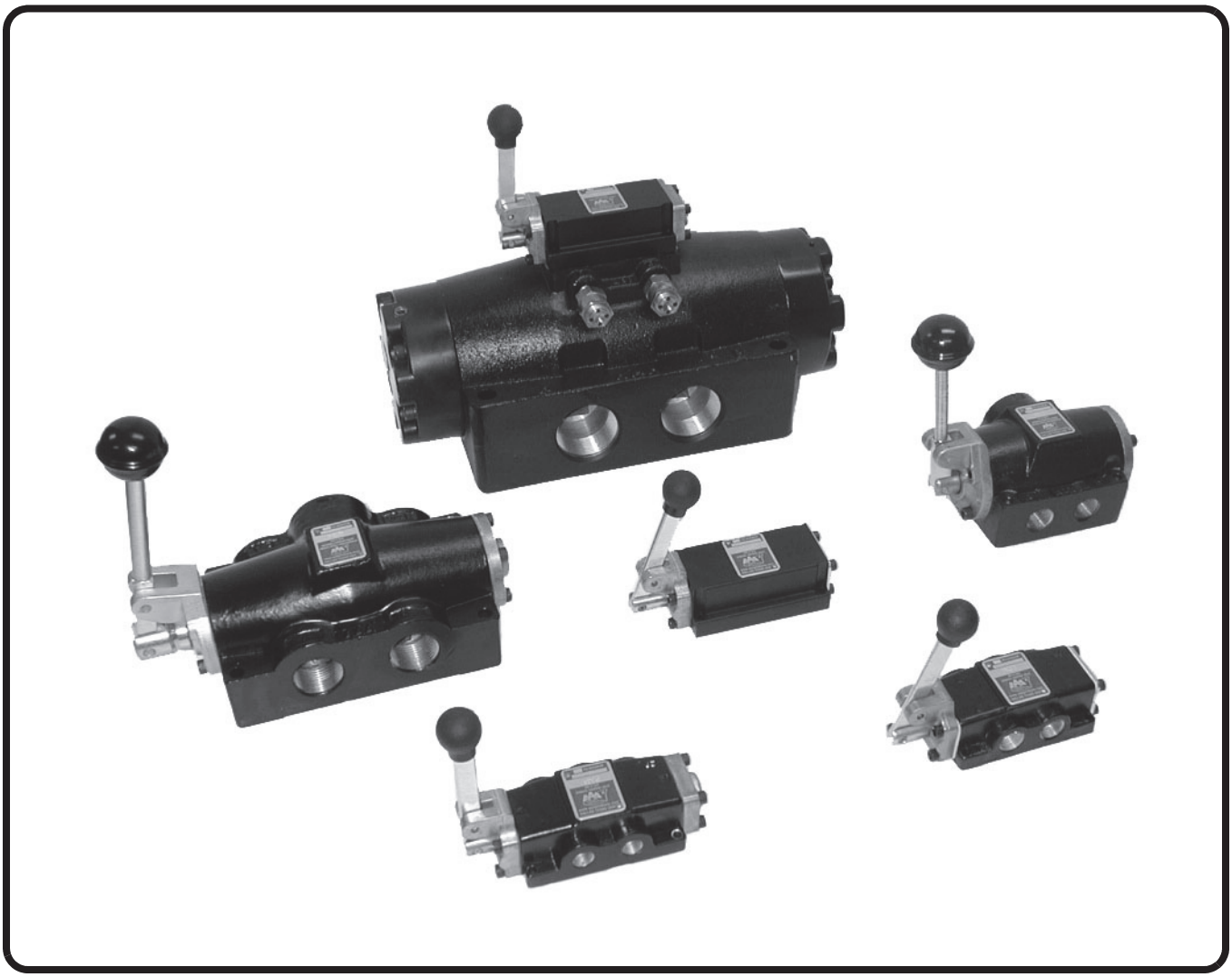
MANUAL LEVER CONTROLLED AIR VALVES

4-WAY: VACUUM TO 250 PSI



PART NUMBER STRUCTURE:

Part 1: The basic part number of an AAA valve is fairly simple to understand. The first part is both an operator style and valve operation. This position describes not only how the valve shifts positions but also what shifts the spool.

Part 2: The second portion is the valve port size and body style. This portion describes whether the valve is a threaded side ported body or a bottom bored subplate body.

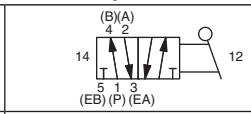
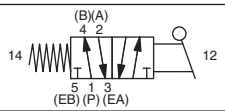
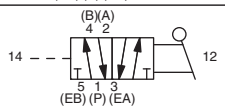
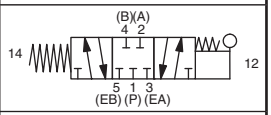
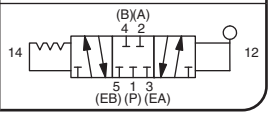
Part 3: The third part of the part number structure is the spool configuration. Normally only needed on three position valves, the spool configuration defines the flow at center position. You can have a spool other than the standard "Closed Center" on two position valves; however, the transitional flow is normally not needed for most applications.

