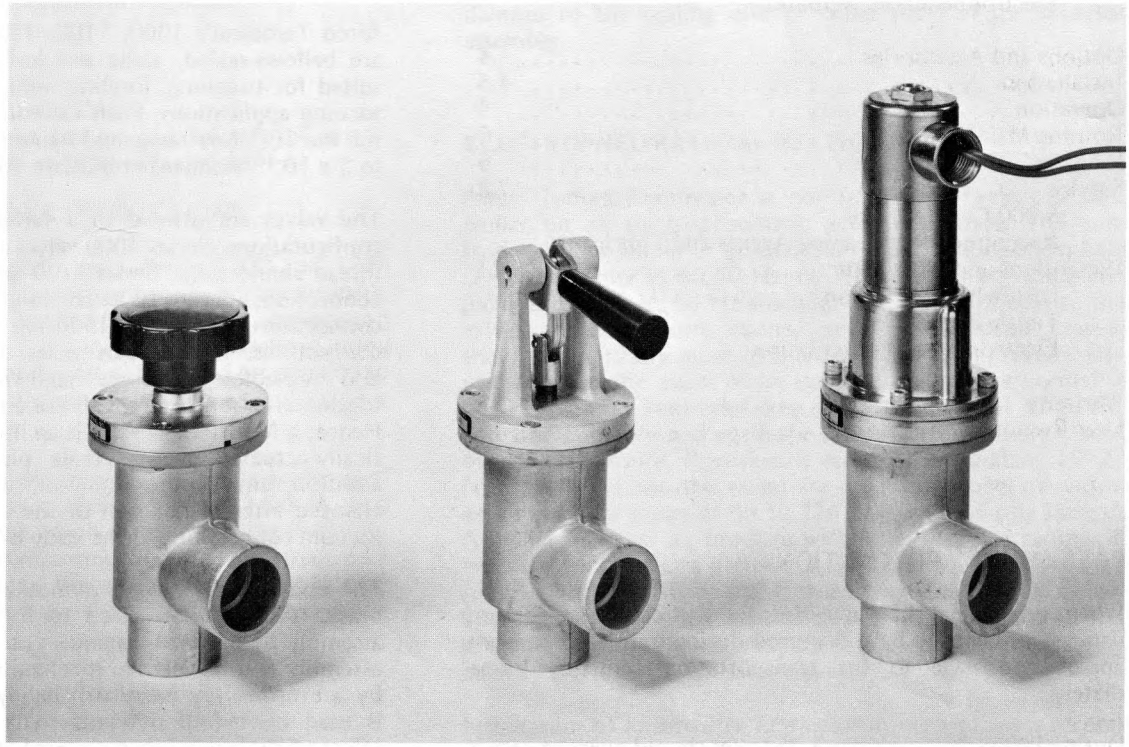
OPERATION AND SERVICE MANUAL

0101-8301-0

BRASS ANGLE AND IN-LINE VALVES, BELLOWS-SEALED

1000, 1100, 1200 AND 1300 SERIES



AIRCO

Temescal

TABLE OF CONTENTS

PRELIMINARY PRECAUTIONS

When unpacking the valve, inspect the container for any damage which may have occurred during transit. Report any apparent damage to the transportation company immediately.

During installation or service, the user should exercise care in keeping the valve as clean as possible. Nicked or gouged surfaces will not provide proper vacuum seal and dust or lint particles can hinder the sealing of o-rings. Parts that will be exposed to vacuum must be handled with lint-free gloves. Perspiration and oil from the fingers will not only contaminate the parts, but will etch and degrade the polished surfaces required for proper vacuum performance.

DESCRIPTION

INTRODUCTION

Airco Temescal's 1000, 1100, 1200 and 1300 series valves are bellows-sealed, angle and in-line valves that are ideally suited for roughing, foreline, vent, leak detection and other vacuum applications. Each valve in the series is vacuum rated for the 10^{-7} torr range and helium mass spectrometer tested to 5×10^{-10} standard atm cc/sec sensitivity.

The valves are offered in a variety of sizes in four series configurations. Series 1000 valves are angle with female pipethread connections, Series 1100 are angle with female solder connections, Series 1200 are in-line with female pipethread connections, and Series 1300 are in-line with female solder connections. Within each series, three actuation styles are also available: XX10 are handwheel actuation, XX20 are toggle actuation, and XX30 are electropneumatic actuation. Hence, a Model 1230 valve is an in-line valve, electropneumatically-actuated, with female pipethread connections. In addition, any of the actuation styles in this series can be changed after installation of the valve without breaking the vacuum connections to the body of the valve.

The body of the valve is monoblock construction of forged brass. It is vacuum sealed to the bonnet of the actuator assembly by a Buna-N (standard) o-ring. In turn, the actuator assembly and its internal mechanism are sealed from vacuum by a bronze-alloy (standard) bellows. This bellows assembly is used instead of dynamic shaft seals and eliminates the effect of gas bursts when opening and closing the valve. When worn, the bellows is easily removed and replaced without brazing or soldering.

The actuator assembly sealing disc provides the vacuum seal for the valve. It is machined brass and has a Buna-N (standard) o-ring which seals against the inside surface, or seat, of the valve body. The entire assembly is designed to actuate or seal against 15 psi in either direction. As a result, the valve can be installed with any horizontal or vertical orientation and will work equally well with vacuum on either side of the disc. However, it is preferable to install the valve with vacuum on the underside of the sealing disc as this eliminates the need to pump out the body of the valve and helps seal the valve as a result of the pressure differential.

BAKEOUT

CAUTION

Airco Temescal does not recommend bakeout of any of the 1000, 1100, 1200 or 1388 series valves.

PIPETHREAD AND SOLDER CONNECTIONS

Valves with pipethread connections, Series 1000 and 1200 valves, are provided with female pipethreads and are available in 1/2-in., 1-in., and 1-1/2-in. i.d. port sizes to correspond with 1/2-in., 1-in., and 1-1/2-in. NPT standards. During installation, excessive force should not be used on pipethread valves as the strain may distort the valve seat and cause a vacuum leak.

