WESTLOCK
CONTROLS CORPORATION

FALCON SOLENOID VALVE OPERATING AND MAINTENANCE MANUAL

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Revision History

Revision
Rev.A 1/14/05: Rev. B 8/14/09: Rev. C 10/27/11: Rev. D 12/16/11

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1. Product Certification

The Falcon valves themselves carry no hazardous area approvals. Refer to approvals of the Westlock unit on which the valves are installed.

2. Warning

Be sure to disconnect power to solenoids and pressurized air supply before conducting any valve service or maintenance. Avoid introducing particles or chemical contaminants into valves.

3. Description

The Falcon solenoid valve is an air piloted solenoid valve system incorporating elastomer static seals through which a shaped spool moves and are manufactured for 3 or 4 way operation. 3 way is normally used for pilot control of the other relay valves or for the operation of single acting cylinders. 4 way is normally used to control the action of double acting cylinders.

4. Principles of Operation

In a typical, normally closed, spring-return Falcon valve, the spool controlling the direction of air flow is moved by pressurized pilot air acting on a piston when the coil is energized. The spool is returned to the normally closed position by a spring when the coil is de-energized, and the piston is vented to atmosphere.

The spool may be manually moved to control air flow direction with override options.

The pilot air supply is normally tapped internally from the air supplied to Inlet port 1 and power is supplied separately to coils.

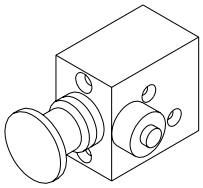


Fig. 1

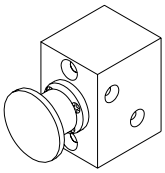


Fig. 2

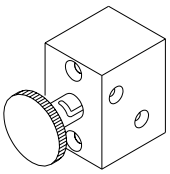


Fig. 3

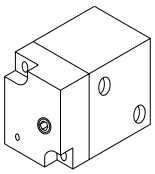


Fig. 4

5. Optional Features

N - No-Voltage Release (Latching)

The palm button is manually moved and latched. The inward movement of the palm button causes the valve to shift. Open position will be sustained and latch will automatically disengage when air and voltage are applied. When the coil is de-energized, the valve will return to its original position. (1.2 Cv Valves only) See Fig. 1

R - No-Voltage Release (Non-Latching)

With the coil first energized, the palm button is then manually moved. The inward movement of the palm button causes the valve to shift.
When the coil is de-energized, the palm button automatically returns to its original position. (1.2 Cv and 3.5 Cv Valves only) See Fig. 2

L - Manual Locking Override

Manually depress palm button and rotate clockwise for maintained condition; must manually disengage to return to original position. See Fig. 3

Coils must be de-energized before operating manual override.

M - Momentary Override

Spring return momentary push type; must hold in to actuate. See Fig. 3

Coils must be de-energized before operating manual override.

H - Hex Drive Maintained Override

Insert allen key in hex head screw and rotate clockwise (4-5 turns) to shift spool. Valve will stay put until hex head screw is rotated counter clockwise (4-5 turns) back to original position. See Fig. 4

Coils must be de-energized before operating manual override.

E - External Pilot

The 1/8" NPT external pilot connection requires a separate auxiliary pressure line to the valve. This feature should be used when the controlled pressure supplied to inlet port 1 is below the minimum 45 psi operating pressure.

D/C - Dual Coil Option

Four way valves are available with a coil/pilot valve on each end of the Falcon valve, coil "A" and coil "B". When coil "A" is energized the valve will shift. If coil "A" is then de-energized, the valve will remain in this position. **The valve will not return to the original state until coil "A" is de-energized and coil "B" is energized.** The process is the same for coil "B".

NOTES - For Dual Coil Valves

1. The valve may be in either position upon installation. Refer to the Air Flow Diagrams (Fig. 5) and energize the appropriate coil (with air) to reset valve to the desired position.

2. Dual coil valves require both an electrical signal and air pressure to operate. See Air Flow Diagram for air pressure requirements. If either or both inputs are lost the valve will remain in it's current position.

