

MORPAC
INDUSTRIES, INC.

MEMCO
POWER PRODUCTS DIVISION

Type VR-1 and VR-2
**VERTICAL REACH
SWITCHES**

*242 kV through 800 kV
4000 Ampere*



GENERAL DESIGN FEATURES

Type VR *Vertical Reach Switch*

The continued demand for high voltage and extra high voltage construction has made it necessary for the industry to re-examine conventional station design practices with a view toward a reduction in space requirements. Spiraling land costs and increasing difficulty in obtaining suitable substation sites have further emphasized the need for more compact designs, without sacrificing utility, flexibility and performance. The vertical reach switch, utilizing a vertical rather than horizontal separation, provides substation designers with a means to reduce space requirements by as much as thirty-five percent.

APPLICATION: The MEMCO vertical reach switch is of the semi-pantograph design. It may be installed either directly below and in line with the overhead bus or on the diagonal at the point of bus crossover. The terminal pads can be arranged so that the lower bus may extend in any of four directions; in line with switch or perpendicular to switch.

The upper contact of the type VR switch is supported by the user's overhead bus. Close cooperation between switch manufacturer and substation designer, in the early stages of design, is highly desirable. The switch is available in two (2) models; the VR-1 for application at 550 kV through 800 kV, and VR-2 for application at 242 kV through 362 kV.

VR-1 FEATURES

• Current Carrying Parts

The live parts utilize high strength, high conductivity aluminum tubing and castings. Transition to copper is made in the moving contact areas. At the point of transition, copper is hot dip tinned and bolted to aluminum with stainless steel bolts. The joint is treated with oxide inhibitor and effectively sealed to prevent the entrance of moisture.

All bearings and counterbalancing springs are isolated from the main current path by insulating bushings.

• Upper Contact

The VR-1 switch at 550 kV is adaptable for either fixed or strain bus; at 800 kV its application is limited to rigid bus. The following table shows the maximum contact deviation under which the switch has been designed to operate.

The upper contact bar consists of a formed copper bar with a silver overlay along each of the contact surfaces. The contact bar is furnished with all necessary supporting members for attachment to the overhead bus.

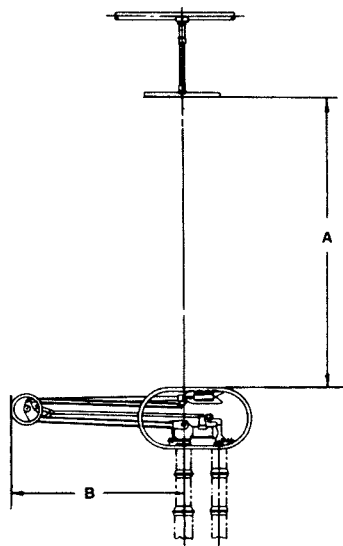
The switch jaw employs a multiple-contact reverse loop arrangement which provides uniform contact pressure throughout the plus-or-minus vertical allowable deviation shown below. This contact arrangement takes advantage of the magnetic forces found under short circuit conditions resulting in increased contact pressure through the "blow on" effect.

• Switch Operation

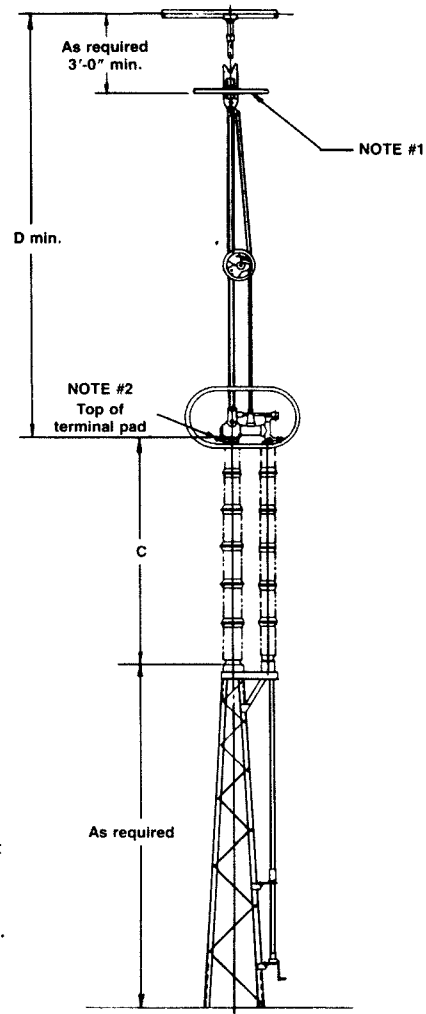
In the open position, the blade sections are folded upon themselves, so that the maximum blade extension is slightly greater than half the open gap dimension. Closure of the switch, created by rotation of the insulator by the operating pipe, causes the blade to unfold in such a manner that the jaws rise in a nearly straight vertical path, opening wide as they approach the upper contact. Further movement causes the blade sections to assume a straight-line vertical relationship, with the jaws clamped firmly on the contact bar. The blade is counterbalanced in all positions so that only friction forces must be overcome when opening or closing the switch.