Part 4: The fourth position of the part number structure is used to specify valve options. You can specify different handle orientations, lockout or detents by choosing options available for the valve configuration you need.

Part 5: The final position allows you to specify different O-rings used in the main valve body. You choose the O-ring most suited for your application. This specification applies to the body O-rings only.

HE3PGR-5

1 Operator Style

Code	Description	Symbol
HE	2-position, friction positioned. Spool stays in any position when handle is released.	
HO	2-position, spring returned spool. Spool returns to position “C” when the handle is released.	
HR	2-position, pilot returned spool. Spool returns to position “C” from auxilary control valve furnished by the user (or by handle).	
HY	3-position, spring centered. Spool returns to position “B” when handle is released.	
HD	3-position, friction position, positive detent in all positions. Spool stays in position when lever is released.	

2 Port Style

Side Ported

2 = 1/4" NPTF
3 = 3/8" NPTF
4 = 1/2" NPTF
6 = 3/4" NPTF
8 = 1" NPTF
12 = 1-1/2" NPTF

Subplate Mounted

3P = 3/8" flow
4P = 1/2" flow
8P = 1" flow
16P = 1-1/2" flow

3 Spool Configuration (Normally on 3-position valves, 2-position valves use a closed center spool)

blank = Closed center, all ports are blocked in the center position.
D = Regenerative center, ports 2 & 4 are connectect to port 1, ports 3 & 5 are blocked.
G = Float center, port 2 is connected to port 3, port 4 is connected to port 5, port 1 is blocked.

4 Valve Options

blank = No options selected.
C = Curved handle.
E = Pin lock (available only on port styles 2, 3 & 3P).
LO = Lockout (available only on port styles 2, 3 & 3P).
Q = 2-postion spool detent (available only on model HD).
R = Handle orientation rotated 90° toward 2-hole side.
U = Factory installed muffler/flow controls in ports 3 and 5 (port styles 2, 3 & 4 only).

5 Valve O-Ring Option (Only applies to valve body O-Rings)

blank = Viton for port styles 2, 3 & 3P, Buna-N for port styles 4, 6, 8, 12, 4P, 8P &16P.
-1 = Neoprene for freon (-40°F to 225°F).
-2 = Silicon (-80°F to 400°F).
-3 = Viton for most aromatic gases (-20°F to 400°F, 600°F for short time).
-4 = Butyl Rubber (-60°F to 200°F).
-5 = Teflon (-250°F to 450°F).
-7 = Urethane, 70 Durometer (-65°F to 200°F).
-9 = Buna-N (-40°F to 250°F).

GENERAL INFORMATION

Manual lever models are operated with a handle that shifts the spool. The standard handle position of the knob for a 3-position valve is the center of the valve (Position "B"). To fully shift the valve, the handle is pulled towards the operator (Position "A") or away from the operator (Position "C"). On 2-position valves, there is no positive detent for centering the spool (Position "B").

OPERATOR STYLE CODE:

HE: 2-position, friction position, manual return. Spool stays in any position when handle is released (See the detented version for mobile or vertical valve mounting).

HO: 2-position, spring returned spool. Spool returns to position "C" when lever is released.

HR: 2-position, pilot returned spool. Spool returns to position "C" from auxiliary control valve furnished by the user or by pushing the lever to position "C". Return shift pressure should be 25 PSI or greater.

HY: 3-position, spring centered. Spool returns to position "B" when lever is released.

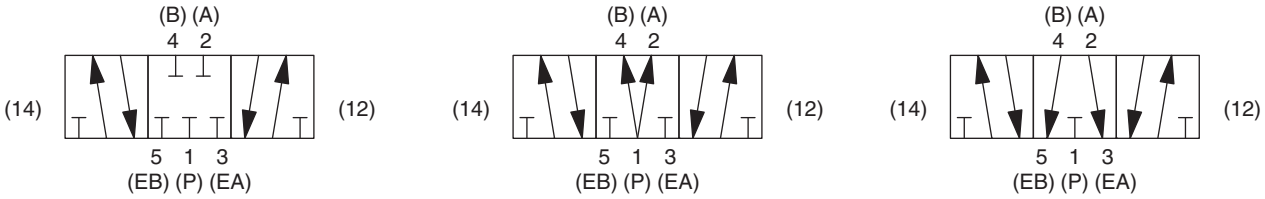
HD: 3-position, friction position, positive detent in all positions. Spool stays in position when lever is released. Additional shifting force is required to initiate spool shifting.

