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NUMATROL® II

HIGHLAND, MICHIGAN, U.S.A.

THE ALL-AIR MOVING PART LOGIC CONTROL SYSTEM

The air valve people – worldwide
numatics®
INCORPORATED

TABLE OF CONTENTS and NUMATROL MPL DIAGRAM

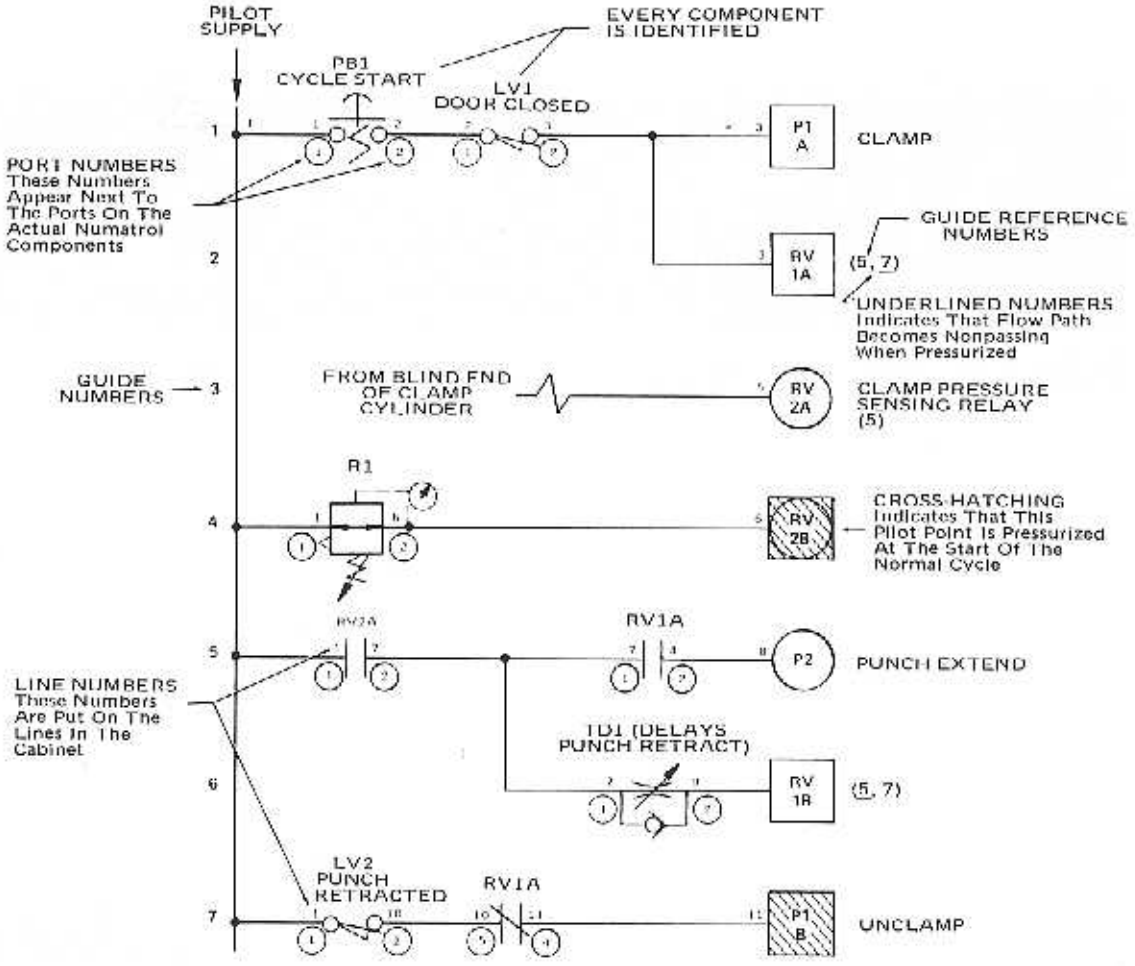
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Illustrated below is a portion of a typical Numatrol II control diagram. In this method of diagramming, all control air comes from the left hand supply line and flows from left to right through the various control devices. Eventually, the air reaches the right end of the flow path and enters a pilot point on either a relay valve or a power valve.

All circuit flow path symbols are understood to be 3-way flow paths with the supply and output ports identified. The exhaust port is not shown or identified, but is understood to be part of the device. The symbols show the condition of the flow paths at the start of the cycle. If a device shows that its flow path is not passing to the incoming air, then we can assume that the downstream flow path is being exhausted to atmosphere. Pressure air flows from left to right; exhausting air flows from right to left, and out to atmosphere at the first break.

Note: The Ladder Diagram Symbols conform to A.N.S.I. Standard B93.38 - 1976.



SERIES LR "SENTINEL" LIMIT VALVES WITH ROTARY ACTUATOR

GENERAL

The Sentinel Line is a family of rugged, heavy-duty limit valves, designed to provide the ultimate in reliability, versatility, and long trouble-free life under the most demanding conditions.

It was intended to out-perform the best limit switches in applications where the limit is exposed to coolants, die lubricants, water, degreasing fluids, foundry sand, and other similar environments where limits are a major source of machine down-time.

APPLICATION

Each "Sentinel" is a small, mechanically actuated, spring return air valve. All models have a blocked center spool, so there is no possibility of blow-by or cross-bleed from one flow path to another as the valve shifts. They are subplate mounted, the equivalent of a plug-in limit switch. Each subplate has three different sets of mounting holes, providing a variety of mounting possibilities.

Subplates have ports in the bottom and in the end opposite the operator. A conduit adapter option allows the connecting tubing to be run to the end ports through standard electrical conduit. The bottom ports have counter-bores for o-ring seals.

LR3 limits are dirtproof and splashproof, multi-purpose, 3-way valves. Any port may be pressurized.

LR4 limits are dirtproof, single purpose, 4-way valves with a common open exhaust construction which is protected by a sintered filter under the nameplate.

LR5 limits are dirtproof and splashproof, multi-purpose, 4-way valves with 5 separate ports for maximum versatility. Any port may be pressurized.

OPERATING DATA

PRESSURE RANGE: Vacuum to 150 PSIG.

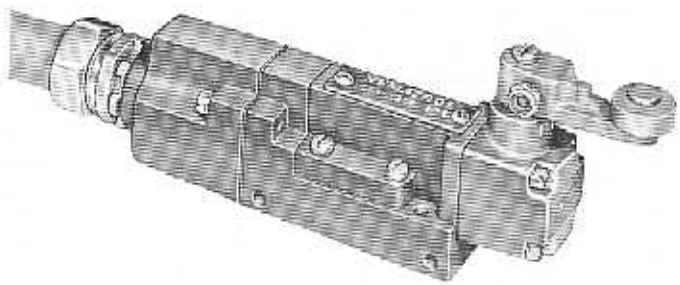
TEMPERATURE RANGE: 140°F to 1200°F ambient.

OPERATING TORQUE OF ROTARY ACTUATORS: 2.5 in/lbs. full shift.

REPEAT ACCURACY:
Rotary Actuator - $\pm$ 1/4°.

SERVICE: Valves may be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: Series LR valves have a C_V of .32. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 14.7 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.



ROTARY ACTUATOR: 3 different roller-lever actuators are available. Each operator can be rotated to any of four positions on the valve, providing considerable mounting versatility. They also may be converted in the field from universal actuation to one-way-trip in either direction. Cam design data is provided for operating levers of varying lengths. See pages N-4 - 5 for installation data and lever arm specifications.

MODEL SELECTION CHART

Valve Action	Mounting Details	Catalog Model No.
3-Way Multi-Purpose Dirt-proof and Splashproof	Complete Valve On Sub-plate, No Conduit Adapter	LR3-0201
	Valve Unit Only - No Sub-plate, No Conduit Adapter	LR3-0001
4-Way Single Inlet Open Exhaust Dirt-proof	Complete Valve On Sub-plate, No Conduit Adapter	LR4-0201
	Valve Unit Only No Sub-plate, No Conduit Adapter	LR4-0001
5-Port Multi-Purpose Dirt-proof and Splashproof	Complete Valve On Sub-plate, No Conduit Adapter	LR5-0201
	Valve Unit Only - No Sub-plate, No Conduit Adapter	LR5-0001
*Conduit Adapters	For LR3 and LR4, All Models	205-100A
	For LR5 Models Only.	205-132A

*REMINDER: Conduit Adapters are an optional accessory. You must order them separately.

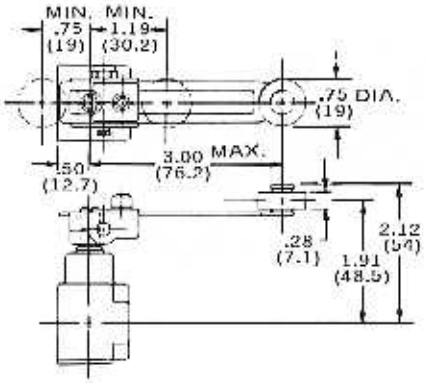
Also, operating levers are not included in any of the above model numbers, order them separately from page N-4.

SERIES LR "SENTINEL" LIMIT VALVES
LEVER ARMS AND
INSTALLATION DATA

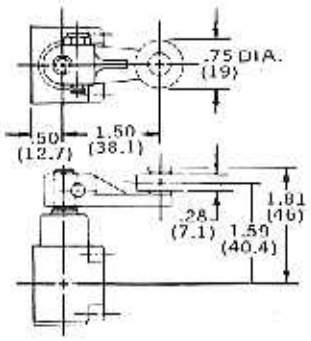
NUMATROL® II
PRODUCT OF NUMATICS, INC

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

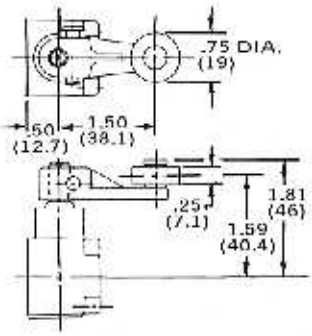
ROLLER LEVER - ADJUSTABLE
SMALL NYLON ROLLER
216-104A



ROLLER LEVER -
NYLON ROLLER
216-101A



ROLLER LEVER
STEEL ROLLER
216-102A

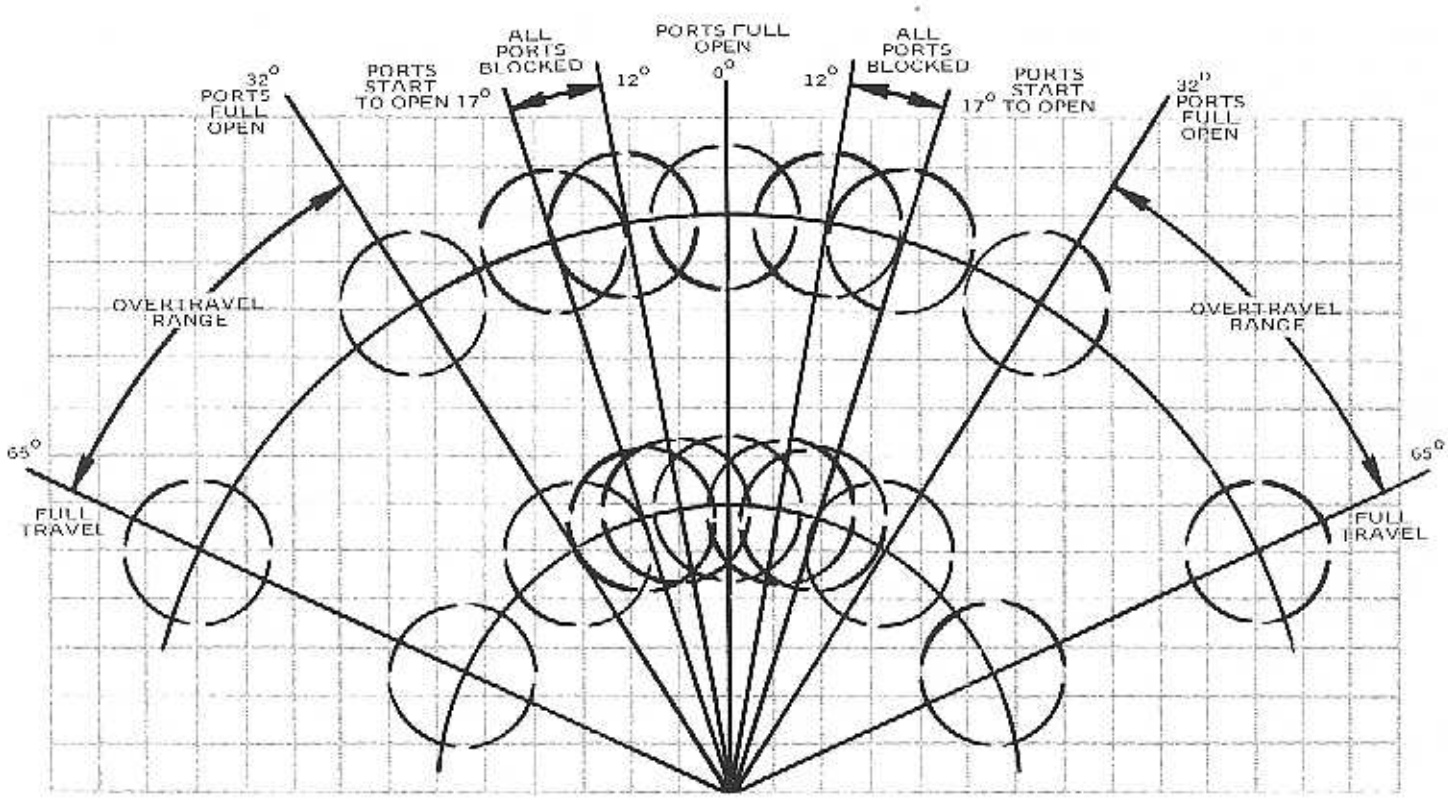


CAM DESIGN CHART:
This chart is a FULL SCALE layout of the movements required to actuate a "Sentinel" limit through the various segments of its travel, superimposed on a grid of .25" (6.3 mm) squares.

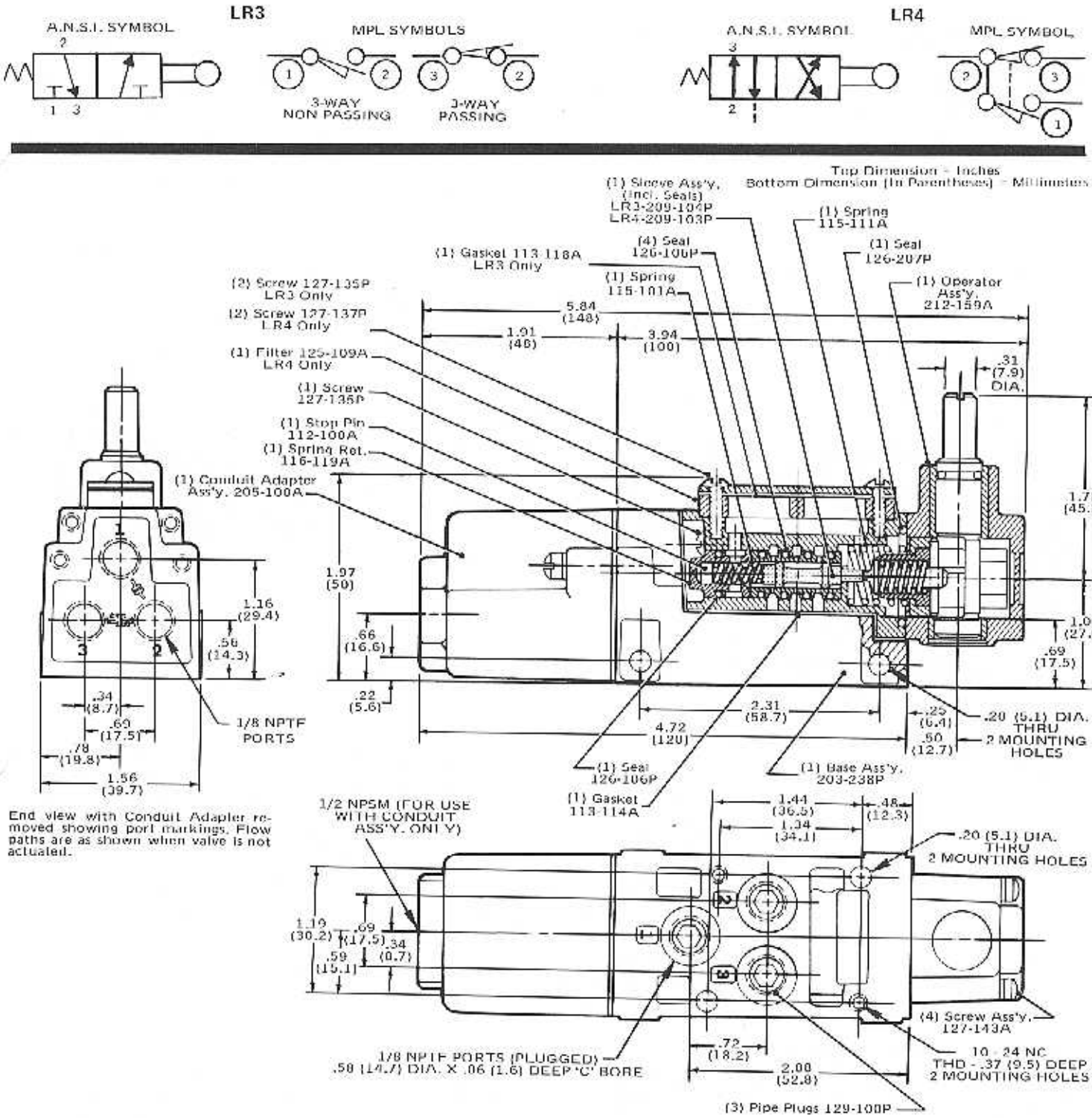
The small circles represent the .75" (19 mm) diameter rollers of the standard operating levers. The inner group of circles is the path followed by the roller of all short lever operators (1.50", 38.1 radius). The outer group of circles is the path followed by long lever operators (3.00", 76.2 mm radius).

Thus, you can count squares (or scale it off) and find the vertical and horizontal travel your cam must provide to actuate the valve properly.

If your lever radius or roller diameter are nonstandard, you can draw your lever and roller on a piece of tracing paper, stick a pin through its center and the pivot point of the chart, and rotate the tracing paper around the pin. This will indicate the path your lever must follow and the linear travel needed.



FULL SIZE CHART - ¼" SQUARE GRID

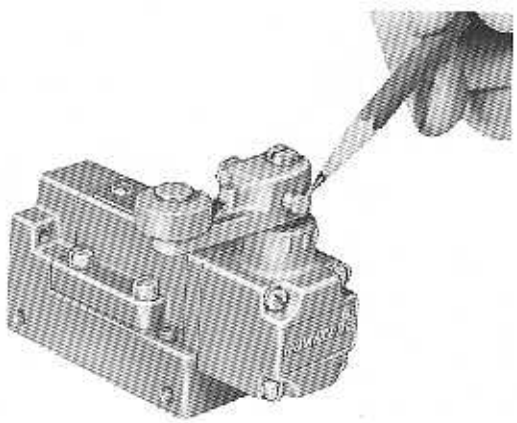


HOW TO ADJUST THE OPERATING LEVER:

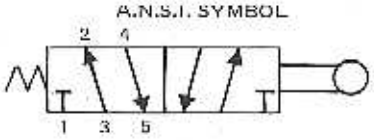
On the bearing housing of the turret head are three register marks. To check whether the valve is being actuated fully, make a pencil mark on the operator opposite one of the register marks.

If the operator is NOT on the cam, make the mark opposite the center register mark. Then watch this mark as the cam actuates the valve. If the mark moves to or beyond either of the other register marks, the valve is being actuated fully.

If the operator is ON the cam, make the mark opposite the left or right register mark (depending on which way the cam has moved the lever arm). Then, as the cam releases the lever arm, the mark will move toward the center register mark. If it moves to or beyond the center mark, the valve is being actuated fully.

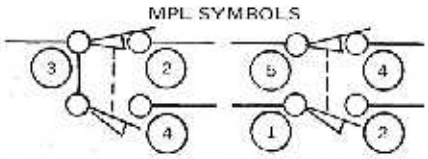


A.N.S.I. SYMBOL



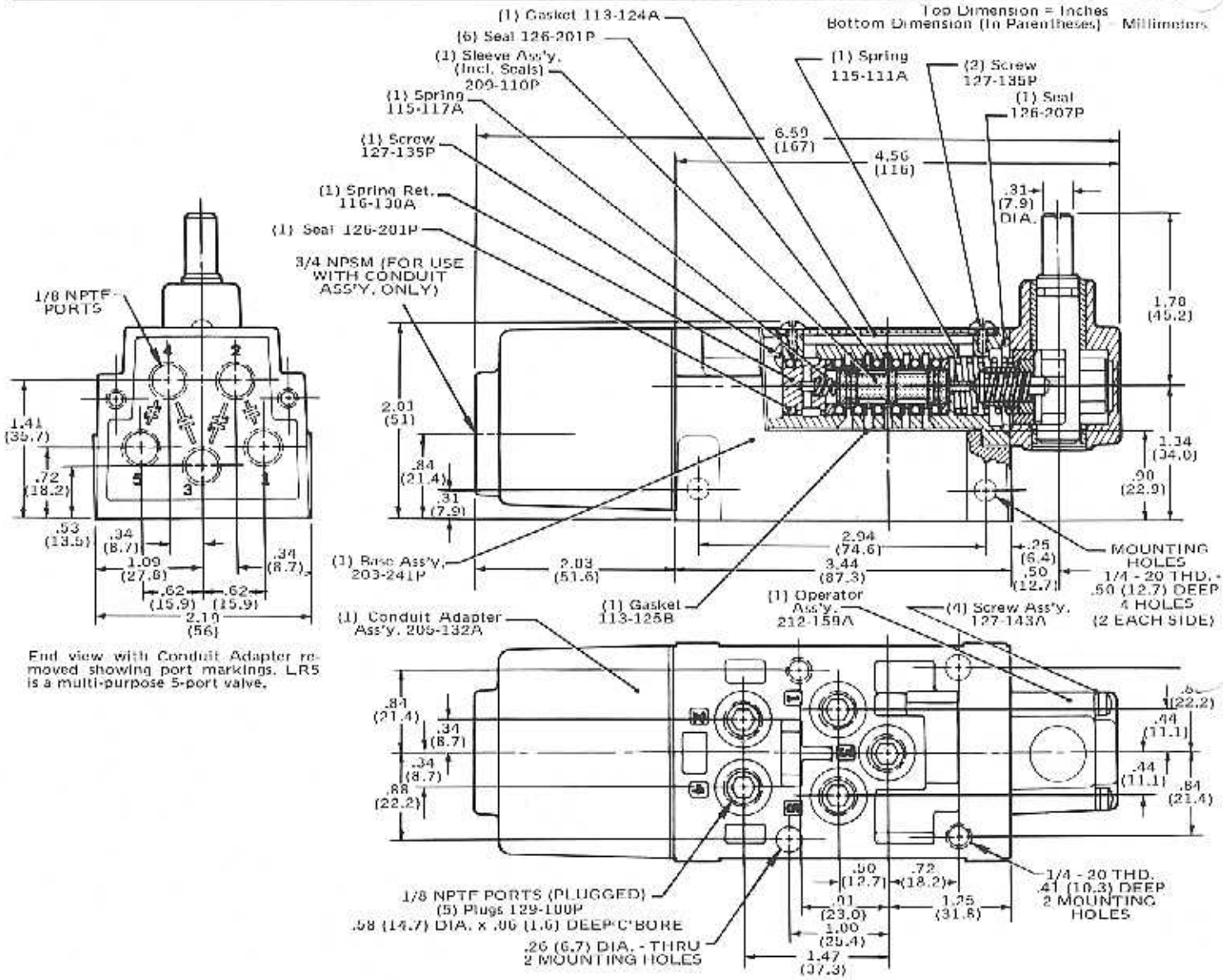
LR5

MPL SYMBOLS



COMMON SUPPLY INDIVIDUAL SUPPL

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters



End view with Conduit Adapter removed showing port markings. LR5 is a multi-purpose 5-port valve.

"SENTINEL" LIMIT VALVE OPERATING HEADS CAN BE ROTATED TO FOUR POSITIONS AND THE DIRECTION OF OPERATION CHANGED FROM UNIVERSAL TO "CW" ONLY OR "CCW" ONLY, AS SHOWN BELOW.

TO TURN OPERATING HEAD

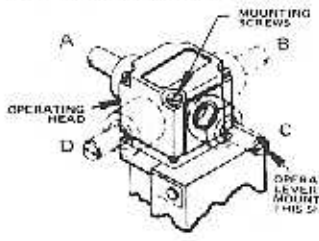


FIG. 1

SENTINEL VALVES ARE FACTORY ASSEMBLED IN THE "A" POSITION.

TO ROTATE HEAD

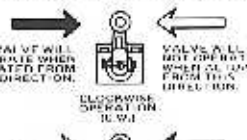
1. REMOVE THE 4 MOUNTING SCREWS.
2. TURN HEAD TO REQUIRED POSITION. (NO NEED TO LIFT HEAD, JUST TURN.)
3. REPLACE THE MOUNTING SCREWS.

DIRECTION OF OPERATION

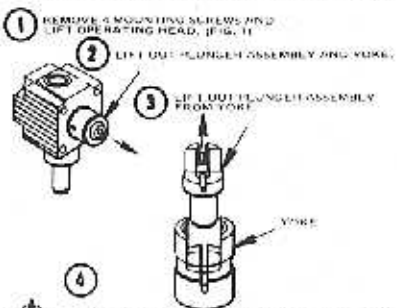


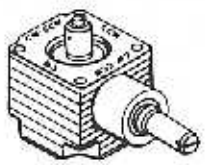
SENTINEL LIMIT VALVES ARE FACTORY ASSEMBLED TO BE OPERATED IN BOTH DIRECTIONS (UNIVERSAL).

THEY CAN BE CHANGED TO



TO CHANGE DIRECTION OF OPERATION





5 PUT THE PLUNGER BACK INTO THE YOKE AND PLACE THE WHOLE ASSEMBLY BACK INTO THE OPERATOR HEAD. POSITION IT SO THAT THE DOT ON THE PLUNGER POINTS TO THE "C.W." OR "C.C.W." MARKED ON THE HEAD.

6 REPLACE THE OPERATOR HEAD ON THE VALVE WHICH WILL NOW OPERATE "C.W." OR "C.C.W." AS SELECTED.

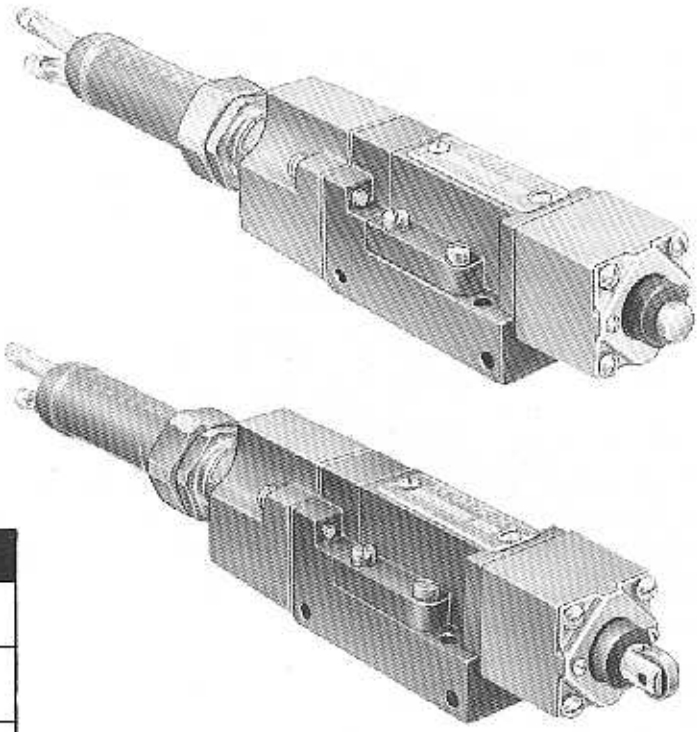
BE SURE YOU HAVE REPLACED THE "O" RING SEAL AND THE RETURN SPRING.

SERIES LR "SENTINEL" LIMIT VALVES WITH MECHANICAL STEM OR ROLLER STEM ACTUATOR

NUMATROL® II
PRODUCT OF NUMATICS, INC.

APPLICATION

The mechanical stem and roller stem Sentinel Limit Valves are intended specifically for short stroke applications to be used in locations where the actuating part or cam does not provide enough lineal movement to properly actuate the rotary shaft Sentinel Limit Valve. The body of the mechanical stem Sentinel is identical with the body of the rotary shaft Sentinel and provides all of the advantages of ruggedness and performance offered by the standard Sentinel. The only difference is the operating head.



SPECIFICATIONS

Repeat Accuracy: ±.002" plunger travel.

Force to Actuate: 3.2 lbs. to fully shift.
6.5 lbs. for full override.

All other specifications are the same as rotary actuated limits.

MODEL SELECTION CHART

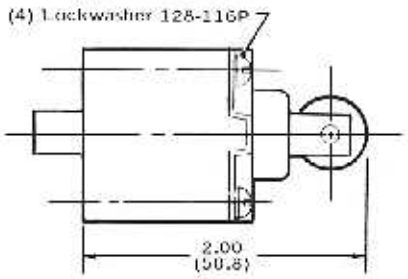
Valve Action	Mounting Details	Actuators	Catalog Model No.
3-Way Multi-Purpose Dirt-proof Splashproof	Complete Valve On Sub-plate, No Conduit Adapter	Mech. Stem	LR3-0203
		Roller Stem	LR3-0204
	Valve Unit Only - No Sub-plate, No Conduit Adapter	Mech. Stem	LR3-0003
		Roller Stem	LR3-0004
4-Way Single Inlet-Open Exhaust Dirt-proof	Complete Valve On Sub-plate, No Conduit Adapter	Mech. Stem	LR4-0203
		Roller Stem	LR4-0204
	Valve Unit Only - No Sub-plate, No Conduit Adapter	Mech. Stem	LR4-0003
		Roller Stem	LR4-0004
5-Port Multi-Purpose Splashproof	Complete Valve On Sub-plate, No Conduit Adapter	Mech. Stem	LR5-0203
		Roller Stem	LR5-0204
	Valve Unit Only - No Sub-plate, No Conduit Adapter	Mech. Stem	LR5-0003
		Roller Stem	LR5-0004
*Conduit Adapters	For LR3 and LR4, All Models	–	205-100A
	For LR5 Models Only	–	205-132A

*REMINDER: Conduit Adapters are an optional accessory. You must order them separately.

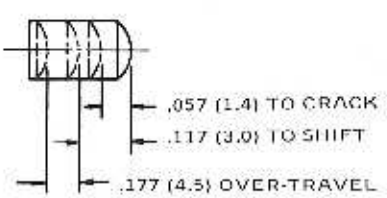
CAUTION: Do not overstroke the mechanical stem as it is possible to "bottom out" the stem, which may cause damage to the operating head or the valving mechanism itself. For this reason, the rotary shaft Sentinel should be used wherever possible and the mechanical stem or roller stem Sentinel only when necessary.

The roller on the roller stem head can be rotated 90° in either direction by simply removing the four head mounting screws, rotating the head and replacing the four screws.

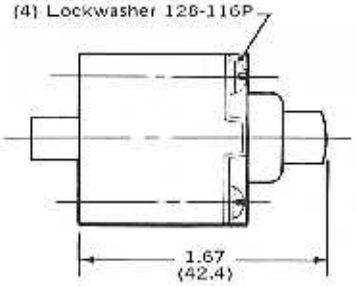
ROLLER - STEM OPERATOR
212-186A



OPERATING TRAVEL FOR ROLLER STEM AND MECHANICAL STEM OPERATED VALVES



MECHANICAL STEM OPERATOR
212-105A



SERIES LM3 and LM5
LIMIT VALVES
3-WAY and 4-WAY, MULTI-PURPOSE

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

Series LM valves are small, economical, multi-purpose units designed to provide the ultimate in reliability and flexibility in control functions. They are intended to be easily adapted to various mechanical actuators for use as limit or selector valves, etc.

CAUTION: LM valves employ an open construction. **DO NOT** expose to adverse environments. In applications where the unit will be exposed to coolants, die lubricants, water, foundry sand, etc., use either the Numatrol II "Sentinel" limit valves (see pages N3 - 7) or install in a watertight enclosure and use the pushbutton or push roller type actuator.

APPLICATION

Each LM valve is a small, mechanically actuated, spring return air valve employing the patented Numatics lapped spool and sleeve construction. They are available as 3-way or 5-ported, 4-way units. All models have a blocked center spool, so that there is no possibility of blow-by or cross-bleed from one flow path to another as the valve shifts. The barbed connector plate is easily removed without disconnecting the tubing for ease of maintenance or changeover.

LM valve ports have barbed fittings designed to accept any 1/4" O.D. tubing. Nylon collars are shipped loose with each valve. These are required when using vinyl or nylon tubing only. The combination provides a safe, reliable connection with air pressures and temperatures as specified on page N-48. The mounting bracket is designed to accommodate standard electrical switch operators.

OPERATING DATA

PRESSURE & TEMPERATURE RANGE:

SEE PAGE N-48

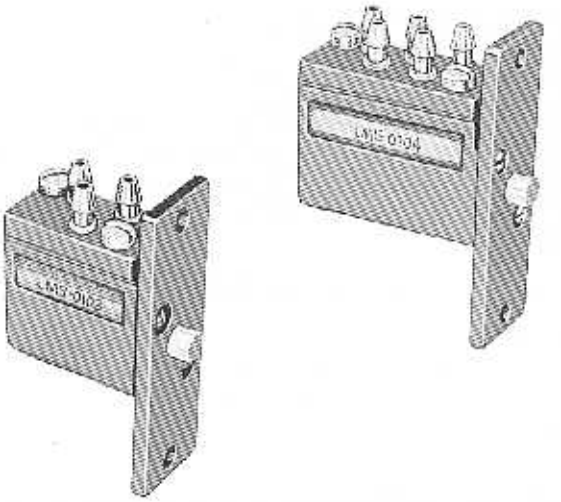
OPERATING FORCE: .62 lbs. for full stroke.

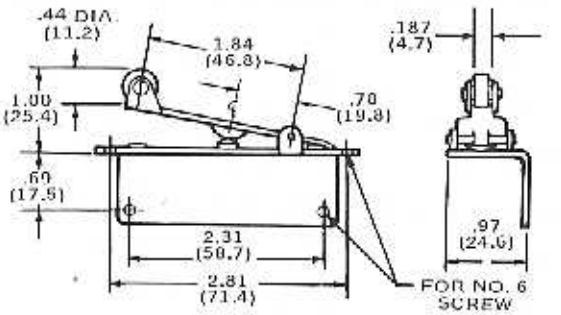
OPERATING STROKE: .11" (2.8 mm) full stroke. **CAUTION:** Do not overstroke the mechanical stem as it is possible to "bottom it out", which will cause damage to the stem or valve mechanism.

