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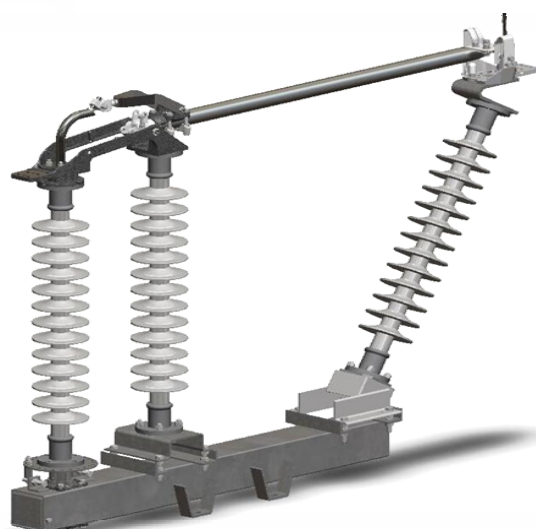
A Switch to Quality



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.

PACIFIC AIR SWITCH CORPORATION

2615 23RD AVENUE
FOREST GROVE, OREGON 97116-0328

PHONE: 503-359-3939

FAX: 503-357-0858

WEBSITE: www.pascor.com

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.

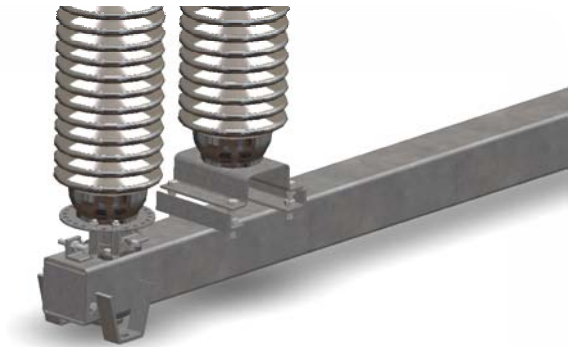


External silver-to-silver contact surfaces that are applied to copper are brazed silver alloy inlay to brazed silver alloy inlay. Minimum silver thickness shall be .010 inches. Contact springs are stainless steel.

VERTICAL BREAK PARALLEL (VBP/ VBS)

Bearings

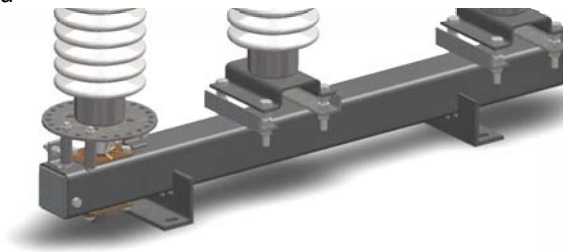
The rotating insulators on switches rated 115kV and above have stainless steel ball bearings in stainless steel races. Bearings are lubricated and sealed from contaminants with a breathable, dust proof seal. The rotating insulators on switches rated 69kV and below have either stainless steel bearings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



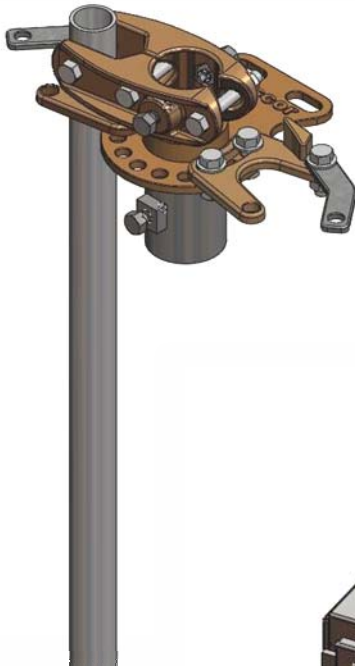
VERTICAL BREAK PARALLEL (VBP / VBS)

Operating Mechanism

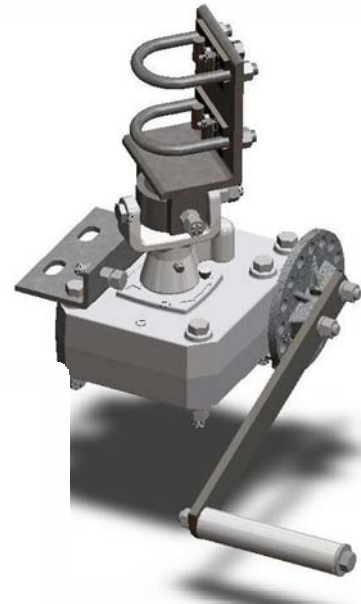
The **VBP / VBS** can be operated by swing handle, worm gear operator, or motor operator. All brackets will be designed to custom fit the structure, and all brackets and accessories are to be assembled to the maximum degree possible for shipment. Hardware that fastens the control brackets to the structure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

