

Pneumatic Division

Richland, Michigan USA

www.parker.com/pneumatics**125 / 250 SAE AUTOMOTIVE SERIES**

Document Number		Description	
<input type="checkbox"/>	V581P	Rev. 6	125 Valve, Installation & Service Instructions
<input type="checkbox"/>	V585P	Rev. 1	Auto 125 / 250 Sandwich Regulators, Installation & Service Instructions
<input type="checkbox"/>	V590P	Rev. 4	250 Valves, Installation Instructions
<input type="checkbox"/>	V591P		250 Valves, Service Instructions
<input type="checkbox"/>	V592P		250 Valves Subbase & Manifold, Installation Instructions
<input type="checkbox"/>	V595P	Rev. 1	Auto 250B Valve, Installation & Service Instructions
<input type="checkbox"/>	V596P	Rev. 1	Auto 250B Subbase & Manifold, Installation & Service Instructions
<input type="checkbox"/>	Safety Guide		PDN Safety Guide



Visit www.pdnplu.com for additional instruction sheets.



Pneumatic Division
Richland, Michigan 49083

Installation & Service Instructions
V581P

125 Series Valves

ISSUED: February, 2002

Supersedes: November, 2001

Doc.# V-581P, ECN# P28822, Rev. 6

! WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer's specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

Units with Flying Leads

Use wires marked "A" for Solenoid "A". Use wires marked "B" for Solenoid "B". For units with DC solenoids and indicator lights, and / or arc suppression coils, red wire is (+) positive, white wire is (-) negative .

! CAUTION: DC solenoids with indicator lights and/or arc suppression coils are polarity sensitive. Observe polarities indicated above

Earth ground: All electrically operated valves must be provided a proper earth ground. Remove the end cover of the manifold or subbase and connect a ground lead to the green ground screw.

NOTE: In addition to the above instructions, follow all requirements for local and national electrical codes.

Service Procedures

NOTE: All cleaning of parts to be done with mineral spirits or equivalent cleaning solution. Grease should be a mineral based lubricant (Magnalube G). All parts showing nicks, scratches or other signs of wear or damage should be replaced.

Valve Service (Use Kit K352386)

1. Mark end sections to ensure reassembly on the proper end. Remove two socket head screws (A) from each end section and detach.

NOTE: The end sections on valve model numbers ending in "A" with 3 and 5-pin connectors cannot be detached. Sufficient wire length has been provided for service access.

- Remove spring (B) (where applicable).
2. Remove spool (C) and clean.
3. Remove molded seal (D) from each end of body and discard.
4. Remove end spacers (E), spacers (F), seal retainers (G) and o-rings (H & J). Discard o-rings. Clean body and all retained parts.
5. Lightly grease new o-rings (H & J) and install onto seal retainers.
6. Using the spool as a mandrel, begin reassembly by sliding a seal retainer (outside o-ring (H) facing downward) over the

Introduction

Follow these instructions when installing, operating, or servicing the product.

Application Limits

These products are intended for use in general purpose compressed air systems only.

Operating pressure range:	PSIG	bar	kPa
Minimum*	35	2.41	241
Maximum (Standard)	150	10.34	1034
(Low Watt)	100	6.89	689

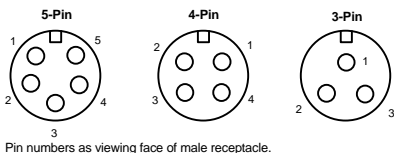
* For lower pressure or vacuum operation, solenoid(s) may be externally piloted (35 psig min.) following the conversion procedure on these instructions.

Operating Temperature Range: 20°F (7°C) to 140°F (60°C)

Voltage Range: +10% to -15% of rating

Wiring Instructions

Units with 3-Pin, 4-Pin or 5-Pin Connectors



	Option 3 SAE J2051	Option 4 General Motors	Option 5 Chrysler	Option 6 4-Pin Male Connector	3-Pin Male Connector
Pin No.	Function	Function	Function	Function	Function
1	Sol B (+)	Sol A (+)	Sol A (+)	—	Ground
2	Sol A (+)	Sol B (+)	Sol A (-)	Sol A (+)	Sol B (+)
3	Ground	Ground	Ground	Common (-)	Sol B (-)
4	Sol A (-)	Sol B (-)	Sol B (-)	Sol B (+)	—
5	Sol B (-)	Sol A (-)	Sol B (+)	—	—

Note: Solenoid B is wired for single solenoid valves. Option Number is seventh digit of the Model Number.

WARNING

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

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

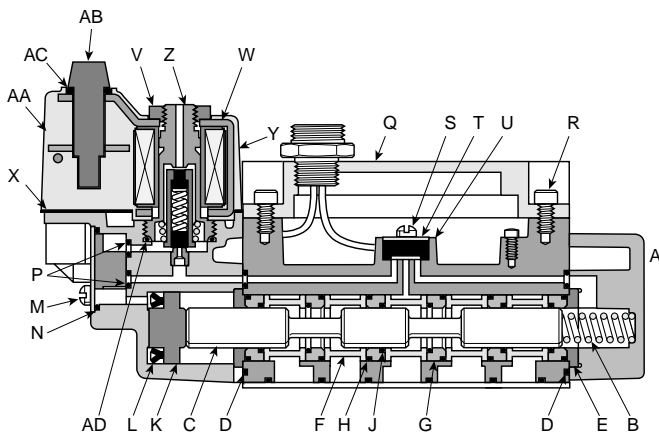
The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT / MAINTENANCE MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.

spool and push down. Then stack a spacer on top of the seal retainer. Next, stack a seal retainer (outside o-ring facing upward). Repeat this process alternating seal retainer orientation each time. The final assembly should have outside o-rings (H) showing at each end of the spool.

NOTE: Valves with four (4) brass and two (2) aluminum seal retainers must be reassembled with the aluminum seal retainers in the middle two (2) positions.

- Grease the outside of this assembly and gently slide it into the valve body. (On spring return valves, the hollow end of the spool goes on the spring return end.)
- Lightly grease new molded seals (D) and place in grooves in ends of body.
- Solenoid and Remote Operated End Sections** -Remove piston (K) from bore. Remove lip seal (L) and discard. Clean piston and housing bore. Grease new lip seal and assemble to piston. Reassemble piston into housing (lip seal end first). Reassemble end sections to body torquing screws to 40 in-lbs.
- Spring Return End Sections** - Slide spring into bore in end of spool. Compress spring while assembling end housing to body with socket head screws. Torque screws to 30-35 in-lbs.
- Manual Override Service** - Remove the two phillips-head screws (M) securing the manual override on the solenoid end(s). Discard seal (N) and the two seated o-rings (P) in the override bore. Clean the override and its bore and install new o-rings. Lightly grease all seals and reinstall the override with the two screws.
- Pilot Selector Service** -Remove the cover (Q) by removing the two socket-head screws (R) located on top of the valve. Remove round head screw (S), large washer (T) and rubber selector (U). Discard rubber selector. Clean selector cavity and place new selector in cavity with either 'I' or 'E' facing down (see *Pilot Selector Settings Chart* on front side of sheet). Reinstall large washer and round head screw and tighten. Reinstall cover and the two socket-head screws. Tighten screws to 10-12 in-lbs.



Solenoid Pilot Service

- Remove hex nut (V), cover (W) and cover seal (X). Slide coil and frame assembly off of plunger guide (Z). Unscrew the plunger guide and remove plunger, spring and o-ring (AD).
- Clean plunger guide, plunger, spring and seat in housing. Replace plunger guide assembly if necessary.
- Grease o-ring and place at bottom of threaded bore. Very lightly grease plunger. Reassemble plunger and spring into plunger guide. Screw plunger guide into housing and torque to 50-60 in-lbs.
- Slide coil and frame assembly back onto plunger guide. Replace cover and cover seal.
- Screw hex nut onto plunger guide and torque to 30-40 in-lbs.

Coil / Indicator Light Replacement

(Model numbers NOT ending with "A")

- Remove the two socket head screws (A) from solenoid end section and detach.
- Remove hex nut (V) and cover (W). Slide coil and frame assembly (Y) off of plunger guide (Z). Remove frame and washer from coil.
- Remove main valve cover (Q) by removing the two socket-head screws (R) located on top of the valve. Unscrew wire nuts securing coil wires to wiring connector located in cover.
- On units with indicator light, snap open splice connectors (AA) and pry clip out of splice. Slide wires out of splice. If replacing indicator light (AB), crush lens. Pull out light, remove and retain o-ring (AC) and discard light. Slide new light into housing and slide o-ring and clip over indicator light until firmly contacting housing. Slide one coil and one indicator light wire into each splice. Place clip into splice and press until flush with top of splice. Snap splice housing shut.
- Reassemble in reverse order of assembly. See *Internal Wiring Diagrams* on front of this sheet to assist in reconnecting wiring.

Coil Replacement

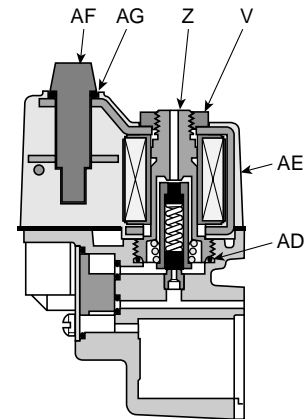
(Model numbers ending with "A")

- Remove hex nut (V). Lift coil assembly (AE) off of plunger guide and discard.
- Peel paper backing from gasket and affix gasket to bottom of coil.
- Place new coil assembly on plunger guide and push down until seated.
- Tighten hex nut to 30-40 in lb.

Indicator Light Replacement

(Model numbers ending with "A")

- Gently pry up under light (AF) and remove. Discard light and o-ring seal (AG).
- Slide new o-ring over lamp body.
- Align "+" printed on light with the "+" molded on the coil. Insert the light and press firmly to seat.



Body to Base Gasket Replacement

- Remove the three valve mounting screws, tap valve with palm of hand to loosen gasket and remove valve from base.
- Peel old gasket off of valve and scrape all remnants from valve and base.
- Peel off paper backing from new gasket and apply to valve body.
- Reassemble valve to base. Tighten three valve mounting screws to 35-40 in-lbs.

