Valvair II

Solenoid Operated Directional Spool Valves

Section N

BOLD ITEMS ARE MOST POPULAR.

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- Full Air Operation for fastest response.
- "Plug-In" Design simplifies maintenance and installation. Reduces downtime. No wiring or plumbing to disturb.
- "Direct Pipe" Design for economy and performance.
- Solenoids Interchange between all styles of plug-in valves.
- Variety of Operators Available; Direct Conduit, (JIC) Junction Box, NEMA 4, Hazardous Duty, (UL, CSA), and remote air pilot.
- Locking Manual Overrides Standard. Non-locking overrides optional.
- Indicator Lights Standard on 120VAC and 24VDC models.
- Encapsulated Coil designed for low-power consumption and maximum life.
- Field Convertible to External Pilot Supply for vacuum or other services.
- "Oversized" Flow Areas.
- Synthetic Rubber O-Ring Seals are specially compounded for minimum compression and friction for superior wear and abrasion resistance.
- Precision Ground Spool "floats" on O-ring seals. Closed center cross-over design saves air.
- Plug-In "Sandwich" Regulators (Available for specific models) fit between valve and base, increase systems design capabilities.
- CSA - Selected Valves are Canadian Standards Association approved for general purpose use.

General Purpose Approvals

CSA - Canadian Standards Association
File Number 42024

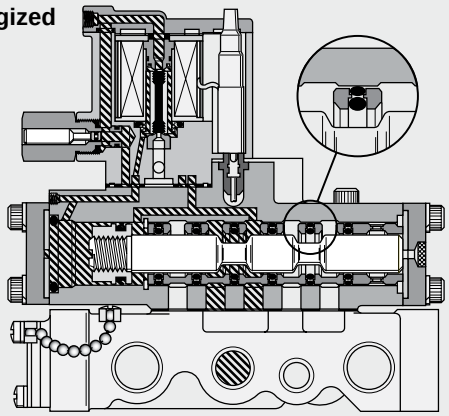
Hazardous Duty Approvals

UL - Underwriters Laboratories, Inc.
File Number E42542
Category Y107

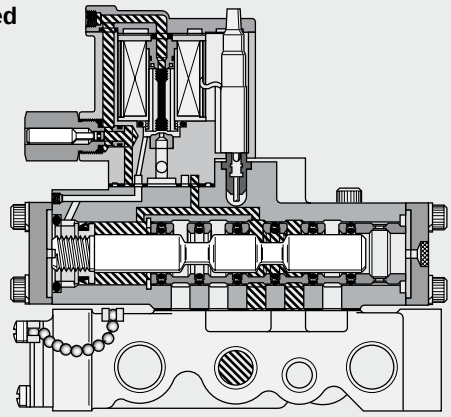
CSA - Canadian Standards Association
File Number 24349

Plug-In

De-Energized

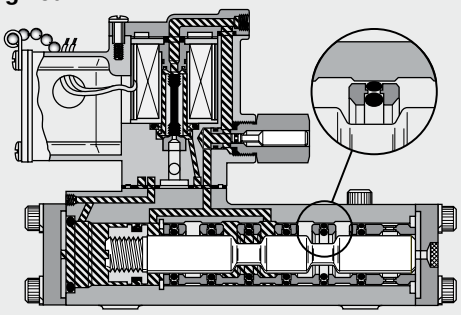


Energized

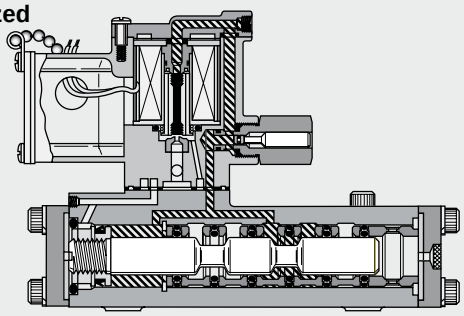


Direct Pipe Ported

De-Energized



Energized



Pressure **Exhaust**

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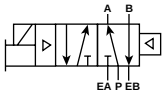
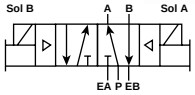
L675 (3/8" Basic Valve)
Single Solenoid
4-Way, 5-Port, 2-Position



L655 (3/8" Basic Valve)
Double Solenoid
4-Way, 5-Port, 2-Position



Valve Only		Voltage	Subbase (Side Ports)	Manifold † (End & Bottom Ports)	Port Size (NPT)	Nominal Cv
Single Solenoid	Double Solenoid					
L675 39 102 53	L655 39 102 53	120V 60Hz	K022 090	K142 230	3/8"	4.8
		110V 50Hz	K022 091	K142 231	1/2"	4.8
L675 33 102 **	L655 33 102 **	Other	K022 101	K142 270	3/4"	4.8

See page 11 for variations and (**) voltage codes.

† Manifolds include mounting hardware.

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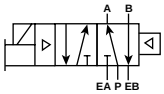
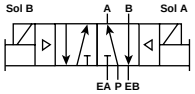
L675 (1" Basic Valve)
Single Solenoid
4-Way, 5-Port, 2-Position



L655 (1" Basic Valve)
Double Solenoid
4-Way, 5-Port, 2-Position



Valve Only		Voltage	Subbase (Side Ports)	Manifold † (End & Bottom Ports)	Port Size (NPT)	Port Adapter (Manifolds)	Nominal Cv
Single Solenoid	Double Solenoid						
L675 89 102 53	L655 89 102 53	120V 60Hz	—	—	3/4"	K122 016 Kit Includes Both Ends	11.3
		110V 50Hz	K022 095	K142 236	1"		
L675 83 102 **	L655 83 102 **	Other	—	—	1-1/4"		

See page 11 for variations and (**) voltage codes.

† Manifolds include mounting hardware, except for port adapters.
See chart, order separately.

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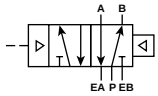
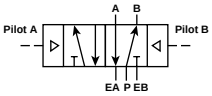
L674 (3/8" Basic Valve)
Single Remote Pilot
4-Way, 5-Port, 2-Position



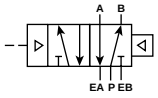
L654 (3/8" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 2-Position



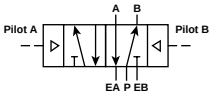
Valve Only		Subbase (Side Ports)	Manifold † (End & Bottom Ports)	Port Size (NPT)	Nominal Cv
Single Remote	Double Remote				
L674 31 102	L654 31 102	K022 090	K142 230	3/8"	4.8
		K022 091	K142 231	1/2"	4.8
		K022 101	K142 270	3/4"	4.8

† Manifolds include mounting hardware.

L674 (1" Basic Valve)
Single Remote Pilot
4-Way, 5-Port, 2-Position



L654 (1" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 2-Position



Valve Only		Subbase (Side Ports)	Manifold † (End & Bottom Ports)	Port Size (NPT)	Port Adapter (Manifolds)	Nominal Cv
Single Remote	Double Remote					
L674 81 102	L654 81 102	—	—	3/4"	K122 016 Kit Includes Both Ends	11.3
		K022 095	K142 236	1"		
		—	—	1-1/4"		

† Manifolds include mounting hardware, except for port adapters.
See chart, order separately.

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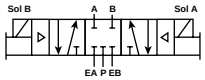
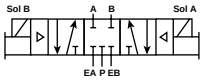
L665 (3/8" Basic Valve)
Double Solenoid
4-Way, 5-Port, 3-Position



L665 (1" Basic Valve)
Double Solenoid
4-Way, 5-Port, 3-Position



Valve Only	Voltage	Subbase (Side Ports)	Manifold † (End & Bottom Ports)	Port Size (NPT)	Port Adapter	Nominal Cv
L665 39 211 53	120V 60Hz	K022 090	K142 230	3/8"	Not Req'd	4.8
	110V 50Hz	K022 091	K142 231	1/2"		
L665 33 211 **	Other	K022 101	K142 270	3/4"		
L665 89 211 53	120V 60Hz	—	—	3/4"	K122 016 Kit Includes Both Ends	11.3
	110V 50Hz	K022 095	K142 236	1"		
L665 83 211 **	Other	—	—	1-1/4"		

See page 11 for variations in class of neutral configuration and (**) voltage codes.

† Manifolds include mounting hardware, except for port adapters. See chart, order separately.

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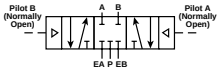
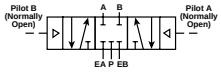
L664 (3/8" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 3-Position



L664 (1" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 3-Position



Valve Only	Subbase (Side Ports)	Manifold † (End & Bottom Ports)	Port Size (NPT)	Port Adapter	Nominal Cv
L664 31 211	K022 090	K142 230	3/8"	Not Req'd	4.8
	K022 091	K142 231	1/2"		
	K022 101	K142 270	3/4"		
L664 81 211	—		3/4"	K122 016 Kit Includes Both Ends	11.3
	K022 095	K142 236	1"		
	—	—	1-1/4"		

See page 11 for variations in class of neutral configurations.

†Manifolds include mounting hardware.

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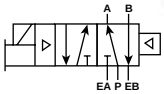
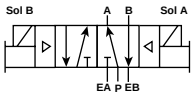
L705 (3/8" Basic Valve)
Single Solenoid
4-Way, 5-Port, 2-Position



L685 (3/8" Basic Valve)
Double Solenoid
4-Way, 5-Port, 2-Position



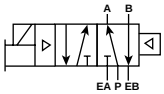
Valve		Voltage	Port Size (NPT)		Operator Type	Nominal Cv
Single Solenoid	Double Solenoid		P, A & B	EA & EB		
L705 39 102 53	**L685 39 102 53**	120V 60Hz 110V 50Hz	3/8"	1/2"	Junction Box	4.8
L705 49 102 53	**L685 49 102 53**		1/2"	1/2"		
L705 36 102 **	**L685 36 102 ****	Other	3/8"	1/2"	Junction Box	4.8
L705 46 102 **	**L685 46 102 ****		1/2"	1/2"		
L705 33 102 **	**L685 33 102 ****	Any	3/8"	1/2"	Basic	4.8
L705 43 102 **	**L685 43 102 ****		1/2"	1/2"		
L705 33 802 **	**L685 33 802 ****	Any	3/8"	1/2"	NEMA 4	4.8
L705 43 802 **	**L685 43 802 ****		1/2"	1/2"		
L705 33 602 **	**L685 33 602 ****	See Voltage Chart	3/8"	1/2"	† Hazardous Duty	4.8
L705 43 602 **	**L685 43 602 ****		1/2"	1/2"		

See page 12 for variations and (**) voltage codes.

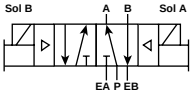
†UL & CSA Approved.

N

L705 (1" Basic Valve)
Single Solenoid
4-Way, 5-Port, 2-Position



L685 (1" Basic Valve)
Double Solenoid
4-Way, 5-Port, 2-Position



Valve		Voltage	Port Size (NPT)		Type	Nominal Cv
Single Solenoid	Double Solenoid		P, A & B	EA & EB		
L705 89 102 53	**L685 89 102 53**	110V 50Hz	1"	1-1/4"	Junction Box	12.0
L705 99 102 53	**L685 99 102 53**		1-1/4"	1-1/4"		
L705 86 102 **	**L685 86 102 ****	Other	1"	1-1/4"	Junction Box	12.0
L705 96 102 **	**L685 96 102 ****		1-1/4"	1-1/4"		
L705 83 602 **	**L685 83 602 ****	See Voltage Chart	1"	1-1/4"	†Hazardous Duty	12.0
L705 93 602 **	**L685 93 602 ****		1-1/4"	1-1/4"		

See page 12 for variations and (**) voltage codes.

†UL & CSA Approved.

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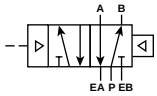
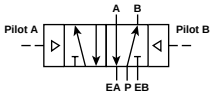
L704 (3/8" Basic Valve)
Single Remote Pilot
4-Way, 5-Port, 2-Position



L684 (3/8" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 2-Position



Valve		Port Size (NPT)		Nominal Cv
Single Remote	Double Remote	P, A & B	EA & EB	
L704 31 102	L684 31 102	3/8"	1/2"	4.8
L704 41 102	L684 41 102	1/2"	1/2"	

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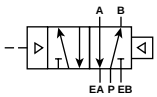
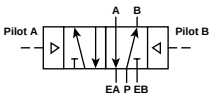
L704 (1" Basic Valve)
Single Remote Pilot
4-Way, 5-Port, 2-Position



L684 (1" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 2-Position



Valve		Port Size (NPT)		Nominal Cv
Single Remote	Double Remote	P, A & B	EA & EB	
L704 81 102	L684 81 102	1"	1-1/4"	12.0
L704 91 102	L684 91 102	1-1/4"	1-1/4"	

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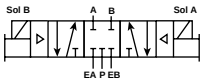
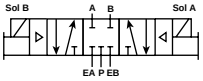
L695 (3/8" Basic Valve)
Double Solenoid
4-Way, 5-Port, 3-Position



L695 (1" Basic Valve)
Double Solenoid
4-Way, 5-Port, 3-Position



Valve		Voltage	Port Size (NPT)		Type	Nominal Cv
3/8" Basic Size	1" Basic Size		P, A & B	EA & EB		
L695 39 211 53	—	120V 60Hz 110V 50Hz	3/8"	1/2"	Junction Box	4.5
L695 49 211 53	—		1/2"	1/2"		
—	L695 89 211 53		1"	1-1/4"		12.0
—	L695 99 211 53		1-1/4"	1-1/4"		
L695 36 211 **	—	Other	3/8"	1/2"	Basic	4.5
L695 46 211 **	—		1/2"	1/2"		
—	L695 86 211 **		1"	1-1/4"		12.0
—	L695 96 211 **		1-1/4"	1-1/4"		

See page 12 for variations in class of neutral configuration and (**) voltage codes.

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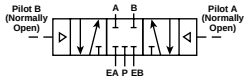
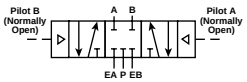
L695 (3/8" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 3-Position



L695 (1" Basic Valve)
Double Remote Pilot
4-Way, 5-Port, 3-Position



Valve	Port Size (NPT)		Nominal Cv
	P, A & B	EA & EB	
L694 31 211	3/8"	1/2"	4.5
L694 41 211	1/2"	1/2"	
L694 81 211	1"	1-1/4"	12.0
L694 91 211	1-1/4"	1-1/4"	

See page 12 for ordering other neutral configurations.

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Lubricated Non-Lubricated Service 2-Position, Plug-In 3/8" & 1" Basic Size

BOLD ITEMS ARE MOST POPULAR.

L	67	5	3	9	10	2	53

Type	
Double	**65**
Single	**67**

Operator	
Remote	4
Solenoid	**5**

Size	
3/8" Basic	**3**
1" Basic	**8**

Operator Options	
Solenoid (Basic) or Remote	**1**
Solenoid with Locking Override	3
Solenoid w/Light (120VAC, 24VDC) & Non-Locking Override	8
Solenoid w/Light (120VAC, 24VDC) & Locking Override	**9**

Enclosure "Class"	
10	**Standard (NEMA 1 & 12) or Remote**

Duty Cycle	
2	**Standard Service, Solenoid or Remote**
4	Continuous Service Solenoid

Voltage & Frequency			
	60Hz	**50Hz**	**DC**
45	—	—	12
49	**—**	**—**	**24**
53	**120**	**110**	**—**
57	240	220	—

N

Lubricated or Non-Lubricated Service 3-Position, Plug-In 3/8" & 1" Basic Size

L	66	5	3	9	21	1	53

Type	
Double	**66**

Operator	
Remote	4
Solenoid	**5**

Size	
3/8" Basic	**3**
1" Basic	**8**

Operator Options	
Solenoid (Basic) or Remote	**1**
Solenoid with Locking Override	3
Solenoid w/Light (120VAC, 24VDC) & Non-Locking Override	8
Solenoid w/Light (120VAC, 24VDC) & Locking Override	**9**

Enclosure "Class"	
21	**All Ports Blocked in Neutral (NEMA 1 & 12 Enclosure) or Remote**
22	Cyl. Ports Open to Exh. in Neutral (NEMA 1 & 12 Enclosure) or Remote
23	Cyl. Ports Open to Inlet in Neutral (NEMA 1 & 12 Enclosure) or Remote

Duty Cycle	
1	**Standard Service, Solenoid or Remote**
5	Continuous Service Solenoid

Voltage & Frequency			
	60Hz	**50Hz**	**DC**
45	—	—	12
49	**—**	**—**	**24**
53	**120**	**110**	**—**
57	240	220	—

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Lubricated or Non-Lubricated Service 2-Position, Direct Pipe Ported, 3/8" & 1" Basic Size

BOLD ITEMS ARE MOST POPULAR.

L	70	5	3	9	10	2	53	—

Type	
Double	**68**
Single	**70**

Operator	
Remote	4
Solenoid	**5**

Size	
3/8" NPT Inlet & Cylinder 1/2" NPT Exhaust	**3**
1/2" NPT Inlet, Cylinder & Exhaust	**4**
1" NPT Inlet & Cylinder 1-1/4" NPT Exhaust	**8**
1-1/4" NPT Inlet Cylinder & Exhaust	9*

* Not available operator option 4 - Remote Pilot.

Operator Options	
Solenoid (Basic) or Remote	1
Solenoid with Locking Override	**3**
Solenoid w/ Junction Box & Locking Override	6
Solenoid w/ Junction Box & Light (120VAC, 24VDC) & Non-Locking Override	8
Solenoid w/ Junction Box & Light (120VAC, 24VDC) & Locking Override	**9**

Enclosure "Class"	
10	**Standard (NEMA 1 & 12) or Remote**
60*†	Hazardous Duty (NEMA 7 & 9)
80†	NEMA 4

* Voltage 49 / 53 only.
† Use with operator options 1, 2 & 3 only, voltage 53 only.

