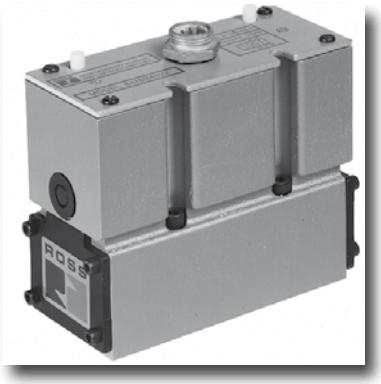
BULLETIN 376

Series 80 and 84

SAE Standard Valves and Bases



• *Manufacturers of Premium Pneumatic Controls since 1921* •

ROSS®

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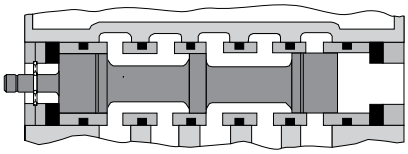
Contents

If you need products or specifications not shown within this bulletin, please contact ROSS for more information or visit ROSS website at www.rosscontrols.com.

Stainless Steel Spool & Sleeve- SAE 80 Series

FEATURES
- Low shifting forces
- No wearing contact
- Balanced spool
- Mechanical detents
- Full 5-port design
- 2 or 3-position types
- No dynamic seals



BENEFITS
- Extremely long service life
- High cycle rates
- Fast response
- Use as 2-, 3-, 4-, or 5-way selector valve
- No seals to wear out
- Very low maintenance

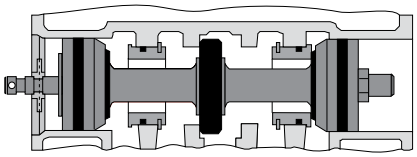
Stainless steel spools move on an extremely thin film of air in the micro-inch clearance between spool and sleeve.

APPLICATIONS
- On high-speed machines
- In food processing
- In dual-pressure circuits
- As little as 15 psi (1 bar) shifts spool

Poppet- SAE 84 Series

Poppet surfaces face-seal against flat poppet seats.

FEATURES
- Large pilot pistons
- Mechanical detents
- Self-cleaning
- Short stroke
- Viton seal option available
- Wear-compensating design.



BENEFITS
- Very dependable
- Tolerant of dirty air
- Positive seating
- Fast response
- Long service life
- Low maintenance
- Repeatability.

APPLICATIONS
- Where there is no lubricated air
- Where the air is dirty (steel mills, glass plants, foundries, and aluminum smelters)
- High-speed machines
- High-temperature environments.

ROSS Valves for SAE Bases

The SAE Standard Interface, though originally developed by U.S. auto companies in the early 1970s, has quickly gained wide acceptance throughout the industry. Due to the design's ruggedness and high-flow characteristics, the Society of Automotive Engineers (SAE) established it as a new standard. This ensures that valves designed to fit the SAE interface will be interchangeable, regardless of manufacturer. In practical terms, the user can change from one brand of valve to another without changing installed bases or manifolds.

ROSS valves are available in SAE sizes 125, 250 and 500. Both poppet and metal spool-and-sleeve construction are offered. The valves described in this bulletin are all solenoid-pilot controlled.

SOLENOID PILOTS

Internal or External Pilot Supply. Valves in this bulletin are made for *internal* pilot supply. However, they are easily converted for use with an external pilot supply by moving a single pipe plug in the bottom of the valve.

With solenoid pilot control, the main valve is shifted by applying air pressure to an actuating piston or spool end. There is no mechanical connection between the solenoid plunger in the pilot and the main valve mechanism as there is in a valve actuated by a direct-acting solenoid. If the valve mechanism were to stick, the plunger in a solenoid-pilot-controlled valve could complete its travel and avoid the high current flow which results when the travel is incomplete. Thus overheating and solenoid burnout are avoided. Furthermore, under average shop conditions, air pressure produces a valve-shifting force much greater than that from a direct-acting solenoid, so that the problem of valve sticking is minimized.

Indicator Lights. An indicator light is wired to each solenoid circuit so that the light is illuminated whenever the solenoid is energized.

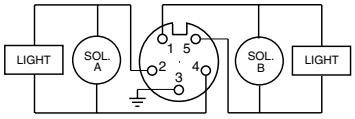
Hard Wiring. An electrical opening, threaded 1/2 NPSC, is available for use with conventional fittings.

ELECTRICAL CONNECTORS

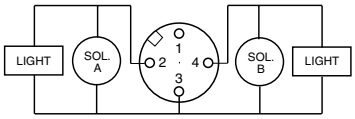
Electrical connections to the valves can be made with sealed 4 or 5-pin connectors (ANSI Standard B93.55) or by conventional hard wiring.

Sealed Connector. A 4 or 5-pin straight connector wired as required by either the Ford Motor Company or the Chrysler Corporation is available. Valves may be ordered with mini- or micro-change connectors. See the wiring diagrams below for the various options available.