Manual Override Conversion

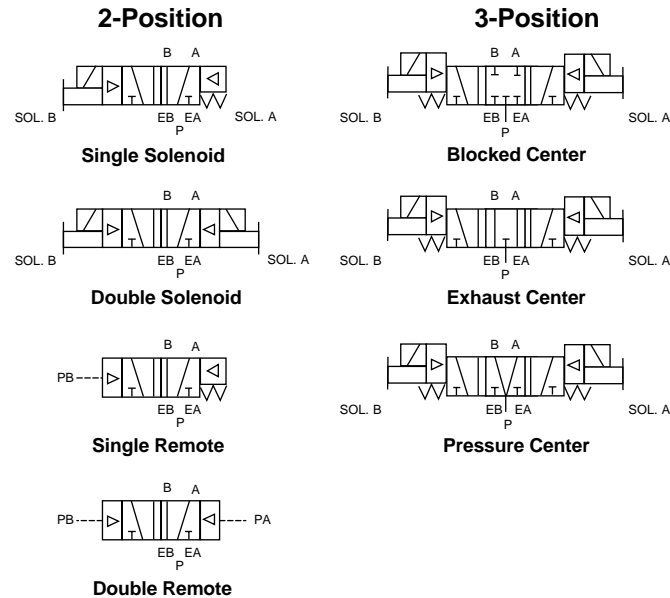
The following override assemblies are interchangeable and can be field converted:

- Locking override K152008
- Flush non-locking override K162005
- Push-button non-locking override K162006

1. Remove the override assembly by removing the two phillips-head screws.
2. Remove the two seals in the override bore and replace with the two small o-rings supplied with the kit. Place the round gasket with the u-shaped protrusion back into place (if it becomes dislodged).
3. Install the new override assembly re-using the two phillips-head screws. (For locking overrides, install unit with the slot vertical so that only 90 degrees of clockwise rotation is possible.)

NOTE: Non-locking overrides are held out by air pressure and may not extend until pressure is reapplied to the valve.

Symbols



Pilot Selector Settings

Function	Selector Position
Solenoid Operated / Internal Pilot Supply	"I" facing down
Solenoid Operated / External Pilot Supply	"E" facing down
Single Remote Pilot Operated / Internal Return Air	"I" facing down
Single Remote Pilot Operated / External Return Air	"E" facing down
Double Remote Operated	"I" or "E" facing down

Available Service Items

Part Number	Description
K352392	Seal Kit
K152008	Locking Override
K162005	Flush Non-locking Override
K162006	Ext. Non-locking Override
H19109	Indicator Lamp (120/60 AC)*
H19110	Indicator Lamp (24V DC)*
K252009	Indicator Lamp (120/60 AC)**
K252008	Indicator Lamp (24V DC)**
K232025	Plunger & Guide (Standard)
K232047	Plunger & Guide (Low Watt)
K473053	Return Spring
7027130	Interface Seal (Body to Base)

Coil Replacement Chart

Voltage			Coil Number		
60 Hz	50 Hz	D.C.	Conduit and Multi-Pin Connector*	Plug-In w/o Light**	Plug-In w/ Light**
12	—	—	K593168	K252013	—
24	—	—	K593169	K252015	—
—	—	12	K593170	K252015	—
—	—	24	K593171	K252017	K252016
—	—	24***	K593281	K252011	K252010
—	—	24****	K593315	K252024	K252023
—	—	24†	K593277	K252026	K252025
120	110	—	K593166	K252020	K252019
240	—	—	K593175	K252021	—
120†	110†	—	—	K252027	K252028

*For use with valve model numbers not ending with "B".

** For use with valve model numbers ending with "B".

*** Low watt.

****Low watt with arc suppression.

† Arc suppression.

For voltages and options not listed, consult your local representative.

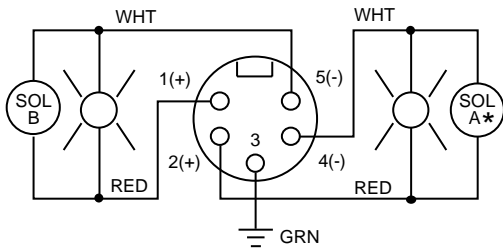
Conversion Procedure For External Pilot

Internal / External Pilot Conversion - Valves are field convertible to an external pilot supply for applications where pressure supplied to the valve inlet is lower than the specified service limitations, including vacuum, dual pressure service or diverter applications.

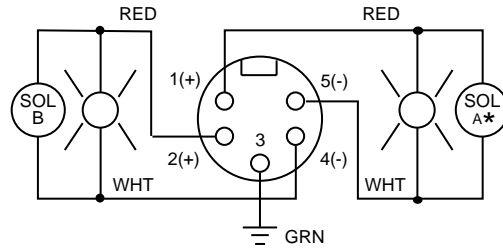
1. When looking down at the top of the valve, remove the (2) socket-head cap screws which hold the valve top cover in place.
2. Remove the top cover, locate and remove the slotted screw holding down the round washer and black rubber plug.
3. Flip the plug over so that 'I' is facing up and 'E' is facing down (plug fits only one way).
4. Replace washer and tighten slotted screw.
5. Replace valve top cover and tighten (2) socket-head cap screws to 20-25 in-lbs (2.2 - 2.8 NM).
6. Connect external pilot air supply (35 psig minimum) to the 1/8" external pilot port marked 'X' on the valve base.

Internal Wiring Diagrams

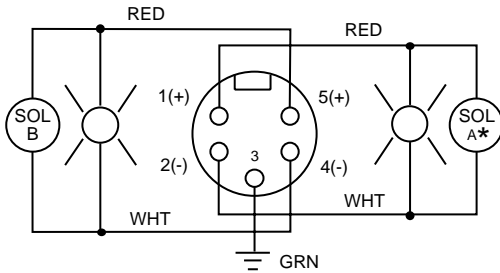
**5-Pin Male Connector
SAE J2051 Wiring Option**



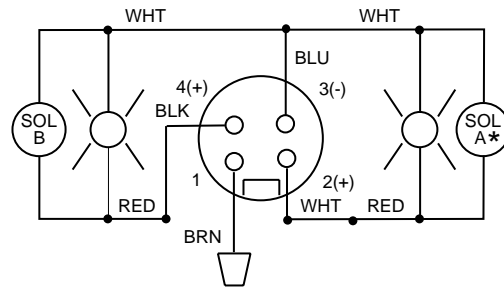
**5-Pin Male Connector
General Motors Wiring Option**



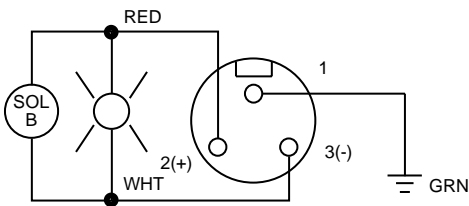
**5-Pin Male Connector
Chrysler Wiring Option**



4-Pin Male Connector



3-Pin Male Connector



*Second solenoid on a double solenoid valve.

NOTE: Depicted are units with 24VDC coils and indicator lights and/or arc suppression. Wire colors are red for all other voltages. (non-polarity sensitive). Omit lights if not applicable.



Pneumatic Division
 Richland, Michigan 49083

Installation & Service Instructions
V585P
 Auto 125 / 250
 Sandwich Regulators
ISSUED: February, 2004
Supersedes: None
 Doc. #V-585P, ECN #031083, Rev. 1

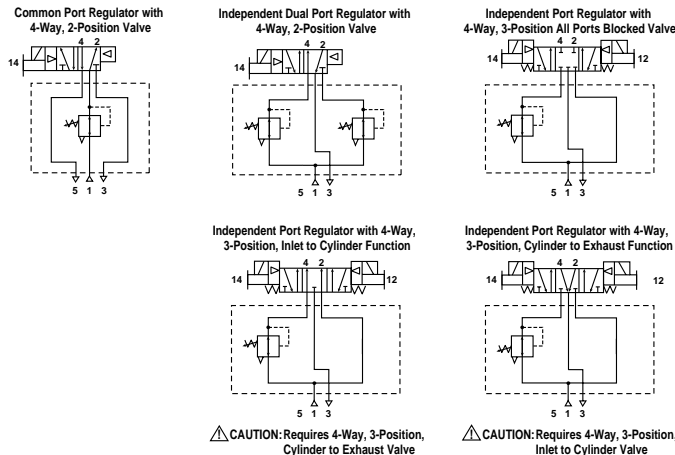
! WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer's specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

Introduction

Follow these instructions when installing, operating, or servicing the product.



Note: The Independent Regulators shown are with regulators on the 14 end. Regulators may also be on the 12 end, or both the 12 and 14 end.

! CAUTION: The reverse valve porting utilized with Independent Port will reverse the function of 4-Way, 3-Position cylinder to exhaust and 4-Way, 3-Position inlet to cylinder. Utilize opposite function valve for normal operation.

Application Limits

These products are intended for use in general purpose compressed air systems only.

Operating Pressure Range:	kPa	PSIG	bar
Minimum*	240	35	2.41
Maximum	1030	150	10.3

* For lower pressure or vacuum operation, valves may be externally piloted (35 PSIG min.).

Ambient Temperature Range: -18°C to 52°C (0°F to 125°F)

Voltage Range: +10%, -15% of Rating

Lubrication

All valves are pre-lubricated at assembly with a petroleum based grease. Filtered and lubricated air is necessary for maximum valve life and minimum maintenance. If in-service lubrication is used, F442 oil is recommended. This oil is specially formulated to provide peak performance and maximum service life from all air operated equipment. Otherwise, use a straight paraffin base mineral oil of viscosity 100–200 SSU @ 100°F and an aniline point greater than 200°F.

Note: Once in-service lubrication is initiated, the practice should be continued in order to maximize valve life.

! CAUTION: Do not use synthetic, reconstituted, or oils with an alcohol content or detergent additives.