Duty Cycle	
2	**Standard Service, Solenoid or Remote**
4	Continuous Service Solenoid

Voltage & Frequency			
	60Hz	**50Hz**	**DC**
45	—	—	12
49	**—**	**—**	**24**
53	**120**	**110**	**—**
57	240	220	—

Lead Length	
Blank	**19" (Standard)**

Lubricated or Non-Lubricated Service 3-Position, Direct Pipe Ported, 3/8" & 1" Basic Size

L	69	5	3	9	21	1	53	—

Type	
Double	**69**

Operator	
Remote	4
Solenoid	**5**

Size	
3/8" NPT Inlet & Cylinder 1/2" NPT Exhaust	**3**
1/2" NPT Inlet, Cylinder & Exhaust	**4**
1" NPT Inlet & Cylinder 1-1/4" NPT Exhaust	8
1-1/4" NPT Inlet Cylinder & Exhaust	9*

* Not available operator option 4 - Remote Pilot.

Operator Options	
Solenoid (Basic) or Remote	1
Solenoid with Locking Override	**3**
Solenoid w/ Junction Box & Locking Override	6
Solenoid w/ Junction Box & Light (120VAC, 24VDC) & Non-Locking Override	8
Solenoid w/ Junction Box & Light (120VAC, 24VDC) & Locking Override	**9**

Enclosure "Class"	
All Ports Blocked in Neutral	
21	**Standard (NEMA 1 & 12) or Remote**
71*†	Hazardous Duty (NEMA 7 & 9)
91†	NEMA 4
Cyl. Ports Open to Exh. in Neutral	
22	Standard (NEMA 1 & 12) or Remote
72*†	Hazardous Duty (NEMA 7 & 9)
92†	NEMA 4
Cyl. Ports Open to Inlet in Neutral	
23	Standard (NEMA 1 & 12) or Remote
73*†	Hazardous Duty (NEMA 7 & 9)
93†	NEMA 4

* Voltage 49 / 53 only.
† Use with operator options 1, 2 & 3 only, voltage 53 only.

Duty Cycle	
1	**Standard Service, Solenoid or Remote**
5	Continuous Service Solenoid

Voltage & Frequency			
	60Hz	**50Hz**	**DC**
45	—	—	12
49	**—**	**—**	**24**
53	**120**	**110**	**—**
57	240	220	—

Lead Length	
Blank	**19" (Standard)**

N

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Modular Pneumatic Controls Plug-In Sandwich Block Design for Modular Port Regulation

These modular regulators assemble to any 3/8" basic valve interface pattern.

Port Regulation Made Easy

Place the sandwich on the manifold or subbase, tighten the four securing screws, then plug the valve into the sandwich and tighten its securing screws to complete the assembly.

Within minutes, these modular components can be installed in new, or used to improve existing manifold systems, without disturbing wiring or air connections.

3-Configurations

1. **Common Port Regulation** - A common regulated pressure is selected to both cylinder ports.
2. **Single Port Regulation** - Line pressure is available to one cylinder port, while a single regulated pressure is selected to the other cylinder port.
3. **Independent Port Regulation** - Two independently regulated pressures selected to the cylinder ports.

NOTE: When using single or independent port sandwich regulators, be aware that:

1. Cylinder port outlets are reversed.
2. 3-Position, cylinder ports open to exhaust and cylinder ports open to inlet functions are reversed. To produce a cylinder ports open to exhaust function, order valve with cylinder ports open to inlet. To produce a cylinder ports open to inlet function, order valve with cylinder ports open to exhaust.

Manual or Remote secondary pressure adjustment.

Three Pressure Ranges are standard for manual units:

1-30 PSIG

1-60 PSIG

2-125 PSIG

Range for Remote: 0-140 PSIG

Gauges are furnished standard; liquid filled gauges are optional.

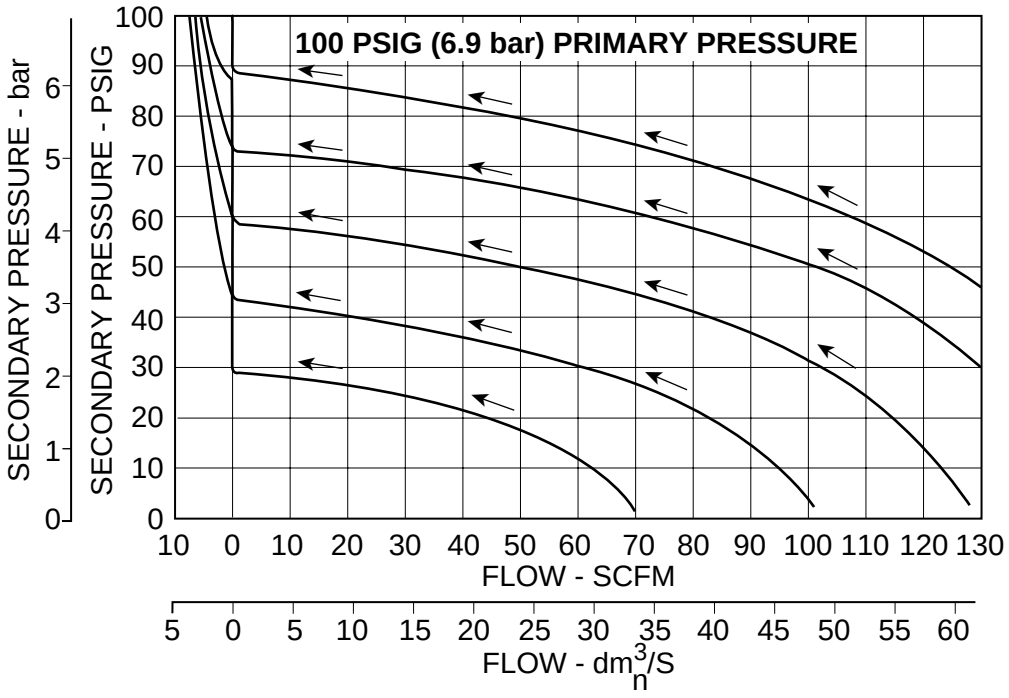
Solenoid Valve Assembly

Regulator Assembly

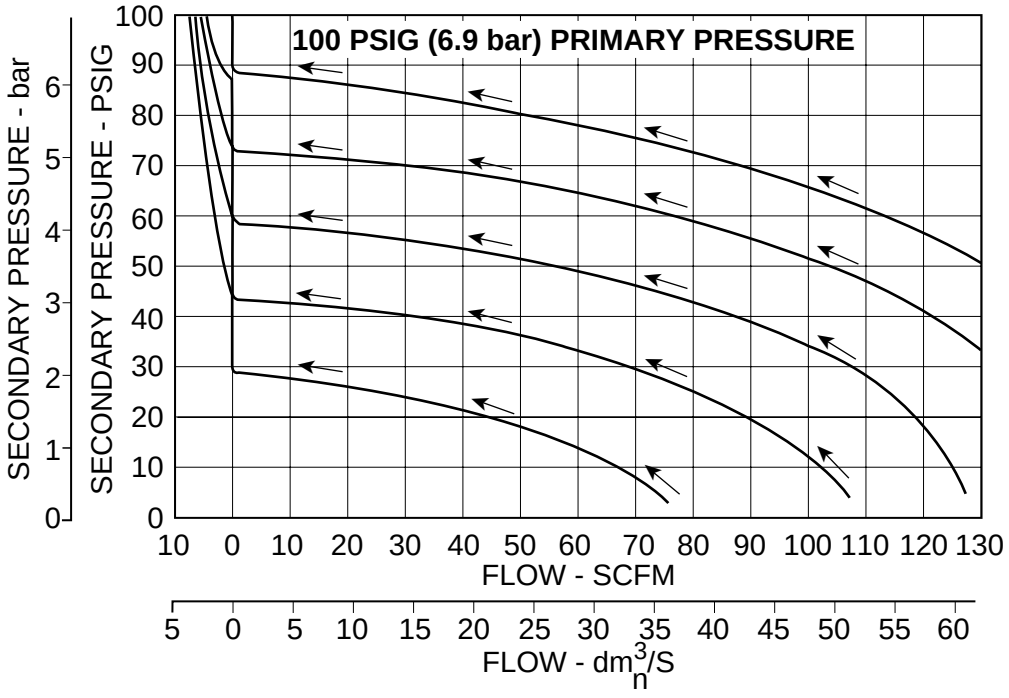
Manifold

Typical Assembly

RELIEF AND FLOW CHARACTERISTICS
COMMON PORT REGULATION



RELIEF AND FLOW CHARACTERISTICS
INDEPENDENT OR SINGLE PORT REGULATION



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The above curves illustrate flow characteristics through an assembled valve, air regulator, and base (or modular manifold) unit.

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Function

This modular air pressure regulator assembly, installed between a 3/8" basic, 4-Way valve and subbase, supplies regulated pressures to both cylinder ports.

Valve must be converted to external pilot supply.

Features

Regulated pressure output from the valve is adjusted by knob on the manually set model or by air pressure signal applied to the regulator pilot port on the remotely set model.

Furnished with pressure gauge as standard.

Assembly “A” (Shown at right) or Assembly “B” may be specified as a matter of convenience, or to satisfy space limitations.*

Pressure Range Options

Maximum Supply Pressure.....140 PSIG

Output Pressure Range.....1 - 60 PSIG
2 - 125 PSIG

Operating Temperature Range

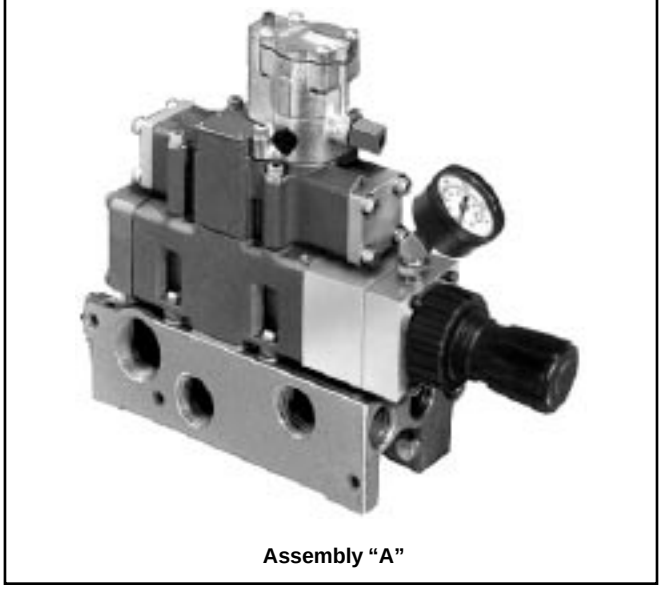
32°F (0°C) to 175°F (79°C)

How To Order

1. Select type of adjustment.
2. Select pressure range.
3. Select assembly style.

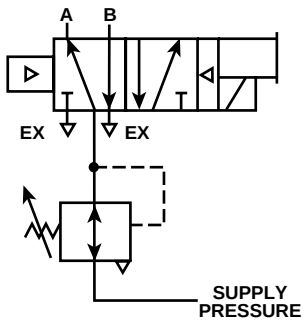
Example: Manual adjusted.
1-60 PSIG with regulator positioned over the junction box.

Model No. L554 08 302C



Assembly “A”

Graphic Symbol



Regulated Pressure at Both “A” & “B”

Pressure Adjustment	Pressure Range	Model Number	
	PSIG	Assembly “A”	Assembly “B”
Manual	1 - 60	L554 02 308C	L554 08 302C
	2 - 125	L554 03 308C	L554 08 303C
Remote	0 - 140	L554 11 308C	L554 08 311C

* Assembly “A” places the regulator on the end opposite the electrical junction box. Assembly “B” places the regulator over the electrical junction box.

See page 34 for gauges.

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Function

This modular air pressure regulator assembly, when installed between a 3/8" basic, 4-Way valve and subbase or modular manifold, supplies one or more regulated pressures to one of the valve cylinder ports and supply pressure to the other cylinder port.

On Single Port Cylinder Port Regulation Units controlled by a single solenoid valve, cylinder port "B" is the normally open cylinder port. The solenoid is energized to open cylinder Port "A". On double solenoid operated valves, energizing solenoid "B" opens cylinder port "A" and energizing solenoid "A" opens cylinder port "B".

Valve must be converted to external pilot supply.

Features

Regulated pressure output from the valve is adjusted by knob on the manually set model or by air pressure signal applied to the regulator pilot port on the remotely set model.

For reduced pressure at "A" cylinder port, the regulator is mounted per assembly "A" on end opposite the electrical junction box. For reduced pressure at "B" cylinder port the regulator is mounted per Assembly "B" which places the regulator over the electrical junction box.

Furnished with pressure gauge as standard.

Pressure Range Options

Maximum Supply Pressure.....140 PSIG

Output Pressure Range.....1 - 30 PSIG
1 - 60 PSIG
2 - 125 PSIG

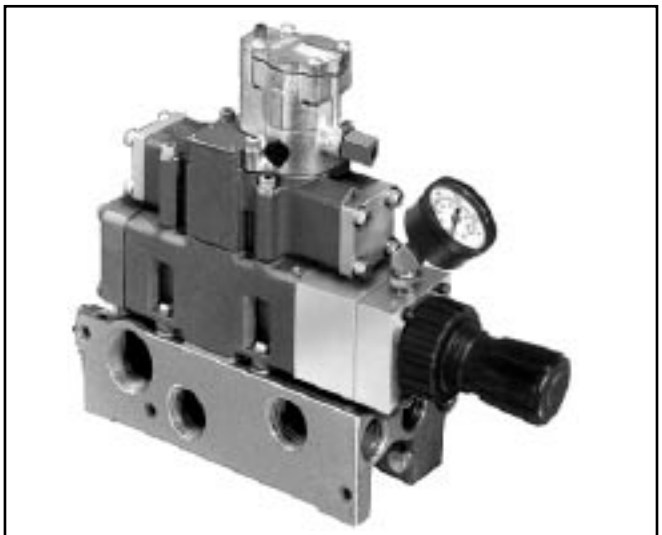
Operating Temperature Range

32°F (0°C) to 175°F (79°C)

How To Order

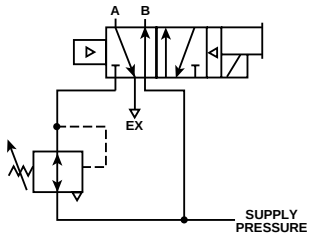
1. Select type of adjustment desired.
2. Select pressure range.
3. Select working port for reduced pressure.

Example: Manual adjustment, 5-60 PSIG, Port A reduced.
Model No. L554 05 307C

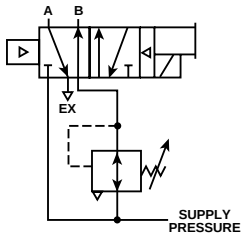


Assembly "A"

Graphic Symbol



Supply Pressure at "B" & Regulated at "A"



Supply Pressure at "A" & Regulated at "B"

Pressure Adjustment	Pressure Range	Model Number	
		Reduced Pressure	
	PSIG	Cyl. Port "A"	Cyl. Port "B"
Manual	1 - 60	L554 05 307C	L554 07 305C
	2 - 125	L554 06 307C	L554 07 306C
Remote	0 - 140	L554 14 307C	L554 07 314C

Note: When using single or independent port sandwich regulators, be aware that:

1. Cylinder port outlets are reversed.
2. 3-Position, cylinder ports open to exhaust and cylinder ports open to inlet functions are reversed. To produce a cylinder ports open to exhaust function, order valve with cylinder ports open to inlet. To produce a cylinder ports open to inlet function, order valve with cylinder ports open to exhaust.

See page 34 for gauges.

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Function

This modular air pressure regulation assembly, when installed between a 3/8" basic, 4-Way valve and subbase or modular manifold, supplies one or more regulated pressures to each of the valve cylinder ports.

Regulated pressure to cylinder port “A”, and a second regulated pressure to cylinder port “B”; independently adjustable.

On Independent Cylinder Port Regulation Units controlled by a single solenoid valve, cylinder port “B” is the normally open cylinder port. The solenoid is energized to open cylinder port “A”. On double solenoid operated valves, energizing solenoid “B” opens cylinder port “A” and energizing solenoid “A” opens cylinder port “B”

Valve must be converted to external pilot supply.

Features

Regulated pressure output from the valve is adjusted by knob on the manually set model or by air pressure signal applied to the regulator pilot port on the remotely set model.

Furnished with pressure gauge as standard.

The regulator controlling pressure to port “A” is mounted on the end opposite the electrical junction box (Assembly “A”). Regulated pressure from cylinder port “B” is controlled by the regulator installed over the electrical junction box (Assembly “B”).

N

Pressure Range Options

Maximum Supply Pressure.....140 PSIG

Output Pressure Range.....1 - 60 PSIG
2 - 125 PSIG

Operating Temperature Range

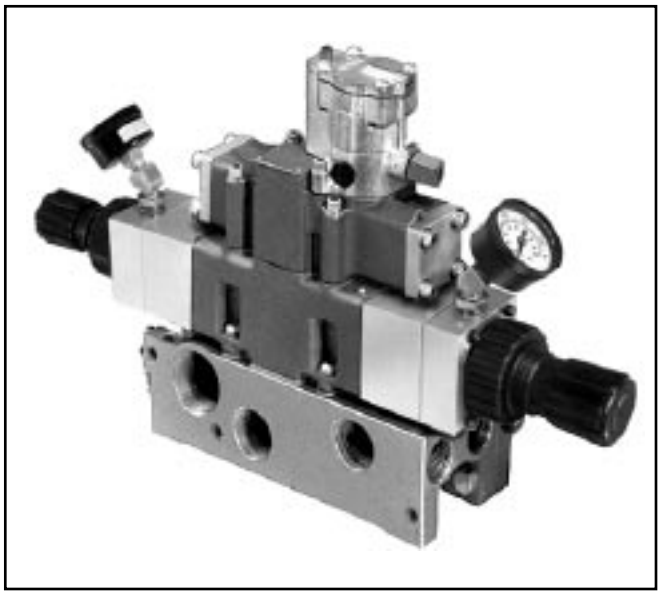
32°F (0°C) to 175°F (79°C)

How To Order

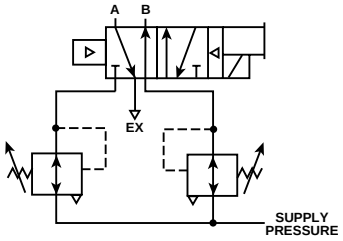
1. Select type of adjustment.
2. Select pressure range for each cylinder port.

