# Viper®-HV

## World's First Sub-Transmission Recloser

Presenter

January 2022

# At G&W Electric, we strive to understand your application and ask the right questions to develop solutions that exactly match your needs.

Since 1905, we've taken a **consultative approach** to every engagement to ensure your needs are met.

Our suite of **best-in-class solutions** means you can find solutions from basic switches to complex automated systems.

Our **research and development efforts** are crucial to creating the roadmaps for solutions that serve tomorrow's evolving grid.



G&W Electric

# Industry-Leading & Field Proven Expertise

As the North American industry leader in reclosers, G&W Electric brings that expertise and knowledge to the sub-transmission electrical grid with our new Viper-HV recloser. G&W Electric's proven commitment to quality, service and support will ensure the highest level of reliability you can trust.

# Introducing the world's first 72kV Pole Top recloser – Viper®-HV

An industry first from the leader in recloser technology, G&W Electric's new Viper-HV high-voltage pole top recloser provides an additional zone of overcurrent protection for isolation of faults on overhead sub-transmission lines. Uniquely designed as a self-contained system featuring three-in-one capabilities of a recloser, CTs, and voltage sensors, the Viper-HV provides utilities better functionality on a pole without the cost of a substation.

# Enhanced Zones of Protection and Isolation

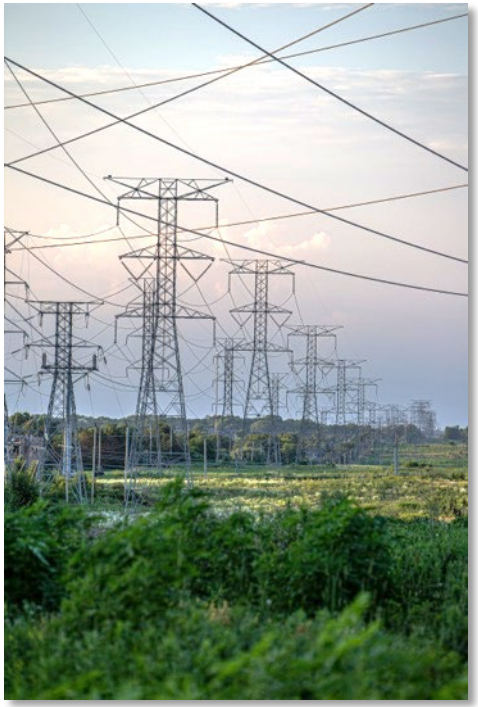
The Viper-HV offers ultimate user flexibility by providing a variety of configurations, including phase-over-phase and cross-arm versions to match line configuration.

Built to be a modular, turnkey solution, the Viper-HV is a reliable, maintenance-free and cost-efficient way to improve system reliability and transmission grid resiliency by providing Protection and Isolation that was previously only available at the substation level.

# Viper-HV Applications

Reclosers were originally designed and utilized to reduce the number and frequency of outages on Overhead Distribution Systems up to 38kV. The introduction of the Viper-HV recloser brings those concepts and value to Electrical Sub-transmission Infrastructures:

- **Main Sub-transmission Lines**
- **Tap Circuits**
- **Select Substations**



# Viper-HV Applications

## Reclosing

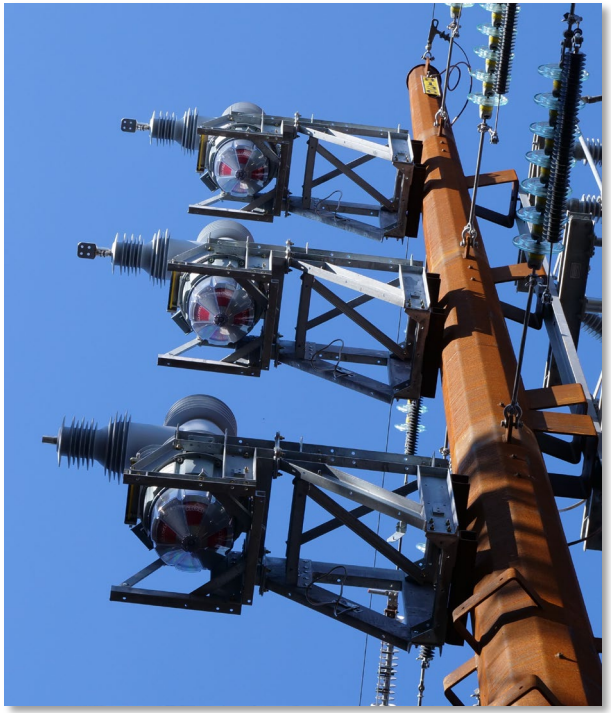
- High speed clearing of temporary faults
- Radial overcurrent protection

