Vertical Break Parallel (VBP) / Vertical Break Slant (VBS)

Type VBPA (Aluminum) / Type VBPC (Copper)  
Type VBSA (Aluminum) / Type VBSC (Copper)

**PASCOR Air Break Switch Technology**

PASCOR offers versatility and reliability in its entire line of group operated switches. Ideal for either substation or transmission applications, PASCOR switches are engineered to the highest standards to meet and often exceed all applicable ANSI and NEMA requirements. PASCOR customizes controls on each switch to suit each application.
Basic Ratings and Switch Types

The VBP switch ratings are as listed in Table 1, ANSI C 37.32 in ratings of 15kV through 345kV, 1200 Amp to 4000 Amp. The VBS switch ratings are as listed in Table 1, ANSI C 37.32 in ratings of 69kV through 230kV, 1200 Amp to 2000 Amp.

The rated withstand and radio influence voltages shall be as shown in Table A for installations below 3300 ft. altitude. Altitude correction factors per ANSI C37.30.2971, Table 1 will apply for higher altitudes. The momentary current withstand shall be as shown in Table B.

Electrical Coordination

The switches shall be fully coordinated. That is, the open gap withstand voltage will be at least 10% greater than the line to ground withstand voltage. If higher BIL level insulators are specified for extra-creep, spill gaps will be supplied on one end of the switch. In the case of bypass or bus transfer switches, spill gaps will be included on both ends.

Live Parts and Application

Manufactured in either aluminum (VBPA) / (VBSA) or copper (VBPC) / (VBSC), the VBP / VBS offers minimum phase spacing and is the most versatile for interrupter accessories. The intrinsic design offers stability under heavy terminal pad loading. The VBP / VBS is ideal for substation and transmission applications, and mounting options include horizontal upright mounting, vertical mounting (up to 230kV) and underhung mounting (up to 230kV).

All hardware in the live parts is 300 series stainless steel and shall be no less than ½” diameter. The VBP / VBS arcing horns are ½” stainless steel.

Contacts

The exposed contacts shall be self-wiping, silver-to-silver and are of the reverse loop shoe type to increase contact pressure under fault conditions. All other current carrying contacts, including hinged end contacts, shall be silver-to-silver, unless sealed and insulated from contamination and corrosion. Internal sealed contacts may be either silver-to-silver or silver-to-copper. All exposed contacts, both fixed and movable, shall be replaceable in the field.

External silver-to-silver contact surfaces that are applied to copper are brazed silver alloy inlay to brazed silver alloy inlay. Minimum silver thickness shall be .010 inches. Contact springs are stainless steel.
**Bearings**

The rotating insulators on switches rated 115kV and above have stainless steel ball bearings in stainless steel races. Bearings are lubricated and sealed from contaminants with a breathable, dust proof seal. The rotating insulators on switches rated 69kV and below have either stainless steel bearings shafts in bronze bushing or stainless steel ball bearings as previously described.

**Bases**

Bases for pascor’s VBP / VBS switches are a square tube galvanized steel base construction offering added strength and rigidity.

Tubular bases provide strength in the torsional, horizontal and vertical directions.

**Terminal Pads**

The VBP / VBS’s terminal pads are flat NEMA standard four-hole for 1200 to 2000A (9/16” round holes drilled on 1-3/4” centers). VBP 3000A and 4000A switches shall have 3-sided pads with 4 holes on each pad.

Terminal pads, other than aluminum, shall be tin-plated.
VERTICAL BREAK PARALLEL (VBP / VBS)

Operating Mechanism

The VBP / VBS can be operated by swing handle, worm gear operator, or motor operator. All brackets will be designed to custom fit the structure, and all brackets and accessories are to be assembled to the maximum degree possible for shipment. Hardware that fastens the control brackets to the structure will be shipped attached to the brackets.

The operating mechanism shall have positive adjustable stops in both the open and closed positions. The operating handle have provisions for padlocking in both open and closed positions. The maximum operating effort shall be 50 lbs. for a swing handle operator or 35 lbs. for a manually operated gear mechanism.
**VERTICAL BREAK PARALLEL (VBP / VBS)**

**Operation**

Switch blades are under positive control at all times and the travel from the fully closed to the fully open position is accomplished with one smooth continuous motion. Switches rated 69kV and above include blade counterbalances. Counterbalances are on all three blades and are easily field adjustable for different mounting configurations.

