

# G&W

Engineered to order. Built to last.

## Viper<sup>®</sup>-SP

SOLID DIELECTRIC, SINGLE PHASE RECLOSER



# Viper-SP

**Viper-SP** solid dielectric, single phase recloser combines the time-proven reliability of electronically controlled, vacuum fault interrupters with the maintenance-free benefits of a solid dielectric insulated device. The Viper-SP is designed for automatic or manual operation providing overcurrent protection for single phase systems through 38kV maximum, 800A continuous current and 12.5kA symmetrical interrupting.

## FEATURES

**Reliable Performance** - The Viper-SP recloser utilizes G&W's time-proven epoxy polymer system to fully encapsulate the vacuum interrupters. This system provides excellent insulation properties while providing fully shielded, void-free construction. All modules are UV protected and 100% factory tested for partial discharge.

The Viper-SP recloser utilizes the latest in magnetic actuator technology. The interrupter and actuator assembly has been tested for over 10,000 mechanical operations to assure a long and maintenance-free operating life.

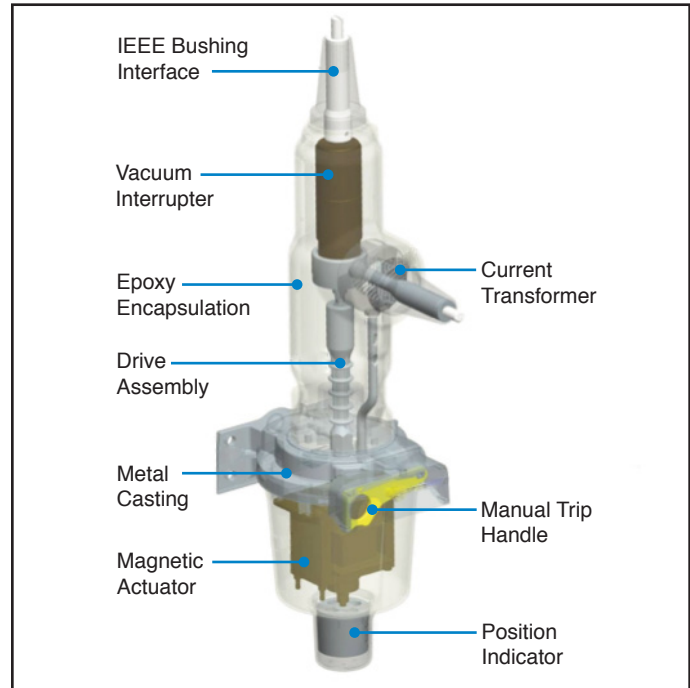
**Operator Safety** - Vacuum interrupters are sealed within solid dielectric epoxy providing dead tank construction. A hookstick operable, manual trip handle prohibits accidental operation through the control or remote operation. A mechanical blocking device further assures against accidental close through the handle. The handle is operable from ground level. An open and close contact indicator verifies contact position. Contact status and lockout condition can also be verified at the control.

**Ease of Operation** -The Viper-SP is compatible with the Schweitzer SEL-351RS Kestrel control.

**Maintenance-free** - Encapsulation in solid dielectric epoxy provides a maintenance-free installation. Electronic equipment associated with the operation of the magnetic actuator is located in the control. The Kestrel is able to monitor the battery status and contact wear to schedule for preventive end of life replacement.

**Ease of Installation** - The Viper-SP is lightweight and compact. For polemount applications, site-ready designs provide mounting brackets and lightning arresters pre-assembled to the recloser, significantly reducing installation time. Voltage transformers and mounting provisions are also provided. One single control cable brings all current, breaker status and trip/close information from the recloser to the control.

**Application Flexibility** - Units are designed for overhead, substation and padmount applications. Pole mounted units can be equipped with either a horizontal or vertical top insulator. Removable silicone insulators are standard for overhead applications. This feature permits easy field replacement if an insulator is damaged. Higher external BIL rated insulators



▲ Isometric view of the Viper-SP without insulators.

can also be used in high pollution areas and can be retrofitted if necessary.