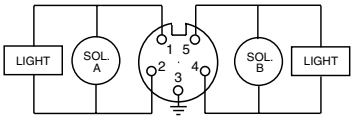
Ford Wired 5-pin mini-connector (all voltages)



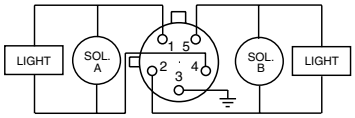
Ford Wired 4-pin micro-connector (24 vdc)



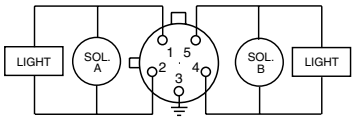
Chrysler Wired 5-pin mini-connector (all voltages)



Chrysler Wired 5-pin micro-connector (24 Volts DC)



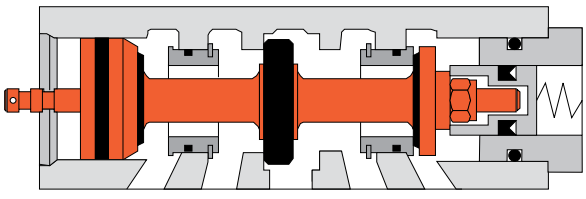
Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz)



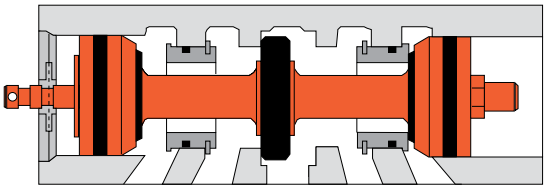
Series 84 Poppet Valve Construction

Poppets are face sealing valve elements which can open or close passageways without sliding friction or the close tolerances required of spool valves. Poppets don't build up breakaway resistance due to varnish, and are highly tolerant of dirty air.

ROSS poppet valves have rugged internals and self-adjusting exhaust poppet seats which equalize wear and promote long life. Designed for use with or without air line lubrication.



Single Control. 5-port, 2-position (5/2) valves that require a maintained signal to keep the valve in its shifted position. Internal air pressure provides the force to return the valve when the signal is removed.



Double Control. 5-port, 2-position (5/2) valves that require only a momentary signal to shift the valve in either direction. A mechanical detent and differential air pressure keep the valve in its shifted postion.

MANUAL OVERRIDES

Each solenoid pilot has a non-locking override button for manual actuation of the valve. For Size 500 valves, locking buttons and extended buttons are also available. See page 9.

VALVE RESPONSE TIME

Average response constants for each valve are listed in the charts on pages 4 thru 6. These constants, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size by using the following formula:

$$\text{Valve Response Time (msec)} = M + (F \bullet V)$$

In this formula, M represents the average time in milliseconds (msec) for the valve parts to move after the valve is energized. F is the average number of milliseconds required for a flow of one standard cubic inch through the valve. V is the number of cubic inches in the volume to be filled or exhausted.

The valve response time given by this formula is the average number of milliseconds required to fill the volume V to 90 per cent of supply pressure, or to exhaust the volume to 10 per cent of supply pressure. Response times will be valid for any pressure in the range specified for the valve under "Standard Specifications."

Note that F values are listed under two headings: "In-Out" and "Out-Exh." The In-Out values are used to calculate *fill* times, and the Out-Exh. values are used to calculate *exhaust* times.

SAMPLE PROBLEM. Using a ROSS double solenoid size 250 poppet valve, how long will it take to fill a 250-cubic-inch chamber to 90% of supply pressure?

SOLUTION. The poppet valves are described on page 4 of this bulletin. From the chart at the bottom of the page, we find that the response constants for a size 250 valve are M = 20 and F = 0.54. Using these values in the response time formula we have:

$$\begin{aligned}\text{Valve Response Time (msec)} &= 20 + (0.54)(250)\\ &= 20 + 135\\ &= 155 \text{ msec}\end{aligned}$$

FLOW RATINGS

IMPORTANT NOTE. Widely different test standards are used by different manufacturers in the determination of Cv ratings of valves. For this reason, the Cv values given in the charts on pages 4, 5, and 6 should not be used in comparing ROSS valves with those of other makers. These Cv values are intended only for use with performance charts published by ROSS.

The Cv ratings in the charts on pages 4, 5, and 6 are averages for the various flow paths through the valve and are for steady flow conditions.

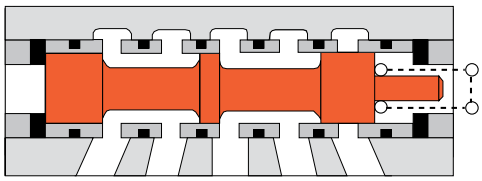
PORT IDENTIFICATION

Ports on bases and line diagrams are designated by the following letters:

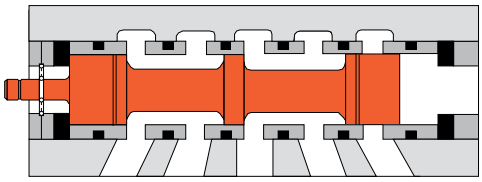
P: Inlet port
A: Outlet port
B: Outlet port
EA: Exhaust port (from port A)
EB: Exhaust port (from port B)
X: External pilot supply port

SERIES 80
Spool Valve Construction

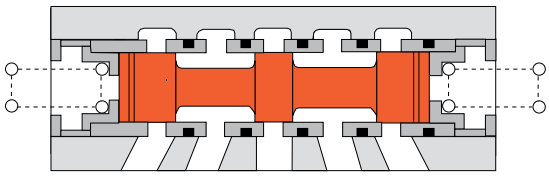
The matched spool and sleeve used in each of these valves is made of precision finished, hardened, stainless steel. The spool moves on a micro-inch film of air between spool and sleeve so that wear is minimized. For use in systems with or without air line lubrication.



