

MAC<sup>®</sup>  
MAC

V A L V E S

# BULLET Valve



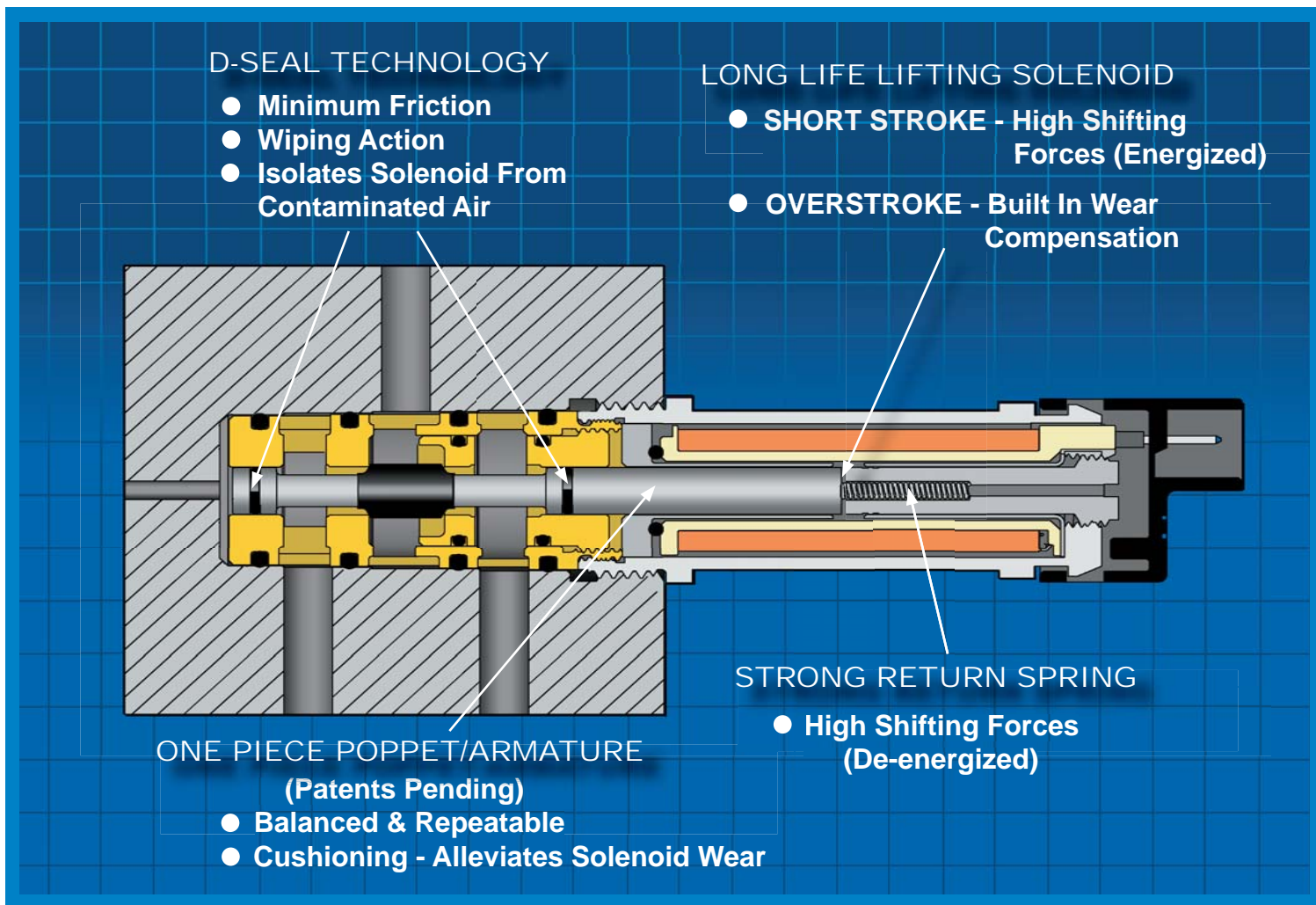
2

# Bullet Valve™ (BV) Series

The Bullet Valve™ represents yet another evolution in air valve technology from MAC.

- **VERY FEW PARTS**
- **LONG LIFE LIFTING SOLENOID**
- **ONE PIECE POPPET / ARMATURE (Patents Pending)**
- **BALANCED DESIGN**
- **SOLENOID ISOLATED FROM CONTAMINATED AIR**
- **UNIQUE MOUNTING**

The threaded cartridge configuration allows for a variety of mounting possibilities, such as direct integration into pneumatic actuators or vacuum generators without the need of external tubing or fasteners. 2-way & 3-way models of the BV cartridge (9mm & 10mm dia.) are available. A surface manifold mount configuration is also offered.





# Bullet Valve™

Function	Flow [max]	Manifold mounting	Series
<b>2/2</b>	<b>Up to 0.08 Cv</b>	<b>Cartridge</b>	<b>BV210A</b>

## OPERATIONAL BENEFITS

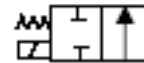
1. Short stroke with high shifting forces
2. Balanced poppet, immune to pressure fluctuations
3. Precise repeatability
4. Solenoid isolated from contaminated air
5. Very few parts
6. Extremely long life
7. Unique mounting - no fasteners or screws required



## HOW TO ORDER

### HOW TO ORDER VALVE

Type	2 Way
Cartridge	BV210A-CA1-00- <b>xxxx-xxx</b>



### SOLENOID OPERATOR

**X XX X - X XX**

Solenoid	Voltage	Lead wire length	Solenoid can (round)	Solenoid cover
<b>B</b> Round	<b>EH</b> 24VDC (2.5W) <b>EG</b> 24VDC (4.0W) <b>EK</b> 12VDC (2.5W) <b>EJ</b> 12VDC (4.0W)	<b>0</b> No lead wire <b>A</b> 18" <b>B</b> 24" <b>C</b> 36" <b>D</b> 48" <b>E</b> 72" <b>F</b> 96" <b>H</b> 144"	<b>C</b> For Top Cover Option and Can w/ Outer Threads	<b>JST Connector</b> <b>Flying Leads</b> <b>TA</b> No ground wire <b>BA</b> <b>TC</b> Blocking & suppr. <b>BC</b> diode & LED (no ground) <b>TE</b> Blocking & suppr. <b>BE</b> diode (no ground) <b>TG</b> LED (no ground) <b>BG</b> <b>TJ</b> MOV (no ground) <b>BJ</b> <b>TL</b> LED & MOV <b>BL</b> (no ground)

\* High wattage - high speed options - consult factory  
 \*\* ERC wattage reduction options - consult factory

### HOW TO ORDER CIRCUIT BAR

Port size	Spacing (mm)	Side cylinder port
<b># 10-32 UNF</b>	12	CCMV10A-00AAA- <b>xx</b>
<b>M5</b>	12	CCMV10A-00AAB- <b>xx</b>
<b>M7</b>	12	CCMV10A-00AAC- <b>xx</b>

**xx** = Number of stations

Note: for valves mounted to bar at factory, add -9 to model number.