BODY STYLE:

SIDE PORTED: Side ported valves can be installed inline. These valves have standard female "National Pipe Threads" to connect directly to installed air lines. The standard pipe sizes are 1/4", 3/8", 1/2", 3/4", 1" and 1-1/2" NPTF.

SUBPLATE MOUNTED: Subplated valves require a mounting base. This mounting base is pre-plumbed to existing control lines. Due to the nature of all the plumbing lines fixed to a mounting base, replacing subplate mounted valves is rapid and quick. All connections, including "Pilot Return" ports, if used, are made through O-ring sealed holes in the base of the valve through a subplate. O-ring seals and mounting screws are furnished with each subplate valve. Because the connections to a base mount can be of any size and configuration, subplate mounted valves are assigned a designation derived from a basic valve body size. A 3P size subplate valve will have the same flow characteristics as a 3/8" NPTF side ported valve body.

SPOOL CONFIGURATION (FOR 3-POSITION VALVES):



STANDARD: Most valves are supplied with a "Closed Center" spool. In the center position, all ports are blocked. If a valve is only a 2-position valve, the actual function of the center position is not critical. So most 2-position valves are "Closed Center". Some designs do require softer transitions, so we offer alternate spool configurations on 2-position valves.

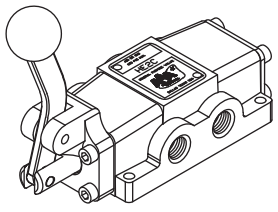
REGENERATIVE: Spool Option "D". In the center position or during transition, ports 2 and 4 are connected to port 1. We call this a "Regenerative" spool since both cylinder ports 2 and 4 are supplied with pressure and flow from port 1.

FLOAT CENTER: Spool Option "G". In the center position or during transition, port 2 is connected to port 3 and port 4 is connected to port 5. We call this a "Float Center" spool since both standard cylinder ports 2 and 4 are vented to an exhaust port and no pressure or flow from port 1 is supplied.

VALVE OPTIONS:

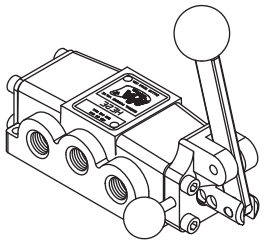
OPTION C: CURVED HANDLE

This option has a slightly curved handle to ease operator use when the valve is mounted in awkward locations. Contact the factory for custom handle curves and also unique lever mechanisms. We even have created a valve with a 3-foot long rod that is used in cattle loading and unloading.



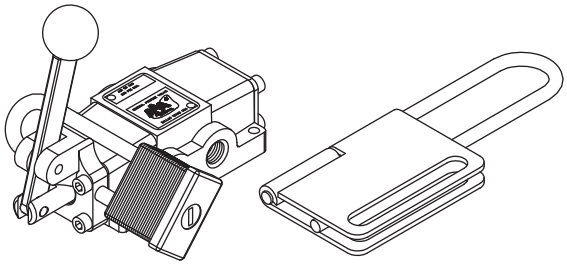
OPTION E: PIN LOCK

This option converts a single hand operated valve into a two hand operated valve required for some safety applications. To operate, user pulls the pin lock out, while simultaneously shifting the valve. The user releases the pin. The pin lock is spring loaded and snaps into the next available detent when the valve is shifted. On two position valves (HE, HO & HR), the pin will only snap in positions "A" and "C". On three position valves (HY), the pin will also snap in the "B" position. Contact the factory if you want valves that only snap in different spool positions. Available only on valve with body style 2, 3 and 3P. Not available on HD models.



OPTION LO: LOCK-OUT

This option allows the valve to be locked into position. On two position valves (HE, HO & HR), the lock-out position is position "C". On three position valves (HY), the lock-out position is position "B". Contact the factory if you want valves that lock-out in different spool positions. Available only on valve with body style 2, 3 and 3P. Valve shown with optional lock and optional multi-lockout hasp.

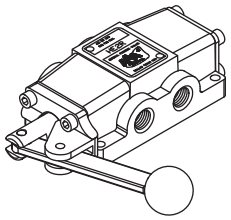


OPTION Q: TWO POSITION DETENT

This option is available on HD models only. Spool stays in position "A" or "C" when lever is released. This is a 2-position version of the model HD, where there is no center position detent. Additional shifting force is required to initiate spool shifting.

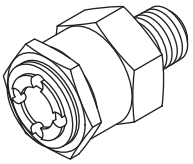
OPTION R: ROTATED HANDLE

On all lever operated valves, the handle can be rotated up or down. On body styles 4, 4P, 6, 8 and 8P, the handle can also be rotated to the left or right position. On body styles, 2, 3, 3P, 12 and 16P, the valve requires a different end cap to change the standard "Up" orientation to a "Left or Right". Once the valve has been converted to the "Left or Right" orientation, you would need the original endcap to return it to the standard "Up or Down" orientation. The picture shows the standard Option "R" orientation. To order the Option "R" so the orientation is "Left", consult factory. This option only applies to valves with body style 2, 3, 3P, 12 and 16P.