Series 1100 and 1300 valves, those with female solder connections, are offered in 3/8-in., 5/8-in., 3/4-in., 1-1/8-in., and 1-5/8-in. i.d. port sizes for which standard tubing is readily available. When the vacuum connections are soldered, care should be exercised to keep the valve body as cool as possible. This will prevent damage to the seating surface inside the valve.

HANDWHEEL ACTUATION

All of the handwheel valves utilize Acme threads to minimize the number of turns required to open and close the valve. Handwheel valves should not be excessively tightened as this will not improve vacuum and may result in damage to the sealing o-ring.

TOGGLE ACTUATION

Toggle actuation valves are designed to lock over-center in order to provide a positive vacuum seal. It is important to exercise reasonable caution when closing the valve. Positive hand pressure should be applied to lock the valve in its closed position. DO NOT allow it to slam shut. This can cause damage to the sealing disc or other parts of the actuator assembly.

ELECTROPNEUMATIC ACTUATION

Airco Temescal provides a normally-closed solenoid controller on all electropneumatic actuation valves. The controller is housed in a general purpose (indoor-atmosphere condition), 115 V, 60/50 Hz, NEMA* Type I enclosure and includes a 115 V, 60 Hz solenoid coil (standard). Since the valves are air-pressure opened and spring-pressure closed, they automatically close in the event of an air pressure failure. And, in the event of an electrical failure the normally-closed solenoid controller cuts off the supply of air to the actuator assembly and again the valve is automatically closed by spring pressure. Provision is made for a standard 1/8-27 NPT air fitting and the valves are designed to operate within an air pressure range of 60 to 125 psig, with 80 psig typical. A higher or lower air pressure within the specified range will not affect the vacuum performance of the valve, but only the speed with which it opens. However, valves operated below 60 psig may not open consistently or fully and too high a pressure, above 125 psig, may damage the sealing disc, spring or other parts of the actuator assembly.

Installation of an air-filter/lubricator in the air lines is recommended for reliable operation of electropneumatic actuation valves. This prevents condensation from entering and inhibiting the operation of the actuator assembly.

*National Electronic Manufacturer's Association

OPTIONS AND ACCESSORIES

VITON O-RINGS

All of the valves in this series can be supplied with optional Viton o-rings of low compression-set fluorocarbon. These o-rings typically provide an improved vacuum seal and longer life than Buna-N o-rings. Installation and service procedures given in this Manual for Buna-N o-rings are applicable to Viton o-rings as well.

NORMALLY-OPEN SOLENOID CONTROLLERS

A normally-open solenoid controller is available for the electropneumatic actuation valves in this series. The controller is housed in a general purpose (indoor-atmosphere condition), 115 V, 60/50 Hz, NEMA Type I enclosure. Like the normally-closed, the normally-open valve is air-pressure opened and spring-pressure closed and automatically closes in the event of an air pressure failure. In the event of an electrical failure, the normally-open solenoid controller permits the flow of air to the actuator assembly instead of restricting it, and the valve is automatically opened. The installation and service procedures given in this manual are applicable to either controller.

SPECIAL SOLENOID COILS

Special solenoid coils for European or specialized operational requirements are available for the electropneumatic actuation valves in this series. The standard coil is easily replaced by removing the solenoid cover, dropping the old coil straight down and out of the assembly, and inserting the new coil. During installation of the valve, the user should exercise caution to carefully check the solenoid nameplate to ensure proper electrical connections to the valve.

STAINLESS STEEL BELLOWS

An optional stainless steel bellows is available for all valves in this series except those with 1-in. and 1-1/8-in. i.d. ports. The bellows is welded stainless steel and offers extended bellows life. The procedures for installation and service of bronze-alloy bellows are applicable to stainless steel bellows as well.

CAUTION

Do not extend or compress stainless steel welded bellows by hand. This may cause permanent damage to the bellows.

INSTALLATION

Ensure that the valve and adjacent piping will be adequately supported in the vacuum system and install the valve as follows.

1. Remove the plastic plugs installed in the valve ports for shipment. Inspect the valve for any obvious physical damage or for loose particles inside the valve such as lint or dust.
2. Loosen the four (4) socket-head screws that secure the bonnet of the actuator assembly to the valve body.
3. Slowly remove the entire actuator assembly from the body of the valve and store it in a clean, lint-free area (a clean, plastic bag is ideal) until needed for reassembly.
4. Using a blunt or wooden implement, remove the o-ring from the valve body. Care should be exercised to assure that the o-ring or o-ring groove is not gouged or scratched. Store the o-ring with the actuator assembly.
5. Install the valve in the system, making sure no foreign material enters the valve:

   Threaded Connections

   a. For in-line installation, wrap Teflon tape 1-1/2 turns in the direction of the threads on both of the mating male pipes (if the valve is used as a vent valve and terminated to atmosphere, only one mating connection is required). Extend the tape to within 1/4-in. of the sealing end.

CAUTION

Do not extend the tape any further, because loose tape threads may enter the vacuum system.

b. Screw the male pipes into the valve ports until hand tight.

CAUTION

Do not use a wrench or excessive force as damage may result to the valve body.

Solder Connections

a. Ensure that the solder surfaces are clean and fit closely.
b. Coat the valve seat with flux to prevent oxidation during soldering.
c. Carefully silver solder the valve ports to the mating connections, keeping the valve body as cool as possible.
d. Using a damp cloth, remove all flux from the valve seat before installing the actuator assembly.

6. Remove the actuator assembly and the body o-ring from storage.
7. Inspect the o-ring in the sealing disc and the body o-ring. Ensure that both are clean and undamaged.
8. Apply a light film of high vacuum grease to both o-rings. Insert the body o-ring into its groove.
9. Ensure that the actuator assembly and the body of the valve are clean and lint free.
10. As outlined below, reinstall the actuator assembly into the body of the valve and complete the installation.