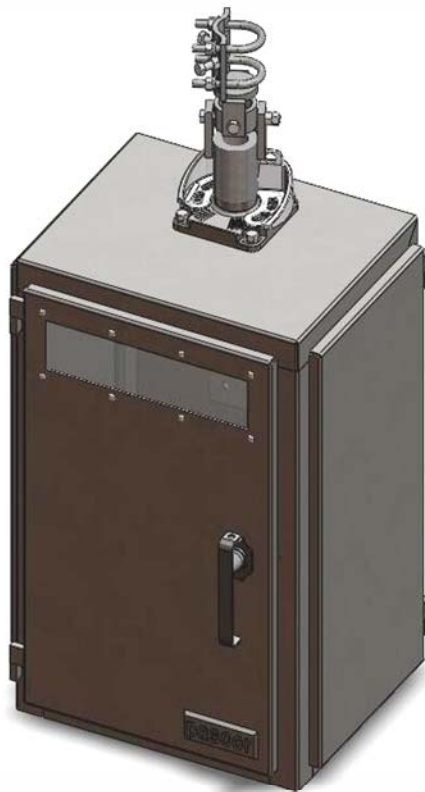
Swing Handle Operator



Worm Gear Operator



MGO Motor Operator

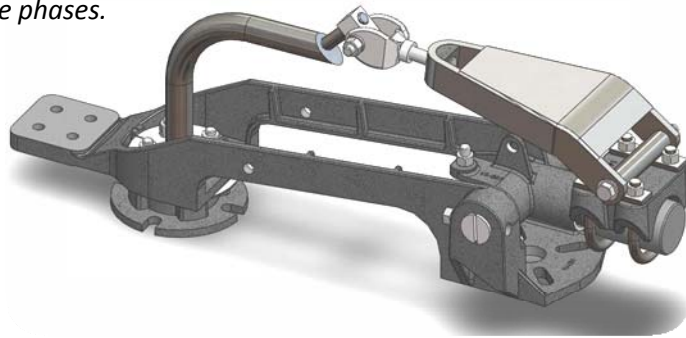


VERTICAL BREAK PARALLEL (VBP / VBS)

Operation

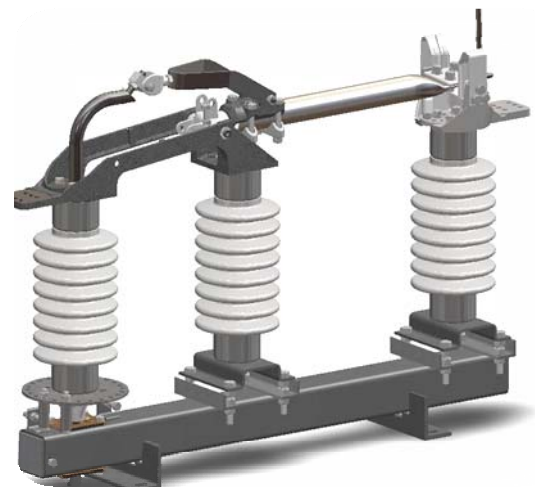
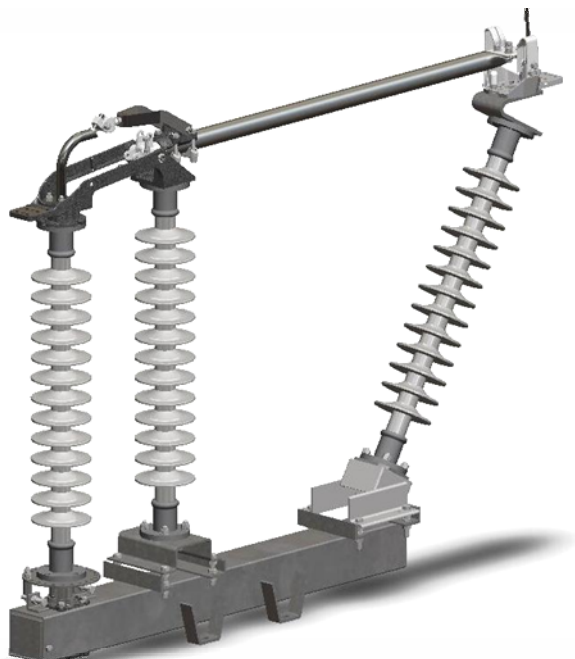
Switch blades are under positive control at all times and the travel from the fully closed to the fully open position is accomplished with one smooth continuous motion. Switches rated 69kV and above include blade counterbalances. Counterbalances are on all three blades and are easily field adjustable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

Vertical Break Parallel Type VBP Aluminum or Copper 1200 & 1600 amp

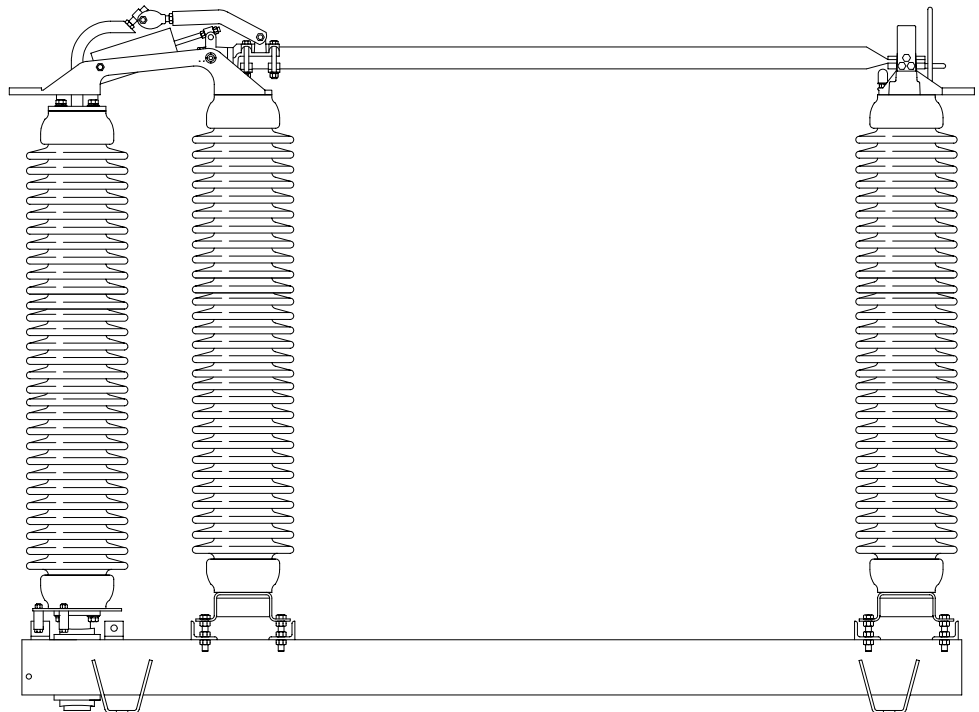
Bulletin #1100

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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