REPEAT ACCURACY: ± .002" (.05 mm) plunger travel.

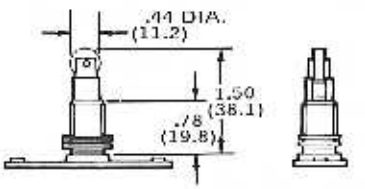
SERVICE: Valves may be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: Series LM valves have a C_V of .25. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 11.5 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.



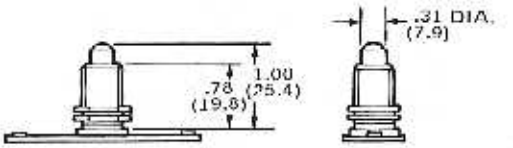


ROLLER LEVER - RIGHT HAND MOUNTING
212-179A SHOWN
ROLLER LEVER - LEFT HAND MOUNTING
212-180A



PUSH ROLLER PARALLEL TO MOUNTING HOLES 212-176A

Will Mount In .50 (12.7) Dia. Hole



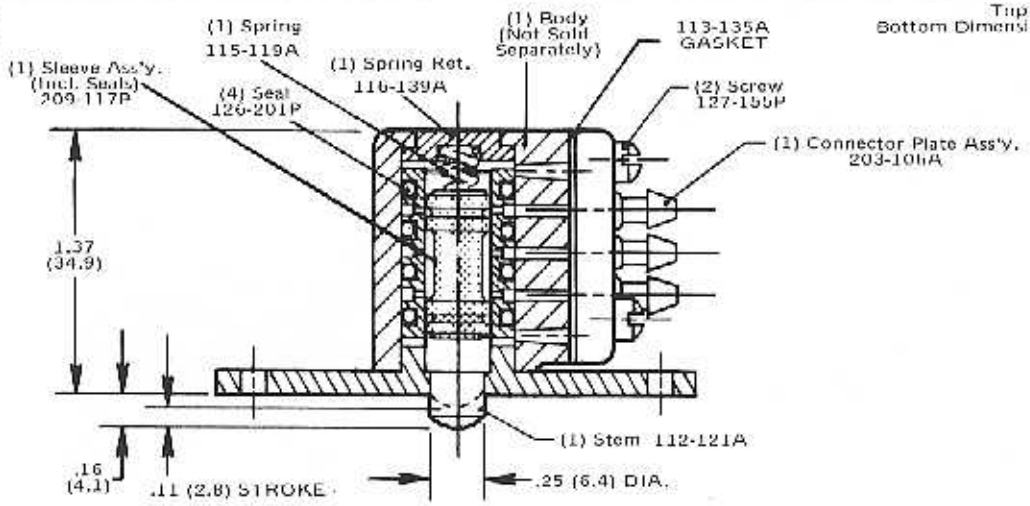
PUSH BUTTON PLUNGER
212-183A

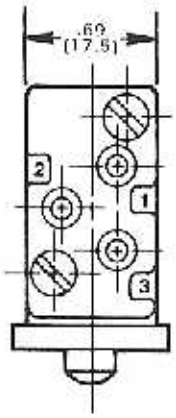
Will Mount In .50 (12.7) Dia. Hole

MODEL SELECTION CHART			
OPERATOR DESCRIPTION	OPERATOR NUMBER	3-WAY LM3-0103	4-WAY LM5-0104
PUSH STEM	212-183A	LM3-0902	LM5-0902
PARALLEL PUSH ROLLER	212-176A	LM3-0903	LM5-0903
ROLLER LEVER, RIGHT HAND	212-179A	LM3-0907	LM5-0907
ROLLER LEVER, LEFT HAND	212-180A	LM3-0908	LM5-0908

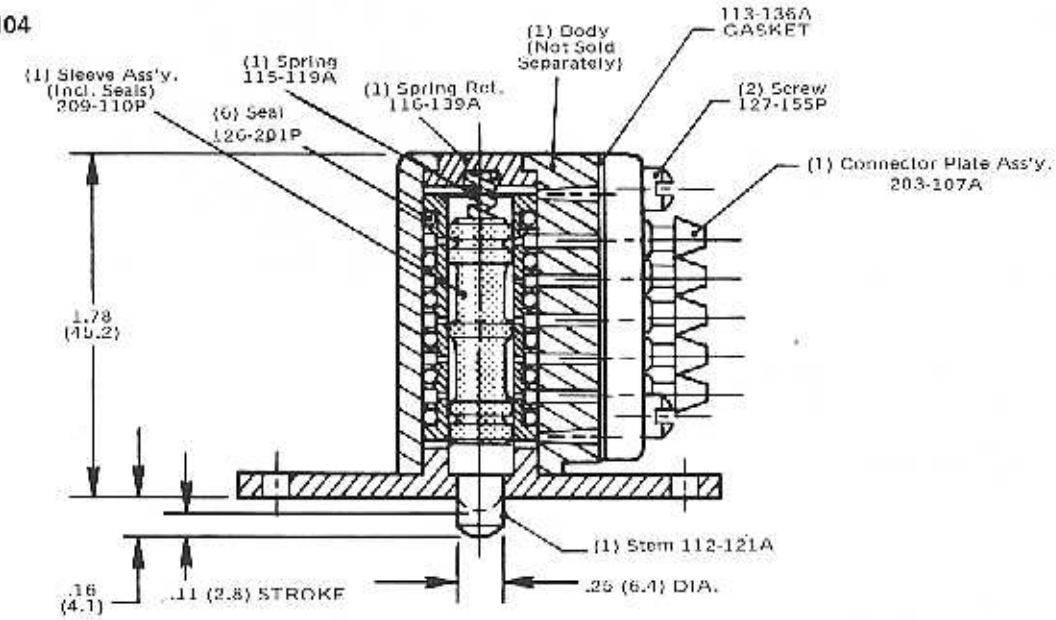
LM3-0103

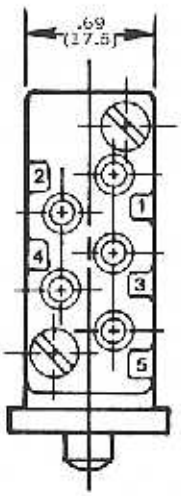
Top Dimension - Inches
Bottom Dimension (In Parentheses) - Millimeters

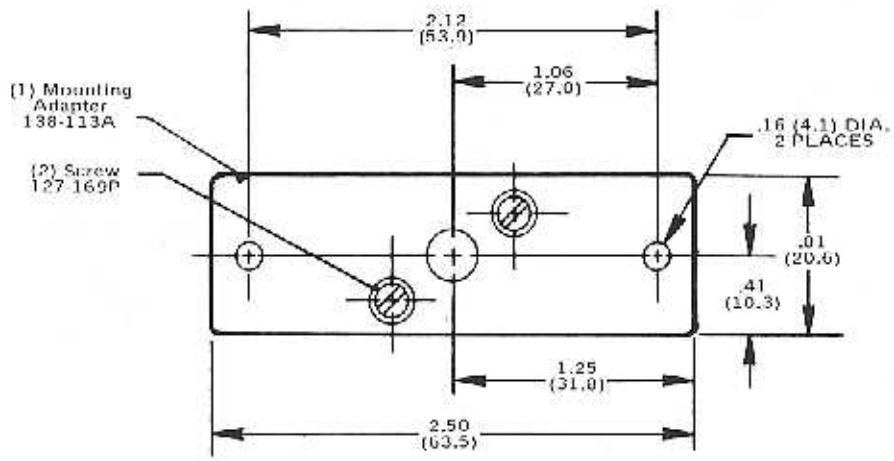




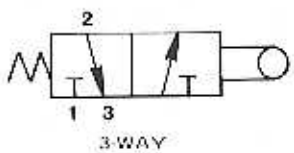
LM5-0104



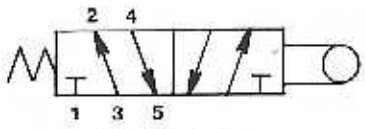




A.N.S.I. SYMBOLS



3-WAY



5-PORT, 4-WAY

NOTE: MOUNTING PLATE TYPICAL ON LM3 AND LM5 SERIES VALVES.

SERIES OA
LIMIT VALVES

SPECIFICATIONS

This Series is a complete family of heavy duty limit valves in a variety of mountings and actuations. These valves are available as multi-purpose 3-ways or open exhaust 4-ways, using roller-lever or mechanical stem actuators. All valves are available with either 1/8 NPTF or 1/4 NPTF ports.

APPLICATION

Series OA valves are designed for general industrial use to provide air signals in all-air control systems. All 3-way valves are 3-port, multi-purpose valves and any port can be pressurized. The 4-way valves may also be used as normally open or closed 3-ways by plugging the appropriate cylinder port. Exhaust is through two screened ports. Since these ports cannot be plugged, 4-way valves may not be used as 2-ways.

SERIES OCLA3 and OCLA4:
These are roller-lever actuated, spring return limit valves. Rollers are stainless steel. They are available with or without a boot.

SERIES OMA3 and OMA4:
These are mechanical stem actuated, spring return limit valves. They are intended for straight push actuation only and are not to be subjected to side loading. A mechanical stop is required to prevent overstroking. If one is not available, use a roller-lever actuated valve.

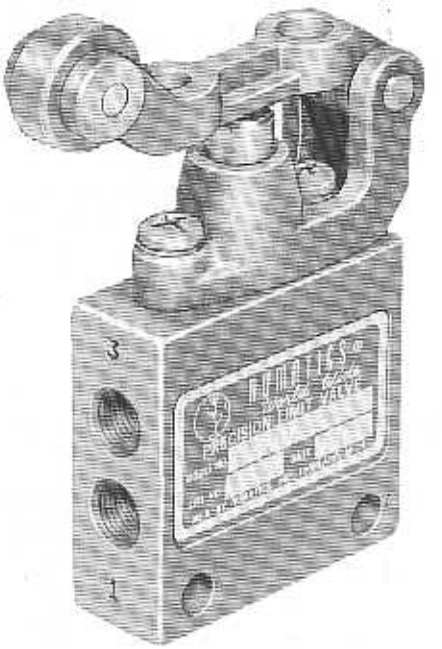
CAM VALVE INSTALLATION

SERIES OCLA:
All Series OCLA valves may be operated by a straight push, a sliding cam or a rotating cam. On all methods of actuation, the valve mounting should be adjustable to provide for full valve opening. All valves have an overtravel mechanism to prevent valve damage. The valve should be set so that the stroke just enters the overtravel slightly. This permits full opening and allows for wear without damage to the valve. Refer to the individual catalog page for proper dimensions. DO NOT OVERSTROKE.

On sliding cam arrangements, the slide should also be adjustable in order to be able to set the point of valve opening precisely. Cams should be strong and rigid to prevent deflection. Deflection can change both the point and amount of valve opening. The leading edge slope of the cam should not exceed 30°. Both roller and lever life are improved tremendously with a shallow cam. On applications where the cam trips the limit and then passes over it, the trailing edge of the cam should also be 30° or less. Due to the geometry, it is good practice to make the trailing edge angle as shallow as possible.

If the valve is to be actuated by a rotary cam, the cam should be designed for harmonic motion to minimize wear on the lever bracket assembly.

SERIES OMA:
These valves are designed for straight push actuation only. They should not be subjected to side loading. Stroke should be adjusted the same as OCLA valves for full opening.



OPERATING DATA

PRESSURE RANGE:
- 3-Way Valves - Vacuum to 300 PSIG (specify pressure over 150 PSIG).
- 4-Way Valves - Vacuum to 125 PSIG.

TEMPERATURE RANGE: +40°F to +200°F ambient.

FORCE TO OPERATE:

Series OCLA3 and OCLA4	
Full Valve Opening	1.5 lbs.
Full Overtravel	3.5 lbs.
Series OMA3 and OMA4	
Full Valve Opening	3.0 lbs.
Full Overtravel	6.0 lbs.

SERVICE: Valves can be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: Series OA valves have a C_V as listed below. See Numatics' Engineering & Technical Data for complete flow chart.

All 3-way valves: C_V = .30
All 4-way valves: C_V = .32

MPL SYMBOLS

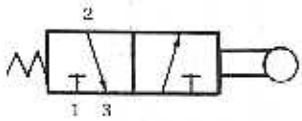


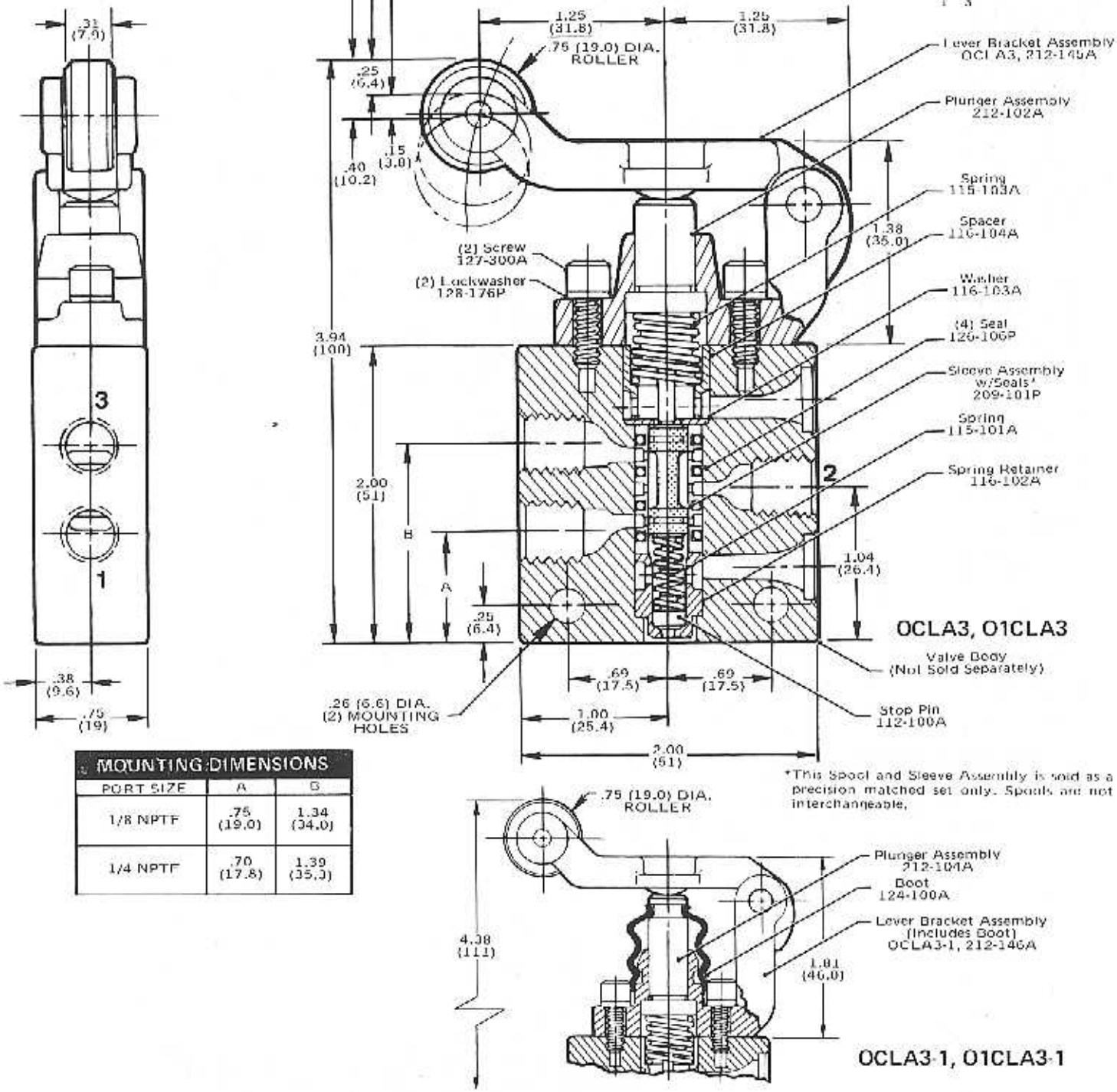
3-WAY NON PASSING 3-WAY PASSING

SERIES OCLA3
3-WAY LIMIT VALVES
ROLLER-LEVER ACTUATED, SPRING RETURN

Top Dimension = Inches
Bottom Dimension
(In Parentheses) = Millimeters

A.N.S.I. SYMBOL





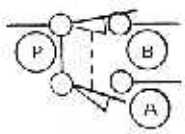
*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

MOUNTING DIMENSIONS		
PORT SIZE	A	B
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)

MODEL SELECTION CHART		
DESCRIPTION	1/8 NPTF	1/4 NPTF
Standard Stem, Stainless Steel Roller	OCLA3	O1CLA3
Dirtproof, Stainless Steel Roller	OCLA3-1	O1CLA3-1

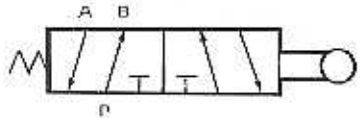
SERIES OCLA4
4-WAY LIMIT VALVES
ROLLER-LEVER ACTUATED, SPRING RETURN

MPL SYMBOL



Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

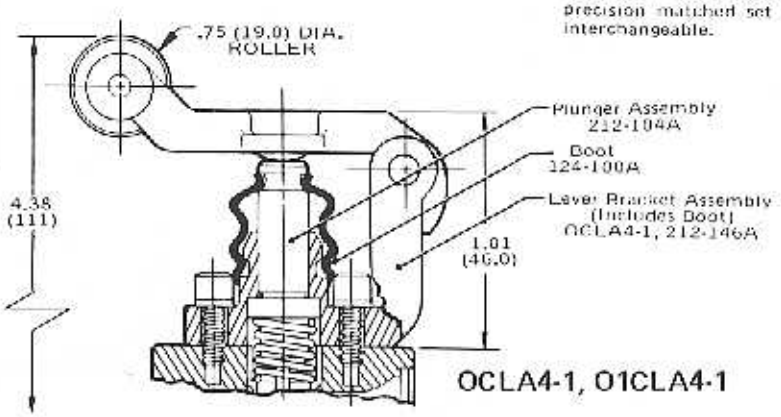
A.N.S.I. SYMBOL



OCLA4, O1CLA4

*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

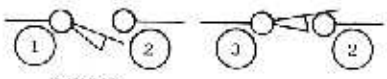
MOUNTING DIMENSIONS		
PORT SIZE	A	D
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)



OCLA4-1, O1CLA4-1

MODEL SELECTION CHART		
DESCRIPTION	1/8 NPTF	1/4 NPTF
Standard Stem, Stainless Steel Roller	OCLA4	O1CLA4
Dirtproof, Stainless Steel Roller	OCLA4-1	O1CLA4-1

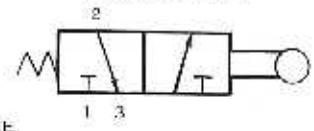
MPL SYMBOLS

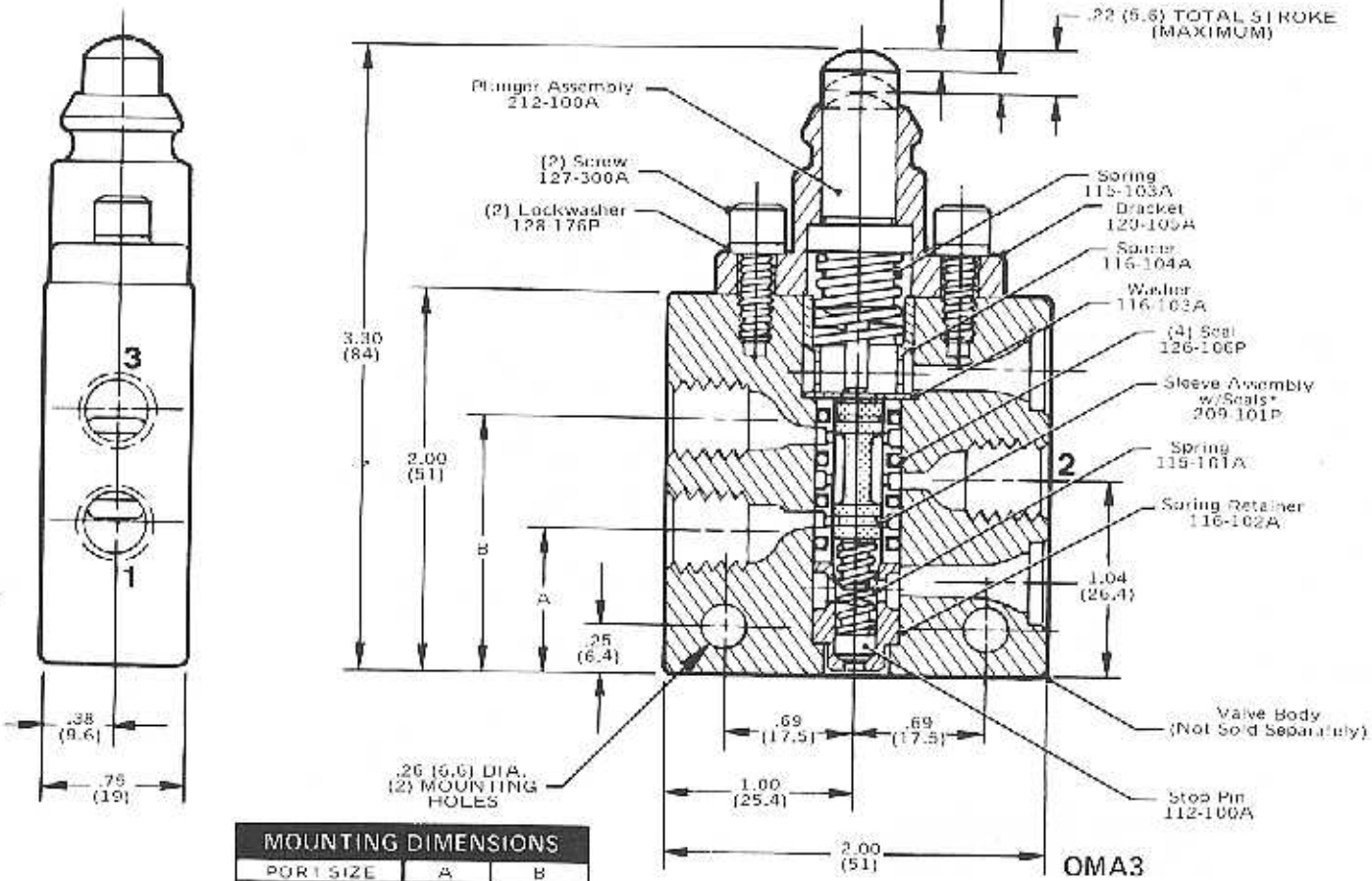


SERIES OMA3
3-WAY LIMIT VALVES
MECHANICAL STEM ACTUATED, SPRING RETURN

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

A.N.S.I. SYMBOL

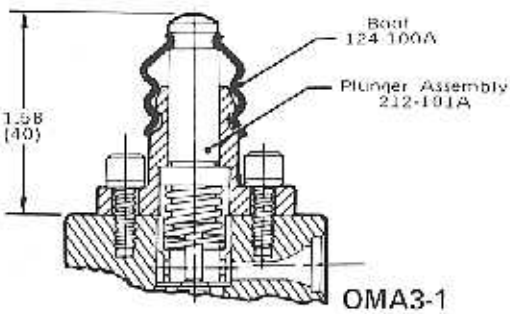




OMA3

MOUNTING DIMENSIONS		
PORT SIZE	A	B
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)

*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.



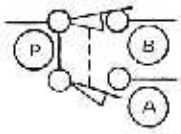
OMA3-1

NOTE:
Stroke Repeat Accuracy = +.002" (.051 mm) Plunger Travel.

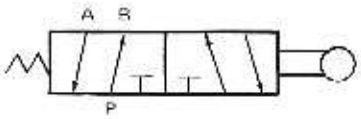
MODEL SELECTION CHART	
Number	Description
OMA3	1/8 NPTF, Standard Stem
OMA3-1	1/8 NPTF, Dirtproof Stem
O1MA3	1/4 NPTF, Standard Stem
O1MA3-1	1/4 NPTF, Dirtproof Stem

SERIES OMA4
4-WAY LIMIT VALVES
MECHANICAL STEM ACTUATED, SPRING RETURN

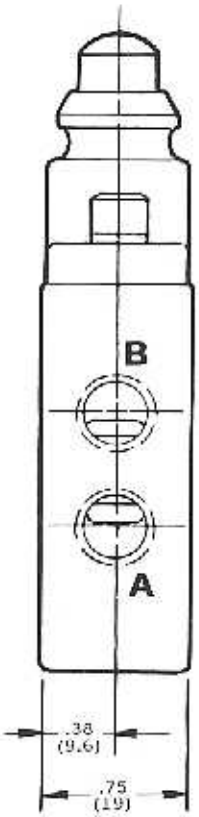
MPL SYMBOL

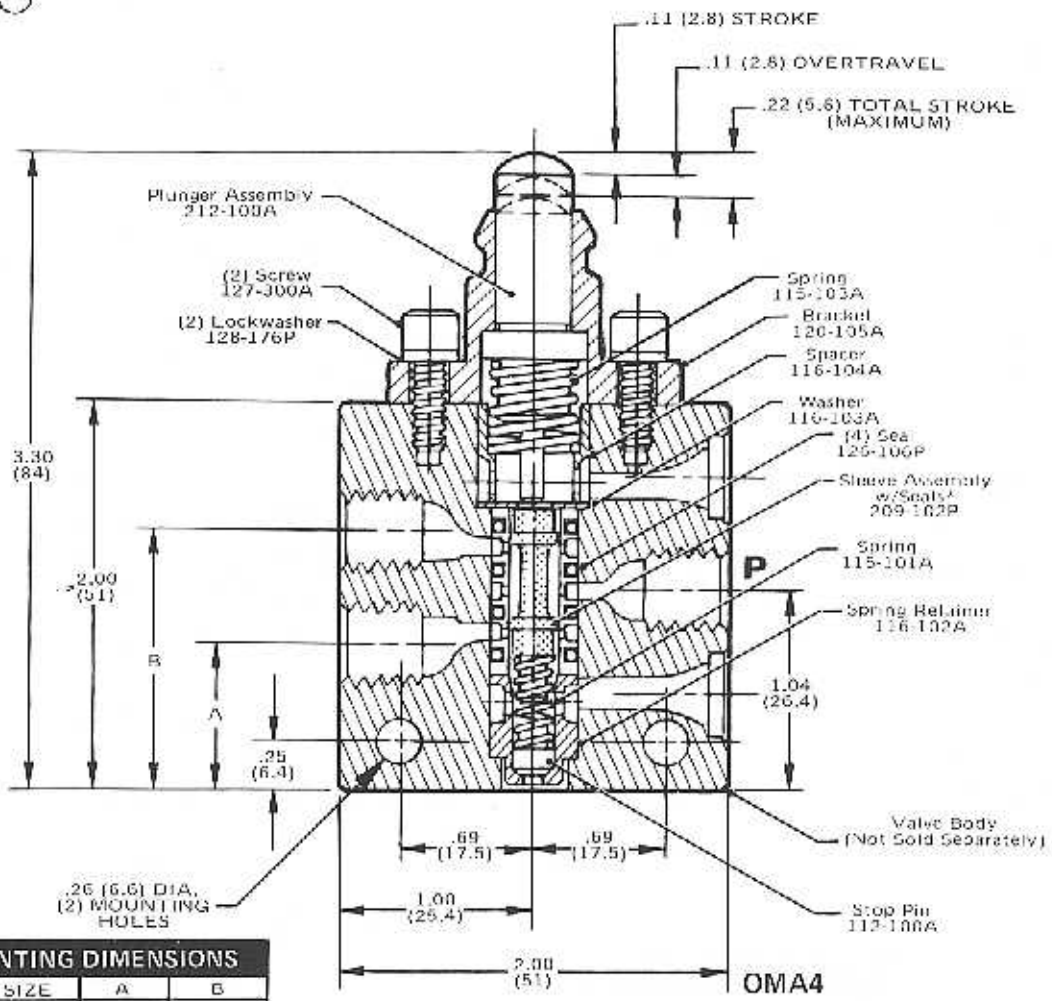


A.N.S.I. SYMBOL



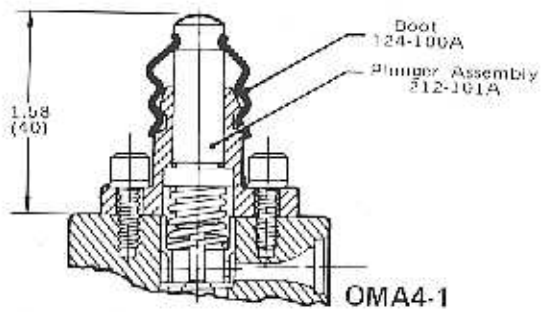
Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters





MOUNTING DIMENSIONS		
PORT SIZE	A	B
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)

*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.



NOTE:
Stroke Repeat Accuracy = ± .002" (.051 mm) Plunger Travel.

MODEL SELECTION CHART	
Number	Description
OMA4	1/8 NPTF, Standard Stem
OMA4-1	1/8 NPTF, Dirtproof Stem
O1MA4	1/4 NPTF, Standard Stem
O1MA4-1	1/4 NPTF, Dirtproof Stem

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

Series PB valves utilize the operating heads from standard electrical pushbuttons and selectors and Numatrol II Series LM air valves mounted on the rear face of the operator, in place of the usual electrical contact block. Series PB is similar to Series PE (page N-20) except for the use of LM valves instead of the PE valve blocks.

The operators are of heavy duty, oil-tight construction and fit standard electrical enclosures. They are assembled with multi-purpose LM3 3-way or LM5 5-ported, 4-way valves, in either single or double arrangements. Proper orientation of valves in multiple assembly enclosures is required to facilitate tubing. LM valve ports have barbed fittings designed to accept any 1/4" O.D. tubing. Nylon collars are shipped loose with each valve. These are required when using vinyl or nylon tubing only.

ORDERING PROCEDURE

PB operators are available in four styles of pushbuttons and five selectors. For all 2-position arrangements, order the valve unit and operator separately. All 3-position valves are supplied assembled to insure proper orientation of the selector to the valve.

To order the maintained contact function, order (1) valve unit assembly, (2) pushbutton operators and one maintained contact attachment to obtain the independent push/push action.

For example:
(1) 212-244A Attachment
(1) 212-193P Red Extended Head Operator
(1) 212-195P Black Extended Head Operator
(1) PB3-0002 Double 3-Way Valve Unit
(Not available with Mushroom Head Operator)

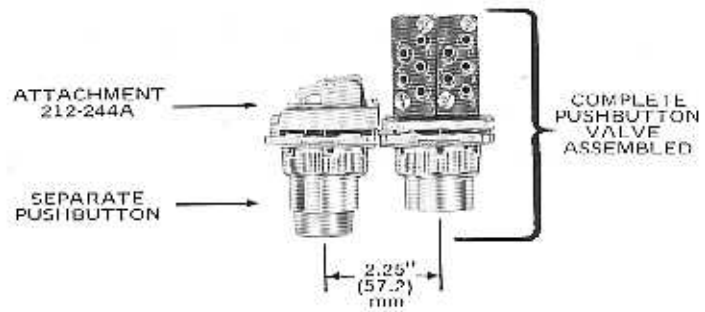
OPERATING DATA

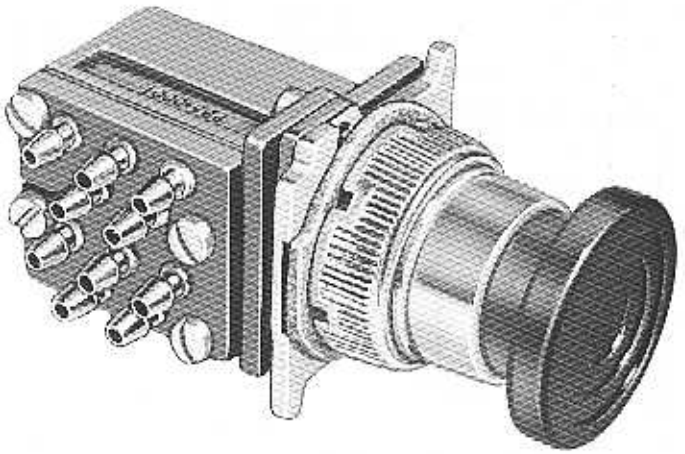
PRESSURE & TEMPERATURE RANGE:

SEE PAGE N-48

SERVICE: Valves can be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

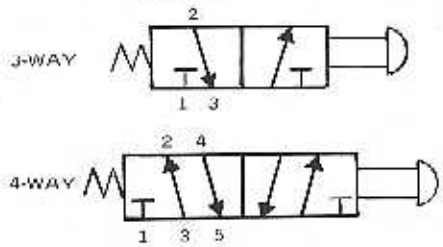
FLOW CAPACITY: Series PB valves have a C_V of .25. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 11.5 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.