\* High wattage configurations require intermittent duty cycles.

\*\* ERC - Energy Reduction Circuitry - Reduces the effective wattage at continuous duty

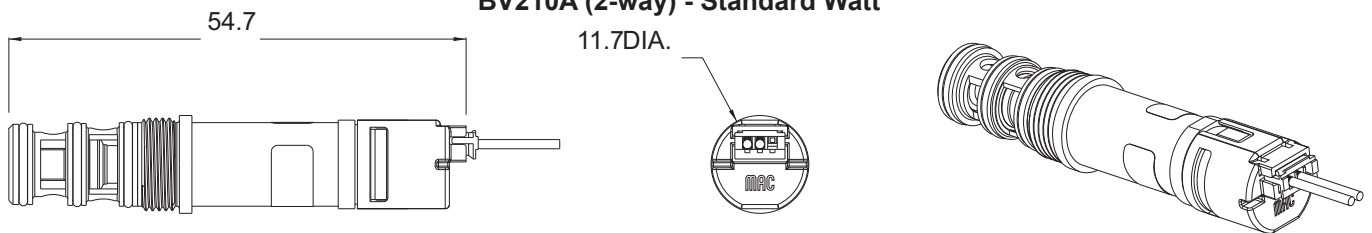
## TECHNICAL DATA

<b>Fluid:</b>	Compressed air, vacuum, inert gases
<b>Pressure range:</b>	Vacuum to 120 PSI
<b>Lubrication:</b>	Not required, if used select a medium aniline point lubricant (between 180°F and 210°F)
<b>Filtration:</b>	40μ
<b>Flow (at 6 bar ΔP=1bar):</b>	Up to 0.08 Cv
<b>Voltage range:</b>	-15% to +10% of nominal voltage

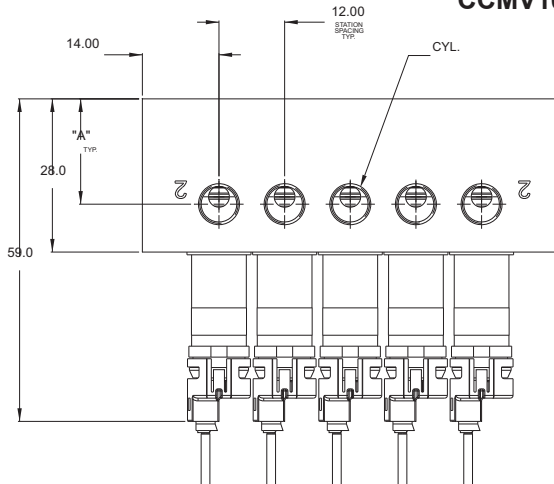
**Tools:** • Manifold cavity step reamer: T-6960 • Insertion/removal socket: AT-1181

## DIMENSIONS

**Bullet Valve with "JST" Cover and Circuit Board for LED., MOV., & Diode Options  
BV210A (2-way) - Standard Watt**

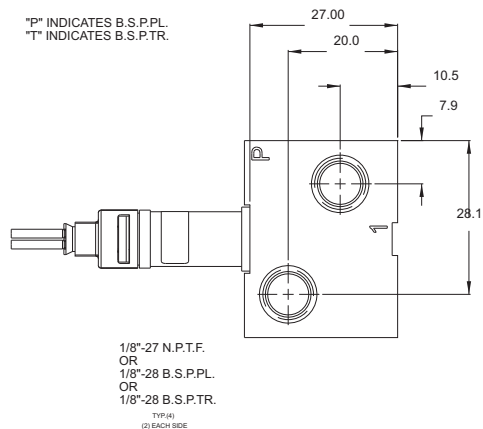
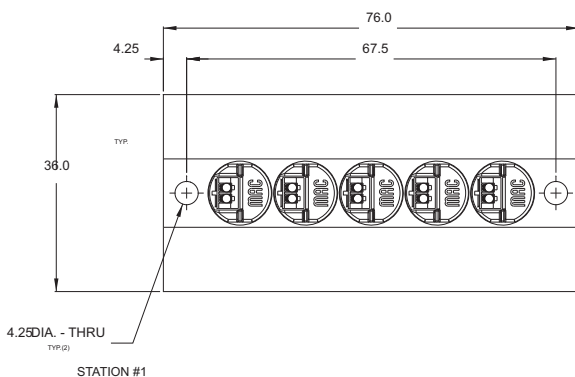


**CCMV10A - Side Ports**



**BV210A  
SIDE PORTS**

CYL.	DIMENSION "A"
#10-32	17.90
M5x0.8	17.90
M7x1.0	19.25





Function	Flow [max]	Manifold mounting	Series
<b>3/2 NC, Universal</b>	<b>Up to 0.08 Cv</b>	<b>Cartridge</b>	<b>BV310A</b>

**OPERATIONAL BENEFITS**

1. Short stroke with high shifting forces
2. Balanced poppet, immune to pressure fluctuations
3. Precise repeatability
4. Solenoid isolated from contaminated air
5. Very few parts
6. Extremely long life
7. Unique mounting - no fasteners or screws required



**HOW TO ORDER**

**HOW TO ORDER VALVE**

Type	3 Way N.C.	3 Way Universal
<b>Cartridge</b>	BV310A-CC1-00- <b>XXXX-XXX</b>	BV310A-CD1-00- <b>XXXX-XXX</b>

**SOLENOID OPERATOR**

<b>X XX X - X XX</b>				
Solenoid	Voltage	Lead wire length	Solenoid can (round)	Solenoid cover
<b>B</b> Round	<b>HA</b> 24VDC (1.0W) <b>HB</b> 24VDC (1.8W) <b>HC</b> 24VDC (2.5W) <b>HD</b> 24VDC (3.0W) <b>HE</b> 24VDC (4.0W) <b>HF</b> 12VDC (1.0W) <b>HG</b> 12VDC (1.8W) <b>HH</b> 12VDC (2.5W) <b>HJ</b> 12VDC (3.0W) <b>HK</b> 12VDC (4.0W)	<b>0</b> No lead wire <b>A</b> 18" <b>B</b> 24" <b>C</b> 36" <b>D</b> 48" <b>E</b> 72" <b>F</b> 96" <b>H</b> 144"	<b>C</b> For Top Cover Option and Can w/ Outer Threads	<b>JST Connector</b> <b>TA</b> No ground wire <b>TC</b> Blocking & suppr. diode & LED (no ground) <b>TE</b> Blocking & suppr. diode (no ground) <b>TG</b> LED (no ground) <b>TJ</b> MOV (no ground) <b>TL</b> LED & MOV (no ground)
				<b>Flying Leads</b> <b>BA</b> <b>BC</b> <b>BE</b> <b>BG</b> <b>BJ</b> <b>BL</b>