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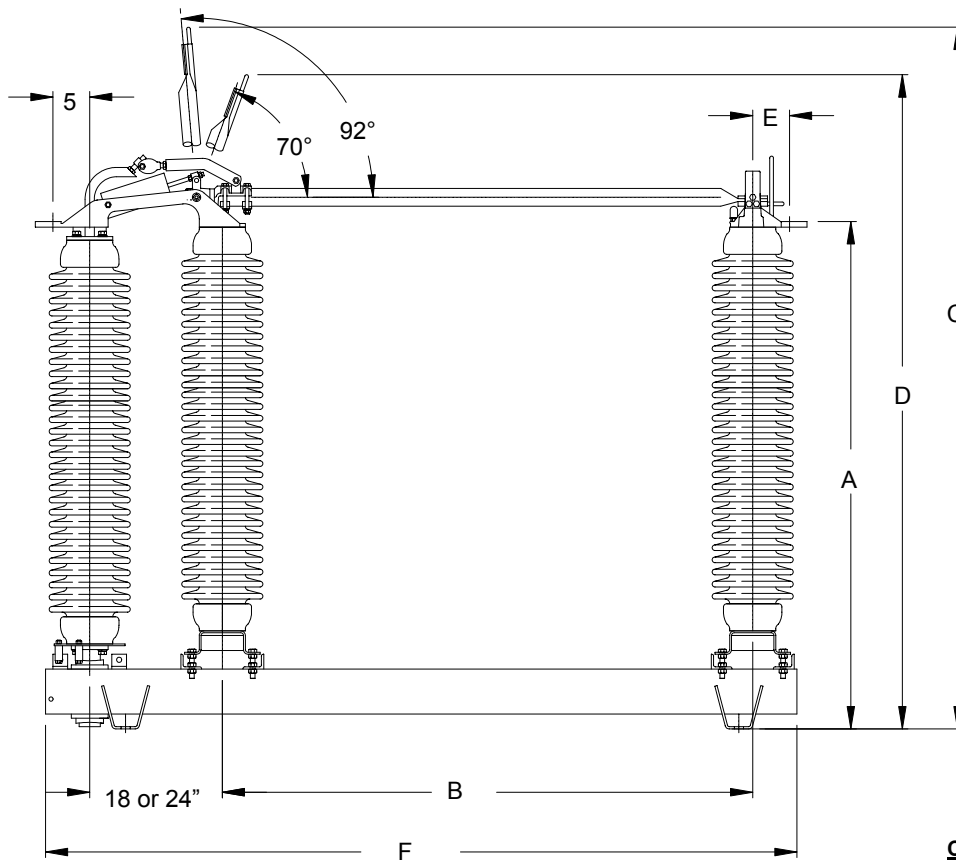
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VBPA Vertical Break Parallel Aluminum

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VBPC Vertical Break Parallel Copper

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TERMINAL PAD DETAILS

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

BASE CROSS SECTION

<u>BASE TUBE CROSS SECTION</u>	<u>ANSI STANDARD MOUNTING "W"</u>
15 - 69kV	4 x 4" 15 - 69kV 6 1/4"
115 - 230kV/900BIL	6 x 6" 115 - 161kV 8 1/4"
230kV/1050BIL	6 x 8" 230kV 12 1/2"

kV (nom)	kV BIL	Amps Continuous	kA Mom.	STD. INSUL.	INSUL. BC (IN)	INSUL. HGT (IN)	Dimensions are in inches						
							A	B	C	D	E	F	G*
15	110	1200/1600	61/70	TR205	3	10	20 1/4	15	46	44 1/2	5	42 1/2	679
23	150	1200/1600	61/70	TR208	3	14	24 1/4	18	53 1/4	51 1/2	5	45 1/2	707
34.5	200	1200/1600	61/70	TR210	3	18	28 1/4	24	63 1/4	61	5	51 1/2	882
46	250	1200/1600	61/70	TR214	3	22	32 1/4	30	73 1/4	70 3/4	5	57 1/2	1086
69	350	1200/1600	61/70	TR216	3	30	40 1/4	42	93 1/4	90	5	69 1/2	1386
115	550	1200/1600	61/70	TR286	5	45	59	60	130	125 1/2	5	90	2622
138	650	1200/1600	61/70	TR288	5	54	68	72	151	145 3/4	5	102	2877
161	750	1200/1600	61/70	TR291	5	62	76	84	172 1/2	166 1/2	5	114	3150
230	900	1200/1600	61/70	TR304	5	80	94	96	201 1/2	195	5	126	4479
230	1050	1200/1600	61/70	TR312	5	92	106	114	234	234	5	144	4514

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

Pacific Air Switch Corporation

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Vertical Break Parallel
Type VBP
Aluminum or Copper
2000 amp