Example: Manual adjusted.
5-60 PSIG range for cylinder port “A”
and 10-125 PSIG for cylinder port “B”
Model No. L554 06 305C

NOTE: When using single or independent port sandwich regulators, be aware that:
1. Cylinder port outlets are reversed.
2. 3-Position, cylinder ports open to exhaust and cylinder ports open to inlet functions are reversed. To produce a cylinder ports open to exhaust function, order valve with cylinder ports open to inlet. To produce a cylinder ports open to inlet function, order valve with cylinder ports open to exhaust.



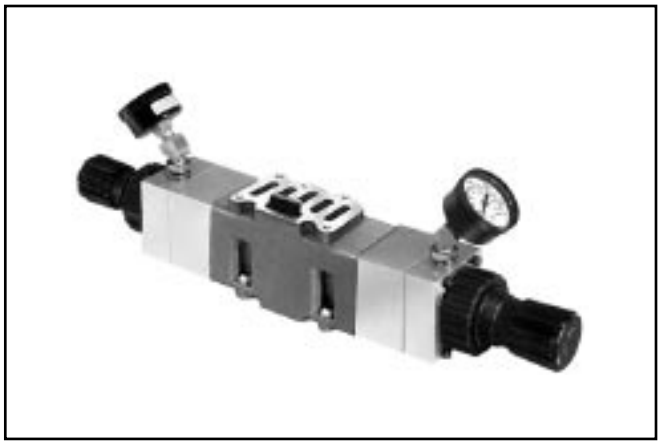
Graphic Symbol



Independently Regulated Pressure at Both “A” & “B”

Pressure Adjustment	Cylinder Port “A”	Model Number	
		Cylinder Port “B”	
	PSIG	5 - 60	10 - 125†
Manual	1 - 60	L554 05 305C	—
Remote	0 - 140	—	L554 14 314C†

† Remote operator units 0-140 PSIG



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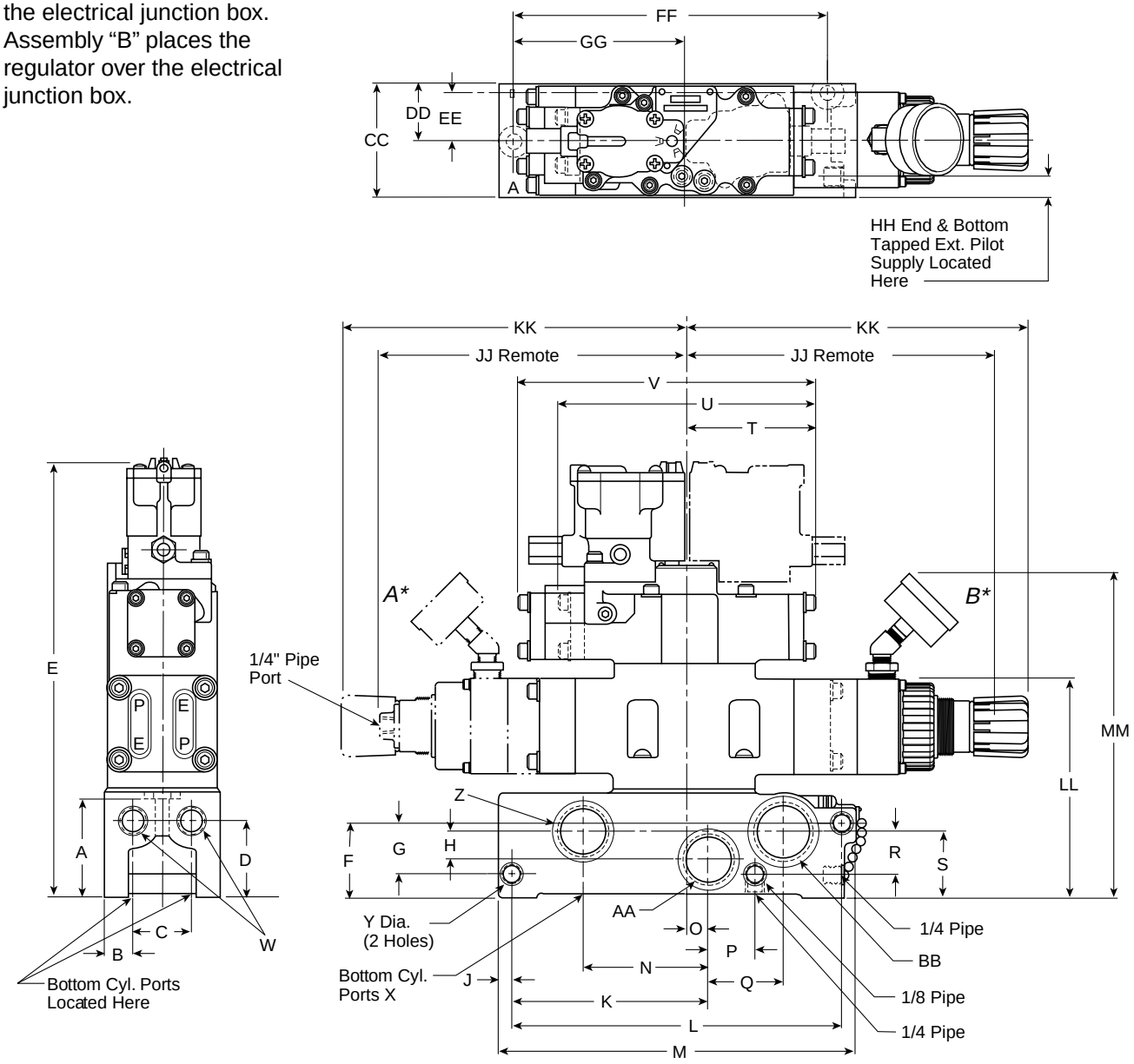
* Assembly “A” places the regulator on the end opposite the electrical junction box. Assembly “B” places the regulator over the electrical junction box.



A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**
2.56 (65.0)	.75 (19.1)	1.50 (38.1)	2.09 (53.1)	11.28 (286.5)	2.06 (52.3)	1.41 (35.8)	.75 (19.1)	.34 (8.64)	5.00 (127.0)	8.44 (214.4)	9.09 (230.9)	3.19 (81.0)
O	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**	**AA**
.61 (15.5)	1.19 (30.2)	1.91 (48.5)	1.09 (27.7)	1.81 (46.0)	3.32 (84.3)	6.64 (168.7)	7.56 (192.0)	3/8", 1/2" or 3/4" NPTF		.39 (9.9)	1" NPTF	1" NPTF
BB	**CC**	**DD**	**EE**	**FF**	**GG**	**HH**	**JJ**	**KK**	**LL**	**MM**		
1-1/4" NPTF	3.00 (76.2)	1.50 (38.1)	1.24 (31.5)	7.97 (202.4)	4.34 (110.2)	.40 (10.2)	8.53 (216.6)	10.15 (257.8)	5.46 (138.6)	8.80 (223.5)		

Inches (mm)

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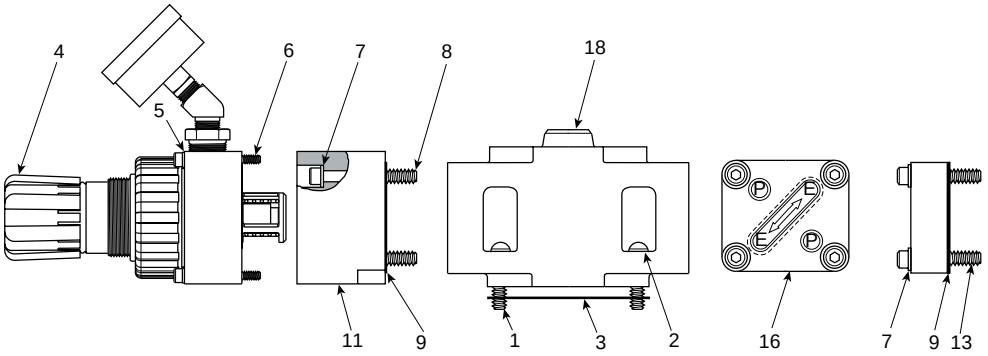
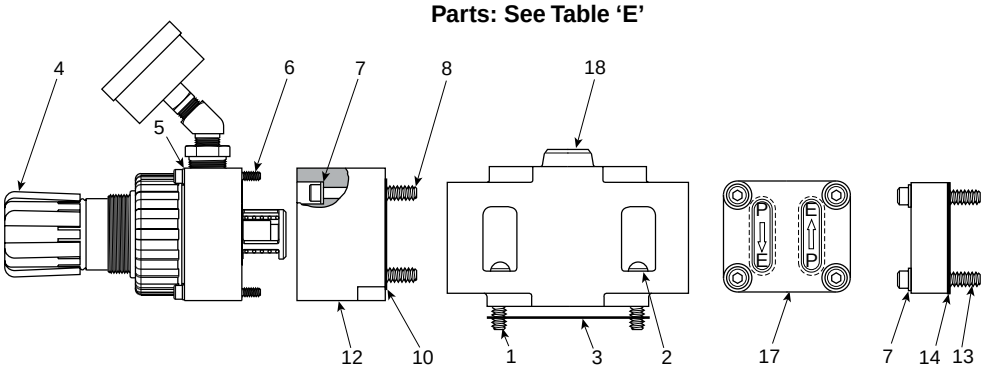
Common Port Regulation

Parts: See Table 'E'



Single Port Regulation

Parts: See Table 'E'



Independent Port Regulation

Parts: See Table 'E'

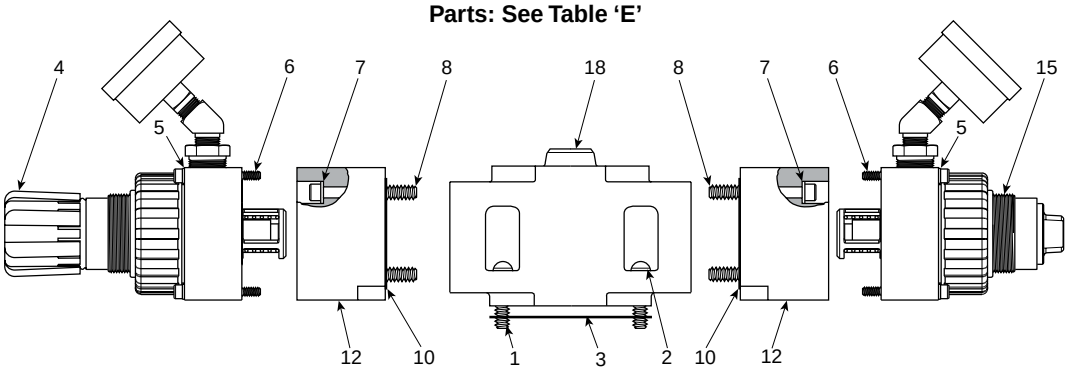


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Table "E": Parts

Item No.	Part Number	Description
1	H098 15	Screw (4)
2	H175 12	Lockwasher (4)
3	K183 077	Gasket
4	Standard	Manual Reg. Assy. (w/Gauge)
	K472 001C	1-30 PSIG
	K472 002C	1-60 PSIG
	K472 003C	2-125 PSIG
5	H175 09	#10 Lockwasher
6	H100 32	#10-32 x 1.75" Lg. SHCS
7	H175 11	1/4" Lockwasher
8	H100 69	1/4-20 x 2.25" Lg. SHCS

Item No.	Part Number	Description
9	K183 082	Gasket
10	K183 084	Gasket
11	K043 012	Function Block (P to P)
12	K043 011	Function Block (P to E)
13	H100 107	1/4-20 x 1-1/2" Lg. SHCS
14	K183 083	Gasket
15	Standard	Remote Reg. Assy. (w/Gauge)
	K472 009C	0-140 PSIG
16	K362 308	Function Plate Assy. (Incl. 7, 9, 13)
17	K362 307	Function Plate Assy. (Incl. 7, 13, 14)
18	K032 270	Body Assy. (Incl. 1, 2, 3)

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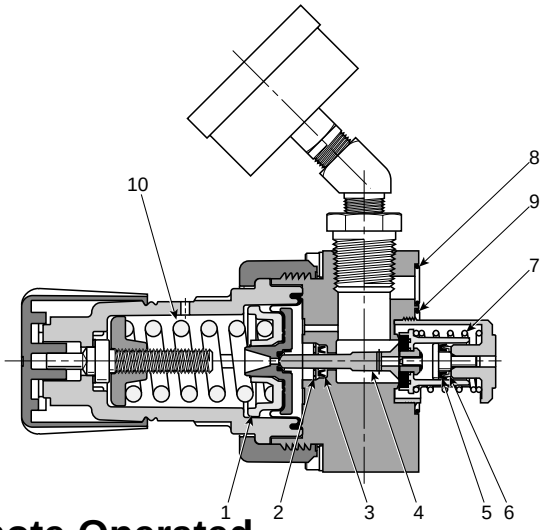
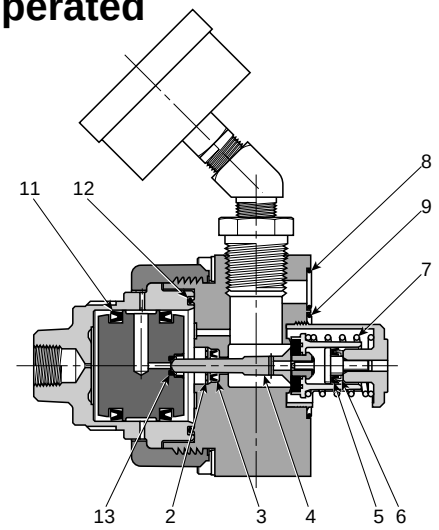
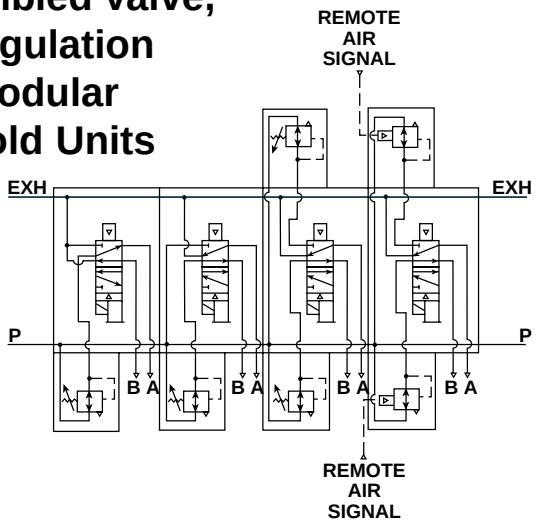
Manual Adjusting



Remote Operated



Suggested Schematic of Assembled Valve, Air Regulation and Modular Manifold Units



Replacement Parts

Item No.	Part Number		Description
1	○		Diaphragm Assembly
2	○	●	Retaining Ring
3	○	●	Vee Packing
4	○	●	Poppet Assembly
5	○	●	Vee Packing
6	○	●	Backflow Retainer
7	○	●	Poppet Spring
8	○	●	.989 ID x .070 W O-Ring
9	○	●	1.301 ID x .070 W O-Ring
10	P01698		1-30 PSI Spring
	P04062		1-60 PSI Spring (Blue)
	P04063		2-125 PSI Spring
11	●		Vee Packing
12	●		1.674 ID x .103 W O-Ring
13	●		Vent Seal

○ Parts included in K352409 Service Kit for Manual Operated Modular Regulators.

● Parts included in K352411 Service Kit for Remote Operated Modular Regulators.

Replacement Gauges

PSIG	Standard
0-60	**K4520N14060**
0-160	**K4520N14160**
0-300	**K4520N14300**

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Blank Station Covers

Manifold Assembly	Blank Cover Kit
—	K060 20007
K142 230	K060 20003
K142 231	
K142 270	
K142 233	K060 20009
K142 236	K060 20004

Flush Type" Hex Drive Pipe Plugs for Port Isolation

Part No.	Size (NPTF)
K21R02012L	1/8"
K21R02025L	1/4"
K21R02037L	3/8"
K21R02050L	1/2"
K21R02075L	3/4"

Conversion Kits: Lubricated to Non-Lubricated Operation

Basic Size	Operators (Solenoid or Remote Pilot)	
	Single	Double (2-Position)
3/8"	K322 012	K322 013

Interchangeable Manual Override Assemblies for Solenoid Operators

Non-Locking Type	Locking Type
K162 001	K152 003

To override valve, use a flat head screwdriver to press in and rotate plunger 90° until plunger locks in place. For proper valve operation, override should be in the out position.

Service Kits

To use this chart you must know the Basic Valve Series, Quantity, and Type of Operators, or the first three characters of the Valve Model Number.

