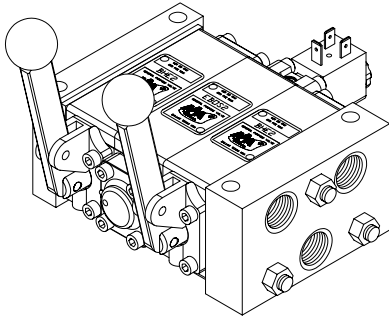


B SERIES — STACK VALVES

GENERAL INFORMATION 1/4" AND 3/8" SIZES — 4-WAY ACTION — VACUUM TO 250 PSI



Typical stack with two manual lever sections and one single solenoid section. The solenoid valve was ordered with the operator reversed to avoid difficulty with shifting the manual lever valves. See page 5 on how to order reversed operators.

Note: Most actuators can be mounted on either end of valve section. Sections can be arranged in any order. Inlet and exhaust ports can be on either end.

The B Series stack valve consists of individual sections sandwiched between two end plates, the stack being held together with three tie bolts. Sections, listed on pages 19 through 22, are available with a variety of actuators. A stack can have sections with an assortment of actuators.

Pressure and exhaust connections are 1/2" NPTF on both the 1/4" and 3/8" sizes. They come in through threaded port holes on one end plate and are manifolded through to all sections. Cylinder connections come out threaded port holes, 1/4" or 3/8" NPTF, in the side of each section. On special orders the stack can be turned with all cylinder port holes facing up.

RATINGS

Valve bodies are rated for vacuum or compressed air up to 250 psi. Not recommended for liquids. Solenoid sections are rated 50 to 150 psi for spring centered and spring return models, 25 to 150 psi for others. Higher or lower pressures can be handled by supplying external pilot pressure to each solenoid actuator. See page 42 for materials of construction.

Flow capacity is the same for 1/4" or 3/8" sizes. Only the cylinder port size is different. Capacity is sufficient to operate air cylinders up to 3" bore at normal speeds, and larger cylinders at reduced speeds. Cylinder speeds can be controlled with flow control valves installed in cylinder lines.

HOW TO ORDER STACK VALVES

Individual parts can be ordered for user assembly or stacks will be assembled at the factory at no extra charge. When facing actuator side of stack, specify each section starting at the left side, BHO2, EBSO2, etc. One ported end plate PEP-4, one blank end plate BEP-4 and one BOS-4 spacer required for every stack. Ported end plate can be assembled on either end of stack. Specify left or right end. Tie rod kits and additional spacer plates will be added as necessary.

ASSEMBLING IN YOUR PLANT

Place all sections side by side in any desired order. Place a threaded end plate PEP-4 on one end (either end) and a blank end plate BEP-4 on the other end. Place a BOS-4 spacer on one end of the stack (depending on which way the sections are turned), to support O-rings. (See page 23 for typical configuration). You may also use two PEP-4 threaded end plates and one BOS-4 spacer plate to supply pilot pressure to both ends of the stack. This is usually used on stack of 10 or more valves or in high flow applications.

Cut 3 tie rods to length from 5/16-18 all-thread steel rod. Allow 1-5/16" for each valve section, 1" for PEP-4 threaded

end plate, 5/8" for BEP-4 blank end plate, 1/8" for BOS-4 spacer and 3/4" for 2 washers and nuts.

Threaded tie rod can be purchased locally or is available in 18" and 36" length tie rod kits from the factory.

CYLINDER PORTS

Normal assembly is with cylinder ports down and name-plate up, with cylinder connections through a cut-out in the mounting surface. However, on special order the stack can be assembled with all cylinder ports up. (On solenoid valves, the manual override will remain on the name tag side.)

If override access is required from cylinder port side, valves must be ordered with OOK (Override Orientation Kit) kit. One kit per solenoid is required except on "EBSY" models which requires one kit. This kit will add 3/8" to overall length of valve per solenoid. These kits can be ordered separately and installed in the field or pre-assembled on original factory orders.

Actuators are normally assembled as shown in the illustrations on pages 19 through 22. However, most actuators can be mounted on opposite end of valve body. Take off actuator and end cap and reverse their positions. Note: on manual lever, spring centered models, the lever must be removed before the end cap with attached spool can be pulled out. Remove lever by pressing out hinge pin.