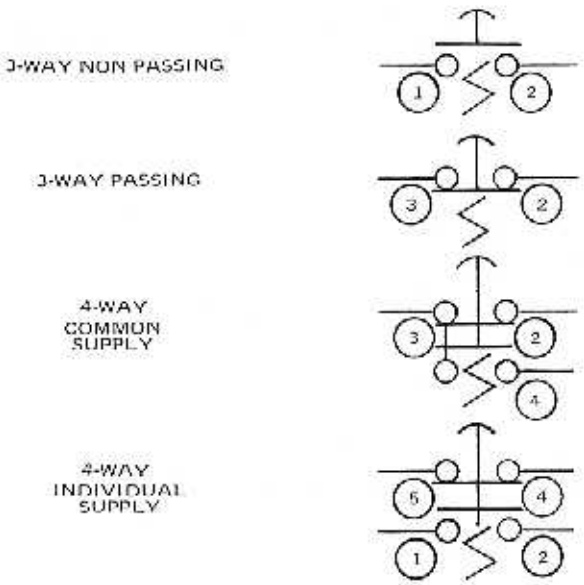


212-212P MOUNTED ON
PB5-0002 DOUBLE 4-WAY

A.N.S.I. SYMBOLS



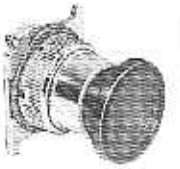
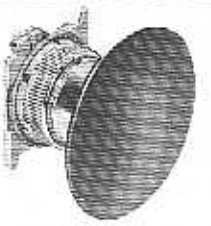
MPL SYMBOLS



MODEL SELECTION CHART
SERIES PB PUSHBUTTON VALVES

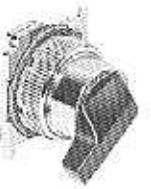
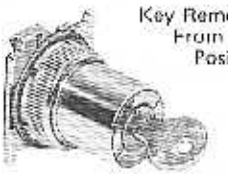
NUMATROL® II
PRODUCT OF NUMATICS, INC

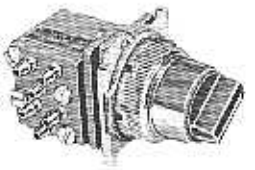
DESCRIPTION	SINGLE 3-WAY	DOUBLE 3-WAY	SINGLE 4-WAY	DOUBLE 4-WAY	1 3-WAY and 1 4-WAY
LM VALVE UNIT ONLY (NO OPERATOR HEAD)	PB3-0001	PB3-0002	PB5-0001	PB5-0002	PB7-0002

PUSHBUTTON OPERATOR HEADS				
TYPE	STANDARD	EXTENDED	MUSHROOM	JUMBO MUSHROOM
RED	212-202P	212-193P	212-211P	212-216P
GREEN	212-203P	212-194P	212-214P	212-217P
BLACK	212-204P	212-195P	212-212P	212-218P
*DIM. "A"	1.06 (26.9)	1.44 (36.6)	1.59 (39.6)	1.72 (43.7)



BUTTON GUARD
125-246B
3.25 Dia. X 1.78 Ht.
Use With Jumbo Mushroom Operator

2-POSITION MAINTAINED SELECTOR HEADS			 Key Removed From Left Position
TYPE	KNOB OPERATOR	LEVER OPERATOR	KEY OPERATOR
NUMBER	212-232P (Black Only)	212-233P (Black Only)	212-229P
*DIMENSION "A"	1.38 (35.0)	1.50 (38.1)	2.50 (63.5)

3-POSITION MAINTAINED SELECTOR VALVES (ASSEMBLED)		
DESCRIPTION	KNOB OPERATED	LEVER OPERATED
DOUBLE 3-WAY	PB3-0884	PB3-0889
DOUBLE 4-WAY	PB5-0884	PB5-0889
1 3-WAY & 1 4-WAY	PB7-0884	PB7-0889
*DIMENSION "A"	1.38 (35.0)	1.38 (35.0)
SELECTOR HEAD	212-235P (Black Only)	212-240P (Black Only)

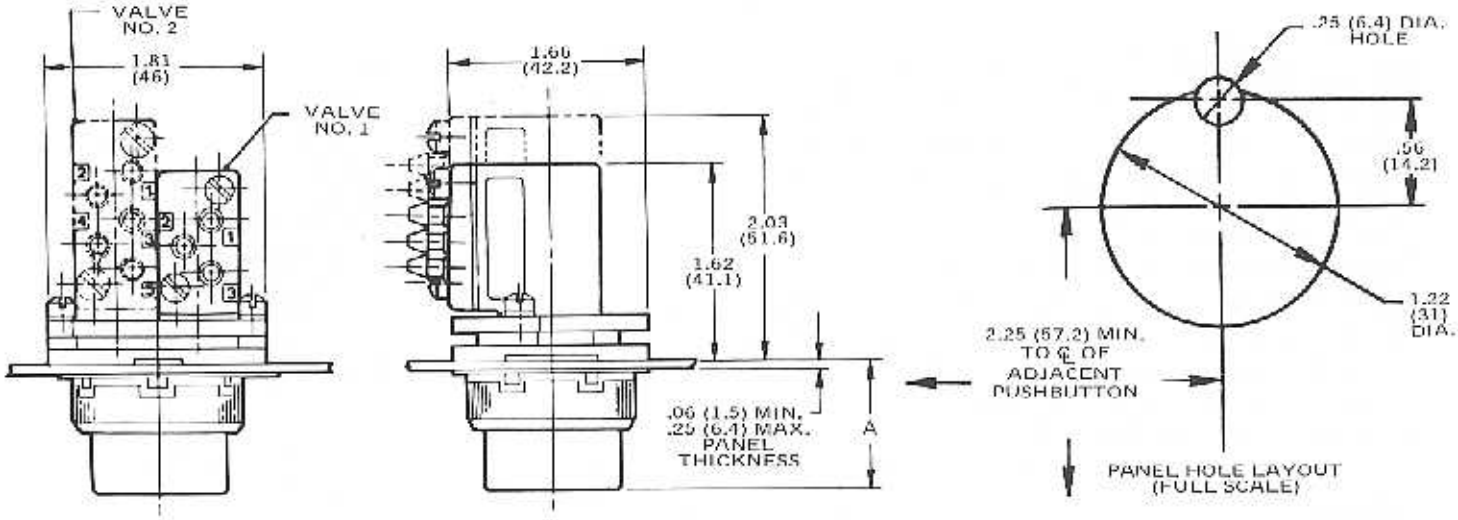
VALVE NUMBER	**CAM ARRANGEMENT
	↖ ↑ ↗
1	XOO
2	OOX

*For drawing reference to Dimension "A", see page N-17.
Left dimension = inches, dimensions in parentheses = millimeters.

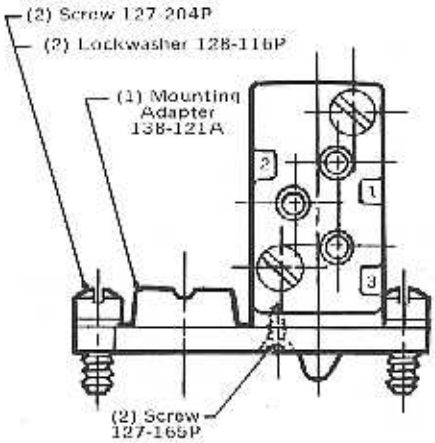
**X indicates valve is actuated, O indicates valve is released, ↖ ↑ ↗ indicates position of selector.

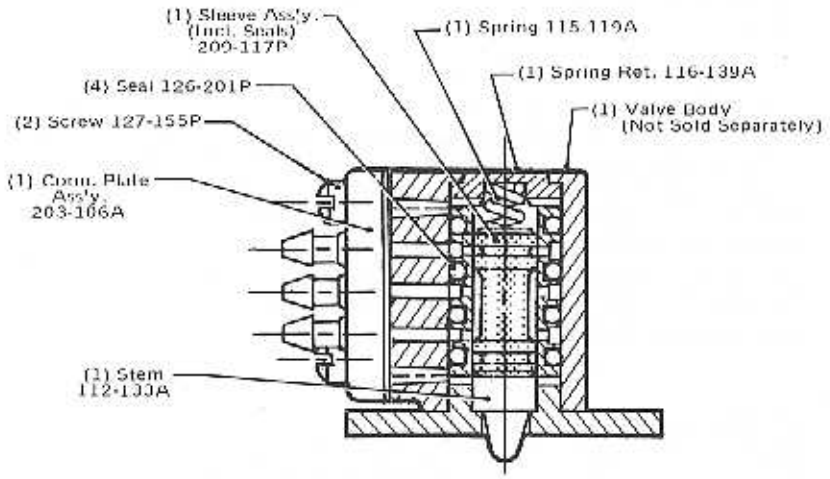
INSTALLATION DRAWINGS:

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

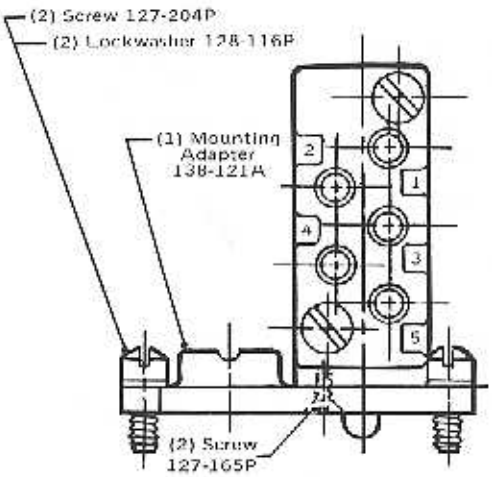


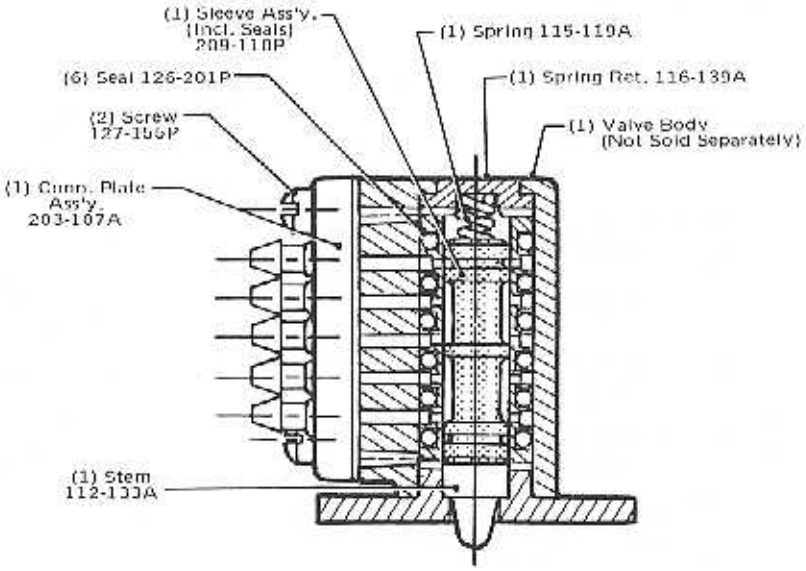
MODEL PB3-0001:





MODEL PB5-0001:





SERIES BA
PUSHBUTTON VALVES
MULTI-PURPOSE 4-WAY

NUMATROL® III
PRODUCT OF NUMATICS, INC.

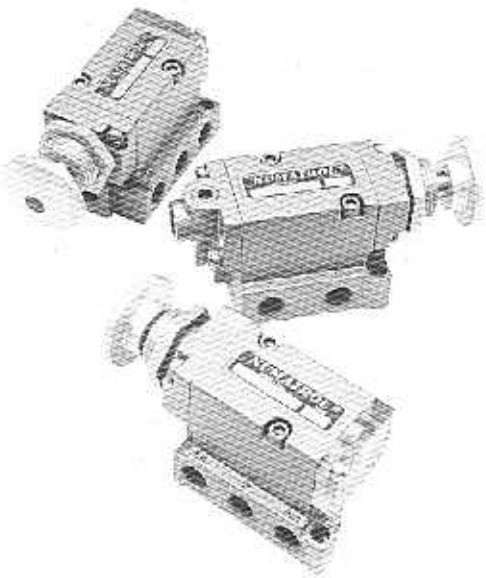
SPECIFICATIONS

The BA Series is a new line of 1/8" NPTF, heavy-duty pushbutton valves. All valves are multi-purpose, 2-position, 4-way, base mounted units, mounted on the Numatics PA-7 valve chassis. They may also be panel mounted for use in air control systems. Three different pushbutton arrangements are available:

PUSHBUTTON OPERATED, SPRING RETURN: Depressing the pushbutton reverses the flow paths. When the button is released, the spring returns the spool to the normal position.

PUSH-PULL OPERATED, DETENTED: The spool is connected to the operator and the valve is operated by pushing or pulling the operator in each direction. The detent holds the spool firmly in the selected position. This valve is ideally suited for emergency stop applications.

PUSHBUTTON OPERATED, AIR RETURN: This valve also has a detent assembly which firmly holds the spool in the shifted position; but the spool is not connected to the operator. The valve is operated in one direction by depressing the pushbutton. The button only is spring loaded and returns to the normal position when it is released. The spool stays in the shifted position until an air signal returns it to the original position.



APPLICATION

BA Series valves are designed for general industrial use and may be used as power valves or as signal valves. They are genuine multi-purpose valves; that is, they may be used as normally open or closed 2- or 3-way valves, single or dual pressure 4-ways, or as selector or diverter valves, dependent only on how they are piped or plugged.

CAUTION: Please note that the porting is reversed from "standard". This reverses the flow through the A and B cylinder ports. Refer to the A.N.S.I. symbols.

MOUNTING MEANS

BA Series valves are base mounted and may be mounted in any position. The end cap is also threaded 7/8 - 14 UNF-2A for panel mounting, if desired. A .90 (22.9mm) dia. hole is recommended. Valves may be mounted in panels up to .25" (6.4mm) thick (maximum).

OPERATING DATA

PRESSURE RANGE: Main valve - 28" Hg. vacuum to 300 PSIG (specify pressure for operation over 150 PSIG). Pilot supply for 11BAA4 models - 15-125 PSIG.

TEMPERATURE RANGE: -10°F to +200°F ambient.

SERVICE: Valves can be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: BA series valves have a C_V of .4. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 18 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.

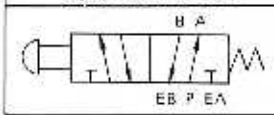
MODEL SELECTION CHART

DESCRIPTION	DETENTED	DETENTED AIR RETURN	SPRING RETURN
Valve unit only, no base	11BDA400OA	11BAA400OA	11BSA400OA
Valve with base, side ports only, individual exhaust	11BDA441OA	11BAA441OA	11BSA441OA
Valve with base, side & bottom ports, individual exhaust	11BDA443OA	11BAA443OA	11BSA443OA
Valve with base, side ports only, common exhaust	11BDA444OA	11BAA444OA	11BSA444OA

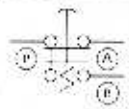
*Models listed have Black button insert. For button with Green insert, add 11T to any model number; for Red insert, add 11V to any model number (e.g. 11BDA441OA11T).

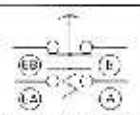
SERIES 11BSA4 SPRING RETURN

A.N.S.I. SYMBOL



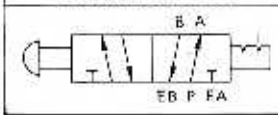
MPL SYMBOLS



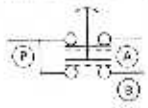


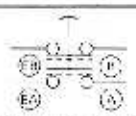
SERIES 11BDA4 DETENTED

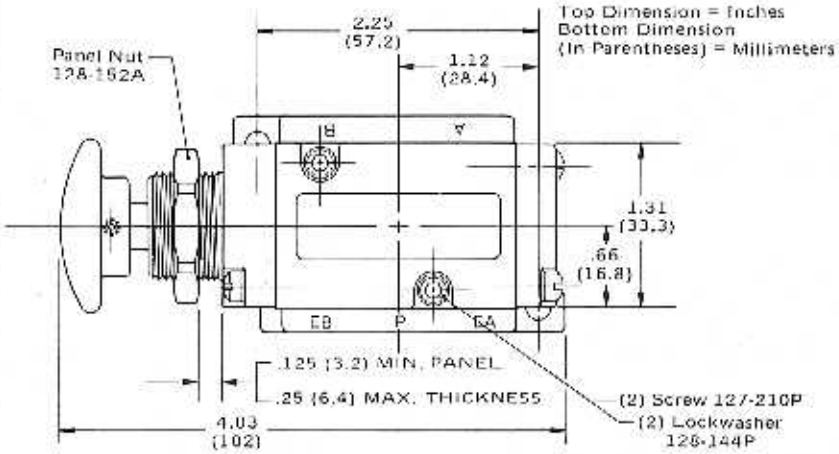
A.N.S.I. SYMBOL

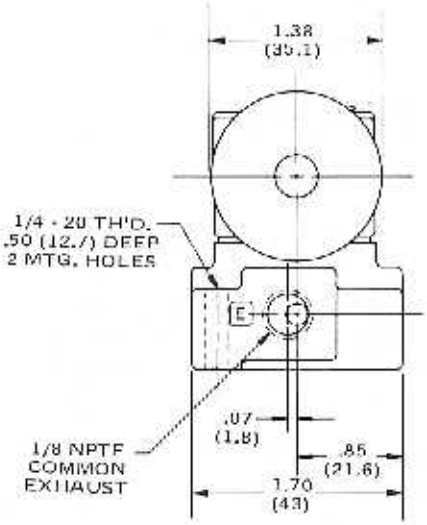


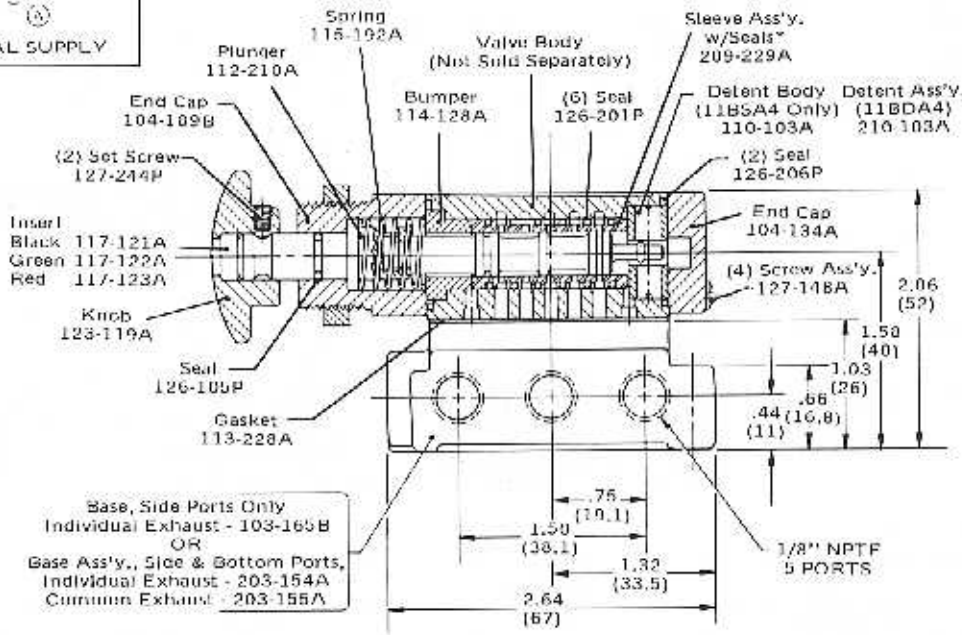
MPL SYMBOLS











NOTE: Common exhaust base cannot be used for individual supply applications.

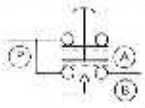
*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

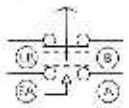
SERIES 11BAA4 DETENTED AIR RETURN

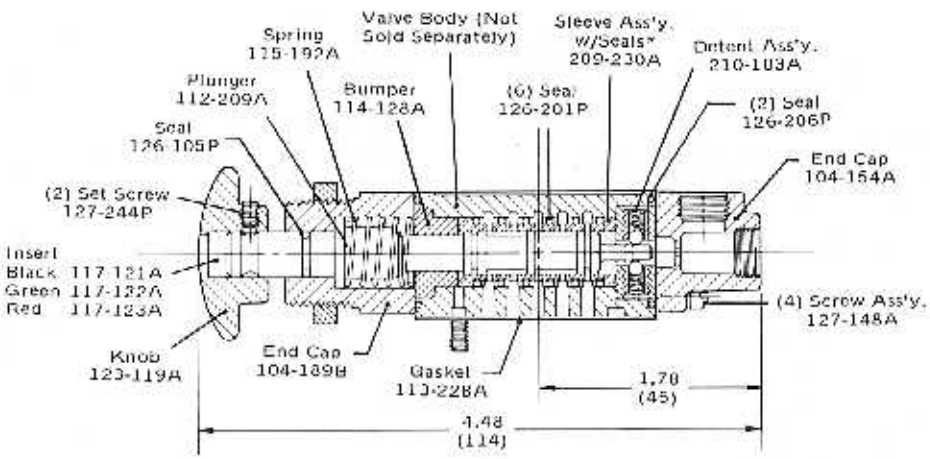
A.N.S.I. SYMBOL



MPL SYMBOLS







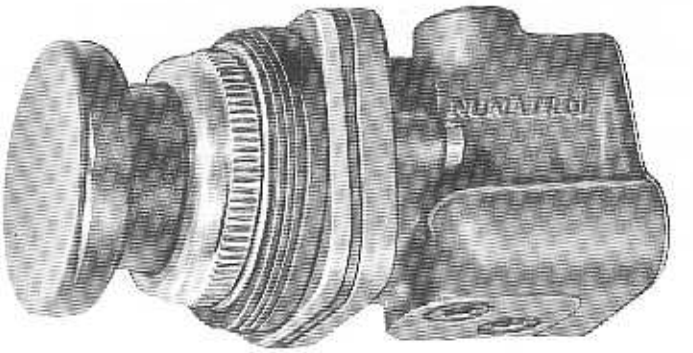
SERIES PE
PUSHBUTTON VALVES
3-WAY and 4-WAY

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

Series PE valves utilize the operating heads from standard electrical pushbuttons and selectors and a Numatrol II valve block mounted on the rear face of the operator, in place of the usual electrical contact block. Series PE is similar to Series PB (page N-15) except for the use of PE valve blocks instead of LM valves.

The operators are of heavy duty, oil-tight construction and fit standard electrical enclosures. Valves are either a multi-purpose PE 3-way or an open exhaust PE 4-way action, spring return. Valves must be purchased separately for the operator head, as listed below.



OPERATOR 212-113P SHOWN MOUNTED TO VALVE UNIT

OPERATING DATA

PRESSURE RANGE: Vacuum to 150 PSIG.

TEMPERATURE RANGE: +40°F to +200°F ambient.

SERVICE: Valves can be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: Series PE valves have a C_V of .23. At 80 PSIG supply pressure, discharging to atmosphere, flow is 10.6 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.

MODEL SELECTION CHART

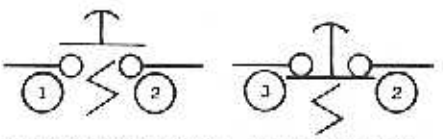
DESCRIPTION	3-WAY	4-WAY
PE VALVE UNIT ONLY (NO OPERATOR HEAD)	PE3-0001	PE4-0001

PUSHBUTTON OPERATOR HEADS				2-POSITION 
TYPE	EXTENDED	FLUSH	MUSHROOM	SELECTOR
RED	212-119P	212-127P	212-111P	—
GREEN	212-120P	212-128P	212-112P	—
BLACK	212-121P	212-129P	212-113P	212-135A
*DIMENSION "A"	.56 (14.3)	.56 (14.3)	1.00 (25.4)	1.16 (29.4)

*For drawing reference to Dimension "A", see page N-21. Left dimension = inches, dimensions in parentheses = millimeters.

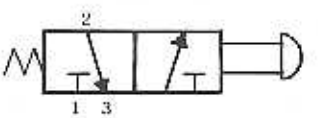
PE3

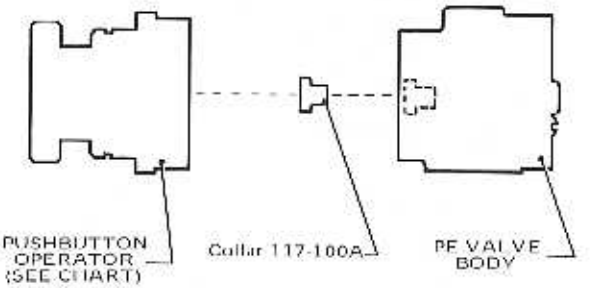
MPL SYMBOLS



3-WAY NON PASSING 3-WAY PASSING

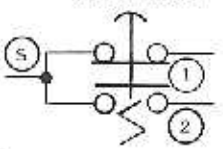
A.N.S.I. SYMBOL



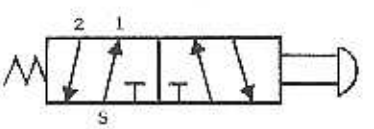


PE4

MPL SYMBOL



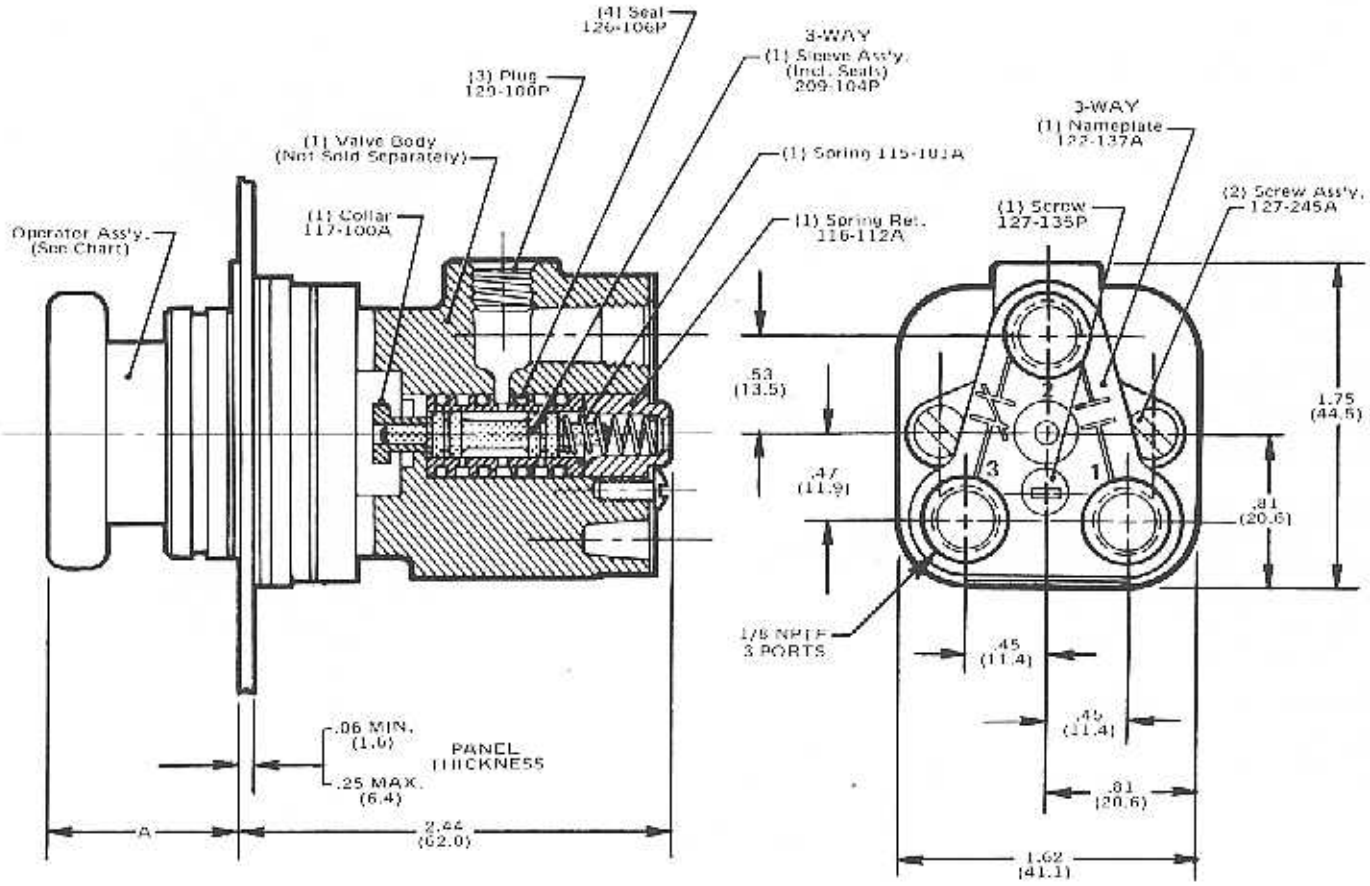
A.N.S.I. SYMBOL



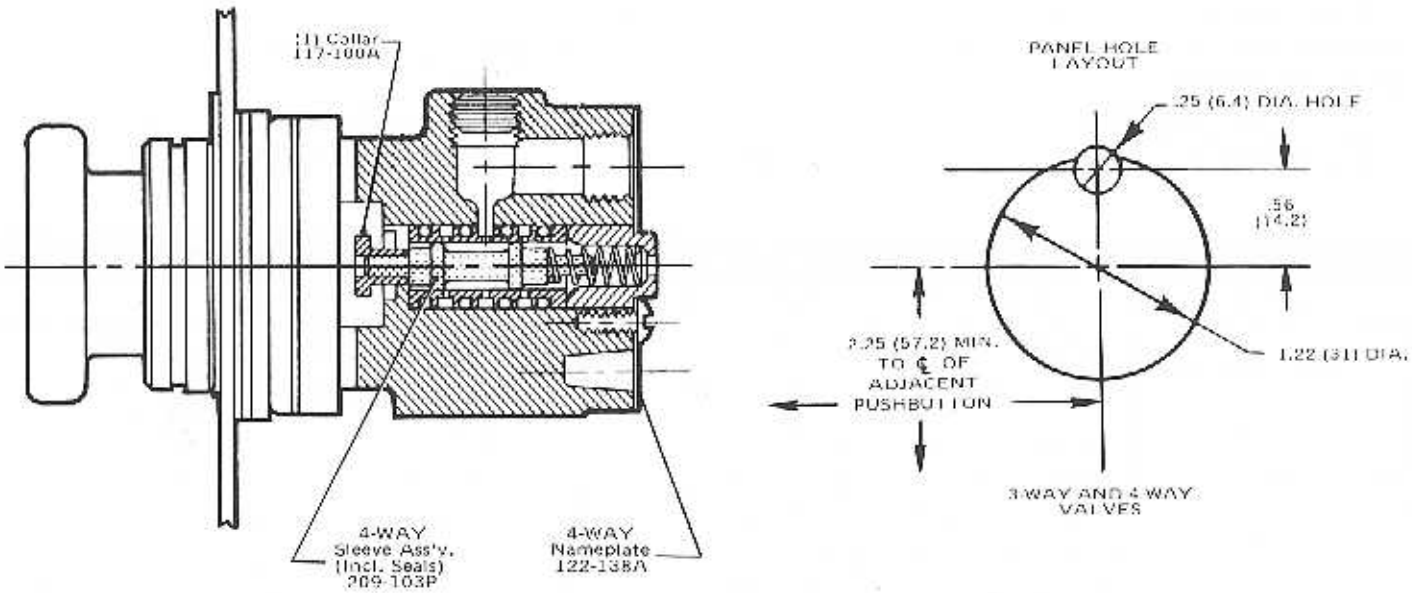
Note: Check for collar installation when assembling PE valves.

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

PE3-0001



PE4-0001



SERIES OA
PUSHBUTTON VALVES

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

This Series is a complete family of heavy duty pushbutton valves in a variety of mountings and actuations. These valves are available as multi-purpose 3-ways or open exhaust 4-ways, with either 1/8 NPTF or 1/4 NPTF ports.

APPLICATION

Series OA valves are designed for general industrial use to provide air signals in all-air control systems. All 3-way valves are 3-port, multi-purpose valves and any port can be pressurized. The 4-way valves may also be used as normally open or closed 3-ways by plugging the appropriate cylinder port. Exhaust is through two screened ports. Since these ports cannot be plugged, 4-way valves may not be used as 2-ways.

SERIES OPBA3 and OPBA4:
These are pushbutton operated, spring return valves. They are available with two different operators which permit them to be panel mounted with a boot.

SERIES OHA3 and OHA4:
These are pushbutton operated, spring return valves designed specifically for rugged duty applications. A heavy duty stem prevents bending under extreme manual force. An override feature prevents unnecessary force from being exerted on the spool once signal contact has been made.

SERIES ODPBA3 and ODPBA4:
These are pushbutton operated, detented valves. Like the OPBA3 and OPBA4 valves, they may be panel mounted with a boot.



OPERATING DATA

PRESSURE RANGE:
3-Way Valves - Vacuum to 300 PSIG (specify pressure over 150 PSIG).
4-Way Valves - Vacuum to 125 PSIG.

TEMPERATURE RANGE: +40°F to +200°F ambient.

FORCE TO OPERATE:

Series OPBA3 and OPBA4	2.5 lbs.
Series OHA3 and OHA4	3.0 lbs.
Series ODPBA3 and ODPBA4	8.0 lbs.

SERVICE: Valves can be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: Series OA valves have a C_V as listed below. See Numatics' Engineering & Technical Data for Complete flow chart.

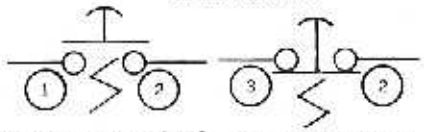
All 3-way valves: C_V = .30
All 4-way valves: C_V = .32

MODEL SELECTION CHART

FUNCTION	1/8 NPTF	1/4 NPTF	DESCRIPTION
MULTI-PURPOSE 3-WAY	OPBA3	O1PBA3	SPRING RETURN, BOOTED, INDIVIDUAL MOUNT
	OPBA3-2	O1PBA3-2	SPRING RETURN, BOOTED, PANEL MOUNT
	OHA3	O1HA3	HEAVY DUTY, SPRING RETURN, INDIVIDUAL MOUNT
	ODPBA3	O1DPBA3	DETENTED, BOOTED, INDIVIDUAL MOUNT
	ODPBA3-2	O1DPBA3-2	DETENTED, BOOTED, PANEL MOUNT
4-WAY	OPBA4	O1PBA4	SPRING RETURN, BOOTED, INDIVIDUAL MOUNT
	OPBA4-2	O1PBA4-2	SPRING RETURN, BOOTED, PANEL MOUNT
	OHA4	O1HA4	HEAVY DUTY, SPRING RETURN, INDIVIDUAL MOUNT
	ODPBA4	O1DPBA4	DETENTED, BOOTED, INDIVIDUAL MOUNT
	ODPBA4-2	O1DPBA4-2	DETENTED, BOOTED, PANEL MOUNT

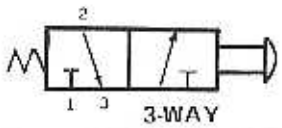
Add one of the following letters to each number (e.g. OPBA3-2B1. B=Black Button, G=Green Button, R=Red Button.

