

Bulletin No. 101-E April, 1995
Supersedes Bulletin 101-E dated March, 1993

DESCRIPTION

The EV-2 is a three insulator, vertical break disconnect switch. Switch opening and closing is accomplished by rotating the outside hinge insulator. Rated 14.4 through 230 kV nominal (15.5 - 242 kV max.) at both 2000 and 3000 continuous amperes, the EV-2 is generally applied in three-phase, group operation, and can be operated either manually or by motor, through conventional interphase pipe arrangements. It can be mounted upright, vertically or underhung, and it meets or exceeds all applicable ANSI standards.

Through ratings of 46 kV, these switches are shipped assembled on insulators, fully adjusted and ready to be mounted on the structure. Ratings of 69 kV and above are normally shipped with live parts pre-assembled, adjusted and bolted to their switch base, with insulators shipped separately. Installation is uncomplicated, consisting principally of aligning the insulators, using easy-to-adjust jack screws, and installing the operating pipes, which are delivered to the job site pre-cut to proper length and identified by a custom operating mechanism drawing.

APPLICATION

The EV-2 can be used for any conventional air break switch application, including disconnecting and sectionalizing lines and isolating or by-passing equipment. The EV-2 is equipped with arcing horns to protect the jaw contacts from pitting or erosion when switching low current values on short runs of bus, lines, and transformer excitation currents.

CONSTRUCTION

The EV-2 is made principally of aluminum. However, an eclectic use of materials for specific components make available for the first time new levels of performance, reliability and quality. Specific construction details, including methods and materials, are available upon request.

Disconnect Switches

Vertical Break Three-Phase, Group Operated

14.4 - 230 kV, 2000-3000 Amp.

Type EV-2

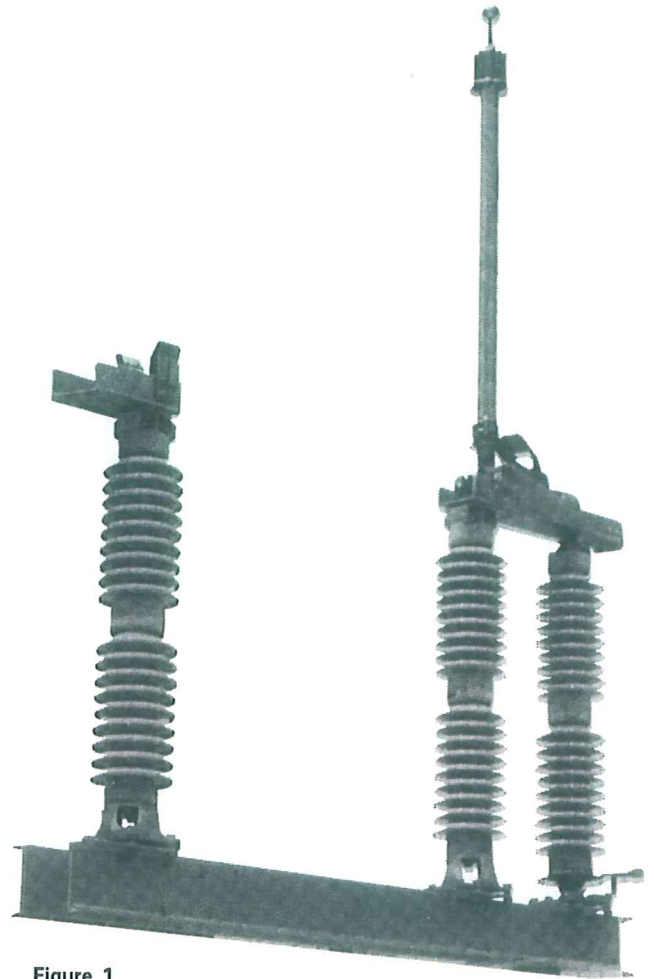


Figure 1

HIGH VOLTAGE
SWITCHMAKERS



Southern States, Inc.