Handwheel and Toggle Actuations

a. Ensure that the actuator assembly is in the open position.

CAUTION

Installing the actuator assembly while it is in the closed position can cause damage to the valve.

b. Carefully insert the actuator assembly into the body of the valve.
c. Tighten the four socket-head screws evenly until metal-to-metal contact is attained between the valve body and the bonnet of the actuator assembly. Number 10 screws on smaller valves are torqued to 20 in.-lb. and 1/4-in. screws on larger valves to 35 in.-lb.
d. Ensure that the actuator assembly works freely.

Electropneumatic

a. Carefully insert the actuator assembly into the body of the valve.
b. Tighten the four socket-head screws evenly until metal-to-metal contact is attained between the valve body and the bonnet of the actuator assembly. Number 10 screws on smaller valves are torqued to 20 in-lb. and 1/4-in. screws on larger valves to 35 in.-lb.
c. For the compressed air supply, wrap Teflon tape 1-1/2 turns in the direction of the threads on the 1/8-in. mating male fitting. Extend the tape to within 1/4-in. of the sealing end.

CAUTION

Do not extend the tape any further, because loose tape threads may enter the actuator assembly.

d. Connect the compressed air supply to the solenoid.
e. Install an air-filter/lubricator in the air lines if desired.
f. Check the solenoid nameplate to ensure the correct voltage requirements and make the necessary electrical connections.
g. Carefully check the operation of the valve with 60–125 psig air pressure.

OPERATION

All Airco Temescal valves are specifically designed for simple, reliable operation. Only minor adjustments and basic precautions are required for their operation.

Handwheel Actuation Valves
CAUTION: Do not use excessive force when opening or closing the valve or damage may result.

Toggle Actuation Valves
When opening and closing, ensure that the valve locks over the (past) center in its full open or closed position. CAUTION: Do not allow the valve to "slam" shut when released or damage may result.

Electropneumatic

CAUTION:
It may be necessary to adjust the air pressure for the desired opening and closing speed. However, valves operated below 60 psig may not open fully or consistently, and under no circumstances should the valves be operated above their 125 psig rating.

ROUTINE MAINTENANCE

A regular schedule of maintenance will assure the continued, trouble-free operation of the valve. It is recommended that at 1,000-cycle intervals the valve be checked to ensure that it is clean and that the bonnet is tightly sealed to the body. Assure that the actuation is smooth and apply light machine oil to the actuation threads of handwheel valves. At 5,000-cycle intervals, the actuator assembly should be removed and disassembled for cleaning and parts replacement as required (see the Service section of this manual).

DIAGNOSTIC GUIDE

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Vacuum Leak	(1) Leak in one of the vacuum connections	—Check all vacuum connections
	(2) Bonnet is loose	—Check the bonnet and tighten the socket-head screws to the specified torque rating
	Toggle Valves	
	(3) The actuator is not locked over the center	—Check the actuator
	Electropneumatic	
	(4) Low input voltage	—Check the electrical connections and ensure that they meet the requirements specified on the solenoid nameplate
	(5) Dirty or damaged body or sealing disc o-ring or o-ring groove	—Remove actuator assembly and check the o-rings and o-ring grooves for loose particles or scratches. Clean or replace as necessary.
	(6) Leaky bellows	—Inspect the bellows and replace it if required
	(7) Broken spring in the actuator assembly	—Disassemble the actuator assembly and inspect the spring. Replace it if necessary.

SERVICE

5,000-CYCLE SERVICE

Every 5,000 cycles, remove the actuator assembly from the valve and disassemble it for cleaning and parts replacement.

1. Loosen the four socket-head screws that secure the bonnet to the body of the valve.
2. Carefully remove the actuator assembly from the body of the valve and disassemble it:

Handwheel Actuation

a. Using hand pressure, compress the bellows downward and insert a screwdriver into the hole on the disc nut.
b. Using the screwdriver to keep the disc nut stationary, unscrew the sealing disc from the stem.

Toggle Actuation

a. Release the actuator handle to its upright position.
b. Insert a pin in one of the small holes in the stem, just above the bonnet.
c. Using the pin to keep the stem stationary, unscrew the sealing disc.

Electropneumatic

DANGER

The bellows assembly on electropneumatic actuation valves is under heavy spring tension. DO NOT disassemble it without adequate precautions or the parts will fly apart and injury to personnel may result.

a. Using normal hand pressure, separate the air cylinder and the solenoid from the bellows assembly.
b. With the sealing disc o-ring in place, use an arbor press or specially adapted vice to carefully compress the bellows assembly.

CAUTION

Care must be exercised to ensure that the sealing surfaces and edges of the bonnet or sealing disc are not gouged when the bellows is compressed. Leave the sealing disc o-ring in place as it will help protect the surface of the sealing disc.

c. Remove the piston locknut and slowly release the compression on the bellows assembly.
d. Remove the bellows assembly from the press.

3. Inspect the bellows to ensure that it is vacuum tight. Replace if required.
4. Using a blunt or wooden implement, carefully remove each o-ring (three on the handwheel and toggle, five on the electropneumatic valve) and check for smoothness and elasticity. It is recommended that the sealing disc o-ring on the electropneumatic actuation valve be replaced every 5,000 cycles and that the remaining o-rings be replaced every 10,000 cycles, or sooner, as required.
5. Inspect the actuator assembly spring and ensure that it is not worn. It is recommended that the spring be replaced on the electropneumatic actuation valve every 10,000 cycles.
6. Visually inspect all other parts of the actuator assembly for abnormal wear and replace if necessary.
7. Clean the interior surfaces and metal parts with acetone. Clean the o-rings with methyl alcohol. Clean the rubber piston on the electropneumatic actuation valve with methyl alcohol.

