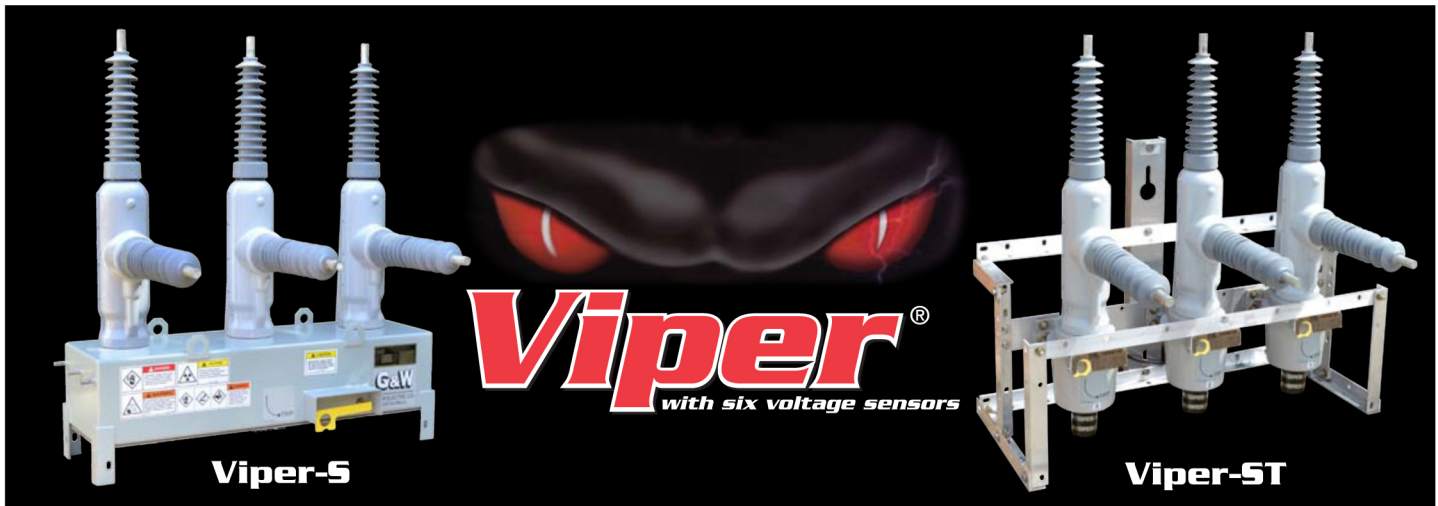


Viper Reclosers with Six Integral Voltage Sensors



G&W Viper-S and Viper-ST three phase reclosers now have the option of incorporating six integral capacitive voltage sensors to allow for voltage measurement on both the line and load sides of the device without the need for costly and heavy potential transformers. This makes G&W Viper reclosers with Six Voltage Sensors (6VS) ideal for distribution automation applications and network reconfiguration schemes through 38kV.

APPLICATIONS

Open Bus-Tie Breaker - Either substation mounted or overhead, where the presence or loss of voltage is used to trigger the tie breaker to close and restore power.

FDIR - Fault Detection Isolation and Restoration where communications are used between recloser controls to operate and restore power on a loop scheme.

Loss of Communication - In the event there is a loss of communication and six voltages are being monitored, the recloser control can be programmed to deploy FDIR without the need for communications, providing the highest level of reliability.

Automatic Transfer - Monitoring two independent source voltages. 6VS permits the control to sense loss of voltage on the primary source and verify a stable voltage reading on the secondary source which assures a proper, safe transfer even if communications is lost.

Distributed Generation - Where the electric grid is synchronized with backup generators. Having six voltage sensors allows the recloser control to monitor phase angle and voltage amplitude of each phase to close the recloser safely when connecting the generator to the grid.