MPL SYMBOLS



3-WAY NON PASSING 3-WAY PASSING

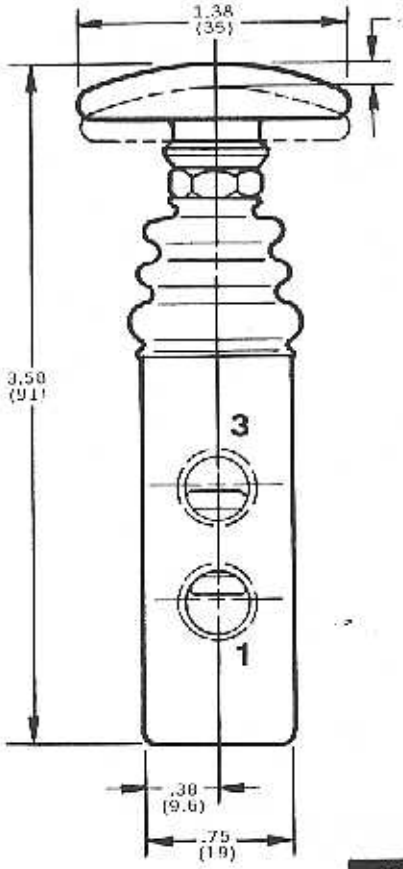
A.N.S.I. SYMBOL

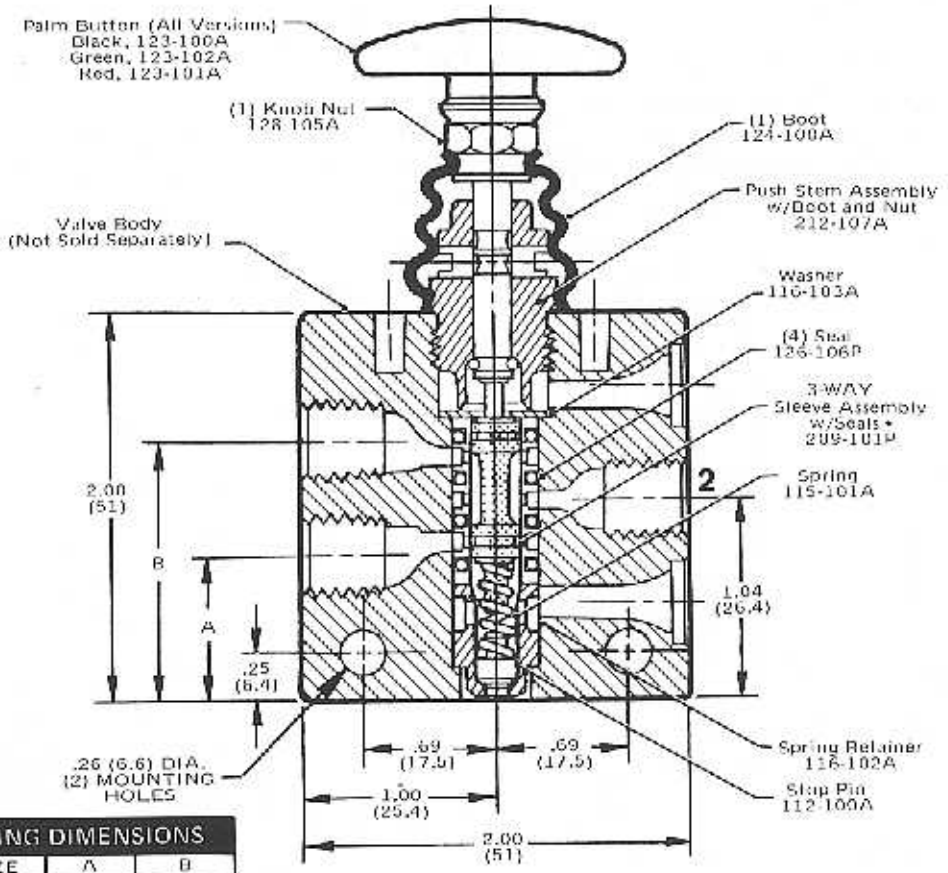


3-WAY

SERIES OPBA3 OPBA4
PUSHBUTTON VALVES 3-WAY and 4-WAY SPRING RETURN

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

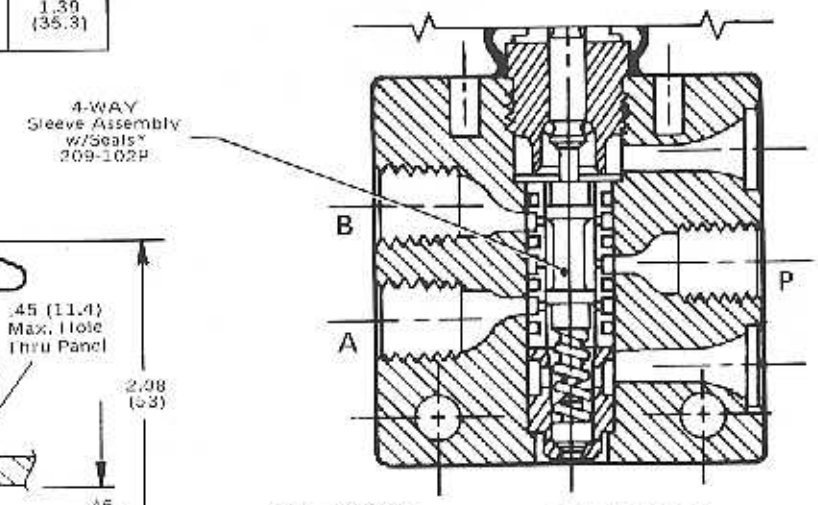


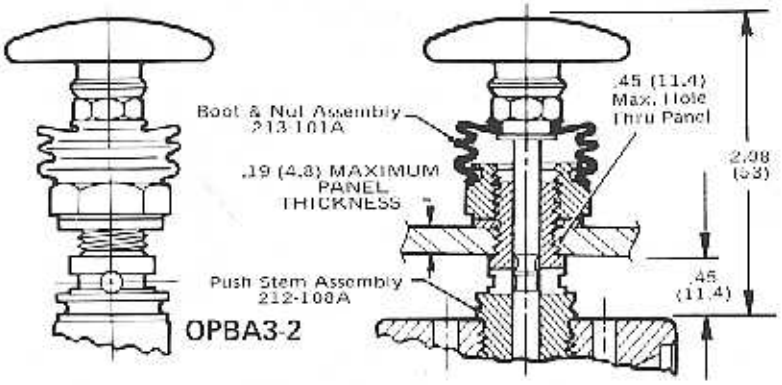


*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

OPBA3, OPBA4
INDIVIDUAL MOUNT

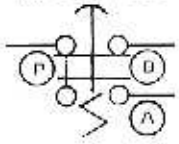
MOUNTING DIMENSIONS		
PORT SIZE	A	B
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)



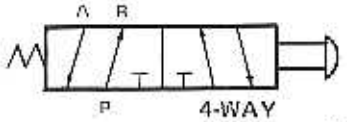


OPBA3-2, OPBA4-2
PANEL MOUNTED

MPL SYMBOL

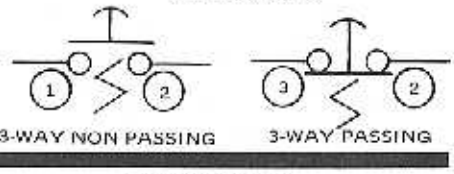


A.N.S.I. SYMBOL



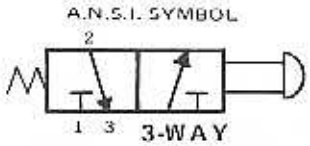
SERIES OHA3 OHA4
PUSHBUTTON VALVES 3-WAY and 4-WAY
HEAVY DUTY, SPRING RETURN

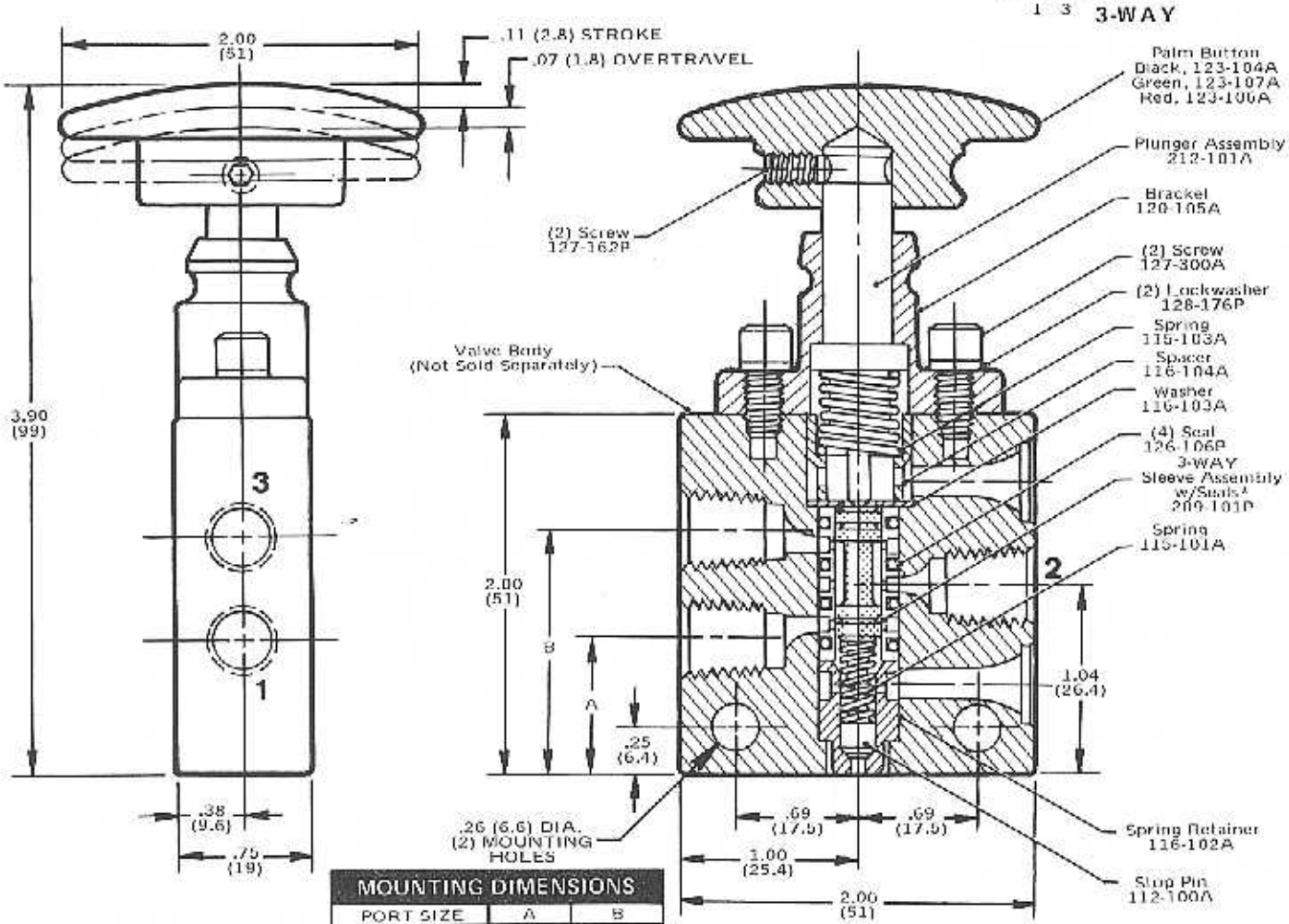
MPL SYMBOLS



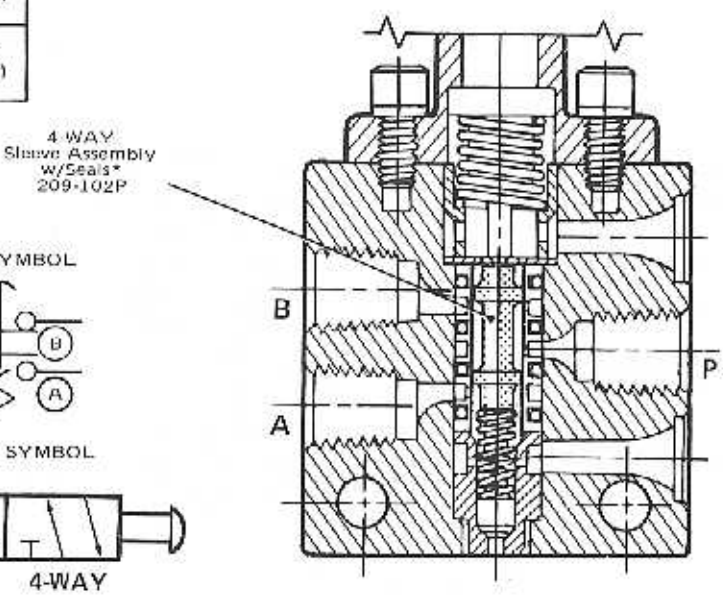
Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

A.N.S.I. SYMBOL



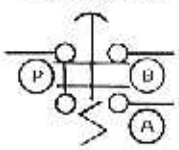


MOUNTING DIMENSIONS		
PORT SIZE	A	B
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)

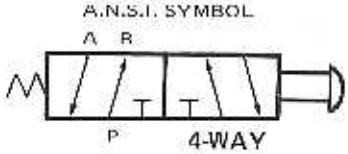


*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

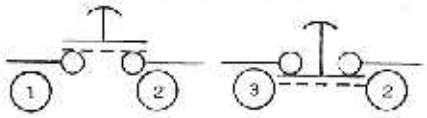
MPL SYMBOL



A.N.S.I. SYMBOL

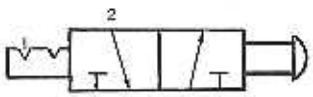


MPL SYMBOLS



3-WAY NON PASSING 3-WAY PASSING

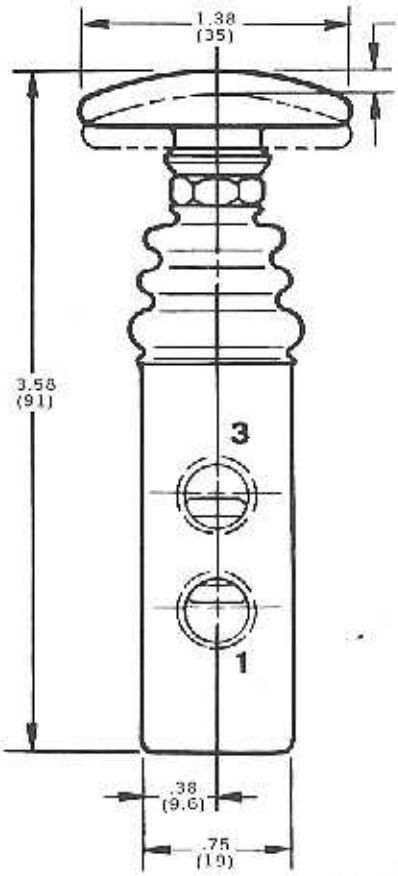
A.N.S.I. SYMBOL

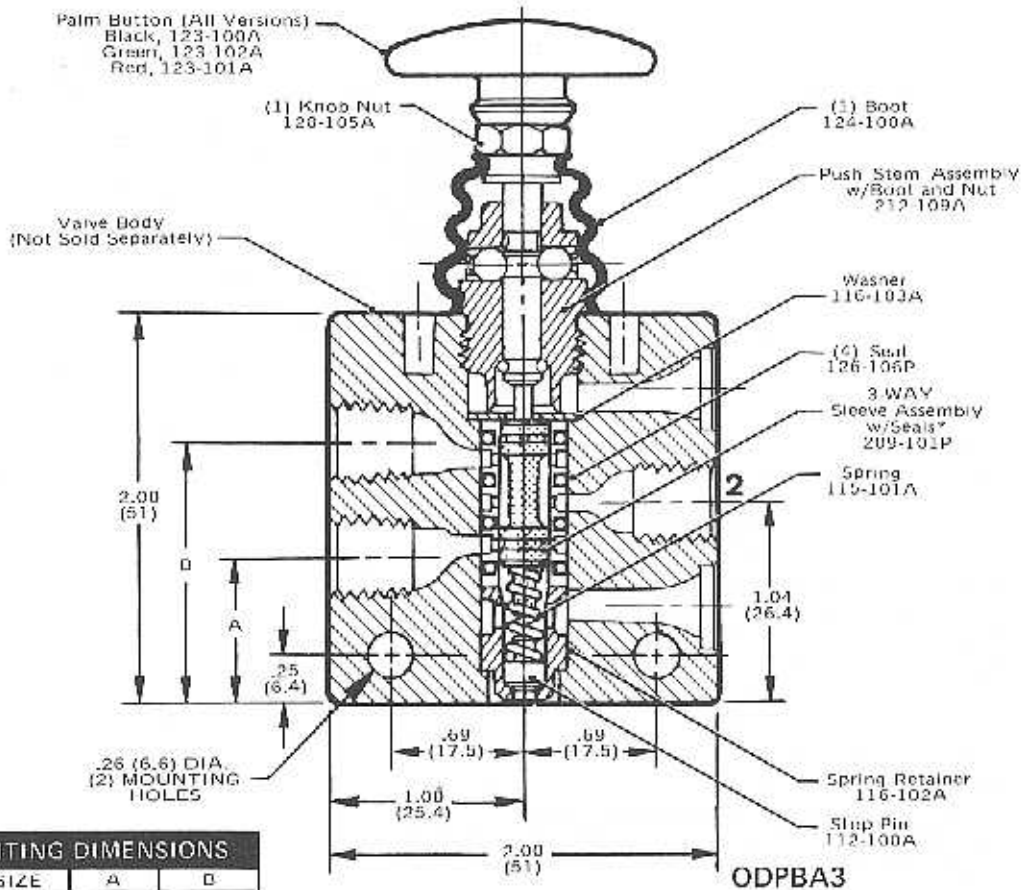


3-WAY

SERIES ODPBA3 ODPBA4
PUSHBUTTON VALVES
3-WAY and 4-WAY DETENTED

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters



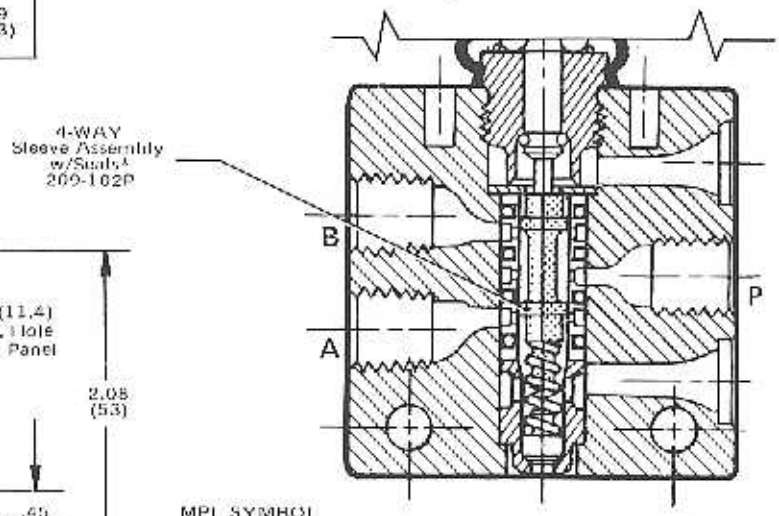


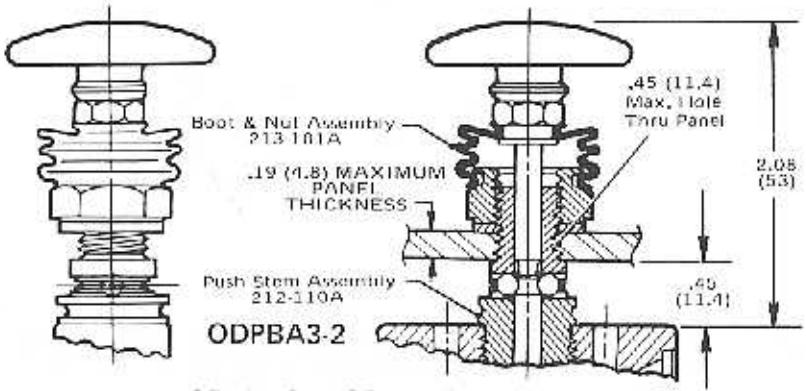
ODPBA3

ODPBA3, ODPBA4
INDIVIDUAL MOUNT

MOUNTING DIMENSIONS		
PORT SIZE	A	B
1/8 NPTF	.75 (19.0)	1.34 (34.0)
1/4 NPTF	.70 (17.8)	1.39 (35.3)

*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

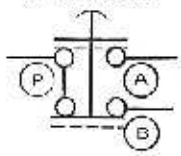


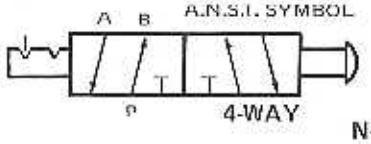


ODPBA3-2

ODPBA3-2, ODPBA4-2
PANEL MOUNTED

MPL SYMBOL



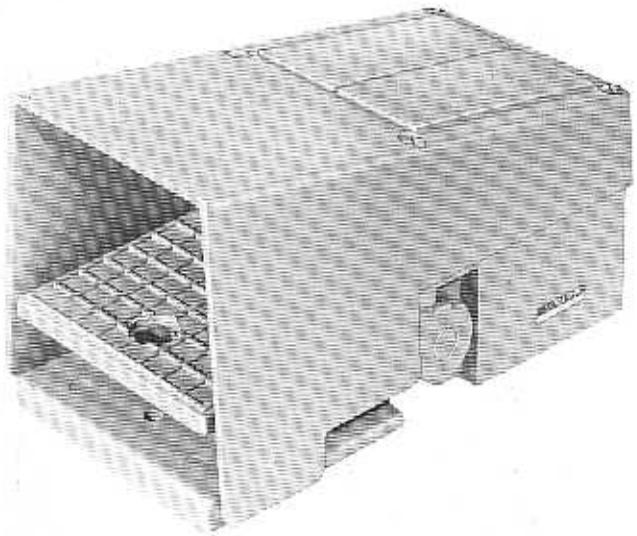


A.N.S.I. SYMBOL

4-WAY

FS5
4-WAY
FOOT OPERATED VALVE

NUMATROL® II
PRODUCT OF NUMATICS, INC.



SPECIFICATIONS

The FS5 foot operated air valve is a sturdy, treadle-actuated assembly, designed to free the operator's hands from actuating pneumatic devices and allowing him to perform other manual tasks at the same time. The unit is completely compatable with Numatrol II systems.

APPLICATION

The FS5 valve utilizes a Cutler-Hammer housing unit and a Numatrol II Series LM air valve. The heavy duty housing and the patented lapped spool and sleeve construction of Numatics valves combine to produce in this assembly a superior, highly reliable device.

The Cutler-Hammer housing, minus the usual electrical switch, is of strong, durable construction, consistent with typical industrial conditions. The foot treadle is spring-operated and shrouded for protection. The entire unit may be used free standing or lagged to the floor.

The Numatrol II Series LM air valve used in this assembly is a multi-purpose, 5-ported 4-way. Its mounting adapter plate is positioned perpendicular to the valve body for easier tubing access to the valve barbs. LM valve ports have barbed fittings designed to accept any 1/4" O.D. tubing. Nylon collars are shipped loose with each valve. These are required when using vinyl or nylon tubing only.

OPERATING DATA

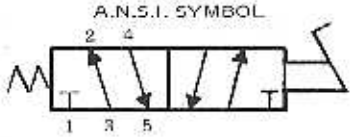
PRESSURE & TEMPERATURE RANGE:

SEE PAGE N-48

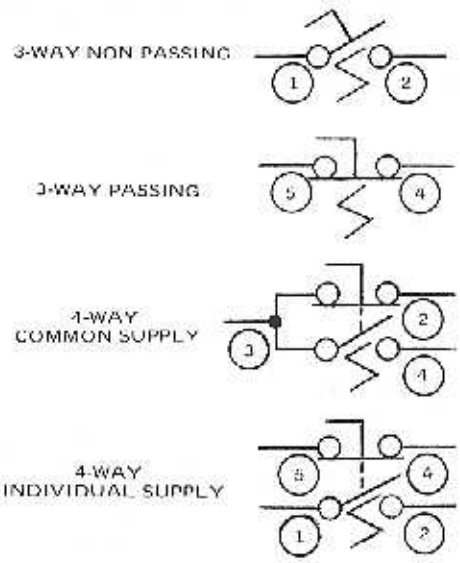
SERVICE: Valves can be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: Series FS5 valves have a C_V of .25. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 11.5 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.

A.N.S.I. SYMBOL



MPL SYMBOLS



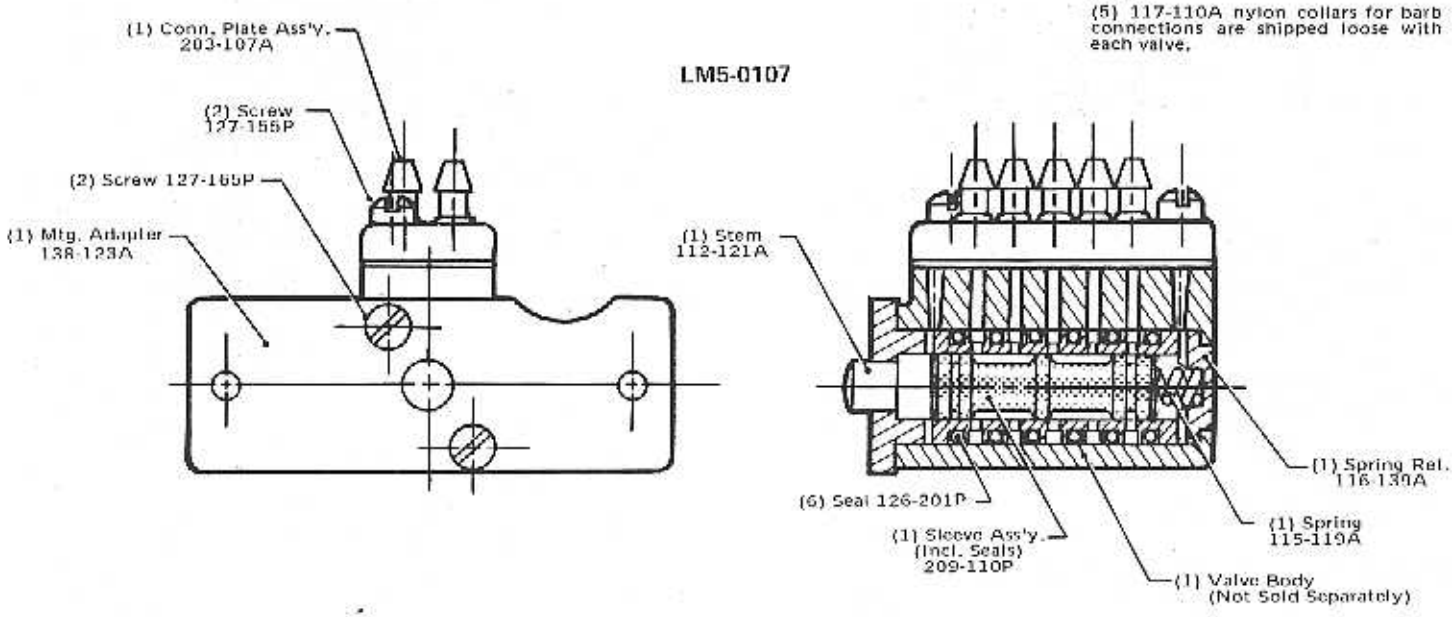
MODEL SELECTION CHART	
Number	Description
FS5-0702	Foot Operated, Spring Return, Shrouded Housing

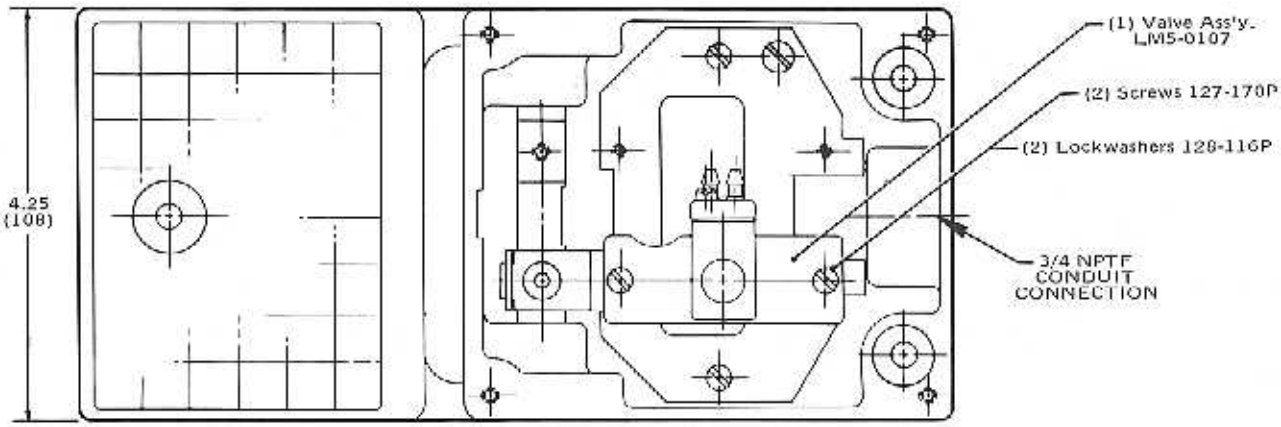
4-WAY
FOOT OPERATED VALVE

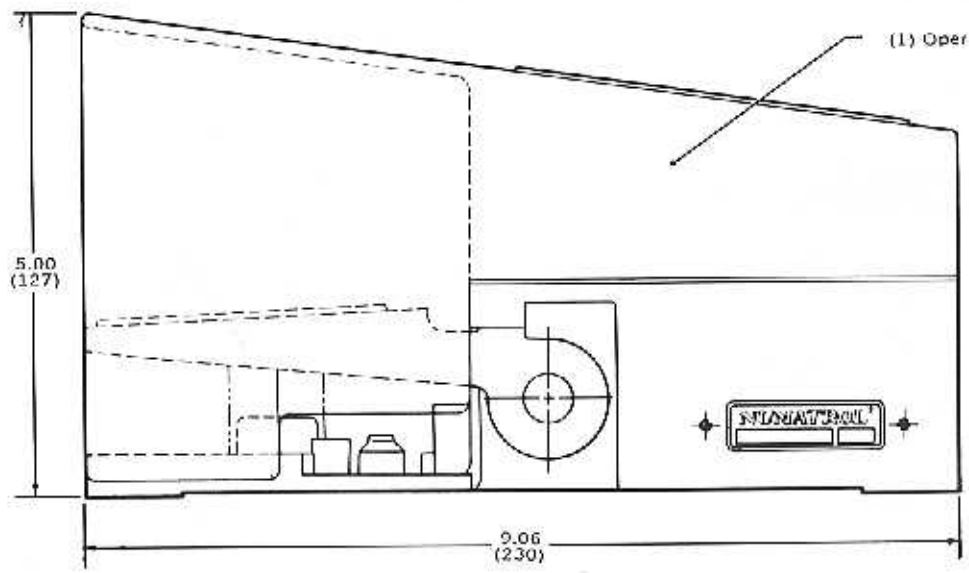
Top Dimension - Inches
Bottom Dimension (In Parentheses) = Millimeters

NOTE:

(5) 117-110A nylon collars for barb connections are shipped loose with each valve.







SERIES RA7
RELAY
VALVES

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

The RA7 relay is the basic logic element of the Numatrol II system. It is a small multi-purpose, 5-port, 4-way, 2-position valve employing the patented Numatics lapped spool and sleeve principle. On the "A" end of each relay is a high strength, clear plastic window which allows for visual indication of spool movement.

RA7 relays are designed specifically for panel installation. They are subbase mounted for ease of maintenance or replacement without disturbing tubing connections. They are designed to operate on clean, dry (unlubricated) air and are compatible with all devices intended for dry air service. RA7 relays are available in three arrangements:

SPRING OFFSET: This valve may be used as a single pilot, spring return or double pilot, spring offset.

DETENTED: A momentary signal shifts the spool and the detent holds the spool in the shifted position. A momentary pulse to the opposite pilot then resets the spool.

FREE FLOAT: This valve has neither spring nor detent and shifts with a very low pressure differential. It is normally used with a constant bias pressure on the "B" port; a control signal is then applied to the "A" port.

OPERATING DATA

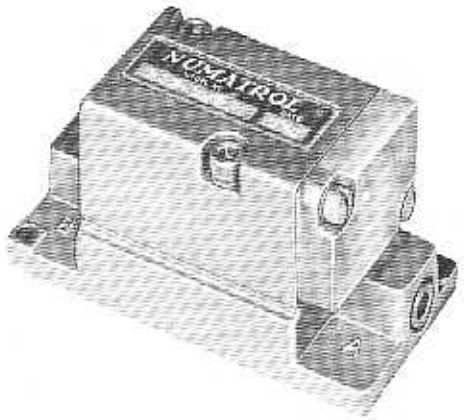
PRESSURE RANGE:
- Main Valve (all models) - Vacuum to 150 PSIG.
- Pilot Supply:
  - Spring Offset - 20 to 50 PSIG.
  - Detented - 15 to 50 PSIG.
  - Free Float - 1.5 to 50 PSIG.

TEMPERATURE RANGE: 140°F to 1150°F ambient.

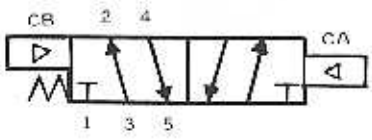
SERVICE: RA7 relays should be used on clean, dry (oil free) air or noncorrosive, nontoxic and non flammable dry gases only.

FLOW CAPACITY: RA7 relays have a C_v of .44. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 20.2 SCFM. See Numatics' Engineering & Technical Data for complete flow chart.