## Sectionalizing/Switching

- Load break switching
- Open Tie points
- Utility interconnection point

## Automation Platform

- System reconfiguration
- Automatic transfers
- FDIR/FLISR



# Viper-HV Recloser Main Components

Wildlife Protectors

Solid Dielectric Insulation

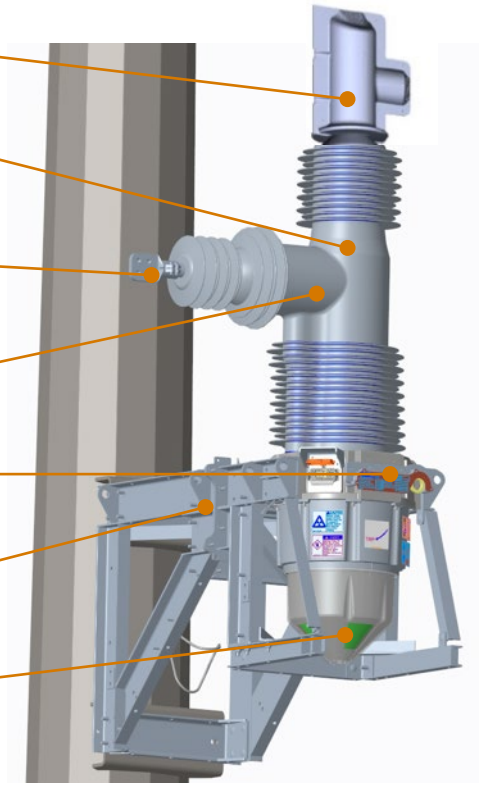
Terminal Connectors

Current and Voltage Sensors

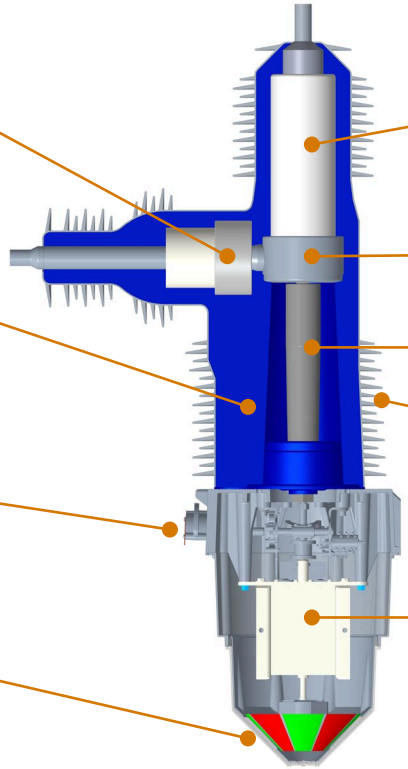
Manual Trip Handle

Pole Mounting Bracket

Position Indicator



# Viper-HV Recloser Main Components



Current Transformer and Voltage Sensors

Solid Dielectric Insulation

Manual Trip Lever

360° Position Indicator

Vacuum Interrupter

Current Transfer Interface

Insulated Drive Rod

External Insulation Sheds

Magnetic Actuator

# Viper-HV Recloser Main Components

## Close and Open Indicator

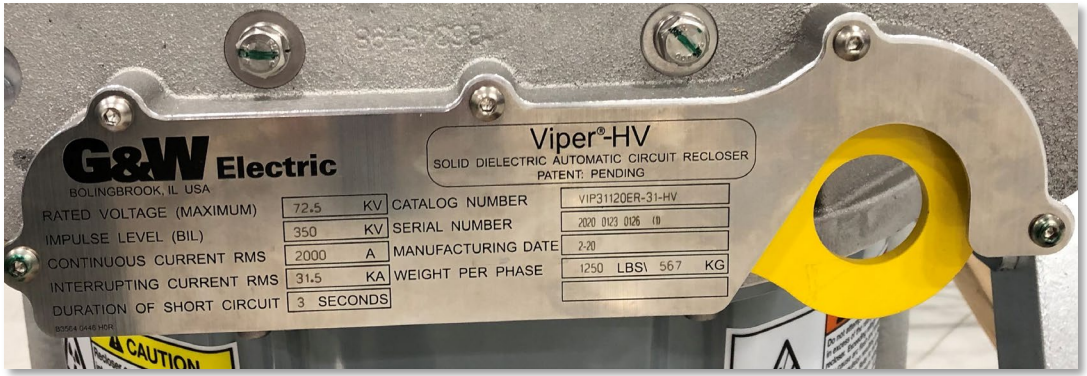


- 360° Viewing
- Reflective Labels


# Viper-HV Recloser Main Components

## Trip and Lockout Handle

- Enhanced Safety


- Manually Trips/Opens the Phase
- Mechanically Blocks any Close Operations
- Electrically Isolation the Magnetic Actuator
- Handle Position Indicator (69 device) to Send Control
- Control can be programmed to Electrically Open other Phases

# Viper-HV Technical Overview

| Ratings: | |
|---|---|
| Voltage Class | 40 to 72.5kV |
| Continuous Current | 1200 and 2000A |
| Interrupting Current | 31.5kA |
| Short-Circuit Making | 80kA pk |
| Short-Time Withstand | 3 seconds |
| Line-Charging Breaking Current | 20A |
| Cable-Charging Breaking Current | 250A |
| Power-Frequency Withstand Voltage (60s) | 160kV |