CAUTION

DO NOT use acetone to clean o-rings or the rubber piston. Permanent damage will result.

8. Inspect the body of the valve, particularly the valve seat. If the seat is damaged, the body must be removed from the vacuum line and either polished to a suitable finish or replaced. If polishing is desired, use 400 grit emery paper to achieve a 32 rms finish.

NOTE: If the valve seat is gouged or deeply scratched, it may not be possible to achieve the necessary finish and maintain the proper vacuum seal. In this case, the valve body must be replaced.

9. Ensure that the air-filter/lubricator (recommended on the electropneumatic valve) is clean. Clean or replace it at the manufacturer's recommendation.

10. Apply a light film of high vacuum grease to the bellows-seal, body and sealing disc o-rings and insert each into the proper o-ring groove. Apply high vacuum grease or Parker O-Lube to the remaining o-rings and install.

11. Lightly grease the rubber piston on the electropneumatic actuation valve with high vacuum grease or Parker O-Lube.

12. Reassemble the actuator assembly.

DANGER

Extreme care must be used when reassembling the bellows assembly on electropneumatic actuation valves. Use precautions to ensure that the spring-loaded parts do not fly apart. Personal injury may result.

13. Apply light machine oil to the handwheel threads and to the toggle actuator link assembly.

14. Install the actuator assembly in the body of the valve as outlined under INSTALLATION, step 10, in this manual.

RECOMMENDED CLEANING AGENTS & LUBRICANTS

Metal Parts —— Acetone
Buna-N and optional Viton O-rings —— Methyl alcohol

CAUTION

DO NOT use acetone to clean o-rings. Permanent damage will result.

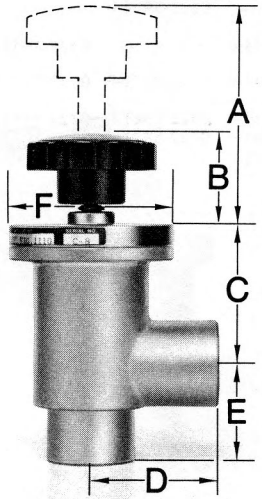
Bellows-seal, Body and Sealing Disc O-rings —— High Vacuum Grease (Dow Corning or Apiezon)
Remaining O-rings —— High Vacuum Grease (Dow Corning or Apiezon) or Parker O-Lube
Rubber Piston on Electropneumatic Actuation Valves —— High Vacuum Grease (Dow Corning or Apiezon) or Parker O-Lube
Handwheel Actuator Threads and Toggle Actuator Linkage —— Light Machine Oil

DIMENSIONS AND PARTS LISTS

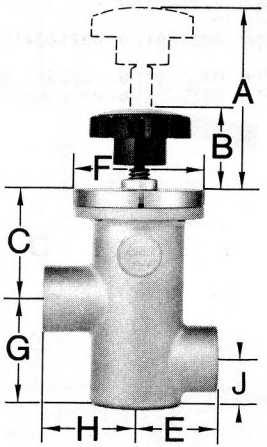
HANDWHEEL ACTUATION
MODELS 1010, 1110, 1210 AND 1310

PORT (I.D.)	A	B	C	D	E	F (Dia.)	G	H	J	WT. (Lbs.)
3/8" 1/2" 5/8" 3/4"	2.06	1.63	1.69	1.75	1.28	2.75	1.56	1.56	0.69	2.00
1" 1-1/8"	2.38	1.50	2.56	2.31	1.78	3.00	2.34	2.16	1.03	3.75
1-1/2" 1-5/8"	2.56	1.44	2.81	2.75	2.22	3.88	3.56	2.63	1.53	6.75

