-150SS-SS







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How to Order Stream Switching Systems and Accessories

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

End Connection	–	Valve Series	Base Option	Seat Material	–	Seal Material	–	Body Material*	–	Number of Modules**

Example 1: **2F – R2 K – V – SS – 2**

Describes a complete two stream switching system having 1/8" female NPT inlet and outlet ports, PCTFE valve seats, fluorocarbon rubber seals, and stainless steel construction.

Example 2: **2F – R2 GC K – EPR – SS – 4**

Describes a complete four stream switching system with GC Module having 1/8" female NPT inlet and outlet ports, PCTFE valve seats, ethylene propylene rubber seals, and stainless steel construction.*

End Connection	Valve Series	Base Option	Seat Material	Seal Material	Body Material*	Number of Modules**
2F **4A7** **4Z7**	**R2**	**Blank** None **GC** GC Service **LS** Lab Switch **EM** Valve Expansion Module **S** Single Valve	**K** – PCTFE	**V** Fluorocarbon Rubber **BN** Buna-N Rubber **EPR** Ethylene Propylene Rubber **NE** Neoprene Rubber **KZ** Highly Fluorinated Fluorocarbon Rubber	**SS** Stainless Steel **M** Alloy N04400	**Numeric Value** **Blank** – LS, EM or S Base Option

*Alloy N04400 not available on Single Valve units
**The number of stream modules should not include a GC module in the count if ordered as part of the system.

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.

Example: 4A7-R2K-V-SS-3**-C3**

How to Order Kits

Stem Seal Kits: KIT-R2K-Seal Material-Body Material. **Example: KIT-R2K-V-SS**. (Consists of one stem with PCTFE upper and lower seats, Fluorocarbon O-rings and associated PTFE back-up rings, and maintenance instructions.)

Valve Cartridge Kits: KIT-R2K-CART-Seal Material-Body Material. **Example: KIT-R2K-CART-V-SS**. (Consists of one completely assembled valve cartridge and maintenance instructions – Items 3 through 13 from Page 4 Materials of Construction.)

Silcosteel®: Add the suffix **-RTK** to the end of the part number to receive Stream Switching Valves with a thin, permanently bonded silicon based coating which shields sample analytes from adsorption.

Silcosteel is a registered trademark of Restek Corporation.

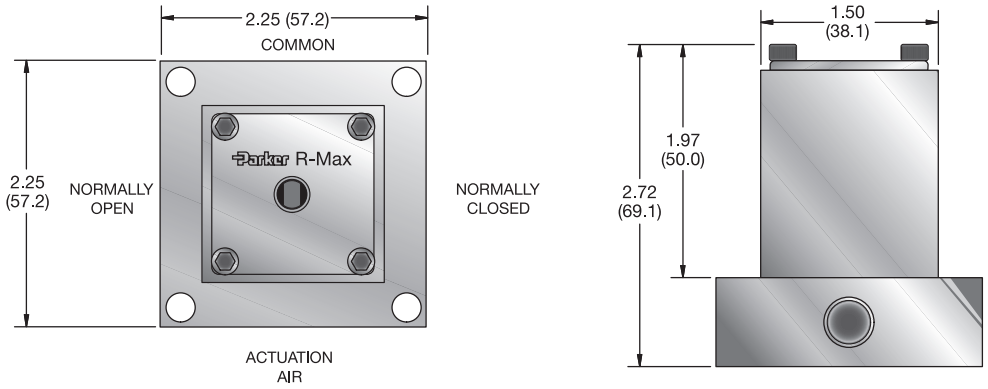
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Single Valve

The Parker *R-max*™ Single Valve shares the same technology, features, and options found in the Stream Switching System. The pneumatically actuated valve serves as a three-way diverting valve with common, normally open, and normally closed porting.