**Smart Grid / Lazer Automation Solutions** - The Viper-SP is automation ready, simplifying conversion for any future automation requirements. A multi-ratio current transformer is encapsulated within the module. A standard 1000/500:1 dual ratio current transformer is provided. A 400/200:1 dual ratio CT option is also available for lower current detection. Inputs to the control are field changeable. CT accuracy is +/-1%. External voltage and current sensors can also be used depending on application requirements.

Complete Lazer® automation packages are available offering a pre-engineered solution for applications requiring intelligent automatic switching and power restoration. Automated packages feature one or more protective relays equipped with all communication and logic accessories for a plug and play system that can be quickly implemented.

## DEAD-LINE OPERATION

The unique design of the Viper-SP magnetic actuator system provides for local and remote operation of the recloser in the event that the AC source power is lost or interrupted. Dead-Line operation allows the unit to operate through the batteries located in the control.

## OPERATION PRINCIPLE

The Viper-SP recloser monitors the circuit using an internal multi-ratio current transformer. The system is powered by an external 120/240 VAC or 125 VDC source. Recloser sequence operations, tripping and overcurrent sensing is an

automatic function of the electronic control. The magnetic actuator uses a permanent magnet to hold a solenoid plunger in the closed position while maintaining a charge on the opening spring. Trip/close operation is simply accomplished by energizing the trip coil which generates a magnetic flux in the opposite direction and releases the trip spring. The trip spring guarantees an open gap of the contacts inside the vacuum interrupter resulting in a fail-safe operation.

## MANUAL TRIP OPERATION

Operation of the hookstick operable manual trip handle trips and locks out the recloser. A contact position indicator is provided indicating open or close status of the contacts. Module contact status is also displayed at the control. Operation of the manual trip handle disables any local or remote closing operation until the handle is reset. A mechanical blocking device further assures against accidental close when the manual trip handle is pulled. The handle is operable from ground level. Once reset, the recloser can be closed using the control.

## CONTROL CAPABILITIES

The Viper-SP recloser works with Schweitzer's SEL-351RS Kestrel control. Typical features of the Kestrel include:

- Choose from two economical, low maintenance aluminum cabinet options: a swing-up door and a conventional swing panel enclosure.
- Improve substation automation and control with the included IEC 61850 communication protocol.
- View basic relay information on a connected Ethernet network with the built-in web server.
- Reduce wiring and supply accurate time throughout an Ethernet network with Simple Network Time Protocol (SNTP).
- Transfer such information as IEC 61850 configuration files and settings to and from the relay faster with File Transfer Protocol (FTP).
- Improve power quality monitoring with root-mean-square (rms) and harmonic metering up to the 16th harmonic.
- Simplify local connection and speed communication with an optional, front-panel USB port.
- Integrate with new and existing networks via standard DNP3.0 and Modbus® protocols.
- Increase communications reliability with a built-in Ethernet switch and failover mode for dual Ethernet.
- Identify phasing of single phase reclosers with standard IEEE C37.118 synchrophasors.

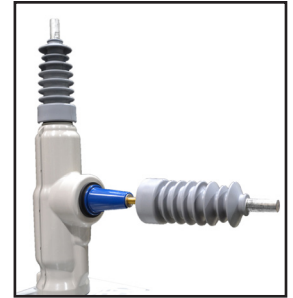
## CATALOG NUMBERS

Voltage Class	Catalog Number
15.5kV	VIP178ER-12-SP
27kV	VIP188ER-12-SP
38kV	VIP198ER-12-SP

Approximate weight = 100lbs. (45kg)



▲ Manual trip handle prohibits electronic closing operation through the control.



▲ Silicone insulators are removable permitting easy replacement in the field if damaged or if higher external BIL level is required.



▲ Schweitzer's SEL-351RS Kestrel front access control with conventional swing panel enclosure. Swing-up style door also available.