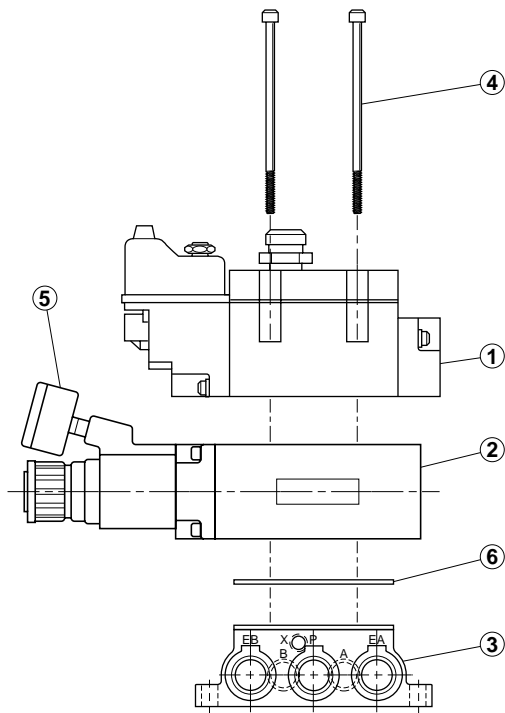
! WARNING

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

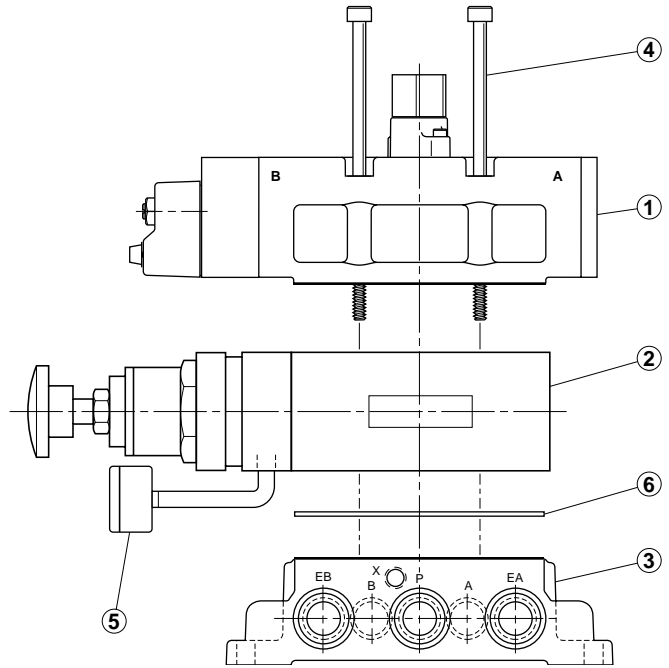
This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application, including consequences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

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

EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT / MAINTENANCE MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.



(Common Port Shown)



(Common Port Shown)

Installation

Remove pressure and electrical connections before installation.

- 1) Remove Valve (1) from Base (3).
- 2) Place the Gasket (6) from the Regulator Kit (2) on the Base (3).
- 3) Install Regulator (2) onto Gasket (6).
- 4) Install Valve (1) onto Regulator (2), making sure that Valve Base Gasket is in between.
- 5) Tighten Mounting Screws (4) –
 - Auto 125 35 to 40 in. lbs.
 - Auto 250 80 to 90 in. lbs.
- 6) Apply main pressure and check for leaks – repeat assembly if leaks are present.

Sandwich Regulator Kits

Part Number	Description	Kit Includes Item No. (Quantity)
RS125A-130	Auto 125 Common Port Regulator (5 to 130 PSIG)	2 (1), 4 (3), 6 (1)
RDS125A-130	Auto 125 Independent Port, Single Inlet Regulator (5 to 130 PSIG)	Not Shown (1), 4 (3), 6 (1)
GA125-130	Auto 125 Gauge Kit	5 (1)
RS250A-130	Auto 250 Common Port Regulator (5 to 130 PSIG)	2 (1), 4 (3), 6 (1)
RDS250A-130	Auto 250 Independent Port, Single Inlet Regulator (5 to 130 PSIG)	Not Shown (1), 4 (3), 6 (1)
GA250-130	Auto 250 Gauge Kit	5 (1)

For all Instruction Sheets, go to www.parker.com/pneumatic

Instruction Sheets Available:

V-581P - Auto 125 Series Valves Installation
 V-582P - Auto 125 Series Subbases /
 Manifolds Installation

V-595P - Auto 250 Series Valves Installation
 V-596P - Auto 250 Series Subbases /
 Manifolds Installation

V-585P - Auto 125 / 250 Sandwich Regulators
 Installation



Pneumatic Division North America
 Richland, MI 49083

Installation Instructions: V-590P
 250 Series Valves
 ISSUED: May, 2001
 Supersedes: November, 1998
 ECN #9369 Rev. 4

⚠ WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Disconnect electrical supply before installation, servicing or conversion.
- Operate within the manufacturer's specified pressure, temperature, voltage and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed on these instructions.
- Installation, service and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

INSTALLATION / OPERATING INSTRUCTIONS

Valve should be installed with reasonable accessibility for service whenever possible -- repair service kits are available. Keep pipe or tubing lengths to a minimum with inside clean and free of dirt and chips. Pipe joint compound should be used sparingly and applied only to the male pipe -- never into the female port. Do not use PTFE tape to seal pipe joints -- pieces have a tendency to break off and lodge inside the unit, possibly causing malfunction. Mounting bolt torque 80-90 in-lbs for manifold and sub-base mounting valves.

Air applied to the valve must be filtered to realize maximum component life.

⚠ CAUTION: It is recommended that double solenoid and double remote air pilot operated 2-position valves be mounted so that the axis of the valve spool is in the horizontal plane. The valve may be rotated 360° around the axis for mounting convenience.

Life Expectancy - Normal multi-million cycle life expectancy of these valves is based on the use of properly filtered and lubricated air at room temperature. These valves are also designed to operate under non-lubricated conditions and will yield millions of maintenance free cycles.

Factory Pre-Lubrication - All valves are pre-lubricated at assembly with Sunaplex 781 or equivalent (Petroleum Base - Lithium Content) grease.

In-Service Lubrication - In-service lubrication is not required; however, if lubrication is to be used, F442 oil is recommended. This oil is specially formulated to provide peak performance and maximum service life from all air operated equipment. Otherwise, use a straight paraffin base mineral oil of viscosity 100-200 SSU @ 100°F and an aniline point greater than 200°F.

⚠ CAUTION: Do not use synthetic, reconstituted, or oils with an alcohol content or detergent additive.

APPLICATION LIMITS

These products are intended for use in general purpose compressed air systems only.

Operating pressure range:	PSIG	Bar	kPa	
Minimum *35	2.41	241		
Maximum (Voltage Code '19')	100	6.89	689	
Maximum (All others)	150	10.34	1034	

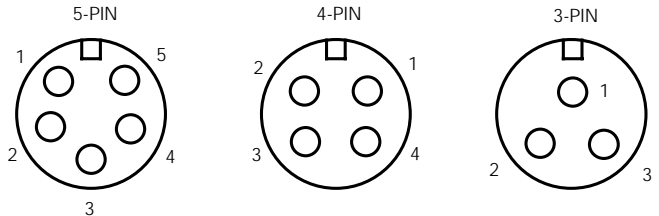
* For lower pressure or vacuum operation, solenoid(s) may be externally piloted (35 psig min.) following the conversion procedure on these instructions.

Operating Temperature Range: 0°F (-18°C) to 125°F (52°C)

Voltage Range: +10% to -15% of rating

WIRING INSTRUCTIONS

Units with 3-pin, 4-pin or 5-pin connectors



Pin numbers as viewing face of male receptacle.

	Option 3 SAE J2051	Option 4 General Motors	Option 5 Chrysler	Option 6 4-Pin Male Connector	3-Pin Male Connector
Pin no.	Function	Function	Function	Function	Function
1	Sol B (+)	Sol A (+)	Sol A (+)	--	Ground
2	Sol A (+)	Sol B (+)	Sol A (-)	Sol A (+)	Sol B (+)
3	Ground	Ground	Ground	Common (-)	Sol B (-)
4	Sol A (-)	Sol B (-)	Sol B (-)	Sol B (+)	--
5	Sol B (-)	Sol A (-)	Sol B (+)	--	--

Note: Solenoid B is wired for single solenoid valves. Option Number is seventh digit of the Model Number.

Units with flying leads

Use wires marked 'A' for solenoid 'A'. Use wires marked 'B' for solenoid 'B'. For units with DC solenoids and indicator lights, red wire is (+) positive white wire is (-) negative.

⚠ CAUTION: DC solenoids with indicator lights are polarity sensitive. Observe polarities indicated above.

Earth ground: All electrically operated valves (except 24VDC low watt) must be provided a proper earth ground. Connect through proper lead in connector or to green wire from valve.

NOTE: In addition to the above instructions, follow all requirements for local and national electrical codes.

CONVERSION PROCEDURE FOR EXTERNAL PILOT

Internal / External Pilot Conversion - Valves are field convertible to an external pilot supply for applications where pressure supplied to the valve inlet is lower than the specified service limitations, including vacuum or dual pressure service.

- 1) When facing the nameplate of the valve, or pressure port of the sub-base, remove the (4) socket head cap screws, lock washers, and end cap from the left hand end of the valve. (Solenoid 'B' side).
- 2) Flip the black oval rubber plug so that 'EX' is facing outward and 'INT' is facing inward and replace the plug in the slot found in the valve body. Replace end cap and install screws and lock washers.
- 3) Torque (4) end cap socket head cap screws to 50-65 in-lbs).
- 4) Connect pilot air supply (35 psig minimum) to the 1/4" external pilot port marked 'X' on valve base.

Pilot Selector Settings:

Function:	Selector Position:
Solenoid Operated / Internal Pilot Supply	'INT' facing out
Solenoid Operated / External Pilot Supply	'EX' facing out
Single Remote Pilot Operated / Internal Return Air	'INT' facing out
Single Remote Pilot Operated / External Return Air	'EX' facing out
Double Remote Pilot Operated	'INT' facing out

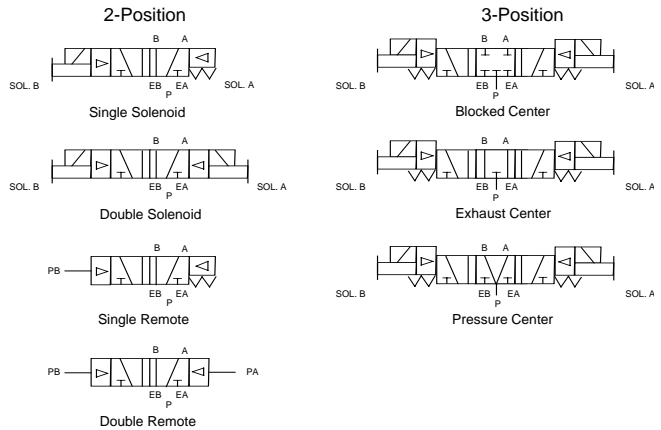
- Service Kit (Single Operated) K352381
- Service Kit (Double Operated) K352383
- Return Spring K473052
- Body to Base Gasket 7037130
- Indicator Light (120/60). H19105

Coil Replacement Chart

Voltage			Coil	
60 Hz	50 Hz	D. C.	No Light	WithLight
12	--	--	K593052	--
24	--	6	K593048	--
--	24	--	K593061	--
--	36	--	K593062	--
--	--	12	K593055	--
--	--	24 (Standard)	K593060	K593274
--	--	24 (Low Watt)•	K593310	K593311
--	--	48	K593074	--
120	110	--	K593071	K593125
240	220	--	K593081	--
--	240	--	K593033	--

• Voltage Code '19' rated at 100 PSIG maximum.