| BIL | 350kV |
| First Pole to Clear Factor | 1.5 / 1.3 |
| Mechanical Endurance | 10,000 |



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# Viper-HV Product Overview

The Viper-HV is a completely integrated and tested package paired with a state-of-the-art relay.

## Configurations:

- Phase-Over-Phase
- Staggered Phase-Over-Phase
- Cross-arm
- Horizontal H Frame
- Horizontal Mounting

## Control Options:

- SEL-651R2, Advance Recloser Control
- SEL-421, Protection, Automation and Control System
- All are automation-ready with battery back-up
- Other relay modes can be made available

## Standard Compliance:

- IEC 62271-111 (2019) / IEEE C37.60 (2018) with ratings from IEEE C37.04 and 09 standards.

# Viper-HV Features & Benefits

## Maintenance Free

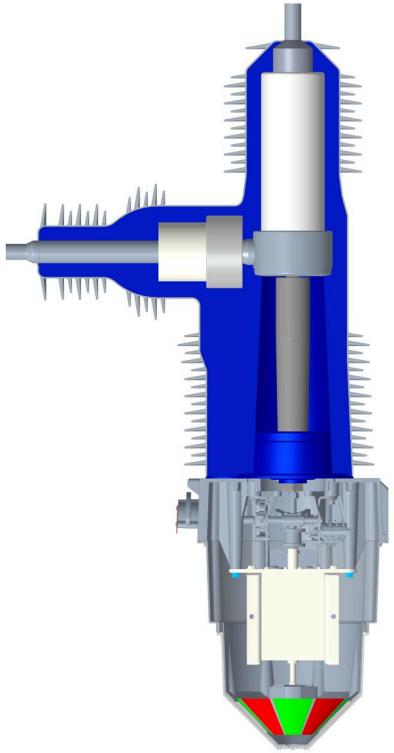
The Viper-HV utilizes field proven solid dielectric insulation so requires no oil or gas levels to monitor, which eliminates the need for routine maintenance and improves personnel safety.

*Solid Dielectric Insulated Module Design Platform*

# Viper-HV Features & Benefits

## Increased Reliability

Current carrying is path protected from the environment, and the magnetic actuator is connected to the vacuum bottle, so there are no gears or motors that could malfunction.



# Viper-HV Features & Benefits

## Operator Safety

The vacuum interrupter and all other energized parts are sealed within field proven solid-dielectric insulation, providing optimum operator safety and additional protection to prevent exposure to wildlife.