MODEL SELECTION CHART	
Number	Description
RA7-0001	Spring Offset unit valve only, no base
RA7-0003	Detented unit valve only, no base
RA7-0005	Free Float unit valve only, no base
RA7-0101	Spring Offset, complete valve with base
RA7-0103	Detented, complete valve with base
RA7-0105	Free Float, complete valve with base

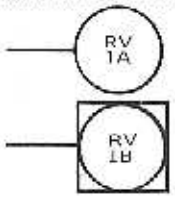


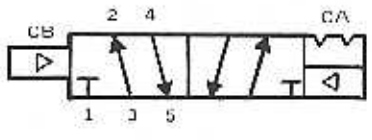
A.N.S.I. SYMBOLS



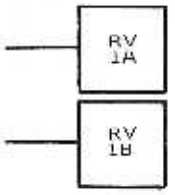
DOUBLE AIR SPRING OFFSET

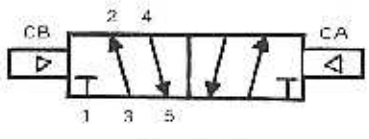
MPL PILOT PORT SYMBOLS



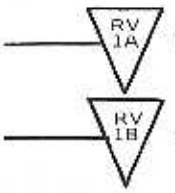


DETENTED





FREE FLOAT



MPL FLOW PATH SYMBOLS

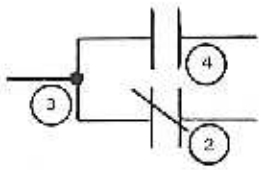
3-WAY NON PASSING



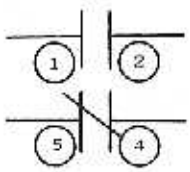
3-WAY PASSING



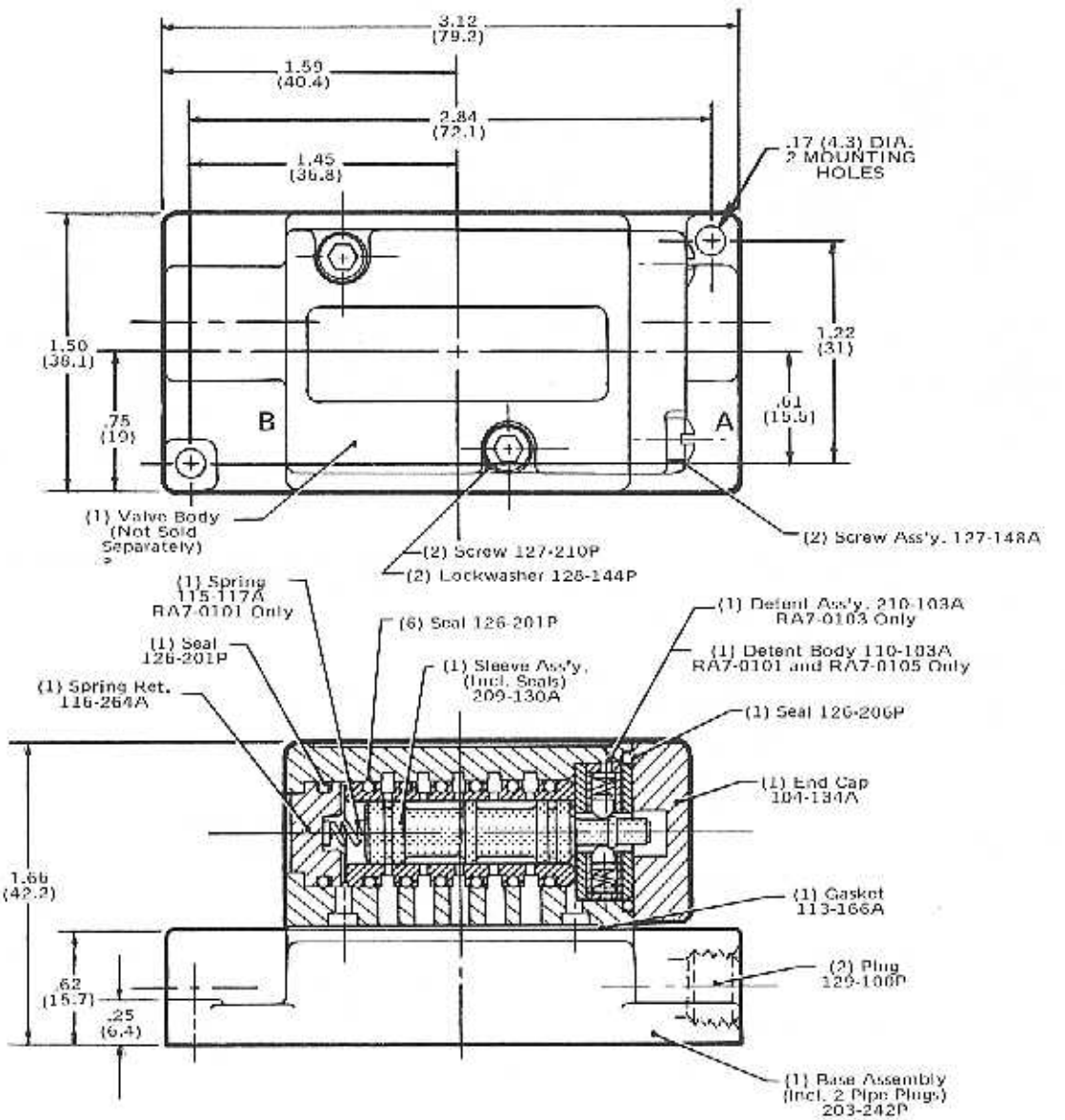
4-WAY COMMON SUPPLY



4-WAY INDIVIDUAL SUPPLY



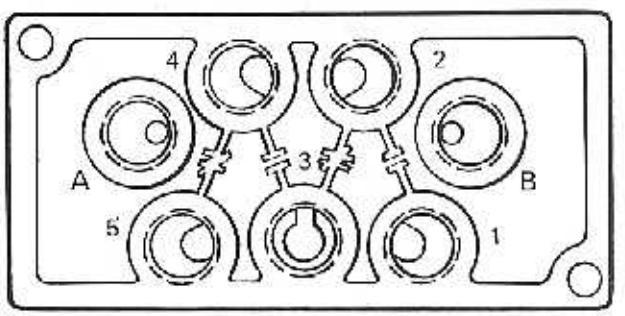
Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters



LEGEND PLATE



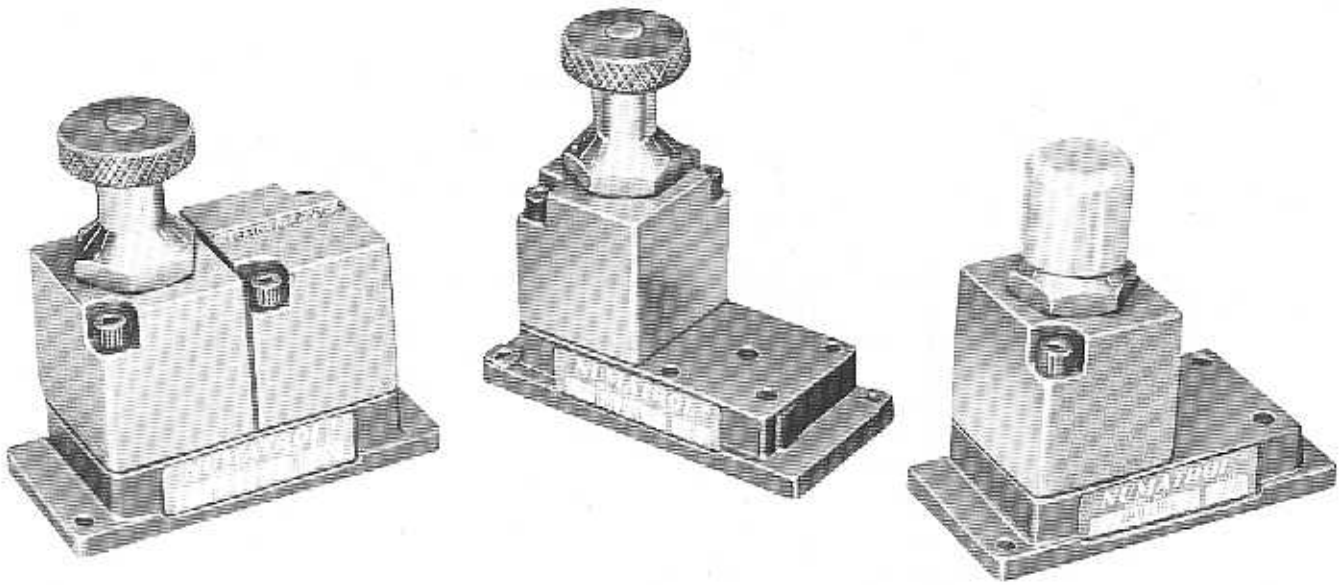
SUBPLATE
SHOWN FROM REAR OF
COMPONENT MOUNTING PANEL
(ACTUAL SIZE)



Rear surface of relay subplate (as viewed from rear of component mounting panel) shows port identification and flow conditions which exist between ports when the B end is in command. When the A end takes command, all flow conditions are exactly reversed. All Ports are 1/8" N.P.T.F.

SERIES TMO
TIMER

NUMATROL® II
PRODUCT OF NUMATICS, INC.



SPECIFICATIONS

The Series TMO timer consists of a precision needle and check valve assembly mounted in a housing with a small volume chamber downstream of the needle. It should be used with a detented or spring offset Numatrol II RA7 relay. When used in the pilot line between the signal source and the pilot connection of the relay, the unit restricts the flow of air into the relay pilot by a measured amount, thus providing a precisely repetitive delay before the relay shifts. The check valve allows free flow of air out of the pilot port, and provides a fast reset when the pilot signal is exhausted.

The timer is available in three arrangements, as shown in the model selection chart.

OPERATING DATA

PRESSURE RANGE: 50 PSIG constant.

TEMPERATURE RANGE: +40°F to +200°F ambient.

SERVICE: TMO timers should be used on clean, dry (oil free) air or nontoxic, noncorrosive and nonflammable dry gases only.

REPEATABILITY: (Provided pressure is maintained at 50 PSIG and air is clean and dry.)
Spring Offset - ± 2% of setting.
Detented - ± 4% of setting.

TIME DELAY DATA

Description	Min. Delay	Max. Delay	Reset Time	Drop Out Time
TMO timing into a detented relay (opposite pilot exhausted)	.03 sec.	8 sec.	.5 sec.	- - - -
TMO with volume timing into a detented relay (opposite pilot exhausted)	.04 sec.	16 sec.	.5 sec.	- - - -
TMO timing into the "A" pilot of a spring offset relay ("B" exhausted)	.03 sec.	8 sec.	.5 sec.	.06 sec.
TMO with volume timing into the "A" pilot of a spring offset relay ("B" exhausted)	.04 sec.	16 sec.	.5 sec.	.10 sec.

RESET TIME is the time required to completely exhaust the volume between the timer and relay.

DROP-OUT TIME is the time required to shift the relay back to the original condition after the signal to the timer has been removed.

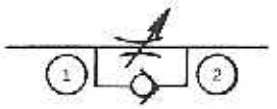
CAUTION: Do not seat needle tightly; this will destroy the timing. The TMO timer is not a shut-off valve.

MODEL SELECTION CHART

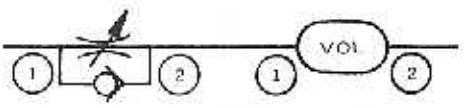
Number	Description
TMO-2001	Timer with Std. Knurled Assy., no base
TMO-2101	One Timer with Std. Knurled Assy. on a base
TMO-2103	Two Timers with Std. Knurled Assy. on a base
TMO-2105	One Timer with Std. Knurled Assy. and One Volume Chamber on a base
TMO-2004	Timer with Tamperproof Assy., no base
TMO-2110	One Timer with Tamperproof Assy. on a base
TMO-2111	Two Timers with Tamperproof Assy. on a base
TMO-2112	One Timer with Tamperproof Assy. and One Volume Chamber on a base

MPL AND A.N.S.I. SYMBOLS

TIMER ONLY

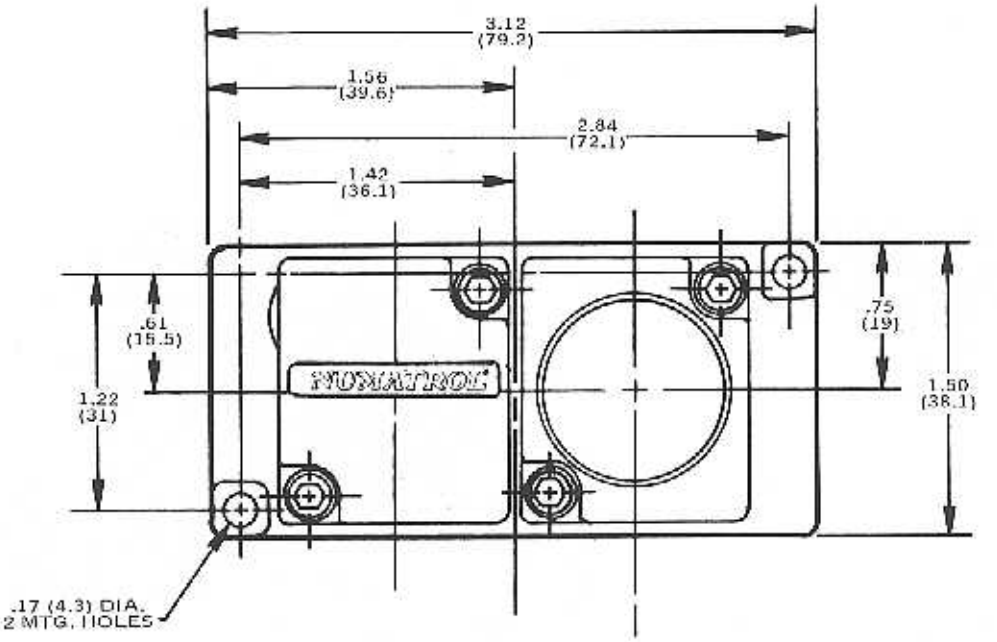


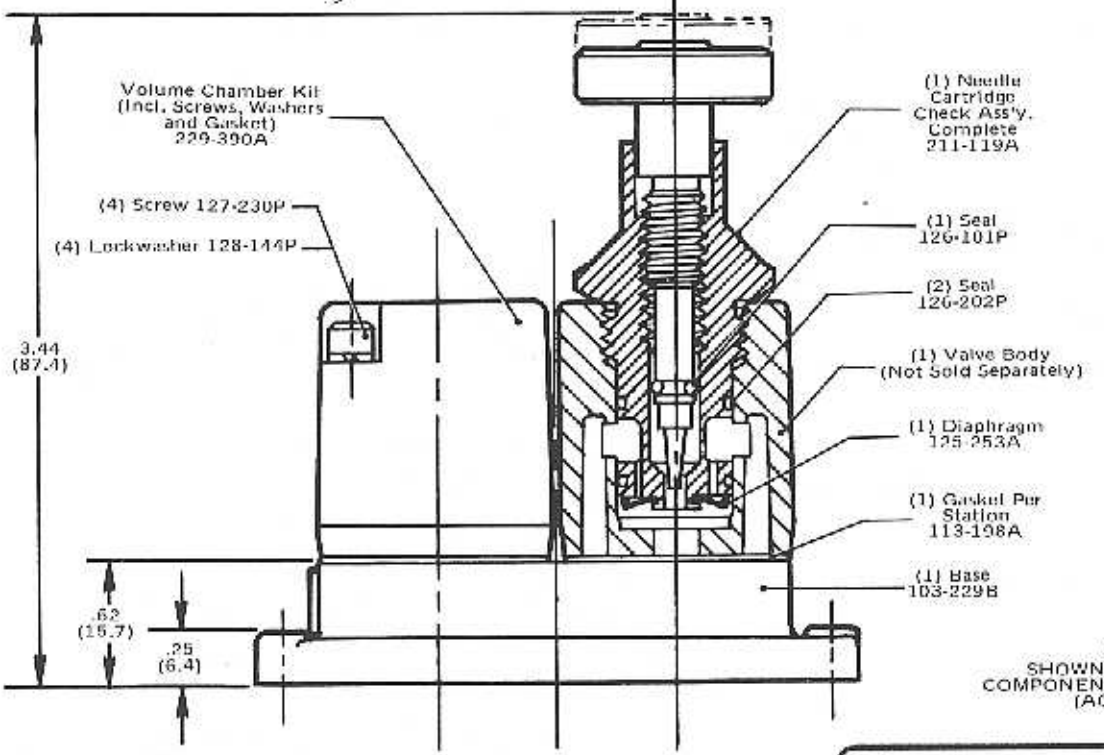
TIMER WITH VOLUME

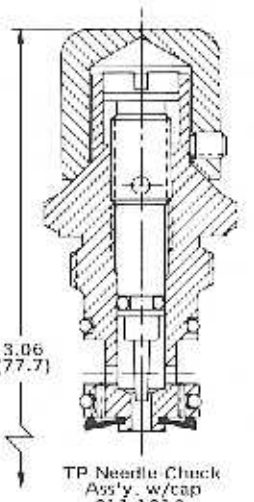


SERIES TMO
TIMER

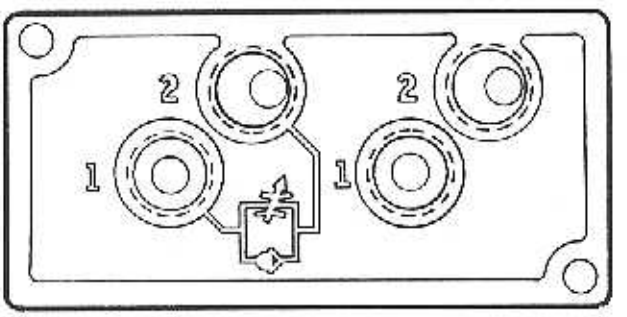
Top Dimension – Inches
Bottom Dimension
(In Parentheses) = Millimeters



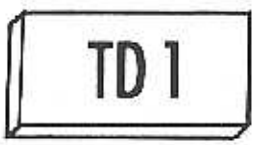




SUBPLATE
SHOWN FROM REAR OF
COMPONENT MOUNTING PANEL
(ACTUAL SIZE)

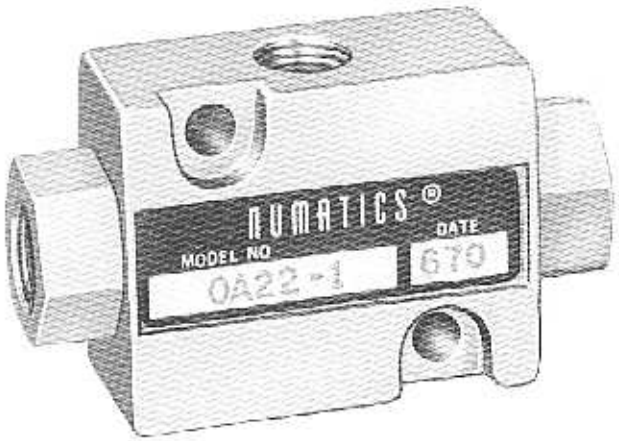


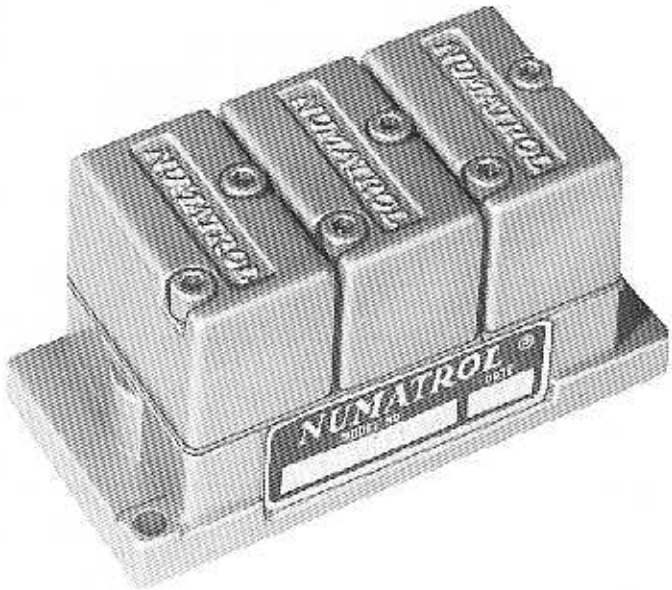
LEGEND PLATE



Mounting surface of the timer subplate shows port identification and flow path symbols. All ports are 1/8" NPTF.

SERIES ORO and OA22-1 SHUTTLE VALVES



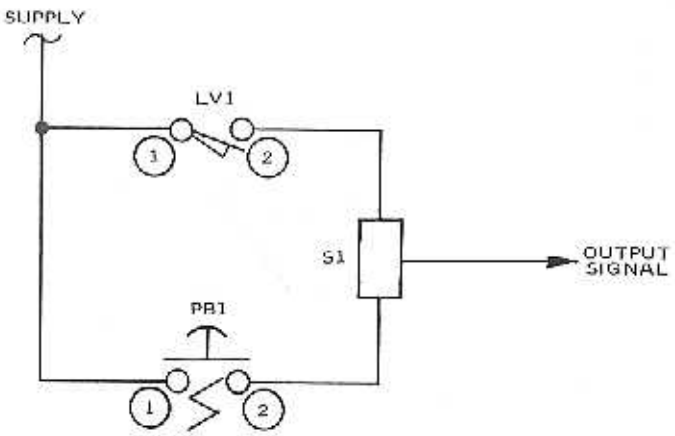


SPECIFICATIONS

The Series ORO shuttle valve is a small, subplate mounted "OR" device, used when two input signals are required into a common output. Because of its small size, it is possible to mount up to three units on one subplate, thus saving considerable panel space.

Each ORO and OA22-1 shuttle has two input ports and one output port. When a signal is applied to an input port, the signal air shifts the valve and it passes through to the output port. When the signal is removed from the input port, the air in the output port exhausts back through the shuttle and out one of the input ports. It normally exhausts out the input port through which it entered, but there is no guarantee and it may exhaust out the other. If a signal is applied to the second input port, a similar action takes place.

If while one input port is pressurized, and the second input port receives a pressure which is 1.5 PSIG greater than the first, the higher pressure will appear at the output. If the second input is the same as the first, no change will take place until the first signal is exhausted. Then, as it drops in pressure, the second input will predominate.



OPERATING DATA

PRESSURE RANGE: 1.5 to 80 PSIG. Any pressure differential greater than 1.5 PSI will cause the disc to shift and seal against the lower pressure input. The higher pressure will appear at the output.

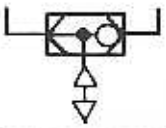
TEMPERATURE RANGE: -40°F to +200°F ambient.

SERVICE: ORO shuttles should be used on clean, dry (oil free) air or noncorrosive, nontoxic and nonflammable dry gases only.

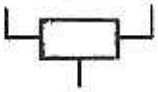
FLOW CAPACITY: ORO shuttles have a C_v of .31 and OA22-1 shuttles have a C_v of .44. At 80 PSIG supply pressure, discharging to atmosphere, the flow is 14.3 SCFM and 20.2 SCFM respectively. See Numatics' Engineering & Technical Data for complete flow chart.

MODEL SELECTION CHART	
Number	Description
ORO-1002	Shuttle Valve unit only, no base
ORO-1102	One Shuttle mounted on a base
ORO-1104	Two Shuttles mounted on a base
ORO-1106	Three Shuttles mounted on a base
OA22-1	Line mounted

A.N.S.I. SYMBOL



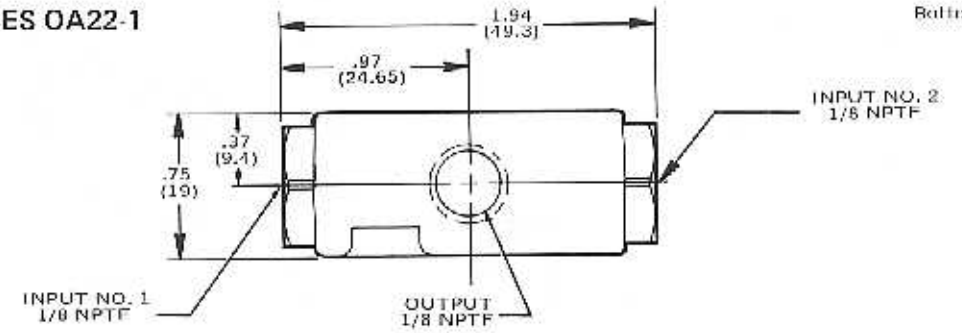
MPL SYMBOL

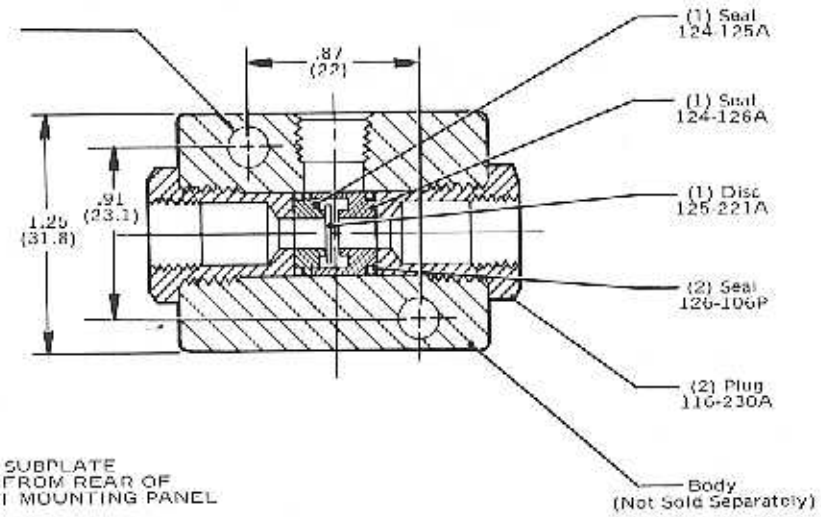


ORO and OA22-1
SHUTTLE VALVES

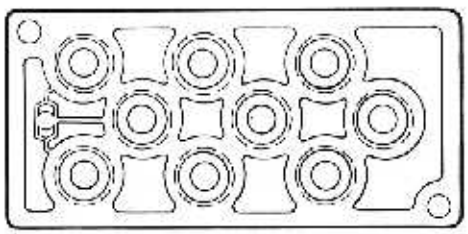
SERIES OA22-1

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters





SUBPLATE
SHOWN FROM REAR OF
COMPONENT MOUNTING PANEL



SERIES ORO

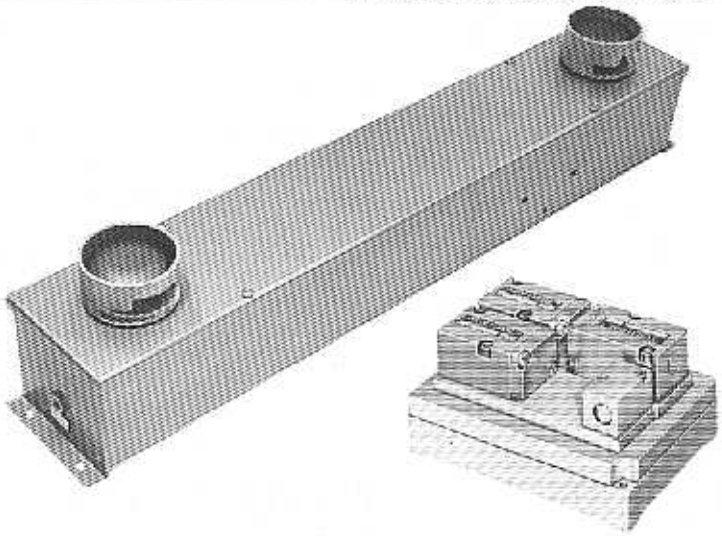
TWO-HAND CYCLE START CONTROL STATION and MODULES

NUMATROL® II
PRODUCT OF NUMATICS, INC.

The Numatrol II two-hand start control station is completely tubed and ready for installation. It consists of (1) module No. CSO-0602, (2) 4-way valves No. PB5-0001, (2) jumbo mushroom operators No. 212-217P, and (2) guards No. 125-246B mounted in the enclosure shown. The two palmbuttons must be depressed virtually simultaneously to initiate an output signal from the module. In addition, both buttons must be released to reset the circuit for the next operation. The circuit emits a pressure output as long as both buttons are held depressed. The circuit will not function if only one button is depressed or released.

Each module may be used separately with two dual supply 4-way valves. These are shown on pages N-15, N-16, N-18 and N-19.

Proper maintenance and filtration should be stressed to keep all system components in good working condition. Numatics recommends its coalescing filters shown on pages N-38/39 to provide clean, dry, oil free air.



APPLICATION

The Module provides a reliable method of two-hand cycle starting. It has application in any industrial area where an operator may accidentally have one hand within the "operating" area of the machine while his other hand is activating the machine's work cycle. With both hands required to operate the Module's circuitry, such hazards can be minimized. Provisions of the Occupational Safety and Health Act (OSHA) require such control devices on this type of machine.

This Module mounts in any position, either directly on a machine or in a control panel of suitable size as part of a total control system.

OPERATING DATA

The Numatrol II Two-Hand Start Module will operate and function only if used as it is assembled and shipped. Its circuitry or assembly cannot be altered in any way and still provide its intended function. To that extent, it is a reliable device. However, users are cautioned that the palmbuttons used to activate this circuit must be mounted in such a way as to prevent operator misuse of the device and not circumvent the Module's intended function.

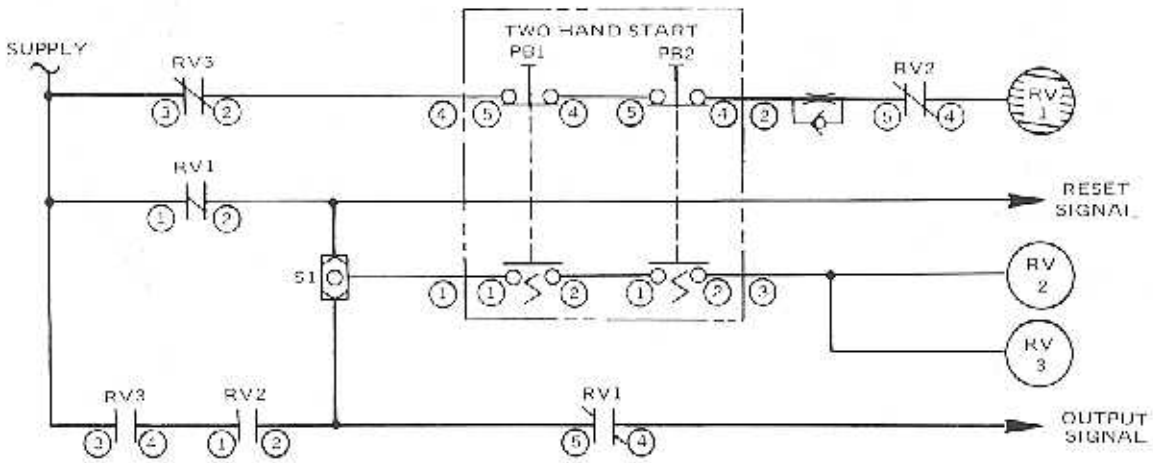
A more detailed technical discussion of this Module's actual sequence of operations is available in Technical Bulletin NT-1-77.

PRESSURE RANGE: Use only 50 PSIG supply pressure. A supply pressure below 40 PSIG will result in no output signal. A supply pressure greater than 50 PSIG will increase the maximum allowable delay between actuation of the first and second palmbuttons. (Approximate time delay at 50 PSIG is 350 ms.)

TEMPERATURE RANGE: +40°F to +200°F ambient (or up to +100°F when using Numatrol II vinyl tubing).

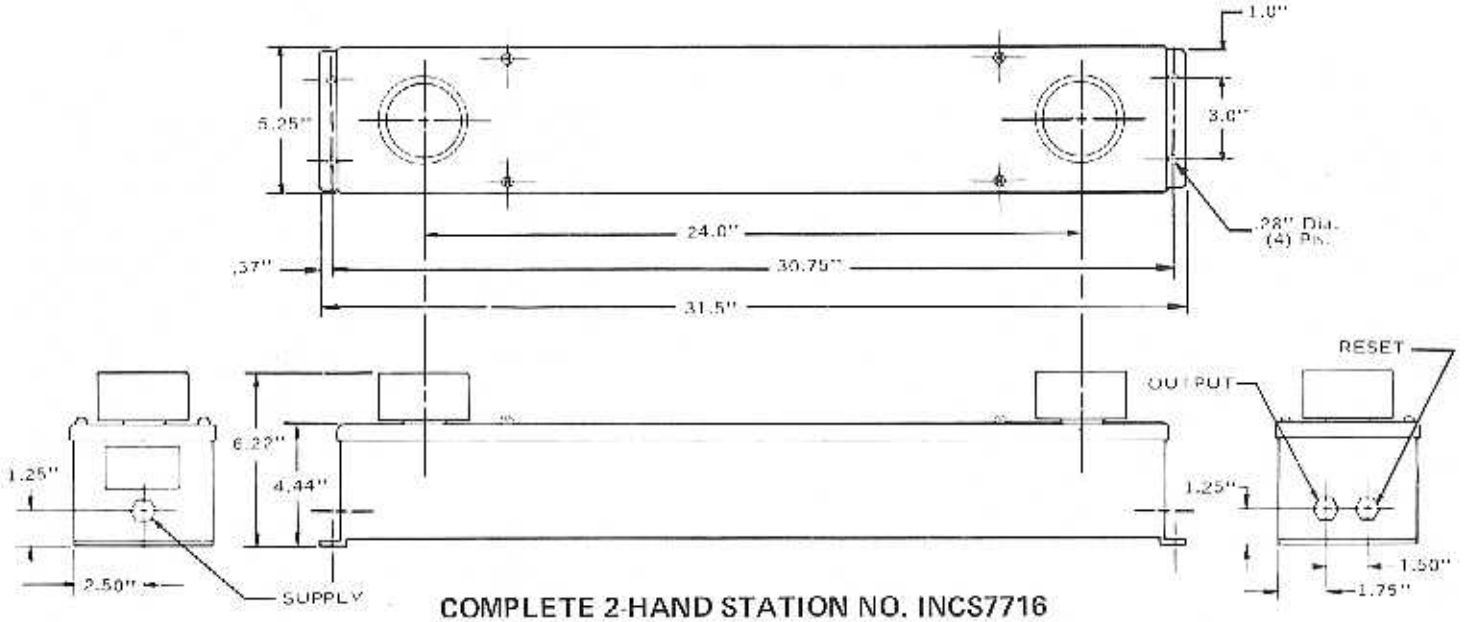
SERVICE: Module must be used on properly filtered dry (oil free) air.

MODEL SELECTION CHART	
Number	Description
CSO-0601	Two-Hand Start Module, Side Ports Only
CSO-0602	Two-Hand Start Module, Bottom Ports Only
INCS7716	Two-Hand Control Station

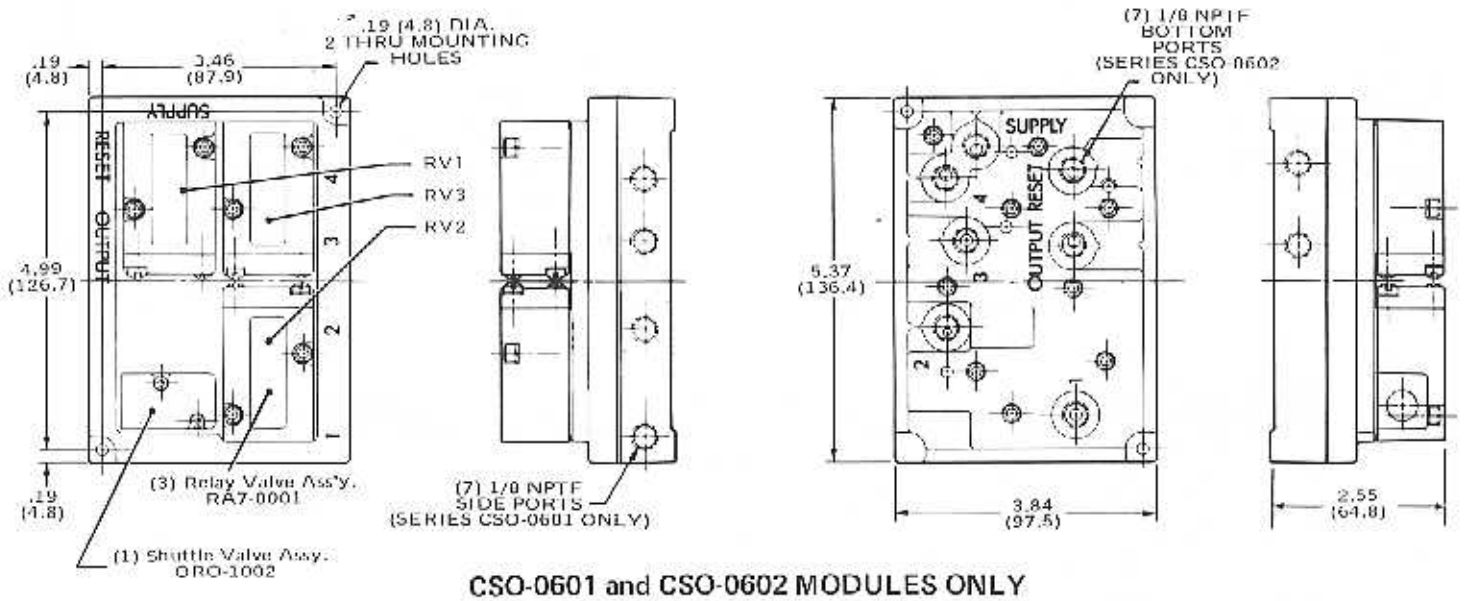


MPL CIRCUIT DIAGRAM FOR TWO-HAND START MODULE

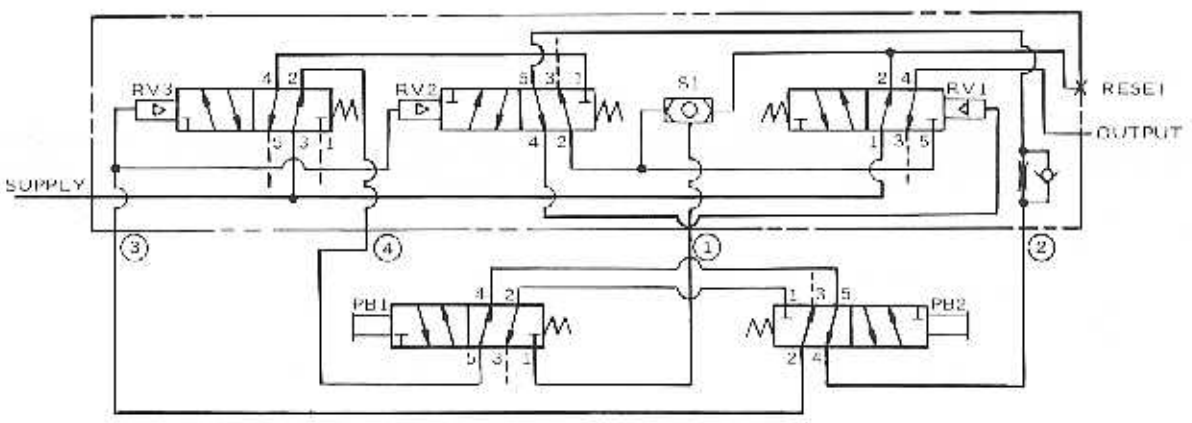
NUMATROL® II
PRODUCT OF NUMATICS, INC.