OPERATION

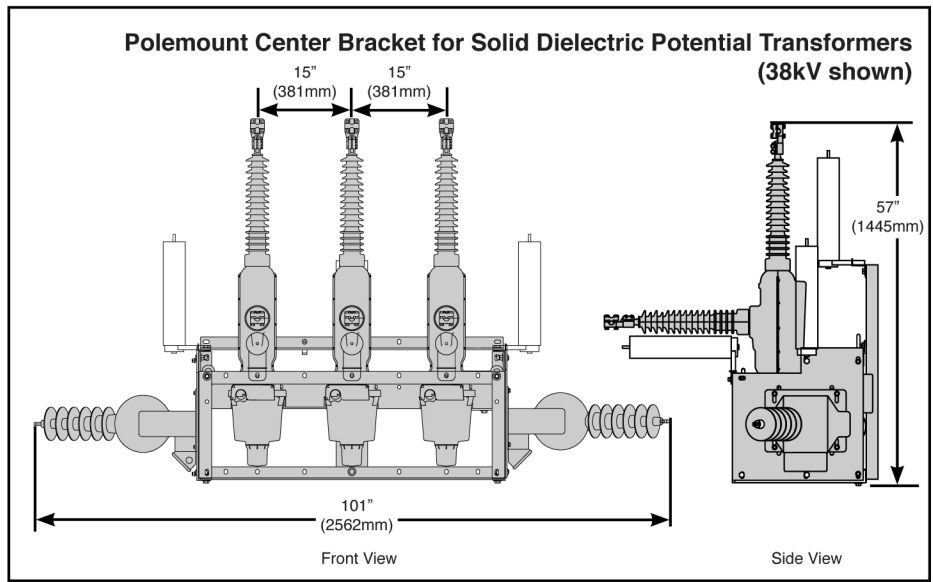
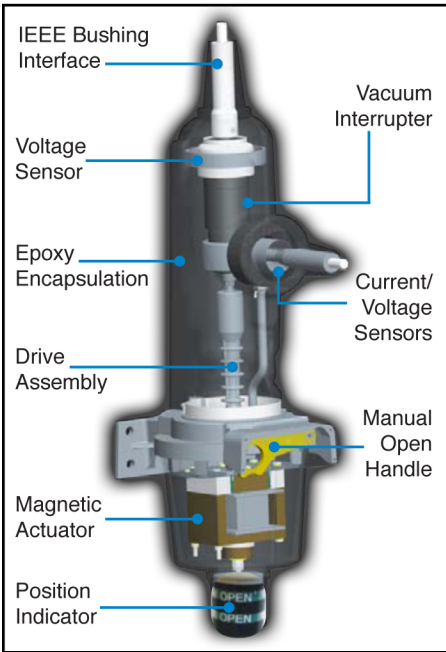
Technology - 6VS is accomplished through capacitive voltage dividers embedded in the epoxy insulation of each phase of the recloser. The sensors have a Low Energy Analog (LEA) output. The capacitive voltage sensors are isolated from the grid and are able to read phase angle and voltage amplitude with a relatively high accuracy. The sensors do not provide power to the recloser control. External sources such as PTs can be supplied to power the relay.

Accuracy - The voltage sensors have been tested in a third party laboratory. Voltage sensing amplitude accuracy is +/- 2 % when tested as a system from -10°C (14°F) to +45°C (113°F). The VS accuracy is +/-4% from -40°C (-40°F) to +65°C (149°F). The phase angle accuracy is +/-1° throughout the full temperature range. Current monitoring is provided through integral multi-ratio current transformers encapsulated within the module of each phase. Ratios available are 1000:1 or 500:1. Inputs to the control are field changeable. CT accuracy is +/- 1%.