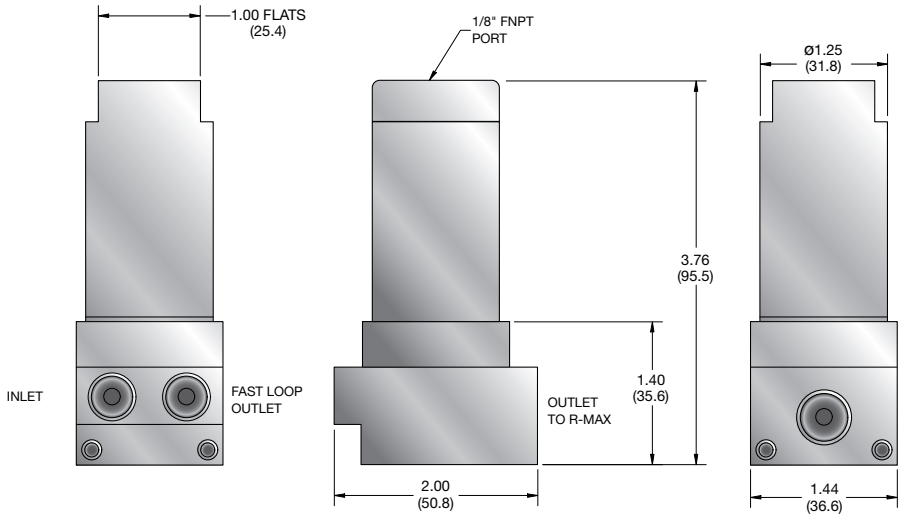
Features

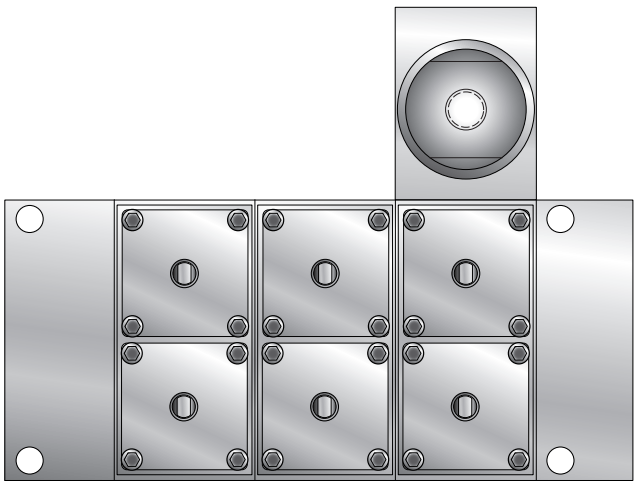
- Surface Mount Technology
- PCTFE Sealing Technology
- Low Internal Volume
- Modular Design
- Visual Position Indicator
- Low Actuation Pressure



Fast Loop Filters

Designed to be used on the stream inlet ports of the Parker *R-max*™ Stream Switching System to provide reduced transport time of filtered sample stream media from the process line through the stream switch to the analyzer. This is achieved by diverting approximately 90% of the inlet flow around the cartridge filter and out of the filter bowl.

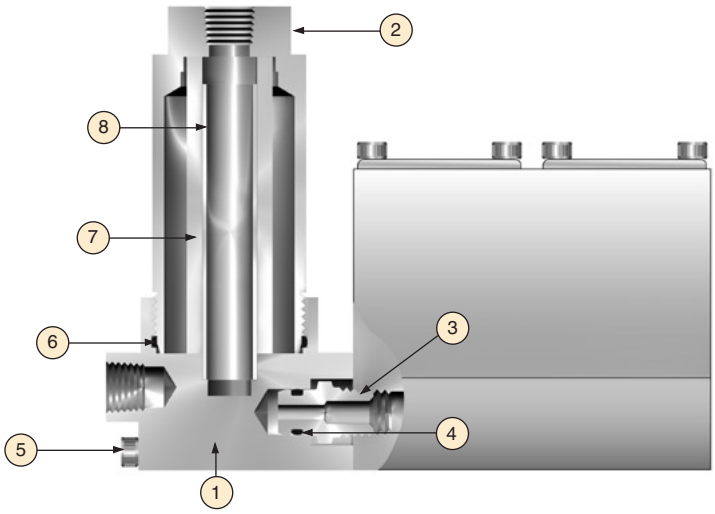




Filter installed on Stream 1 of a Three Stream System

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Fast Loop Filters



Note: Flow paths in the filter body vary according to the element type and are not shown.