3. Both coils should never be energized simultaneously.

4. If using overrides on a dual coil valve, the coils must be de-energized.

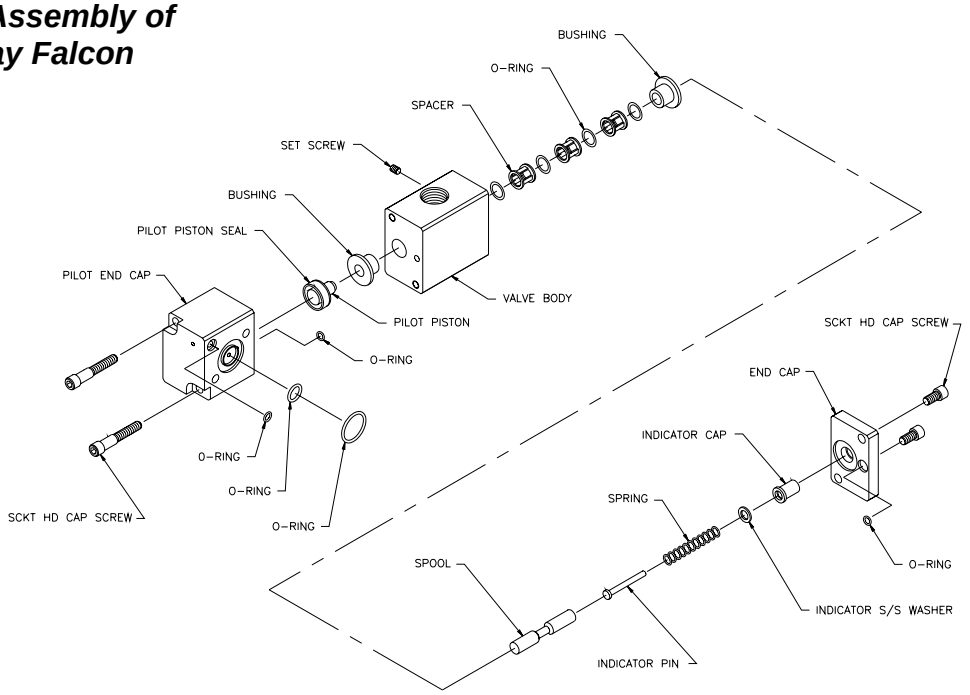
Specifications

Operating Pressure: 45-120 PSIG
Operating Temperature: -4° F to 176° F
(Agency approvals may not encompass full operating temperature range).
Operating Media: Lubricated or dry air, filtered to 20 microns.