ANSI SYMBOLS



⚠ WARNING

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

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

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

EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT/MAINTENANCE INSTRUCTION MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.



Pneumatic Division North America
Richland, MI 49083

Service Instructions: V-591P
250 Series Valves
ISSUED: November, 1998
Supersedes: K583-341 March 1995
ECN # 8920



WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Disconnect electrical supply before installation, servicing or conversion.
- Operate within the manufacturer's specified pressure, temperature, voltage and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed on these instructions.
- Installation, service and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

APPLICATION LIMITS

These products are intended for use in general purpose compressed air systems only.

Operating pressure range:	PSIG	Bar	kPa
Minimum*	35	2.41	241
Maximum (Voltage Code '19')	100	6.89	689
Maximum (All others)	150	10.34	1034

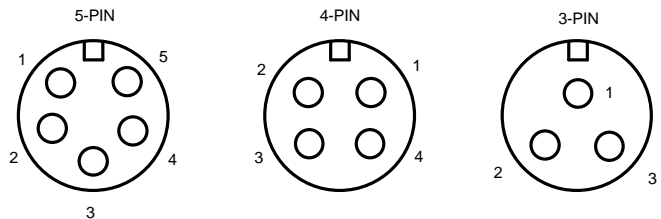
* For lower pressure or vacuum operation, solenoid(s) may be externally piloted (35 psig min.) following the conversion procedure on these instructions.

Operating Temperature Range: 0°F (-18°C) to 125°F (52°C)

Voltage Range: +10% to -15% of rating

WIRING INSTRUCTIONS

Units with 3-pin, 4-pin or 5-pin connectors



Pin numbers as viewing face of male receptacle.

	Option 3 SAE J2051	Option 4 General Motors	Option 5 Chrysler	Option 6 4-Pin Male Connector	3-Pin Male Connector
Pin no.	Function	Function	Function	Function	Function
1	Sol B (+)	Sol A (+)	Sol A (+)	--	Ground
2	Sol A (+)	Sol B (+)	Sol A (-)	Sol A (+)	Sol B (+)
3	Ground	Ground	Ground	Common (-)	Sol B (-)
4	Sol A (-)	Sol B (-)	Sol B (-)	Sol B (+)	--
5	Sol B (-)	Sol A (-)	Sol B (+)	--	--

Note: Solenoid B is wired for single solenoid valves. Option Number is seventh digit of the Model Number.

Units with flying leads

Use wires marked 'A' for solenoid 'A'. Use wires marked 'B' for solenoid 'B'. For units with DC solenoids and indicator lights, red wire is (+) positive white wire is (-) negative.



CAUTION: DC solenoids with indicator lights are polarity sensitive. Observe polarities indicated above.

Earth ground: All electrically operated valves (except 24VDC low watt) must be provided a proper earth ground. Connect through proper lead in connector or to green wire from valve.

NOTE: In addition to the above instructions, follow all requirements for local and national electrical codes.

SERVICE PROCEDURES

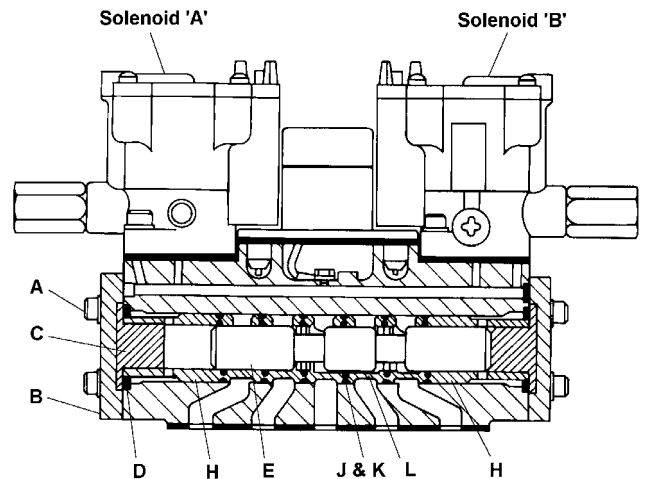
NOTE: All cleaning of parts to be done with mineral spirits or equivalent cleaning solution. Grease should be a mineral based lubricant (Sunaplex 781). All parts showing nicks, scratches or other signs of wear or damage should be replaced.

Valve Service

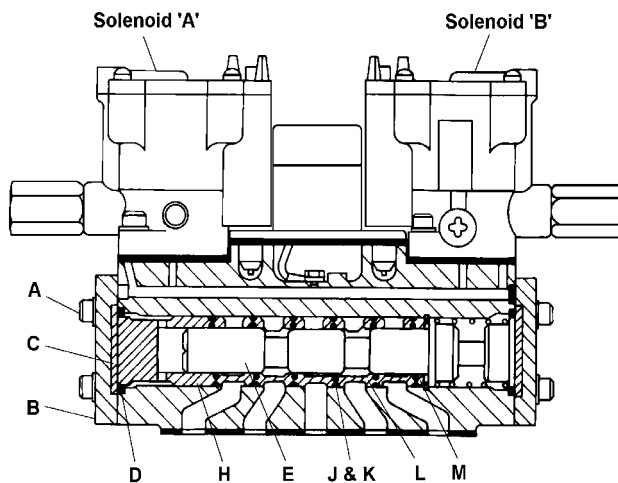
- 1) Orient valve with Solenoid 'B' on the right hand side. (Letters 'A' and 'B' are cast into the sides of the body near each end.)
- 2) Remove (4) socket head screws (A) and lock washers from each end. (Be sure to start on right hand side for single operated valves, to prevent end spacer and spring from popping out end of valve.)
- 3) Remove end caps (B), bumpers (C) and o-rings (D). Discard o-rings.
- 4) Remove spool or spool assembly (E) and spring (F) (single solenoid valves only).
- 5) **Single Operated Valves Only** - Remove and discard u-cup (G) from spool assembly. Clean spool assembly. Apply grease to new u-cup from kit and assemble to spool assembly (open end away from spool).
- 6) Remove end spacer (H), o-rings (J & K), spacers (L) and spacer ring (M) (where applicable). Discard o-rings. Clean spacers.
- 7) Apply grease to inner and outer o-rings (J & K).
- 8) Reassemble one end spacer (H), a set of o-rings (J & K) and one spacer (L). Alternatively assemble a set of o-rings and a spacer until all o-rings and spacers are used. Press each set firmly into place.
- 9) Reassemble second end spacer (H).

- 10) On left end of valve, assemble o-ring (D), end cap (B), (4) socket head screws (A) and lock washers. Torque screws to 50-65 in-lbs.
- 11) Assemble spring (F) (where applicable) and spool or spool assembly (E).
- 12) Repeat step 9) for right end of valve.

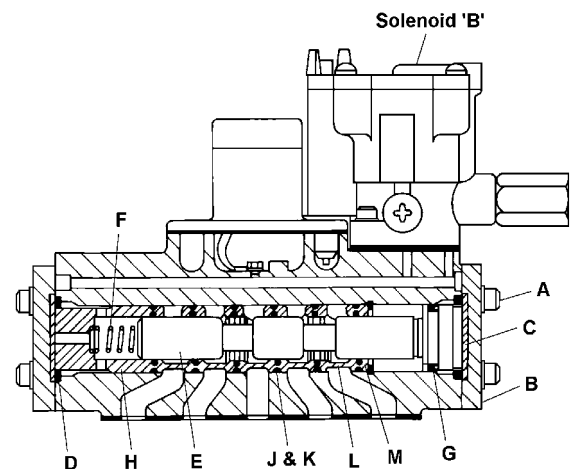
Double Solenoid, 2-Position Valves



Double Solenoid, 3-Position Valves



Single Solenoid, 2-Position Valves



SERVICE PROCEDURES (CONTINUED)

Pilot Valve Service

See *Service Instructions V-644P L-Pilot Valves and Operators* packed with **Pilot Valve Service Kit K352166** included in this kit.

Coil / Indicator Light Replacement

See *Service Instructions V-644P L-Pilot Valves and Operators* packed with replacement coils and lights.

Body to Base Gasket Replacement

- 1) Remove the three valve mounting screws, tap valve with palm of hand to loosen gasket and remove valve from base.
- 2) Peel old gasket off of valve and scrape all remnants from valve and base
- 3) Peel off paper backing from new gasket and apply to valve body.
- 4) Reassemble valve to base. Tighten three valve mounting screws to 80-90 in-lbs.

MANUAL OVERRIDE REPLACEMENT OR CONVERSION

The following override assemblies are interchangeable and can be replaced or field converted:

- Non-locking override..... K162004
- Locking override..... K152005

Remove override and clean internal threads in housing. Apply pipe sealant sparingly to threads of override housing and assemble override to pilot valve housing.

NOTE: Overrides are held out by air pressure and may not extend until pressure is reapplied to the valve.

CONVERSION PROCEDURE FOR EXTERNAL PILOT

Internal / External Pilot Conversion - Valves are field convertible to an external pilot supply for applications where pressure supplied to the valve inlet is lower than the specified service limitations, including vacuum or dual pressure service.

- 1) When facing the nameplate of the valve, or pressure port of the sub-base, remove the (4) socket head cap screws, lock washers, and end cap from the left hand end of the valve. (Solenoid 'B' side).
- 2) Flip the black oval rubber plug so that 'EX' is facing outward and 'INT' is facing inward and replace the plug in the slot found in the valve body. Replace end cap and install screws and lock washers.
- 3) Torque (4) end cap socket head cap screws to 50-65 in-lbs).
- 4) Connect pilot air supply (35 psig minimum) to the 1/4" external pilot port marked 'X' on valve base.