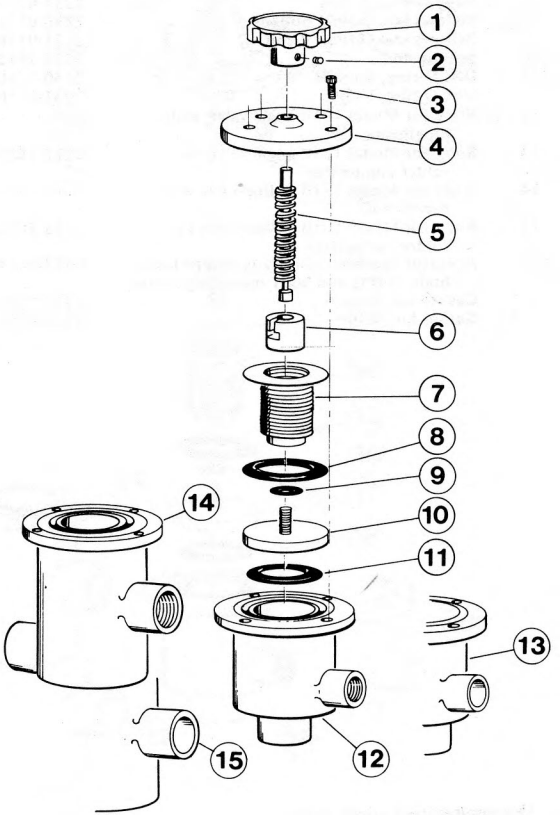
Note: Dimensions in inches



ANGLE VALVE
Pipethread, Model 1010
Solder, Model 1110



IN-LINE VALVE
Pipethread, Model 1210
Solder, Model 1310



ITEM	DESCRIPTION	3/8"	1/2"	5/8"	3/4"	1"	1-1/8"	1-1/2"	1-5/8"
	Part Number								
	Angle	**0724-5011-0**	**0024-0011-0**	**0024-1851-0**	**0024-1881-0**	**0024-0071-0**	**0024-1941-0**	**0024-0131-0**	**0024-2001-0**
	In-Line	**0724-6011-0**	**0724-6401-0**	**0724-6801-0**	**0724-7201-0**	**0724-7601-0**	**0724-8001-0**	**0724-8401-0**	**0724-8801-0**
1	Knob	0222-9811-0	0222-9811-0	0222-9811-0	0222-9811-0	0222-9811-0	0222-9811-0	0222-9811-0	0222-9811-0
2	Knob set screw	1214-1754-0	1214-1754-0	1214-1754-0	1214-1754-0	1214-1754-0	1214-1754-0	1214-1754-0	1214-1754-0
3	Body-mounting screw	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1855-0	1221-1855-0
4	Bonnet	0222-2113-0	0222-2113-0	0222-2113-0	0222-2113-0	0222-2123-0	0222-2123-0	0222-2133-0	0222-2133-0
5	Stem	0222-2512-0	0222-2512-0	0222-2512-0	0222-2512-0	0222-2522-0	0222-2522-0	0222-2532-0	0222-2532-0
6*	Disc nut	0222-3012-0	0222-3012-0	0222-3012-0	0222-3012-0	0222-3022-0	0222-3022-0	0222-3022-0	0222-3022-0
7*	Bellows, bronze (standard)	0222-3212-0	0222-3212-0	0222-3212-0	0222-3212-0	0222-3222-0	0222-3222-0	0222-3232-0	0222-3232-0
	Bellows, stainless steel	0322-5872-1	0322-5872-1	0322-5872-1	0322-5872-1	--------	--------	0322-5692-0	0322-5692-0
8	Body O-ring, Buna-N	2130-0223-0	2130-0223-0	2130-0223-0	2130-0223-0	2130-0225-0	2130-0225-0	2130-0230-0	2130-0230-0
	Body O-ring, Viton	2231-0223-1	2231-0223-1	2231-0223-1	2231-0223-1	2231-0225-1	2231-0225-1	2231-0230-1	2231-0230-1
9	Bellows seal O-ring, Buna-N	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0
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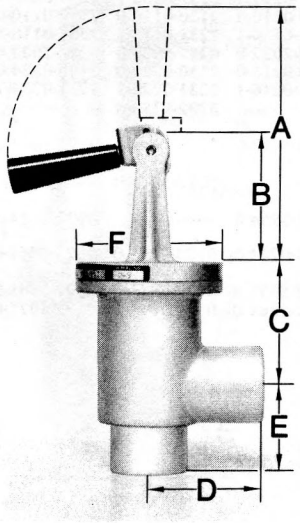
10	Sealing disc	0222-2912-0	0222-2912-0	0222-2912-0	0222-2912-0	0222-2922-0	0222-2922-0	0222-2932-0	0222-2932-0
11	Disc O-ring, Buna-N	2130-0210-0	2130-0210-0	2130-0210-0	2130-0210-0	2130-0216-0	2130-0216-0	2130-0224-0	2130-0224-0
	Disc O-ring, Viton	2231-0210-1	2231-0210-1	2231-0210-1	2231-0210-1	2231-0216-1	2231-0216-1	2231-0224-1	2231-0224-1
12	Body for Model 1010 angle valve with pipethread	--------	0222-1713-0	--------	--------	0222-1733-0	--------	0222-1753-0	--------
13	Body for Model 1110 angle valve for solder connection	0222-1803-0	--------	0222-1813-0	0222-1823-0	--------	0222-1843-0	--------	0222-1863-0
14	Body for Model 1210 in-line valve with pipethread	--------	0222-3994-0	--------	--------	0222-3944-0	--------	0222-3904-0	--------
15	Body for Model 1310 in-line valve for solder connection	0222-4024-0	--------	0222-3984-0	0222-4034-0	--------	0222-3954-0	--------	0222-3934-0
	Actuator assembly. All parts except body, body O-ring and body-mounting screws	0023-0011-0	0023-0011-0	0023-0011-0	0023-0011-0	0023-0041-0	0023-0041-0	0023-0071-0	0023-0071-0
*	Gasket kit, Buna-N	0322-5921-0	0322-5921-0	0322-5921-0	0322-5921-0	0322-5931-0	0322-5931-0	0322-5941-0	0322-5941-0
*	Gasket kit, Viton	0322-5951-0	0322-5951-0	0322-5951-0	0322-5951-0	0322-5961-0	0322-5961-0	0322-5971-0	0322-5971-0

*Recommended spare parts

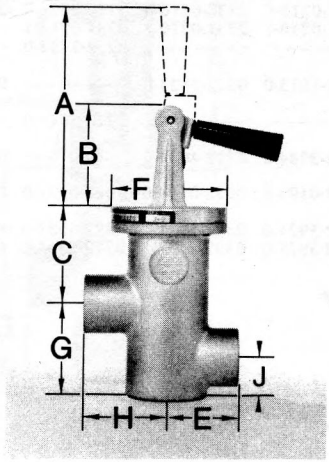
TOGGLE ACTUATION
MODELS 1020, 1120, 1220 AND 1320

PORT (I.D.)	A	B	C	D	E	F (Dia.)	G	H	J	WT. (Lbs.)
3/8" 1/2" 5/8" 3/4"	5.19	2.69	1.69	1.75	1.28	2.75	1.56	1.56	0.69	2.00
1" 1-1/8"	5.19	2.69	2.56	2.31	1.78	3.00	2.34	2.16	1.03	3.50
1-1/2" 1-5/8"	5.19	2.69	2.81	2.75	2.22	3.88	3.56	2.63	1.53	6.00