Basic Valve		Solenoid Operated *				Remote Pilot Operated	
		Standard Service (Intermittent Duty)		Special Service ** (Continuous Duty)			
Size	Series (Prefix)	Single	Double 2 & 3-Position	Single	Double 2 & 3-Position	Single	Double 2 & 3-Position
3/8"	L65	–	K352 126	–	K352 127	–	K352 355
	L66	–	K352 126	–	K352 127	–	K352 355
	L67	K352 124	–	K352 125	–	K352 362	–
	L68	–	K352 126	–	K352 127	–	K352 355
	L69	–	K352 126	–	K352 127	–	K352 355
	L70	K352 124	–	K352 125	–	K352 362	–
1"	L65	–	K352 130	–	K352 131	–	K352 360
	L66	–	K352 130	–	K352 131	–	K352 360
	L67	K352 128	–	K352 129	–	K352 359	–
	L68	–	K352 130	–	K352 131	–	K352 360
	L69	–	K352 130	–	K352 131	–	K352 360
	L70	K352 128	–	K352 129	–	K352 359	–

Notes:
* Kits for solenoid operated valves include solenoid service kits.
****** Special service (continuous duty) solenoids may be identified as having gold colored solenoid tops.

Voltage Suffix Codes

L□□□ □□ □□□ **

Voltage Code

Code	Voltage			Coil Number	
**	60 Hz	50 Hz	DC	Plug-In	Flying Lead (19") *
49	–	–	24†	K593 060 K593 274‡	K593 014
53	120†	110	–	K593 071 K593 125‡	K593 025
57	240†	220	–	K593 081	K593 035

Notes: Bold Face type indicated primary coil rating.
† Indicates voltages approved for solenoid operators designed for use in hazardous locations. (See page 40.)
* 19" Coil lead length is standard. Other lead lengths may be available, consult supplier.
‡ Assembly includes indicator light socket, less light.

Electrical Connectors Single or Double Solenoid Valves

Basic Size	Valve Body		Subbase / Manifold	
	Single Solenoid	Double Solenoid	19" Leads	72" Leads
3/8"	H027 23	H027 22	H027 13	H027 89
1"				

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Plug-In Pilot

With Indicator Light

Description	Standard Service		Special Service	
Override Type	**Locking**	**Non-Locking**	**Locking**	**Non-Locking**
With Override (120VAC)	K175 9035 53	K175 8035 53	K185 9025 53	K185 8025 53
With Override (Other than 120VAC)	K175 3035**	—	K185 3025**	—

** See voltages on page 39.

NEMA 1 & 12

Basic Pilot

JIC Pilot

Description	Standard Service		Special Service	
Override Type	**Locking**	**Non-Locking**	**Locking**	**Non-Locking**
Basic with Override	K065 3035**	—	K085 3025**	—
JIC with Junction Box & Override	K065 6035**	K065 5035**	K085 6025**	K085 5025**
JIC Pilot with Junction Box & Override & Indicator Lights (120VAC Only)	K065 9035**	K065 8035**	K085 9025**	K085 8025**

** See voltages on page 39.

N

NEMA 4, 7 & 9

Hazardous Duty

NEMA 4 Pilot

Description	Standard Service		Special Service	
Hazardous Duty Pilot - UL & CSA	K025 1035** †		K045 1025** †	
NEMA 4 Pilot	K235 1035** †		—	
Override Type	**Locking**	**Non-Locking**	**Locking**	**Non-Locking**
Hazardous Duty with Override	K025 3035** †	K025 2035** †	K045 3035** †	K045 2025** †
NEMA 4 with Override	—	K235 3035** †	K235 2035** †	—

† 49 / 53 only

** See voltages on page 39.

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Installation

Valves should be installed with reasonable accessibility for service. Exercise care in keeping piping lengths to a minimum. Piping should be free of dirt, chips & scale. Pipe joint compound should be used sparingly applied only to the thread, never to the valve body. Avoid undue strain at piping joints. Protect the valve from exposure to extreme temperatures, dirt and moisture to maximize life.

Note: Valves equipped with locking manual overrides. Override(s) must be in the fully extended position for proper valve operation.

Double Solenoid / Remote Caution

Note: It is recommended that double solenoid and double remote 2-Position valves be mounted with the main spool in the horizontal plane.

Wiring Instructions for Base Mounted Valves

Single Solenoid:
Use wires marked “2” & “3” for connection. Units with DC Solenoids and indicator lights are polarity sensitive. Wire marked “3” is positive (+).

Double Solenoid:
Use wires marked “1” & “2” for Solenoid “A”. Use wires marked “3” & “4” for Solenoid “B”. Units with DC Solenoids and indicator lights are polarity sensitive. Wires marked “1” and “3” are positive.

⚠ ***Caution:***
DC Solenoids are polarity sensitive. Observe polarities indicated above.

Units with Flying Leads

Wires are not polarity sensitive.

⚠ ***Caution:***
DC solenoids with indicator lights and / or arc suppression coils are polarity sensitive. Use red wire as positive.

Listing Agencies

General Purpose Approvals

CSA - Canadian Standards Association
File Number 42024

Hazardous Duty Approvals

UL - Underwriters Laboratories, Inc.
File Number E42542
Category Y107

CSA - Canadian Standards Association
File Number 24349

See page 87 for Approved Hazardous Location Class, Group & Division.

“Special Service” Solenoid (Continuous Duty)

Special Service Solenoids are designed for use when the solenoid duty cycle is greater that 70% or when energization times are for 10 minutes or longer.

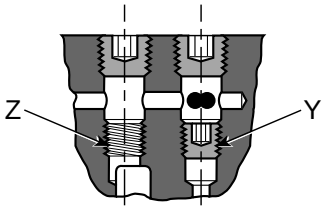
These solenoids should be used when valves are to be held energized for hours, days or weeks… or when extended ambient temperature operation is required. Apply the duty cycle formula to determine if this type of solenoid is required.

Duty Cycle Formula

$$\frac{\text{Time Energized}}{\text{Time Energized + Time Off}} \times 100 = \%\ \text{Duty Cycle}$$

If Duty Cycle is 70% or greater, then Special Service (Continuous Duty) Solenoid should be used.

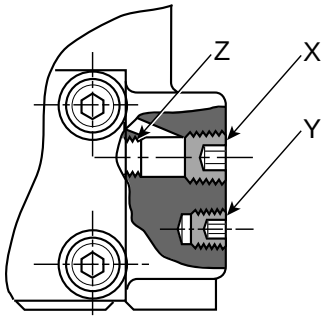
Pilot Supply Conversion



Base Mounted

For field conversion to external pilot supply, remove two 1/8" NPTF plugs from top of valve body and move bottom plug from “Y” to “Z”.

Replace 1/8" NPTF plugs and connect pilot pressure to the 1/4" NPTF external pilot supply port “X” in subbase.



Direct Pipe Ported

For field conversion to external pilot supply, remove and discard 1/4" NPTF plug in external pilot supply port “X”. Move stored plug “Y” to location “Z” in bottom of pilot supply port “X”. Then connect pilot pressure to port “X” in valve body.

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Flow Capacities

Valve Type	Cylinder Port Size (NPTF)	Mounting Style	Cv Flow Rating Inlet to Cylinder "A"
3/8" Double	3/4"	Subbase	5.0
	3/4"	Manifold	4.9
3/8" Double 3-Position	3/4"	Subbase	4.5
	3/4"	Manifold	4.1
1" Single & Double	1"	Subbase	11.3

Valve Type	Cylinder Port Size (NPTF)	Mounting Style	Cv Flow Rating Inlet to Cylinder "A"
3/8" Single	3/8"	Direct Pipe	4.7
	1/2"	Direct Pipe	5.3
3/8" Double	3/8"	Direct Pipe	4.5
	1/2"	Direct Pipe	5.5
3/8" Double 3-Position	3/8"	Direct Pipe	4.1
	1/2"	Direct Pipe	4.5
1" Single & Double	1"	Direct Pipe	12.0

Materials of Construction

Valve Bodies..... Aluminum alloy

Valve Spool –
* Aluminum alloy with special coating on 3/8" basic valves

Hard chrome plated AISI type 416 stainless steel on 1/4" & 1/2" basic valves.

Resilient Seals: In Valve Body -
Dynamic..... Polyurethane base on 3/8" basic valves*
Static / Dynamic.....Nitrile base w / 12% Molybdenum Disulphide on 1/4" & 1/2" basic valves

Other Seals..... Nitrile

Shock Pads..... Polyurethane

Valve Spacers..... Brass

Manifolds & Subbases ..... Aluminum alloy

Solenoid Bodies..... Plated zinc alloy
Internal Components ..... Corrosion resistant steel
Resilient Seals –
Standard Service..... Nitrile
Special Service (continuous duty) .....Fluorocarbon & Silicone

Other Seals..... Nitrile

Coil.....Class "B" epoxy encapsulated (Class "H" also available on some models, consult supplier)

* These materials are specially designed for valves used on non-lubricated service

Recommended Filtration

Maintained 40 Micron Filtration

Life Expectancy

Valves designed for non-lubricated service as well as those designed for lubricated service will provide millions of maintenance free cycles. Under laboratory conditions service life exceeds 25,000,000 cycles!

Factory Pre-Lubrication

Valves are lubricated at assembly with Sunaplex 781 or equivalent. Valves specified for vacuum service are lubricated with Dow Corning Valve Seal A.

Valves for Non-Lubricated Service

3/8" basic valve sizes are designed to operate in applications where in-service lubrication is not desirable. Valves are factory pre-lubed as noted above. These valves may be used for lubricated service as well.

Lubrication

Air Line Lubricant (compatible with Nitrile & Polyurethane seals) must readily atomize and be of the medium analine type. Analine point range must be between 180° and 220°F.
Viscosity @ 100°F: 140-170 SUS.

Recommended Lubricant

If in-service lubrication is required, use F442 oil, or equivalent. F442 is specially formulated to provide peak performance and maximum service life for air operated equipment.

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Pressure Range for Solenoid Operated Valves

Media	Internal Pilot Supply Basic Valve Size			External Pilot Supply Basic Valve Size		
	1/4"	3/8"	1/2"	1/4"	3/8"	1/2"
Air	35-140* PSIG			N.A.	Main	0-250 PSIG
					Pilot	35-140* PSIG
Vacuum	Do Not Use			N.A.	Main	Within 1 Hg of Perfect
					Pilot	35-140* PSIG
Other	Consult Supplier					

* 200 PSIG Solenoid Is Optional (consult supplier).

Pressure Range for Remote Pilot Operated Valves

Media		Valve Type	
		Single	Double & 3-Position
Air	Main	35-250 PSIG	0-250 PSIG
	Pilot	35-200 PSIG	35-200 PSIG
Vacuum	Main	Do Not Use	Within 1" Hg of Perfect
	Pilot	Do Not Use	35-200 PSIG
Other	Consult Supplier		

N

Ambient Temperature Range Standard Service Solenoid Operator

Minimum	Maximum	
	Intermittent Duty	Continuous Duty
0°F	125°F	100°F

Special Service (Continuous Duty) Solenoid Operator

Minimum	Maximum	
	Intermittent Duty	Continuous Duty
0°F	125°F	125°F

As the above chart indicates, Standard Duty Solenoids may be used on continuous duty but ambient temperature is de-rated.

In some cases, Special Service Solenoids may be rated for higher ambient temperatures (consult supplier).

Ambient Temperature Range Remote Pilot Operated Valves

Minimum	Maximum
0°F	200°F

⚠ ***Caution:***

If it is possible that the ambient temperature may fall below freezing, the medium must be moisture free to prevent internal damage and unpredictable behavior.

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Solenoid Enclosure Ratings

Type	Listing Agency	NEMA Rating	Description
Plug-In	CSA	1 & 12	General Purpose Indoor Only Dust Tight
Conduit / Flying Lead	CSA	1 & 12	General Purpose Indoor Only Dust Tight
* Conduit (As Specified)	UL & CSA	7 & 9	Hazardous Location See Chart Below)
* Conduit (As Specified)	CSA	4	General Purpose Indoor / Outdoor

* See ordering information on specific valve type. (Direct Pipe Ported Valves Only.)

Solenoid Characteristics Chart

Voltage Range +10/-15% of Nominal

3/8" & 3/4" Basic – L-Pilot					
Voltage/ Cycles	**Amps Inrush**	**Amps Holding**	**Resistance Ohms**	**Watts**	**Insulation Class**
120/60VAC	.29	.18	122	12	B
110/50VAC	.21	.14	122	12	B
240/60VAC	.18	.12	610	12	B
24/60VAC	1.6	1.0	4.5	9.5	B
24/50VAC	1.2	.75	6.4	9.5	B
6VDC	–	1.4	4.5	7.6	B
12VDC	–	.66	17.7	9	B
24VDC	–	.32	71	9	B
48VDC	–	.22	216	11	B

N

Hazardous Duty Solenoid Listing

Valves with solenoid operators designated for hazardous locations are UL & CSA Approved as follows:

National Electric Code	Ambient Conditions	NEMA Classification
Class I Div. 1 Group C	Ethyl, Ether, Etc., Gases & Vapors	VII (7)
Class I Div. 1 Group D	Gasoline, Etc., Gases & Vapors	VII (7)
Class I Div. 2 Group B	Butadiene, Etc., Liquid, Fluid or Vapor Normally Contained, or Atmosphere Ventilated	VII (7)
Class II Div. 1 Group E	Metal Dust	IX (9)
Class II Div. 1 Group F	Coal, Coke, Carbon Black Dust	IX (9)
Class II Div. 1 Group G	Flour, Starch, Grain Dust	IX (9)

See Article 500 - Hazardous (Classified) Locations, National Electric Code.

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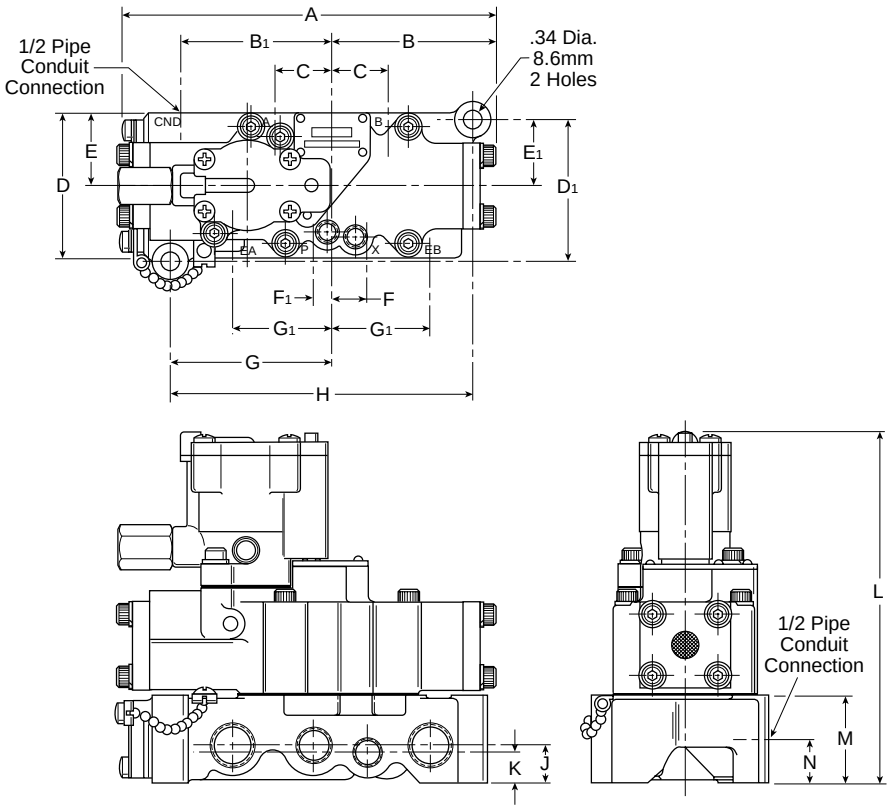
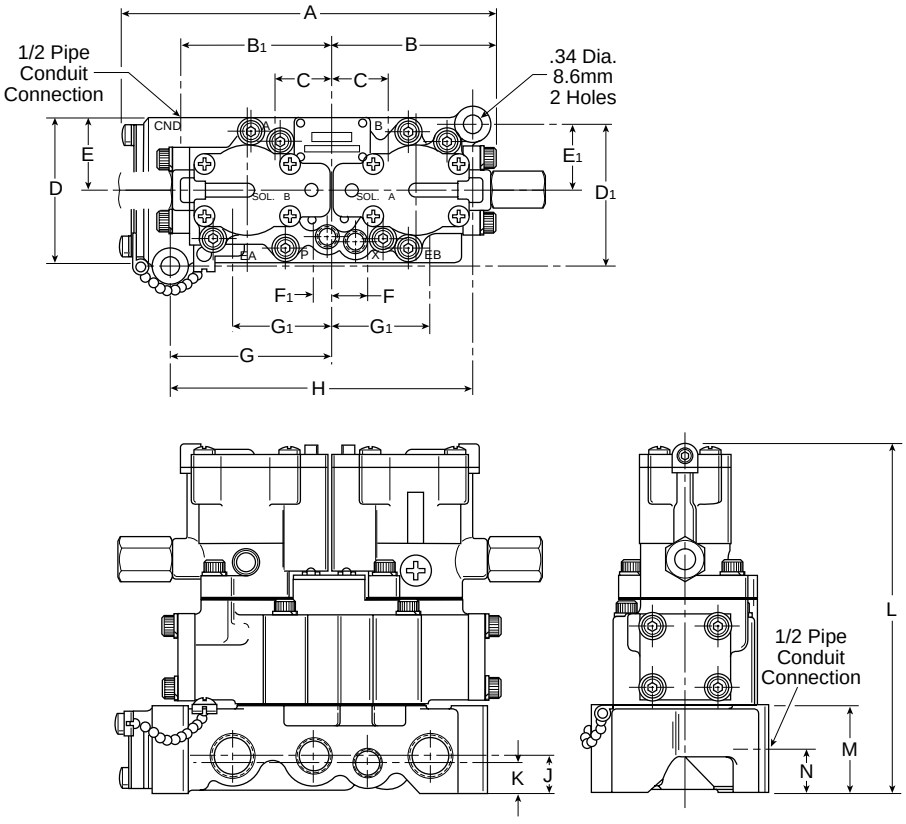