\* High wattage - high speed options - consult factory  
 \*\* ERC wattage reduction options - consult factory

\* M8 (pico) connector - Consult factory

**HOW TO ORDER CIRCUIT BAR**

Port size	Spacing (mm)	Side cylinder port
<b># 10-32 UNF</b>	12	CCMV10A-00ABA- <b>xx</b>
<b>M5</b>	12	CCMV10A-00ABB- <b>xx</b>
<b>M7</b>	12	CCMV10A-00ABC- <b>xx</b>

**xx** = Number of stations

Note: for valves mounted to bar at factory, add -9 to model number.

\* High wattage configurations require intermittent duty cycles.

\*\* ERC - Energy Reduction Circuitry - Reduces the effective wattage at continuous duty.

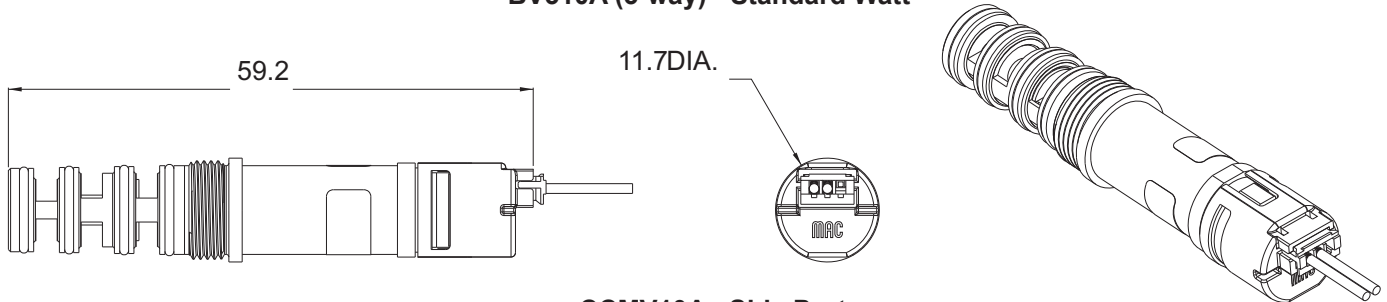
**TECHNICAL DATA**

<b>Fluid:</b>	Compressed air, vacuum, inert gases
<b>Pressure range:</b>	Vacuum to 120 PSI
<b>Lubrication:</b>	Not required, if used select a medium aniline point lubricant (between 180°F and 210°F)
<b>Filtration:</b>	40μ
<b>Flow (at 6 bar ΔP=1bar):</b>	Up to 0.08 Cv
<b>Voltage range:</b>	-15% to +10% of nominal voltage

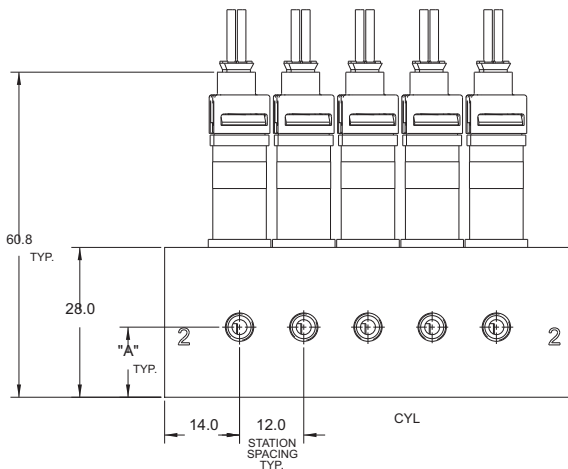
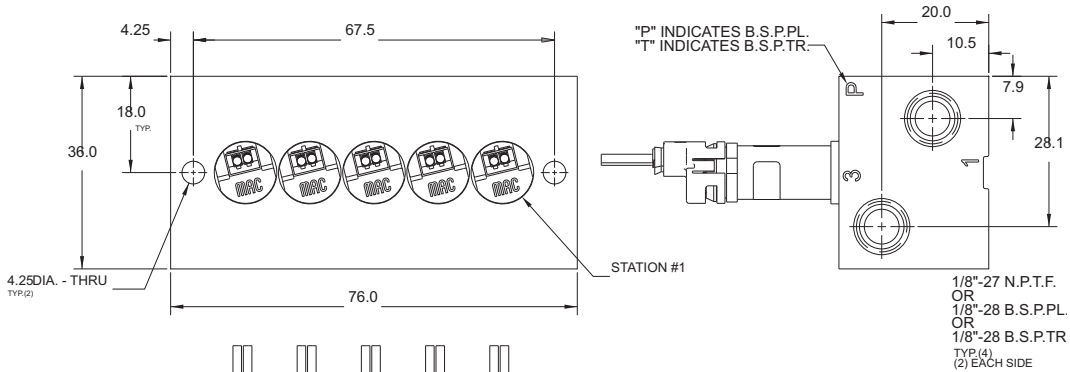
**Tools:** • Manifold cavity step reamer: T-6963 • Insertion/removal socket: AT-1181

**DIMENSIONS**

**Bullet Valve with “JST” Cover and Circuit Board for LED., MOV., & Diode Options  
BV310A (3-way) - Standard Watt**



**CCMV10A - Side Ports**



CYL	DIMENSION "A"
#10-32	13.0
M5 X 0.8	13.0
M7 X 1.0	11.5

**BV310A  
SIDE PORTS**

Function	Flow [max]	Manifold mounting	Series
<b>3/2 NC, Universal</b>	<b>Up to 0.08 Cv</b>	<b>Manifold mount - Non plug-in</b>	<b>BV310A</b>

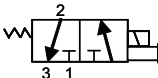
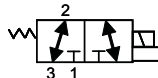
### OPERATIONAL BENEFITS

1. Short stroke with high shifting forces
2. Balanced poppet, immune to pressure fluctuations
3. Precise repeatability
4. Solenoid isolated from contaminated air
5. Very few parts
6. Extremely long life



### HOW TO ORDER

#### HOW TO ORDER VALVE

Type	3 Way N.C.	3 Way Universal
		
Manifold Mount - Non plug-in	BV310A-LC1-00- <b>xxxx-xxx</b>	BV310A-LD1-00- <b>xxxx-xxx</b>