COMPLETE 2-HAND STATION NO. INCS7716



CSO-0601 and CSO-0602 MODULES ONLY



A.N.S.I. CIRCUIT DIAGRAM FOR TWO-HAND START MODULE

SERIES SCO
PRIMARY FILTERS

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

Numatrol II systems operate on dry, nonlubricated air. Therefore, ALL air going to a Numatrol system MUST be processed through an SCO series primary filter. The system requires that standard shop air be filtered by a conventional air line filter and passed through the SCO filter. The SCO primary filter is placed in the line downstream of the standard regulator and before the lubricator which supplies power air to the machine. All dirt particles 3 microns and larger are removed.

The SCO filter is mounted on a patented subbase which has the following advantages: (1) the filter may be piped in either direction (accomplished by merely rotating the filter on the subbase 180°); (2) the filter may be replaced with a new assembly by removing the old assembly from the subbase (2 screws) and installing another one. Thus, the filter element may be installed in a relatively clean area and placed in operation with a minimum of machine down time. Complete instructions are attached to every unit.

Line mounted filters are also available at considerable cost savings. 1/2 NPTF filters have 1 quart capacity. 1/4 NPTF filters have 1/2 pint capacity.

OPERATING DATA

PRESSURE RANGE: Vacuum to 150 PSIG.

TEMPERATURE RANGE:
Polycarbonate Bowls - 140°F to 1130°F ambient.
Solid Metal Bowls - 140°F to 1200°F ambient.

MAINTENANCE: Replace both the SCO element and the RFO element when the RFO shows the slightest discoloration.

1 QUART

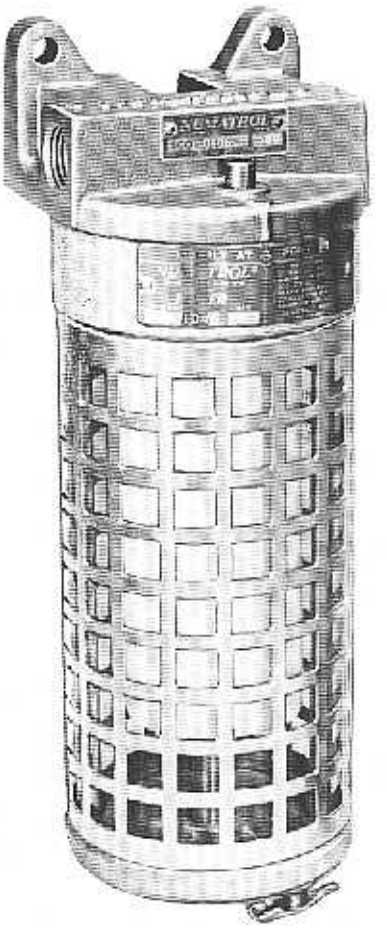


9.62 X 3.75 DIA.
1/2 NPTF

1/2 PINT



6.5 X 2.62 DIA.
1/4 NPTF



SUBBASE MOUNTED

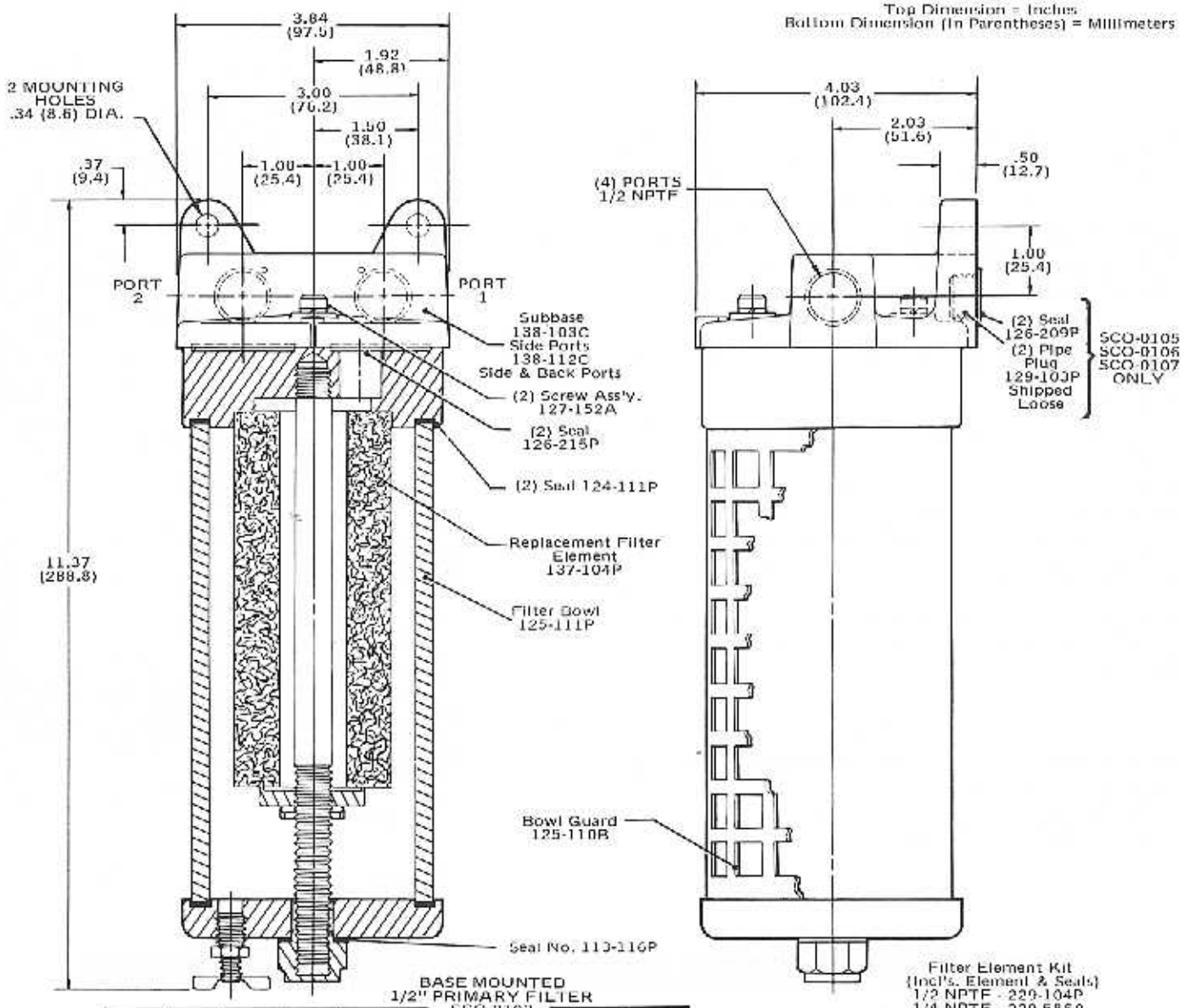
MODEL SELECTION CHART - SUBBASE MOUNTED	
NUMBER	DESCRIPTION
SCO-0002	Filter unit only with bowl guard, no subbase
SCO-0003	Filter unit only with metal bowl, no subbase
SCO-0103	Filter unit with subbase and bowl guard, side ports only
SCO-0104	Filter unit with subbase and metal bowl, side ports only
SCO-0106	Filter unit with subbase and bowl guard, side and back ports
SCO-0107	Filter unit with subbase and metal bowl, side and back ports

MODEL SELECTION CHART - 1/2 NPTF INLINE	
NUMBER	DESCRIPTION
SCO-0508	Filter with polycarbonate bowl and guard
SCO-0509	Filter with metal bowl and sight level
125-110B	Bowl guard
125-111P	Polycarbonate filter bowl
137-104P	Filter element for all models

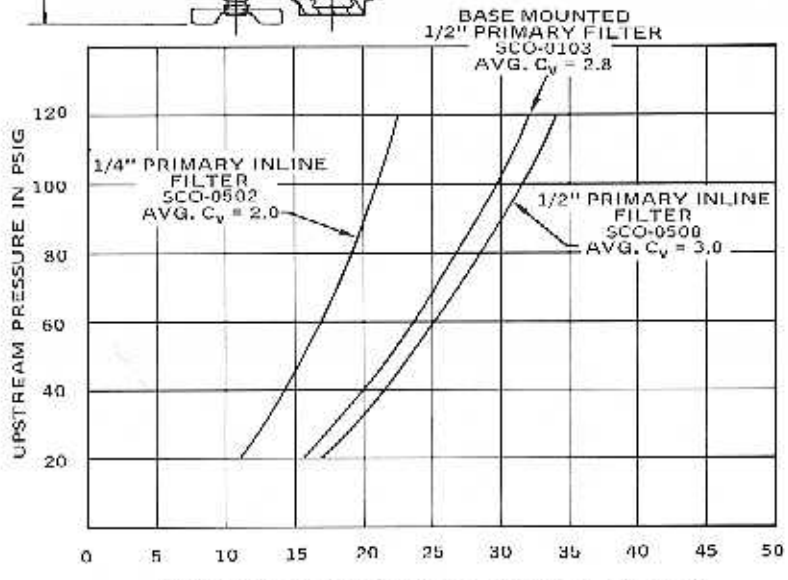
MODEL SELECTION CHART - 1/4 NPTF INLINE	
NUMBER	DESCRIPTION
SCO-1502	Filter with polycarbonate bowl and guard
SCO-1503	Filter with metal bowl - no sight level
125-231P	Bowl guard
125-262P	Polycarbonate filter bowl
137-144P	Filter element for all models

SERIES SCO
SUBBASE MOUNTED
PRIMARY FILTERS

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters



Filter Element Kit
(Incl's. Element & Seals)
1/2 NPTF - 229-104P
1/4 NPTF - 229-586A



Important
Do Not Exceed Flow Rates Shown.

SERIES SCO
COALESCING FILTERS

NUMATROL® II
PRODUCT OF NUMATICS, INC.

SPECIFICATIONS

The Numatrol II coalescing filter is a primary filter designed specifically to remove oil vapor and aerosols by a coalescing action. When used downstream of a standard SCO primary filter, which removes all particles larger than 3 microns, the coalescing filter will last indefinitely since it is nonclogging on oil alone. Coalescing filters will also remove all additional particles down to 0.1 micron size and provide clean, oil free instrument quality air.

Since the coalescing filter removes all particles and vapor down to 0.1 microns, it may be used without the standard filter upstream. However, the element will eventually clog and have to be replaced.

The SCO coalescing filter is mounted on a patented subbase which has the following advantages: (1) the filter may be piped in either direction (accomplished by merely rotating the filter on the subbase 180°); (2) the filter may be replaced with a new assembly by removing the old assembly from the subbase (2 screws) and installing another one. Complete instructions are attached to every unit.

Line mounted filters are also available at considerable cost savings. 1/2 NPTF filters have 1 quart capacity. 1/4 NPTF filters have 1/2 pint capacity.

OPERATING DATA

PRESSURE RANGE: Vacuum to 150 PSIG maximum.

TEMPERATURE RANGE:
Polycarbonate Bowls - +40°F to +130°F ambient.
Solid Metal Bowls - +40°F to +200°F ambient.

1 QUART

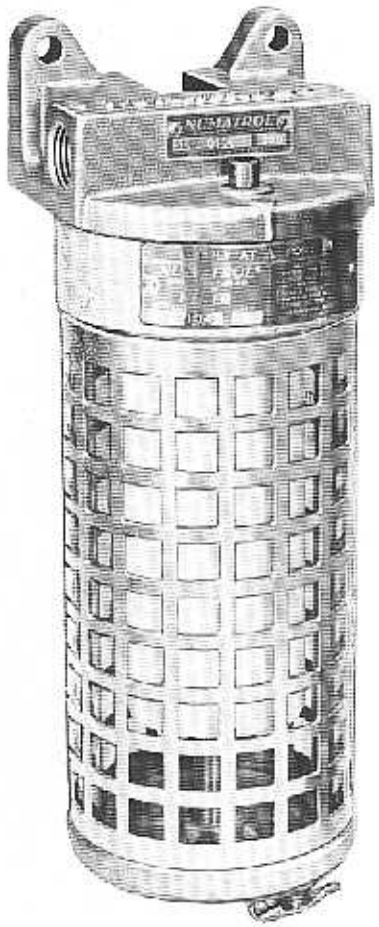


9.62 X 3.75 DIA.
1/2 NPTF

1/2 PINT



6.50 X 2.62 DIA.
1/4 NPTF

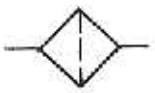


SUBBASE MOUNTED

MODEL SELECTION CHART - SUBBASE MOUNTED	
NUMBER	DESCRIPTION
SCO-1005	Filter unit only with bowl guard, no subbase
SCO-1006	Filter unit only with metal bowl, no subbase
SCO-1109	Filter unit with subbase and bowl guard, side ports only
SCO-1110	Filter unit with subbase and metal bowl, side ports only
SCO-1112	Filter unit with subbase and bowl guard, side and back ports
SCO-1113	Filter unit with subbase and metal bowl, side and back ports

MODEL SELECTION CHART - 1/2 NPTF INLINE	
NUMBER	DESCRIPTION
SCO-1511	Filter with polycarbonate bowl and guard
SCO-0512	Filter with metal bowl and sight level
125-110B	Bowl guard
125-111P	Polycarbonate filter bowl
137-141P	Filter element for all models

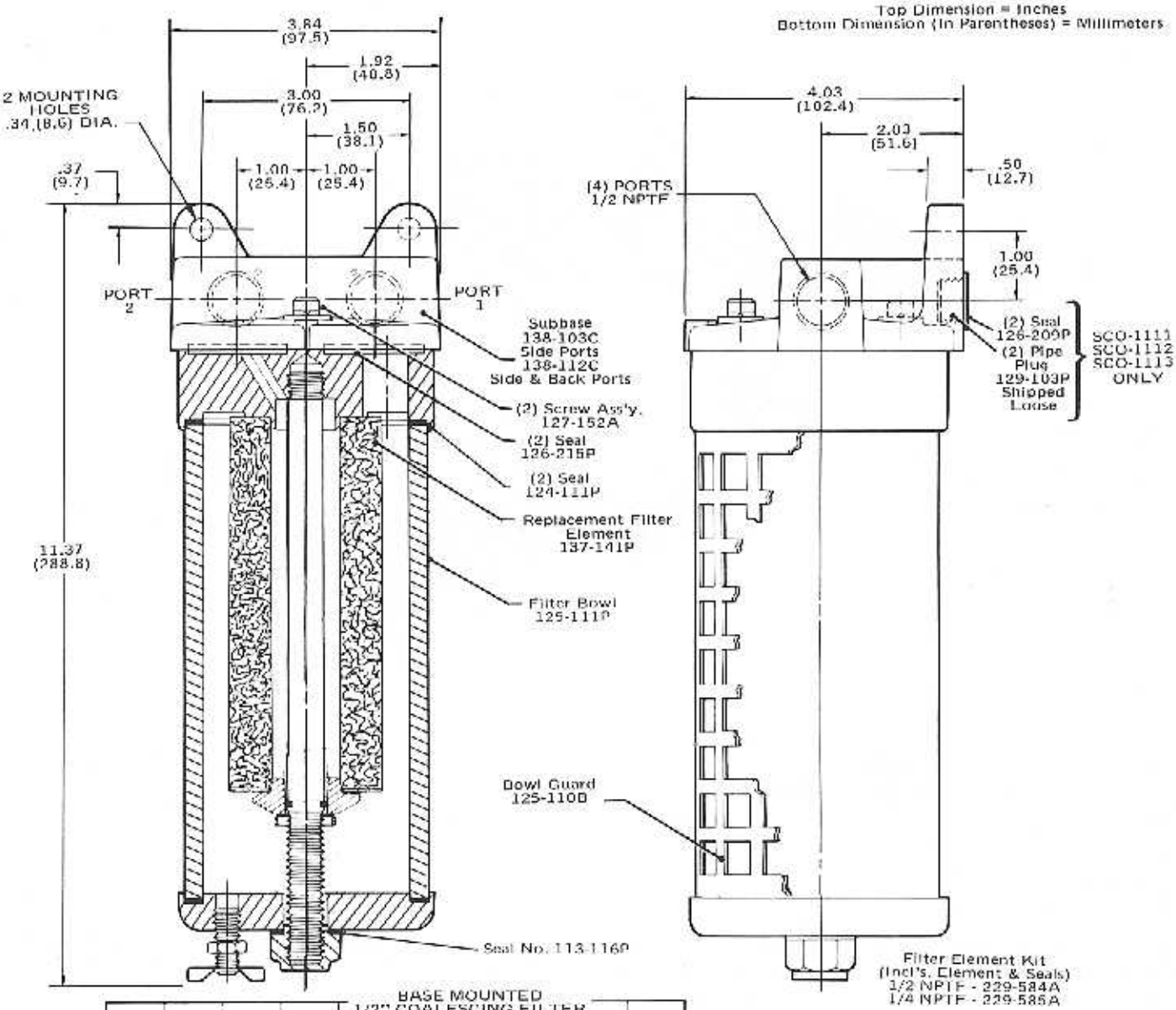
MODEL SELECTION CHART - 1/4 NPTF INLINE	
NUMBER	DESCRIPTION
SCO-1505	Filter with polycarbonate bowl and guard
SCO-0506	Filter with metal bowl, no sight level
125-231P	Bowl guard
125-262P	Polycarbonate filter bowl
137-143P	Filter element for all models

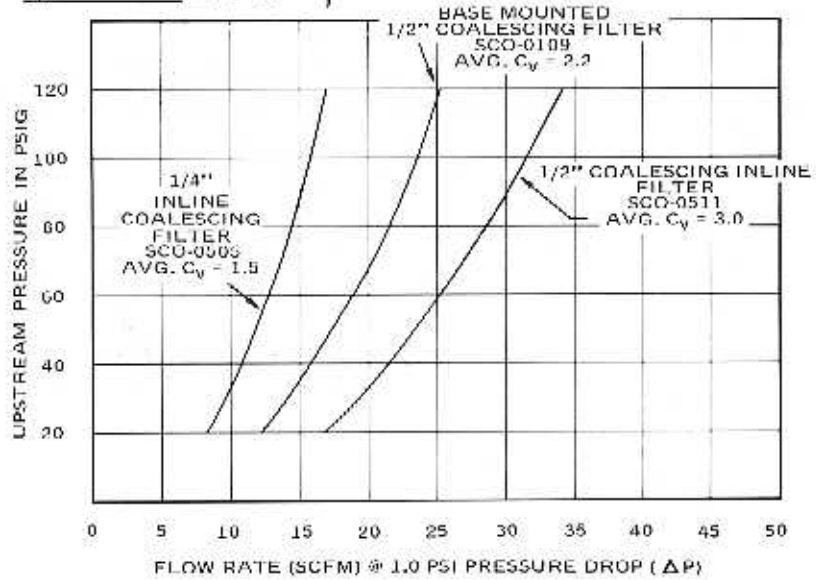


MPI AND
A.N.S.I. SYMBOL

SERIES SCO
COALESCING FILTERS

Top Dimension = Inches
Bottom Dimension (In Parentheses) = Millimeters

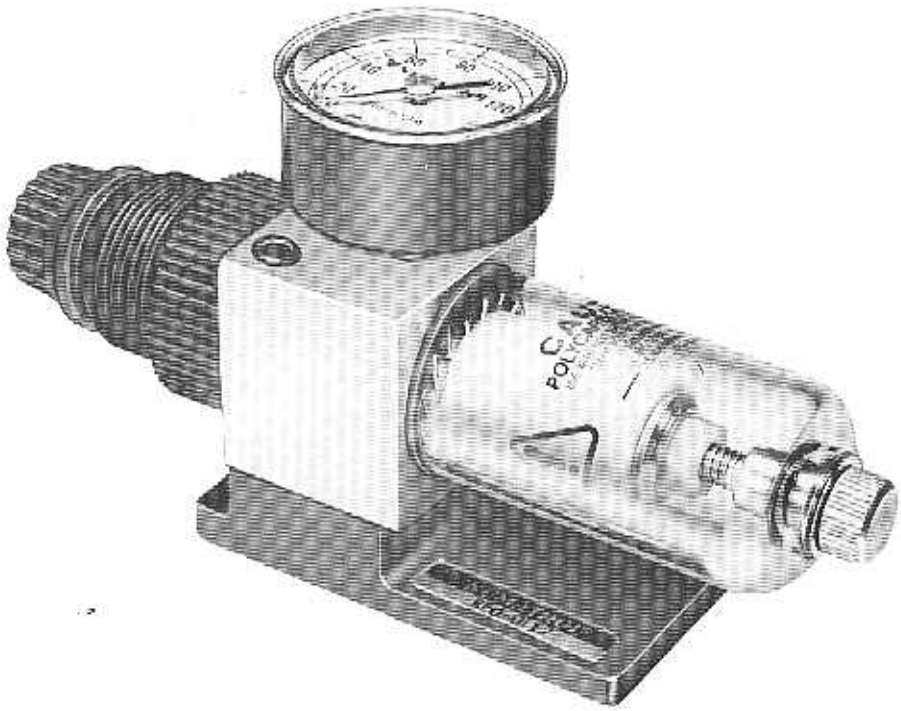




Important
Do Not Exceed Flow Rates Shown.

SERIES RFO
REGULATOR-FILTER
ASSEMBLY

NUMATROL® II
PRODUCT OF NUMATICS, INC.



SPECIFICATIONS

The Series RFO regulator-filter unit consists of a pressure regulator and a filter mounted on a common subplate. Air passes through the regulator first and then through the filter. The regulator-filter is intended to be used downstream from the Numatrol II SCO primary and coalescing filters. The use of a common subplate frees a cabinet mounting location for other Numatrol II components

The RFO unit regulates the incoming air down to the required system pressure (50 psig). The filter receives the air from the regulator and filters it AS IT EXPANDS into the filter bowl. The sudden expansion of the air through the regulator causes oil particles to gather into larger drops which can then be trapped by the filter element. In addition, the cooling of the air may drop out additional water vapor. This regulator-filter action provides additional protection which could not be produced otherwise.

The pure white filter element provides a visual check on the condition of the primary filter. When the secondary filter element becomes discolored, it is time to change both filter units. Subbase mounting permits easier maintenance. Note that the gage is installed in the filter outlet port, and indicates the actual pressure being furnished to the system.

OPERATING DATA

PRESSURE RANGE:

Primary - 250 PSIG maximum.

Secondary - 5 to 60 PSIG or 10 to 120 PSIG.

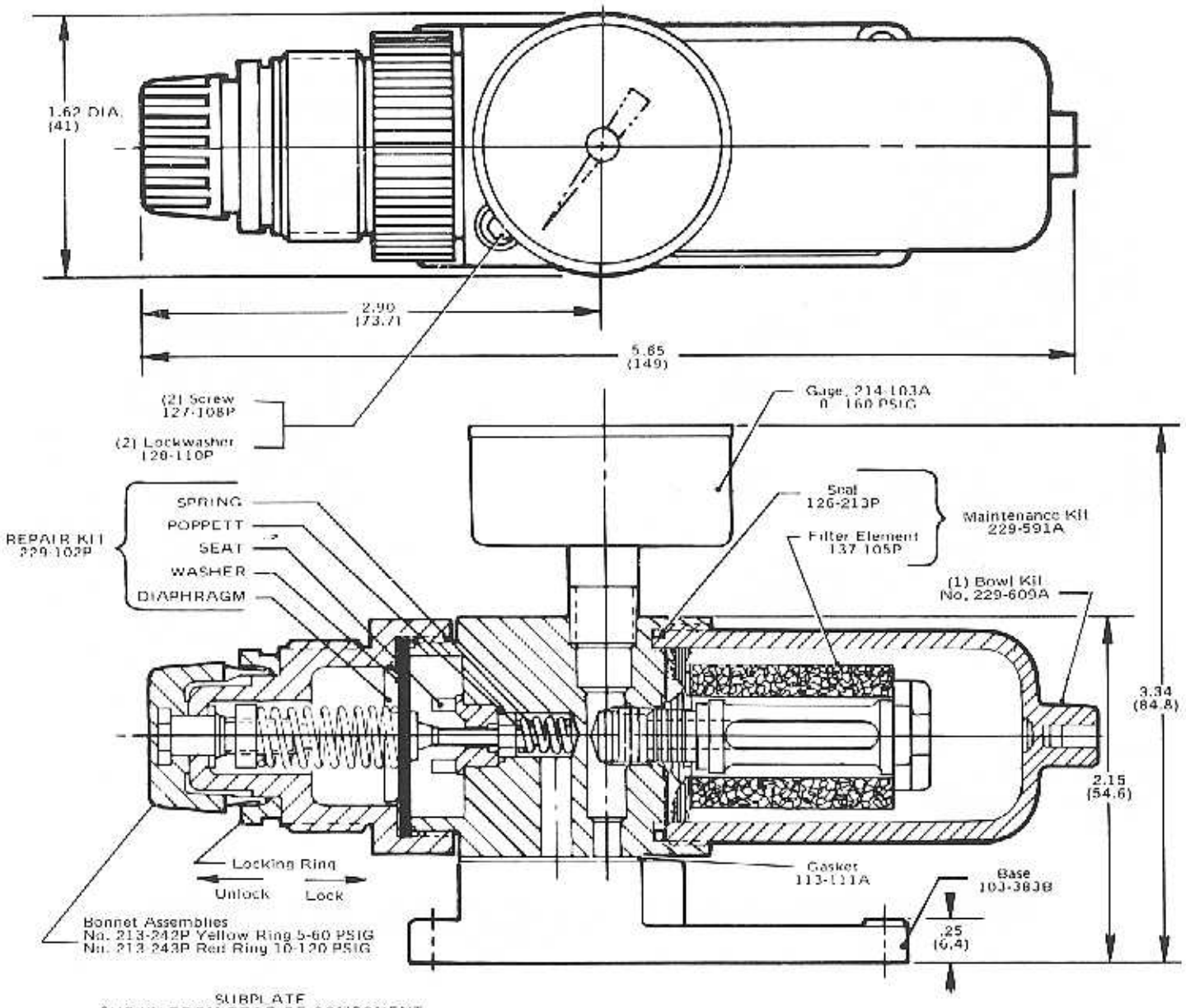
TEMPERATURE RANGE: +40°F to +120°F ambient.

GAGE (All Regulators): 0 to 160 PSIG.

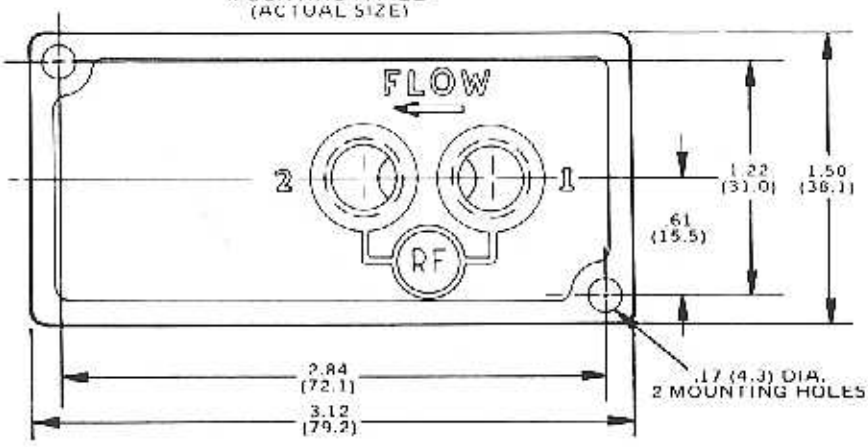
FILTRATION RATING: Filter element is white cellulose fiber with resin bonding. It will remove all particles larger than 3 microns. Both this element and the standard SCO element upstream should be replaced at the first sign of discoloration.

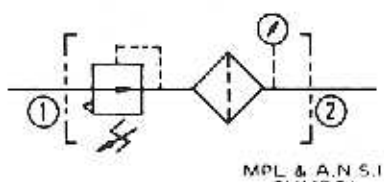
MODEL SELECTION CHART	
MODEL	DESCRIPTION
RFO-1010	Regulator-filter unit only, no subbase, with gage 5 - 60 PSIG (Yellow Ring)
RFO-1011	Regulator-filter unit only, no subbase, with gage 10 - 120 PSIG (Red Ring)
RFO-1111	Regulator-filter with subbase and gage, 5 - 60 PSIG (Yellow Ring)
RFO-1112	Regulator-filter with subbase and gage, 10 - 120 PSIG (Red Ring)
NOTE: Regulator-filter units only include screws and base gasket.	

Top Dimension – Inches
Bottom Dimension (In Parentheses) – Millimeters



SUBPLATE
SHOWN FROM REAR OF COMPONENT
MOUNTING PANEL
(ACTUAL SIZE)





MPL & A.N.S.I.
SYMBOL

RF1

LEGEND PLATE

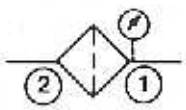
INDIVIDUAL RFO SERIES REGULATORS and FILTERS

NUMATROL® II
PRODUCT OF NUMATICS, INC.





MPL & A.N.S.I. Symbols



Note: All replacement parts are identical to the combination filter-reg. assy's. shown on the preceding page.

MODEL SELECTION CHART	
NUMBER	DESCRIPTION
RFO-0002	0-60 PSIG Regulator unit only, no subbase, with gage
RFO-0003	0-120 PSIG Regulator unit only, no subbase, with gage
RFO-0005	0-60 PSIG Regulator unit only, no subbase, no gage
RFO-0006	0-120 PSIG Regulator unit only, no subbase, no gage
RFO-0107	0-60 PSIG Regulator with subbase and gage
RFO-0108	0-60 PSIG Regulator with subbase, no gage
RFO-0109	0-120 PSIG Regulator with subbase and gage
RFO-0110	0-120 PSIG Regulator with subbase, no gage
RFO-1001	Filter unit only, no subbase or gage
RFO-1004	Filter unit only, no subbase, with 0-160 PSIG gage
RFO-1103	Filter with subbase and 0-160 PSIG gage
RFO-1104	Filter with subbase, no gage
NOTE: Regulator and filter units only include screws and base gasket.	

NUMATROL® II

PRODUCT OF NUMATICS, INC.

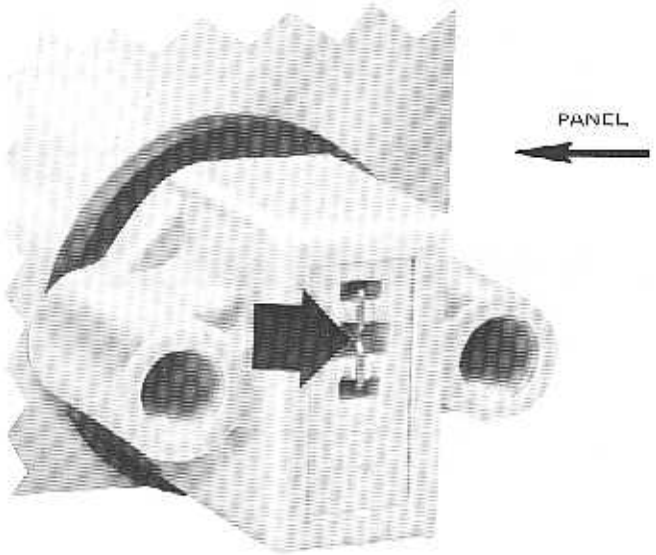
Top Dimension = Inches
Bottom Dimension
(In Parentheses) = Millimeters

SPECIFICATIONS

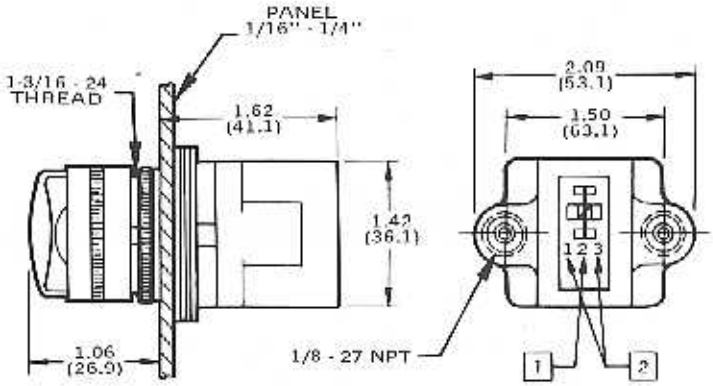
These oil-tight pneumatic indicators are ruggedly constructed, bushing mounted and feature a metal pressure chamber. They are nonconsumptive and provide a 2-color, 2-position, ambient lighted, fluorescent signal, visible from the front and side. They are field adjustable for either 1-input with spring return or 2-input with "memory". The memory does not require continuous pressure to maintain its last signal input. These indicators are available in a variety of color combinations and are completely compatible with Numatrol II systems.

Field conversion may be made to select either single input, spring return or 2-input, maintained modes of operation. The illustration below shows the convenient adjustment on the rear of the indicator housing. Using the same adjustment, either of the two display colors and its individual input may be selected for single input operation. In the center position, this adjustment allows the indicator to accept two inputs for a maintained ("memory") mode of operation.