OPTION U: EXHAUST FLOW CONTROLS

Available only on body styles 2, 3 and 4. A Model MFC flow control, listed on page 146, is screwed into each exhaust port, giving meter-out speed control of an associated air cylinder or air motor in both directions of travel. MFC flow controls not only give adjustable speed control but have a built-in muffler to reduce exhaust noise.



MFC Flow Control

OPTIONAL O-RING MATERIALS:

Unless otherwise specified, all 1/4" and 3/8" soft seal valves come standard with Viton O-rings and all 1/2", 3/4", 1", 1-1/2" and 2" soft seal valves come standard with Buna-N O-rings. If a different material is required, use the dash numbers following the basic valve numbering code. As an example, model SY3G-2 will have Silicon O-rings installed for a low temperature application. On valves larger than 1", consult factory on availability of O-ring materials.

Dash No.	O-ring Description	Temperature Rating
-1	Neoprene for freon	-40°F to 225°F
-2	Silicon	-80°F to 400°F
-3	Viton for most aromatic gases	-20°F to 400°F, 600°F for short time
-4	Butyl Rubber	-60°F to 200°F
-5	Teflon	-250°F to 450°F
-7	Urethane, 70 Durometer	-65°F to 200°F
-9	Buna-N	-40°F to 250°F

We are constantly researching O-ring materials to evaluate performance and durability in the AAA valve product line. Above is a compilation of the most commonly requested O-ring materials and the associated dash number. If you have a particular application that requires an O-ring material that is not listed, please contact us. Since we utilize standard O-ring dimensions in our valves, we can respond to the most obscure O-ring material request.

STANDARD TEMPERATURE RANGE:

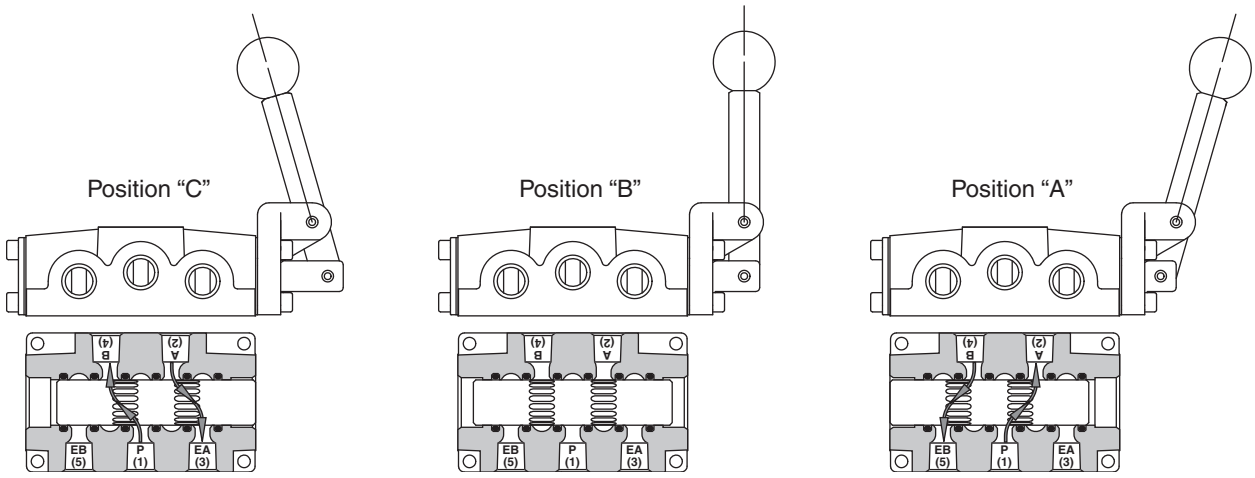
Operating temperature is dependent upon the seal materials used. The following are temperatures for standard valves:

1/4" and 3/8"valves use Viton O-rings: -20°F to 400°F, 600°F for short time.

1/2", 3/4", 1", 1-1/2" and 2" valves use Buna-N O-rings: -40°F to 250°F.

Caution: If it is possible that the ambient temperature may fall below freezing, the medium must be moisture free to prevent internal damage or unpredictable behavior.

FLOW PATTERN:



1/4" through 1": When the handle is shifted, causing the internal spool to shift, various ports will be connected. If the handle is in position “A”, port 1 will connect to port 2. When the handle is in position “C”, port 1 will connect to port 4. The appropriate exhaust will connect to the un-pressurized port. In position “B”, the connection of the ports depend on the style of spool used.

1-1/2" and 2": These larger valves use a “Piggy-Back” valve mounted to the top of the larger valve. The flow through the larger valve is the same as above.