#### SOLENOID OPERATOR

**X XX X - X XX**

Solenoid	Voltage	Lead wire length	Solenoid can (round)	Solenoid cover
<b>B</b> Round	<b>HA</b> 24VDC (1.0W) <b>HB</b> 24VDC (1.8W) <b>HC</b> 24VDC (2.5W) <b>HD</b> 24VDC (3.0W) <b>HE</b> 24VDC (4.0W) <b>HF</b> 12VDC (1.0W) <b>HG</b> 12VDC (1.8W) <b>HH</b> 12VDC (2.5W) <b>HJ</b> 12VDC (3.0W) <b>HK</b> 12VDC (4.0W)	<b>0</b> No lead wire <b>A</b> 18" <b>B</b> 24" <b>C</b> 36" <b>D</b> 48" <b>E</b> 72" <b>F</b> 96" <b>H</b> 144"	<b>B</b> Cover For Manifold Body	<b>JST Connector Flying Leads</b> <b>TA</b> No ground wire <b>TC</b> Blocking & suppr. diode & LED (no ground) <b>TE</b> Blocking & suppr. diode (no ground) <b>TG</b> LED (no ground) <b>TJ</b> MOV (no ground) <b>TL</b> LED & MOV (no ground) <b>BA</b> <b>BC</b> <b>BE</b> <b>BG</b> <b>BJ</b> <b>BL</b>

\* High wattage - high speed options - consult factory  
 \*\* ERC wattage reduction options - consult factory

\* M8 (pico) connector - Consult factory

#### HOW TO ORDER NON PLUG-IN CIRCUIT BAR

Port size	Spacing (mm)	Side cylinder port	Bottom cylinder port
<b># 10-32 UNF</b>	12	CBMV10A-00ABA- <b>xx</b>	CBMV10A-00BBA- <b>xx</b>
<b>M5</b>	12	CBMV10A-00ABB- <b>xx</b>	CBMV10A-00BBB- <b>xx</b>
<b>M7</b>	12	CBMV10A-00ABC- <b>xx</b>	CBMV10A-00BBC- <b>xx</b>

**xx** = Number of stations

Note: for valves mounted to bar at factory, add -9 to model number.

### OPTIONS

BV310A-LC 1 -00-**xxxx-xxx**  
 Replace with "0" for no manual operator

#### How to order bar configured for regulator

CBMV10A-00 **A** **BB**- **xx**  
 Replace with **D** for regulator - Side ports  
 Replace with **E** for regulator - Bottom ports

Note: Regulator must be ordered separately - see back

\* High wattage configurations require intermittent duty cycles

\*\*ERC - Energy Reduction Circuitry - Reduces the effectiveness wattage at continuous duty

**TECHNICAL DATA**

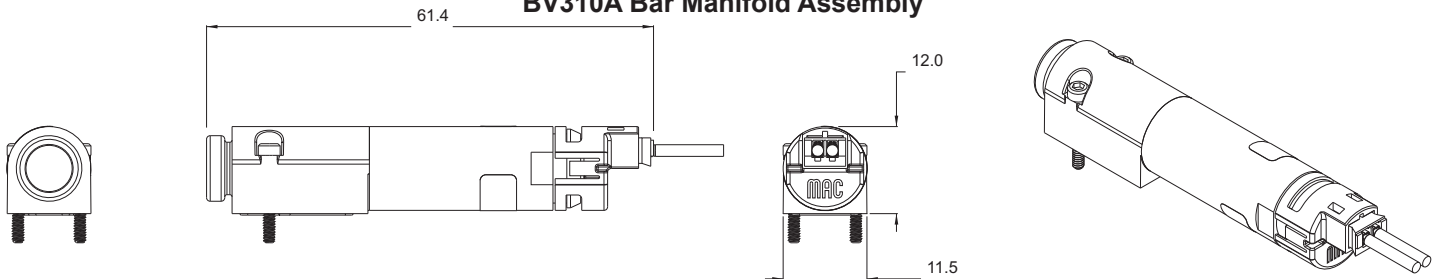
<b>Fluid:</b>	Compressed air, vacuum, inert gases
<b>Pressure range:</b>	Vacuum to 120 PSI
<b>Lubrication:</b>	Not required, if used select a medium aniline point lubricant (between 180°F and 210°F)
<b>Filtration:</b>	40μ
<b>Flow (at 6 bar ΔP=1bar):</b>	Up to 0.08 Cv
<b>Voltage range:</b>	-15% to +10% of nominal voltage

**Spare parts:**

- Pressure seal, body to base: 16985
  - Mounting screw, body to base: 35166 - 2 pcs required
  - Regulator for bar: PR44A-A0AX
- X =**
- A** 0 to 100 PSI
  - B** 0 to 60 PSI
  - C** 0 to 40 PSI
  - D** 0 to 15 PSI