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Type EV-2

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Extruded aluminum hinge and jaw support members. **High strength, maximum rigidity for terminal connections.**

Sealed, threaded hinge contacts. **Negligible wear; cool-running, excellent current interchange. Lifetime lubricated and sealed.**

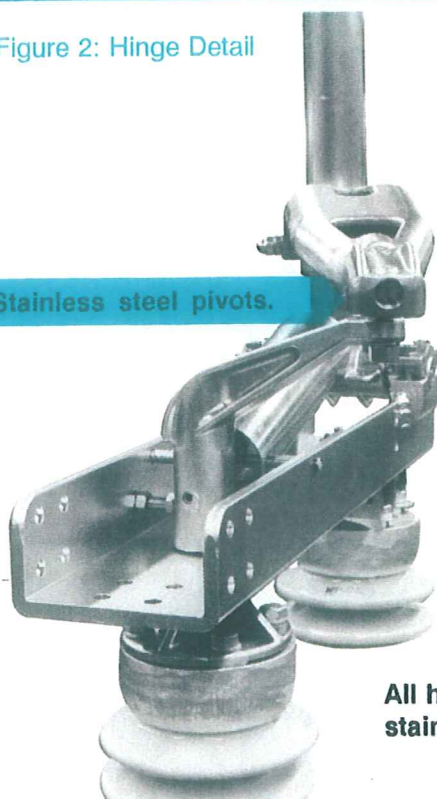
Blade mechanism over-toggle when closed. Positively locks switch closed. **Maximum circuit security.**

Three, four-hole terminal pads on each end of the switch. **Greater convenience during installation of conductors.**

Yoke pivots are stainless steel; pivot seats are tinned bronze. **Will not seize. Long term, flawless operation ensured.**

Figure 2: Hinge Detail

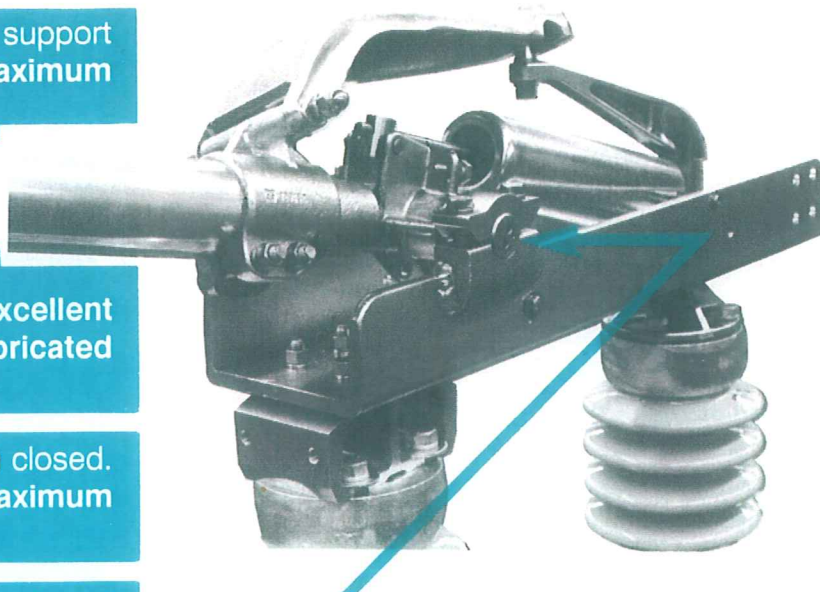
Stainless steel pivots.



All hardware is stainless steel.

CONSTRUCTION and FEATURES:

Figure 3: Hinge Detail



Hinge contacts are enclosed, lubricated and sealed. Current transfer across the hinge members--both at the pivot studs and the blade socket--is through threaded contacts, lifetime lubricated and sealed with O-rings. The external threads are silver plated bronze, the internal threads are machined copper alloy. Lubrication is provided by a silver-rich industrial lubricant.

The aluminum-to-tinned bronze interface of the hinge pivot studs is cleaned of oxidation and permanently sealed with an oxidation inhibitor.

The rotating base shaft extends through a high density polyethylene (high-moly) bushing, which is UV protected.

Ratings of 46 kV and above have counter-balance springs to keep operating efforts low. The springs are steel coil, protected with a tough, flexible coating, enclosed in a tubular aluminum housing. The spring shaft is stainless steel.