• Operators

The switch is available for either single pole manual operation or three pole power operation.



- NOTES:**
 1 — Switch may be oriented at any angle with respect to upper bus.
 2 — Terminal may be located as shown, or at right angles to either side.



TYPE VR-1

Insul. Type	RATINGS				CATALOG NUMBER	APPROXIMATE DIMENSIONS (Refer to Factory for Certified Prints)			
	Voltage Rating kV		Current Rating AMPS			A	B	C	D
	Max.	BIL	Cont.	Momen- tary					
Station Post	550	1550	3000	100,000	1550VR1-30	13'6"	9'6"	11'0"	19'10"
	550	1800	3000	100,000	1800VR1-30	16'0"	10'6"	13'0"	22'4"
	800	2050	3000	100,000	2050VR1-30	19'6"	12'0"	15'9"	25'10"

For 4000 Amp, change suffix on catalog number to -40.

VR-2 FEATURES

• Current Carrying Parts

The blades are made of high strength, high conductivity parallel aluminum bus bars which are trussed to form a rigid unit. Transition to copper is made in the moving contact areas. At the point of transition, copper is hot dip tinned and bolted to aluminum with stainless steel bolts. The joint is treated with oxide inhibitor and effectively sealed to prevent the entrance of moisture. All bearings and springs are isolated from the main current path by insulating bushings.

• Upper Contact

The upper contact consists of a copper plate located within a bell shaped housing which shields the contact surface from ice formation. The complete assembly is rigidly fixed to the upper bus.

The blade contact consists of multiple reverse loop copper alloy fingers, with silver overlay at the contact point. When the switch is in the open position the contact fingers are arranged to touch the opposing contacts. During closure of the switch the contact fingers deflect as they slide on the upper contact plate.

The reverse loop design takes advantage of magnetic forces found under short circuit conditions to increase the contact pressure through the "blow on" effect.

• Switch Operation

The blade assembly is raised and lowered by the direct action of a reciprocating, rather than rotating, control insulator. The weight of this insulator assembly partially balances the weight of the blade - the remainder is balanced by a counter-balance assembly located at the base of the insulator stack. A single column insulator furnishes the main support, and the entire assembly is designed for mounting on a single column structure.

The blade weight is slightly underbalanced so that the switch has no tendency to move upward on its own. A downward pull on the control insulator stack will cause the blade to rise and unfold in such a manner that the blade and contacts follow a nearly straight vertical path when approaching the upper contact. The contact fingers are guided onto the flat copper contact plate by guide horns on the blade and slide approximately 4" onto the plate. Since the actual pivot point at the center of the blade ("elbow") has passed over-center, there is no force tending to open the switch.

• Operators

The switch is available for either single pole manual operation, three pole manual operation, or three pole power operation.