The handle of any section can be pointed up or down by removing 4 mounting screws, rotating the handle 180° and re-mounting.

SPACER AND END PLATES

PEP-4. End plate, 1" thick, with 1/2" NPTF threaded inlet and exhaust ports. Includes 3 O-ring seals.

BEP-4. Blank end plate 5/8" thick with 3 O-ring seals.

BOS-4. 1/8" spacer with 3 holes. Used between an end plate and adjacent section to support O-rings. One required on each stack.

PS-4. 5/16" spacer plate with 3 holes. Used between two adjacent solenoid valves when using alternate solenoids shown on page 54 (except explosion proof - see XPS-4).

XPS-4. 1/2" spacer plate with 3 holes. Used between two adjacent solenoid valves when using alternate explosion proof solenoids shown on page 54.

REPLACEMENT SEAL KIT

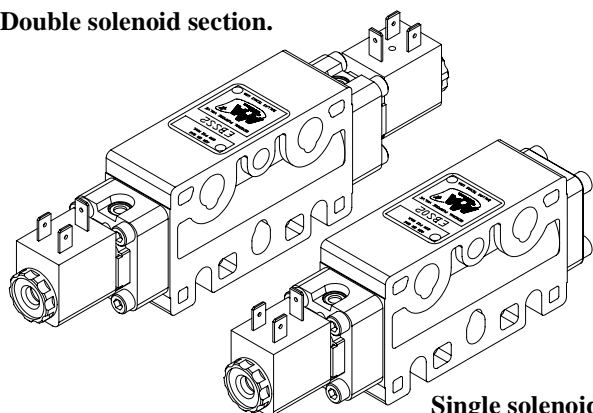
BRKV-3MP. One kit required for each valve section. Includes 6 V-39 Viton body O-rings, 3 V-110 Buna-N section O-ring seals, 2 EMG3 Buna-N solenoid gaskets, and 2 NEG3 composition end cap gaskets.

SOLENOID

SECTIONS FOR B-SERIES STACK VALVE ASSEMBLIES 4-WAY
1/4" AND 3/8" SIZES VACUUM TO 250 PSI*
General Information page 18, Dimensions page 23.



Double solenoid section.



Single solenoid section.

PRESSURE RATING. Standard solenoid sections are assembled for "internal pilot" operation using end mount solenoids. Shifting pressure is obtained from the main body through holes drilled from the body into the solenoid base. Caution! Inlet pressure on standard solenoid operators must not exceed 150 psi.

Models EBSR and EBSS (no internal springs) will shift reliably on a minimum line pressure of 25 psi. Spring return (EBSO) and spring centered (EBSY) should not be operated on a line pressure less than 50 psi.

Solenoid sections may be used on vacuum or on pressure below the above limits, or up to 250 psi, by ordering them with option "Z", or converting them in the field to "external pilot" operation, provided the pilot pressure is in the range of 50 to 150 psi. The external pilot pressure must be connected to the external pilot port on each solenoid base.

EXTERNAL PILOT OPERATION. To order a standard solenoid section factory assembled for external pilot operation, add suffix "Z" following the regular model number.

Example: EBSO2Z, etc. (manual override is facing down.)

CONVERSION TO EXTERNAL PILOT OPERATION. This valve can be converted to external pilot operation in the field by rotating the entire solenoid assembly 180°. Manual override will be facing opposite the nameplate.

To orient the override on the same side as the nameplate and still be externally piloted, you must use kit EPOOK (External Pilot Override Orientation Kit). It takes one kit per solenoid. Models "EBSY" only one kit is required (spring centered assembly is rotated and instead of the solenoid assembly). This kit will add 1/8" to overall length of valve per solenoid. This kit can be ordered separately and installed in the field or pre-assembled on original factory orders.

FLOW PATTERN. When a solenoid is energized, this will cause air to flow from the pressure inlet out the cylinder port which is closest to the solenoid which was energized.

Voltages: This chart shows most common voltages. Consult the AAA factory for other voltages which may be available. See page 54 for other solenoid options which may provide the requested voltage or environmental rating.