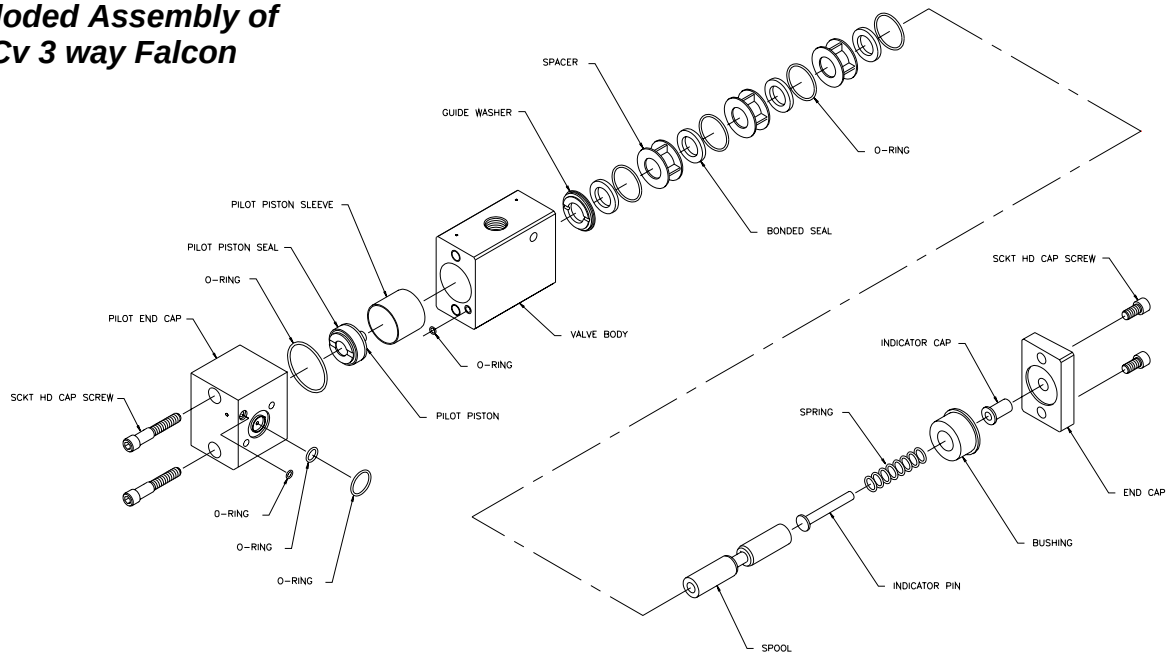
6. Order Guide

Spare Falcon valve assemblies and stand-alone valves for use outside an integrated Westlock control monitor can be purchased through your regular sales contact. To specify a Falcon valve as an integrated part of your Quantum or Intellis control monitor, please consult the product ordering guides also available from your sales contact or on the Westlock website at www.westlockcontrols.com under the control monitor of your choice.

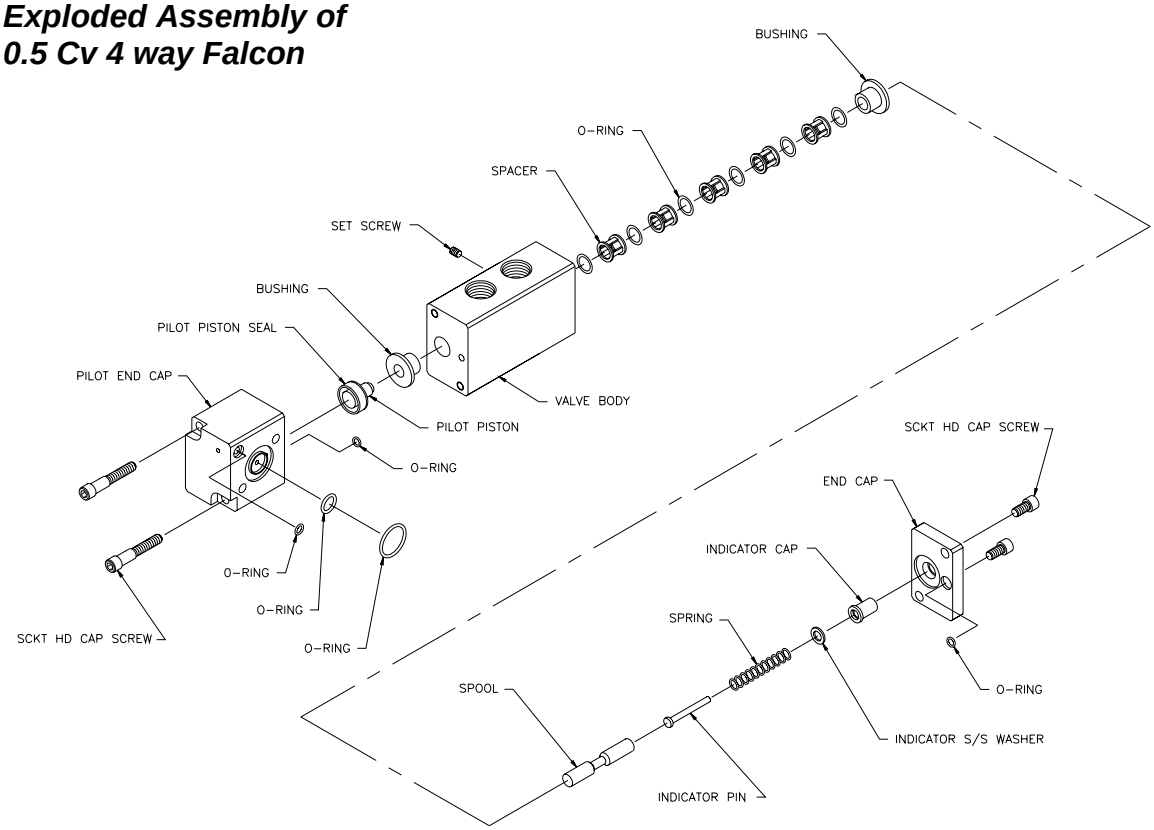
Exploded Assembly of 0.5 Cv 3 way Falcon