**DIMENSIONS**

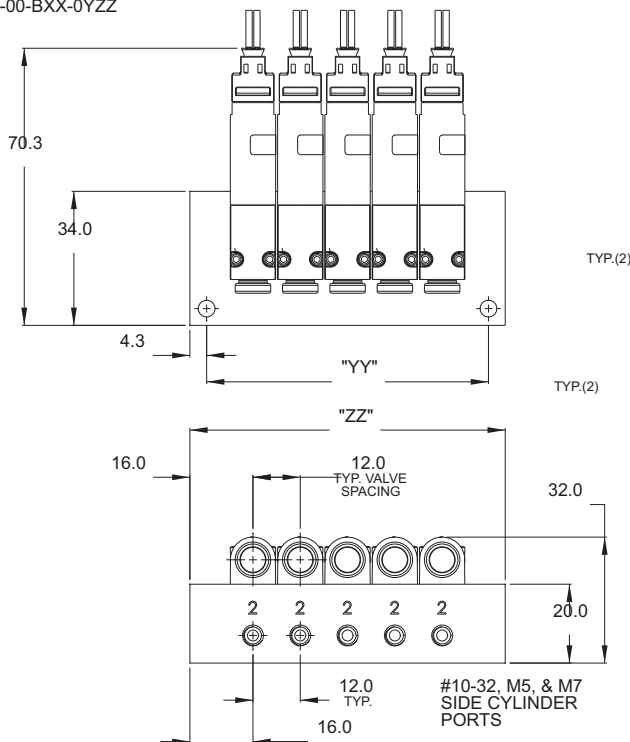
**BV310A Bar Manifold Assembly**



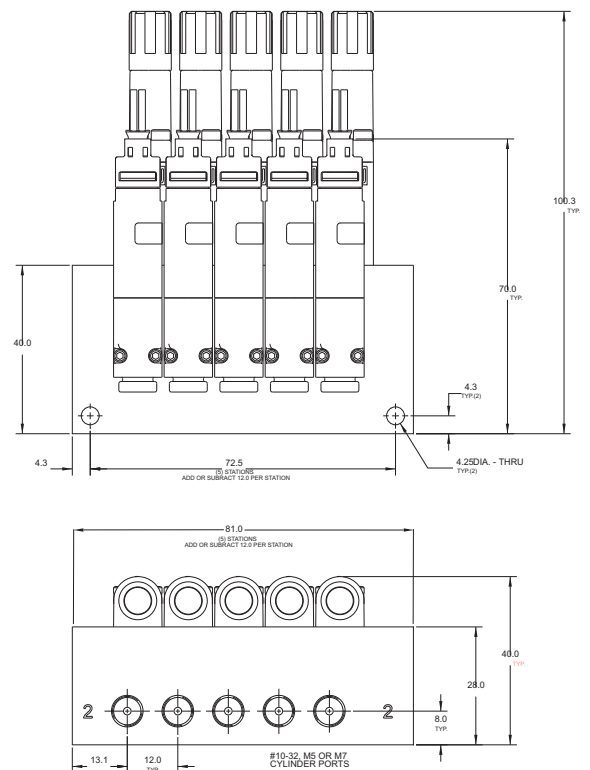
**CBMV10A Circuit bar for BV310**

**Without regulator**

BV310A-LCX-00-BXX-0YZZ



**With regulator**







# Bullet Valve™

Function	Flow [max]	Manifold mounting	Series
2/2	Up to 0.07 Cv	Cartridge	BV209A

## OPERATIONAL BENEFITS

1. Short stroke with high shifting forces
2. Balanced poppet, immune to pressure fluctuations
3. Precise repeatability
4. Solenoid isolated from contaminated air
5. Very few parts
6. Extremely long life
7. Unique mounting - no fasteners or screws required



## HOW TO ORDER

### HOW TO ORDER VALVE

Type	2 Way
Cartridge	BV209A-CA1-00-xxxx-xxx

### SOLENOID OPERATOR

X XX X - X XX

Solenoid	Voltage	Lead wire length	Solenoid can (round)	Solenoid cover
<b>B</b> Round	<b>GC</b> 24VDC (2.5W) <b>GE</b> 24VDC (4.0W) <b>GH</b> 12VDC (2.5W) <b>GK</b> 12VDC (4.0W)	<b>0</b> No lead wire <b>A</b> 18" <b>B</b> 24" <b>C</b> 36" <b>D</b> 48" <b>E</b> 72" <b>F</b> 96" <b>H</b> 144"	<b>C</b> For Top Cover Option and Can w/ Outer Threads	<b>JST Connector</b> <b>TA</b> No ground wire <b>TC</b> Blocking & suppr. diode & LED (no ground) <b>TE</b> Blocking & suppr. diode (no ground) <b>TG</b> LED (no ground) <b>TJ</b> MOV (no ground) <b>TL</b> LED & MOV (no ground)
				<b>Flying Leads</b> <b>BA</b> <b>BC</b> <b>BE</b> <b>BG</b> <b>BJ</b> <b>BL</b>

\* High wattage - high speed options - consult factory  
 \*\* ERC wattage reduction options - consult factory

\* M8 (pico) connector - Consult factory

### HOW TO ORDER CIRCUIT BAR

Port size	Spacing (mm)	Side cylinder port
# 10-32 UNF	11	CCMV09A-00AAA-xx
M5	11	CCMV09A-00AAB-xx
M7	11	CCMV09A-00AAC-xx

xx = Number of stations

Note: for valves mounted to bar at factory, add -9 to model number.

\* High wattage configurations require intermittent duty cycles.

\*\* ERC - Energy Reduction Circuitry - Reduces the effective wattage at continuous duty

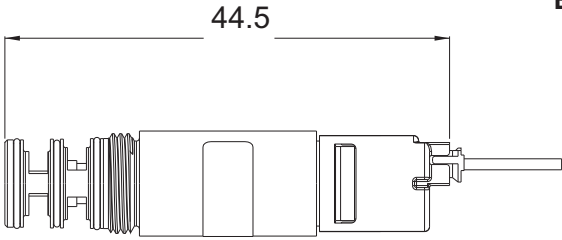
## TECHNICAL DATA

<b>Fluid:</b>	Compressed air, vacuum, inert gases
<b>Pressure range:</b>	Vacuum to 120 PSI
<b>Lubrication:</b>	Not required, if used select a medium aniline point lubricant (between 180°F and 210°F)
<b>Filtration:</b>	40μ
<b>Flow (at 6 bar ΔP=1bar):</b>	Up to 0.07 Cv
<b>Voltage range:</b>	-15% to +10% of nominal voltage

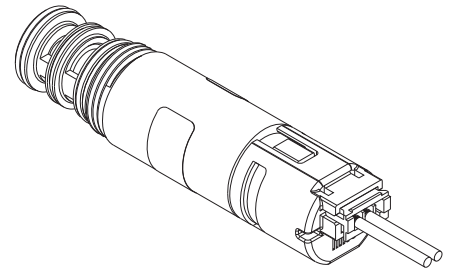
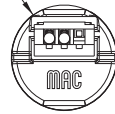
**Tools:** • Manifold cavity step reamer: T-6961 • Insertion/removal socket: AT-1180

## DIMENSIONS

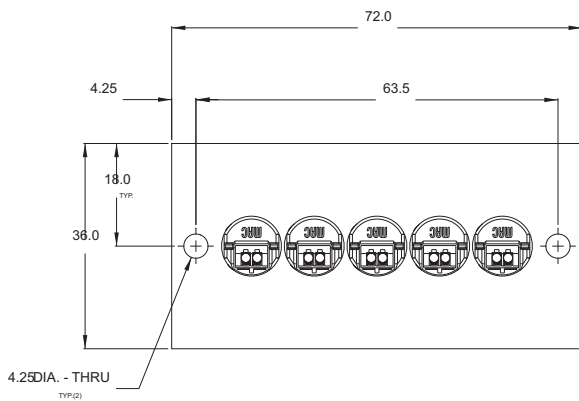
Bullet Valve with "JST" Cover and Circuit Board for LED., MOV., & Diode Options  
**BV209A (2-way) - Standard Watt**