The hinge mechanism shall overtoggle in the closed position. For switches rated 138kV and above, the hinge design will allow for field adjustment of both hold down pressure on the blade and timing coordination of the three phases.

**Insulators**

When requested, we will ship our VBP / VBS switch with insulators (porcelain or polymer) fully assembled and adjusted on the switch up to 230kV, 1050kV BIL. Highway restrictions prevent 345kV switches shipping assembled.
**Adjustment**

For all voltages the length of the group control rod and the length of the outboard bearing lever will be adjustable to allow for proper alignment of the switch.

For 69kV and above, the length of the interphase rods will have vernier length adjustment. The vernier will have threads that are corrosion resistant.

All switches shall include provisions for the adjustment of each individual switch pole. These provisions will be of a continuously adjustable threaded type for correction of any misalignment in the switch insulators, bases and operating pipes. It is mechanically impossible, after final adjustment has been made, for any switch to remain in a partially open or closed position at the completion of an operator cycle.

Galvanized steel control and interphase pipes are sized to eliminate twist in the torsional operating pipes and sag in push-pull interphase pipes. Units 69kV and above interphase rods have vernier length adjustment, and the vernier threads are corrosion resistant.

All switches include provisions for the adjustment of each individual switch pole by a continuously adjustable threaded type for correction of any misalignment in the switch insulators, bases and operating pipes. It is mechanically impossible, after final adjustment has been made, for any switch to remain in a partially open or closed position at the completion of any operator cycle.

**Shipping**

Switches are crated so a three-pole switch with controls and pipe can be clearly identified at the jobsite as a complete unit without having to re-package any parts.

All hardware, except mounting hardware, is pre-assembled in mounting holes to minimize loose hardware identification at the jobsite.

**Design Tests**

All VBP / VBS designs have undergone thorough design tests in accordance with IEEE Standard C37.34.1994 and certified test reports are available upon request.

**Accessories**

- Ground Switches, jaw or hinge end application
- Whip horns
- Vacuum interrupters
- Auxiliary switches
- Key interlock provisions
- SR-500 resistors
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**Vertical Break Parallel**
- Manufactured in either aluminum or copper
- Permits minimum phase spacing
- Stable under heavy terminal pad loading
- Most versatile for interrupter accessories

**Application:**
- Substation & Transmission
  - Horizontal upright
  - Vertical
  - Underhung

**Standard Features**
- Silver to silver exposed contacts
- Rigid tubular blade
- 1/2" Stainless Steel Arcing horn
- Stainless steel live parts hardware
- Galvanized steel square tube base
- Stainless steel ball bearings 115kV and up
- Stainless steel shaft in bronze sleeve bearing 69kV and below

**Operator Option**
- Swing handle
- Worm gear
- Motor Operator

**Accessories**
- Whip type horns
- Single or multi vacuum bottle Interrupters
- Ground switches

---

Pacific Air Switch Corporation
P.O. Box 328, 2615 23rd Avenue, Forest Grove, OR 97116, (503) 359-3939, Fax: (503) 357-0858
### TERMINAL PAD DETAILS

ANSI Standard Hole Pattern
9/16" diameter holes (center holes for 600A connector)

### BASE CROSS SECTION

**BASE TUBE CROSS SECTION**

- 15 – 69kV: 4 x 4"
- 115 – 230kV/900BIL: 6 x 6"
- 230kV/1050BIL: 6 x 8"

**ANSI STANDARD MOUNTING "W"**

- 15 – 69kV: 6 ¼"
- 115 – 230kV/900BIL: 8 ¼"
- 230kV/1050BIL: 12 ½"

---

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<th>kv (nom)</th>
<th>kV BIL</th>
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<th>kA Mom.</th>
<th>STD. INSUL.</th>
<th>INSUL. BC (IN)</th>
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*Weights are in lbs., and include 3 phases, insulators and controls*

---

Pacific Air Switch Corporation

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Pacific Air Break Switch Technology

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Vertical Break Parallel
- Manufactured in either aluminum or copper
- Permits minimum phase spacing
- Stable under heavy terminal pad loading
- Most versatile for interrupter accessories