Adjustable open and closed position stops on (1) rotating insulator bearing, (2) live parts, (3) manual and/or motor operator. **Easier installation. Ensures fine-tuning of synchronous open/close operations, precise contact alignment.**

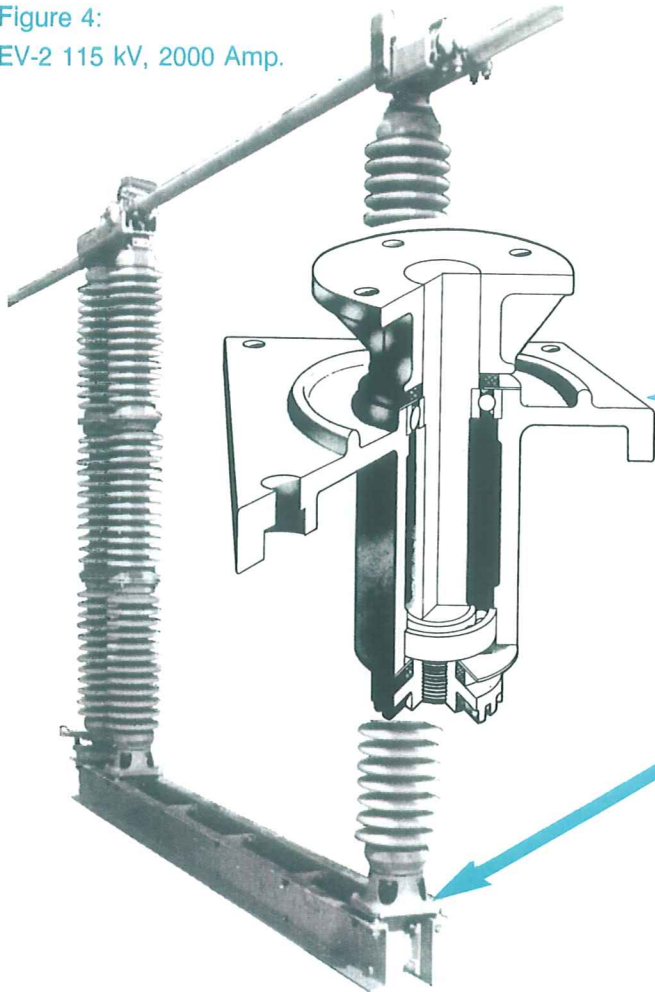
Figure 4:
EV-2 115 kV, 2000 Amp.



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Type EV-2

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No sleeve type bearings are used on the EV-2. The bearing on ratings 115 kV and above has a galvanized, cast nodular iron housing and mounting hub with a machined steel shaft. It uses double row, steel ball-and-race bearings, factory lubricated and sealed.

Switch bases through 69 kV are single channel steel. Standard bases 115 kV and above are double channel steel, with stiffeners placed near the bearing and at approximately 2' - 6" intervals. Both single and double channel bases are hot dip galvanized after fabrication.

Conventional jack screw adjustments for insulators 69 kV and above.
Quick, precise, virtually unlimited adjustment. Easy to use.

Silver-to-silver make/break jaw contacts, using silver alloys of different hardness on the moving and stationary contact surfaces. Silver current interchange ensures cool-running, optimal current flow. "Normally open" switches will carry full load after being open for extended periods. Alloys of differing hardness greatly extend contact life by minimizing wear and galling.

Reverse-loop, AMPLITACT® contacts, rotating blade.

Greater nominal contact pressure for trouble-free operation. Maximum performance during overcurrents, whose magnetic fields increase the contact pressure as the current flow increases. Reduced downtime and maintenance, greater safety to equipment and personnel. Blade rotation cleans contact surfaces with each open/close operation.

Contact fingers widely spaced.
Excellent ice breaking performance.

See blade tip construction on the following page.