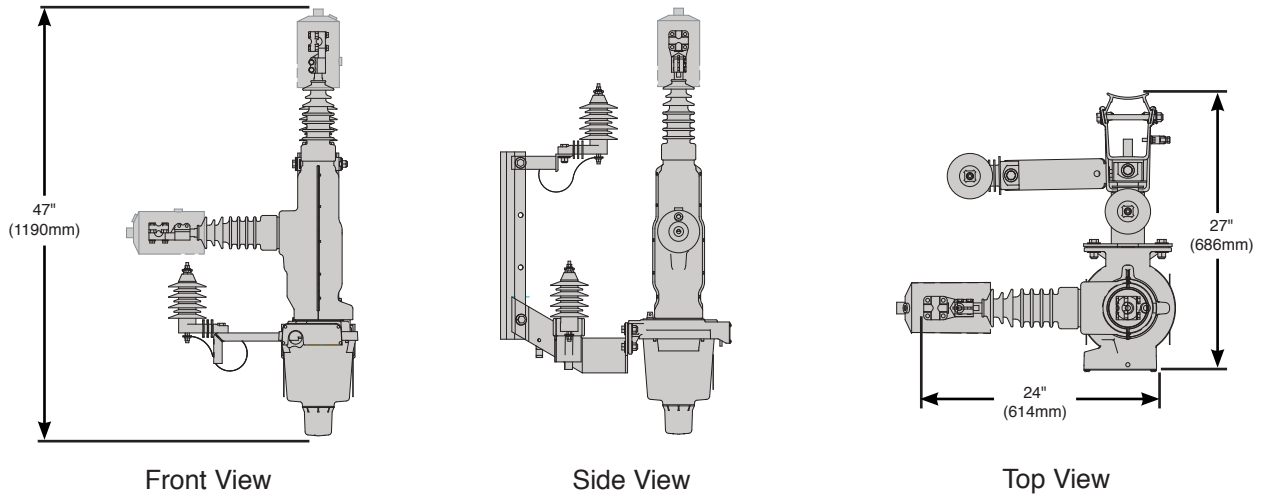


▲ 10-pin control cable with twist lock connector permits easy field installation.

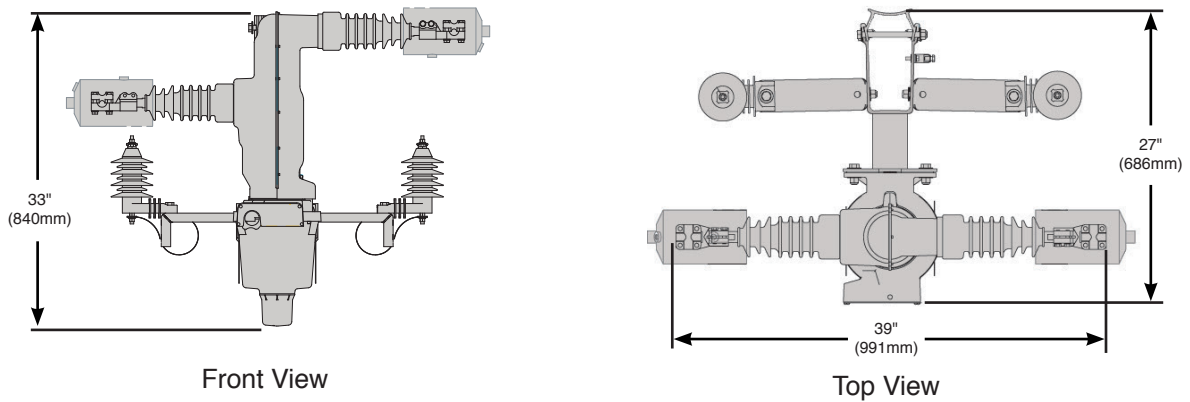
## CONTROL CONNECTIONS

A twist lock style connector makes the cable connection between the control and the recloser. AC power provides the normal power supply to the control.

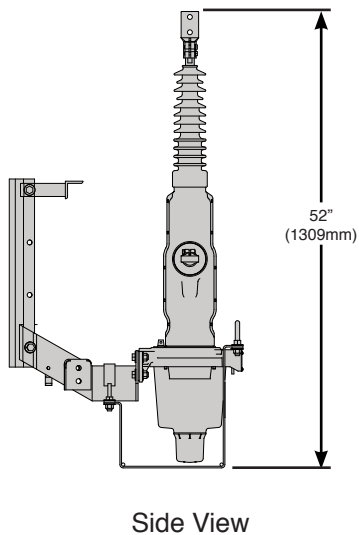
## Standard Polemount Bracket for "L" Insulator Configuration (15kV drawing shown)\*