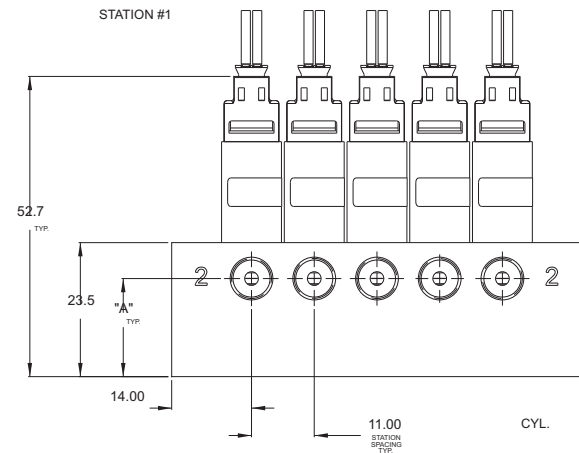
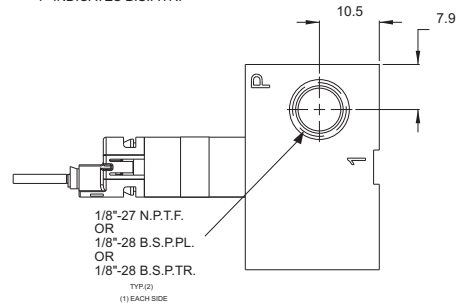
10.5DIA.



**CCMV09A - Side ports**



"P" INDICATES B.S.P.P.L.  
 "T" INDICATES B.S.P.T.R.



**BV209A  
 SIDE PORTS**

CYL.	DIMENSION "A"
#10-32	17.20
M5x0.8	17.20
M7x1.0	17.20

Function	Flow [max]	Manifold mounting	Series
<b>3/2 NC, Universal</b>	<b>Up to 0.06 Cv</b>	<b>Cartridge</b>	<b>BV309A</b>

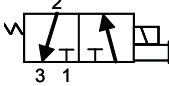
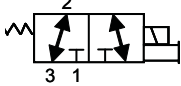
**OPERATIONAL BENEFITS**

1. Short stroke with high shifting forces
2. Balanced poppet, immune to pressure fluctuations
3. Precise repeatability
4. Solenoid isolated from contaminated air
5. Very few parts
6. Extremely long life
7. Unique mounting - no fasteners or screws required



**HOW TO ORDER**

**HOW TO ORDER VALVE**

Type	3 Way N.C.	3 Way Universal
		
<b>Cartridge</b>	BV309A-CC1-00- <b>xxxx-xxx</b>	BV309A-CD1-00- <b>xxxx-xxx</b>

**SOLENOID OPERATOR**

**X XX X - X XX**

Solenoid	Voltage	Lead wire length	Solenoid can (round)	Solenoid cover
<b>B</b> Round	<b>GA</b> 24VDC (1.0W) <b>GB</b> 24VDC (1.8W) <b>GC</b> 24VDC (2.5W) <b>GD</b> 24VDC (3.0W) <b>GE</b> 24VDC (4.0W) <b>GF</b> 12VDC (1.0W) <b>GG</b> 12VDC (1.8W) <b>GH</b> 12VDC (2.5W) <b>GJ</b> 12VDC (3.0W) <b>GK</b> 12VDC (4.0W)	<b>0</b> No lead wire <b>A</b> 18" <b>B</b> 24" <b>C</b> 36" <b>D</b> 48" <b>E</b> 72" <b>F</b> 96" <b>H</b> 144"	<b>C</b> For Top Cover Option and Can w/ Outer Threads	<b>JST Connector</b> <b>Flying Leads</b> <b>TA</b> No ground wire <b>BA</b> <b>TC</b> Blocking & suppr. <b>BC</b> diode & LED (no ground) <b>TE</b> Blocking & suppr. <b>BE</b> diode (no ground) <b>TG</b> LED (no ground) <b>BG</b> <b>TJ</b> MOV (no ground) <b>BJ</b> <b>TL</b> LED & MOV <b>BL</b> (no ground)

\* High wattage - high speed options - consult factory  
 \*\* ERC wattage reduction options - consult factory

\* M8 (pico) connector - Consult factory

**HOW TO ORDER CIRCUIT BAR**

Port size	Spacing (mm)	Side cylinder port
<b># 10-32 UNF</b>	11	CCMV09A-00ABA- <b>xx</b>
<b>M5</b>	11	CCMV09A-00ABB- <b>xx</b>
<b>M7</b>	11	CCMV09A-00ABC- <b>xx</b>

**xx** = Number of stations

Note: for valves mounted to bar at factory, add -9 to model number.

\* High wattage configurations require intermittent duty cycles.

\*\* ERC - Energy Reduction Circuitry - Reduces the effective wattage at continuous duty.

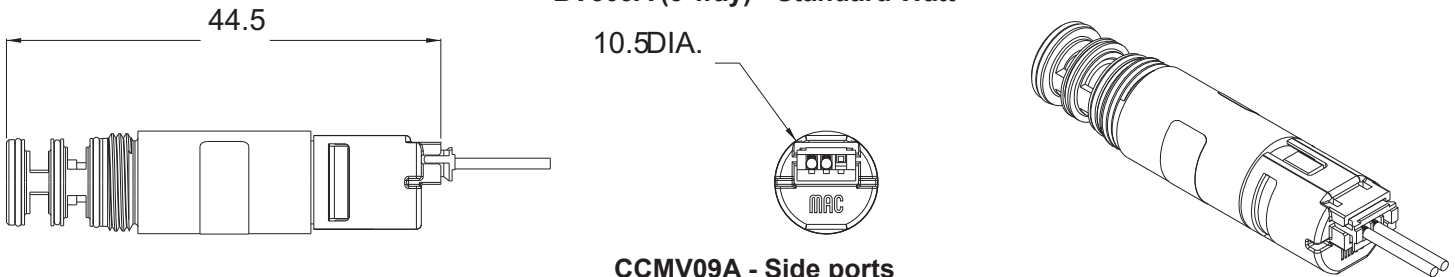
**TECHNICAL DATA**

<b>Fluid:</b>	Compressed air, vacuum, inert gases
<b>Pressure range:</b>	Vacuum to 120 PSI
<b>Lubrication:</b>	Not required, if used select a medium aniline point lubricant (between 180°F and 210°F)
<b>Filtration:</b>	40μ
<b>Flow (at 6 bar ΔP=1bar):</b>	Up to 0.06 Cv
<b>Voltage range:</b>	-15% to +10% of nominal voltage