Pilot Selector Settings:

Function:	Selector Position:
Solenoid Operated / Internal Pilot Supply	'INT' facing out
Solenoid Operated / External Pilot Supply	'EX' facing out
Single Remote Pilot Operated / Internal Return Air	'INT' facing out
Single Remote Pilot Operated / External Return Air	'EX' facing out
Double Remote Pilot Operated	'INT' facing out

SERVICE KITS

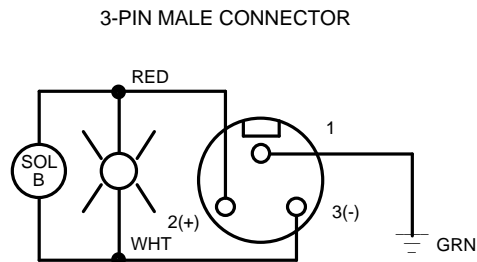
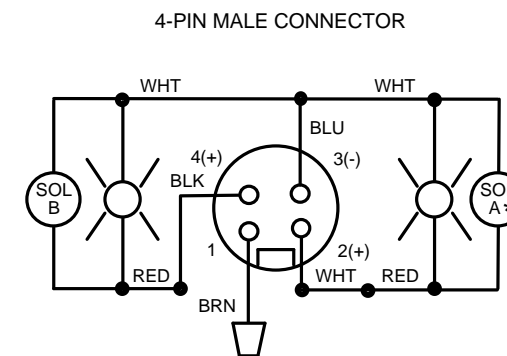
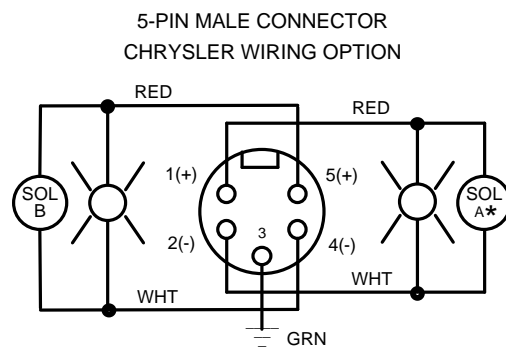
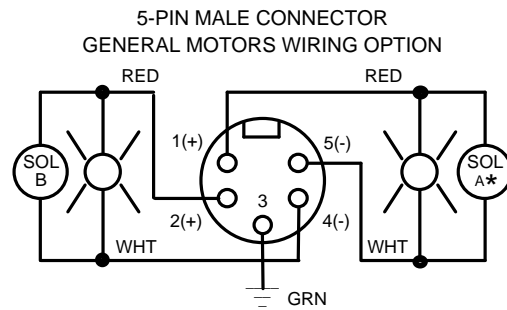
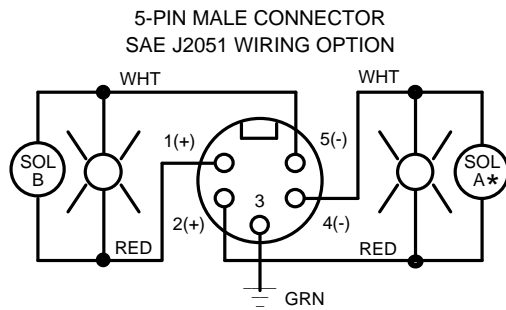
- Service Kit (Single Operated) K352381
- Service Kit (Double Operated) K352383
- Return Spring K473052
- Body to Base Gasket 7037130
- Indicator Light (24 VDC)..... H19112
- Indicator Light (120/60)..... H19105

Coil Replacement Chart

Voltage			Coil	
60 Hz	50 Hz	D. C.	No Light	WithLight
12	--	--	K593052	--
24	--	6	K593048	--
--	24	--	K593061	--
--	36	--	K593062	--
--	--	12	K593055	--
--	--	24 (Standard)	K593060	K593274
--	--	24 (Low Watt)•	K593310	K593311
--	--	48	K593074	--
120	110	--	K593071	K593125
240	220	--	K593081	--
--	240	--	K593033	--

• Voltage Code '19' rated at 100 PSIG maximum.

INTERNAL WIRING DIAGRAMS



* Second solenoid on a double solenoid valve.

NOTE: Depicted are units with 24VDC coils and indicator lights. Wire colors are red for all other voltages (non-polarity sensitive).

Omit lights if not applicable.

WARNING

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

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

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

EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT / MAINTENANCE INSTRUCTION MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.



Pneumatic Division North America
Richland, MI 49083

Installation Instructions: V-592P
250 Series Subbases/Manifolds
ISSUED: November, 1998
Supercedes: K583-339 December, 1993
ECN #8920

WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Disconnect electrical supply before installation, servicing or conversion.
- Operate within the manufacturer's specified pressure, temperature, voltage and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed on these instructions.
- Installation, service and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

APPLICATION LIMITS

These products are intended for use in general purpose compressed air systems only. Compliance with the rated pressure, temperature and voltage is necessary -- see **Installation Instructions** packed with (or label on) valve.

WIRING INSTRUCTIONS

See **Installation Instructions** packed with valve and follow all requirements of local and national electrical codes.

VALVE MOUNTING PROCEDURES

(Applies to both sub-bases and manifolds.)

- 1) Clean top surface of sub-base or manifold and bottom surface of valve of any dirt or dust.
- 2) Place valve on top of sub-base or manifold, lining up all three mounting holes.
- 3) Insert (3) valve mounting screws and torque to 80-90 in-lbs in progressive steps with a criss-cross pattern.

SUB-BASE PORT CONNECTIONS

(See reverse for *Manifold Port Connections*)

- 1) Connect a single inlet air supply to port 'P'. (For dual pressure applications connect inlet air supplies to ports 'EA' and 'EB'.
- 2) Connect mufflers (or pipe exhaust) from ports 'EA' and 'EB' for single air supply. (For dual pressure applications connect to port 'P').
- 3) Connect cylinder ports 'A' and 'B' to ends of cylinder or other device to be supplied air.

SUB-BASE EXTERNAL PILOT SUPPLY CONNECTIONS

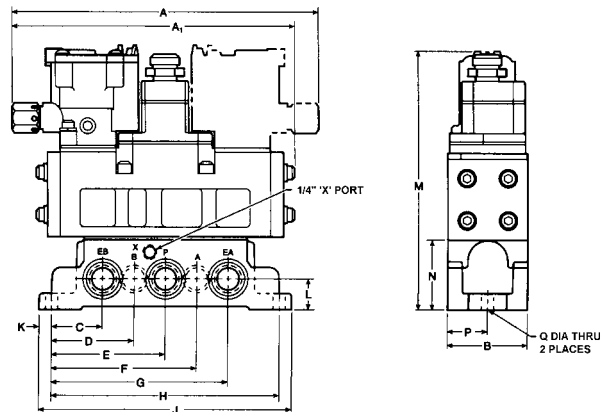
(See reverse for *Manifold External Pilot Supply Connections*)

Use an external pilot for dual inlet air supplies, for inlet pressures below minimum valve ratings, or any other application requiring pilot pressure different than main supply pressure.

- 1) Perform pilot supply conversion outlined on **Installation Instructions** packed with the valve.
- 2) Connect pilot supply source to port 'X'.

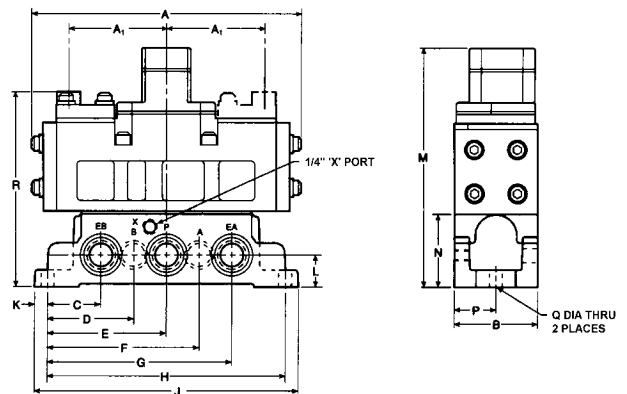
DIMENSIONS

Solenoid Valve with Sub-base (2 & 3 Position)



	A	A1	B	C	D	E	F	G
in	9.47	8.77	2.75	1.63	2.63	3.63	4.63	5.63
mm	240.5	222.8	69.9	41.4	66.8	92.2	117.6	143.0
	H	J	K	L	M	N	P	Q
in	7.26	8.02	.38	.88	8.21	2.25	1.38	.41
mm	184.4	203.7	9.7	22.3	208.5	57.2	35.1	10.4

Remote Pilot Valve with Sub-base (2 & 3 Position)



	A	A1	B	C	D	E	F	G	H
in	8.07	2.45	2.75	1.63	2.63	3.63	4.63	5.63	7.26
mm	205.0	62.2	69.9	41.4	66.8	92.2	117.6	143.0	184.4
	J	K	L	M	N	P	Q	R	
in	8.02	.38	.88	7.20	2.25	1.38	.41	5.77	
mm	203.7	9.7	22.3	182.9	57.2	35.1	10.4	146.6	

MANIFOLD APPLICATION

Valves may be gang manifolded up to any number of stations, providing that sufficient pressure is realized in the circuits downstream of the valve outlets; and sufficient pressure is available for shifting the valves. Longer manifold gangs may require intermediate supports. Means to increase pressure levels include supply connections at both ends of the manifold gang, external pilot supplies and sequencing the valve operation to maximize time between different valve shifts.



WARNING: Air exhausting from one valve into the exhaust gallery of the manifold may pressurize other valve circuits open to the same gallery. Design the circuit such that there is no hazard or damage consequence from this action.

MANIFOLD PORT CONNECTIONS

(See front for *Sub-base Port Connections*)

- Connect a single inlet air supply to the manifold inlet gallery by one of the following methods:
 - All valves to be supplied with a common pressure:** Connect air supply to port marked 'P' on either end of manifold package and plug port on other end marked 'P' (or connect air supply to both ends for applications requiring a larger volume of air).
 - Two groups of valves each requiring a different supply pressure:** Isolate valves into two groups using Manifold Isolation Procedures. Connect appropriate air supply to each end of manifold package at port 'P'.

NOTE: For dual pressure applications (two inlet air supplies to either end of the bank, or an isolated zone within a bank) connect supply to ports 'EA' and 'EB'.
- Connect mufflers (or pipe exhaust) at ports 'EA' and 'EB' for single exhaust; and port 'P' for dual supplies.
- Connect cylinder ports marked 'A' and 'B' on bottom of manifold to ends of cylinder or other device to be supplied air.

MANIFOLD EXTERNAL PILOT SUPPLY CONNECTIONS

(See front for *Sub-base External Pilot Supply Connections*)

- Perform pilot supply conversion outlined on **Installation Instructions** packed with valve.
- Isolate external pilot supply gallery (designated by 'X') to those valves requiring external pilot supply.
- Connect pilot supply source to the 'X' port gallery by one of the following methods:
 - All valves to be Externally Piloted:** Connect pilot supply source to port 'X' on one end of 'X' port gallery. Plug port 'X' on the opposite end.
 - Valves on one end of a bank to be Externally Piloted:** Connect pilot supply source to port 'X' on the end to be externally piloted.