AIR FLOW RATINGS:

Test for the determination of flow-rate characteristics conforms to ISO 6358, *Pneumatic fluid power - Components using compressible fluids - Determinations of flow-rate characteristics*. These tests were conducted on AAA valves at the Fluid Power Institute Testing Laboratories of the Milwaukee School of Engineering.

RATED FLOW. Flow factor tests were made with the valve outlet vented to atmosphere and flow in the sonic region. The average flow factor was calculated from tests over a range of inlet pressures. The factor was then used to calculate expected flow at 100 PSIG. Cv values were calculated by graphing the flow (scfm) versus the square root of change in pressure across the valve. A line was fitted to this graph and the resulting slope is the Cv value. Cv uses the theoretical flow (scfm) through the valve when the differential pressure between the inlet and outlet is equal to 1 psi. **We have never lost an application based on either flow or durability**.

	Rated Flow					
Body Style	**2**	**3**	**4**	**6***	**8***	**12***
Port Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/2"
SCFM Flow	73.9	97.1	215.0	446.9	477.7	1627
Cv Factor	1.6	2.4	5.0	10.4	11.1	37.8

*Tested before the published ISO standards. Cv's were calculated using previous data.

SCFM flow in the above table was calculated for 70 PSIG then converted to 100 PSIG (114.7 PSIA) inlet pressure. At other inlet pressures, SCFM flow will be in proportion to PSIA inlet pressure.

Example: Size 3P at 80 PSIG (94.7 PSIA) inlet pressure.

Ratio of 94.7 to 114.7 is 94.7 ÷ 114.7 = 0.826

Flow at 80 PSIG = 0.826 x 97.1 = 80.2 SCFM.

LIMITATIONS ON VACUUM OPERATION

The five main ports on AAA valves can be operated on industrial vacuum to 28" Hg, based on a 30" barometer. O-rings between all ports give tight sealing. While AAA valves are basically 4-way, they can be used for 3-way service by plugging the unused port 2 or 4.

MOUNTING OF VALVES

AAA valves may generally be mounted in any position. But for safety, any valve which does not have springs or detents to hold the spool in position should be mounted with the spool horizontal unless pressure is continually applied to hold the spool in position.

SEAL KITS:

ERKV-3: One kit required for each 1/4" or 3/8" valve. Includes six V-39 Viton body O-rings, two EMG3 Buna-N solenoid gaskets, two ECG3 composition end cap gaskets, two V-565 Buna-N Namur mounting O-rings, one PBG3 gasket, one PBG3-1 gasket, five V-92 Buna-N subplate O-rings and two V-93 Buna-N subplate pilot O-rings (Seals used determined by valve model and style).

ERKV-4: One kit required for each 1/2" valve. Includes six V-6 Buna-N body O-rings, two EMG3 Buna-N solenoid gaskets, two ECG48 composition end cap gaskets, five V-110 Buna-N subplate O-rings, two V-29 Buna-N subplate pilot hole O-rings (Seals used determined by valve model and style).

ERKV-8: One kit required for each 3/4" or 1" valve. Includes six V-30 Buna-N body O-rings, two EMG3 Buna-N solenoid gaskets, two ECG48 composition end cap gaskets, five V-90 Buna-N subplate O-rings, two V-89 Buna-N subplate pilot hole O-rings (Seals used determined by valve model and style).

ERKV-16: One kit required for each 1-1/2" or 2" valve. Includes six V-123 Buna-N body O-rings, two V-124 Buna-N end cap O-rings, two V-89 Buna-N end cap pilot O-rings, five V-125 Buna-N subplate O-rings, two V-89 Buna-N subplate pilot O-rings (Seals used determined by valve model and style). To repair piggy back valve, use ERKV-3.

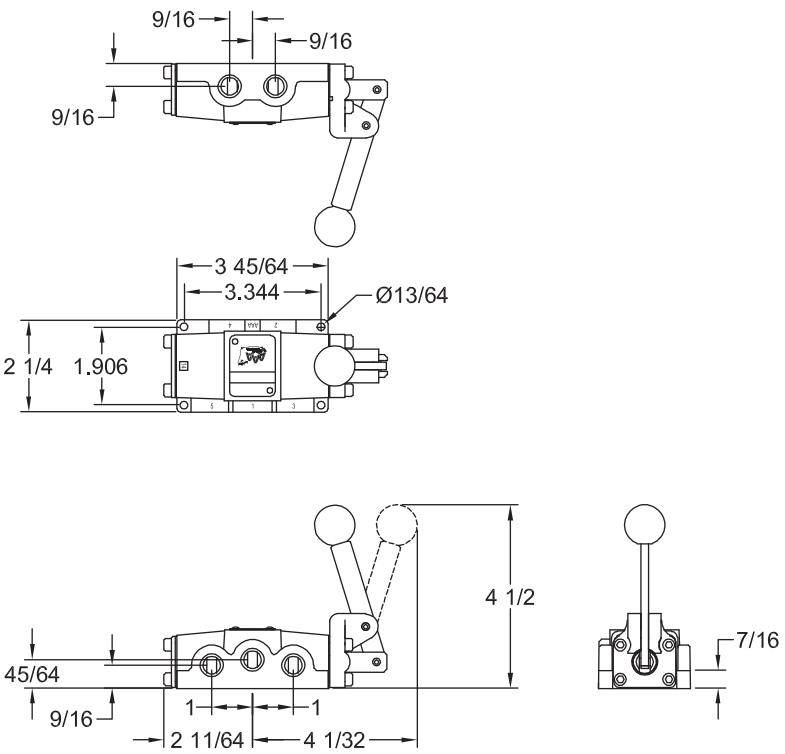
VGK-3: AAA valve grease to lubricate body O-rings during valve overhaul (Each seal repair kit does supply enough grease for complete seal replacement).