Coil Voltage and Frequency	Pick-Up	Holding
24 volts, 60 Hz	7.1 VA	5.8 VA
48volts, 60 Hz	7.7 VA	6.2 VA
120 volts, 60 Hz	7.8 VA	6.3 VA
240 volts, 60 Hz	7.8 VA	6.3 VA
12 volts D-C		4.6 Watts
24 volts D-C*		4.8 Watts
60 volts D-C		4.3 Watts

*Intrinsically safe 24 VDC Operator Available - Contact Factory.

(continued on next page)

Select basic model. See page 50 for optional spools.

MODEL NUMBER Threaded body		DESCRIPTION	SYMBOL
1/4" NPTF	3/8" NPTF		
EBSO2	EBSO3	Single solenoid, 2-position, spring return. Spool returns to original position when solenoid is de-energized.	
EBSR2	EBSR3	Single solenoid, 2-position, pilot pressure returned spool. Pilot pressure from an external 3-way valve returns spool to its original position.	
EBSS2	EBSS3	Double solenoid, 2-position, no springs. Spool shifts and remains shifted when one solenoid or the other is momentarily or continuously energized.	
EBSY2	EBSY3	Double solenoid, 3-position, spring centered, closed center spool. All ports are blocked when both solenoids are de-energized. See page 50 for other spools.	

*Operating pressure range of AAA solenoid valves is subject to limitations stated in the text on this page.

DIN CONFIGURATION. The coils are a "DIN 43650" style with 11mm/Industrial Form B connector pin pattern. "DIN" caps are ordered as a separate line item:

Optional "DIN" Caps (11 mm style): Various styles of din caps are available, see page 48 for more information.

Optional Coils: See page 49 for additional coils.

Environmental Ratings: (with mounted plug-in connector per IEC 529) IP 65 (NEMA 4 without structural rating). See page 54 for other solenoid options which may provide the requested environmental rating.

Voltage Tolerance: ±10%.

Operating Temperatures: -4°F to 120°F

Moulding Material: Duroplast/thermoset resin (Duro)

Operating Pressures: 29" Hg VAC - 250 PSIG. Standard models are assembled for "internal pilot operation". They will operate reliably on line pressures from 150 down to 25 PSIG minimum for no spring models, and down to 50 PSIG on spring return and spring centered models. Above

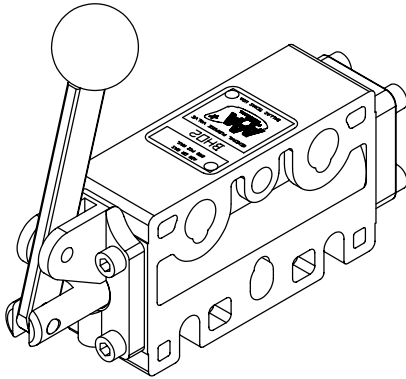
150 PSIG, below minimum pressure and for vacuum service, the valve must be configured for external pilot (between 50 PSIG and 150 PSIG).

Manual Override: solenoid structures are equipped with a non-locking manual override on the side of the solenoid structure. To activate manual override, the inset plunger must be depressed. Spool will shift while the plunger is depressed but will return to original position on spring models EBSO, and EBSY when plunger is returned to normal (sufficient shifting pressure and pilot source is assumed). Spool will remain shifted on springless models EBSS and EBSR models.

Locking Override: solenoid structures with locking overrides are available. The entire solenoid assembly must be changed from the standard non-locking to locking style. These assemblies can be ordered separately or requested at time of initial purchase, Contact factory for details.

MANUAL LEVER

SECTIONS FOR B-SERIES STACK VALVE ASSEMBLIES — 4-WAY — 1/4" & 3/8" SIZES Vacuum to 250 PSI — See General Information page 18, Dimensions page 23.



Normal position of handle on spring return model. Manual lever can be installed on opposite end. See page 18 "Cylinder Ports". Entire stack can be turned with cylinder ports up.

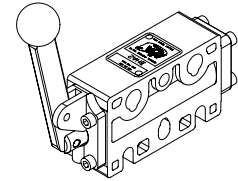
HANDLE POSITION. On 3-position models, handle is vertical in neutral position. On spring return models the handle is normally in position shown at left. On friction positioned models there is no normal position; handle moves 1-1/2" from side to side or 3/4" from center to a side position.