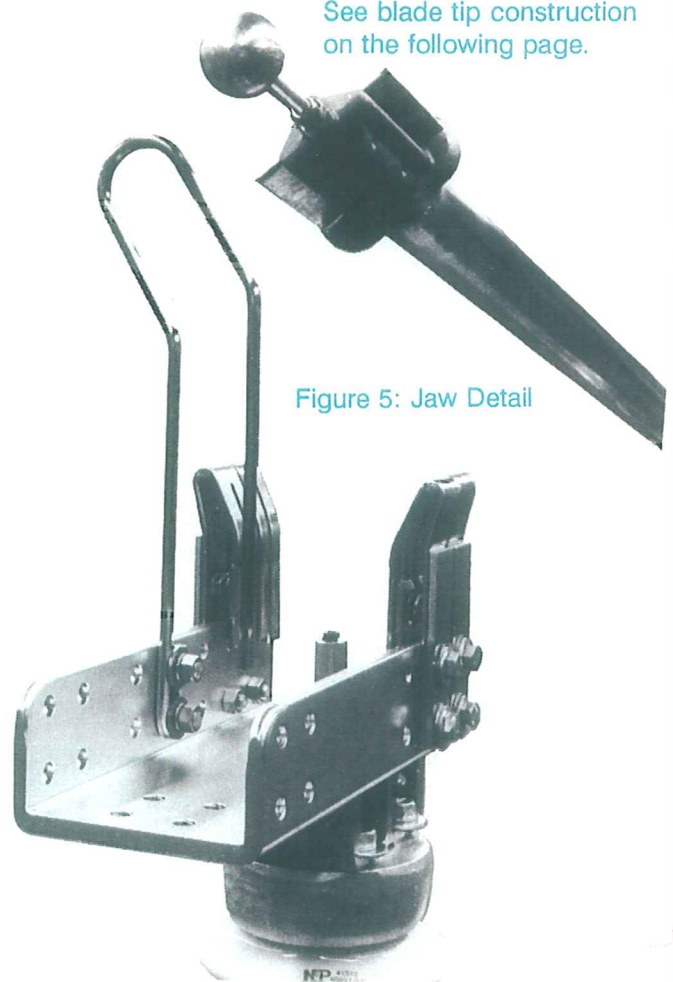


Figure 5: Jaw Detail



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Type EV-2

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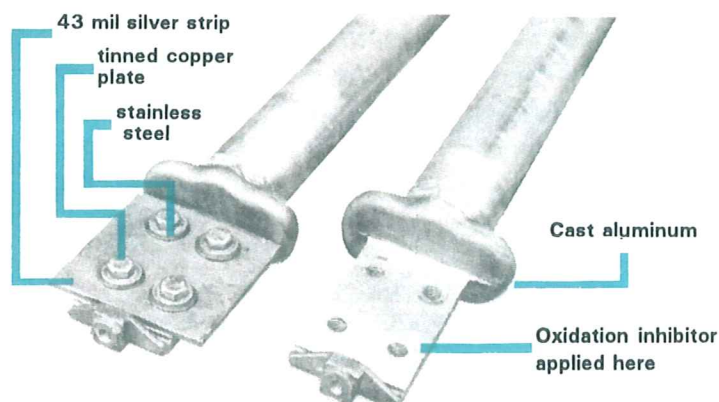


Figure 6: Blade Tip Construction

The blade tip is a machined aluminum casting, welded to the blade. A tinned copper plate is bolted to this casting, and 43 mil, dome-shaped, silver strips are brazed to its contact edges. These strips rotate into high pressure contact with dome-shaped strips brazed to the jaw contact fingers, providing self-cleaning, silver-to-silver current interchange.

All silver-to-copper attachment is by brazing, for maximum thermal performance. All tinned copper-to-aluminum interfaces are cleaned of oxidation and permanently sealed with an oxidation inhibitor.

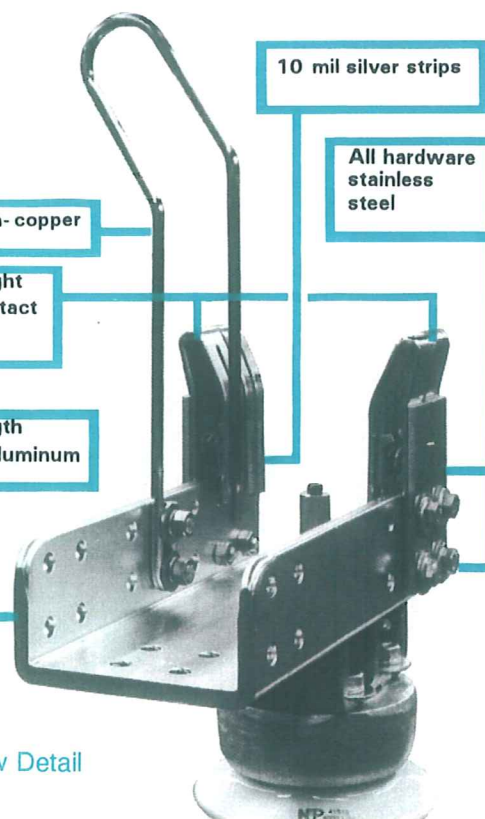


Figure 7: Jaw Detail

The jaw consists of tin plated, hard-wrought copper bars formed into the Amplitact® reverse-loop shape, to which are brazed silver strips (10 mil), which are the actual current transfer surfaces. The contact fingers are backed up by stainless steel coil springs, which supply the nominal contact pressure.