REPLACEMENT COMPONENTS:

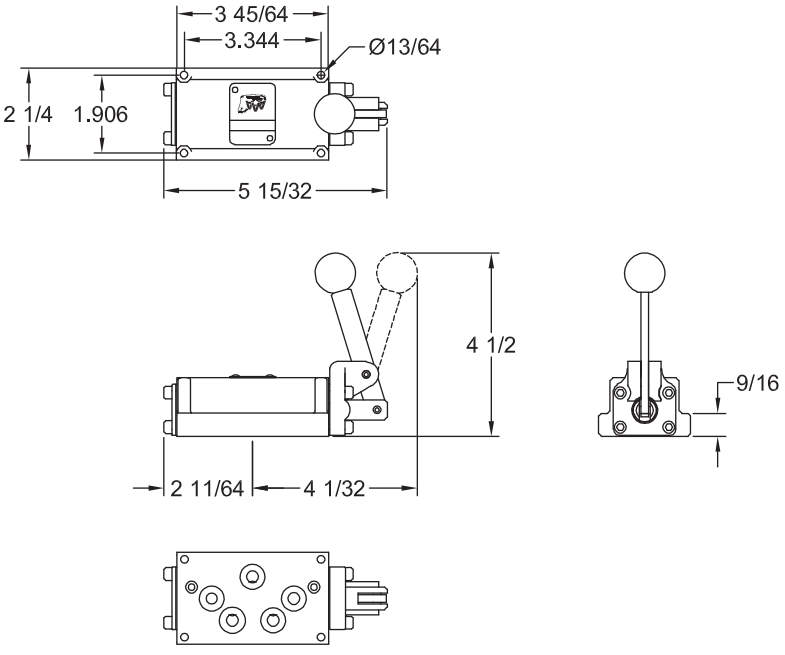
Consult Factory. All AAA valves are designed for rugged applications. But sometimes unforeseen damage does occur. Please contact us for broken clevis', handles, tired springs or any other component that appears to be working less than optimum.

SEMI-DIMENSIONAL DRAWINGS:

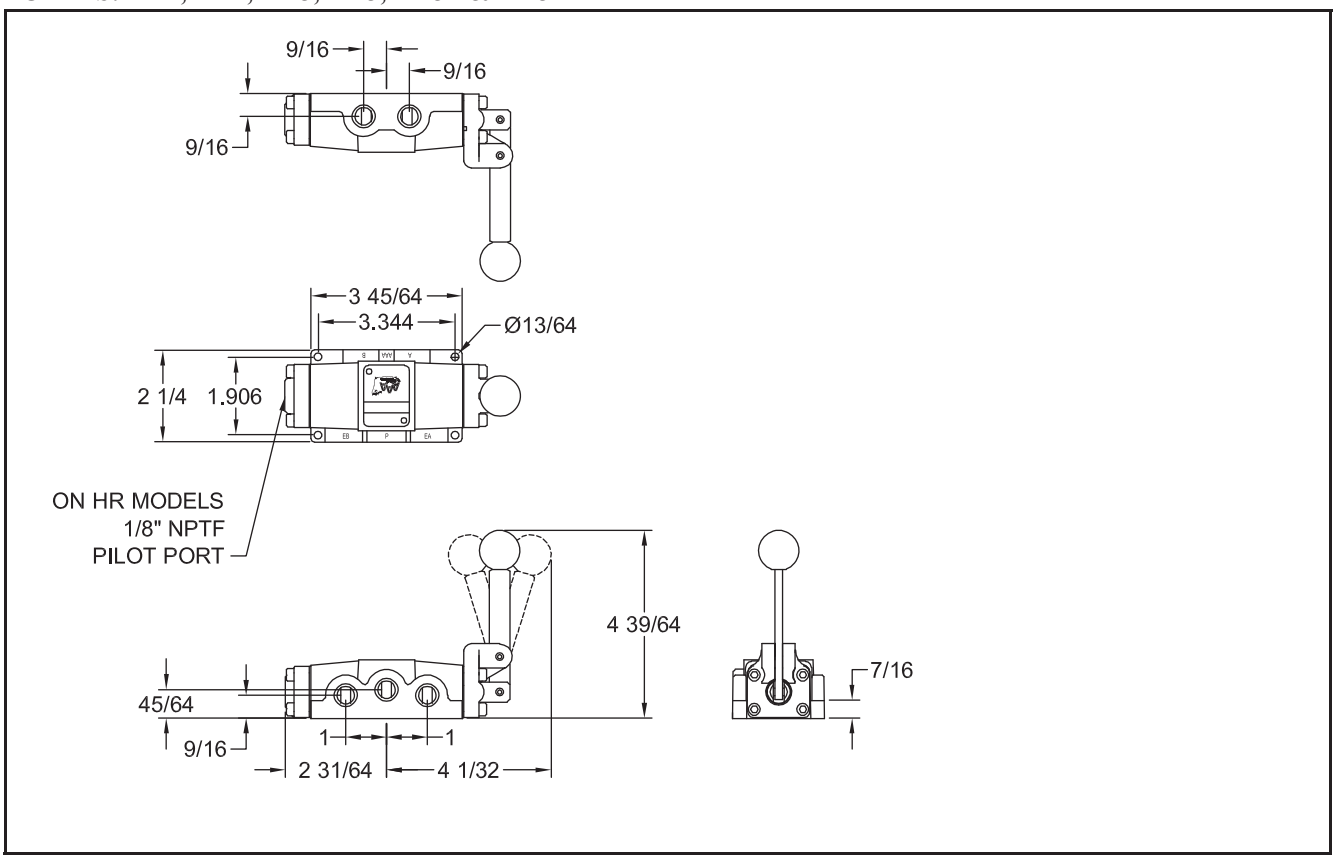
MODELS: HE2, HO2, HD2, HE3, HO3 & HD3



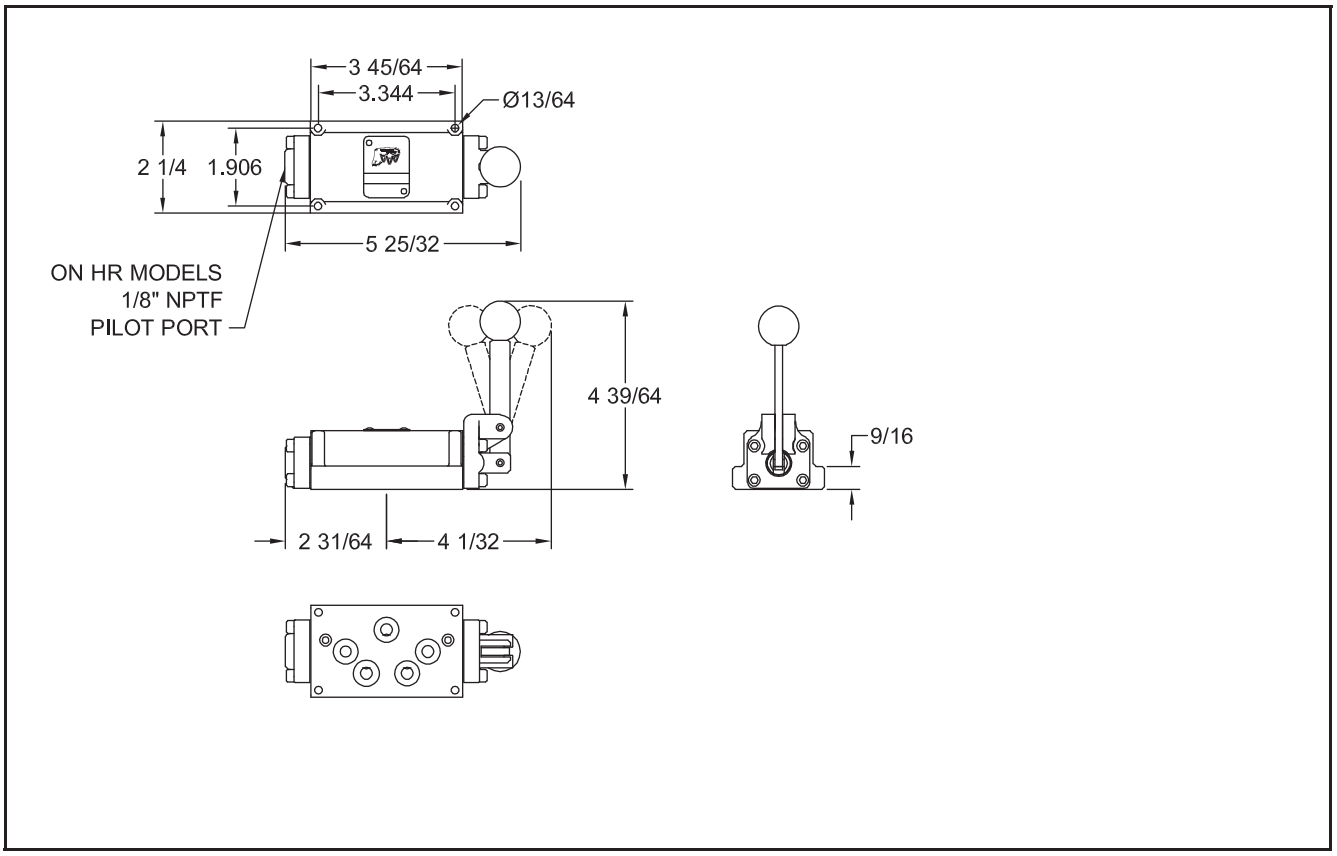
MODELS: HE3P, HO3P & HD3P



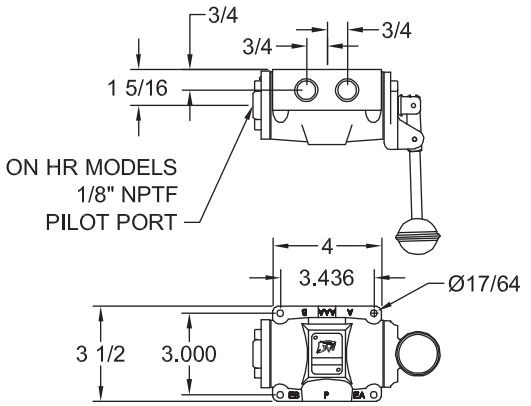
MODELS: HR2, HY2, HR3, HY3, HR3P & HY3P

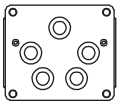


MODELS: HR3P & HY3P

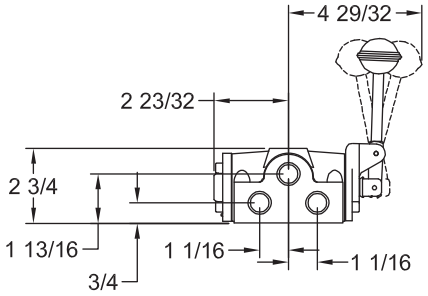


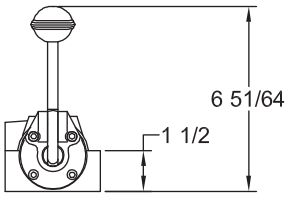
MODELS: HE4, HO4, HR4, HY4, HD4, HE4P, HO4P, HR4P, HY4P & HD4P