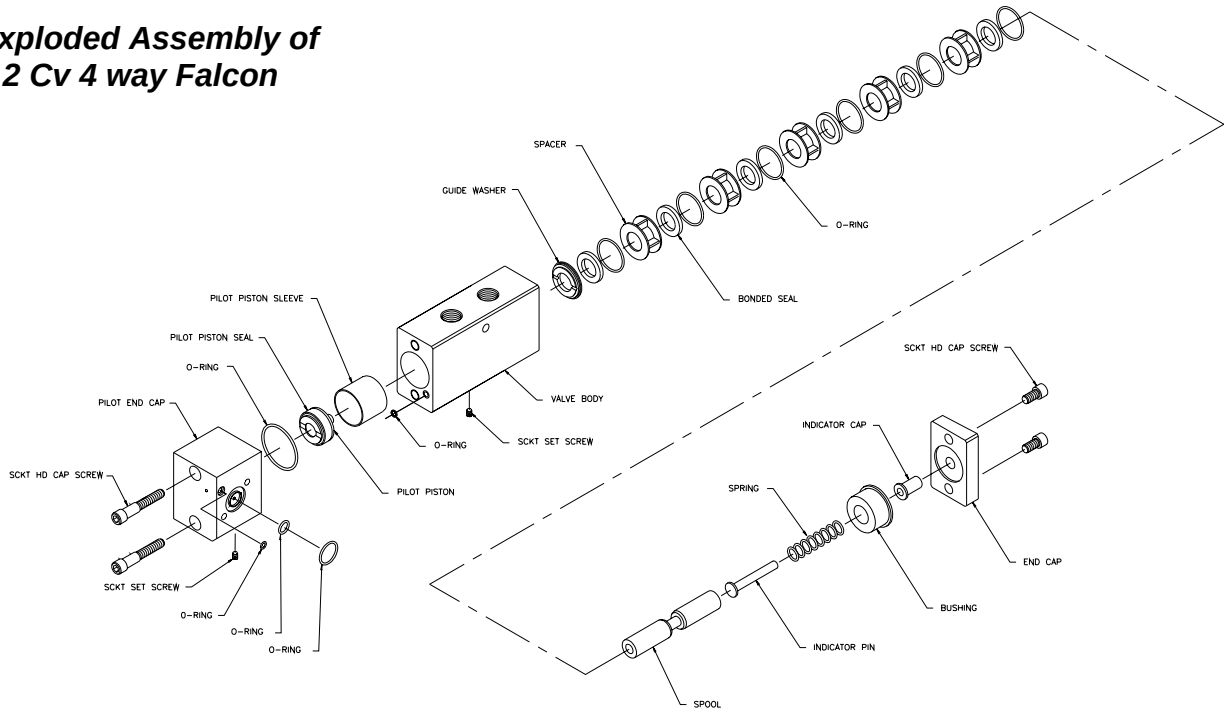
Exploded Assembly of 1.2 Cv 3 way Falcon



Exploded Assembly of 0.5 Cv 4 way Falcon

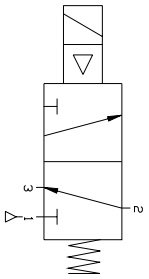


Exploded Assembly of 1.2 Cv 4 way Falcon

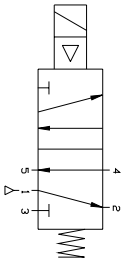


7. Installation

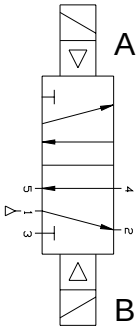
Porting Designation
1/4” NPT air ports for inlet, outlet, and exhaust
(3.5 Cv valve has 1/2” NPT air ports)



Spring Return 3-Way (3/2) Valve
Description of Operation: Solenoid De-energized - air flows from Outlet Port 2 to Exhaust Port 3. Solenoid Energized - air flows from Inlet Port 1 to Outlet Port 2.