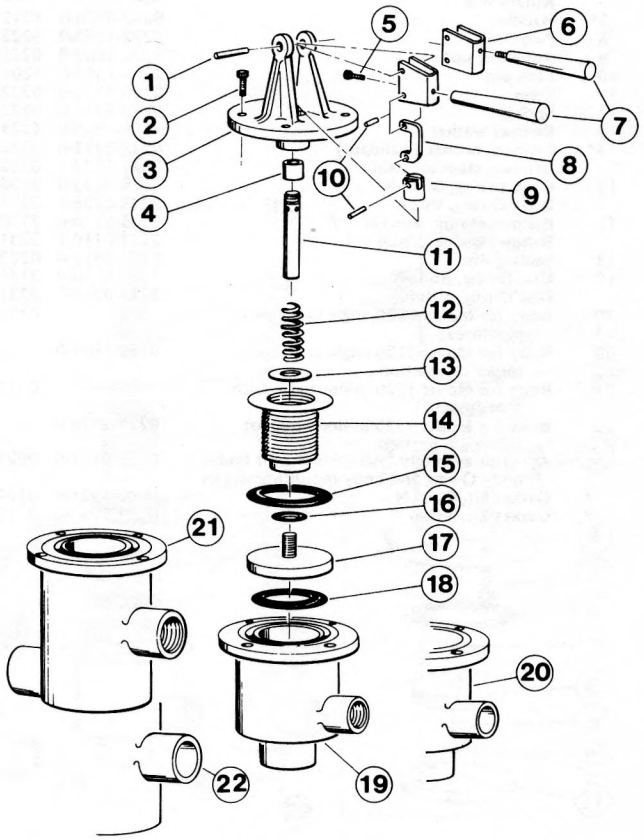
Note: Dimensions in inches



ANGLE VALVE
Pipethread, Model 1020
Solder, Model 1120



IN-LINE VALVE
Pipethread, Model 1220
Solder, Model 1320



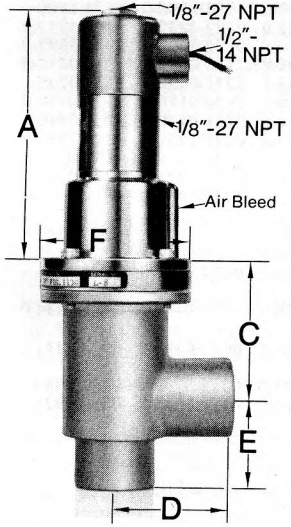
ITEM	DESCRIPTION	3/8"	1/2"	5/8"	3/4"	1"	1-1/8"	1-1/2"	1-5/8"
	Part Number								
	Angle	**0724-5061-0**	**0024-0311-0**	**0024-2211-0**	**0024-2241-0**	**0024-0371-0**	**0024-2301-0**	**0024-0431-0**	**0024-2361-0**
	In-Line	**0724-6051-0**	**0724-6451-0**	**0724-6851-0**	**0724-7251-0**	**0724-7651-0**	**0724-8051-0**	**0724-8451-0**	**0724-8851-0**
1	Stationary pin	1206-1669-0	1206-1669-0	1206-1669-0	1206-1669-0	1206-1669-0	1206-1669-0	1206-1669-0	1206-1669-0
2	Body-mounting screw	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1855-0	1221-1855-0
3	Bonnet assembly (includes Item 4)	0222-2213-0	0222-2213-0	0222-2213-0	0222-2213-0	0222-2223-0	0222-2223-0	0222-2333-0	0222-2333-0
4	Bushing	1186-0612-0	1186-0612-0	1186-0612-0	1186-0612-0	1186-0612-0	1186-0612-0	1186-0612-0	1186-0612-0
5	Handle screw	--------	--------	--------	--------	--------	--------	1219-1857-0	1219-1857-0
6	Rotary link assembly	0222-3412-0	0222-3412-0	0222-3412-0	0222-3412-0	0222-3422-0	0222-3422-0	--------	--------
	Rotary link	--------	--------	--------	--------	--------	--------	0222-2432-0	0222-2432-0
7*	Handle	9012-0226-0	9012-0226-0	9012-0226-0	9012-0226-0	9012-0226-0	9012-0226-0	9012-0692-0	9012-0692-0
8	Pivot link	0222-1662-0	0222-1662-0	0222-1662-0	0222-1662-0	0222-1662-0	0222-1662-0	0222-1662-0	0222-1662-0
9	Adjusting nut	0222-3062-0	0222-3062-0	0222-3062-0	0222-3062-0	0222-3062-0	0222-3062-0	0222-3062-0	0222-3062-0
10	Link pin	1206-1357-0	1206-1357-0	1206-1357-0	1206-1357-0	1206-1357-0	1206-1357-0	1206-1357-0	1206-1357-0
11	Stem	0222-2712-0	0222-2712-0	0222-2712-0	0222-2712-0	0222-2722-0	0222-2722-0	0222-2732-0	0222-2732-0
12	Spring	0322-6221-0	0322-6221-0	0322-6221-0	0322-6221-0	0322-6231-0	0322-6231-0	0222-6241-0	0222-6241-0
13	Bellows washer	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0
14*	Bellows, bronze (standard)	0222-3212-0	0222-3212-0	0222-3212-0	0222-3212-0	0222-3222-0	0222-3222-0	0222-3232-0	0222-3232-0
	Bellows, stainless steel	0322-5872-1	0322-5872-1	0322-5872-1	0322-5872-1	--------	--------	0322-5692-0	0322-5692-0
15	Body O-ring, Buna-N	2130-0223-0	2130-0223-0	2130-0223-0	2130-0223-0	2130-0225-0	2130-0225-0	2130-0230-0	2130-0230-0
	Body O-ring, Viton	2231-0223-1	2231-0223-1	2231-0223-1	2231-0223-1	2231-0225-1	2231-0225-1	2231-0230-1	2231-0230-1
16	Bellows O-ring, Buna-N	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0
	Bellows O-ring, Viton	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1
17	Sealing disc	0222-2912-0	0222-2912-0	0222-2912-0	0222-2912-0	0222-2922-0	0222-2922-0	0222-2932-0	0222-2932-0
18	Disc O-ring, Buna-N	2130-0210-0	2130-0210-0	2130-0210-0	2130-0210-0	2130-0216-0	2130-0216-0	2130-0224-0	2130-0224-0
	Disc O-ring, Viton	2231-0210-1	2231-0210-1	2231-0210-1	2231-0210-1	2231-0216-1	2231-0216-1	2231-0224-1	2231-0224-1
19	Body for Model 1020 angle valve with pipethread	--------	0222-1713-0	--------	--------	0222-1733-0	--------	0222-1753-0	--------
20	Body for Model 1120 angle valve for solder connection	0222-1803-0	--------	0222-1813-0	0222-1823-0	--------	0222-1843-0	--------	0222-1863-0
21	Body for Model 1220 in-line valve with pipethread	--------	0222-3994-0	--------	--------	0222-3944-0	--------	0222-3904-0	--------
22	Body for Model 1320 in-line valve for solder connection	0222-4024-0	--------	0222-3984-0	0222-4034-0	--------	0222-3954-0	--------	0222-3934-0
	Actuator assembly. All parts except body, body O-ring and body-mounting screws	0023-0191-0	0023-0191-0	0023-0191-0	0023-0191-0	0023-0221-0	0023-0221-0	0023-0251-0	0023-0251-0
*	Gasket kit, Buna-N	0322-5921-0	0322-5921-0	0322-5921-0	0322-5921-0	0322-5931-0	0322-5931-0	0322-5941-0	0322-5941-0
*	Gasket kit, Viton	0322-5951-0	0322-5951-0	0322-5951-0	0322-5951-0	0322-5961-0	0322-5961-0	0322-5971-0	0322-5971-0