Application:
Substation & Transmission
- Horizontal upright
- Vertical
- Underhung

Standard Features
- Silver to silver exposed contacts
- Rigid tubular blade
- 1/2" Stainless Steel Arcing horn
- Stainless steel live parts hardware
- Galvanized steel square tube base
- Stainless steel ball bearings 115kV and up
- Stainless steel shaft in bronze sleeve bearing 69kV and below

Operator Option
- Swing handle
- Worm gear
- Motor Operator

Accessories
- Whip type horns
- Single or multi vacuum bottle Interrupters
- Ground switches

Pacific Air Switch Corporation
P.O. Box 328, 2615 23rd Avenue, Forest Grove, OR 97116, (503) 359-3939, Fax: (503) 357-0858
VBPA  Vertical Break Parallel Aluminum
VBPC  Vertical Break Parallel Copper

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*Weights are in lbs., and include 3 phases, insulators and controls

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**TERMINAL PAD DETAILS**

ANSI Standard Hole Pattern
9/16" diameter holes

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**BASE CROSS SECTION**

ANSI STANDARD MOUNTING "W"

- 15 – 69kV: 6 ¼" BIL
- 115 – 230kV: 6 x 6"
- 230kV – 345kV (1050BIL): 6 x 8"
- 345kV/1300BIL: 6 x 10"

---

5 ½" on 345kV switches

---

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- Silver to silver exposed contacts
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- Galvanized steel square tube base
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ANSI Standard Hole Pattern
9/16" diameter holes

**BASE CROSS SECTION**
ANSI STANDARD MOUNTING “W”

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<th>kV BIL</th>
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<th>INSUL. HGT (IN)</th>
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<th>C</th>
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- Worm gear
- Motor operator

Accessories
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- Ground switches

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VBPA  Vertical Break Parallel Aluminum
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<th>V (nom)</th>
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<th>STD. INSUL.</th>
<th>INSUL. BC (IN)</th>
<th>INSUL. HGT (IN)</th>
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*Weights are in lbs., and include 3 phases, insulators and controls
*Based on aluminum switch design

Pacific Air Switch Corporation
P.O. Box 328 , 2615 23rd Avenue, Forest Grove, OR 97116, (503) 359-3939, Fax: (503) 357-0858
PASCOR offers versatility and reliability in its entire line of group operated switches. Ideal for either substation or transmission applications, PASCOR switches are engineered to the highest standards to meet ANSI requirements. Pascor customizes controls on each switch to suit the application.

**Vertical Break Slant**
- Manufacture in either aluminum or copper
- Permits minimum phase spacing
- Stable under heavy terminal pad loading
- Most versatile for interrupter accessories

**Application:**
- Substation & Transmission
  - Horizontal upright
  - Vertical
  - Underhung
  - Unitized phase over phase

**Standard Features**
- Silver to silver exposed contacts
- Rigid tubular blade
- 1/2” Stainless Steel Arcing horn
- Stainless steel live parts hardware
- Galvanized steel square tube base
- Stainless steel ball bearings 115kV and up
- Stainless steel shaft in bronze sleeve bearing 69kV and below

**Operator Option**
- Swing handle
- Worm gear
- Motor Operator

**Accessories**
- Whip type horns
- Single or multi
- bottle vacuum interrupters
- Ground switches

Pacific Air Switch Corporation
P.O. Box 328, 2615 23rd Avenue, Forest Grove, OR 97116, (503) 359-3939, Fax: (503) 357-0858
**TERMINAL PAD DETAILS**

ANSI Standard Hole Pattern

9/16" diameter holes

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**BASE CROSS SECTION**

**BASE TUBE CROSS SECTION**

- 15 – 69kV: 4 x 4"
- 115 – 161kV: 6 x 6"
- 230kV: 6 x 10"

**ANSI STANDARD MOUNTING "W"**

- 15 – 69kV: 6 ¼"
- 115 – 161kV: 8 ¼"
- 230kV: 12 ½"

---

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<th>kV (nom)</th>
<th>kV BIL</th>
<th>Amps Continuous</th>
<th>kA Mom.</th>
<th>STD. INSUL.</th>
<th>INSUL. BC (IN)</th>
<th>INSUL. HGT (IN)</th>
<th>Dimensions are in inches</th>
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