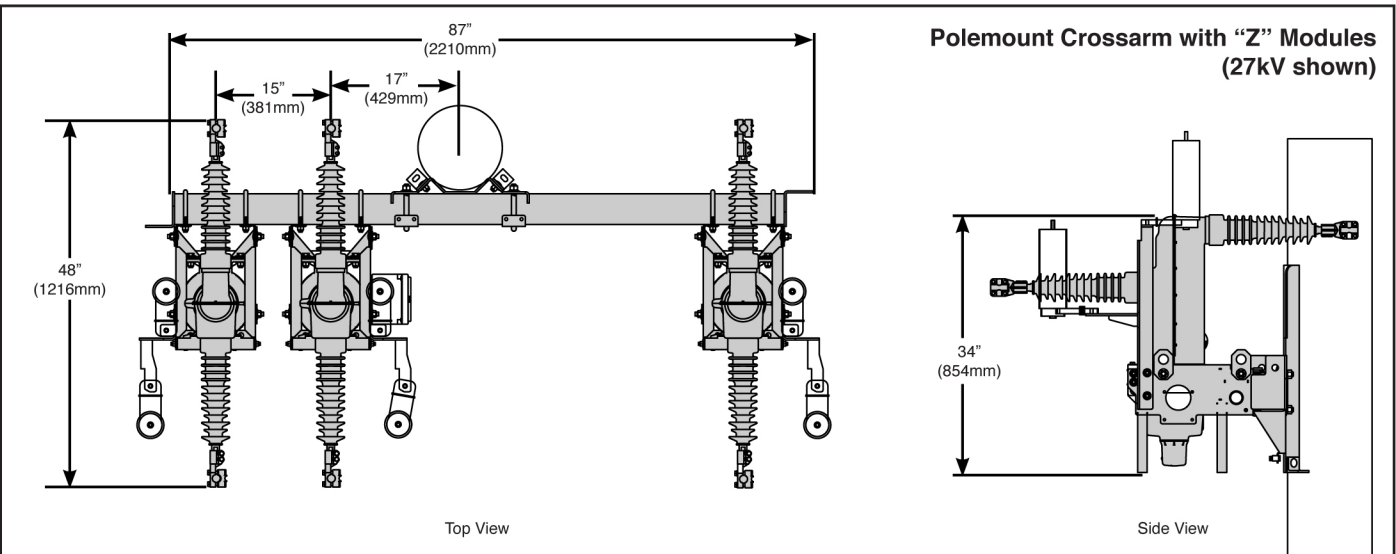
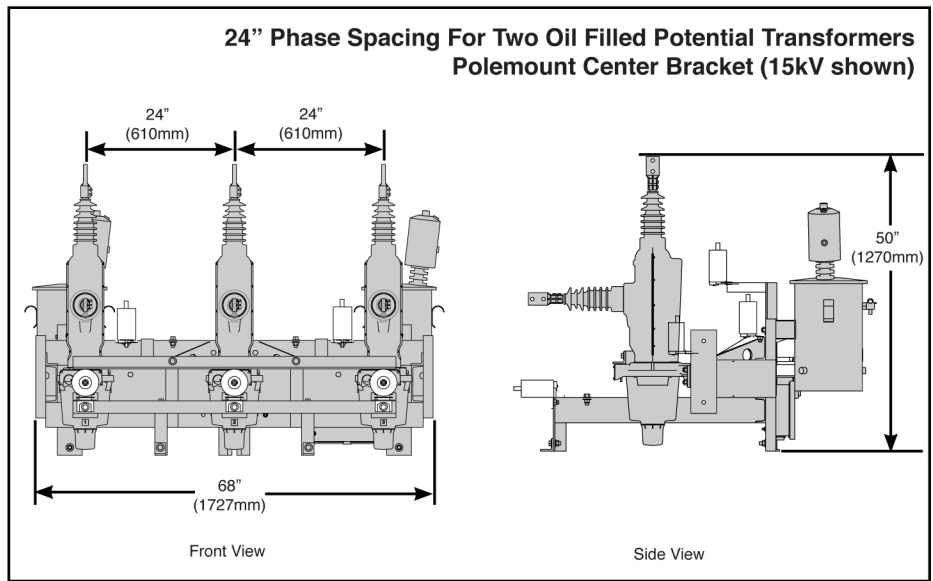
Configurations – The Viper-S and Viper-ST with 6 LEA VS are available with both L or Z modules. This allows the Vipers to be used for pole-top, substation or padmount applications. The padmount configuration is only available with Z modules and 38 kV IEEE interface regardless of the voltage level of the application. 38 kV class elbows are required for connections to the Viper.