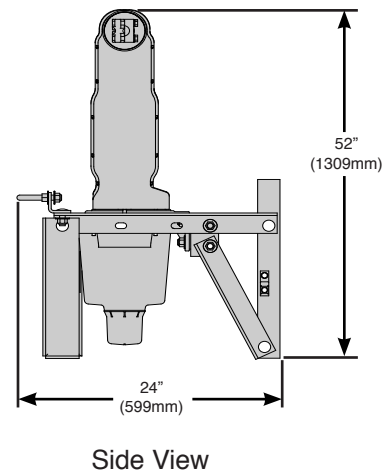
## Polemount Bracket for Horizontal Insulator Configuration (15kV drawing shown)\*



## Free-standing Frame (27kV drawing shown)\* Provides easier handling during storage and installation.



## Optional Substation or polemount frame with "Z" modules (27kV drawing shown)\*



## ORIENTATION MOUNTING BRACKET



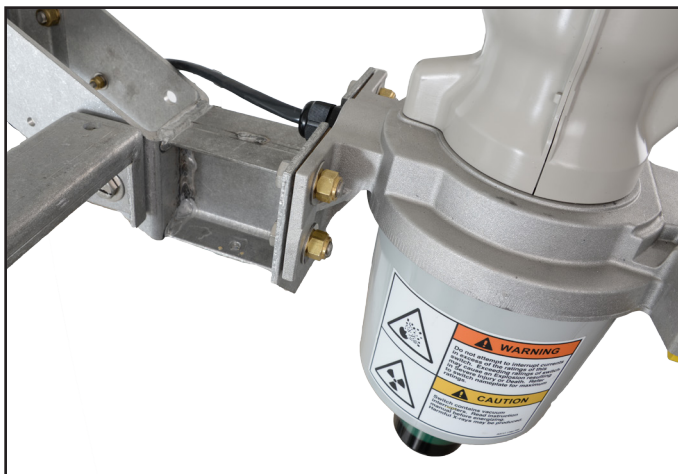
▲ Right mount



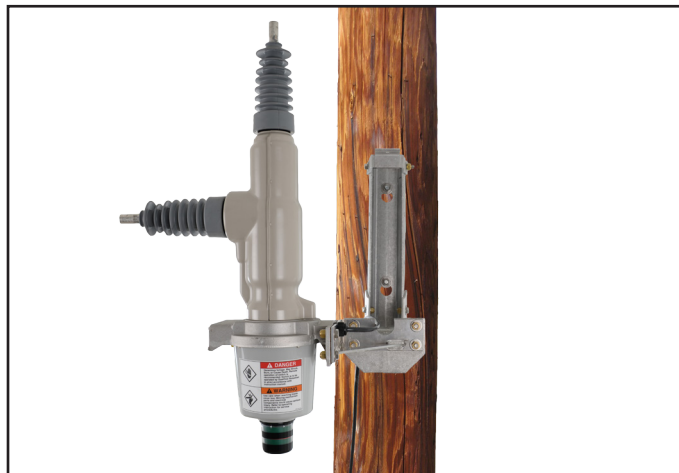
▲ Orientation mounting bracket inserted between Viper-SP module and frame for a right bushing orientation.



▲ Perpendicular center mount



▲ Orientation mounting bracket is not required for center bushing orientation.



▲ Left mount



▲ Orientation mounting bracket for a left bushing orientation.

# Typical Specifications

## A. GENERAL

This specification covers the requirements for an electronically controlled, solid dielectric vacuum recloser for use on single phase distribution systems through 38kV. Manufactured by G&W Electric Company, designated as Viper-SP solid dielectric recloser. Configuration options for the recloser shall be

**(check one):**

- Polemount
- Substation, 90°
- Substation, 45°
- Padmount, dead-front

The manufacturer shall be ISO 9001:2008 and ISO 14001:2004 certified.