OTHER HANDLE OPTIONS - See page 51

PRESSURE RATING. A manual lever section can be used on any pressure from vacuum to 250 psi. Can be used as a 3-way valve by plugging the unused cylinder port.

FLOW PATTERN. When lever is pulled outward. Air flows out the cylinder port nearest the handle.

On factory order, 2-position, spring return, model can be furnished with normal handle in position "A", (order as BHA2 or BHA3).

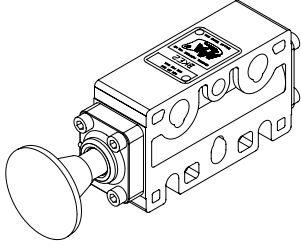


Threaded body ports. Select basic model. See page 50 for optional spools.

MODEL NUMBER Threaded body		DESCRIPTION	SYMBOL
1/4" NPTF	3/8" NPTF		
BHE2	BHE3	2-position, friction positioned. Spool stays in any position when handle is released.	
BHO2	BHO3	2-position, spring return. Handle returns to original position (see left illustration above) when handle is released.	
BHY2	BHY3	3-position, spring centered, closed center spool. All ports blocked when handle is released. See other spools on page 50.	
BHD2†	BHD3†	3-position, click detent, closed center spool. Handle stays in any one of three positions. See other spools on page 50.	
BHD2Q	BHD3Q	2-position, click detent. Handle detents in both end positions.	

†Also available, 3-position manual valve detented in position "C", spring return to center from "A" position.

**SECTIONS FOR B-SERIES STACK VALVE ASSEMBLIES 4-WAY
1/4" AND 3/8" SIZES VACUUM TO 250 PSI
General Information page 18, Dimensions page 23.**



The knob (with spool) can be installed on opposite end of body. Entire stack can be turned with cylinder ports up.

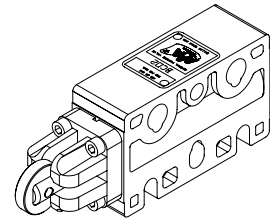
PALM BUTTON

PALM BUTTON SECTION. Valve is operated with a push-pull motion by a knob attached to the spool. The knob is moved 17/32" to fully shift a 2-position model or 1/4" each side of center on a 3-position model. The actuating force is about 12 lbs. on spring loaded models and 5 lbs. on no-spring models. Consult factory for mounting palm button valves side by side.

FLOW PATTERN. When the knob is pushed in, air flows out the cylinder port which is nearest the knob.

PILOT RETURN MODEL. Model BKR has its spool returned by application of pilot pressure from another valve furnished by the user. This could be a miniature manual or solenoid 3-way model (25 psi minimum).

MOUNTING. Palm button models are available for panel mounting up to 1/4" thick. Use a 7/8" diameter hole in panel for mounting valve. To order add suffix "R" to regular valve model number for this option. (Example: BKO2R)



The roller (with spool) can be installed on opposite end of body. Roller can be positioned horizontally or vertically.

CAM OPERATED

CAM OPERATED SECTION. Hardened steel roller can be actuated either by cross-moving or head-on action of a suitable cam mounted on a machine. Functional spool travel is 17/32" with an over-travel of 1/32" to prevent accidental damage to the valve body in case of incorrect adjustment of the cam. A force of 20 lbs. is needed to fully shift the spool on spring return models.

Normal assembly is with the cam roller in a vertical plane as shown in the illustration. Valve may be ordered with roller horizontal or it can be re-positioned in the field.

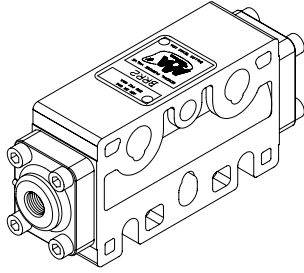
FLOW PATTERN. When roller is pushed in, air comes out of the cylinder port which is nearest the roller.

PILOT RETURN MODEL. Model BCR has its spool returned by application of pilot pressure from another valve furnished by the user. This may be a miniature 3-way valve of any type (25 psi minimum).

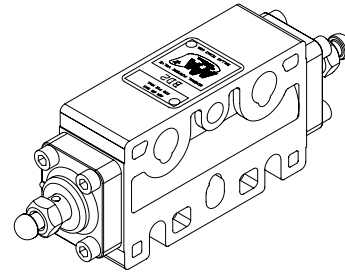
See page 50 for optional spools.