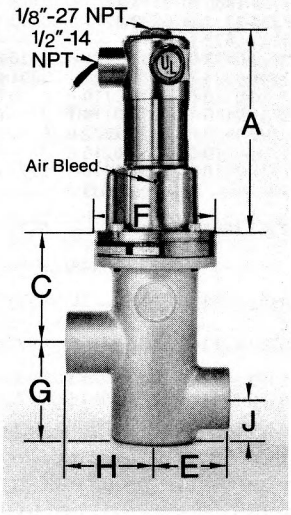
*Recommended spare parts

ELECTROPNEUMATIC ACTUATION
MODELS 1030, 1130, 1230 AND 1330

PORT (I.D.)	A	C	D	E	F (Dia.)	G	H	J	WT. (Lbs.)
3/8" 1/2" 5/8" 3/4"	4.75	1.94	1.75	1.28	2.75	1.56	1.56	0.69	3.25
1" 1-1/8"	5.00	2.81	2.31	1.78	3.00	2.34	2.16	1.03	5.25
1-1/2" 1-5/8"	5.38	3.13	2.75	2.22	3.88	3.56	2.63	1.53	8.50

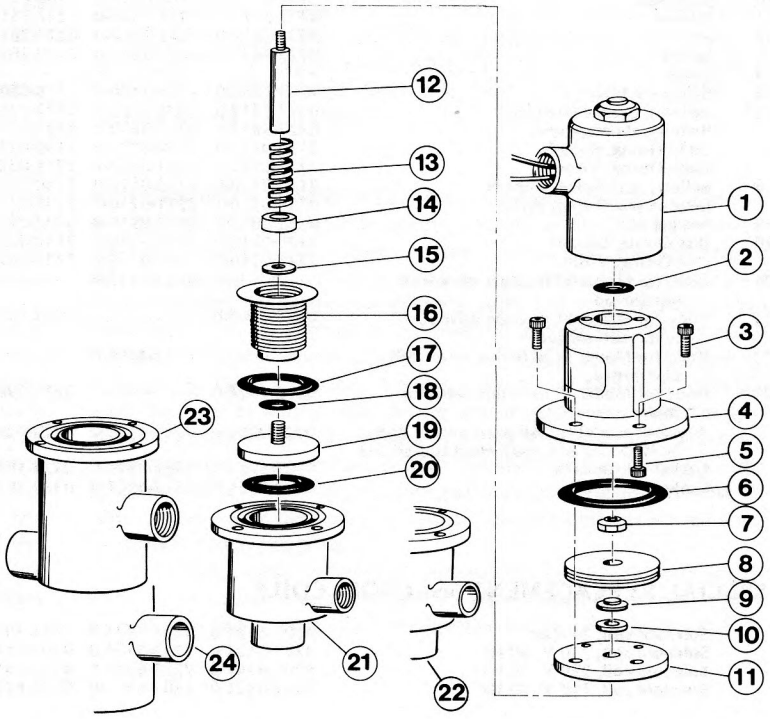
Note: Dimensions in Inches





ANGLE VALVE
Pipethread, Model 1030
Solder, Model 1130

IN-LINE VALVE
Pipethread, Model 1230
Solder, Model 1330



ITEM	DESCRIPTION	3/8"	1/2"	5/8"	3/4"	1"	1-1/8"	1-1/2"	1-5/8"
	Part Number								
	Angle	**0724-5111-0**	**0024-0461-0**	**0024-2391-0**	**0024-2631-0**	**0024-0951-0**	**0024-3111-0**	**0024-1451-0**	**0024-3591-0**
	In-Line	**0724-6101-0**	**0724-6501-0**	**0724-6901-0**	**0724-7301-0**	**0724-7701-0**	**0724-8101-0**	**0724-8501-0**	**0724-8901-0**
1	Solenoid, normally-closed, 115 V, 60 Hz, (standard)	9203-4435-0	9203-4435-0	9203-4435-0	9203-4435-0	9203-4435-0	9203-4435-0	9203-4435-0	9203-4435-0
	Solenoid, normally-open, 115 V, 60 Hz	9203-2611-0	9203-2611-0	9203-2611-0	9203-2611-0	9203-2611-0	9203-2611-0	9203-2611-0	9203-2611-0
*	Solenoid coil (included with solenoid)	9203-3124-0	9203-3124-0	9203-3124-0	9203-3124-0	9203-3124-0	9203-3124-0	9203-3124-0	9203-3124-0
2	Solenoid O-ring	2130-0116-0	2130-0116-0	2130-0116-0	2130-0116-0	2130-0116-0	2130-0116-0	2130-0116-0	2130-0116-0
3	Body-mounting screw	1221-1759-0	1221-1759-0	1221-1759-0	1221-1759-0	1221-1759-0	1221-1759-0	1221-1859-0	1221-1859-0
4	Air cylinder	0222-2013-0	0222-2013-0	0222-2013-0	0222-2013-0	0222-2023-0	0222-2023-0	0222-2033-0	0222-2033-0
5	Solenoid-mounting screw	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0	1221-1755-0
6	Air cylinder O-ring	2130-0224-0	2130-0224-0	2130-0224-0	2130-0224-0	2130-0225-0	2130-0225-0	2130-0230-0	2130-0230-0
7	Piston locknut	1267-1901-0	1267-1901-0	1267-1901-0	1267-1901-0	1267-1901-0	1267-1901-0	1267-1901-0	1267-1901-0
8	Piston	9210-8158-0	9210-8158-0	9210-8158-0	9210-8158-0	9210-8134-0	9210-8134-0	9210-8214-0	9210-8214-0
9	Piston adapter	--------	--------	--------	--------	--------	--------	0222-3512-0	0222-3512-0
10	Stem seal	2108-0110-0	2108-0110-0	2108-0110-0	2108-0110-0	2108-0110-0	2108-0110-0	2108-0110-0	2108-0110-0
11	Bonnet	0222-2313-0	0222-2313-0	0222-2313-0	0222-2313-0	0222-2323-0	0222-2323-0	0222-2333-0	0222-2333-0
12	Stem	0222-2812-0	0222-2812-0	0222-2812-0	0222-2812-0	0222-2822-0	0222-2822-0	0222-2832-0	0222-2832-0
13	Spring	0322-7071-0	0322-7071-0	0322-7071-0	0322-7071-0	0322-7081-0	0322-7081-0	0322-7091-0	0322-7091-0
14	Spacer	--------	--------	--------	--------	0122-4501-0	0122-4501-0	0122-4511-0	0122-4511-0