## B. DESIGN RATINGS AND STANDARDS

Reclosers shall be designed, tested and built per IEEE C37.60 latest version. Certified test reports shall be provided. The operating temperature range shall be -60°C to +65°C. The recloser shall be rated:

**(select column):**

Voltage Class (kV)	15	25	35
Max System Voltage (kV)	15.5	27*	38
BIL (kV)	110	125	150
Continuous Current (A)	800A**	800A**	800
8 Hr. Overload, at 20° C	960	960	960
Interrupting Rating RMS (kA)	12.5	12.5	12.5
Making Current, RMS, asym, kA	20	20	20
Peak, asym (kA)	32	32	32
Short Circuit Current, kA sym	12.5	12.5	12.5
60Hz Withstand, kV rms Dry, 1 min	50	60	70
60Hz Withstand, kV rms Wet, 10 sec	45	50	60
Mechanical Operations	10K	10K	10K

\*Can be applied on 29.3kV systems

\*\*Consult factory for higher continuous current up to 1000A.

## C. RECLOSER CONSTRUCTION

### C1: Mechanism Enclosure

The magnetic actuator and corresponding linkage assembly shall be housed within a high impact, UV stable, air insulated, polycarbonate enclosure. A contact position indicator, air vent and lifting provisions shall be provided.

### C2. Operating Mechanism

The operating mechanism shall utilize a magnetic actuator for opening and closing of the vacuum interrupters. The magnetic actuator must include a fail-safe trip spring to ensure the recloser will fully open 100% of the time. Likewise, the trip spring will maintain the recloser on the open position if it can not perform a full close operation. The magnetic actuator shall be powered by capacitor located in the control enclosure. A mechanical block shall be provided to prevent accidental close signals to operate the recloser when the trip and lock out handle is engaged. Vacuum interrupter contact position indication shall be accomplished using green (open) and red (closed) indicators located on the bottom of each mechanism enclosure and through LEDs inside the control.

### C3. Vacuum Interrupter

Interruption of the fault or load current shall be accomplished through a vacuum interrupter located inside the solid dielectric module.

### C4. Solid Dielectric Module

The solid dielectric module shall utilize a time-proven solid dielectric epoxy insulation to fully encapsulate the vacuum interrupter. The module shall be fully shielded and incorporate a high impact polycarbonate, track resistant, UV stable covering providing dead tank construction. Module shall be molded with one (1) source side and one (1) load side, IEEE apparatus bushing interface.

### C5. Bushings

Cable bushings shall be (check one):

For Overhead/substation design:

- Air insulated, removable silicone insulators over an IEEE apparatus bushing interface

For Padmount design:

- 600A apparatus bushing
- 200A deep well bushing

## D. OPERATION

Monitoring of the circuit shall be accomplished using an internal multi-ratio current transformer. The unit shall be powered by an external 120/240 VAC or 125 VDC source. In the event AC power is lost, the unit shall have trip/close operating capabilities through the batteries located in the control.

Recloser sequencing, tripping and overcurrent sensing, shall be an automatic function of the electronic control. Manual trip and lockout shall be provided by an external, hookstick operable handle. Operation of the manual trip handle shall activate a mechanical block device, disabling any local or remote closing operation until the handle is reset.

#### E. SMART GRID / LAZER AUTOMATION

The recloser shall be automation ready simplifying conversion for any future automation requirements. A multi-ratio current transformer shall be encapsulated within the module. The current transformer shall be provided with 1000/500:1 or 400/200:1 dual ratios. Inputs to the control shall be field changeable. CT accuracy shall be +/-1%.

#### F. MOUNTING

Lifting provisions shall be provided. Mounting provision options shall be supplied as follows:

- Aluminum polemount bracket with arrester provisions on the load and source side.
- Galvanized steel substation frame.
- Dead-front padmounted design with galvanized steel enclosure. Stainless steel enclosure optional. (See section G)

#### G. PADMOUNT ENCLOSURE (if applicable)

Enclosures shall be made of 12 gauge galvanized or stainless steel and manufactured to IEEE C37.72 and C57.12.28 standards. Enclosures shall be tamper-resistant incorporating hinged access door(s) with pentahead locking bolts(s) and provisions for padlocking. The enclosure shall be provided with lifting provisions and painted with a Munsell 7.0GY3.29/1.5 green finish.

#### H. ELECTRONIC CONTROLS

The recloser shall be controlled using the Schweitzer SEL-351RS Kestrel control.