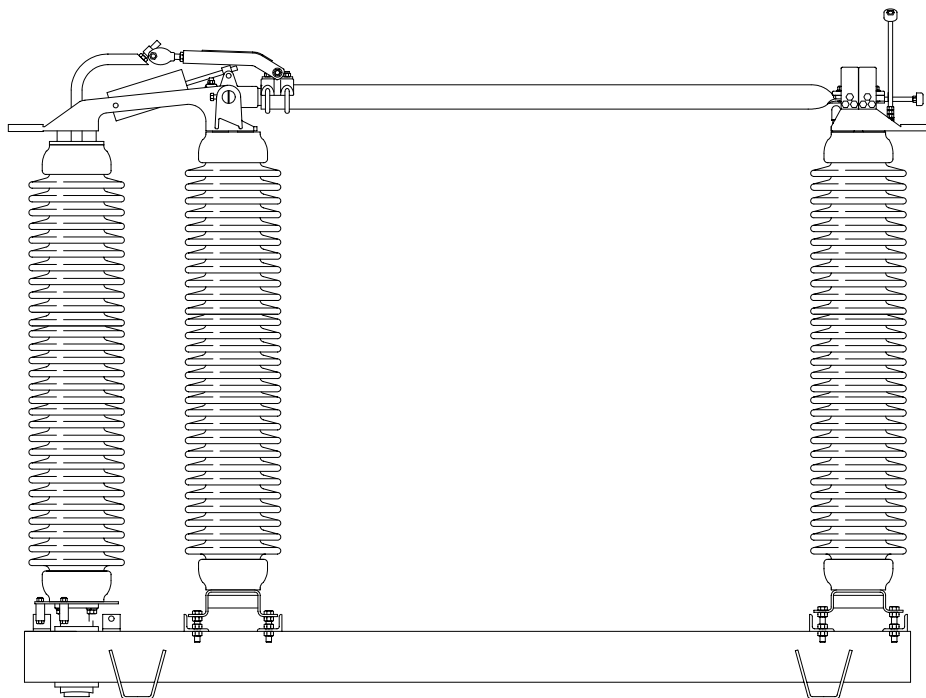
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Vertical Break Parallel

- 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

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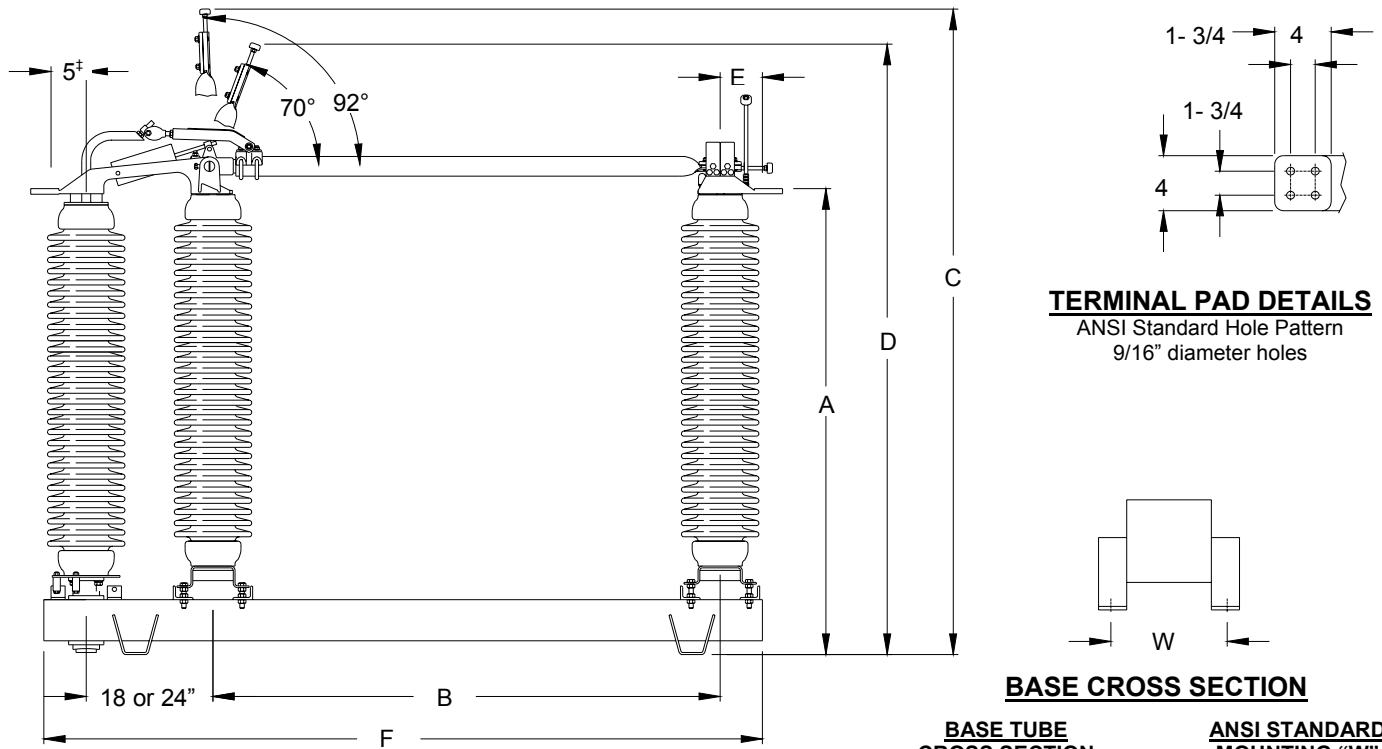
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VBPA Vertical Break Parallel Aluminum

VBPC Vertical Break Parallel Copper

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TERMINAL PAD DETAILS
ANSI Standard Hole Pattern
9/16" diameter holes

BASE CROSS SECTION

BASE TUBE CROSS SECTION		ANSI STANDARD MOUNTING "W"
15 – 69kV	4 x 4"	15 – 69kV 6 ¼"
115 – 230kV/900BIL	6 x 6"	115 – 161kV 8 ¼"
230kV – 345kV (1050BIL)	6 x 8"	230kV 12 ½"
345kV/1300BIL	6 x 10"	