MODEL NUMBER Threaded body		DESCRIPTION	SYMBOL
1/4" NPTF	3/8" NPTF		
BKE2	BKE3	Palm button, 2-position, friction positioned. Spool stays in any position when knob is released.	
BKO2	BKO3	Palm button, 2-position, spring return. Knob returns to "Out" position (see drawing on page 23) when knob is released.	
BKY2	BKY3	Palm button, 3-position, spring centered, closed center spool. All ports blocked when knob is released. See other spools on page 50.	
BKD2	BKD3	Palm button, 3-position, click detent, closed center spool. Knob stays in any one of three positions. See other spools on page 50.	
BKR2	BKR3	Palm button, 2-position, pilot return. Spool is returned by external 3-way control valve furnished by user. (25 psi minimum)	
BKD2Q	BKD3Q	Palm button, 2-position, click detent. Spool stays in either of 2 positions when knob is released.	
BCO2	BCO3	Cam actuated, 2-position, spring return. Roller returns to position "Out" when released.	
BCR2	BCR3	Cam actuated, 2-position, pilot pressure return. Spool is returned by external 3-way control valve furnished by user. (25 psi minimum)	

**SECTIONS FOR B-SERIES STACK VALVE ASSEMBLIES 4-WAY
1/4" AND 3/8" SIZES — VACUUM TO 250 PSI
General Information page 18, Dimensions page 23.**



The entire stack can be turned with cylinder ports on top.



The entire stack can be turned with cylinder ports on top. Bleed button(s) are furnished with each valve section.

PILOT OPERATED

PILOT OPERATED SECTIONS require a minimum of 25 psi for reliable shifting of no-spring model BRR and 50 psi for spring loaded models BRO and BRY. Pilot pressure up to 250 psi is permissible. Pilot ports on one or both end caps are 1/8" NPTF.

FLOW PATTERN. When pilot pressure is applied, flow comes out cylinder port which is nearest the end being piloted.

REMOTE CONTROL. Pilot operated sections must be controlled with an auxiliary remote 3-way valve on each pilot. A remote solenoid or manual valve, with 3-position float center spool is sometimes used to control both pilots.

DIFFERENTIAL PILOT

DIFFERENTIAL PILOT SECTIONS will not operate on liquids, vacuum, nor on inlet pressure less than 25 psi. Two bleed buttons are furnished, screwed into body end caps. In a stack valve, these two buttons are usually removed and connected to body end caps with short lengths of hose for remote operation from a few feet away.

Bleed buttons supplied do not have threaded exhaust ports. For this reason, other types of 2-way N.C. miniature valves must sometimes be substituted for the bleed buttons for remote control. See more information on differential pilot operation on page 44.

FLOW PATTERN. On differential pilot sections, when a bleed button is actuated, air comes out the cylinder port farthest from the button which was actuated.

REMOTE CONTROL. Remote operation by means of bleed buttons should be limited to a distance of less than 10 feet from the valve. At greater distances, spool shifting may be slow or unreliable.