Spring Return 4-way (5/2) Valve
Description of Operation: Solenoid De-energized - air flows from Inlet Port 1 to Outlet Port 2 and exhausts from Port 4 to Port 5. Solenoid Energized - air flows from Inlet Port 1 to Outlet Port 4 and exhausts from Port 2 to Port 3.



Dual Coil 4-way (5/2) Valve
Description of Operation: Coil B Energized - air flows from Inlet Port 1 to Outlet Port 2 and exhausts from Port 4 to Port 5.
Coil A Energized - air flows from Inlet Port 1 to Outlet Port 4 and exhausts from Port 2 to Port 3.

Fig. 5
Air Flow Diagrams

Note: The valve will not change state until the energized coil is de-energized and the opposite coil is energized in that order.

PLUMBING AND AIR SUPPLY CONSIDERATIONS

Air mains and lines should be large enough to avoid excessive pressure loss under conditions of maximum flow. Air lines should be installed with as few restrictions as possible if the cost of compressed air is to be kept to a minimum. Sharp turns in piping should be avoided for more efficient air flow and economical air power. It is advisable to pitch the mains in the direction of air flow so that both gravity and air flow will carry the water to traps or water legs located at frequent intervals.

To help in preventing condensed moisture from reaching the point of usage, down pipes should never be taken directly from the bottom of air pipes or mains. Connection should be made at the top of the main and a long radius return bend used.

The importance of proper filtration (20 Micron) of the air supply to pneumatic equipment can never be over-emphasized as a means of preventing wear due to abrasive solids being present in the air supply. At higher pressures than recommended, pneumatic equipment can wear excessively or undergo seal damage with no significant increase in output and compressed air is consequently wasted. Therefore, provide pneumatic equipment with serviced air by including suitable air line filters, and pressure regulators in the installation at minimum. If lubricators are used in the air line, use appropriate oil grades, such as ISO and UNI FD22. The performance and life of pneumatic valves may be affected by air supply conditioning methods.

AIR FLOW

Pipe sizes are normally determined on semi empirical lines, the basis for selection being an acceptable pressure drop (e.g. not more than 10% of the applied pressure). In sizing pipes, consideration should be given to likely future demands, as a system will be inefficient if the demand outgrows the supply. It is always better to over size mains as this will reduce air velocity and make water separation more effective.

TUBES AND FITTINGS

The use of copper, stainless steel, nylon or polyethylene tube is recommended for piping up air circuits and equipment. As a general rule, pipe threaded fittings should not be assembled to a specific torque because the torque required for a reliable joint varies with thread quality, port and fitting materials, sealant used, and other factors. The suggested method of assembling pipe threaded connections is to assemble them finger tight and then wrench tighten further to a specified number of turns from finger tight. The assembly procedure given below is for reference only, the fitting should not be over tightened for this will lead to distortion and most likely, complete valve failure.

1. Inspect port and connectors to ensure that the threads on both are free of dirt, burrs and excessive nicks.

2. Apply sealant/lubricant or Teflon tape to the male pipe threads. **With any sealant or tape, the first one or two threads should be left uncovered and care must be taken to avoid the application of excessive sealant media to avoid system contamination.**

3. Screw the connector into the port to the finger tight position.

4. Wrench tighten the connector aproximately 1 - 2 turns (to seal) from finger tight. again this is only reference - the fitting should **NOT** be over tightened.

8. Field Wiring

Complete the electrical wiring in accordance with local and National Electrical Codes. The ground wire should be secure under the green screw. Check all screws for tightness. If the installation is in a hazardous area, all electrical leads must be sealed with an approved compound, in accordance with local and National Electrical Codes unless the switches are hermetically sealed. (NEC 5051-5)
Always check the nameplate to make sure the approval ratings coincide with the application.

CAUTION: To prevent ignition of hazardous atmospheres, replace cover before actuating the electrical circuits. Keep cover tightly closed when in operation.

9. Maintenance and Repair

Routine maintenance is usually confined to the periodic replenishment of Dow Corning 111 lubricant or equivalent to spool and spring if needed. Repair and overhaul kits are available for soft seals replacement or replacement of all internal parts in the event of catastrophic contamination of the valve. Consult your sales contact for details.