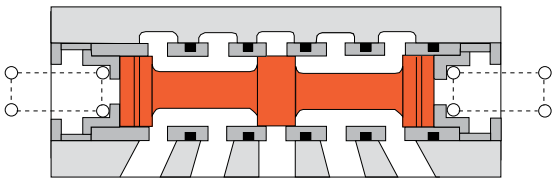
Single Control. 5-port, 2-position (5/2) valves require a maintained signal to keep the valve shifted. A spring provides the return force after the signal is removed.



Double Momentary Control. 5-port, 2-position (5/2) valves require only a momentary signal to shift the valve in either direction. A mechanical detent keeps the valve in its shifted position.



Closed Center, Double Control. 5-port, 3-position (5/3) valves require a maintained signal to shift the valve in either direction from center. In the center position all ports are closed.

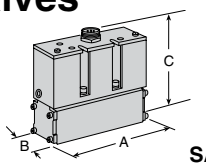


Open Center, Double Control. 5-port, 3-position (5/3) valves require a maintained signal to shift the valve in either direction from center. In the center position the outlet ports are connected to the exhaust ports and the inlet port is closed.

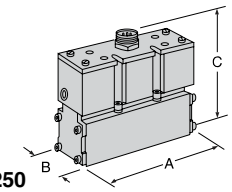
STANDARD SPECIFICATIONS (for valves on page 5**):**
Solenoids: AC or DC power. Rated for continuous duty.
Standard Voltages:
SAE Size 125, 250 models: 100-110 volts, 50 Hz; 100-120 volts, 60 Hz; 24 volts DC; 110 volts DC. For other voltages, consult ROSS.
SAE Size 500 models: 100-110 volts, 50 Hz; 100-120 volts, 60 Hz; 24 volts DC; 110 volts DC. For other voltages, consult ROSS.
Power Consumption: Each solenoid:
SAE Size 125, 250 models: 8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC.
SAE Size 500 models: 87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC.
Indicator Light: One for each solenoid.
Ambient Temperature: 40° to 120°F (4° to 50°C).
Media Temperature: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air; 5 micron recommended.
Inlet Pressure: Vacuum to 150 psig (10 bar).
Pilot Pressure: At least 15 psig (1 bar).
Options: Pressure Controlled Valves–Interposed Pressure Regulators.

Series 80 Spool & Sleeve Valves for SAE Bases

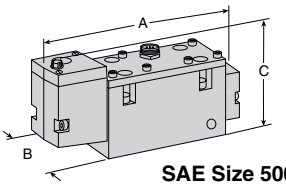
5/2 Spool Valves



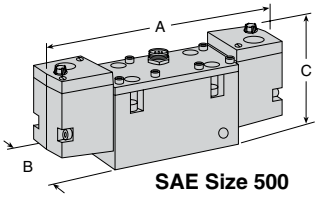
SAE Size 125
Single or Double Solenoid



SAE Size 250
Single or Double Solenoid



SAE Size 500
Single Solenoid



SAE Size 500
Double Solenoid

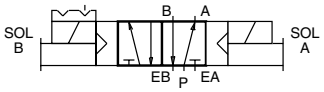
Valve Model Numbers (Base not included)

SAE Size	Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz)	Chrysler Wired 5-pin micro-connector (24 Volts DC)	Ford Wired 5-pin mini-connector (all voltages)	Chrysler Wired 5-pin mini-connector (all voltages)	Hardwire	Ford Wired 4-pin micro-connector (24 Volts DC)	Avg. C_v
Single Solenoid Pilot Valves							
125	8076C3311	8076C3321	8076C3331	8076C3341	8076C3351	8076C3361	1.4
250	8076C4311	8076C4321	8076C4331	8076C4341	8076C4351	8076C4361	4.0
500	8076B6311	8076B6321	8076B6331	8076B6341	8076B6351	8076B4361	8.2
Double Solenoid Pilot Valves							
125	8076C3312	8076C3322	8076C3332	8076C3342	8076C3352	8076C3362	1.4
250	8076C4312	8076C4322	8076C4332	8076C4342	8076C4352	8076C4362	4.0
500	8076B6312	8076B6322	8076B6332	8076B6342	8076B6352	8076B6362	8.0

*Bases and manifolds on pages 7-9.

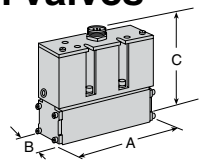
Note: For wiring diagrams, see page 3.