MANIFOLD ISOLATION PROCEDURES

Inlet, exhaust and external pilot galleries may be isolated from those in neighboring manifolds through the use of flush pipe plugs.

- Determine gallery and manifold position to be isolated.
- Apply pipe sealant to threads of pipe plug.
- Screw pipe plug into threaded end of gallery and tighten.

MANIFOLDING ASSEMBLY PROCEDURES

Manifolds may be assembled to one another either before or after assembling valves to manifolds. If inlet, exhaust or external pilot galleries are to be isolated from neighboring manifolds be sure to follow *Manifold Isolation Procedures* before proceeding with this section.

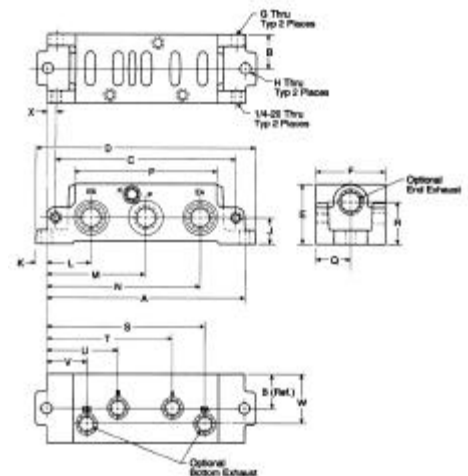
- Clean counterbores in side of manifold and mating surface of neighboring manifold.
- Apply a light coating of grease to o-rings and place in counterbores.
- Place manifold next to neighboring manifold, lining up connecting screw holes.
- Place lock washers on socket-head cap screws and insert through clearance holes in one manifold and screw into neighboring manifold. Torque screws to 80-90 in-lbs.

OPTIONAL ACCESSORY - BLANK STATION PLATE

This is used with a manifold block to reserve a place for a valve that will be later added to the manifold bank or to remove a valve from a manifold without having to remove the manifold block from the manifold bank. Place gasket and block on manifold and assemble using screws provided with the plate. Tighten screws to 80-90 in-lbs.

Manifold Dimensions

	in	mm
A	7.26	184.4
B	1.28	32.5
C	6.62	168.3
D	8.02	203.7
E	2.25	57.1
F	2.56	65.0
G	.28	7.1
H	.41	10.4
J	.88	22.4
K	.38	9.7
L	1.63	41.4
M	3.63	92.2
N	5.63	143.0
P	5.31	134.9
Q	1.28	32.5
R	1.56	39.6
S	5.80	147.3
T	4.63	117.6
U	2.63	66.8
V	1.45	36.8
W	1.84	46.7
X	.32	8.1



WARNING

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

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

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

EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT / MAINTENANCE INSTRUCTION MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.



Pneumatic Division
Richland, Michigan 49083

Installation & Service Instructions:
V595P

Auto 250B Series Valves

ISSUED: December, 2003
Supersedes: None
Doc.# V-595P, ECN# 030893, Rev. 1

⚠ WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer's specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

Introduction

Follow these instructions when installing, operating, or servicing the product.

Application Limits

These products are intended for use in general purpose compressed air systems only.

Operating Pressure Range:	kPa	PSIG	bar
Minimum*	240	35	2.41
Maximum	1030	150	10.3

* For lower pressure or vacuum operation, solenoid(s) may be externally piloted (35 PSIG min.) following the conversion procedure in these instructions.

Ambient Temperature Range: -18°C to 52°C (0°F to 125°F)

Voltage Range: +10%, -15% of Rating

Installation & Operating Instructions

⚠ CAUTION: Solenoid versions of this valve contain solid state components that can be damaged by transient voltage spikes, over-voltage or high temperature. To protect against premature solenoid failure, please read and adhere to the following:

1. If this solenoid operated valve is used in a circuit with other inductive loads, the solenoid should be electrically protected with a voltage suppression device (e.g. transient voltage suppressor or varistor) that has a minimum rating of 1.6 times the rated voltage of the solenoid valve and sufficient capacity to dissipate the energy of other inductive loads.
2. Valve should be installed with reasonable accessibility for service whenever possible - repair service kits are available. Keep pipe or tubing lengths to a minimum with inside clean and free of dirt and chips. Pipe joint compound should be used sparingly and applied only to the male pipe - never to the female port. Do not use PTFE tape to seal pipe joints - pieces have a tendency to break off and lodge inside the unit possibly causing malfunction.

⚠ CAUTION: It is recommended that double solenoid and double remote air pilot operated 2-Position valves be mounted so that the axis of the valve spool is in the horizontal plane. The valve may be rotated 360° around the axis for mounting convenience.

⚠ CAUTION: An interruption of 10 milliseconds or greater to the power supplied to the solenoid of a solenoid operated valve may cause the valve to shift. Provision must be made to prevent power interruption of this duration to avoid unintended, potentially hazardous, consequences.

Lubrication

All valves are pre-lubricated at assembly with a petroleum based grease. Filtered and lubricated air is necessary for maximum valve life and minimum maintenance. If in-service lubrication is used, F442 oil is recommended. This oil is specially formulated to provide peak performance and maximum service life from all air operated equipment. Otherwise, use a straight paraffin base mineral oil of viscosity 100-200 SSU @ 100°F and an aniline point greater than 200°F.

NOTE: Once in-service lubrication is initiated, the practice should be continued in order to maximize valve life.

⚠ CAUTION: Do not use synthetic, reconstituted, or oils with an alcohol content or detergent additives.

⚠ WARNING

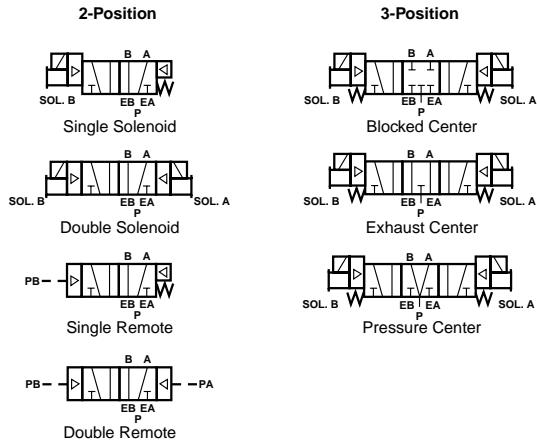
FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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

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

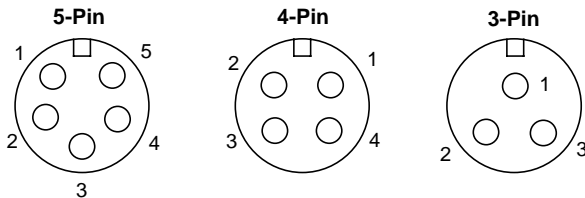
EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT / MAINTENANCE MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.

Auto 250 Series Valves ANSI Symbols



Wiring Instructions

Units with 3-Pin, 4-Pin or 5-Pin connectors



Pin numbers as viewing face of male receptacle.

	Option 3 SAE J2051	Option 4 General Motors	Option 5 Chrysler Connector	Option 6 4-Pin Male	3-Pin Male Connector
Pin no.	Function	Function	Function	Function	Function
1	Sol B	Sol A	Sol A	—	Ground
2	Sol A	Sol B	Sol A	Sol A	Sol B
3	Ground	Ground	Ground	Common	Sol B
4	Sol A	Sol B	Sol B	Sol B	—
5	Sol B	Sol A	Sol B	—	—

Note: Solenoid B is wired for single solenoid valves. Option Number is seventh digit of the Model Number.

Units with flying leads

Use red wires for solenoid 'A'. Use blue wires for solenoid 'B'.

Earth ground: All electrically operated valves (except 24VDC low watt) must be provided a proper earth ground. Connect through proper lead in connector or to green wire from valve.

NOTE: In addition to the above instructions, follow all requirements for local and national electrical codes.

Field Conversion of Pilot Supplies

(Internal vs. External)

CAUTION: Turn air and electrical supplies off before servicing unit.

1. Remove valve from base, if required.
2. Remove (4) screws which fasten solenoid block or end cap to body at both A and B ends.

NOTE: Valve body has two pilot holes (internal and external). The internal pilot hole is located nearest to valve spool bore (Figure 1).

3. To select external supply, install seal in its recess in the body with the projection on backside of seal plugging the internal supply hole. To select internal supply, install seal as above but with the projection plugging the external supply hole.

NOTE: The selection of seal positioning must be the same at both A and B ends.

V-595P

4. Reassemble unit by reversing the order by which it was disassembled. See valve servicing for proper assembly techniques and screw torque.

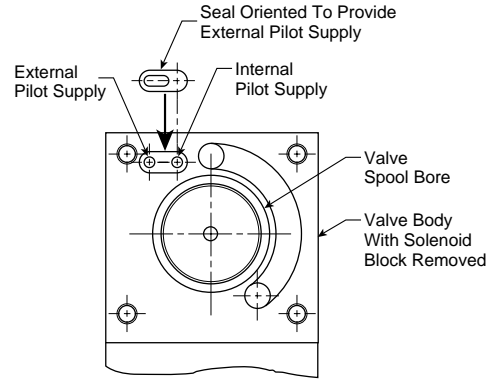


Figure 1

Maintenance & Trouble Shooting Hints

Valve Not Shifting Completely When Energized:

1. Check to insure that the proper voltage is supplied to the solenoids.
2. Check to insure that supply pressure is 240 kPa (35 PSIG) or greater at the valve's inlet when shifting valve.
3. Check for possible restrictions in air supply, such as undersized hoses, fittings or quick disconnects.
4. Check to insure that the spool moves smoothly.
5. Check spool seals for proper installation, dirt or damage.

Air Leakage Through Exhaust Ports:

1. Check for internal leakage in the cylinder being operated by the valve.
2. Check condition of the spool seals for proper alignment, damaged (nicked or broken) seals, and dirt contamination.
3. Inspect the solenoid plunger guide, plunger, spring and seat (as well as their mating parts) for dirt, nicks, or damage.
4. Check for missing, damaged, or incorrectly assembled o-rings and gaskets.

Noisy Solenoids:

1. Check to insure that voltage and pressure supplies are adequate.
2. Inspect the plunger guide, plunger, spring, and seat (as well as their mating parts) for dirt, nicks, or damage.

Replace worn or damaged parts. Reassemble and retest unit.