‡ 5 ½" on 345kV switches

kV (nom)	kV BIL	Amps Continuous	kA Mom.	STD. INSUL.	INSUL. BC (IN)	INSUL. HGT (IN)	Dimensions are in inches						
							A	B	C	D	E	F	G*
15	110	2000	100	TR205	3	10	20 ¼	15	46	44 ½	6	42 ½	700
23	150	2000	100	TR208	3	14	24 ¼	18	53 ¼	51 ½	6	45 ½	777
34.5	200	2000	100	TR210	3	18	28 ¼	24	63 ¼	61	6	51 ½	911
46	250	2000	100	TR214	3	22	32 ¼	30	73 ¼	70 ¾	6	57 ½	1116
69	350	2000	100	TR216	3	30	40 ¼	42	93 ¼	90	6	69 ½	1418
115	550	2000	100	TR286	5	45	59	60	130	125 ½	6	90	2657
138	650	2000	100	TR288	5	54	68	72	151	145 ¾	6	102	2914
161	750	2000	100	TR291	5	62	76	84	172 ½	166 ½	6	114	3189
230	900	2000	100	TR304	5	80	94	96	201 ½	195	6	126	4520
230	1050	2000	100	TR312	5	92	106	114	234	N/A	6	144	4660
345	1050	2000	100	TR316	5	92	106	114	234 ½	N/A	6 ½	144	5245
345	1300	2000	100	TR324	5/7	106	120	132	267	N/A	6 ½	168	5360

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

Pacific Air Switch Corporation

P.O. Box 328 , 2615 23rd Avenue, Forest Grove, OR 97116, (503) 359-3939, Fax: (503) 357-0858

Vertical Break Parallel
Type VBP 30V2
Aluminum or Copper
3000 amp

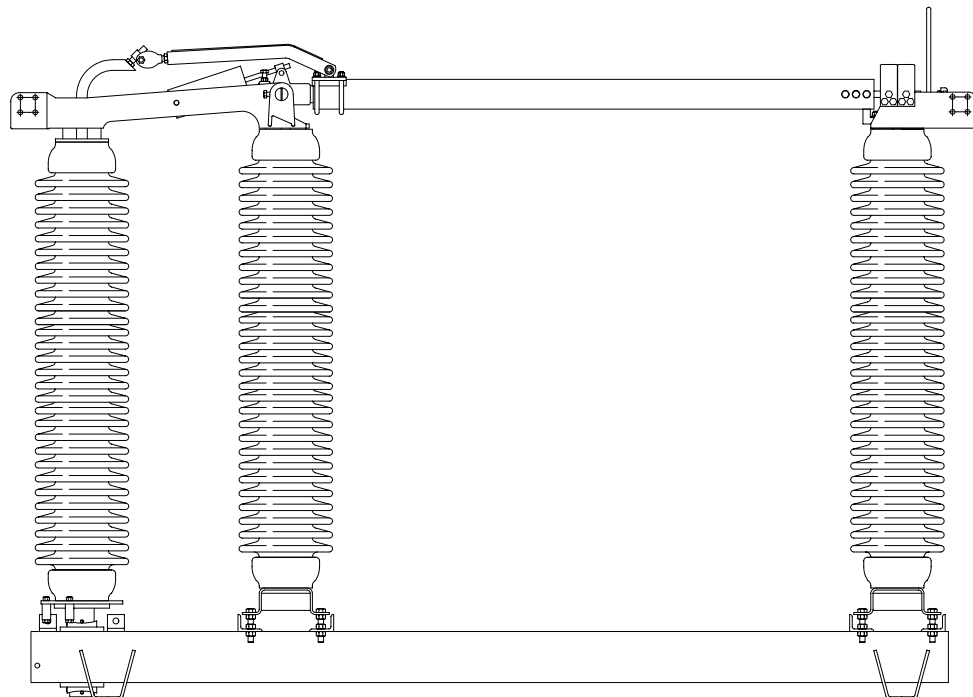
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Vertical Break Parallel

- 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

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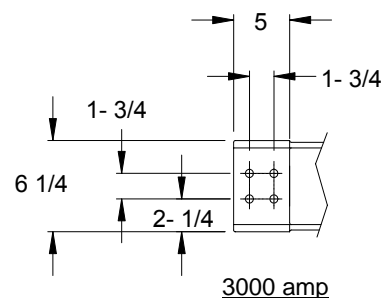
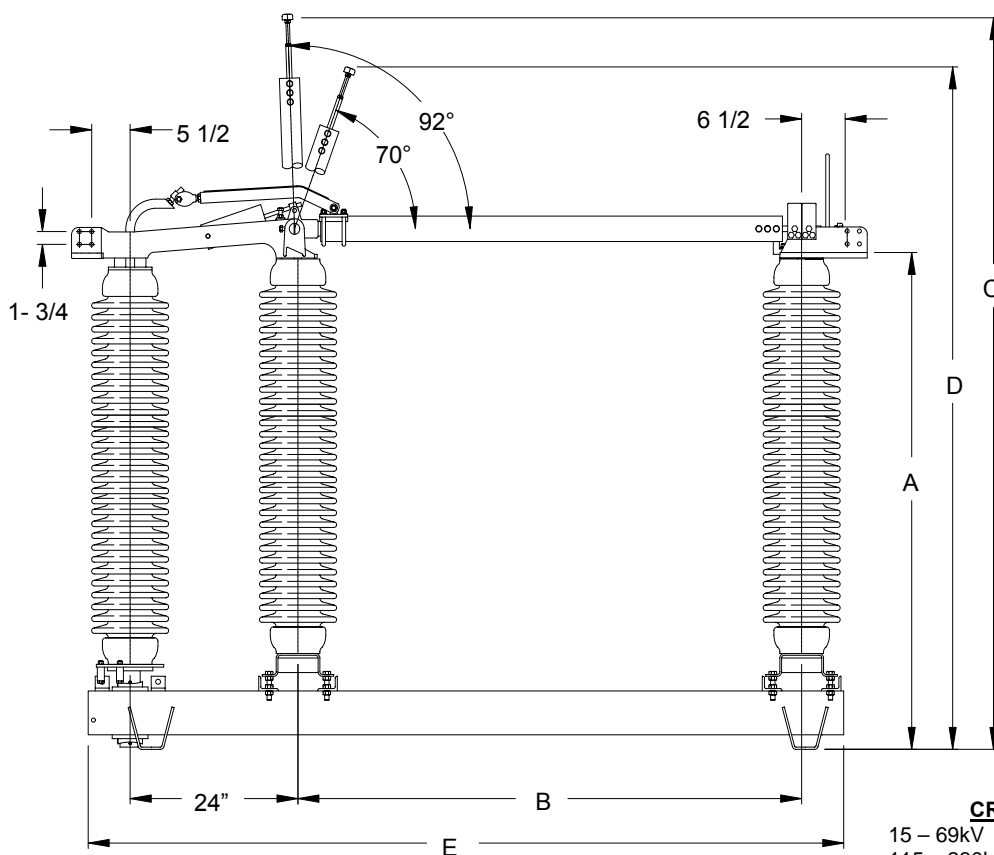
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VBPA Vertical Break Parallel Aluminum