Materials of Construction

Item	Part Description	Material
1	Body	ASTM A 479, Type 316
2	Bowl	ASTM A 479, Type 316
3	Adapter	ASTM A 479, Type 316
4	O-Ring 2-008	Optional Elastomers
5	Body Bolt	ASTM A 193, Grade B8
6	O-Ring 2-025	Optional Elastomers
7	Element	316SS and Microfibre
8	Support Core	316SS

How to Order Fast Loop Filters

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

Inlet and Bypass Outlet	–	Filter Series	–	O-Ring Seals	–	Filtration Type	Element Type	–	Body Material	–	*R-max*™ Connection Type
Example 1: 2F	–	FR2	–	EPR	–	S	100	–	SS	–	B

Describes a FR2 Series Fast Loop Filter with 1/8" FNPT inlet and bypass outlets, ethylene propylene rubber seals, 100 micron 316SS sintered metal filter element, stainless steel construction, and designed to be attached to a Parker *R-max*™ Stream Switch having inverted CPI™ or A-LOK® stream inlet ports.

Inlet and Outlet Bypass Outlet	Filter Series	O-Ring Seals	Filtration Type	Element Type		Body Material*	*R-max*™ Connection Type
				Balston® P and C	Sintered Metal (S)		
2F 1/8" Female NPT	**FR2**	**V** Fluorocarbon Rubber **BN** Buna-N Rubber **EPR** Ethylene Propylene Rubber **NE** Neoprene Rubber **KZ** Highly Fluorinated Fluorocarbon Rubber	**P** Particulate **C** Coalescing **S** Sintered Metal	**93** 93% Microfibre **99** 99% Microfibre	**100** 100 micron **70** 70 micron **40** 40 micron **20** 20 micron **10** 10 micron **5** 5 micron	**SS** Stainless Steel	**A** 2F **B** 4A7 or 4Z7

Fast Loop Filter Options

Silcosteel®: Add the suffix **-RTK** to the end of the part number to receive Filters with a thin, permanently bonded silicon based coating which shields sample analytes from adsorption.

Silcosteel is a registered trademark of Restek Corporation.

Parker Hannifin Corporation
Instrumentation Products Division
Huntsville, AL USA
www.parker.com/icd

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6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products.

Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.

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AEROSPACE

Key Markets

- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products

- Flight control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes



CLIMATE CONTROL

Key Markets

- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products

- CO^2 controls
- Electronic controllers
- Filter driers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves



ELECTROMECHANICAL

Key Markets

- Aerospace
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products

- AC/DC drives & systems
- Electric actuators, gantry robots & slides
- Electrohydrostatic actuation systems
- Electromechanical actuation systems
- Human machine interface
- Linear motors
- Stepper motors, servo motors, drives & controls
- Structural extrusions



FILTRATION

Key Markets

- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products

- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators



FLUID & GAS HANDLING

Key Markets

- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products

- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



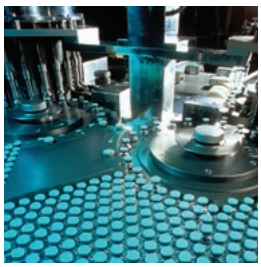
HYDRAULICS

Key Markets

- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products

- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



PNEUMATICS

Key Markets

- Aerospace
- Conveyor & material handling
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Brass fittings & valves
- Manifolds
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves & controls
- Quick disconnects
- Rotary actuators
- Rubber & thermoplastic hose & couplings
- Structural extrusions
- Thermoplastic tubing & fittings
- Vacuum generators, cups & sensors



PROCESS CONTROL

Key Markets

- **Chemical & refining**
- **Food, beverage & dairy**
- **Medical & dental**
- **Microelectronics**
- **Oil & gas**
- **Power generation**

Key Products

- **Analytical sample conditioning products & systems**
- **Fluoropolymer chemical delivery fittings, valves & pumps**
- **High purity gas delivery fittings, valves & regulators**
- **Instrumentation fittings, valves & regulators**
- **Medium pressure fittings & valves**
- **Process control manifolds**



SEALING & SHIELDING

Key Markets

- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductor
- Telecommunications
- Transportation

Key Products

- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management

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