Viper-[®]ST

with six voltage sensors



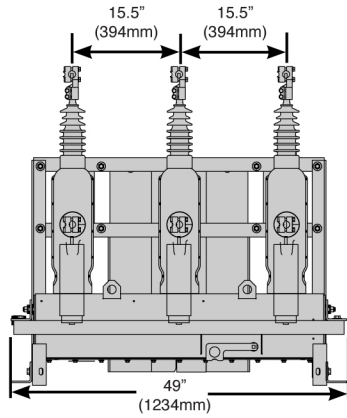
Viper-ST 32-Pin Connector & Junction Box



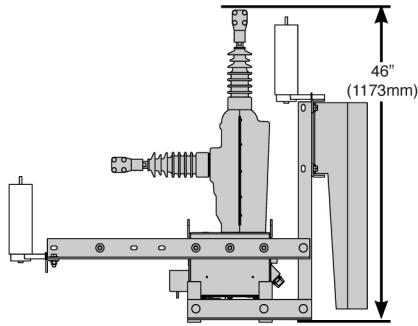
Viper[®]-S

with six voltage sensors

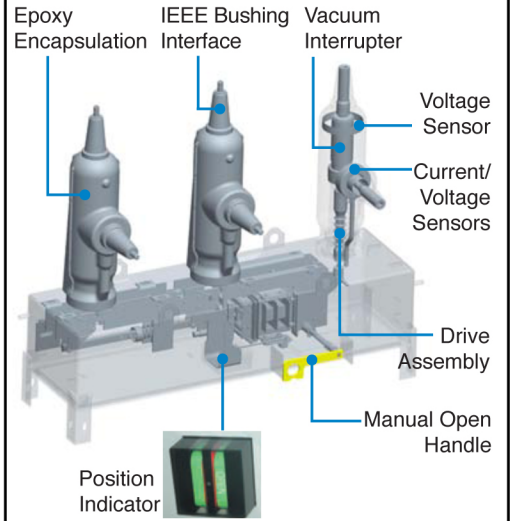
Standard Polemount Center Bracket (15kV shown)



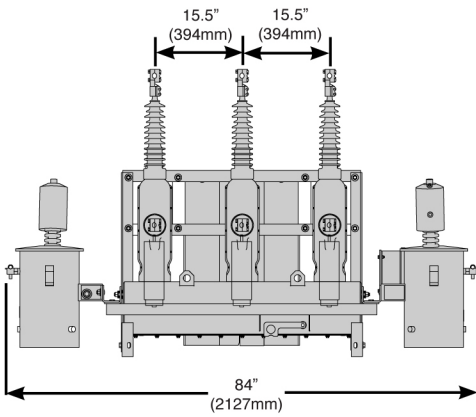
Front View



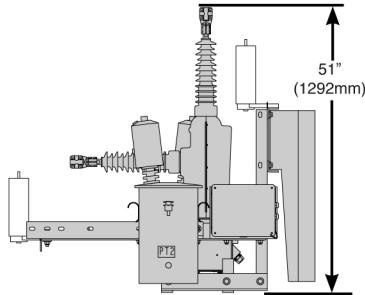
Side View



Polemount Center Bracket with Oil Filled Potential Transformers (27kV shown)



Front View

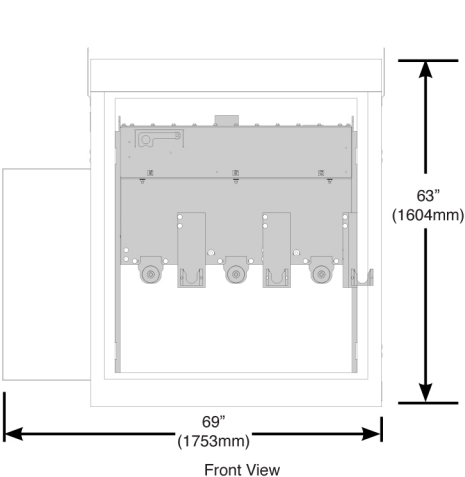


Side View

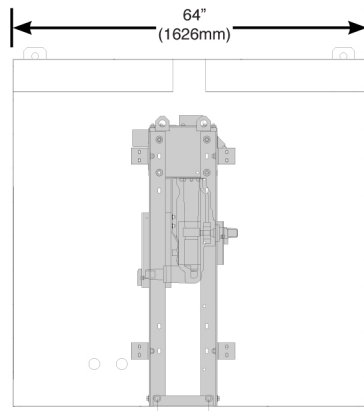


Viper-S 19-pin control power connector and 8-pin 6VS LEA quick connector

Padmount with "Z" Modules and 38kV IEEE interfaces (15kV shown)