Manual trip and lockout handle provides redundant protection against closing through:

- Physical mechanical block
- Electrical isolation of the magnetic actuator
- Control programmed to block close commands

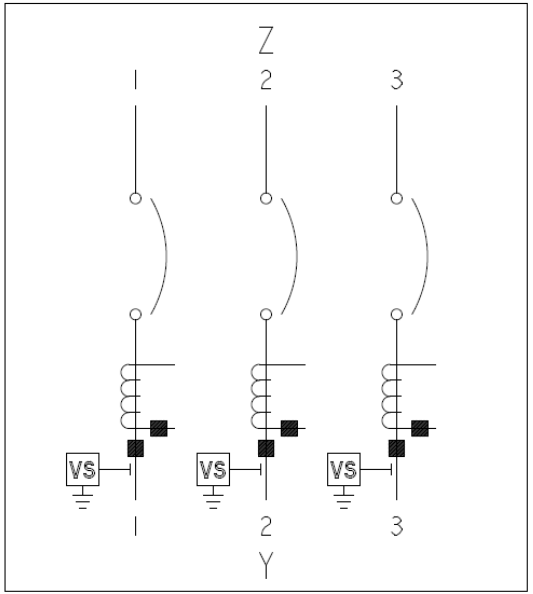
# Viper-HV Features & Benefits

## Compact 3-in-1 Device

The Viper-HV features a recloser, CTs, and voltage sensors in a single space-saving design.

**Integrated Sensors:**

- (3) 2,000:1 MR Current Transformers (CTs)
  - Taps: 300, 400, 500, 800, 1100, 1200, 1500, 1600, & 2000:1
- (3) 15,000:1 Internal Voltage Sensors (VS)

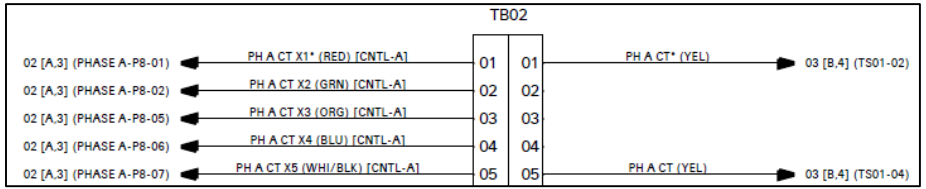



THREE LINE DIAGRAM

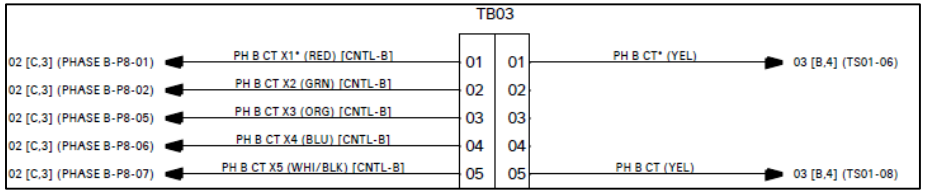
# Current Transformer Tap Selections

| Current Transformer Ratio | Secondary Taps |
|---|---|
| 300:1 | X3 – X4 |
| 400:1 | X1 – X2 |
| 500:1 | X4 – X5 |
| 800:1 | X2 – X3 |
| 1100:1 | X2 – X4 |
| 1200:1 | X1 – X3 |
| 1500:1 | X1 – X4 |
| 1600:1 | X2 – X5 |
| 2000:1 | X1 – X5 |

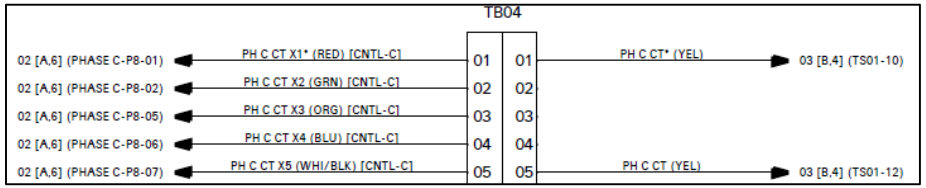
*Phase A:*




*Phase B:*




*Phase C:*



# Viper-HV Features & Benefits

## Pole Top Design Platform

Offers more design flexibility and provides additional savings by not having a foundation in a fenced substation and control house.

# Viper-HV Features & Benefits

## Flexibility

Designed under a modular concept with various mounting configurations and different relay options, the Viper-HV allows customers to adapt to their pole construction and select a relay that best matches their requirements.