Coil Replacement Chart

Voltage			Coil
60 Hz	50 Hz	D.C.	WithLight
—	—	24 (B9)*	K252023
120	110	—	K252019

* Low Watt with Surge Suppression (Blue)

Plunger & Guide Assembly

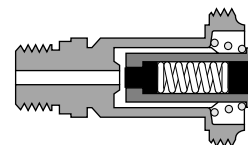
(Includes Plunger, Plunger Guide and Spring)

K232 025

Standard Voltages

K232 049

B9 Low Watt Voltage Code (Blue Coil)



Auto 250 Series Valves
Service Procedures

V-595P

⚠ CAUTION: Turn air and electrical supplies off before servicing unit. When servicing this valve equipped with solenoid operators, note that the solenoid adapters are permanently wired to the body. Handle the disassembled valve with care to avoid damage to the wiring harness and solenoid adapters.

NOTE: All cleaning of parts to be done with mineral spirits or equivalent cleaning solution. All parts showing nicks, scratches or other signs of wear or damage should be replaced.

Valve Service

Use Service Kit K352419 for single operator, use Service Kit K352420 for double operator.

1. Remove valve body assembly with interface block from base.
2. Orient valve with 14 end on the left hand side.
3. Remove (4) socket head screws (A) out from each end. (Be sure to start on left hand side for single operated valves, to prevent end spacer and spring from popping out end of valve.)
4. Remove solenoid block (B), end cap (E), bumpers (C), and square seals (D) or o-rings (DD). Discard square seals or o-rings.
5. Remove spool or spool assembly (F), end spacer (G), with spring (H) (single solenoid valves only).
6. Single Operated Valves Only - Remove and discard u-cup (J) from spool assembly. Clean spool assembly. From kit, use grease from tube to lubricate the new u-cup and assemble to spool assembly (open end away from spool).
7. Remove end spacer (G), o-rings (K & L), spacers (M), and spacer ring (N) (where applicable). Discard o-rings. Clean spacers.
8. Apply grease to inner and outer o-rings (K & L).
9. Reassemble one end spacer (G), a set of o-rings (K & L), and one spacer (M). Alternatively assemble a set of o-rings and a spacer until all o-rings and spacers are installed. Press each set firmly into place.
10. Reassemble second end spacer (G) on double operator, 2-Position valves.
11. On right end of valve, assemble square seal (D) or o-ring (DD) (3-Position valves only), bumper (C), solenoid block (B), end cap (E), and (4) socket head screws (A). Tighten screws 5.0 to 5.6 Nm (45 to 50 in-lbs).
12. Assemble spring (H) (where applicable), and spool or spool assembly (F).
13. Repeat step 8 for left end of valve.
14. Reassemble valve onto base and tighten mounting screws 9.0 to 10.2 Nm (80 to 90 in-lbs).

Service Solenoid Coil

1. Remove nut (P) which secures solenoid coil in place. Slide coil off of the plunger guide.
2. Remove paper backing from gasket provided in kit to expose adhesive surface. Align and attach gasket to new solenoid coil.

3. Slide new coil onto plunger guide and install nut on guide with bearing face toward the coil or diffuser nut and muffler plug and tighten 5.1 to 6.2 Nm (45 to 55 in-lbs).

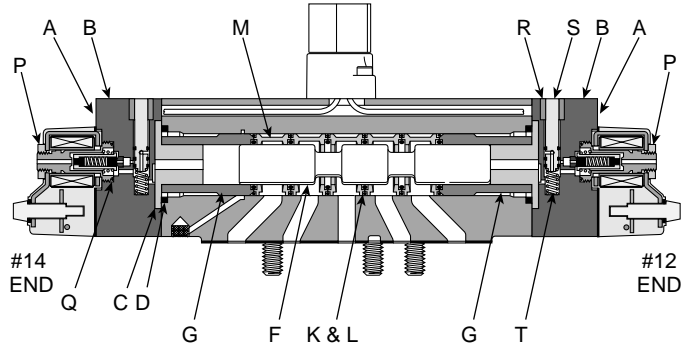
Servicing Solenoid Plunger Assembly

1. Remove the nut (P) which secures the solenoid coil to the plunger guide assembly. Then slide coil off of the plunger guide. Unscrew the plunger guide and remove plunger, spring, and o-ring (Q).
2. Using a clean, lint free cloth, clean plunger guide, plunger, spring, and seat (which is permanently mounted in the adapter block). Replace plunger guide assembly if necessary.
3. Grease o-ring and place at bottom of threaded bore. Very lightly grease plunger. Reassemble plunger and spring into plunger guide. Screw plunger guide into adapter block and tighten 5.6 to 6.8 Nm (50 to 60 in-lbs).
4. Slide coil onto plunger guide and then screw nut onto plunger guide and tighten 5.1 to 6.2 Nm (45 to 55 in-lbs).

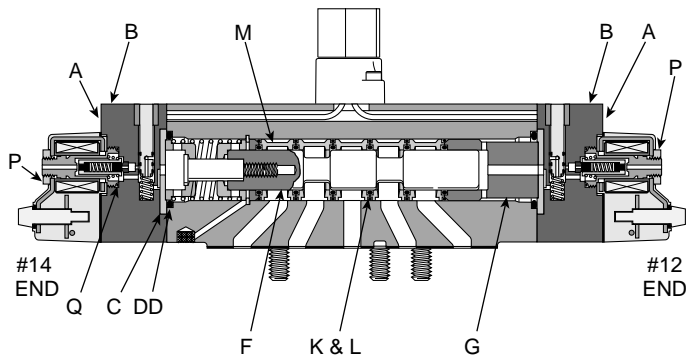
Manual Override Service

Use PS1725 Service Kit for Non-Locking Override.

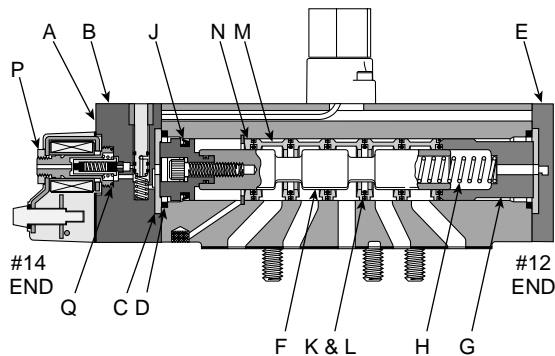
1. Reference: Double Solenoid, 2-Position Valve illustration below.
2. Remove retainer (R) with 1/4" hex key, withdraw override stem with seals (S) and spring (T). Discard parts.
3. Inspect and remove any debris which may be present in hole in solenoid adapter.
4. From kit, place spring in hole.
5. Install stem with o-rings in solenoid adapter. O-rings must be coated with grease, prior to stem installation.
6. Install threaded retainer - tighten 4.5 to 5.6 Nm (40 to 50 in-lbs).



Double Solenoid, 2-Position Valves



Double Solenoid, 3-Position Valves



Single Solenoid, 2-Position Valves



Pneumatic Division
 Richland, Michigan 49083

Installation & Service Instructions:
V596P

**Auto 250B Series Subbases
 & Manifolds**

ISSUED: December, 2003
Supersedes: None

Doc.# V-596P, ECN# 030893, Rev. 1

! WARNING

To avoid unpredictable system behavior that can cause personal injury and property damage:

- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to this product before installation, servicing, or conversion.
- Operate within the manufacturer's specified pressure, temperature, and other conditions listed in these instructions.
- Medium must be moisture-free if ambient temperature is below freezing.
- Service according to procedures listed in these instructions.
- Installation, service, and conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversion, air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or the product does not operate properly, do not put into use.
- Warnings and specifications on the product should not be covered by paint, etc. If masking is not possible, contact your local representative for replacement labels.

Introduction

Follow these instructions when installing, operating, or servicing the product.

Application Limits

These products are intended for use in general purpose compressed air systems only.

Operating Pressure Range:	kPa	PSIG	bar
Minimum*	240	35	2.41
Maximum	1030	150	10.3

* For lower pressure or vacuum operation, solenoid(s) may be externally piloted (35 PSIG min.) following the conversion procedure in *Installation Instructions (V-595P)*.

Ambient Temperature Range: -18°C to 52°C (0°F to 125°F)

Voltage Range: +10%, -15% of Rating

Wiring Instructions

See *Installation Instructions (V-595P)* packed with valve and follow all requirements of local and national electrical codes.

Valve Mounting Procedures

(Applies to both sub-bases and manifolds.)

- 1) Clean top surface of sub-base or manifold and bottom surface of valve of any dirt or dust.
- 2) Place valve on top of sub-base or manifold, lining up all three mounting holes.
- 3) Insert (3) valve mounting screws and torque to 80-90 in-lbs in progressive steps with a criss-cross pattern.

Sub-Base Port Connections

(See reverse for *Manifold Port Connections*)

- 1) Connect a single inlet air supply to port 'P'. (For dual pressure applications connect inlet air supplies to ports 'EA' and 'EB'.
- 2) Connect mufflers (or pipe exhaust) from ports 'EA' and 'EB' for single air supply. (For dual pressure applications connect to port 'P').

- 3) Connect cylinder ports 'A' and 'B' to ends of cylinder or other device to be supplied air.

Sub-Base External Pilot Supply Connections

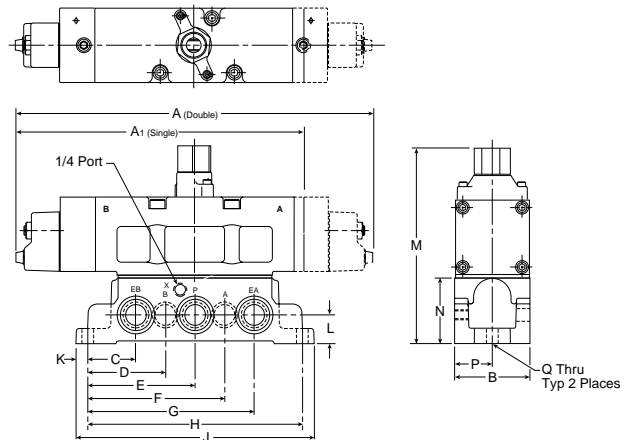
(See reverse for *Manifold External Pilot Supply Connections*)

Use an external pilot for dual inlet air supplies, for inlet pressures below minimum valve ratings, or any other application requiring pilot pressure different than main supply pressure.

- 1) Perform pilot supply conversion outlined on *Installation Instructions (V-595P)* packed with the valve.
- 2) Connect pilot supply source to port 'X'.