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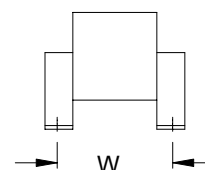
VBPC Vertical Break Parallel Copper

3/2006



TERMINAL PAD DETAILS

ANSI Standard Hole Pattern
9/16" diameter holes



BASE CROSS SECTION

BASE TUBE CROSS SECTION

15 – 69kV 4 x 4"
115 – 230kV/900BIL 6 x 6"
230kV – 345kV (1050BIL) 6 x 8"
345kV/1300BIL 6 x 10"

ANSI STANDARD MOUNTING "W"

15 – 69kV 6 1/4"
115 – 161kV 8 1/4"
230kV 12 1/2"

kV (nom)	kV BIL	Amps Continuous	kA Mom.	STD. INSUL.	INSUL. BC (IN)	INSUL. HGT (IN)	Dimensions are in inches					
							A	B	C	D	E	F*
15	110	3000	120	TR205	3	10	20 1/4	15	48	46 1/2	51 1/2	750
23	150	3000	120	TR208	3	14	24 1/4	18	52	50 1/2	51 1/2	822
34.5	200	3000	120	TR210	3	18	28 1/4	24	62	60	57 1/2	938
46	250	3000	120	TR214	3	22	32 1/4	30	72	70	63 1/2	1171
69	350	3000	120	TR216	3	30	40 1/4	42	92	89	75 1/2	1515
115	550	3000	120	TR286	5	45	59	60	128 1/2	124 1/2	96	2722
138	650	3000	120	TR288	5	54	68	72	149 1/2	144 3/4	108	3001
161	750	3000	120	TR291	5	62	76	84	171 1/2	167 1/4	120	3224
230	900	3000	120	TR304	5	80	94	96	201 1/2	195 1/4	132	4563
230	1050	3000	120	TR312	5	92	106	114	231 1/2	225 3/4	150	4701
345	1050	3000	120	TR316	5	92	106	114	234 1/2	N/A	150	5330
345	1300	3000	120	TR324	5/7	106	120	132	267	N/A	168 1/2	5553

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

Pacific Air Switch Corporation

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Vertical Break Parallel
Type VBP 40V2
Aluminum or Copper
4000 Amp

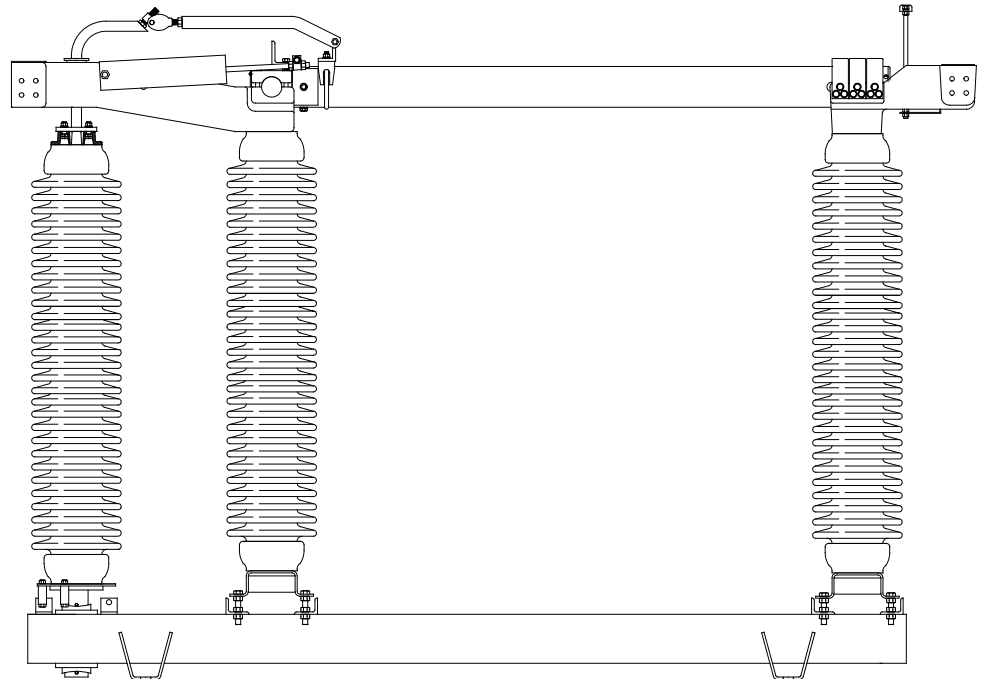
Bulletin 14V2

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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 mounting
- Vertical mounting
- Underhung mounting