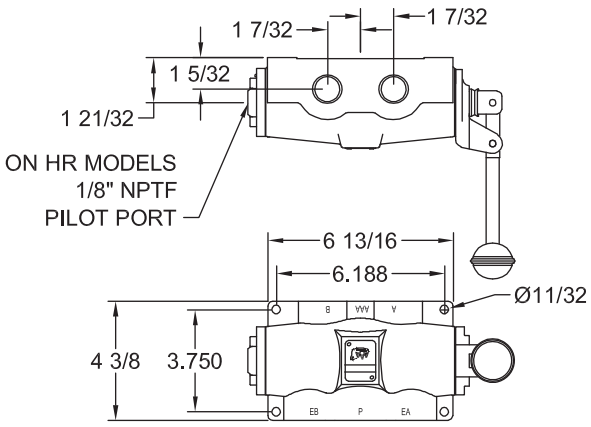


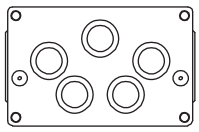
SUBPLATE VALVE PORTS
ARE LOCATED ON THE
BOTTOM OF THE BODY



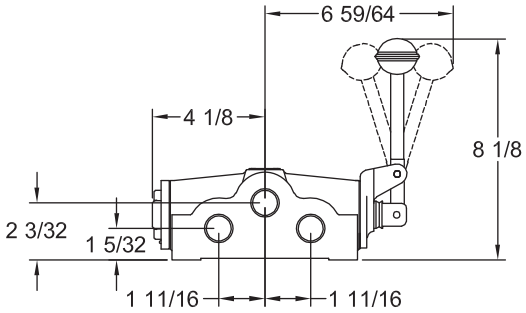


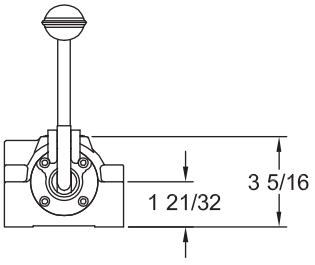
MODELS: HE6, HO6, HR6, HY6, HD6, HE8, HO8, HR8, HY8, HD8, HE8P, HO8P, HR8P, HY8P & HD8P





SUBPLATE VALVE PORTS
ARE LOCATED ON THE
BOTTOM OF THE BODY





MODELS: HE12, HO12, HR12, HY12, HD12, HE16P, HO16P, HR16P, HY16P & HD16P