Single Solenoid

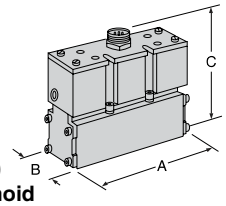


Double Solenoid

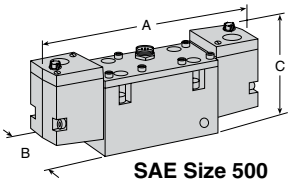
5/3 Spool Valves



SAE Size 125
Double Solenoid



SAE Size 250
Double Solenoid



SAE Size 500
Double Solenoid

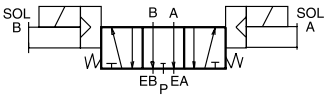
Valve Model Numbers (Base not included)

SAE Size	Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz)	Chrysler Wired 5-pin micro-connector (24 Volts DC)	Ford Wired 5-pin mini-connector (all voltages)	Chrysler Wired 5-pin mini-connector (all voltages)	Hardwire	Ford Wired 4-pin micro-connector (24 Volts DC)	Avg. C_v
Power Center Solenoid Pilot Valves							
125	–	–	8077B3910	8077B3904	–	–	1.4
250	–	–	8077A4907	8077A4904	–	–	4.0
Single Solenoid Pilot Valves							
125	8077C3312	8077C3322	8077C3332	8077C3342	8077B3352	8077C3362	1.4
250	8077C4312	8077C4322	8077C4332	8077C4342	8077C4352	8077C4362	4.0
500	8077B6312	8077B6322	8077B6332	8077B6342	8077B6352	8077B6362	8.0
Closed Center Solenoid Pilot Valves							
125	8077C3312	8077C3322	8077C3331	8077C3341	8077C3351	8077C3362	1.4
250	8077C4312	8077C4322	8077C4331	8077C4341	8077C4351	8077C4362	4.0
500	8077B6312	8077B6322	8077B6331	8077B6341	8077B6351	8077B6362	8.0

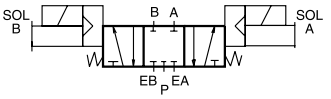
*Bases and manifolds on pages 7-9.

Note: For wiring diagrams, see page 3.

Power Center



Open Center



Closed Center

Measurements: Dimensions & Weights

5/2 Spool Valves

SAE Size	Dimensions inches (mm) A	B	C	Weight lb (kg)
Single Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	3.5 (1.6)
250	7.3 (185)	2.6 (65)	5.6 (142)	6.5 (2.9)
500	10.1 (257)	3.0 (76)	4.8 (121)	8.3 (3.7)
Double Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	3.5 (1.6)
250	7.3 (185)	2.6 (65)	5.6 (142)	7.0 (3.2)
500	11.2 (285)	3.0 (76)	4.8 (121)	9.5 (4.3)

5/3 Spool Valves

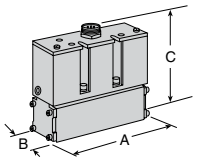
SAE Size	Dimensions inches (mm) A	B	C	Weight lb (kg)
Power Center Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	3.5 (1.6)
250	7.3 (185)	2.6 (65)	5.6 (142)	6.5 (2.9)
Open Center Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	3.5 (1.6)
250	7.3 (185)	2.6 (65)	5.6 (142)	7.0 (3.2)
500	12.0 (306)	3.0 (76)	4.8 (121)	9.5 (4.3)
Closed Center Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	3.5 (1.6)
250	7.3 (185)	2.6 (65)	5.6 (142)	7.0 (3.2)
500	12.0 (306)	3.0 (76)	4.8 (121)	9.5 (4.3)

STANDARD SPECIFICATIONS: See page 4.

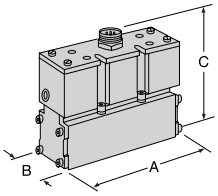
Note: For wiring diagrams, see page 3.

Series 84 Poppet Valves for SAE Bases

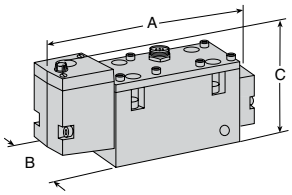
Series 84 Poppet Valves



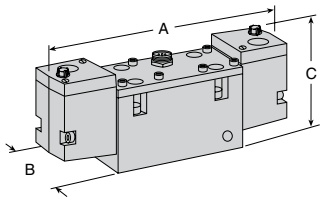
SAE Size 125
Single or Double Solenoid



SAE Size 250
Single or Double Solenoid

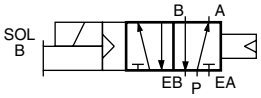


SAE Size 500
Single Solenoid

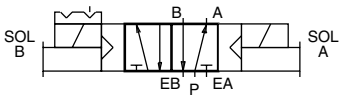


SAE Size 500
Double Solenoid

Single Solenoid



Double Solenoid



Valve Model Numbers (Base not included)

SAE Size	Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz)	Chrysler Wired 5-pin micro-connector (24 Volts DC)	Ford Wired 5-pin mini-connector (all voltages)	Chrysler Wired 5-pin mini-connector (all voltages)	Hardwire	Ford Wired 4-pin micro-connector (24 Volts DC)	Avg. C_v
Single Solenoid Pilot Valves							
125	8476C3311	8476C3321	8476C3331	8476C3341	8476C3351	8076C3361	1.8
250	8476C4311	8476C4321	8476C4331	8476C4341	8476C4351	8076C4361	5.5
500	8476B6311	8476B6321	8476B6331	8476B6341	8476B6351	8076B4361	7.9
Double Solenoid Pilot Valve							
125	8476C3312	8476C3322	8476C3332	8476C3342	8476C3352	8476C3362	1.8
250	8476C4312	8476C4322	8476C4332	8476C4342	8476C4352	8476C4362	5.7
500	8476B6312	8476B6322	8476B6332	8476B6342	8476B6352	8476B6362	7.6

*Bases and manifolds on pages 7-9.