Dimensions

A	B	B1	C
7.56 (192)	3.32 (84.3)	2.94 (74.7)	1.12 (28.4)
D	**D1**	**E**	**E1**
2.88 (73.2)	2.84 (72.1)	1.44 (36.6)	1.34 (34)
F	**F1**	**G**	**G1**
75 (19.1)	.38 (9.7)	3.16 (80.3)	2.00 (50.8)
H	**J**	**K**	**L**
6.03 (153.2)	.75 (19.1)	.62 (15.7)	6.93 176)
M	**N**		
1.75 (44.5)	1.00 (25.4)		

Inches (mm)

N



Dimensions

A	B	B1	C
7.38 (187.5)	3.32 (84.3)	2.94 (74.7)	1.12 (28.4)
D	**D1**	**E**	**E1**
2.88 (73.2)	2.84 (72.1)	1.44 (36.6)	1.34 (34)
F	**F1**	**G**	**G1**
.75 (19.1)	.38 (9.7)	3.16 (80.3)	2.00 (50.8)
H	**J**	**K**	**L**
6.03 (153.2)	.75 (19.1)	.62 (15.7)	6.93 (176)
M	**N**		
1.75 (44.5)	1.00 (25.4)		

Inches (mm)

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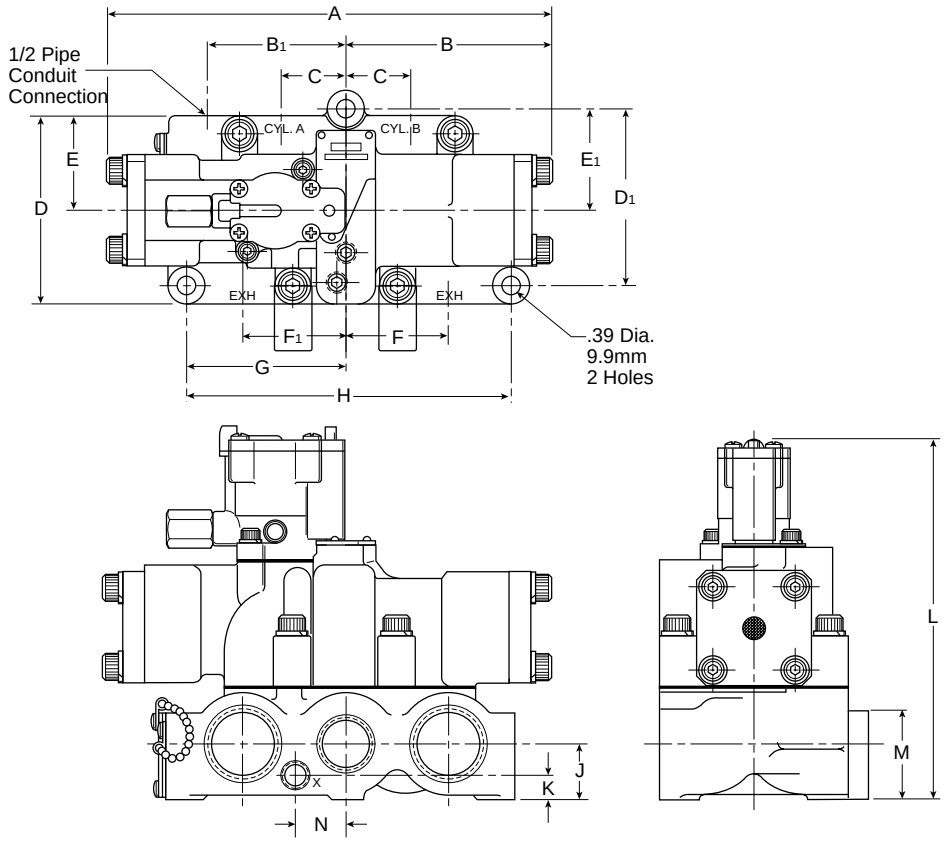
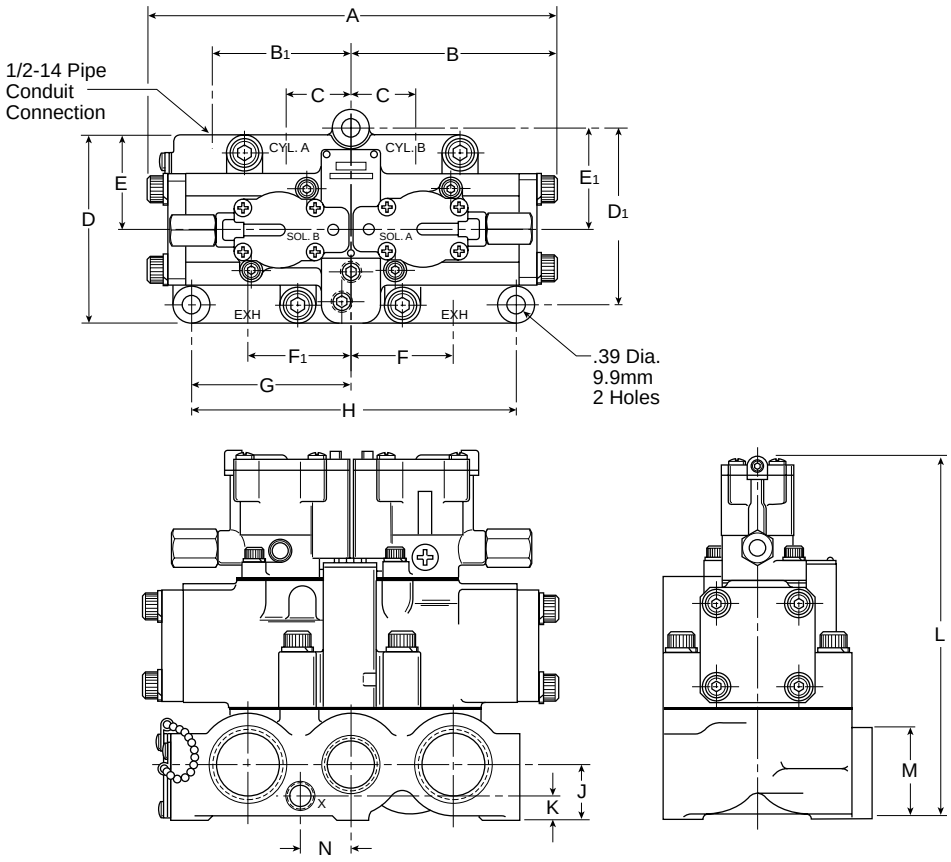


Dimensions

A 10.46 (265.7)	**B** 4.75 (120.6)	**B1** 3.38 (85.8)	**C** 1.53 (38.9)
D 4.56 (115.8)	**D1** 4.28 (108.7)	**E** 2.28 (57.9)	**E1** 2.44 (62)
F 2.45 (62.2)	**F1** 2.46 (62.5)	**G** 3.81 (96.8)	**H** 7.62 (193.5)
J 1.31 (33.3)	**K** .59 (15)	**L** 8.74 (222)	**M** 2.09 (53.1)
N 1.22 (31)			

Inches (mm)



Dimensions

A 9.50 (241.3)	**B** 4.75 (120.6)	**B1** 3.38 (85.8)	**C** 1.53 (38.9)
D 4.56 (115.8)	**D1** 4.28 (108.7)	**E** 2.28 (57.9)	**E1** 2.44 (62)
F 2.45 (62.2)	**F1** 2.46 (62.5)	**G** 3.81 (96.8)	**H** 7.62 (193.5)
J 1.31 (33.3)	**K** .59 (15)	**L** 8.74 (222)	**M** 2.09 (53.1)
N 1.22 (31)			

Inches (mm)

N

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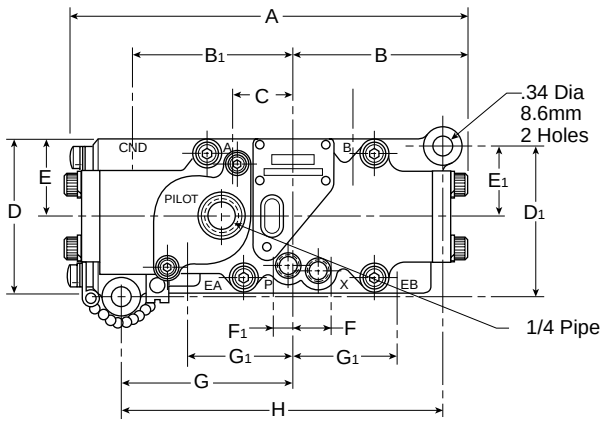
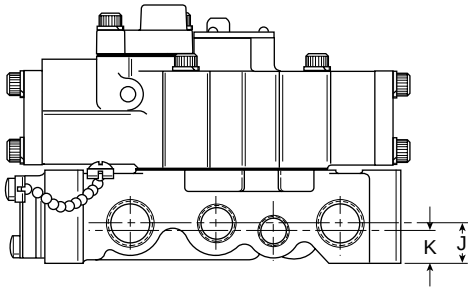
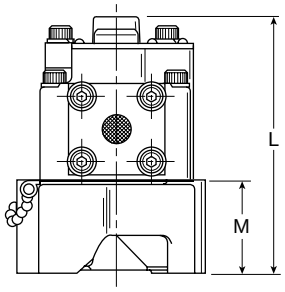




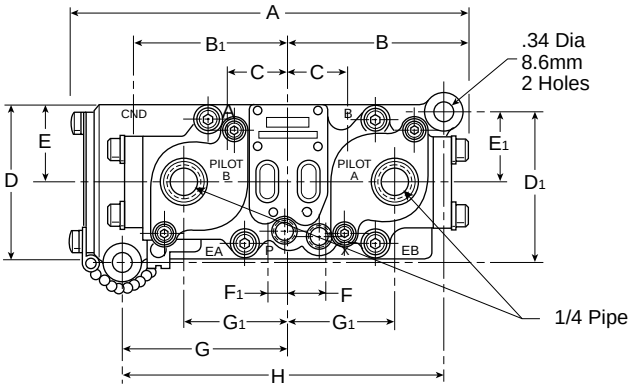


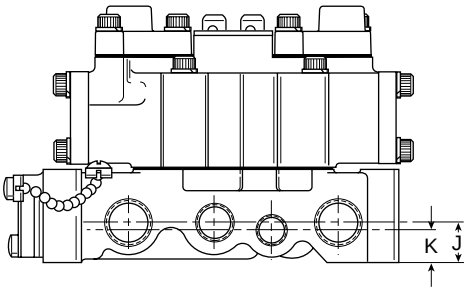
Dimensions

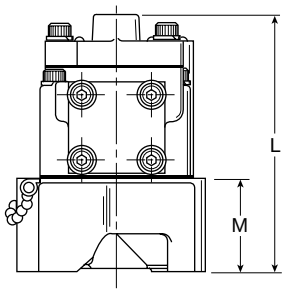
A	B	B1	C
7.56 (192)	3.32 (84.3)	2.94 (74.7)	1.12 (28.4)
D	**D1**	**E**	**E1**
2.88 (73.2)	2.84 (72.1)	1.44 (36.6)	1.34 (34)
F	**F1**	**G**	**G1**
.75 (19.1)	.38 (9.7)	3.16 (80.3)	2.00 (50.8)
H	**J**	**K**	**L**
6.03 (153.2)	.75 (19.1)	.62 (15.7)	4.76 (120.9)
M			
1.75 (44.5)			

Inches (mm)

N







Dimensions

A	B	B1	C
7.56 (192)	3.32 (84.3)	2.94 (74.7)	1.12 (28.4)
D	**D1**	**E**	**E1**
2.88 (73.2)	2.84 (72.1)	1.44 (36.6)	1.34 (34)
F	**F1**	**G**	**G1**
.75 (19.1)	.38 (9.7)	3.16 (80.3)	2.00 (50.8)
H	**J**	**K**	**L**
6.03 (153.2)	.75 (19.1)	.62 (15.7)	4.76 (120.9)
M			
1.75 (44.5)			

Inches (mm)

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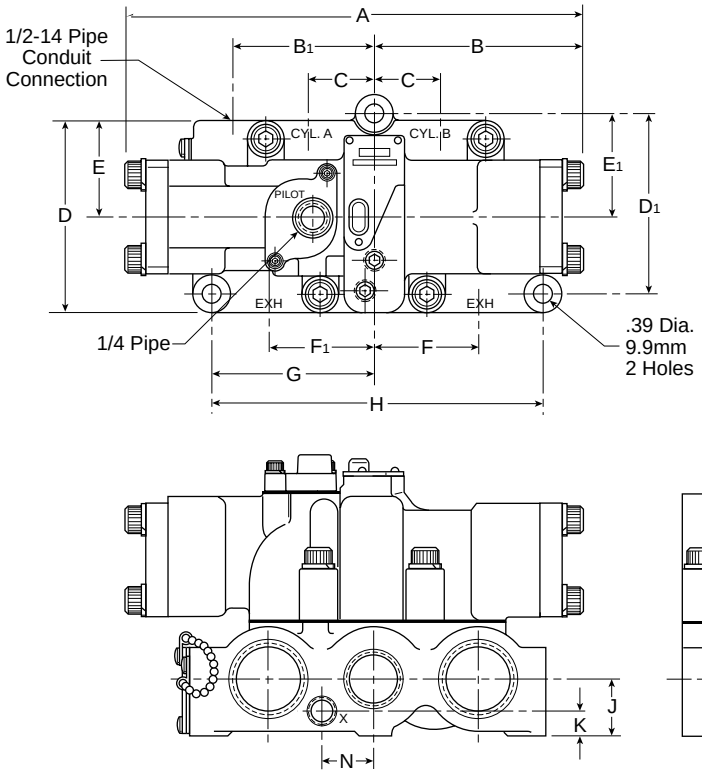
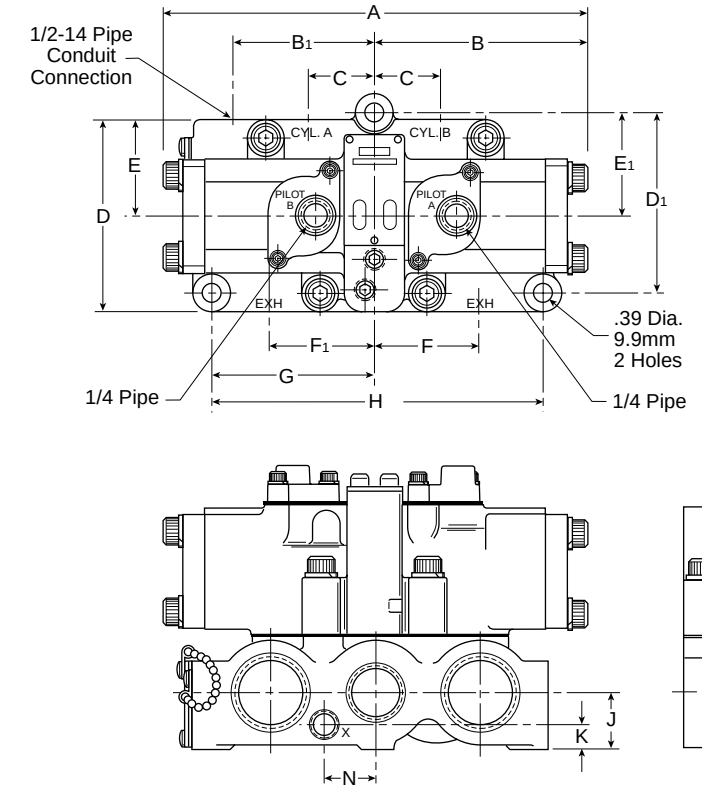


Dimensions

A	B	B1	C
10.46 (265.7)	4.75 (120.6)	3.38 (85.8)	1.53 (38.9)
D	**D1**	**E**	**E1**
4.56 (115.8)	4.28 (108.7)	2.28 (57.9)	2.44 (62)
F	**F1**	**G**	**H**
2.45 (62.2)	2.46 (62.5)	3.81 (96.8)	7.62 (193.5)
J	**K**	**L**	**M**
1.31 (33.3)	.59 (15)	6.57 (166.9)	2.09 (53.1)
N			
1.22 (31)			

Inches (mm)



Dimensions

A	B	B1	C
9.50 (241.3)	4.75 (120.6)	3.38 (85.8)	1.53 (38.9)
D	**D1**	**E**	**E1**
4.56 (115.8)	4.28 (108.7)	2.28 (57.9)	2.44 (62)
F	**F1**	**G**	**H**
2.45 (62.2)	2.46 (62.5)	3.81 (96.8)	7.62 (193.5)
J	**K**	**L**	**M**
1.31 (33.3)	.59 (15)	6.57 (166.9)	2.09 (53.1)
N			
1.22 (31)			

Inches (mm)