INSULATORS

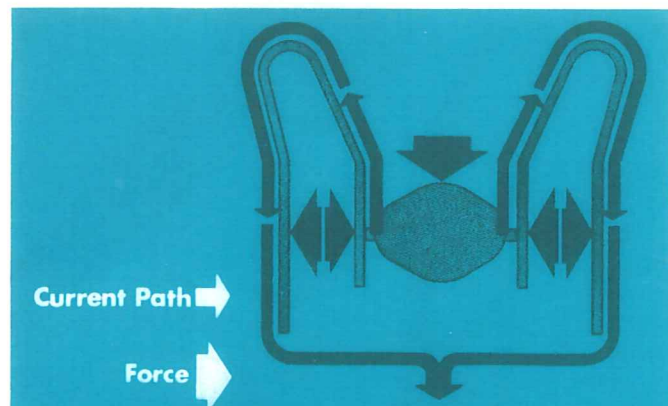
The EV-2 live parts will accommodate three- and five-inch bolt circle insulators. Rotating insulator bearings and insulator adaptors are available for three- or five-inch bolt circles. For seven-inch bolt circle applications, please refer to the factory.

TESTING

The EV-2 switch has been successfully tested to all applicable ANSI standards for air break switches, including Temperature Rise, 10-Cycle and Three-Second Short-time current, Operations Tests, Radio-Influence, Lightning Impulse, 60 Hz Withstand and 3/4" Ice.

OPERATION

The EV-2 switch can be three-phase operated by a manual swing handle in lower ratings, and by a manual gear operator or by single-motor drive in the higher ratings.



The Amplitact® Contact

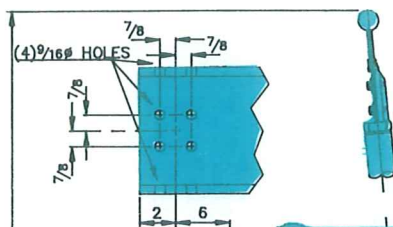
The EV-2 switch has the most trouble free contacts ever designed. A product of this company's research and testing, the Amplitacts® used on these switches are high pressure, silver-to-silver contacts that use the magnetic fields generated by fault currents to increase the contact pressure as the current increases.

The drawing shows the principle of the Amplitact®. The contact geometry carries the current flow first up, then down the contact fingers, which places opposing magnetic fields in close proximity to each other. These fields increase with the square of the current, clamping the blade tip ever tighter when high pressures are needed the most - during fault currents.

Catalog Numbers

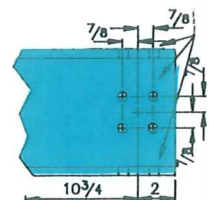
kV	BIL kV	AMP Cont.	Mom kA	TR No.	CATALOG NUMBERS	kV	BIL kV	AMP Cont.	Mom kA	TR No.	CATALOG NUMBERS
15	110	2000	100	205	EV-2152000	138	650	2000	100	288	EV-21382000
		3000	120	225	EV-2153000			3000	120	288	EV-21383000
23	150	2000	100	208	EV-2232000	161	750	2000	100	291	EV-21612000
		3000	120	227	EV-2233000			3000	120	291	EV-21613000
34	200	2000	100	210	EV-2342000	230	900	1200	61	*	EV-223012009
		3000	120	231	EV-2343000			1600	70	304	EV-223016009
46	250	2000	100	214	EV-2462000			2000	100	304	EV-223020009
		3000	120	267	EV-2463000			3000	120	304	EV-223030009
69	350	2000	100	216	EV-2692000	230	1050	1200	61	*	EV-2230120010
		3000	120	278	EV-2693000			1600	70	312	EV-2230160010
115	550	2000	100	286	EV-21152000			2000	100	312	EV-2230200010
		3000	120	286	EV-21153000			3000	120	312	EV-2230300010

Dimensions and Weights



RATING		DIMENSIONS (METERS)				WT. (1φ)
kV		A	B	C	D	KG.
15	2000 and 3000 Amp	.457	.486	1.354	.914	88
23		.533	.587	1.532	.991	105
34		.686	.689	1.786	1.219	125
46		.838	.791	2.040	1.372	150
69		1.143	1.029	2.583	1.753	208
115		1.524	1.521	3.473	2.210	390
138		1.828	1.749	4.007	2.515	438
161		2.134	1.953	4.515	2.819	499
230a		2.438	2.461	5.344	*	788
230b		2.896	2.765	6.106	*	1709