IMPORTANT NOTE:

The C_v values given in this publication should not be used in comparing ROSS valves with those of other makers. These C_v values are intended only for use with performance charts published by ROSS. The C_v ratings listed in this bulletin are averages for the various flow paths through the valve and are for steady flow conditions.

SAE Size	Dimensions inches (mm) A	B	C	Weight lb (kg)
Single Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	2.8 (1.3)
250	7.3 (185)	2.6 (65)	5.6 (142)	5.2 (2.4)
500	10.1 (257)	3.0 (76)	4.8 (121)	7.7 (3.5)
Double Solenoid Pilot Valves				
125	5.5 (140)	1.8 (45)	5.1 (129)	3.3 (1.5)
250	7.3 (185)	2.6 (65)	5.6 (142)	5.7 (2.6)
500	11.2 (285)	3.0 (76)	7.1 (180)	8.9 (4.1)

STANDARD SPECIFICATIONS: For valves on this page.
Solenoids: AC or DC power. Rated for continuous duty.
Standard Voltages:
SAE Size 125, 250 models: 100-110 volts, 50 Hz; 100-120 volts, 60 Hz; 24 volts DC; 110 volts DC. For other voltages, consult ROSS.
SAE Size 500 models: 100-110 volts, 50 Hz; 100-120 volts, 60 Hz; 24 volts DC; 110 volts DC. For other voltages, consult ROSS.
Power Consumption: Each solenoid:
SAE Size 125, 250 models: 8 VA inrush; 6 VA holding on 50/60 Hz; 8 watts on DC.
SAE Size 500 models: 87 VA inrush; 30 VA holding on 50/60 Hz; 14 watts on DC.
Indicator Light: One for each solenoid.
Ambient Temperature: 40° to 120°F (4° to 50°C).
Media Temperature: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air; 5 micron recommended.
Inlet Pressure: 30 to 150 psig (10 bar).
Pilot Pressure: Must be equal to or greater than inlet pressure.
Options: Pressure Controlled Valves–Interposed Pressure Regulators.

IMPORTANT NOTE: Please read carefully and thoroughly all of the **CAUTIONS** on the inside back cover.

Sub-Bases for Series 80 & 84 SAE Valves

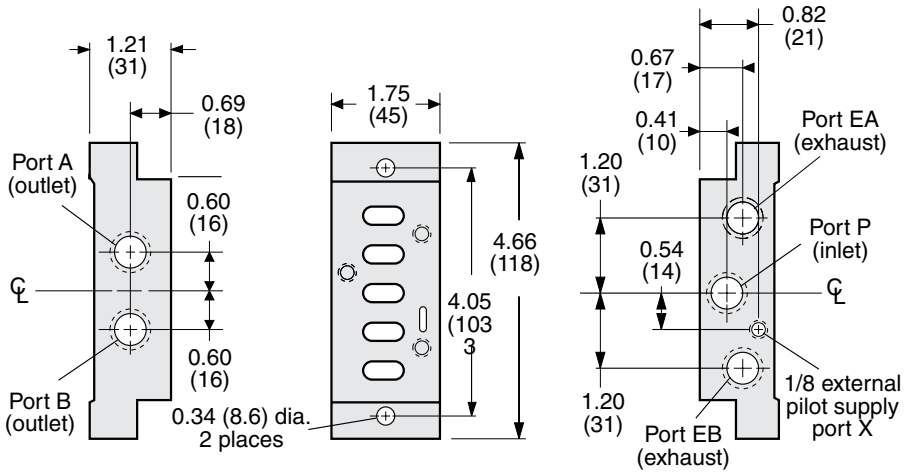
Side-Ported

Dimensions: inches (mm)

SAE Size 125

Sub-Base Number	Port Size* A, B	P, EA, EB
577K91	1/8	1/4
578K91	1/4	3/8
579K91	3/8	3/8

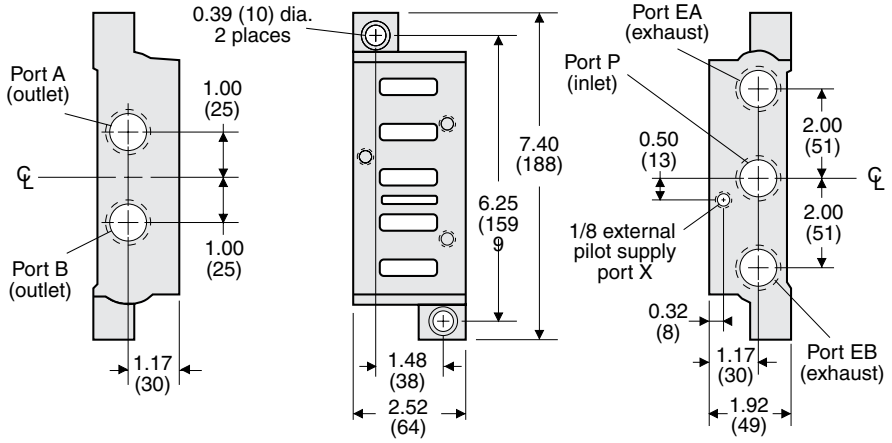
*NPT threads. For SAE threads, consult ROSS.