Dimensions

Solenoid Valve with Sub-base (2 & 3 Position)



	A	A ₁	B	C	D	E	F	G	H
in	12.08	9.76	2.75	1.63	2.63	3.63	4.63	5.63	7.26
mm	306.8	248	69.9	41.4	66.8	92.2	117.6	143.0	184.4
	J	K	L	M	N	P	Q		
in	8.02	.38	.88	6.60	2.25	1.38	.41		
mm	203.7	9.7	22.3	167.6	57.2	35.1	10.4		

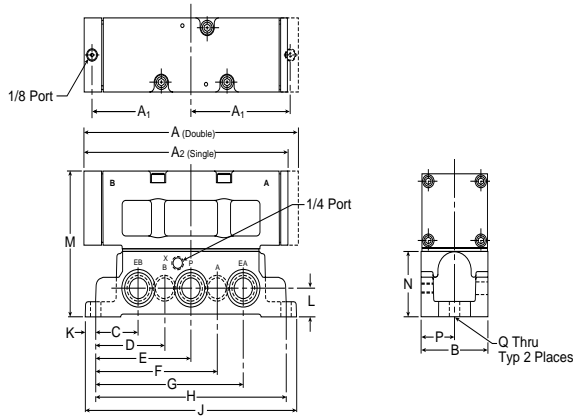
! WARNING

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

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

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

EXTRA COPIES OF THESE INSTRUCTIONS ARE AVAILABLE FOR INCLUSION IN EQUIPMENT / MAINTENANCE MANUALS THAT UTILIZE THESE PRODUCTS. CONTACT YOUR LOCAL REPRESENTATIVE.



Remote Pilot Valve with Sub-base (2 & 3 Position)

	A	A ₁	A ₂	B	C	D	E	F	G
in	8.22	3.81	7.83	2.75	1.63	2.63	3.63	4.63	5.63
mm	208.7	96.8	198.9	69.9	41.4	66.8	92.2	117.6	143.0
	H	J	K	L	M	N	P	Q	
in	7.26	8.02	.38	.88	4.87	2.25	1.38	.41	
mm	184.4	203.7	9.7	22.3	123.7	57.2	35.1	10.4	

Manifold Application

Valves may be gang manifolded up to any number of stations, providing that sufficient pressure is realized in the circuits downstream of the valve outlets; and sufficient pressure is available for shifting the valves. Longer manifold gangs may require intermediate supports. Means to increase pressure levels include supply connections at both ends of the manifold gang, external pilot supplies and sequencing the valve operation to maximize time between different valve shifts.

⚠ WARNING

Air exhausting from one valve into the exhaust gallery of the manifold may pressurize other valve circuits open to the same gallery. Design the circuit such that there is no hazard or damage consequence from this action.

Manifold Port Connections

(See front for *Sub-base Port Connections*)

- 1) Connect a single inlet air supply to the manifold inlet gallery by one of the following methods:
 - a) **All valves to be supplied with a common pressure:** Connect air supply to port marked 'P' on either end of manifold package and plug port on other end marked 'P' (or connect air supply to both ends for applications requiring a larger volume of air).
 - b) **Two groups of valves each requiring a different supply pressure:** Isolate valves into two groups using Manifold Isolation Procedures. Connect appropriate air supply to each end of manifold package at port 'P'.

NOTE: For dual pressure applications (two inlet air supplies to either end of the bank, or an isolated zone within a bank) connect supply to ports 'EA' and 'EB'.
- 2) Connect mufflers (or pipe exhaust) at ports 'EA' and 'EB' for single exhaust; and port 'P' for dual supplies.
- 3) Connect cylinder ports marked 'A' and 'B' on bottom of manifold to ends of cylinder or other device to be supplied air.

Manifold External Pilot Supply Connections

(See front for *Sub-base External Pilot Supply Connections*)

- 1) Perform pilot supply conversion outlined on **Installation Instructions (V-595P)** packed with valve.
- 2) Isolate external pilot supply gallery (designated by 'X') to those valves requiring external pilot supply.
- 3) Connect pilot supply source to the 'X' port gallery by one of the following methods:
 - a) **All valves to be Externally Piloted:** Connect pilot supply source to port 'X' on one end of 'X' port gallery. Plug port 'X' on the opposite end.

- b) **Valves on one end of a bank to be Externally Piloted:** Connect pilot supply source to port 'X' on the end to be externally piloted.

Manifold Isolation Procedures

Inlet, exhaust and external pilot galleries may be isolated from those in neighboring manifolds through the use of flush pipe plugs.

- 1) Determine gallery and manifold position to be isolated.
- 2) Apply pipe sealant to threads of pipe plug.
- 3) Screw pipe plug into threaded end of gallery and tighten.

Manifolding Assembly Procedures

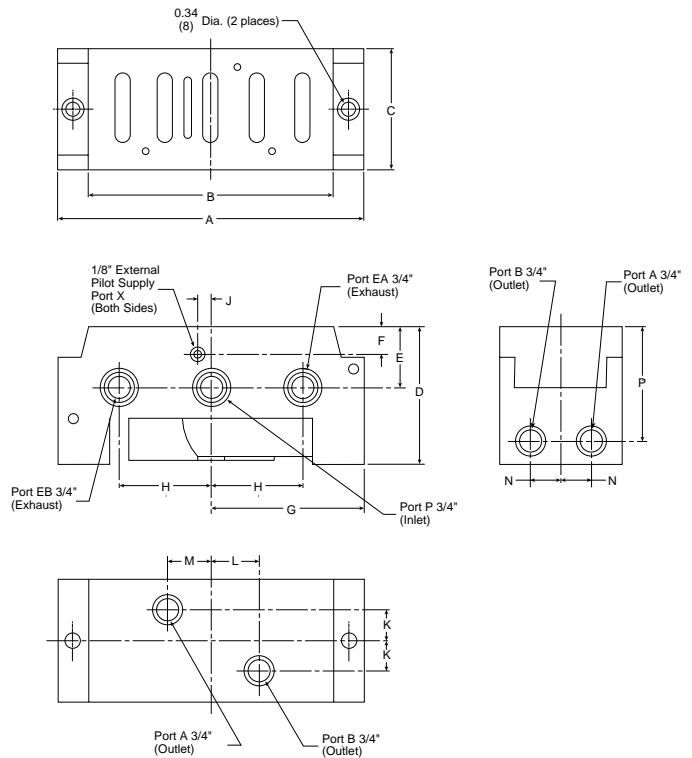
Manifolds may be assembled to one another either before or after assembling valves to manifolds. If inlet, exhaust or external pilot galleries are to be isolated from neighboring manifolds be sure to follow *Manifold Isolation Procedures* before proceeding with this section.

- 1) Clean counterbores in side of manifold and mating surface of neighboring manifold.
- 2) Apply a light coating of grease to o-rings and place in counterbores.
- 3) Place manifold next to neighboring manifold, lining up connecting screw holes.
- 4) Place lock washers on socket-head cap screws and insert through clearance holes in one manifold and screw into neighboring manifold. Torque screws to 80-90 in-lbs.

Optional Accessory - Blank Station Plate

This is used with a manifold block to reserve a place for a valve that will be later added to the manifold bank or to remove a valve from a manifold without having to remove the manifold block from the manifold bank. Place gasket and block on manifold and assemble using screws provided with the plate. Tighten screws to 80-90 in-lbs.

Manifold Dimensions



	A	B	C	D	E	F	G	H	J
in	7.20	6.31	3.44	3.44	1.38	0.44	3.52	2.00	.50
mm	181	160	87	87	35	11	89	51	13
	K	L	M	N	P				
in	.88	1.00	1.00	.88	2.50				
mm	22	25	25	22	64				



Pneumatic Division
Richland, Michigan 49083
269-629-5000

PDNSG-1

Pneumatic Division Safety Guide

ISSUED: August 1, 2006

Supersedes: June 1, 2006

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

⚠ WARNING:

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

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

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

1. GENERAL INSTRUCTIONS

- 1.1. Scope:** This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.
- 1.2. Fail-Safe:** Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.
- 1.3. Relevant International Standards:** For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power – General Rules Relating to Systems. See www.iso.org for ordering information.
- 1.4. Distribution:** Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.
- 1.5. User Responsibility:** Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:
 - Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
 - Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
 - Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
 - Assuring compliance with all applicable government and industry standards.
- 1.6. Safety Devices:** Safety devices should not be removed, or defeated.
- 1.7. Warning Labels:** Warning labels should not be removed, painted over or otherwise obscured.
- 1.8. Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2. PRODUCT SELECTION INSTRUCTIONS

- 2.1. Flow Rate:** The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.
- 2.2. Pressure Rating:** Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.
- 2.3. Temperature Rating:** Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.
- 2.4. Environment:** Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.
- 2.5. Lubrication and Compressor Carryover:** Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.
- 2.6. Polycarbonate Bowls and Sight Glasses:** To avoid potential polycarbonate bowl failures:
 - Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
 - Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, ketones, esters or certain alcohols.
 - Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.

Pneumatic Division Safety Guide

- 2.7. Chemical Compatibility:** For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5
- 2.8. Product Rupture:** Product rupture can cause death, serious personal injury, and property damage.
- Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
 - Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
 - Consult product labeling or product literature for pressure rating limitations.

3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

- 3.1. Component Inspection:** Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.
- 3.2. Installation Instructions:** Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER, or at www.parker.com.
- 3.3. Air Supply:** The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

- 4.1. Maintenance:** Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.10.
- 4.2. Installation and Service Instructions:** Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in question for the appropriate practices to service the unit in question. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker web site at www.parker.com.
- 4.3. Lockout / Tagout Procedures:** Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – (Lockout / Tagout)
- 4.4. Visual Inspection:** Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:
- Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
 - Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation.
 - Kinked, crushed, or damaged hoses. Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
 - Any observed improper system or component function: Immediately shut down the system and correct malfunction.
 - Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

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

- 4.5. Routine Maintenance Issues:**
- Remove excessive dirt, grime and clutter from work areas.
 - Make sure all required guards and shields are in place.
- 4.6. Functional Test:** Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.
- 4.7. Service or Replacement Intervals:** It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Service intervals need to be established based on:
- Previous performance experiences.
 - Government and / or industrial standards.
 - When failures could result in unacceptable down time, equipment damage or personal injury risk.
- 4.8. Servicing or Replacing of any Worn or Damaged Parts:** To avoid unpredictable system behavior that can cause death, personal injury and property damage:
- Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – Lockout / Tagout).
 - Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
 - Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
 - Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
 - After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
 - Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.
- 4.9. Putting Serviced System Back into Operation:** Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.