(4) 9/16" HOLES

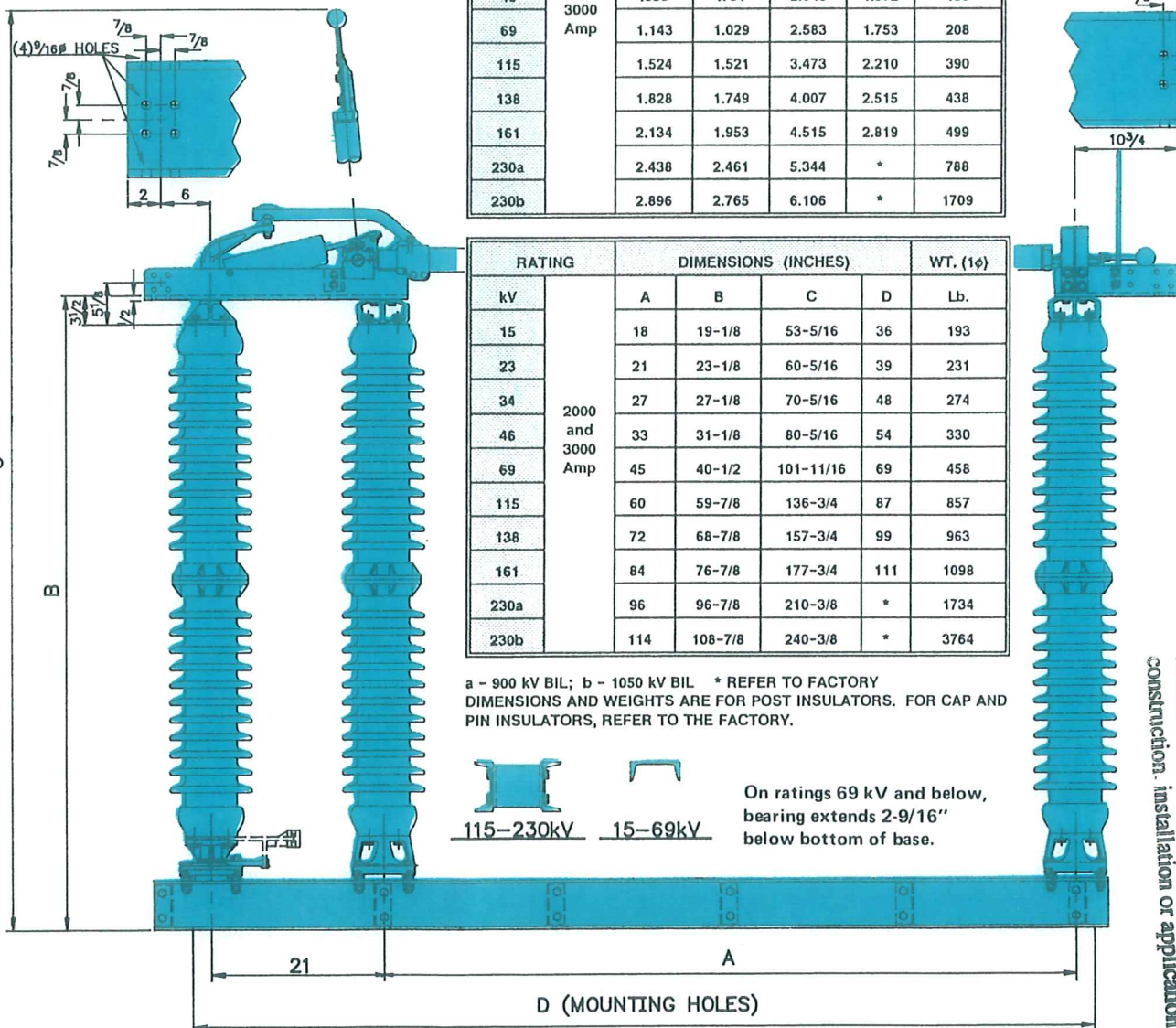


RATING		DIMENSIONS (INCHES)				WT. (1φ)
kV		A	B	C	D	Lb.
15	2000 and 3000 Amp	18	19-1/8	53-5/16	36	193
23		21	23-1/8	60-5/16	39	231
34		27	27-1/8	70-5/16	48	274
46		33	31-1/8	80-5/16	54	330
69		45	40-1/2	101-11/16	69	458
115		60	59-7/8	136-3/4	87	857
138		72	68-7/8	157-3/4	99	963
161		84	76-7/8	177-3/4	111	1098
230a		96	96-7/8	210-3/8	*	1734
230b		114	108-7/8	240-3/8	*	3764

a - 900 kV BIL; b - 1050 kV BIL * REFER TO FACTORY
DIMENSIONS AND WEIGHTS ARE FOR POST INSULATORS. FOR CAP AND PIN INSULATORS, REFER TO THE FACTORY.