SAE Size 250

Sub-Base Number	Port Size* A, B	P, EA, EB
539K91	1/4	3/8
540K91	3/8	1/2
541K91	1/2	1/2
542K91	3/4	3/4

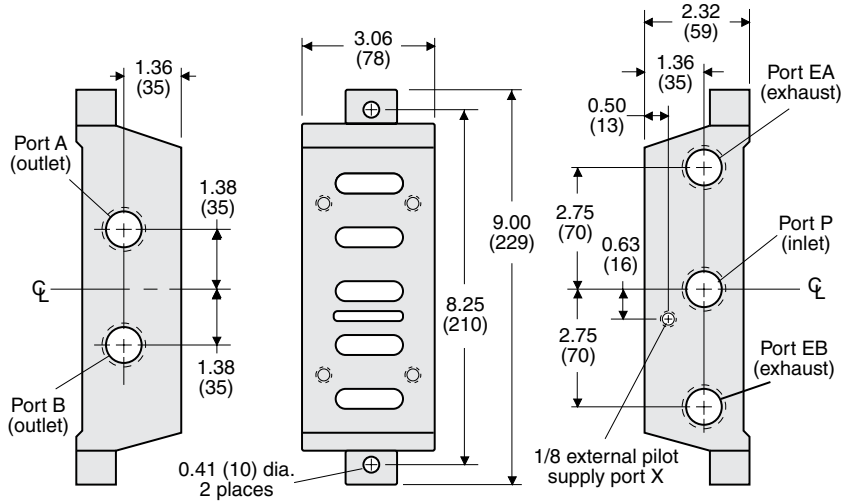
*NPT threads. For SAE threads, consult ROSS.



SAE Size 500

Sub-Base Number	Port Size* A, B	P, EA, EB
582K91	1/2	3/4
728K91	3/4	3/4
583K91	3/4	1
584K91	1	1

*NPT threads. For SAE threads, consult ROSS.



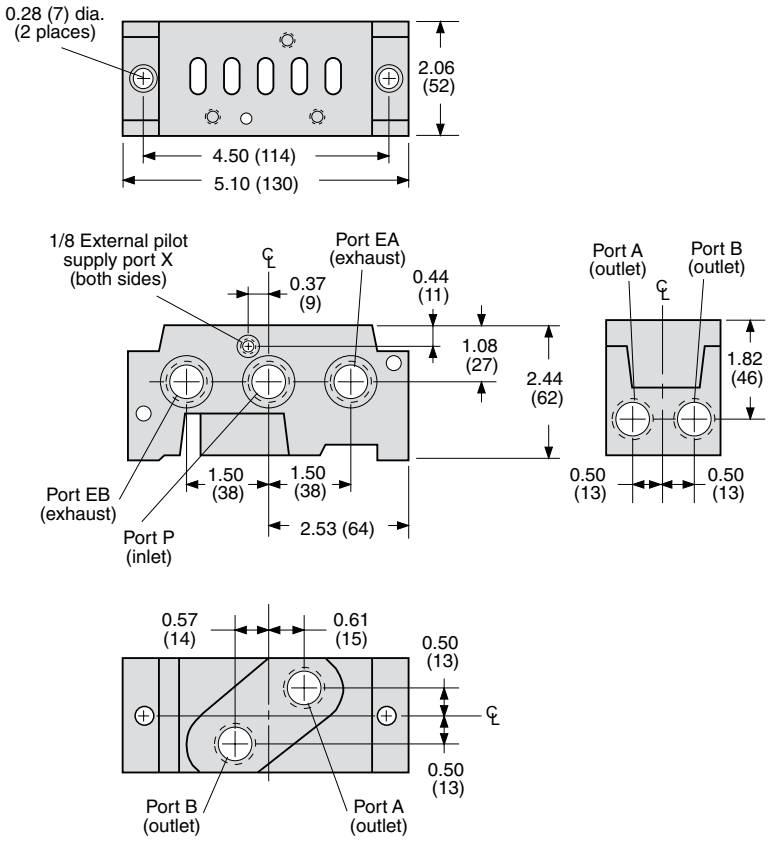
Manifolds for Series 80 & 84 SAE Valves

SAE Size 125 Manifold Stations

Dimensions: inches (mm)

Station Number	Port Sizes* A, B	P, EA, EB
580K91	1/4	3/8
581K91	3/8	3/8

*NPT threads. For SAE threads, consult ROSS.