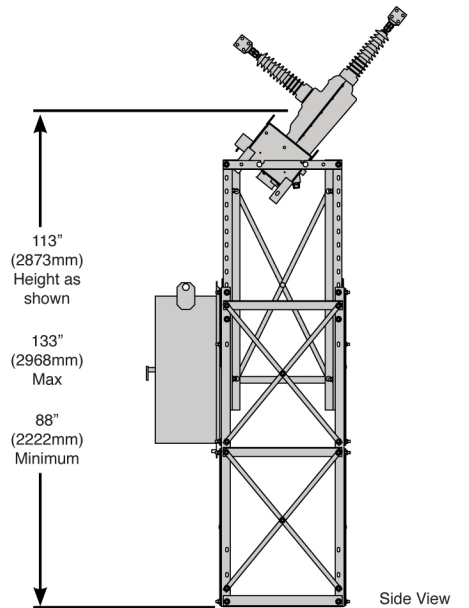


Front View



Side View

45° Substation Mount



FEATURES

Operator Safety - Vacuum interrupters are sealed within solid dielectric insulation providing fully shielded modules. The module housing, being at ground potential, provides additional safety. A hookstick operable, manual trip and lockout handle prohibits operation either from the control or remotely. A mechanical blocking device further assures against accidental close through the handle. An open and closed contact indicator verifies contact position. Contact status and lock-out condition can also be verified at the control. The maximum input to the SEL-651R is limited to 5 VAC, the 6 LEA VS feature is safe to the operator.

Reliability - Having both the current and voltage sensors embedded into the epoxy module protects them from environmental damage or contamination and makes for a cleaner, and less cluttered installation. Other manufacturers must use expensive, external add-on sensors or potential transformers to accomplish the same functionality which can significantly increase installation costs and result in a much more congested appearance, not to mention additional equipment to maintain.

Compact, Lightweight Construction - Built-in sensors eliminate the need for heavy, add-on potential transformers or other sensors significantly reducing the overall weight of the installation. The Viper-ST has one single control cable for all voltage, current, breaker status and trip/close information. The Viper-S comes with a 19-pin interface and an 8-pin cable for the voltage sensors.

VS Ratios - The 6 LEA VS measures the Line-to-Ground voltage. The Viper-ST and Viper-S come with two different voltage ratio boards depending on the application. The standard 10,000:1 ratio will allow voltage monitoring from a minimum of 3.3 kV to a maximum of 50kV L-G. While the optional 2,500:1 ratio will read voltages in a range from 825 V up to 12.5 kV L-G for applications below 15 kV.

| Legend | |
|----------------|---|
| Standard | S |
| Option | O |
| Not Applicable | - |

6VS LEA FEATURES COMPARISON CHART

| Feature | Viper-S | Viper-ST |
|--|---------|----------|
| Basic Features | | |
| 6VS LEA | S | S |
| Mechanically Ganged | S | - |
| Triple Option | - | S |
| Trip / Lock Out Handle | S | S |
| Mechanical Block | S | S |
| Removable Silicone Insulators | S | S |
| Magnetic Actuator | S | S |
| Trip Spring | S | S |
| Grounded Solid Dielectric Modules | S | S |
| Polemount Frame | S | S |
| Integrated 1000/500: 1 CTs | S | S |
| Dead-line Operation | S | S |
| "L" Shaped Modules | S | S |
| 32-pin Interface | - | S |
| 19-pin Interface | S | - |
| 10,000:1 ratio | S | S |
| Other Features and Options | | |
| Six 0-144 VAC Analog VS | O | - |
| 14-pin Interface without dead-line operation | O | - |
| "Z" Shaped Modules | O | O |
| Padmount Application | O | O |
| Site-Ready Design | O | O |
| Substation Frames | O | O |
| External CTs | O | O |
| Customized Frames | O | O |
| 2,500:1 ratio | O | O |
| Control Packages | | |
| SEL-651R | S | S |
| Other Custom Relay Solutions | O | - |