VR-2

ALLOWABLE DEVIATION OF UPPER CONTACT	
Relationship with	Fixed Bus
Contact Plate	242 kV - 362 k V
Vertical	$\pm 3''$
Parallel	$\pm 4''$
Perpendicular	$\pm 4''$

ACCESSORIES

• Switch Support Structures

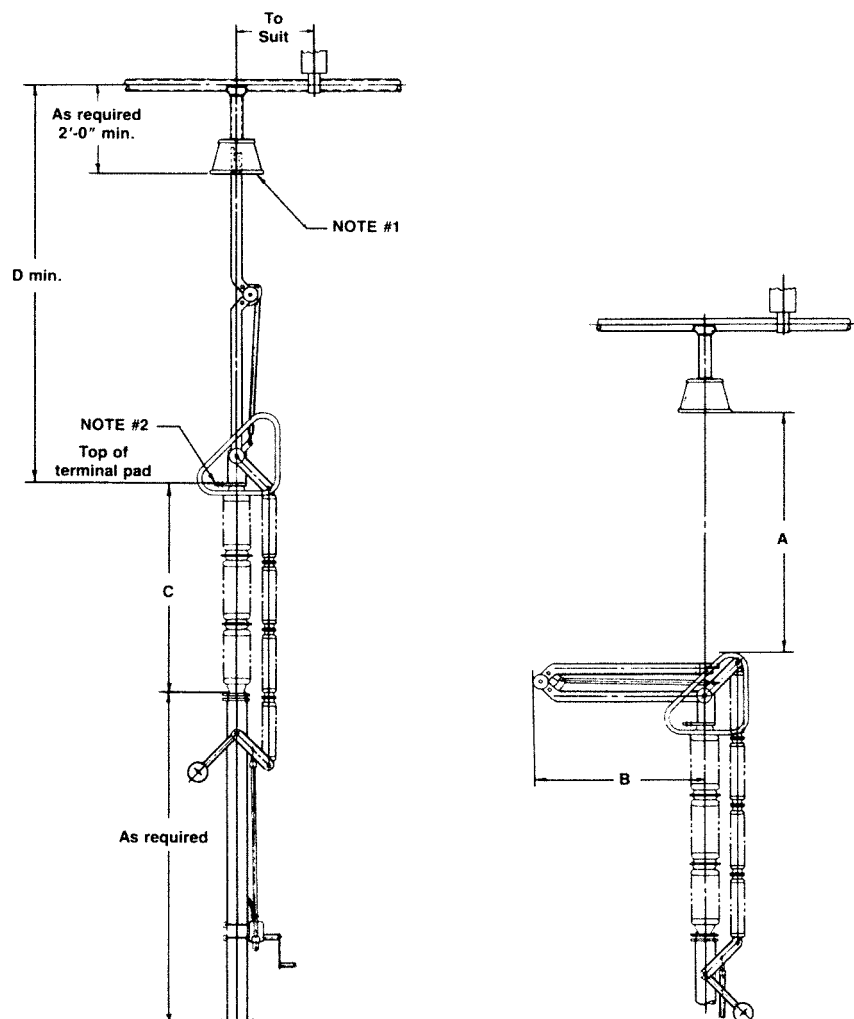
Both the VR-1 and VR-2 are available with or without supporting structure. Supporting structures can be of the tubular, tapered polygon, wide flange or lattice design.

• Ground Switches

Ground switch attachments of the same or lower momentary ratings can be installed as required.

• Terminal Connectors & Outriggers

Terminal connectors and outriggers can be furnished to meet any particular requirement.



NOTES:

- 1 — Switch may be oriented at any angle with respect to upper bus.
- 2 — Terminal may be located as shown, or at right angles to either side. Straight-through connection also available.

TYPE VR-2

Insul. Type	RATINGS				CATALOG NUMBER	APPROXIMATE DIMENSIONS (Refer to Factory for Certified Prints)			
	Voltage Rating kV		Current Rating AMPS			A	B	C	D
	Max.	BIL	Cont.	Momen- tary					
Station Post	242	900	3000	100,000	900VR2-30	7'3"	4'10"	6'9"	11'10"
	242	1050	3000	100,000	1050VR2-30	8'11"	5'8"	7'9"	13'6"
	362	1050	3000	100,000	1050VR2-30	8'11"	5'8"	7'9"	13'6"
	362	1300	3000	100,000	1300VR2-30	10'3"	6'4"	8'11"	14'10"