On ratings 69 kV and below, bearing extends 2-9/16" below bottom of base.



The information contained herein is general in nature and is not intended for specific construction, installation or application.

ORDERING INFORMATION

To facilitate prompt response to your inquiry, please include the following information:

- Voltage
- Amperage continuous and momentary
- BIL level
- Mounting position
- Insulator bolt circle
- Type of operation (manual or motor)
- Accessories required
- Any special considerations or specifications

ACCESSORIES AVAILABLE:

- Arcing horns (Standard on upright switches, optional on vertical and underhung)
- Auxiliary switch
- Braidless grounding device
- Grounding switches; (Specify type of operation required.)
- Insulated interphase pipe
- Insulated vertical pipe
- Interlocks: electrical, mechanical
- Key interlock
- Motor operator (See SSI catalog bulletin 500, Type VM-1 Motor Operator)
- Outriggers
- Quickbreak whips
- RVB Quickbreak Device
- Terminal connectors (Specify copper or aluminum, conductor size.)
- Vacuum interrupter

For any accessories required but not listed, please contact your local Southern States representative, or the factory.

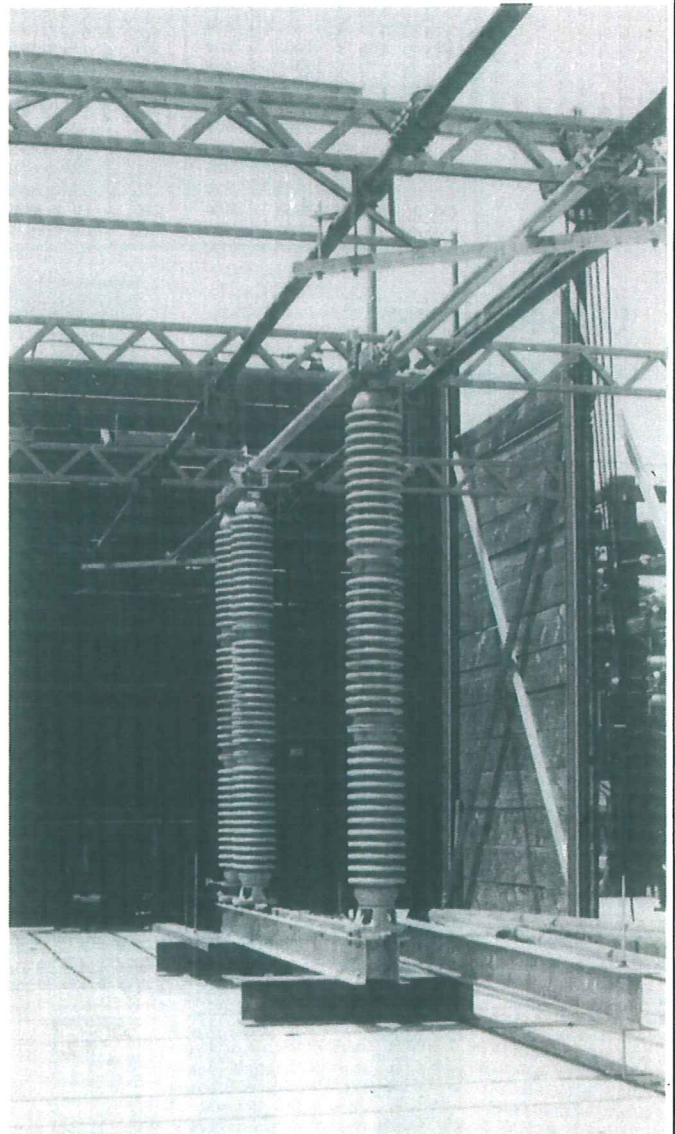


Figure 8: Type EV-2 230 kV during short-time current tests