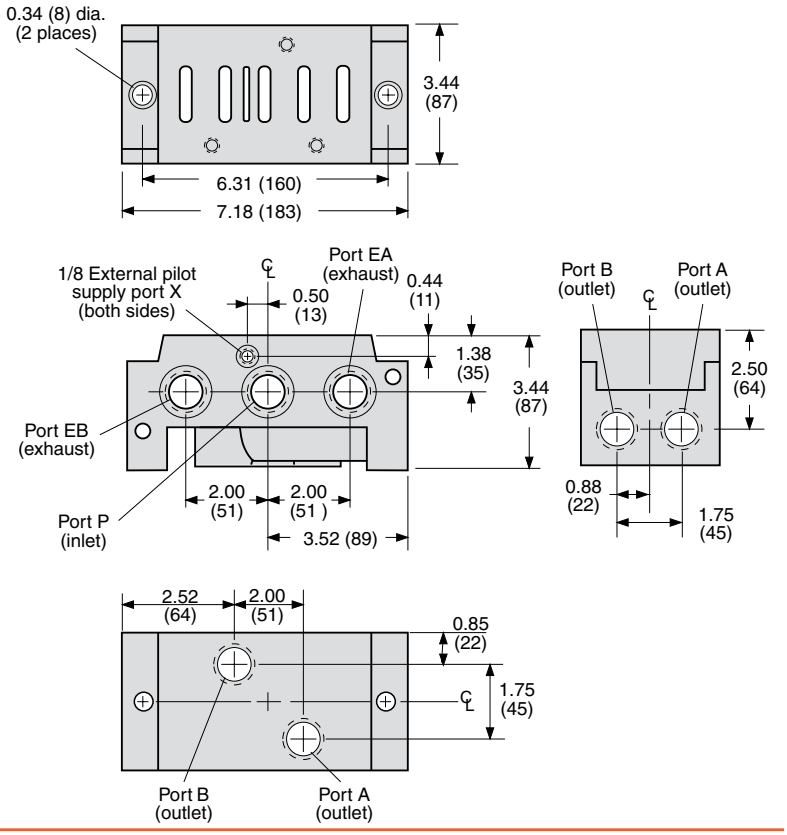
Each manifold station is supplied with all necessary seals and hardware for assembly. End plates are *not* required with these manifolds. Each station has all ports threaded to accept piping.

Blanking Plate: For manifold stations not occupied by a valve, blanking plates are available. These plates block the unused air passages.
Order by part number **820K77.**

SAE Size 250 Manifold Stations

Station Number	Port Sizes* A, B	P, EA, EB
553K91	3/8	1/2
554K91	1/2	3/4
555K91	3/4	3/4

*NPT threads. For SAE threads, consult ROSS.



Each manifold station is supplied with all necessary seals and hardware for assembly. End plates are *not* required with these manifolds. Each station has all ports threaded to accept piping.

Blanking Plate: For manifold stations not occupied by a valve, blanking plates are available. These plates block the unused air passages.
Order by part number **821K77.**

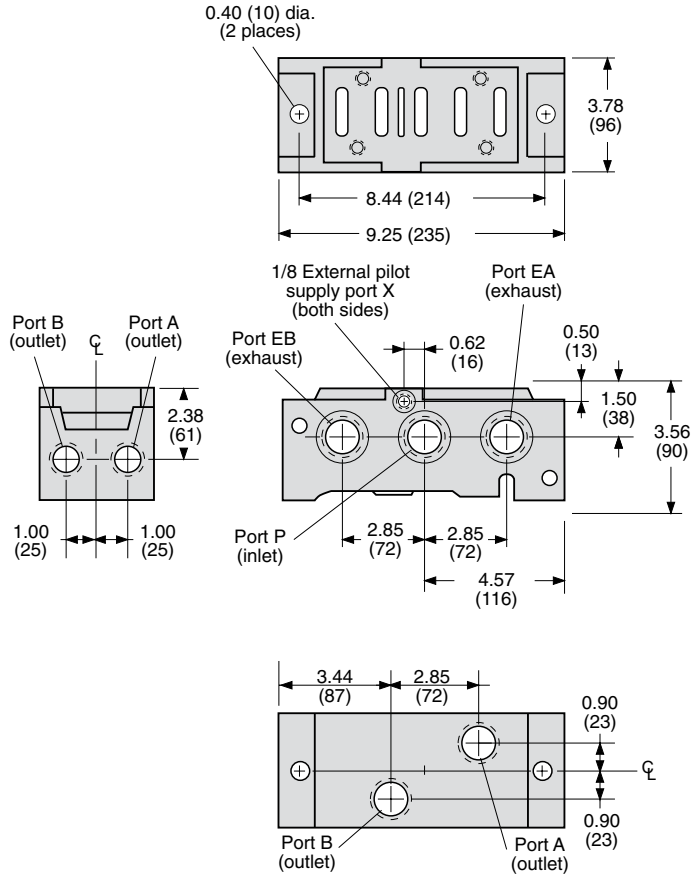
Manifolds for Series 80 & 84 SAE Valves

SAE Size 500 Manifold Stations

Dimensions: inches (mm)

Station Number	Port Sizes* A, B	P, EA, EB
585K91	1/2	3/4
586K91	3/4	1
587K91	1	1

*NPT threads. For SAE threads, consult ROSS.

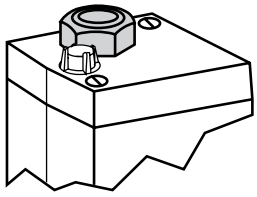


Each manifold station is supplied with all necessary seals and hardware for assembly. End plates are *not* required with these manifolds. Each station has all ports threaded to accept piping.

Blanking Plate: For manifold stations not occupied by a valve, blanking plates are available. These plates block the unused air passages.
Order by part number **822K77.**

Accessories

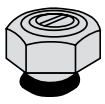
Manual Override Kits for SAE Size 500 Valve



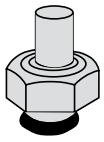
Flush metal buttons (shown at left as installed) are of either the locking or non-locking type. The extended button (see below) is the non-locking type.