N

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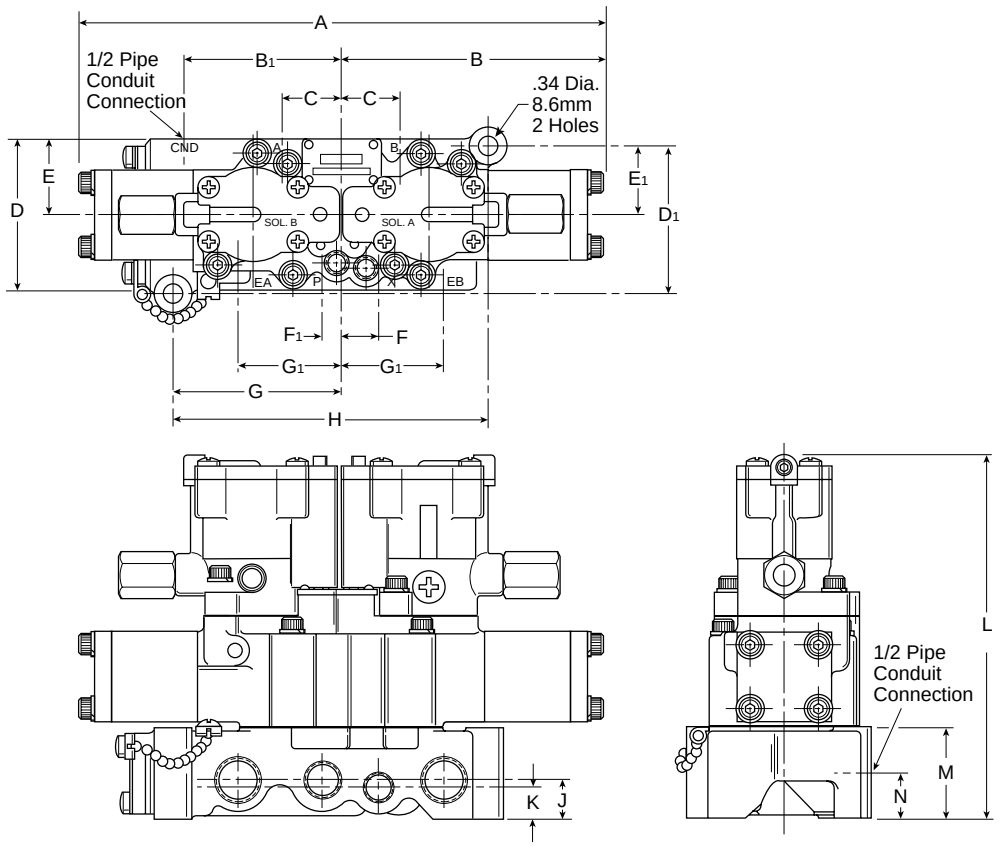
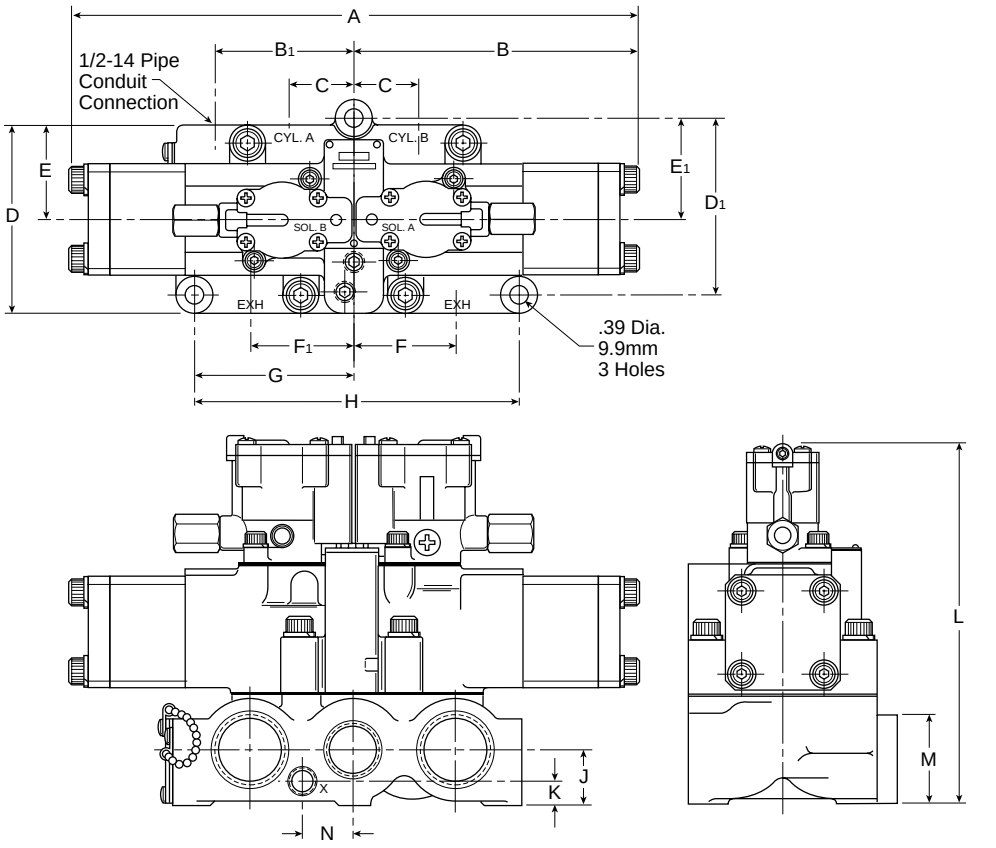


Dimensions

A	B	B1	C
9.64 (244.8)	4.82 (122.4)	2.94 (74.7)	1.12 (28.4)
D	**D1**	**E**	**E1**
2.88 (73.2)	2.84 (72.1)	1.44 (36.6)	1.34 (34)
F	**F1**	**G**	**G1**
.75 (19.1)	.38 (9.7)	3.16 (80.3)	2.00 (50.8)
H	**J**	**K**	**L**
6.03 (153.2)	.75 (19.1)	.62 (15.7)	6.93 (176)
M			
1.00 (25.4)			

Inches (mm)



Dimensions

A	B	B1	C
13.62 (345.9)	6.81 (173)	3.38 (85.8)	1.53 (38.9)
D	**D1**	**E**	**E1**
4.56 (115.8)	4.28 (108.7)	2.28 (57.9)	2.44 (62)
F	**F1**	**G**	**H**
2.45 (62.2)	2.46 (62.5)	3.81 (96.8)	7.62 (193.5)
J	**K**	**L**	**M**
1.31 (33.3)	.59 (15)	8.74 (222)	2.09 (53.1)
N			
1.22 (31)			

Inches (mm)

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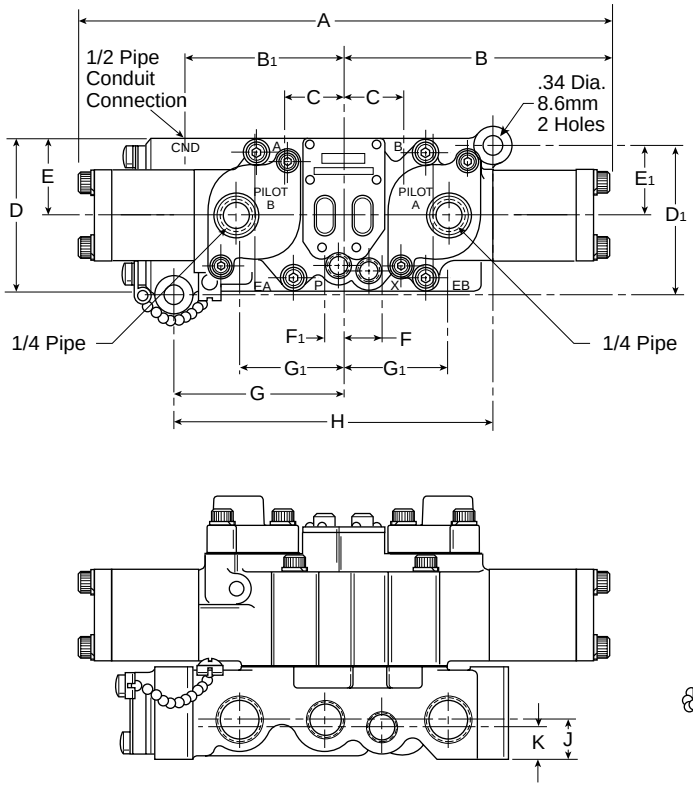
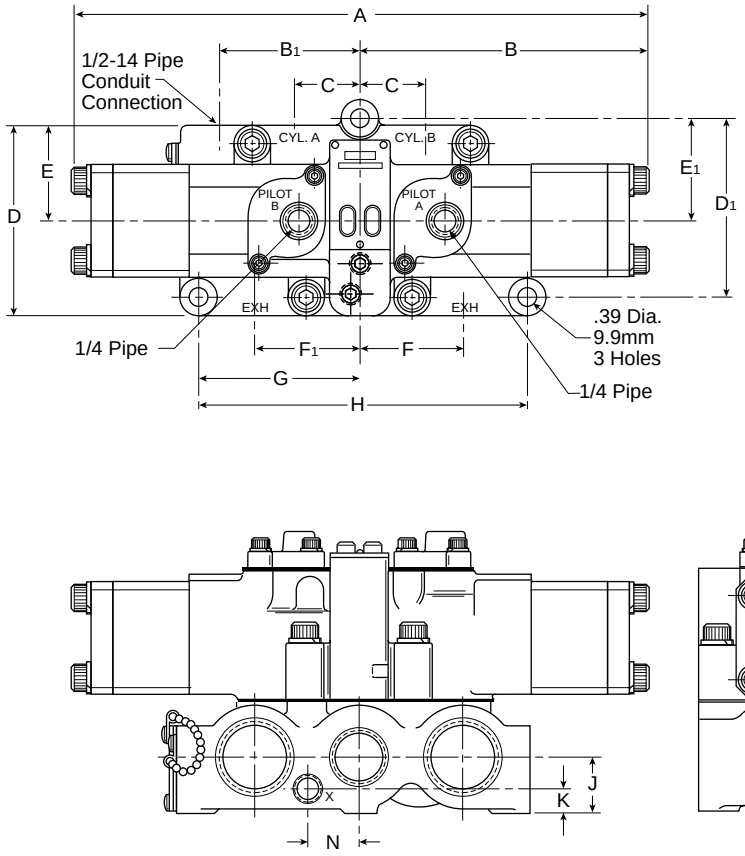


Dimensions

A	B	B1	C
9.64 (244.8)	4.82 (122.4)	2.94 (74.7)	1.12 (28.4)
D	**D1**	**E**	**E1**
2.88 (73.2)	2.84 (72.1)	1.44 (36.6)	1.34 (34)
F	**F1**	**G**	**G1**
.75 (19.1)	.38 (9.7)	3.16 (80.3)	2.00 (50.8)
H	**J**	**K**	**L**
6.03 (153.2)	.75 (19.1)	.62 (15.7)	4.76 (120.9)
M			
1.75 (44.5)			

Inches (mm)



Dimensions

A	B	B1	C
13.62 (345.9)	6.81 (173)	3.38 (85.8)	1.53 (38.9)
D	**D1**	**E**	**E1**
4.56 (115.8)	4.28 (108.7)	2.28 (57.9)	2.44 (62)
F	**F1**	**G**	**H**
2.45 (62.2)	2.46 (62.5)	3.81 (96.8)	7.62 (193.5)
J	**K**	**L**	**M**
1.31 (33.3)	.59 (15)	6.57 (166.8)	2.09 (53.1)
N			
1.22 (31)			

Inches (mm)

N

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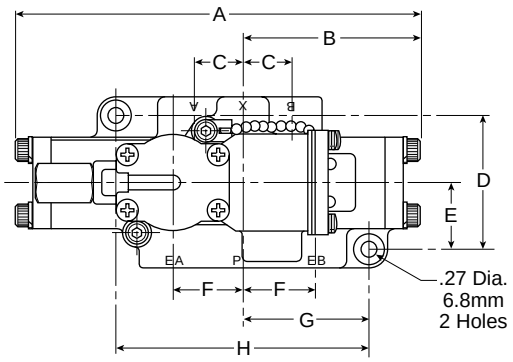
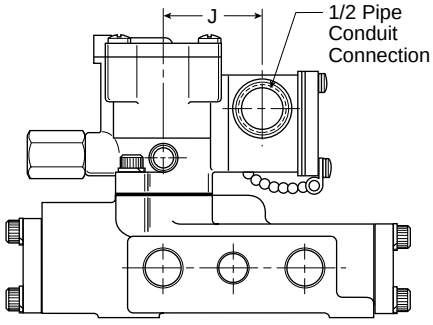
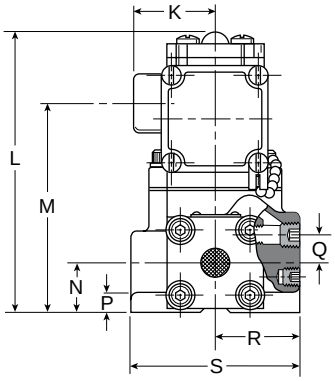




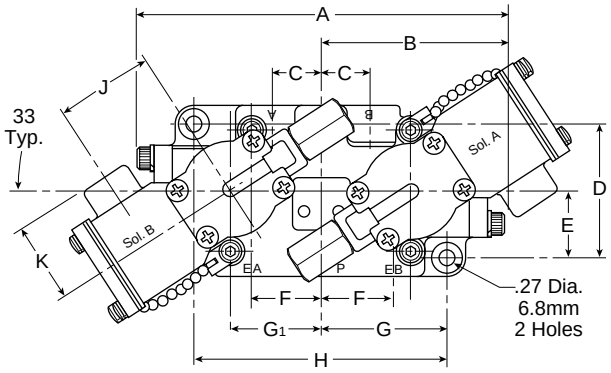


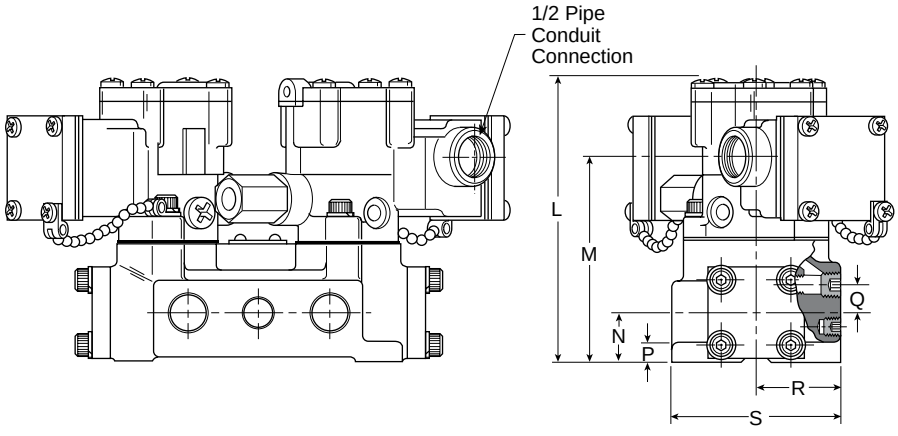
Dimensions

A	B	C	D
7.56 (192)	3.32 (84.3)	.90 (22.9)	2.56 (65)
E	**F**	**G**	**H**
1.28 (32.5)	1.33 (33.8)	2.34 (59.4)	4.69 (119.1)
J	**K**	**L**	**M**
1.82 (46.2)	1.50 (38.1)	5.35 (135.9)	3.91 (99.3)
N	**P**	**Q**	**R**
.94 (23.9)	.38 (9.7)	.53 (13.5)	1.62 (41.1)
S			
3.25 (82.6)			

Inches (mm)

N





Dimensions

A	B	C	D
7.56 (192)	3.32 (84.3)	.90 (22.9)	2.56 (65)
E	**F**	**G**	**G_1**
1.28 (32.5)	1.33 (33.8)	2.34 (59.4)	1.66 (42.4)
H	**J**	**K**	**L**
4.69 (119.1)	1.82 (46.2)	1.50 (38.1)	5.35 (135.9)
M	**N**	**P**	**Q**
3.91 (99.3)	.94 (23.9)	.38 (9.7)	.53 (13.5)
R	**S**		
1.62 (41.1)	3.25 (82.6)		

Inches (mm)

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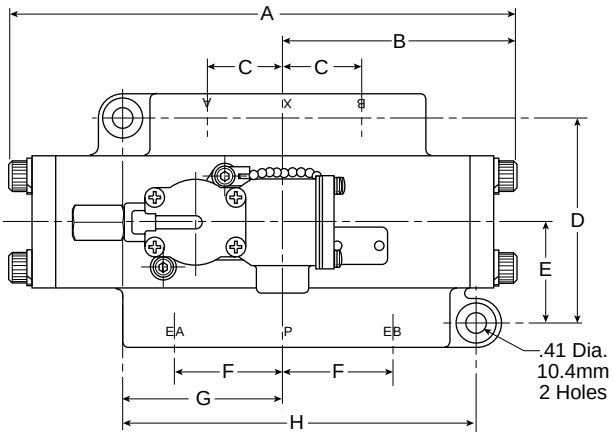
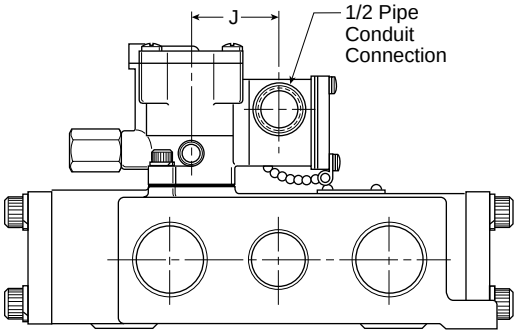
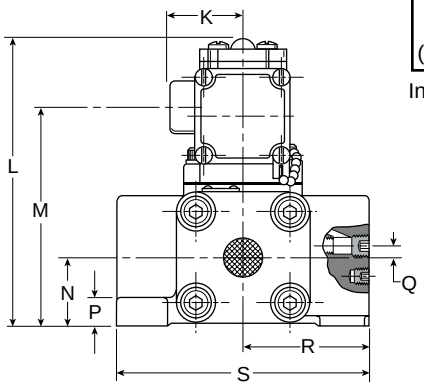