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

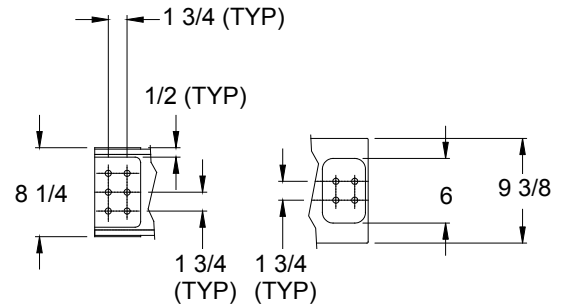
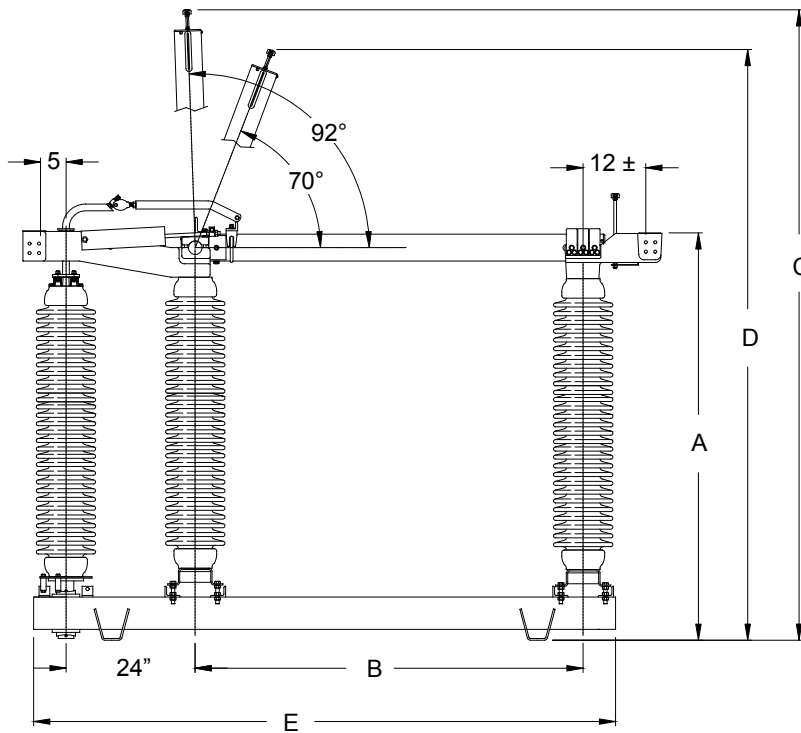
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VBPA Vertical Break Parallel Aluminum

VBPC Vertical Break Parallel Copper

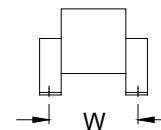
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7/2009



TERMINAL PAD DETAILS

ANSI Standard Hole Pattern
9/16" diameter holes



BASE CROSS SECTION

BASE TUBE CROSS SECTION

15 – 230kV/900BIL 6 x 6"
230kV – 345kV (1050BIL) 6 x 8"
345kV/1300BIL 6 x 10"

ANSI STANDARD MOUNTING "W"

15 – 69kV 6 1/4"
115 – 161kV 8 1/4"
230kV 12 1/2"

V (nom)	kV BIL	Amps Continuous	kA Mom.	STD. INSUL.	INSUL. BC (IN)	INSUL. HGT (IN)	Dimensions are in inches (min. length)					
							A	B	C	D	E	F*
23	150	4000	120	TR208	3	14	31 7/8	21	57 1/4	55 1/4	54 1/2	1055
23	150	4000	120	TR227	5	15	36 1/2	21	62	60 3/8	57	1375
34.5	200	4000	120	TR210	3	18	35 7/8	27	67 1/4	65 1/4	60 1/2	1168
34.5	200	4000	120	TR231	5	20	41 1/2	27	72 7/8	70 7/8	63	1643
46	240	4000	120	TR214	3	22	31 3/4	33	77	74 5/8	66 1/2	1270
46	240	4000	120	TR-267	5	24	45 1/2	33	83	80 1/2	69	1770
69	350	4000	120	TR216	3	30	47 7/8	45	97	85	78 1/2	1639
69	350	4000	120	TR278	5	30	51 1/2	45	101	97 7/8	81	2071
115	550	4000	120	TR286	5	45	66 1/2	60	131 1/2	127 1/2	96	2459
138	650	4000	120	TR288	5	54	75 1/2	72	152 1/2	147 3/4	108	2630
161	750	4000	120	TR291	5	62	83 1/2	84	172 7/8	167 7/8	120	2954
230	900	4000	120	TR308	5	80	101 1/2	96	202 7/8	197	132	3697
230	1050	4000	120	TR312	5	92	113 1/2	114	232 3/4	226	150	4165
345	1300	4000	120	TR324	5	106	126 7/8	132	263 3/4	256	168 3/4	6207

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

*Based on aluminum switch design

Pacific Air Switch Corporation

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Vertical Break Slant
Type VBS
Aluminum or Copper
1200,1600,2000 amp