REAR VIEW
(ARROW SHOWS MODE
ADJUSTMENT CLIP)



1 Maintained - 2 - Input with mode adjustment clip in No. 2 position.

2 Spring Return - Single Input with mode adjustment clip in position No. 1 or No. 3. Input same side as wire.

OPERATING DATA

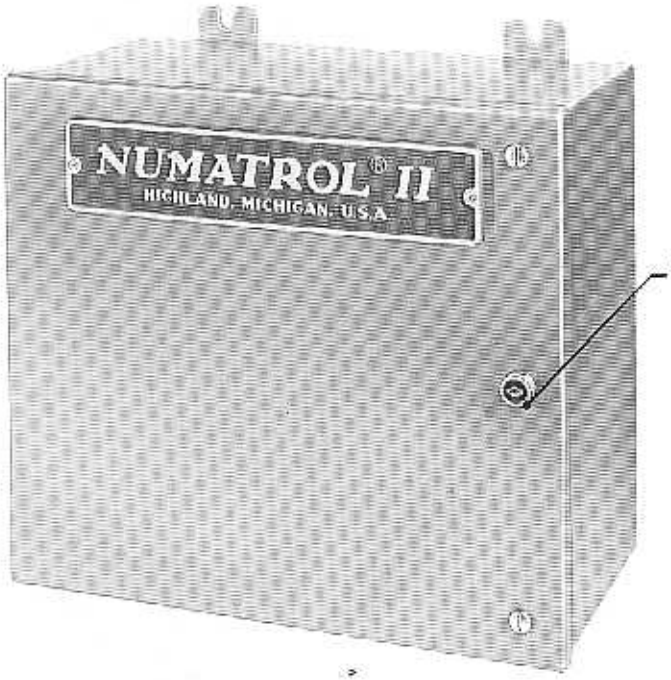
PRESSURE RANGE: 50 - 150 PSIG maximum.

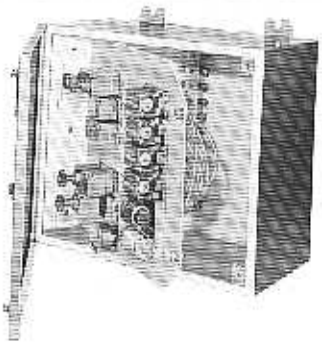
TEMPERATURE RANGE: +35°F to +150°F ambient; -20°F with dry air.

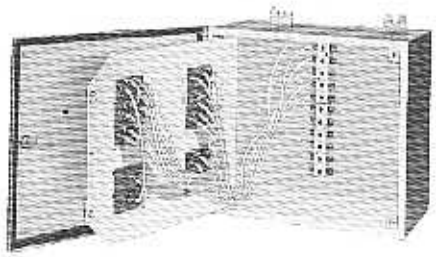
ACTUATION TIME: 1 second maximum.

MODEL SELECTION CHART	
Number	Color Combination
215-156P	Red - Green
215-157P	Green - Black
215-158P	Red - Black
215-159P	Yellow - Black
215-160P	Amber - Black

CONTROL CABINETS and ACCESSORIES







SPECIFICATIONS

Numatrol II control cabinets are specially made to house Numatrol components and facilitate installation. They are available in six convenient sizes. Each cabinet has an interior hinged panel which contains subbase mounting cutouts to fit all standard Numatrol II components. All tube connections are made behind this hinged panel, which is secured with spring-loaded screws when the circuit is complete.

The mounting cutouts in the hinged interior panel will also accept Numatics' MARK 7 Line direct solenoid actuated valves when mounted on Numatrol II RA7 relay subbases. This permits a neat, compact housing arrangement of all power and control elements for a Numatrol II system. Consult the factory for proper ordering procedure when designing or installing a Numatrol II system.

The door of the cabinet uses spring-loaded screws and key-lock hardware. The Numatrol II nameplate shown is supplied only with complete Numatrol II systems.

MODEL SELECTION CHART

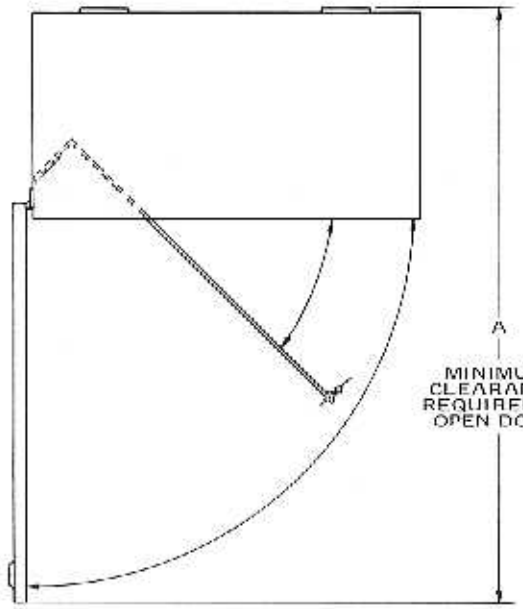
Number	Description
136-142C	8-Station Cabinet
136-143C	12-Station Cabinet
136-144C	16-Station Cabinet
136-145C	24-Station Cabinet
136-146C	30-Station Cabinet
136-147C	36-Station Cabinet
104-171A	Blank Station Plate
122-139A	Caution Tag
122-157P*	Legend Plate, .06 x .5 x 1.0" (1.5 x 12.7 x 25.4 mm), Custom inscription (1 line, 7 spaces)
122-158P*	Legend Plate, .06 x 1.0 x 2.0" (1.5 x 25.4 x 50.8 mm), Custom inscription (4 lines, 16 spaces ea.)
122-159P*	Legend Plate, .06 x .75 x 4.0" (1.5 x 19 x 101.6 mm), Custom inscription (3 lines, 23 spaces ea.)
137-152P	Cabinet Lock and Key

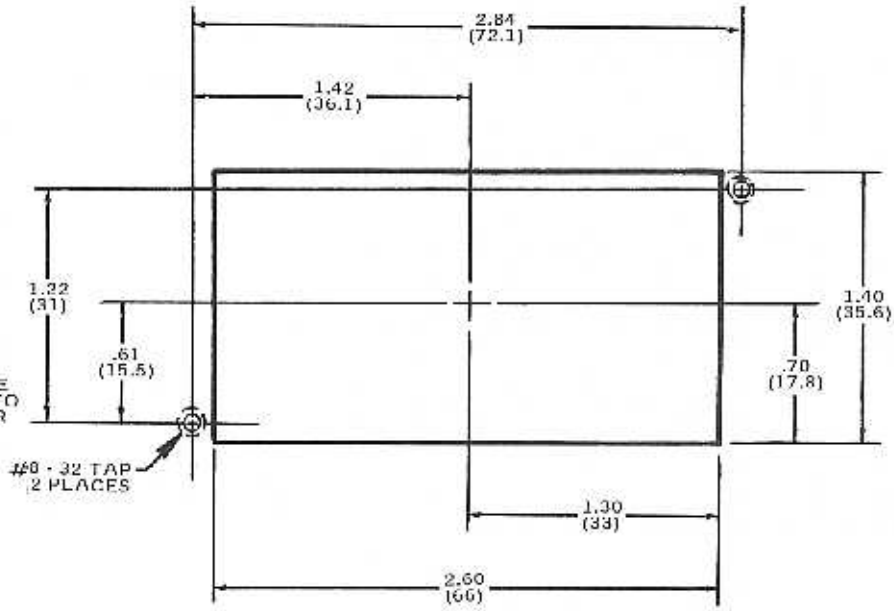
Legend Plates, Standard inscription, .06 x .5 x 1.0" (1.5 x 12.7 x 25.4 mm):

Number	Description	Number	Description
122-162P*	RV1	122-175P*	TD4
122-163P*	RV2	122-176P*	TD5
122-164P*	RV3	122-177P*	S1
122-165P*	RV4	122-178P*	S2
122-166P*	RV5	122-179P*	S3
122-167P*	RV6	122-180P*	S4
122-168P*	RV7	122-181P*	S5
122-169P*	RV8	122-182P*	S6
122-170P*	RV9	122-249P*	F1
122-171P*	RV10	122-250P*	F2
122-172P*	TD1	122-251P*	R1
122-173P*	TD2	122-252P*	R2
122-174P*	TD3	122-253P*	R3

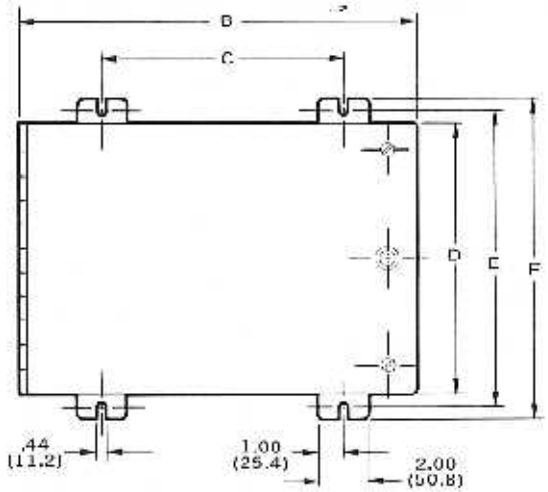
* All legend plates are of Bakelite, self-bonding material.

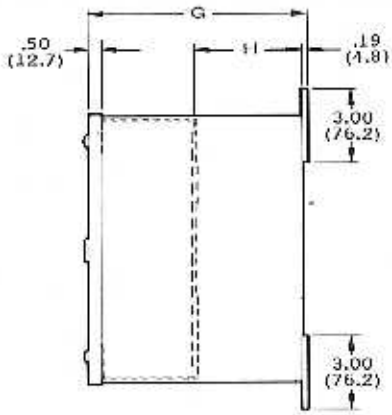
CONTROL CABINETS and ACCESSORIES



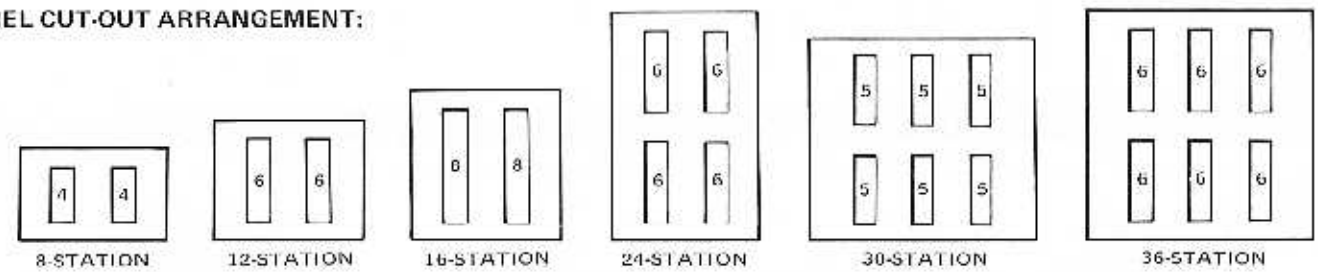


PANEL CUTOUT REQUIRED WHEN USING OTHER THAN NUMATROL CONTROL CABINETS (FULL SCALE)





PANEL CUT-OUT ARRANGEMENT:

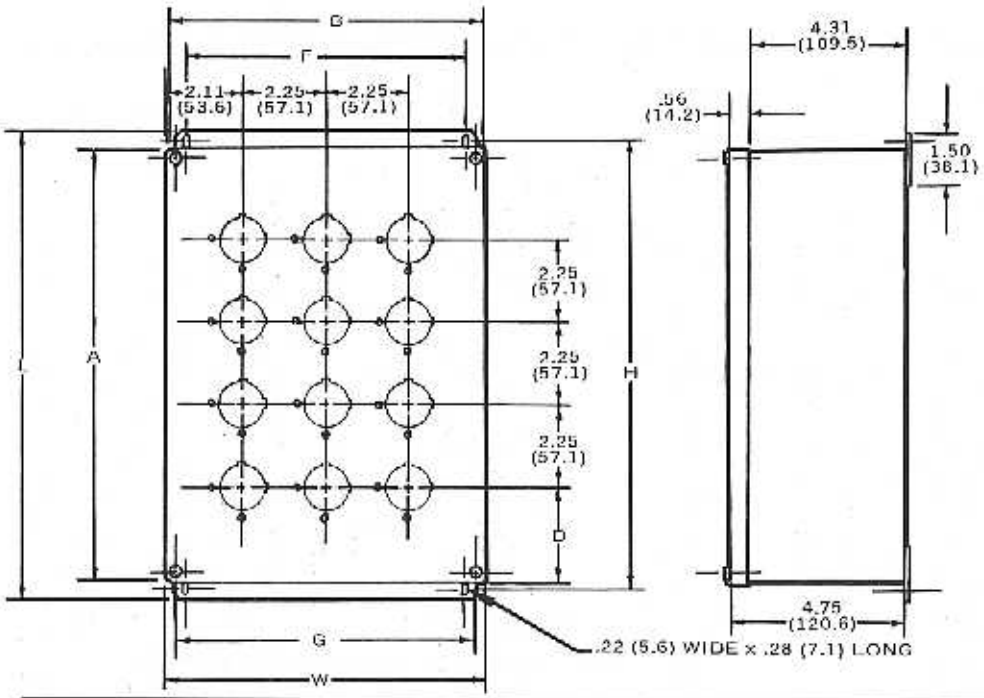


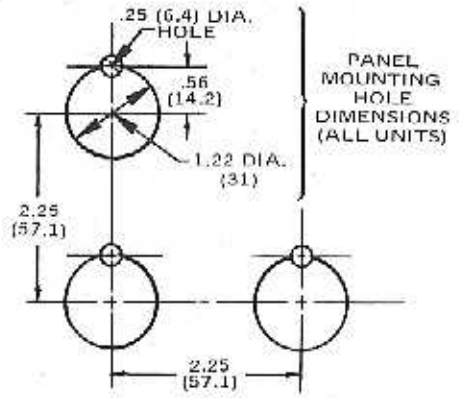
8-STATION 12-STATION 16-STATION 24-STATION 30-STATION 36-STATION

DIMENSIONS*								
SIZE	A	B	C	D	E	F	G	H
8-STATION	25.00 (635)	16.38 (416)	10.00 (254)	11.19 (284.2)	12.25 (311.1)	13.25 (336.5)	8.69 (220.7)	4.50 (114.3)
12-STATION	25.00 (635)	16.38 (416)	10.00 (254)	14.19 (360.4)	15.25 (387.3)	16.25 (412.7)	8.69 (220.7)	4.50 (114.3)
16-STATION	25.00 (635)	16.38 (416)	10.00 (254)	17.19 (436.6)	18.25 (463.5)	19.25 (488.9)	8.69 (220.7)	4.50 (114.3)
24-STATION	26.50 (673.1)	16.38 (416)	10.00 (254)	25.19 (639.8)	26.25 (666.7)	27.25 (692.1)	10.19 (258.8)	6.00 (152.4)
30-STATION	34.00 (863.6)	24.38 (619.2)	18.00 (457.2)	22.19 (563.6)	23.25 (590.5)	24.25 (615.9)	10.19 (258.8)	6.00 (152.4)
36-STATION	34.00 (863.6)	24.38 (619.2)	18.00 (457.2)	25.19 (639.8)	26.25 (666.7)	27.25 (692.1)	10.19 (258.8)	6.00 (152.4)

* Dimension in parentheses = millimeters

Top Dimension = Inches
Bottom Dimension
(In Parentheses) = Millimeters

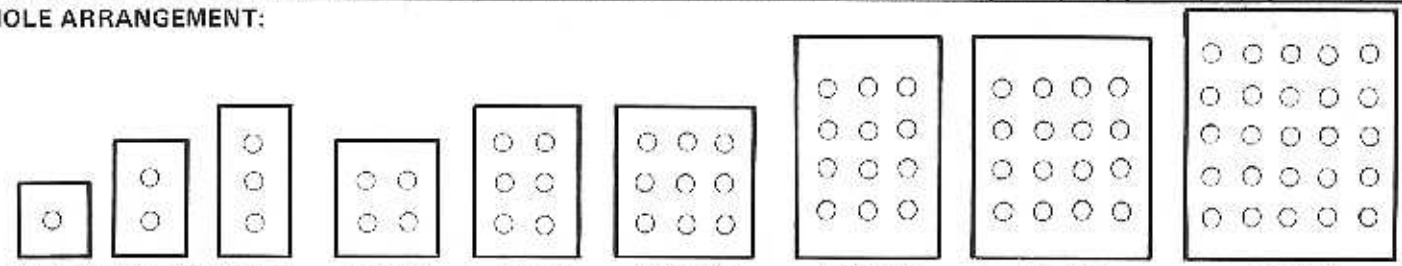




MODEL AND DIMENSION CHART

NUMBER	SIZE: A X B (TO OUTSIDE OF BOX BODY)	NO. OF HOLES	F	MOUNTING G	H	HOLE LOCATION D	OVERALL I	OVERALL W
136-103P	4.00 (102) x 4.00 (102)	1	3.12 (79.4)	3.75 (95.2)	4.50 (114.3)	2.11 (53.6)	5.00 (127)	4.22 (107)
136-118P	6.00 (152) x 4.00 (102)	2	3.12 (79.4)	3.75 (95.2)	6.50 (165.1)	1.51 (38.5)	7.00 (178)	4.22 (107)
136-104P	8.00 (203) x 4.00 (102)	3	3.12 (79.4)	3.75 (95.2)	8.50 (215.9)	1.86 (47.2)	9.00 (229)	4.22 (107)
136-105P	7.25 (184) x 6.25 (159)	4	5.37 (136.5)	6.00 (152.4)	7.75 (196.8)	2.61 (66.3)	8.25 (210)	6.47 (164)
136-119P	9.50 (241) x 6.25 (159)	6	5.37 (136.5)	6.00 (152.4)	10.00 (254)	2.61 (66.3)	10.50 (267)	6.47 (164)
136-106P	9.50 (241) x 8.50 (216)	9	7.62 (193.7)	8.25 (209.6)	10.00 (254)	2.61 (66.3)	10.50 (267)	8.72 (221)
136-107P	11.75 (298) x 8.50 (216)	12	7.62 (193.7)	8.25 (209.6)	12.25 (311.1)	2.61 (66.3)	12.75 (324)	8.72 (221)
136-108P	11.75 (298) x 10.75 (273)	16	9.87 (250.8)	10.50 (266.7)	12.25 (311.1)	2.61 (66.3)	12.75 (324)	10.97 (279)
136-109P	14.00 (356) x 13.00 (330)	25	12.12 (308.0)	12.75 (323.8)	14.50 (368.3)	2.61 (66.3)	15.00 (381)	13.22 (336)

HOLE ARRANGEMENT:



136-103P 136-118P 136-104P 136-105P 136-119P 136-106P 136-107P 136-108P 136-109P

ACCESSORIES

DESCRIPTION		NUMBER	DESCRIPTION	NUMBER
PUSHBUTTON NAMEPLATE, STANDARD INSCRIPTION	"CLOSE"	122-102P	"ON"	122-118P
	"DOWN"	122-103P	"OPEN"	122-119P
	"EMERG-STOP"	122-104P	"OPEN-CLOSE"	122-120P
	"FOR-REV"	122-105P	"OUT"	122-121P
	"FORWARD"	122-106P	"RAISE"	122-122P
	"HAND AUTO"	122-107P	"RAISE-LOWER"	122-123P
	"HIGH-LOW"	122-108P	"RESET"	122-124P
	"IN"	122-109P	"REVERSE"	122-125P
	"JOG"	122-110P	"RUN"	122-126P
	"JOG-FOR"	122-111P	"START"	122-127P
	"JOG-REV"	122-112P	"STOP"	122-128P
	"JOG-RUN"	122-113P	"STOP-START"	122-129P
	"LEFT-RIGHT"	122-114P	"TEST"	122-130P
	"LOWER"	122-115P	"UP"	122-131P
	"OFF"	122-116P	"UP-DOWN"	122-132P
	"OFF-ON"	122-117P		
PUSHBUTTON NAMEPLATE CUSTOM INSCRIPTION:		ONE LINE, 13 SPACES		122-154P
		TWO LINES, 13 SPACES EACH		122-155P

DESCRIPTION	NUMBER
BLANK STATION COVER	137-103P

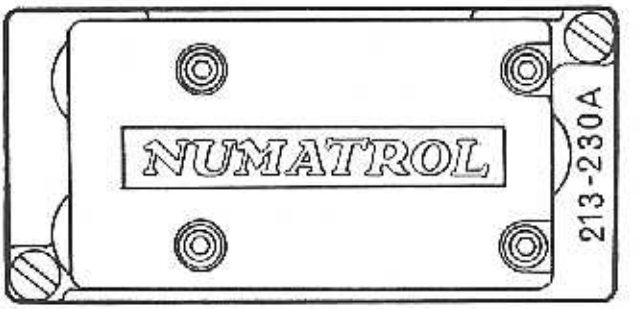
JUNCTION BLOCK **213-229A**

Provides three "T" connections and mounts in any standard panel opening.

MANIFOLD BLOCK **213-230A**

Provides nine common connections and mounts in any standard panel opening.

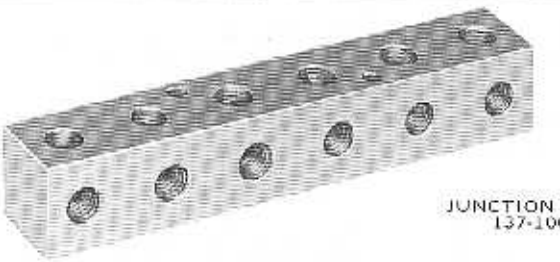
NOTE: Both of the above assemblies use Shuttle Base No. 103-228B. Different covers provide the different connections.



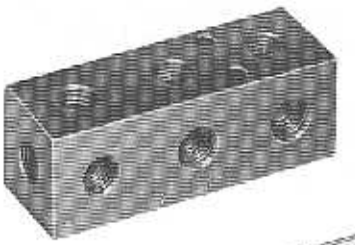
THE FOLLOWING BLOCKS MAY BE USED FOR MAKING TUBING CONNECTIONS WHEN PANEL OPENINGS ARE NOT AVAILABLE.

Junction Boxes are used for collecting tubes from various limits into one common sealtite conduit for connection to the control panel.

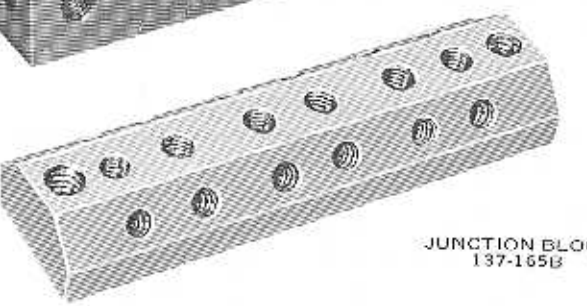
PARTS LIST	
DESCRIPTION*	NUMBER
JUNCTION BLOCK, 6 3-PORT STATIONS, 1/8 NPTF, 1.00 x 1.00 x 5.87 (25.4 x 25.4 x 149.1)	137-100B
JUNCTION BLOCK, 6 3-PORT STATIONS, 10-32 UNF-3B, .88 x .50 x 3.25 (22.35 x 12.25 x 82.55)	137-165B
MANIFOLD BLOCK, 8 COMMON PORTS, 1/8 NPTF, 1.00 x 1.00 x 2.00 (25.4 x 25.4 x 50.8)	137-124A
MANIFOLD BLOCK, 11 COMMON PORTS, 1/8 NPTF, 1.00 x 1.00 x 3.00 (25.4 x 25.4 x 76.2)	137-125A
JUNCTION BOX, 12.00 x 10.00 x 6.00 (304.8 x 254 x 152.4)	136-120P
JUNCTION BOX, 8.00 x 6.00 x 4.00 (203.2 x 152.4 x 101.6)	136-121P
*Dimensions in parentheses — millimeters	



JUNCTION BLOCK
137-100B



MANIFOLD BLOCK
137-125A



JUNCTION BLOCK
137-165B

PRESSURE INDICATOR (1/8 NPTF) **215-103P**

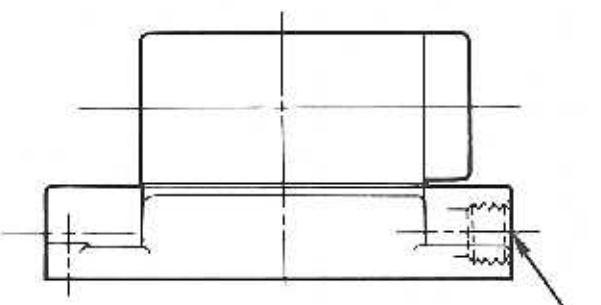


TEST FITTING (1/8 NPTF) **215-123A**



TEST GAGE, 20 - 120 PSIG **215-124P**





1/8 NPTF TAPPED HOLE IN EACH END IS CONNECTED TO PILOT PORTS FOR PRESSURE INDICATORS AND TEST FITTINGS.

SINGLE BARB TUBE FITTINGS
and
FLEXIBLE POLYURETHANE TUBING

NUMATROL® II
PRODUCT OF NUMATICS, INC.

Numatics now has a new "building block" style of single barb fitting for use with polyurethane tubing. These fittings, when used with urethane tubing permit fast, and highly reliable connections at temperature limits that were not practicable until now.

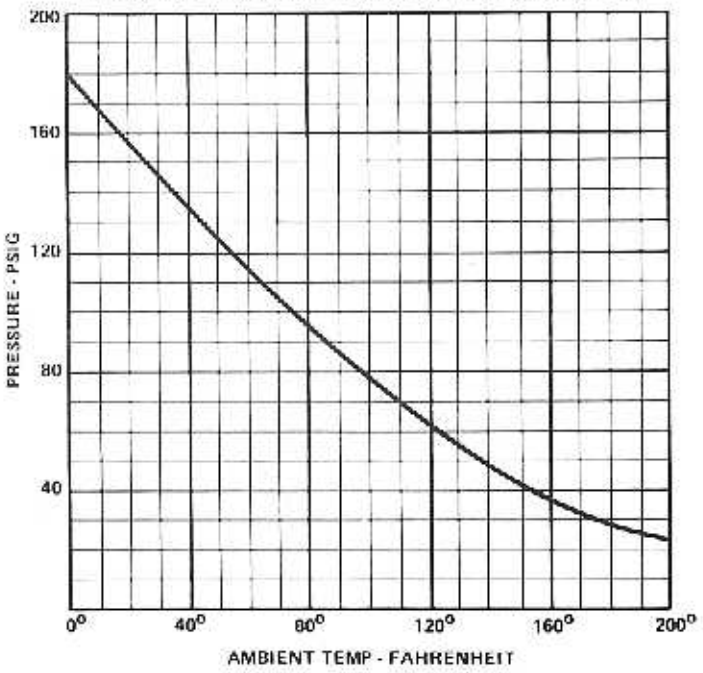
Polyurethane tubing offers superior performance to other plastic tubing with regard to kink resistance, low temperature flexibility, higher working pressures, and resistance to ambient ozone, oil, grease, fuels and most chemicals. The highly flexible tubing allows easy "push on" connections and neat installations with sharp bends possible in less than one inch. Many Numatrol II installations that previously required the use of nylon tubing for high pressure, clamp functions for example, can now easily be accomplished with this new tubing.

This new, unique fitting design permits leak proof connections with easy orientation possible. Male threads are 1/8 NPTF, 1/4 NPTF, and No. 10-32 UNF-3A tapered. The No. 10-32 tapered fittings fit into No. 10-32 UNF-3B straight threads providing orientation and virtually dry seal connections.

Just two different male connectors, No. 10-32 to 1/4 tube and No. 10-32 to 1/8 tube, thread into a variety of different size elbows and tees to provide a complete line of fittings. A deep socket, 1/4 inch drive nutdriver is available to provide easy assembly of the No. 10-32 male connectors into the various fittings and No. 10-32 straight taps.

CAUTION: Do not overtighten No. 10-32 fittings into aluminum or zinc parts. Threads can easily be stripped. It is only necessary to tighten down snug to achieve a leak tight connection.

TUBING TEMPERATURE/PRESSURE SPECIFICATIONS



HOW TO ORDER

FITTINGS:
Fittings will be pre-packaged in specific quantities per package as stated below. Order the total quantity required making certain that the quantity is in even multiples.

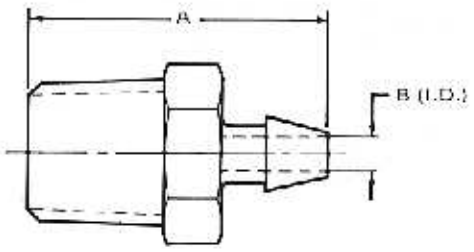
PART NO.	QUANTITY	PART NO.	QUANTITY
129-127A	5/bag	134-231A	15/bag
134-223A	25/bag	134-232A	25/bag
134-224A	25/bag	134-233A	10/bag
134-225A	15/bag	134-234A	10/bag
134-226A	15/bag	134-235A	10/bag
134-227A	10/bag	134-236A	25/bag
134-228A	10/bag	134-238A	1/bag
134-229A	10/bag		

TUBING:
Available in 100' cartons or 1000' rolls only.
135-124A 1000' roll 1/4 O.D. X 1/8 I.D.
135-125A 100' carton 1/4 O.D. X 1/8 I.D.
135-127A 1000' roll 1/8 O.D. X 1/16 I.D.
135-126A 100' carton 1/8 O.D. X 1/16 I.D.

NUTDRIVER TOOL for No. 10-32 male connectors.
Part Number 137-153P (Williams 1/4 inch drive - No. ND-8).

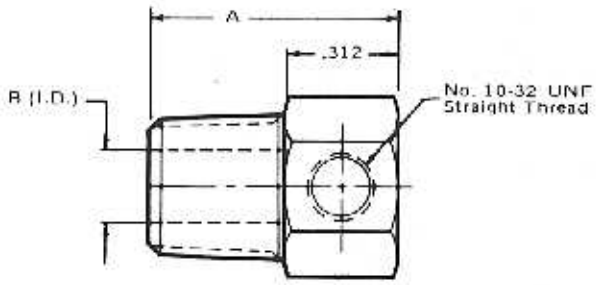


FITTING PART NUMBERS and DIMENSIONS



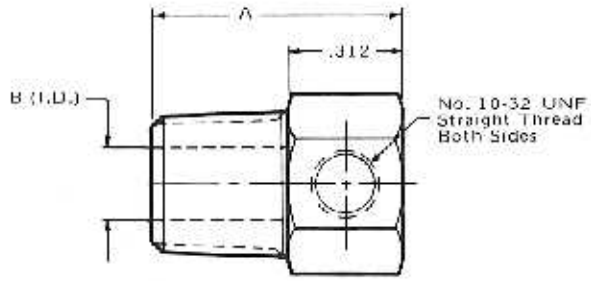
CONNECTOR (TUBE TO MALE THREAD)

PART NUMBER	TUBE O.D. I.D.	MALE THREAD	HEX	A	B
134-223A	1/4 1/8	1/8 NPTF	.438	.84	.109
134-224A	1/4 1/8	10-32 TAPERED	.250	.62	.109
134-236A	1/8 1/16	10-32 TAPERED	.250	.54	.047
134-232A	1/4 1/8	1/4 NPTF	.562	1.11	.109



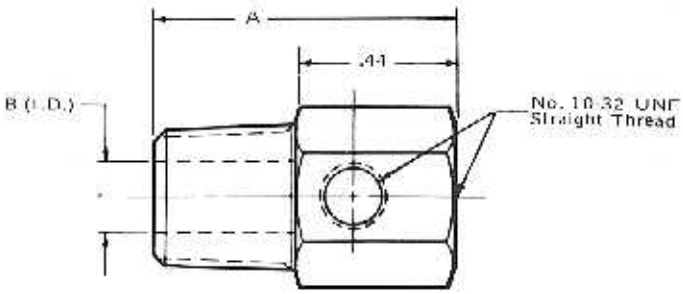
ELBOW (MALE TO FEMALE THREAD)

PART NUMBER	MALE THREAD	HEX	A	B
134-225A	1/8 NPTF	.438	.70	.203
134-226A	10-32 TAPERED	.375	.54	.109
134-231A	1/4 NPTF	.562	.88	.265



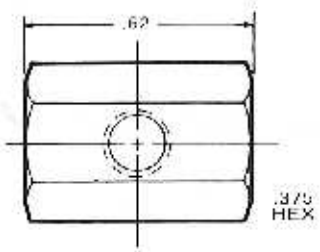
BRANCH TEE (MALE TO FEMALE THREAD)

PART NUMBER	MALE THREAD	HEX	A	B
134-227A	1/8 NPTF	.438	.70	.203
134-228A	10-32 TAPERED	.375	.54	.109
134-235A	1/4 NPTF	.562	.88	.265

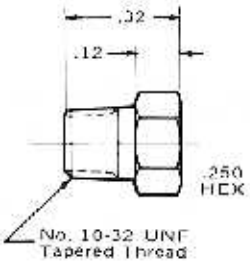


RUN TEE (MALE TO FEMALE THREAD)

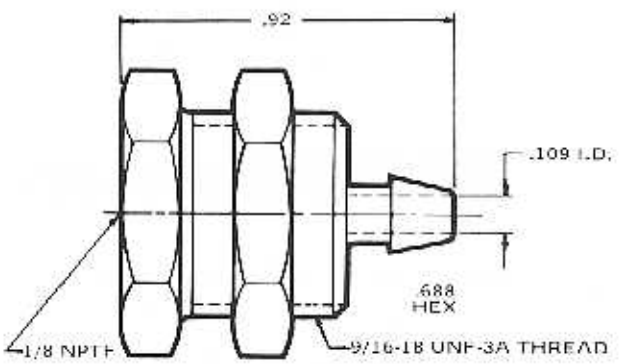
PART NUMBER	MALE THREAD	HEX	A	B
134-233A	10-32 TAPERED	.375	.68	.109
134-234A	1/8 NPTF	.438	.84	.203



LINE TEE 134-229A
Has (3) No. 10-32 UNF
Straight Taps



PLUG 129-127A



BULKHEAD ADAPTER 134-238A
1/4 Tube to 1/8 NPTF Female Thread

TUBE TIE, NYLON	137-102A
STICK-ON TUBE NUMBERS (Consists of 1 card with 36 identical tapes per card. Specify tube number desired when ordering.	137-123P

CONDUIT:

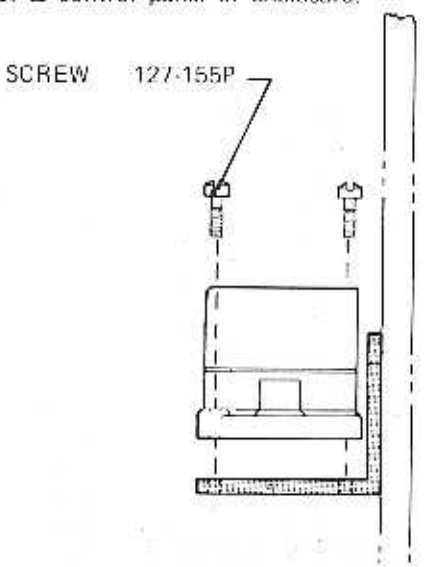
Signal lines extending beyond the Numatrol II control cabinet should be either of hard tubing or enclosed in conduit. The standard practices of installing conduit, as established by the electrical industry, should be followed.