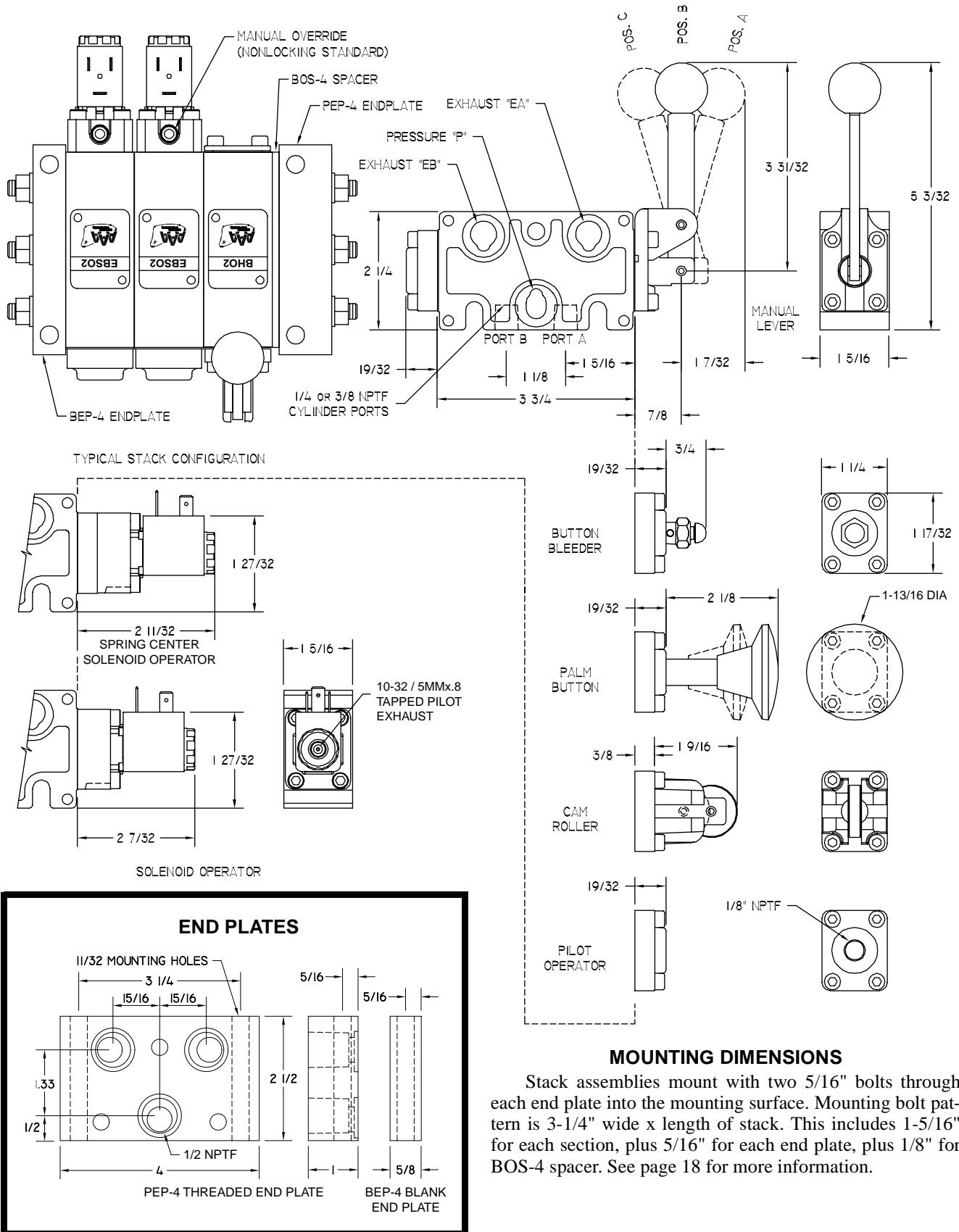
Select basic model. See page 50 for optional spools.

MODEL NUMBER Threaded body		DESCRIPTION	SYMBOL
1/4" NPTF	3/8" NPTF		
PILOT OPERATED SECTION			
BRR2	BRR3	2-position, double pilot, no springs. Spool stays in position to which shifted when pressure on pilot(s) is vented.	
BRO2	BRO3	2-position, single pilot, spring return. Spool returns to original position when pilot pressure is released.	
BRY2	BRY3	3-position, double pilot, spring centered, closed center spool. All ports are blocked when pressure is released from both pilots. See other spools on page 50.	
DIFFERENTIAL PILOT SECTION			
BD2	BD3	2-position, differential pilot. Furnished with a button valve on both ends. See page 44 for pressure limitations on button bleed operations.	
BDY2	BDY3	3-position, differential pilot, spring centered, closed center spool. Spool returns to center when buttons are released.	
BDO2	BDO3	2-position, single differential pilot, spring return. Spool returns to original position when button is pressed.	

BODY DIMENSIONS - STACK VALVES

VALVE SECTIONS — PAGES 18 THROUGH 22

Overall dimensions are shown. If additional dimensions or a certified print is required, your distributor will obtain it for you.



MOUNTING DIMENSIONS

Stack assemblies mount with two 5/16" bolts through each end plate into the mounting surface. Mounting bolt pattern is 3-1/4" wide x length of stack. This includes 1-5/16" for each section, plus 5/16" for each end plate, plus 1/8" for BOS-4 spacer. See page 18 for more information.