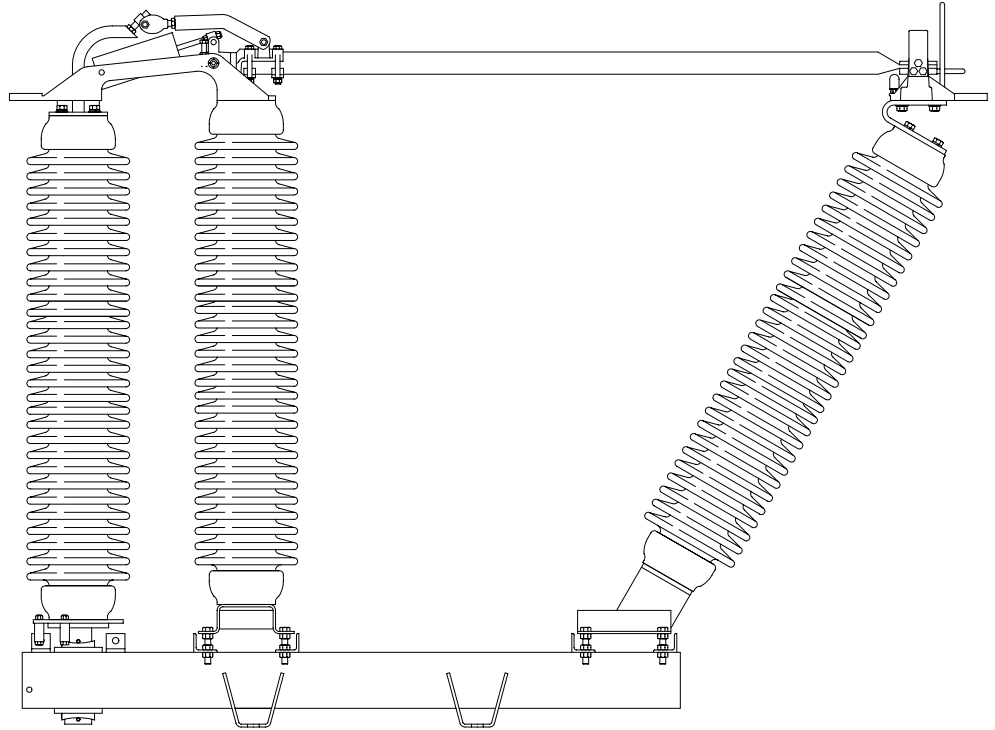
Bulletin #1200

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**Pacific 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 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

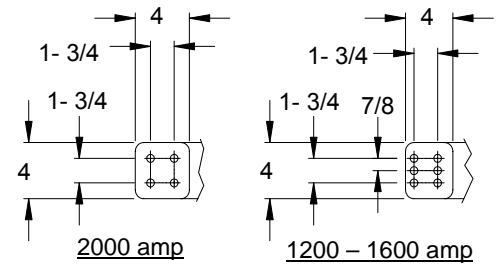
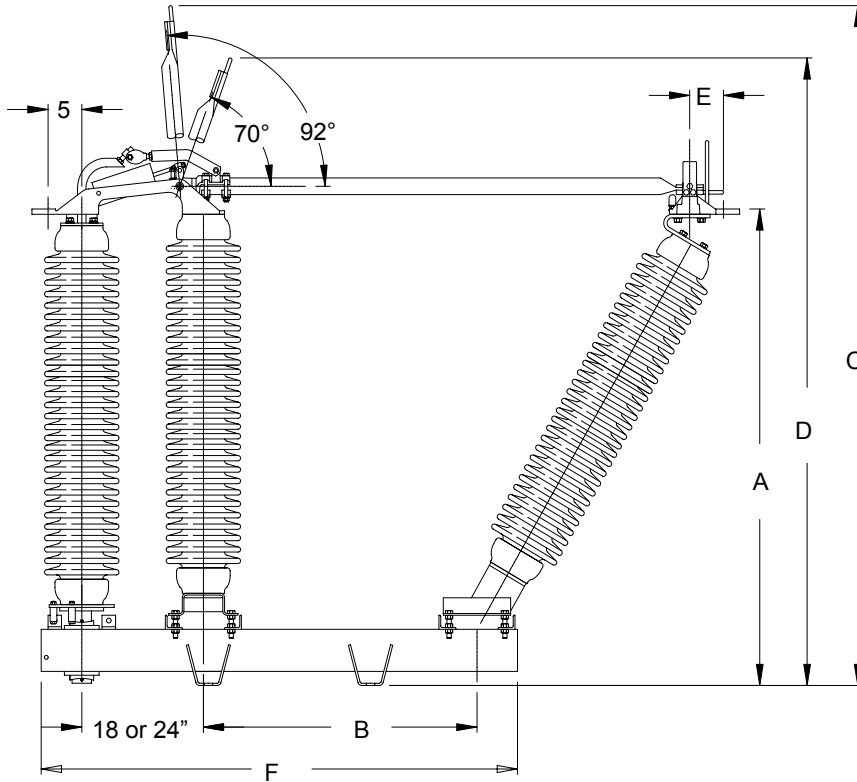
- Swing handle
- Worm gear
- Motor Operator

Accessories

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

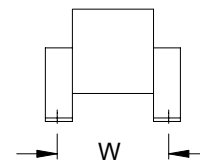
Pacific Air Switch Corporation

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



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 1/4"
115 - 161kV	8 1/4"
230kV	12 1/2"

kV (nom)	kV BIL	Amps Continuous	kA Mom.	STD. INSUL.	INSUL. BC (IN)	INSUL. HGT (IN)	Dimensions are in inches						
							A	B	C	D	E	F	G*
69	350	1200/1600	61/70	TR216	3	30	40 1/4	22	93 1/4	90 1/4	5	49 5/8	1386
69	350	2000	100	TR216	3	30	40 1/4	22	92	89	6	49 5/8	1418
115	550	1200/1600	61/70	TR286	5	45	59	33 11/16	130	125 1/2	5	62 7/8	2622
115	550	2000	100	TR286	5	45	59	33 11/16	130	125	6	62 7/8	2657
138	650	1200/1600	61/70	TR288	5	54	68	40 1/2	151	145 3/4	5	70 1/2	2877
138	650	2000	100	TR288	5	54	68	40 1/2	149 3/4	145 3/4	6	70 1/2	2914
161	750	1200/1600	61/70	TR291	5	62	76	48	172 1/2	166 1/2	5	78	3720
161	750	2000	100	TR291	5	62	76	48	172 1/2	166 1/2	6	78	3783
230	900	1200/1600	61/70	TR304	5	80	94	49 1/2	201 1/2	195	5	79 1/2	4479
230	900	2000	100	TR304	5	80	94	49 1/2	202	197	6	79 1/2	4520

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

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