PARTS LIST

DESCRIPTION	NUMBER	NO. OF TUBES	
		REC.	MAX.
1/2" EXTRA FLEXIBLE LIQUID TIGHT CONDUIT	135-108P	3	3
3/4" EXTRA FLEXIBLE LIQUID TIGHT CONDUIT	135-109P	6	7
1" EXTRA FLEXIBLE LIQUID TIGHT CONDUIT	135-110P	9	10
1-1/4" EXTRA FLEXIBLE LIQUID TIGHT CONDUIT	135-111P	16	19
1-1/2" EXTRA FLEXIBLE LIQUID TIGHT CONDUIT	135-116P	25	26

MOUNTING BRACKET KIT, NO. 229-426A:

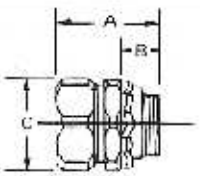
A mounting bracket is available to accept Numatrol II components and which may be mounted on surfaces other than a Numatrol II control panel or enclosure.



ACCESSORIES

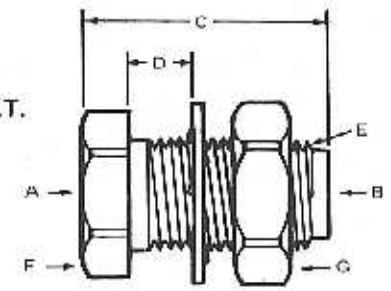
DESCRIPTION	NUMBER
1/2" LIQUID-TIGHT CONDUIT STRAIGHT CONNECTOR	134-153P
3/4" LIQUID-TIGHT CONDUIT STRAIGHT CONNECTOR	134-154P
1" LIQUID-TIGHT CONDUIT STRAIGHT CONNECTOR	134-155P
1-1/4" LIQUID-TIGHT CONDUIT STRAIGHT CONNECTOR	134-156P
1-1/2" LIQUID TIGHT CONDUIT STRAIGHT CONNECTOR	134-162P
FERRULE, 1/2" LIQUID-TIGHT CONNECTOR	134-157P
FERRULE, 3/4" LIQUID TIGHT CONNECTOR	134-158P
FERRULE, 1" LIQUID-TIGHT CONNECTOR	134-159P
FERRULE, 1-1/4" LIQUID-TIGHT CONNECTOR	134-160P
FERRULE, 1-1/2" LIQUID-TIGHT CONNECTOR	134-168P

STRAIGHT CONNECTOR DIMENSIONS



FLEXIBLE CONDUIT SIZE	STD. TAPER PIPE THREAD SIZE	DIMENSIONS*		
		A	B	C
1/2"	1/2" - 14	1.44	.62	1.06
3/4"	3/4" - 14	1.50	.62	1.31
1"	1" - 11-1/2	1.62	.75	1.66
1-1/4"	1-1/4" - 11-1/2	2.00	.62	2.12
1 1/2"	1-1/2" - 11-1/2	2.25	.62	2.50

BULKHEAD ADAPTER
Female P.T. to Female P.T.



DIMENSION CHART

Part Number	A Pipe Thread	B Opening	C Length	D Bulkhead Thickness	E Thread	F Hex	G Hex
134-151P	1/8	.33 (8.3)	1.50 (38.1)	.87 (22.1)	5/8 - 18	.87 (22.1)	.94 (23.8)
134-149P	1/4	.42 (10.7)	.94 (23.8)	.25 (6.4)	3/4 - 16	1.00 (25.4)	1.12 (28.4)
134-150P	1/2	.69 (17.5)	1.50 (38.1)	.62 (15.7)	1-1/8 - 14	1.25 (31.8)	1.50 (38.1)

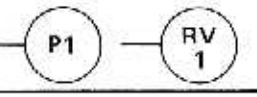
*Left dimension = inches. Right dimension (in parentheses) = millimeters.

MPL LADDER DIAGRAMMING SYMBOLS

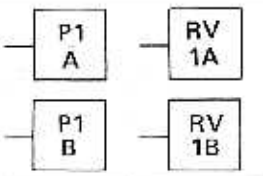
NUMATROL® II
PRODUCT OF NUMATICS, INC

(CONFORMS TO A.N.S.I. STANDARD B93.38 - 1976)

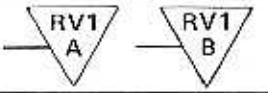
A pilot point on a single pilot action with spring return or automatic return.



Pilot points on a double pilot, detented action.



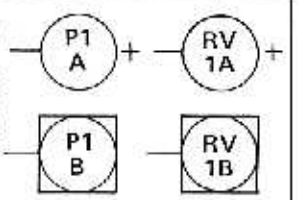
Pilot points on a double pilot, free floating spool action.



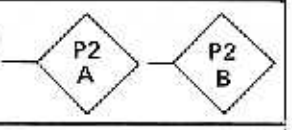
Pilot points on a double pilot, spring offset action:

Circle with + represents the pilot point on the end opposite the spring.

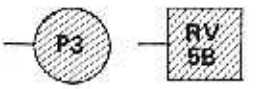
Circle in the square represents the pilot point on the spring end.



Pilot points on a double pilot, 3-position, spring centered power valve.



Cross-hatching indicates pilot points that are pressurized at the start of a normal, automatic cycle.

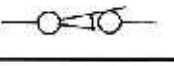


Limit Valves (Flow Paths):

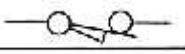
Normally nonpassing



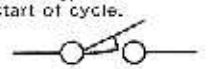
Normally passing



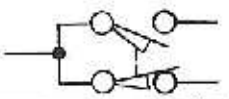
Normally nonpassing, held passing at start of cycle.



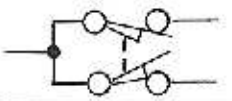
Normally passing, held nonpassing at start of cycle.



4-Way not actuated

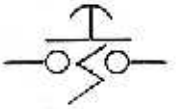


4-Way actuated

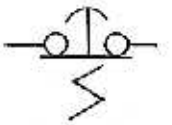


Pushbuttons (Flow Paths):

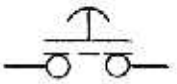
3-Way spring return, normally nonpassing.



3-Way spring return, normally passing.



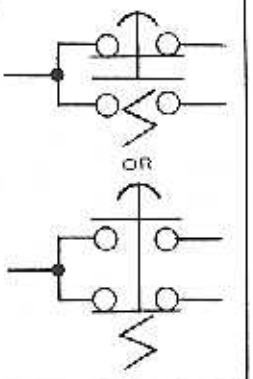
3-Way detented, nonpassing at start of cycle.



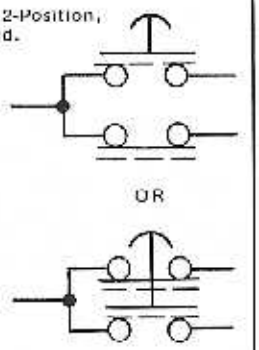
3-Way detented, passing at start of cycle.



4-Way, 2-Position, spring return.

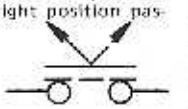


4-Way, 2-Position, detented.



Selectors (Flow Paths):

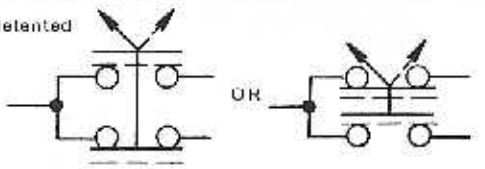
3-Way detented, nonpassing at start of cycle. Left position nonpassing, right position passing.



3-Way detented, passing at start of cycle. Left position passing, right position nonpassing.

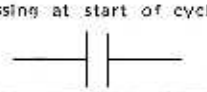


4-Way, detented

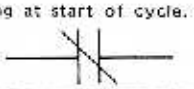


Relays, 3-Way Function (Flow Paths):

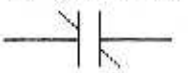
Nonpassing at start of cycle.



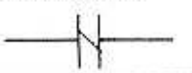
Passing at start of cycle.



Normally passing, held nonpassing at start of cycle.

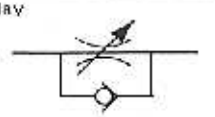


Normally nonpassing, held passing at start of cycle.

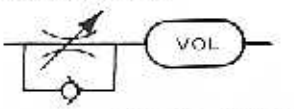


Timers:

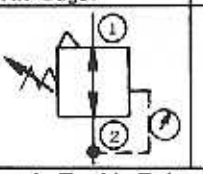
Time Delay



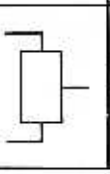
Time Delay with Volume



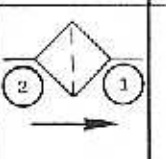
Pressure Regulator With Gage:



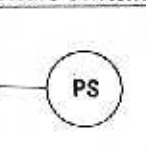
Shuttle:



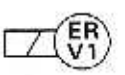
Filter:



Air Operated Pressure Switch:



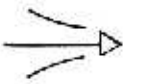
Electric-To-Air Relay (Solenoid Valve):



Remote Pressure:



Jet Orifice:

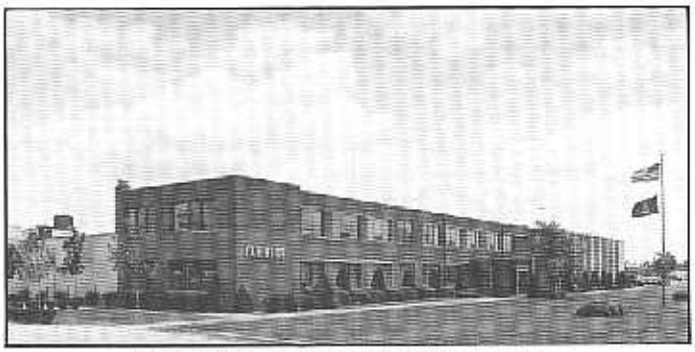


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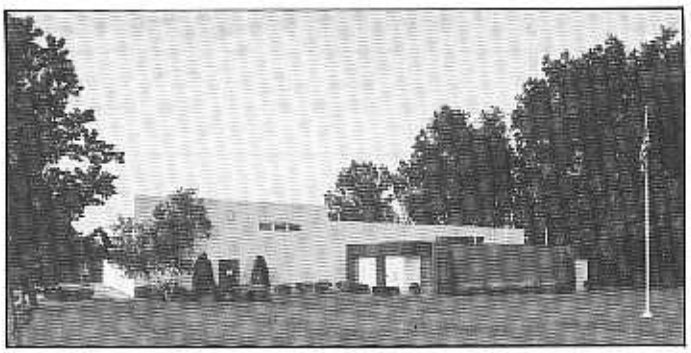
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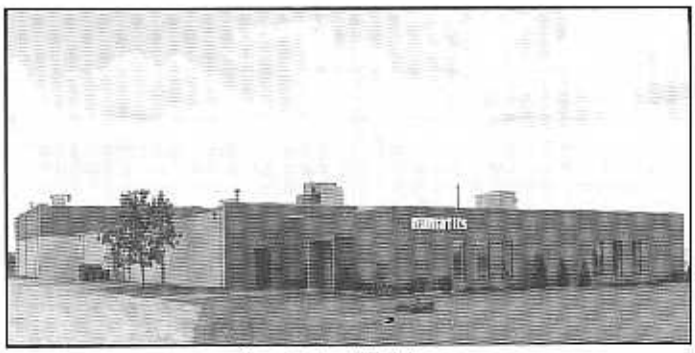
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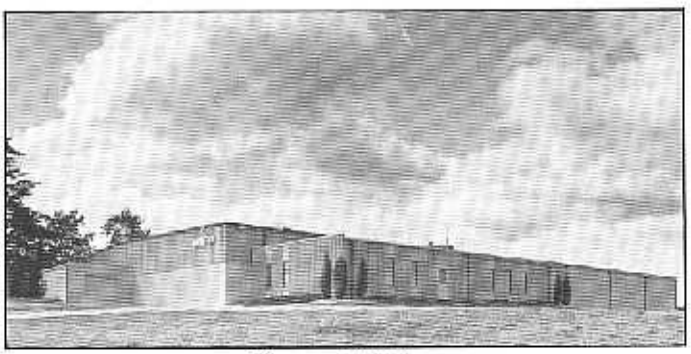
Main Plant - Highland, Michigan U.S.A.



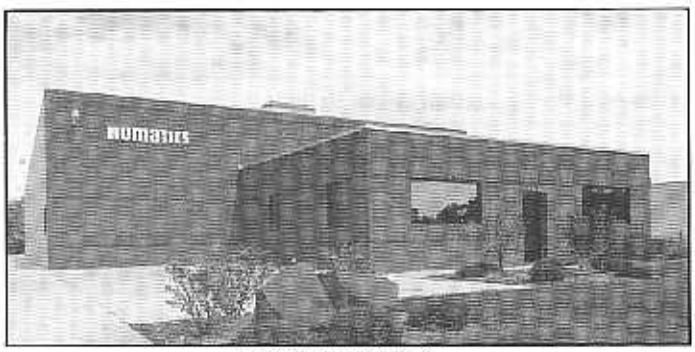
East Highland, Michigan



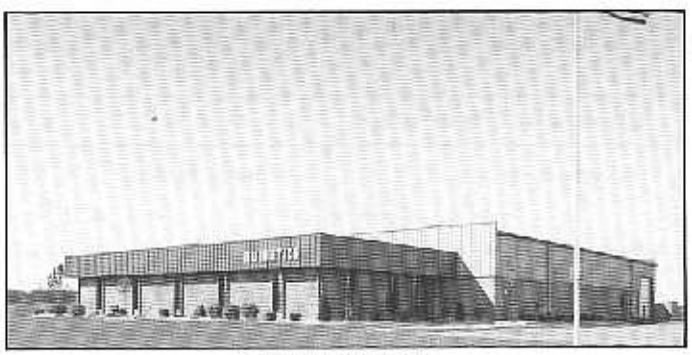
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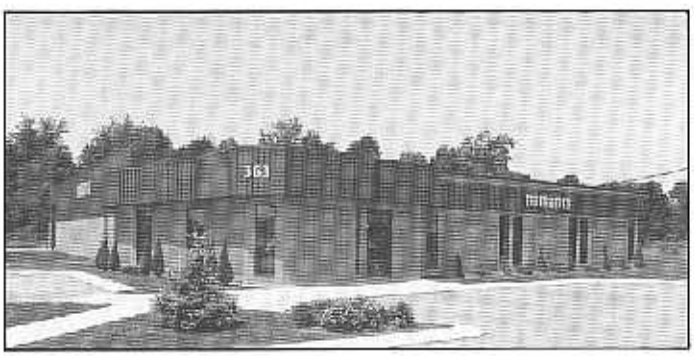
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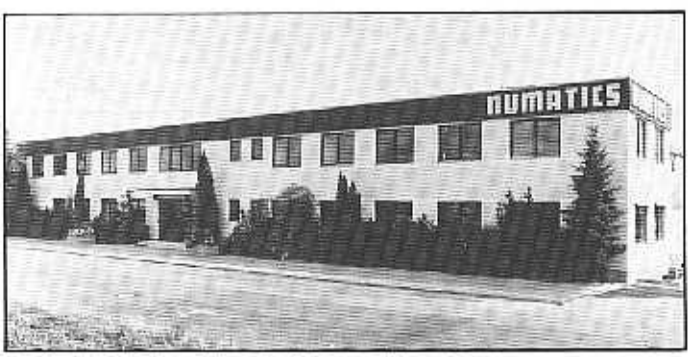
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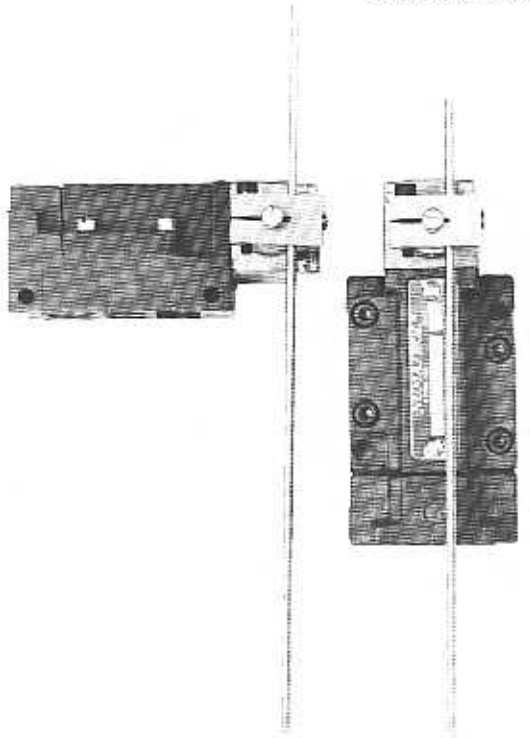
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PRODUCT BULLETIN

1450 N. Milford Road · Highland, Michigan 48031 · (313) 887-4111 · Telex: 23 0340

NNPB-1-75
Issued: June 30, 1975

NUMATROL® II
GRAVITY RETURN LIMIT VALVES



SPECIFICATIONS

Numatics now offers a series of gravity return limits in its Sentinel Line of heavy-duty limit valves. These new limits have very low force characteristics and are designed to return the operator assembly easily by gravity. These new limits have a similar external appearance as the standard Sentinel models, however the various valves and head assemblies are not interchangeable.

The gravity return limits are available as multi-purpose, waterproof 3-way or 5-way valves. A 4-way model is not available since the considerable back pressure created by the Sentinel's open exhaust filter causes a dramatic rise in operating torque, negating the special function of these gravity return limits.

APPLICATIONS

Each gravity return limit is a small, mechanically actuated air valve, ideally suited for counting, transferring or detecting the absence or presence of lightweight items. They may be used, in many cases, to replace proximity switches, jets or electric eyes. All models have a blocked center spool, so there is no possibility of blow-by or cross-bleed from one flow path to another as the valve shifts. They are subplate mounted, the equivalent of a plug-in limit switch. Each subplate has three different sets of mounting holes, providing a variety of mounting possibilities. The head assemblies on these limits may be rotated in 90° increments, providing even greater application flexibility.

Subplates have ports in the bottom and in the end opposite the operator. A conduit adapter option allows the connecting tubing to be run to the end ports through standard electrical conduit. The bottom ports have counter-bores for o-ring seals.

The lever actuator used on these limits must be able to return the valve to its initial condition. There is no internal spring mechanism to accomplish this. A recommended lever assembly and installation data and cam arrangements are shown on page 4.

OPERATING DATA

PRESSURE RANGE: Vacuum to 150 psig.

TEMPERATURE RANGE: -10°F to +150°F ambient.

OPERATING TORQUE: 2 in/ozs. full shift.

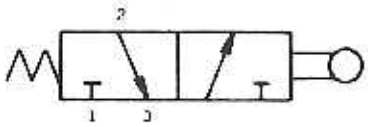
SERVICE: Valves may be used on properly filtered and lubricated air, dry air, vacuum or noncorrosive, nontoxic and nonflammable dry gases.

FLOW CAPACITY: LR Series valves have a C_V of .32. At 80 psig supply pressure, discharging to atmosphere, the flow is 14.7 scfm. See Numatics' Engineering & Technical Data for complete flow chart.

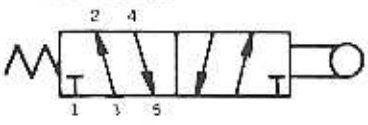
MODEL SELECTION CHART		
MOUNTING OPTION	3-WAY	5-WAY
Valve unit only, no conduit adapter*	LR3-0008	LR5-0008
Valve unit with base, no conduit adapter*	LR3-0206	LR5-0206
*Conduit adapters and lever No. 216-124P must be ordered separately.		

A.N.S.I. SYMBOLS

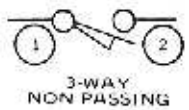
SERIES LR3



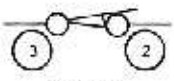
SERIES LR5



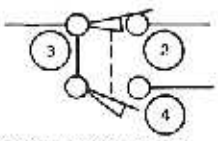
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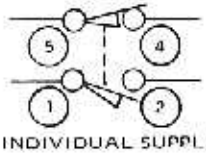
3-WAY
NON PASSING



3-WAY
PASSING



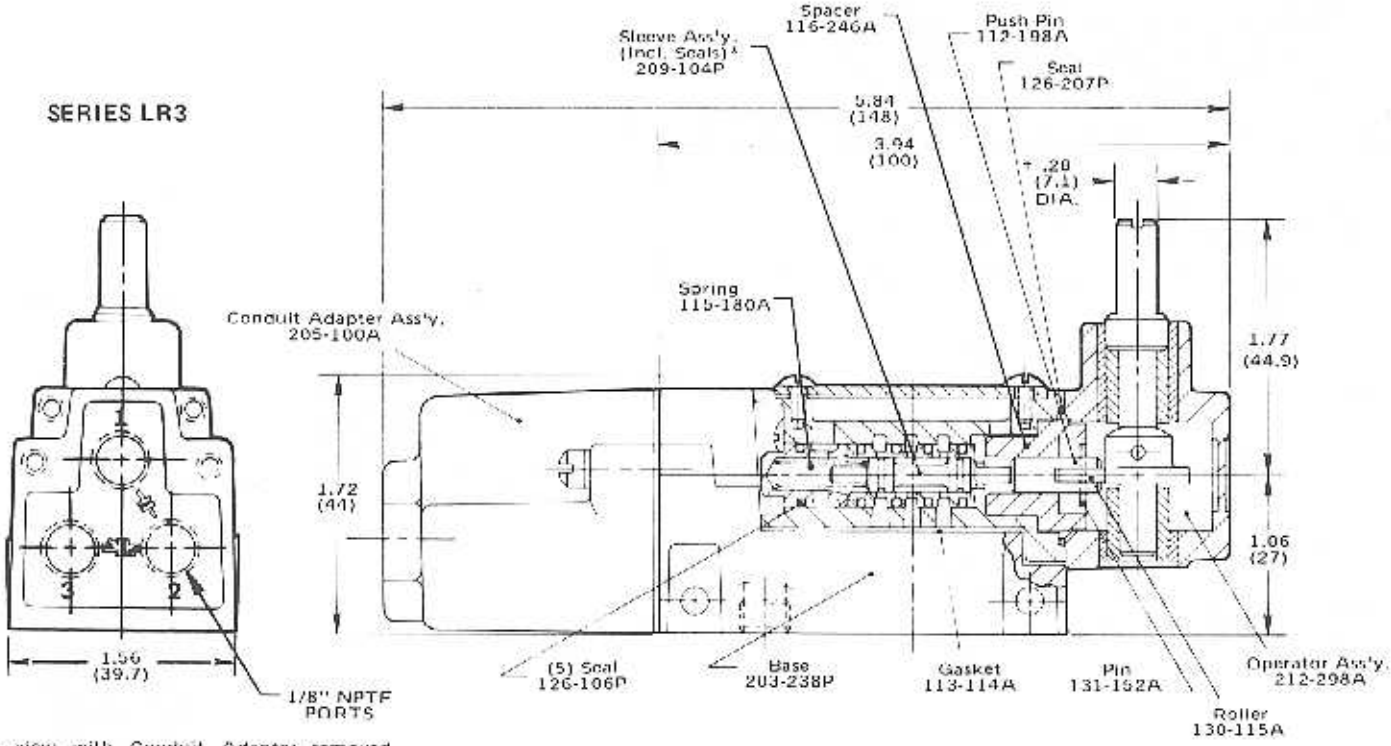
COMMON SUPPLY



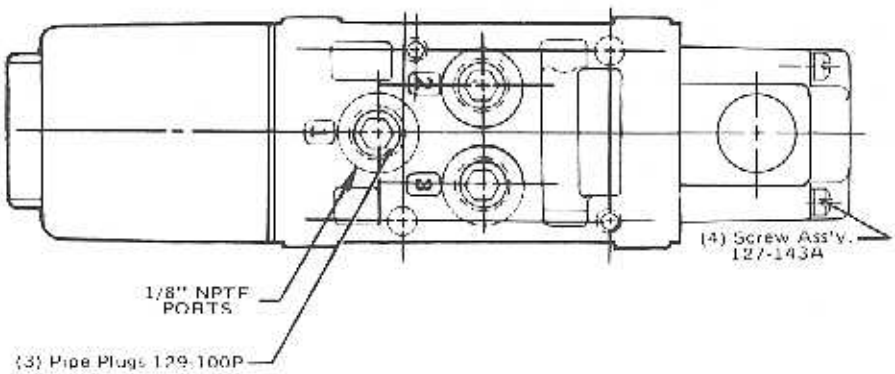
INDIVIDUAL SUPPLY

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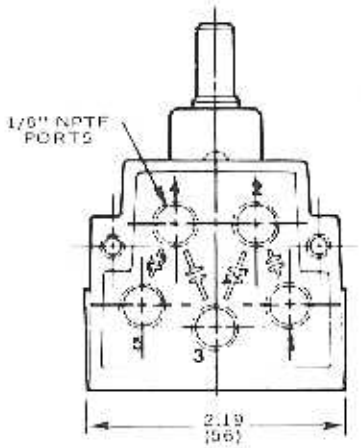
SERIES LR3



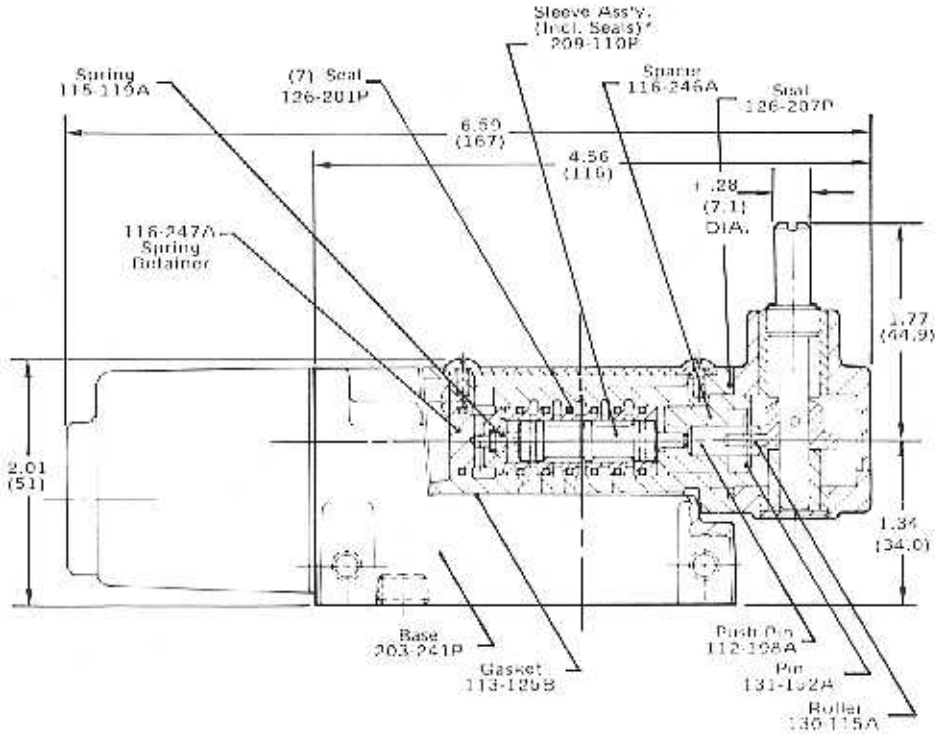
End view with Conduit Adapter removed showing port markings. Flow paths are as shown when valve is not actuated.

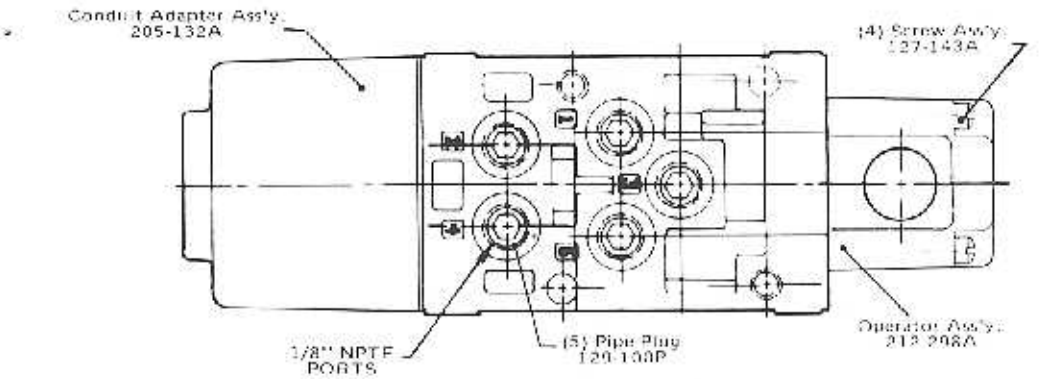


SERIES LR5



End view with Conduit Adapter removed showing port markings. LR5 is a multi-purpose, 5-port valve.





Top dimension = inches
Bottom dimension = millimeters

*This Spool and Sleeve Assembly is sold as a precision matched set only. Spools are not interchangeable.

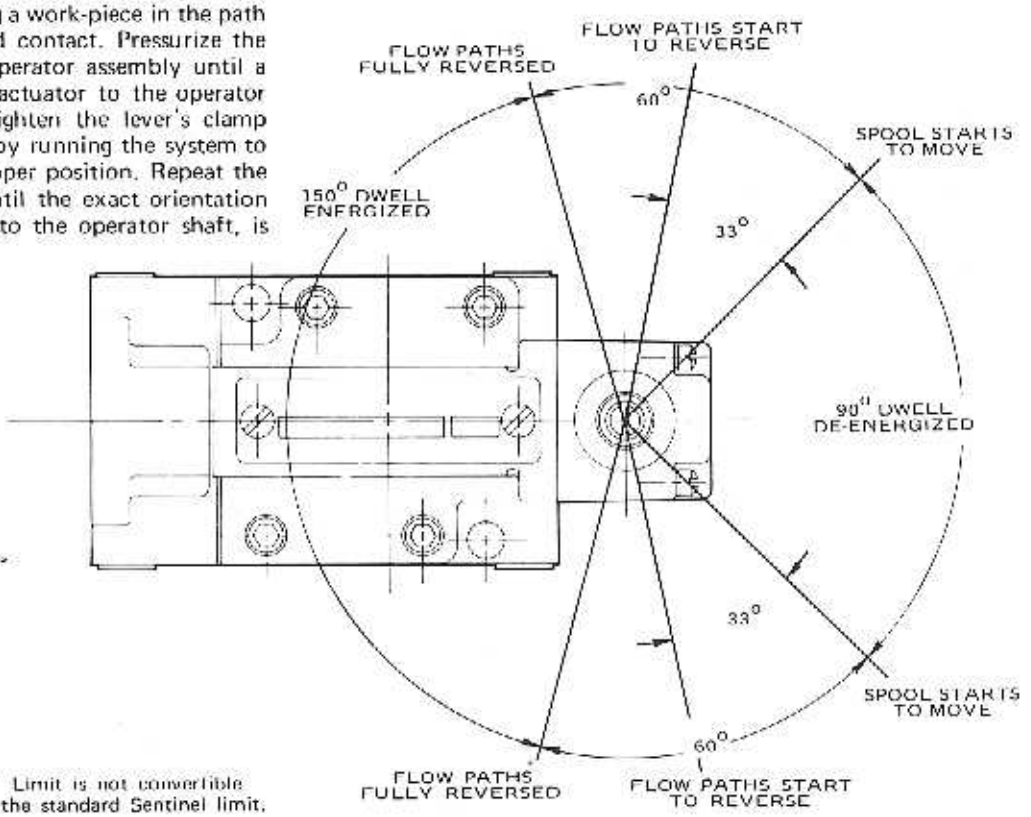
†Operator shaft diameter is different than that of standard Sentinel limit models.

INSTALLATION AND CAM ARRANGEMENT

Figure 1 shows the positions of the lever actuator, relative to the operator assembly shaft, which determine valve operation. The "circle" may be rotated in any increment of the possible 360°, however the relative positions of the energized of de-energized "segments" are always the same. To take full advantage of the valve's flow capacity, the lever actuator must travel 60° for full valve spool shift from full open to full close. However, fewer degrees of travel will produce a signal.

For proper operation, first determine the actuating position desired. This may be done by placing a work-piece in the path of the lever at the point of desired contact. Pressurize the valve, and rotate the shaft of the operator assembly until a signal is obtained. Attach the lever actuator to the operator shaft in the desired position and tighten the lever's clamp assembly. Test the limit's operation by running the system to see if the lever is actuated in the proper position. Repeat the assembly procedure, if necessary, until the exact orientation of the lever assembly, with respect to the operator shaft, is achieved.

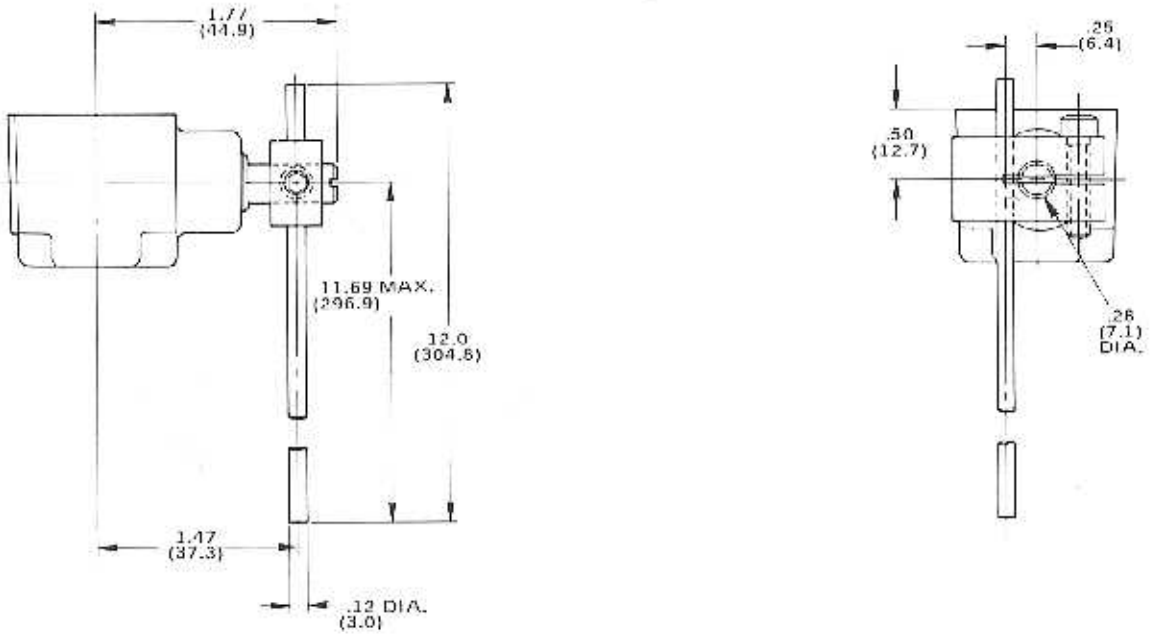
Fig. 1



NOTE: The "Gravity Return" Limit is not convertible to a one-way trip, as the standard Sentinel limit.

Lever Operator Assembly, 216 - 124P

Fig. 2



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