#### I. FACTORY PRODUCTION TESTS

Each individual recloser shall undergo a mechanical operation check verifying contact trip/close velocity, travel profile and timing. Mechanical block test shall be performed. The recloser shall be AC hi-pot tested one minute phase-to-ground and across the open contacts. Circuit resistance shall be checked. System testing shall be conducted to verify TCC performance.

#### J. STANDARD COMPONENTS

The following shall be included as standard:

1. Lifting provisions
2. Grounding provisions
3. Manual trip and mechanical lockout handle
4. SEL-351RS control and associated control cable
5. Corrosion-resistant name plates
6. Dead tank solid dielectric module with internal dual ratio CT
7. Arrester mounting provisions (overhead applications only)
8. Field changeable silicone insulators

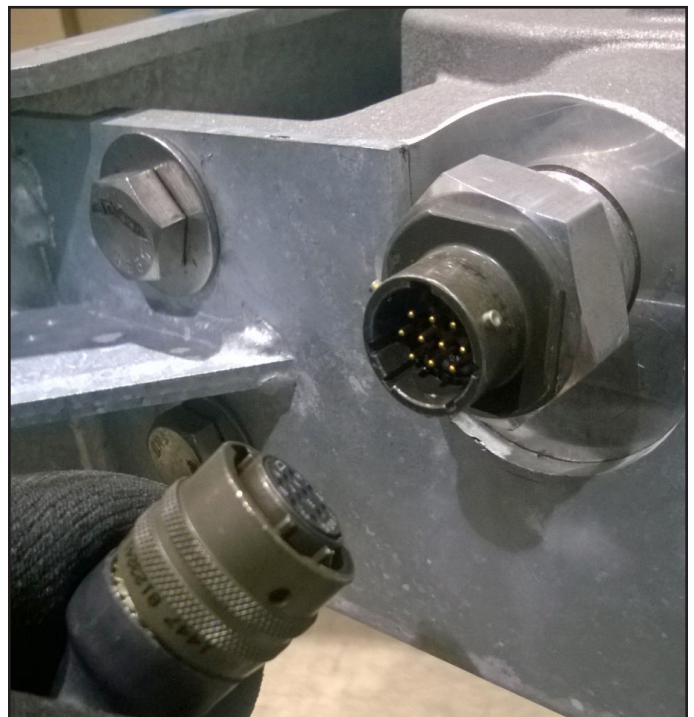
#### K. OPTIONS

The following options shall be supplied:

##### (Check as necessary)

- NEMA 2-hole aerial lugs
- NEMA 4-hole aerial lugs
- Clamp style aerial lugs (#2-500 kcmil)
- Clamp style aerial lugs (250-750kcmil)
- 4/0 brass eyebolt style ground lug
- Lightning arresters
- Dead-front padmounted design with stainless steel enclosure.
- External 1.0 KVA oil transformer for AC power supply with hardware to mount on standard aluminum frame.
- External 0.75 KVA solid dielectric transformer (0.3% accuracy) for AC power supply with hardware to mount on standard aluminum frame
- High impact, UV stable wildlife protectors for source and load insulators
- External CTs for current monitoring
- External voltage sensors
- Connectorized module

A standard hardwired control cable is provided on the Viper-SP module end. As an option, a connectorized module can be provided. ▶

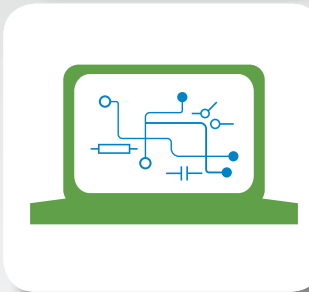


# G&W offers Technical Support and Services:



## Custom Engineering

Our engineers can tailor our products to meet the needs of any application.



## Custom Programming

Our automation engineers can provide tailored relay programs to meet any specified needs.



## Factory Acceptance Testing

G&W's Factory Acceptance Testing ensures customers' automation solutions are certified to operate properly and meet all requirements prior to being installed in the field.



## Training Services

G&W offers a range of training solutions at both G&W facilities and on site.



## 24 Hour Technical Support

Technical support for G&W products is available 24 hours a day, 7 days a week.



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