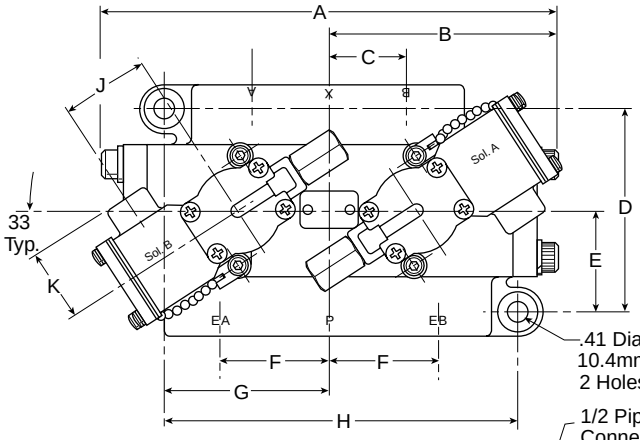


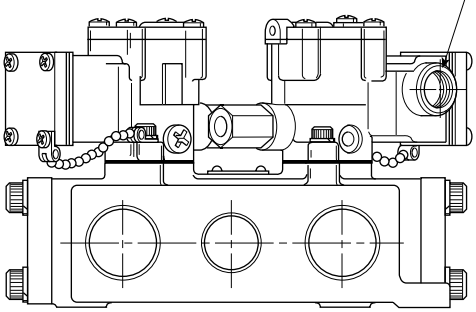


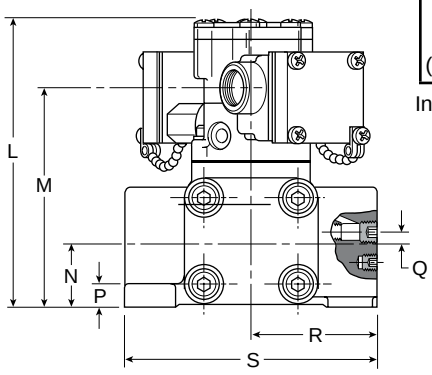
Dimensions

A	B	C	D
10.46 (265.7)	4.75 (120.6)	1.62 (41.1)	4.25 (108)
E	**F**	**G**	**H**
2.12 (53.8)	2.19 (55.6)	3.44 (87.4)	7.44 (189)
J	**K**	**L**	**M**
1.82 (46.2)	1.50 (38.1)	6.44 (163.6)	4.95 (125.7)
N	**P**	**Q**	**R**
1.50 (38.1)	.69 (17.5)	.20 (5.1)	2.62 (66.5)
S			
5.25 (133.4)			

Inches (mm)







Dimensions

A	B	C	D
9.50 (241.3)	4.75 (120.6)	1.62 (41.1)	4.25 (108)
E	**F**	**G**	**H**
2.12 (53.8)	2.19 (55.6)	3.44 (87.4)	7.44 (189)
J	**K**	**L**	**M**
1.82 (46.2)	1.50 (38.1)	6.44 (163.6)	4.95 (125.7)
N	**P**	**Q**	**R**
1.50 (38.1)	.69 (17.5)	.20 (5.1)	2.62 (66.5)
S			
5.25 (133.4)			

Inches (mm)

N

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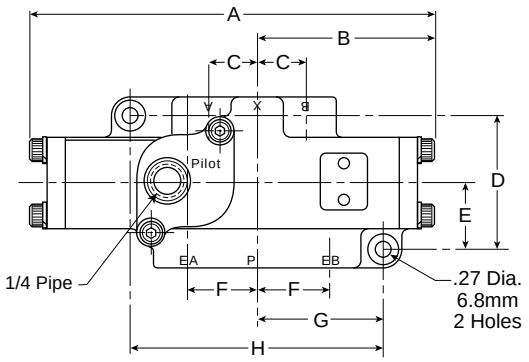
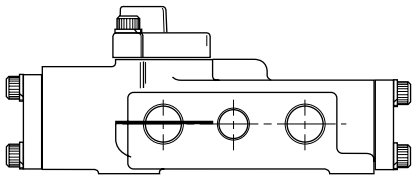
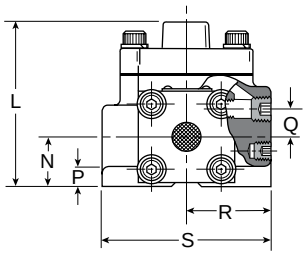




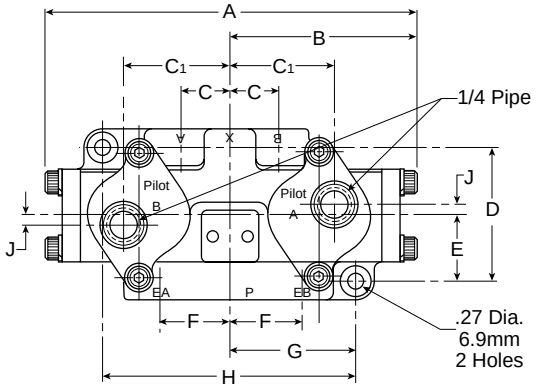


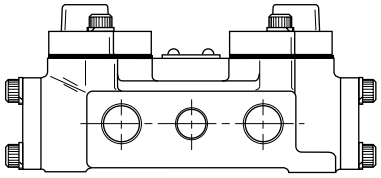
Dimensions

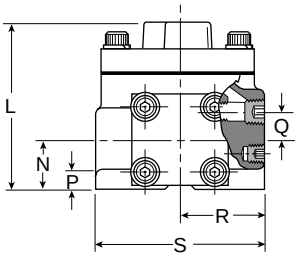
A	B	C	D
7.56 (192)	3.32 (84.3)	.90 (22.9)	2.56 (65)
E	**F**	**G**	**H**
1.28 (32.5)	1.33 (33.8)	2.34 (59.4)	4.69 (119.1)
L	**N**	**P**	**Q**
3.18 (80.8)	.94 (23.9)	.38 (9.7)	.53 (13.5)
R	**S**		
1.62 (41.1)	3.25 (82.6)		

Inches (mm)

N







Dimensions

A	B	C	C1
6.64 (168.7)	3.32 (84.3)	.90 (22.9)	1.98 (50.3)
D	**E**	**F**	**G**
2.56 (65)	1.28 (32.5)	1.33 (33.8)	2.34 (59.4)
H	**J**	**L**	**N**
4.69 (119.1)	.22 (5.6)	3.05 (77.5)	.94 (23.9)
P	**Q**	**R**	**S**
.38 (9.7)	.53 (13.5)	1.62 (41.1)	3.25 (82.6)

Inches (mm)

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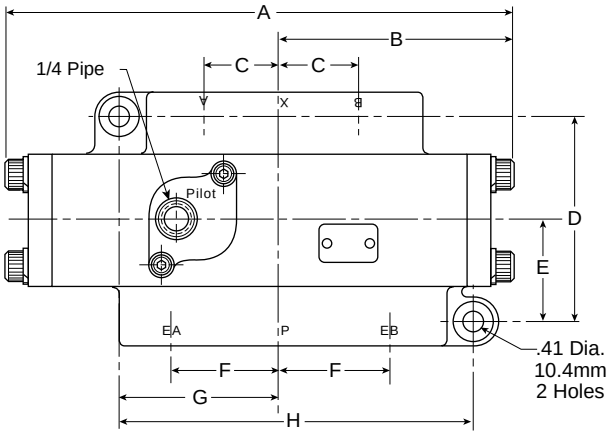
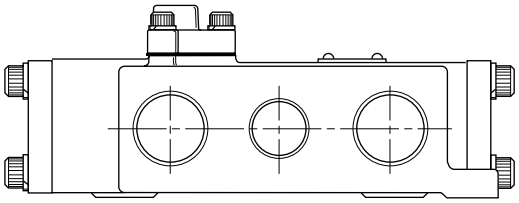
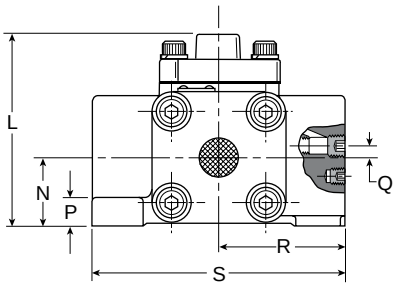


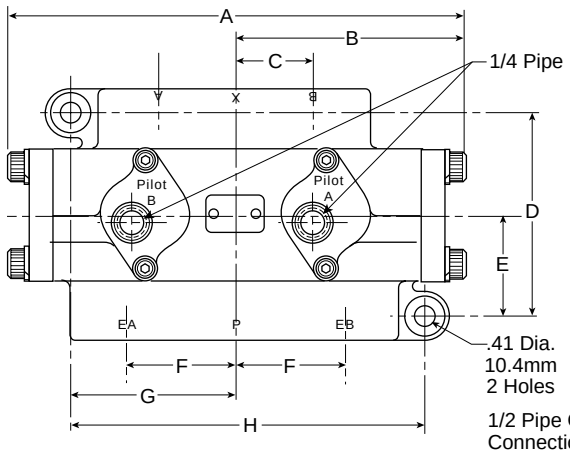


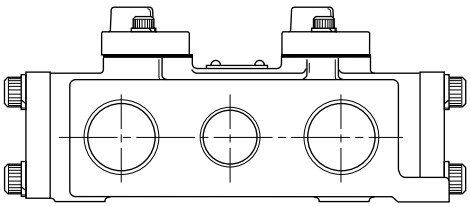


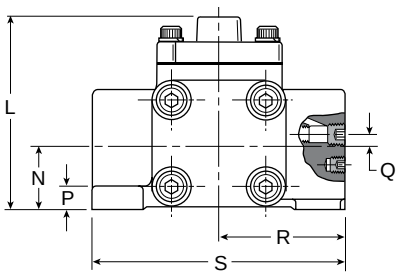
Dimensions

A	B	C	D
10.46 (265.7)	4.75 (120.6)	1.62 (41.1)	4.25 (108)
E	**F**	**G**	**H**
2.12 (53.8)	2.19 (55.6)	3.44 (87.4)	7.44 (189)
L	**N**	**P**	**Q**
4.09 (103.9)	1.50 (38.1)	.69 (17.5)	.20 (5.1)
R	**S**		
2.62 (66.5)	5.25 (133.4)		

Inches (mm)







Dimensions

A	B	C	D
9.50 (241.3)	4.75 (120.6)	1.62 (41.1)	4.25 (108)
E	**F**	**G**	**H**
2.12 (53.8)	2.19 (55.6)	3.44 (87.4)	7.44 (189)
L	**N**	**P**	**Q**
4.09 (103.9)	1.50 (38.1)	.69 (17.5)	.20 (5.1)
R	**S**		
2.62 (66.5)	5.25 (133.4)		

Inches (mm)

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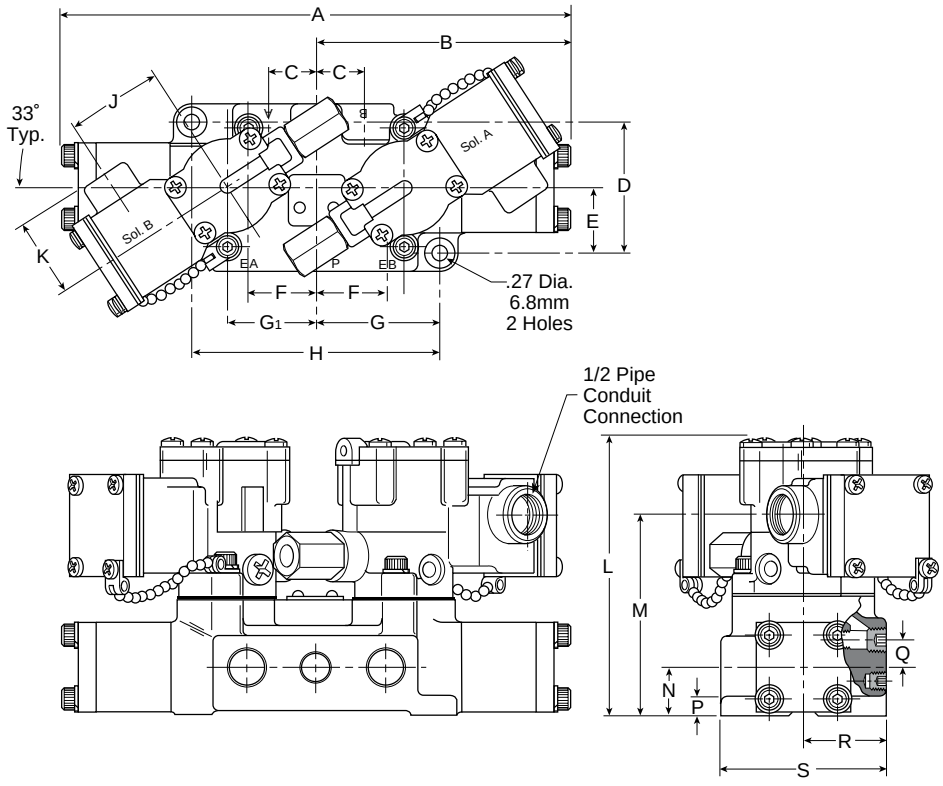
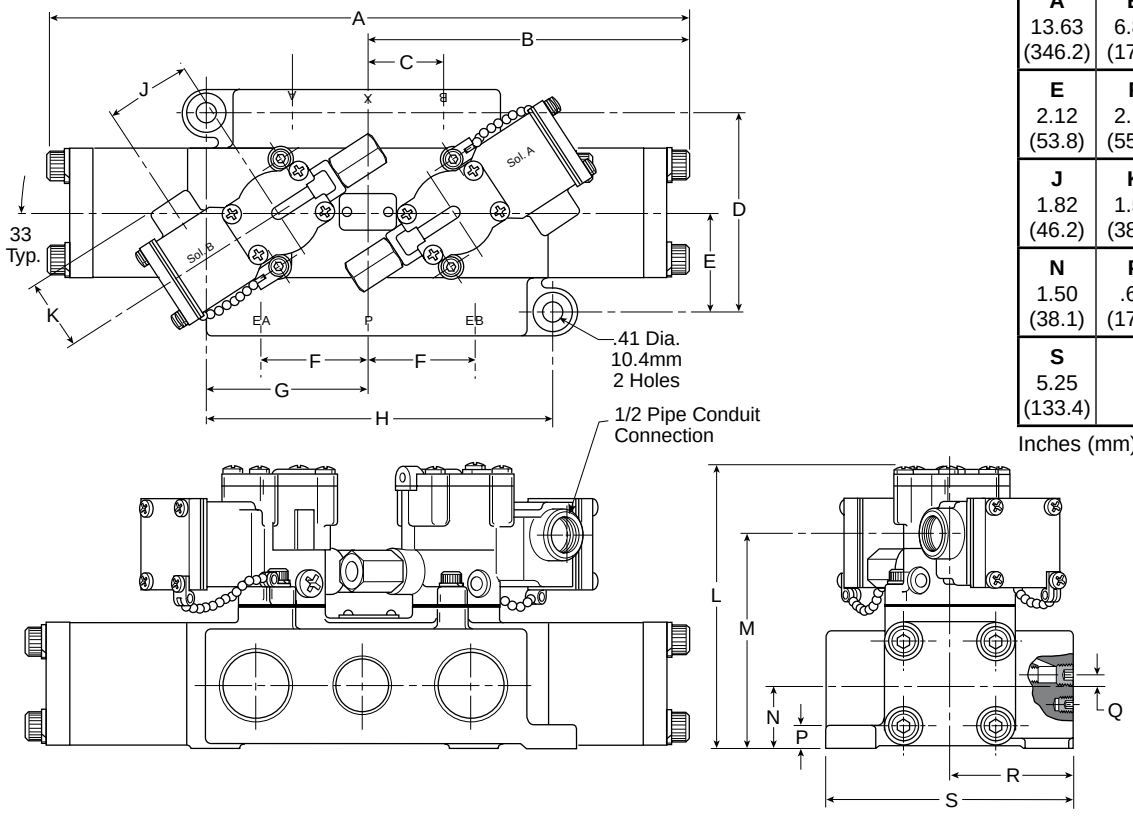


Dimensions

A	B	C	D
9.64 (244.8)	4.82 (122.4)	.90 (22.9)	2.56 (65)
E	**F**	**G**	**G1**
1.28 (32.5)	1.33 (33.8)	2.34 (59.4)	1.66 (42.4)
H	**J**	**K**	**L**
4.69 (119.1)	1.82 (46.2)	1.50 (38.1)	5.35 (135.9)
M	**N**	**P**	**Q**
3.91 (99.3)	.94 (23.9)	.38 (9.7)	.53 (13.5)
R	**S**		
1.62 (41.1)	3.25 (82.6)		

Inches (mm)

N



Dimensions

A	B	C	D
13.63 (346.2)	6.81 (173)	1.62 (41.1)	4.25 (108)
E	**F**	**G**	**H**
2.12 (53.8)	2.19 (55.6)	3.44 (87.4)	7.44 (189)
J	**K**	**L**	**M**
1.82 (46.2)	1.50 (38.1)	6.44 (163.6)	4.95 (125.7)
N	**P**	**Q**	**R**
1.50 (38.1)	.69 (17.5)	.20 (5.1)	2.62 (66.5)
S			
5.25 (133.4)			

Inches (mm)

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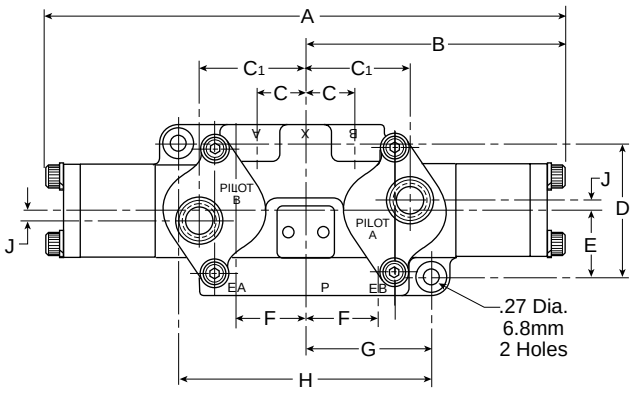
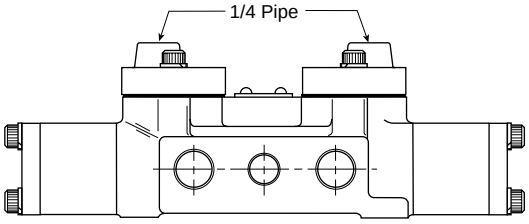
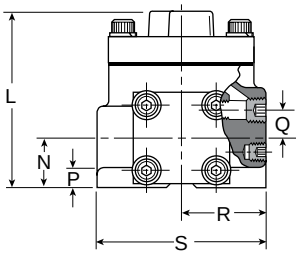