Order by the kit numbers below:

Flush Button
Non-locking 790K87
Locking 792K87



Extended Button
Non-locking 791K87



Interposed Regulators

Both single and dual interposed regulators are available for SAE sizes 125 and 250.

A regulator is sandwiched between the valve and sub-base or manifold station and the valve is then bolted through the regulator to the sub-base or manifold station with the longer bolts provided.

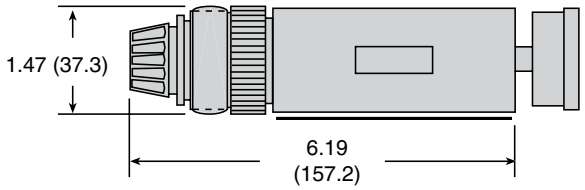
Single pressure regulators supply the same regulated pressure at both outlet ports.

Dual pressure regulators allow the pressure at each outlet port to be set independently.

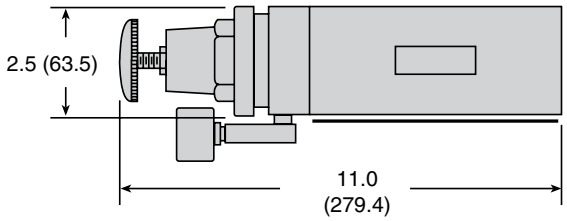
Use dual pressure regulators with 80 Series valves only. When using dual pressure regulators, the valve must be externally piloted.

Regulated pressure range:
10 – 130 psig (regulator-to-base gasket included).

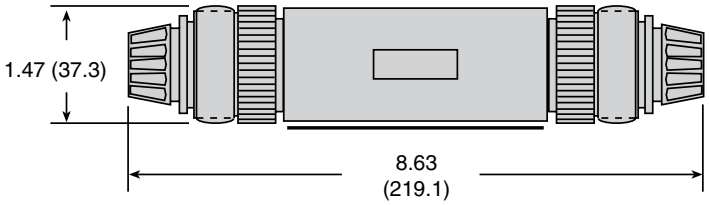
SAE Size 125 – Single: 593K91



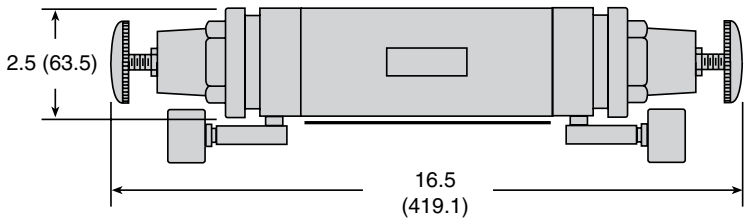
SAE Size 250 – Single: 595K91



SAE Size 125 – Dual: 873H91



SAE Size 250 – Dual: 816H91



Cautions

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked-out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury. If you have questions regarding whether a lubricant used on your system is compatible with ROSS products, please contact ROSS.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and manual **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

STANDARD WARRANTY

All products sold by ROSS CONTROLS are warranted for a one-year period [with the exception of all Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven years] from the date of purchase to be free of defects in material and workmanship. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty becomes void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering.

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ROSS CONTROLS
Troy, MI., U.S.A.
Telephone: + 1-248-764-1800
Fax: + 1-248-764-1850
In the United States:
Customer Service: 1-800-GET ROSS (438-7677)
Technical Service: 1-888-TEK-ROSS (835-7677)
www.rosscontrols.com

ROSS EUROPA GmbH
Langen, Germany
Telephone: + 49-6103-7597-0
Fax: + 49-6103-74694
Email: info@rosseuropa.com
www.rosseuropa.com

ROSS ASIA K.K.
Kanagawa, Japan
Telephone: + 81-427-78-7251
Fax: + 81-427-78-7256
www.rossasia.co.jp

ROSS UK Ltd.
Birmingham, United Kingdom
Telephone: + 44-121-559-4900
Fax: + 44-121-559-5309
Email: sales@rossuk.co.uk

ROSS CONTROLS INDIA Pvt. Ltd.
Chennai, India
Telephone: + 91-44-2624-9040
Fax: + 91-44-2625-8730
Email: rossindia@airtelmail.in

ROSS SOUTH AMERICA Ltda.
São Paulo, Brazil CEP 09725-020
Telephone: + 55-11-4335-2200
Fax: + 55-11-4335-3888
Email: vendas@ross-sulamerica.com.br

DIMAFLUID s.a.s.
Saint Ouen, France
Telephone: + 33-01-49-45-65-65
Fax: + 33-01-49-45-65-30
Email: dimafluid@dimafluid.com
www.dimafluid.com

ROSS CONTROLS (CHINA) Ltd.
Shanghai, China
Telephone: + 86-21-6915-7951
Fax: + 86-21-6915-7960
Email: alvinzhurong@vip.163.com
www.rosscontrolschina.com

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This catalog presents an overview of the extensive ROSS product line. Other literature is available for engineering, maintenance, and service requirements. If you need products or specifications not shown here, please contact ROSS or your ROSS distributor. They will be happy to assist you in selecting the best product for your application.

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