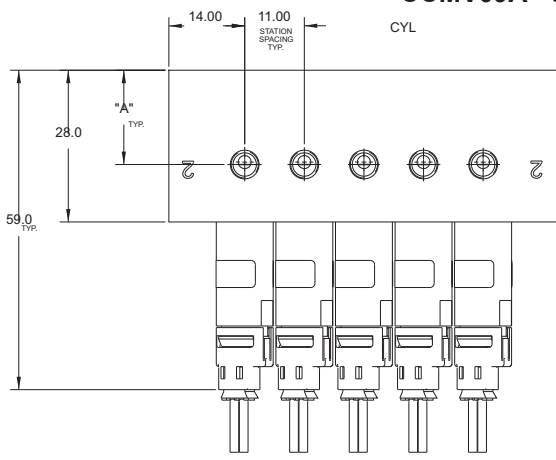
**Tools:** • Manifold cavity step reamer: T-6962 • Insertion/removal socket: AT-1180

**DIMENSIONS**

**Bullet Valve with "JST" Cover and Circuit Board for LED., MOV., & Diode Options  
BV309A (3-way) - Standard Watt**

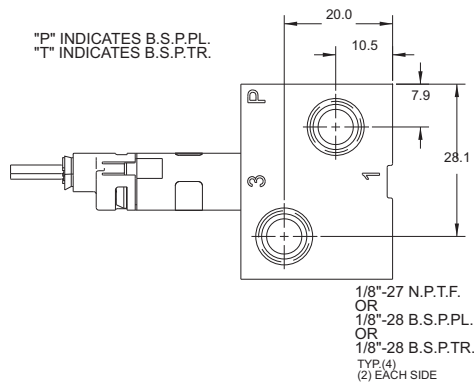
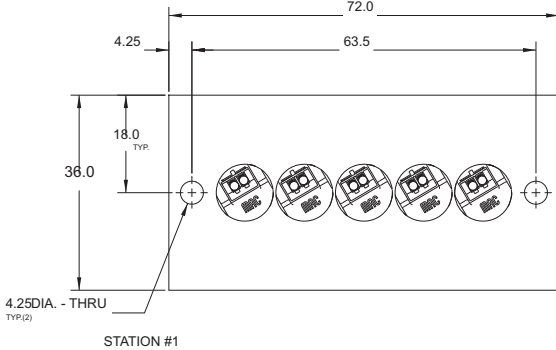


**CCMV09A - Side ports**



**BV309A  
SIDE PORTS**

CYL	DIMENSION "A"
#10-32	17.4
M5 X 0.8	17.4
M7 X 1.0	18.9



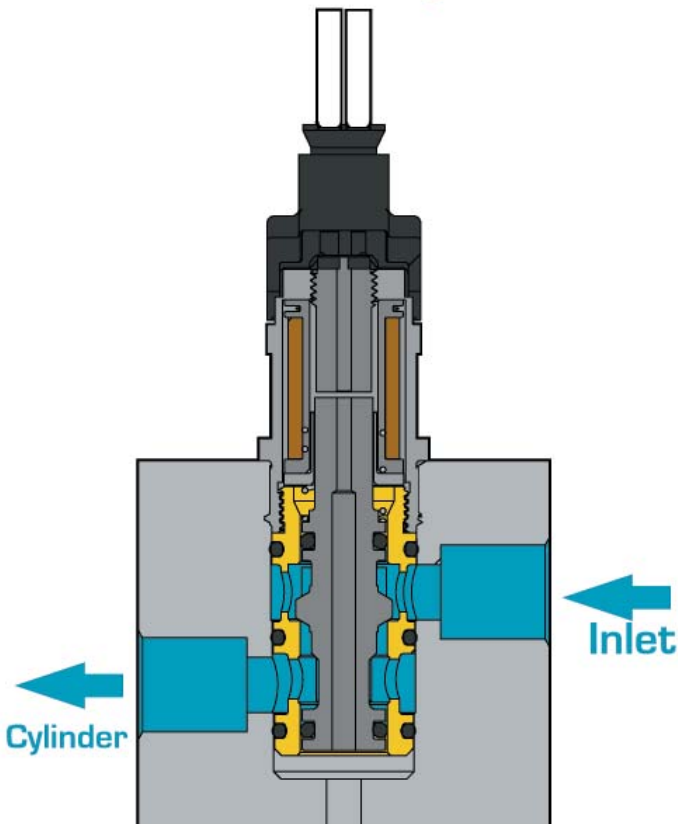
## CARTRIDGE MODIFICATIONS

Our manufacturing process of the Bullet Valve™ cartridge body enables flexibility with regards to offering potential modifications to meet your specific application needs. An example of such modifications is the “axial flow” modification we are currently offering for the BV210 series.

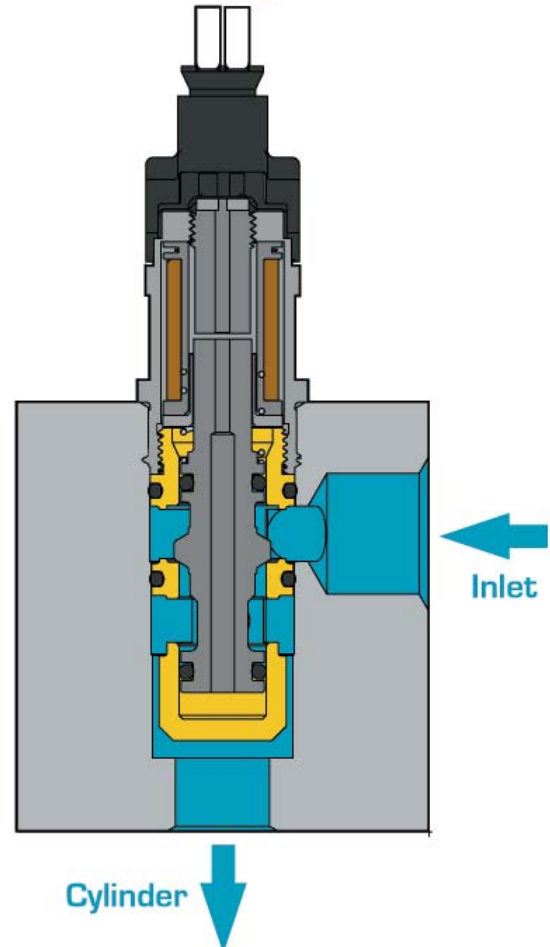
The “axial flow” cartridge enables the valve to flow air between the bottom of the valve body and manifold it is housed in – see figure below. This modification allows for a linear flow path out of the manifold producing measurably higher outlet pulse height (force) in blow off type of applications. We have currently used this modification for applications in the sorting industry with excellent results.

If you have an application that would benefit from utilizing the axial flow cartridge option or wish to discuss other potential cartridge modifications, please consult your local MAC distributor (MDN Associate). By understanding your application and valve requirements we can optimize the valve settings accordingly.