15	Bellows washer	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0	1778-1800-0
16*	Bellows, bronze (standard)	0222-3212-0	0222-3212-0	0222-3212-0	0222-3212-0	0222-3222-0	0222-3222-0	0222-3232-0	0222-3232-0
	Bellows, stainless steel	0322-5872-1	0322-5872-1	0322-5872-1	0322-5872-1	--------	--------	0322-5692-0	0322-5692-0
17	Body O-ring, Buna-N	2130-0223-0	2130-0223-0	2130-0223-0	2130-0223-0	2130-0225-0	2130-0225-0	2130-0230-0	2130-0230-0
	Body O-ring, Viton	2231-0223-1	2231-0223-1	2231-0223-1	2231-0223-1	2231-0225-1	2231-0225-1	2231-0230-1	2231-0230-1
18	Bellows seal O-ring, Buna-N	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0	2130-0110-0
	Bellows seal O-ring, Viton	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1	2231-0110-1
19	Sealing disc	0222-2912-0	0222-2912-0	0222-2912-0	0222-2912-0	0222-2922-0	0222-2922-0	0222-2932-0	0222-2932-0
20	Disc O-ring, Buna-N	2130-0210-0	2130-0210-0	2130-0210-0	2130-0210-0	2130-0216-0	2130-0216-0	2130-0224-0	2130-0224-0
	Disc O-ring, Viton	2231-0210-1	2231-0210-1	2231-0210-1	2231-0210-1	2231-0216-1	2231-0216-1	2231-0224-1	2231-0224-1
21	Body for Model 1030 angle valve with pipethread	--------	0222-1713-0	--------	--------	0222-1733-0	--------	0222-1753-0	--------
22	Body for Model 1130 angle valve for solder connection	0222-1803-0	--------	0222-1813-0	0222-1823-0	--------	0222-1843-0	--------	0222-1863-0
23	Body for Model 1230 in-line valve with pipethread	--------	0222-3994-0	--------	--------	0222-3944-0	--------	0222-3904-0	--------
24	Body for Model 1330 in-line valve for solder connection	0222-4024-0	--------	0222-3984-0	0222-4034-0	--------	0222-3954-0	--------	0222-3934-0
	Actuator assembly. All parts except body, body O-ring and body-mounting screws	0023-0281-0	0023-0281-0	0023-0281-0	0023-0281-0	0023-0381-0	0023-0381-0	0023-0481-0	0023-0481-0
*	Gasket kit, Buna-N	0322-5921-0	0322-5921-0	0322-5921-0	0322-5921-0	0322-5931-0	0322-5931-0	0322-5941-0	0322-5941-0
*	Gasket kit, Viton	0322-5951-0	0322-5951-0	0322-5951-0	0322-5951-0	0322-5961-0	0322-5961-0	0322-5971-0	0322-5971-0

SPECIAL REPLACEMENT SOLENOID COILS

Solenoid coil, 24 Vdc	9203-3024-0	9203-3024-0	9203-3024-0	9203-3024-0	9203-3024-0	9203-3024-0	9203-3024-0	9203-3024-0
Solenoid coil, 230 V, 60 Hz	9203-3424-0	9203-3424-0	9203-3424-0	9203-3424-0	9203-3424-0	9203-3424-0	9203-3424-0	9203-3424-0
Solenoid coil, 220 V, 50 Hz	9203-6341-0	9203-6341-0	9203-6341-0	9203-6341-0	9203-6341-0	9203-6341-0	9203-6341-0	9203-6341-0
Solenoid coil, 110 V, 50 Hz	9203-6321-0	9203-6321-0	9203-6321-0	9203-6321-0	9203-6321-0	9203-6321-0	9203-6321-0	9203-6321-0

*Recommended spare parts