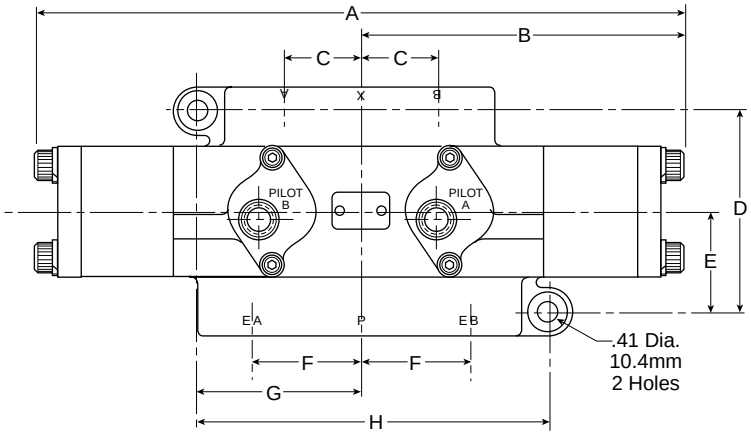


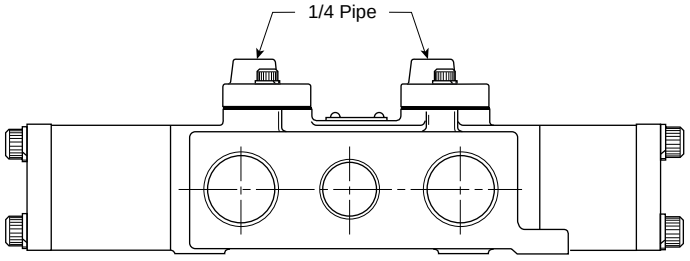


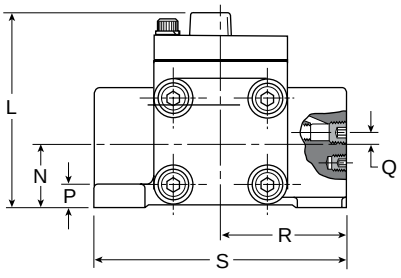
Dimensions

A	B	C	C1
9.64 (244.8)	4.82 (122.4)	.90 (22.9)	1.98 (50.3)
D	**E**	**F**	**G**
2.56 (65)	1.28 (32.5)	1.33 (33.8)	2.34 (59.4)
H	**J**	**L**	**N**
4.69 (119.1)	.22 (5.6)	3.05 (77.5)	.94 (23.9)
P	**Q**	**R**	**S**
.38 (9.7)	.53 (13.5)	1.62 (41.1)	3.25 (82.6)

Inches (mm)







Dimensions

A	B	C	D
13.63 (346.2)	6.81 (173)	1.62 (41.1)	4.25 (108)
E	**F**	**G**	**H**
2.12 (53.8)	2.19 (55.6)	3.44 (87.4)	7.44 (189)
L	**N**	**P**	**Q**
6.44 (163.6)	1.50 (38.1)	.69 (17.5)	.20 (5.1)
R	**S**		
2.62 (66.5)	5.25 (133.4)		

Inches (mm)

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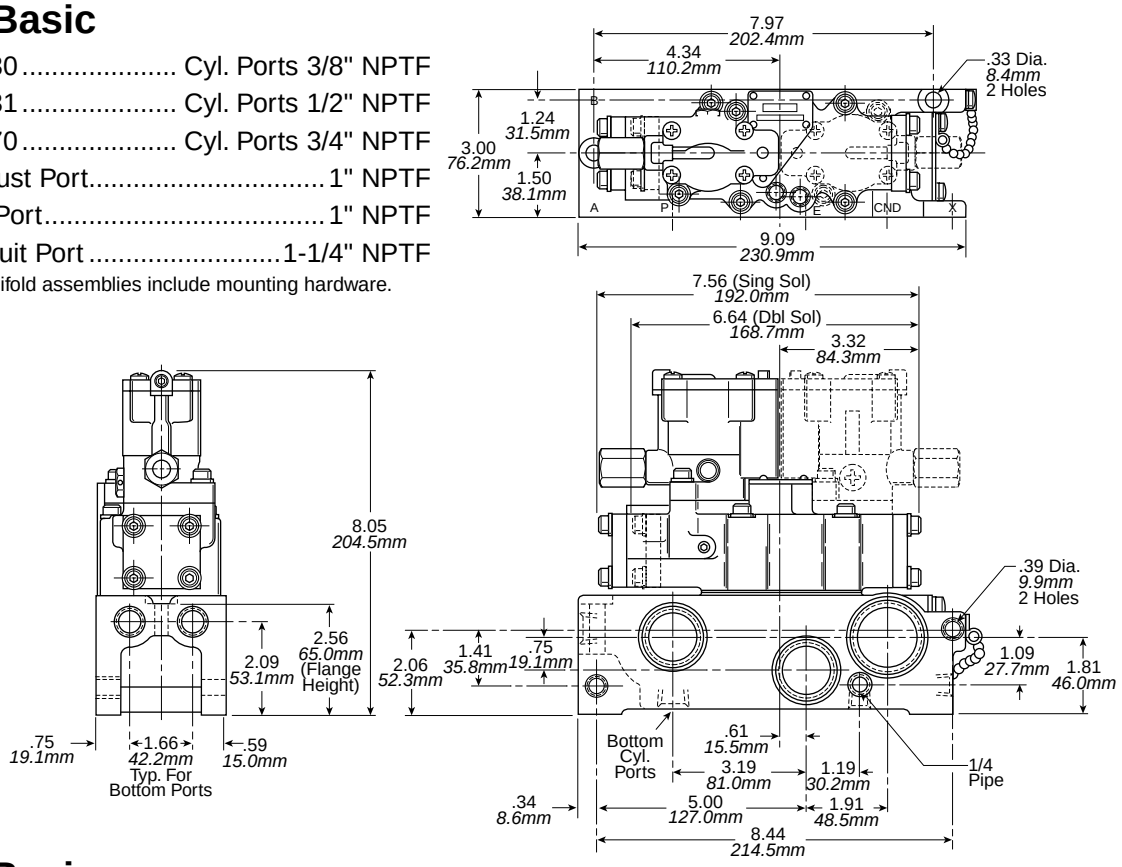
3/8" Basic

K142 230 ..... Cyl. Ports 3/8" NPTF
K142 231 ..... Cyl. Ports 1/2" NPTF
K142 270 ..... Cyl. Ports 3/4" NPTF
Exhaust Port..... 1" NPTF
Inlet Port..... 1" NPTF
Conduit Port ..... 1-1/4" NPTF

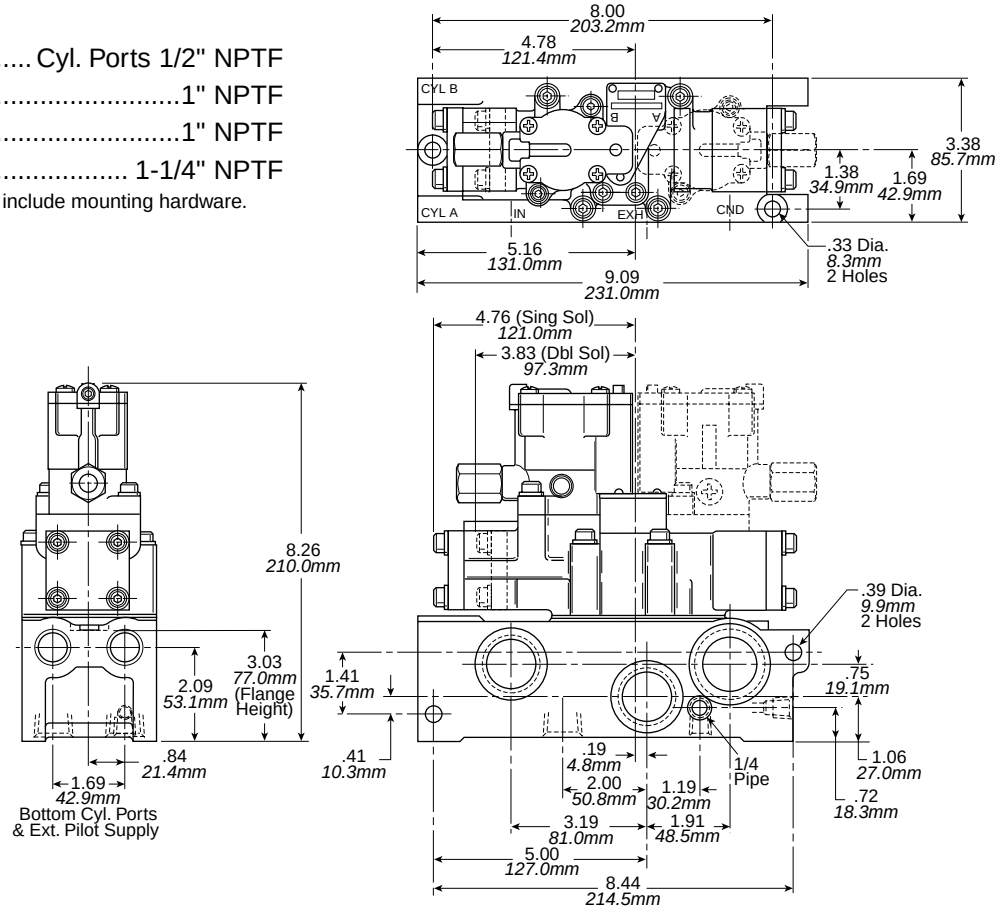
Note: Manifold assemblies include mounting hardware.



1/2" Basic

K142 233 ..... Cyl. Ports 1/2" NPTF
Exhaust Port..... 1" NPTF
Inlet Port..... 1" NPTF
Conduit Port ..... 1-1/4" NPTF

Note: Manifold assemblies include mounting hardware.



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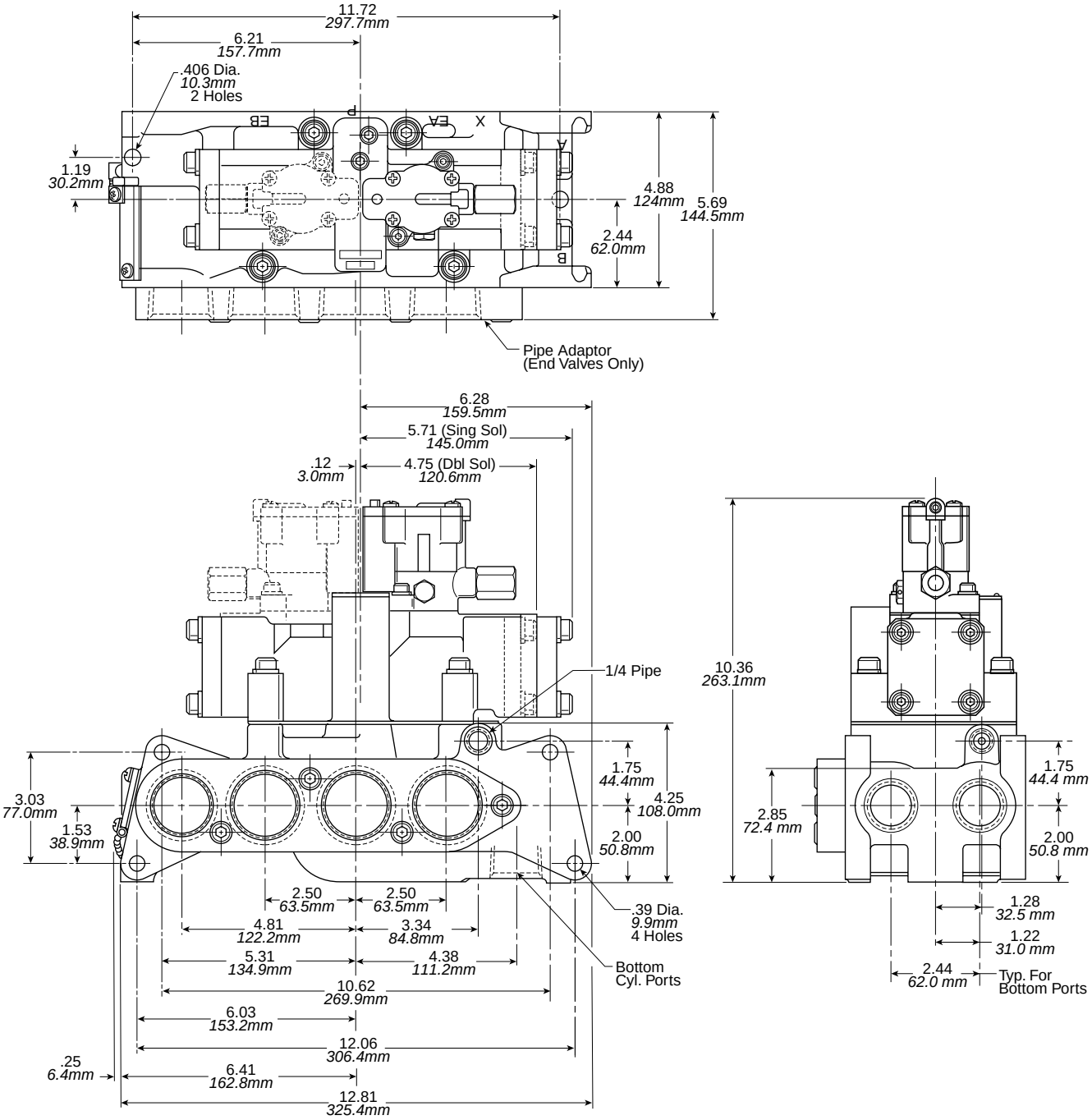
1" Basic

K142 236 ..... Cyl. Ports 1" NPTF
K122 016 ..... End Plate Kit (Both Plates)
Exhaust Port..... 1-1/2" NPTF (Port Plate)
Inlet Port..... 1-1/2" NPTF (Port Plate)
Conduit Port ..... 1-1/4" NPTF (Port Plate)



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Notes

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* Stocking levels vary by country

⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application including consequences of any failure, and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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Parker Hannifin Corporation
Pneumatic Division
Richland, Michigan
www.parker.com/pneumatics

Safety Guide For Selecting And Using Pneumatic Division Products And Related Accessories

⚠ WARNING:

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF PNEUMATIC DIVISION PRODUCTS, ASSEMBLIES OR RELATED ITEMS ("PRODUCTS") CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work pieces or component parts being thrown off at high speeds.
- Failure of a device to function properly for example, failure to clamp or unclamp an associated item or device.
- Explosion
- Suddenly moving or falling objects.
- Release of toxic or otherwise injurious liquids or gasses.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

1. GENERAL INSTRUCTIONS

1.1. Scope: This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.

1.2. Fail-Safe: Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.

1.3 Relevant International Standards: For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power – General Rules Relating to Systems. See www.iso.org for ordering information.

1.4. Distribution: Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.

1.5. User Responsibility: Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
- Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
- Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
- Assuring compliance with all applicable government and industry standards.

1.6. Safety Devices: Safety devices should not be removed, or defeated.

1.7. Warning Labels: Warning labels should not be removed, painted over or otherwise obscured.

1.8. Additional Questions: Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2. PRODUCT SELECTION INSTRUCTIONS

2.1. Flow Rate: The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.

2.2. Pressure Rating: Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.

2.3. Temperature Rating: Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.

2.4. Environment: Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.

2.5. Lubrication and Compressor Carryover: Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.

2.6. Polycarbonate Bowls and Sight Glasses: To avoid potential polycarbonate bowl failures:

- Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
- Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, keytones, esters or certain alcohols.
- Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.

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2.7. Chemical Compatibility: For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5

2.8. Product Rupture: Product rupture can cause death, serious personal injury, and property damage.
- Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
- Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
- Consult product labeling or product literature for pressure rating limitations.

3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1. Component Inspection: Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.

3.2. Installation Instructions: Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER, or at www.parker.com.

3.3. Air Supply: The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1. Maintenance: Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.10.

4.2. Installation and Service Instructions: Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in question for the appropriate practices to service the unit in question. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker web site at www.parker.com.

4.3. Lockout / Tagout Procedures: Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – (Lockout / Tagout)

4.4. Visual Inspection: Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:
- Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
- Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation.
- Kinked, crushed, or damaged hoses. Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
- Any observed improper system or component function: Immediately shut down the system and correct malfunction.
- Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

Caution: Leak detection solutions should be rinsed off after use.

4.5. Routine Maintenance Issues:
- Remove excessive dirt, grime and clutter from work areas.
- Make sure all required guards and shields are in place.

4.6. Functional Test: Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.

4.7. Service or Replacement Intervals: It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Service intervals need to be established based on:
- Previous performance experiences.
- Government and / or industrial standards.
- When failures could result in unacceptable down time, equipment damage or personal injury risk.

4.8. Servicing or Replacing of any Worn or Damaged Parts: To avoid unpredictable system behavior that can cause death, personal injury and property damage:
- Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – Lockout / Tagout).
- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
- Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
- Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.

4.9. Putting Serviced System Back into Operation: Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.

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1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGN OR SPECIFICATIONS.

5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitations, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. 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 items sold hereunder, 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.

8. 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 (2) 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.

9. Taxes: Unless otherwise indicated on the face hereof, 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 the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. 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 Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "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 an item sold pursuant to this contract 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 an item sold hereunder 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 said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item 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 items 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 item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgements resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.