**Standard 2 Way Bullet**



**Axial 2 Way Bullet**





## Notes

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## PRECAUTIONS AND WARNINGS CONCERNING THE APPLICATION, INSTALLATION AND SERVICE OF MAC VALVES AND OTHER MAC VALVES PRODUCTS

The warnings and precautions below are important to be read and understood before designing into a system any MAC Valves products, and before installing or servicing any MAC Valves product. Improper use, installation or servicing of any MAC Valves product in some systems could create a hazard to personnel or equipment. No distinction in importance should be made between the terms warnings and precautions.

### WARNING :

Under no circumstances are MAC Valves products to be used in any application or in any manner where failure of the MAC Valves product to operate as intended could in any way jeopardize the safety of the operator or any other person or property.

- Do not operate outside of pressure range listed on a valve label or outside of the designated temperature range.
- Air supply must be clean and dry. Moisture or contamination can affect proper operation of the valve.
- Before attempting to repair, adjust or clean a MAC Valves product, consult catalog, parts & operation sheet, or factory for proper maintenance procedures, lubrication and cleaning agents. Never attempt to repair or perform other maintenance with air pressure to the valve.
- If air line lubrication is used do not use any lubrication other than those recommended in the catalog, parts & operation sheet or by the factory.

### APPLICATION PRECAUTIONS :

#### INDUSTRIAL USE -

- MAC Valve products are intended for general use in industrial pneumatic and/or vacuum systems. They are general purpose industrial products with literally thousands of different applications in industrial systems. These products are not inherently dangerous, but they are only a component of an overall system. The system in which they are used must provide adequate safeguards to prevent injury or damage in the event failure occurs, whether it be failure of switches, regulators, cylinders, valves or any other component.

#### POWER PRESSES -

MAC Valve products are not designed nor intended to be used to operate and/or control the operation of clutch and/or brake systems on power presses. There are special products on the market for such use.

#### 2-POSITION VALVES -

Some MAC valves are 2-position, 4-way valves. When air is supplied to the inlet port(s) of these valves, there will always be a flow path from the inlet to one of the outlets regardless of which of the two positions the valve is situated. Therefore, if pressurized air retained in the system would present a hazard in the application or servicing of the valve or system, a separate method in the system must be provided to remove the trapped air.

#### 3- POSITION VALVES-

Some MAC valves are 3-position, 4-way valves. These valves are either double solenoid or double remote air operated.

If either of the two operators is in control, air supplied to the inlet port(s) will pass through the valve to one of the outlets as on 2-position, 4-way valves. However, if neither operator is in control, the valve moves to a center position. Listed below are the various center position functions :

#### A. CLOSED CENTER-

With this type valve, when in the center position all ports are blocked (inlets and exhausts) meaning the air at both outlet ports is trapped. If trapping the air in both outlet ports would present a hazard in the application or servicing, a separate method in the system must be provided to remove the trapped air or this type valve should not be used.

#### B. OPEN CENTER-

With this type valve, when in the center position, the inlet port(s) is blocked and the two outlet ports are open to the exhaust port(s) of the valve. If having no air in either outlet port would present a hazard in the application or servicing, this type valve should not be used.

#### C. PRESSURE CENTER-

With this type valve, when in the center position, the inlet port(s) is connected to both outlet ports of the valve. If having pressurized air to either or both outlet ports would present a hazard in the application or servicing of the valve or system, a separate method in the system must be provided to remove the retained air or this type valve should not be used.

#### OPERATING SPECIFICATIONS -

MAC Valves products are to be installed only on applications that meet all operating specifications described in the MAC catalog for the MAC Valves product.

#### MANUAL OPERATORS-

Most MAC valves can be ordered with manual operators. Manual operators when depressed, are designed to shift the valve to the same position as would the corresponding solenoid or remote air pilot operator if it were activated. Care must be taken to order a type, if any, that will be safe for the physical location of the manual operator in the system. If intentional or accidental operation of a valve by a manual operator could cause personal injury or property damage, a manual operator should not be used.

#### REMOTE AIR OPERATED VALVES

Pilot valves supplying signal pressure to remote air operated valves should be 3-way valves with adequate supply and exhaust capacity to provide positive pressurizing and exhausting of the pilot supply line. Pilot lines should be open to exhaust when valves are deenergized.

#### INSTALLATION PRECAUTIONS :

- Do not install any MAC Valves product without first turning off air (bleed system completely) and electricity to the machine.
- MAC Valves products should only be installed by qualified, knowledgeable personnel who understand how the specific valve is to be pneumatically piped and electrically connected (where applicable). Flow paths through the valve are shown in the catalog and on the valve by use of ANSI or ISO type standard graphic symbols. Do not install unless these symbols and the valve functions and operations are thoroughly understood.
- If air line lubrication is used do not use any lubrication other than those recommended in the catalog, parts & operation sheet or by the factory.

#### SERVICE PRECAUTIONS :

- Do not service or remove from service any MAC Valves product without first shutting off both the air and electricity to the valve and making certain no pressurized air which could present a hazard is retained in the system.
- MAC Valves products should only be serviced or removed from service by qualified, knowledgeable personnel who understand how the specific product is used and/or how the specific valve is piped and used and whether there is air retained in the connecting lines to the valve or electric power still connected to the valve.
- Before attempting to repair, adjust or clean a MAC Valves product, consult catalog, parts & operation sheet, or factory for proper maintenance procedures, lubrication and cleaning agents. Never attempt to repair or perform other maintenance with air pressure to the valve.
- MAC Valves products are never to be stepped on while working on a machine. Damage to a MAC valve, or other product or lines to the product (either air or electrical lines) or accidental activation of a manual operator on the valve could result in personal injury or property damage.

#### LIMITATION OF GUARANTEE

This Guarantee is limited to the replacement or rebuilding of any valve or other product which should fail to operate properly. Valves or other products, under the MAC Guarantee, must be returned (with or without bases) transportation prepaid and received at our factory within the Guarantee period. They will be returned to the customer at the expense of MAC Valves, Inc., and will carry the same guarantee as provided under the Flat Rate Rebuild Program.

#### DISCLAIMER OF GUARANTEE

No claims for labor, material, time, damage, or transportation are allowable nor will any valve or other product be replaced or rebuilt under this guarantee which has been damaged by the purchaser not in the normal course of its use and maintenance during the warranty period. The guarantee does not apply to loss or damage caused by fire, theft, riot, explosion, labor dispute, act of God, or other causes beyond the control of MAC Valves, Inc. MAC Valves, Inc. shall in no event be liable for remote, special or consequential damages under the MAC Guarantee, nor under any implied warranties, including the implied warranty of merchantability.

The above Guarantee is our manner of extending the engineering and service resources of the MAC Valves, Inc. organization to assure our customer long, and continued satisfaction.



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