*Phase-Over-Phase*

*Crossarm*

*Staggered Phase-Over-Phase*

# Viper-HV Features & Benefits

## Automation Ready

Simplifying integration for any future requirements, the Viper-HV provides faster fault isolation, automatic restoration and reconfiguration capabilities.

## LaZer® Distribution Automation System

LaZer® automation solutions combine expertise in automated switches and automation software/programming. It features full system integration of new and existing components, including switches, relays, communications and SCADA systems to utilize previous investments.

# Viper-HV Features & Benefits

## Plug-and-Play Installation

The Viper-HV includes protection relay in an outdoor enclosure with connectorized control cables on both ends.

*Mechanism Connector*

*Main Control Cable Connectors with Protective Cable Armor*

*Control Connector*

# Viper-HV Configuration Details

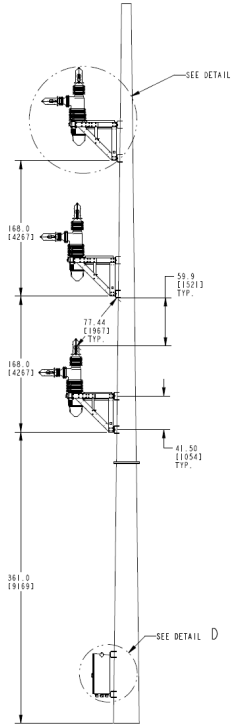
*Phase-Over-Phase*

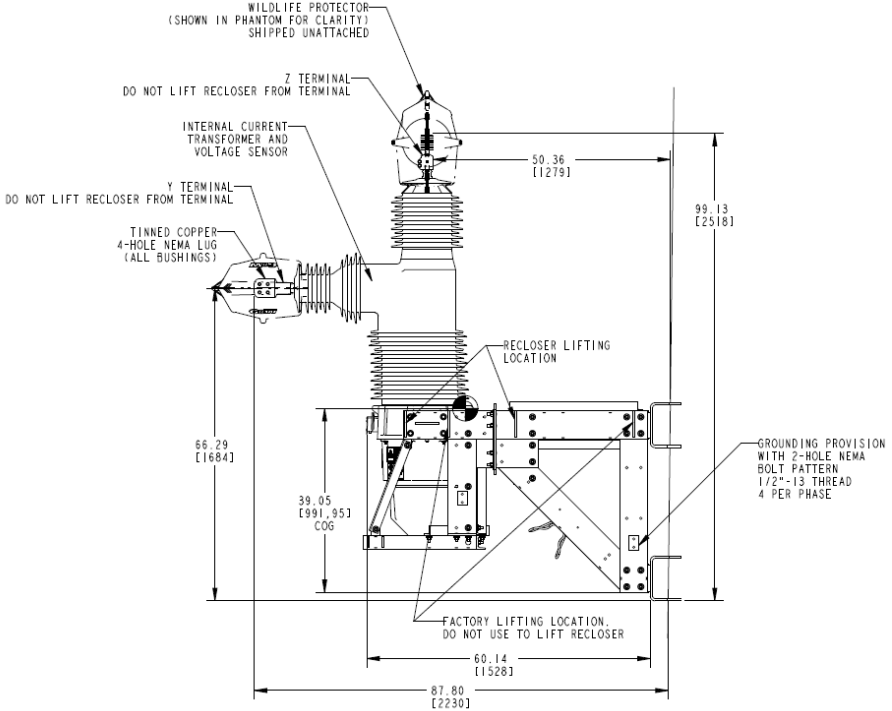
*Staggered Phase-Over-Phase*

*Crossarm*

# Viper-HV Configuration Details

## Phase-Over-Phase Outline



# Viper-HV Configuration Details

**Phase-Over-Phase Installation**

# Viper-HV Configuration Details

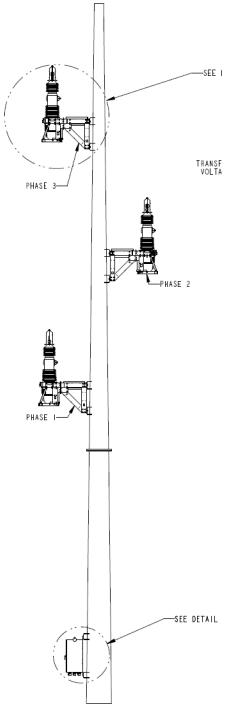
## Phase-Over-Phase Installation

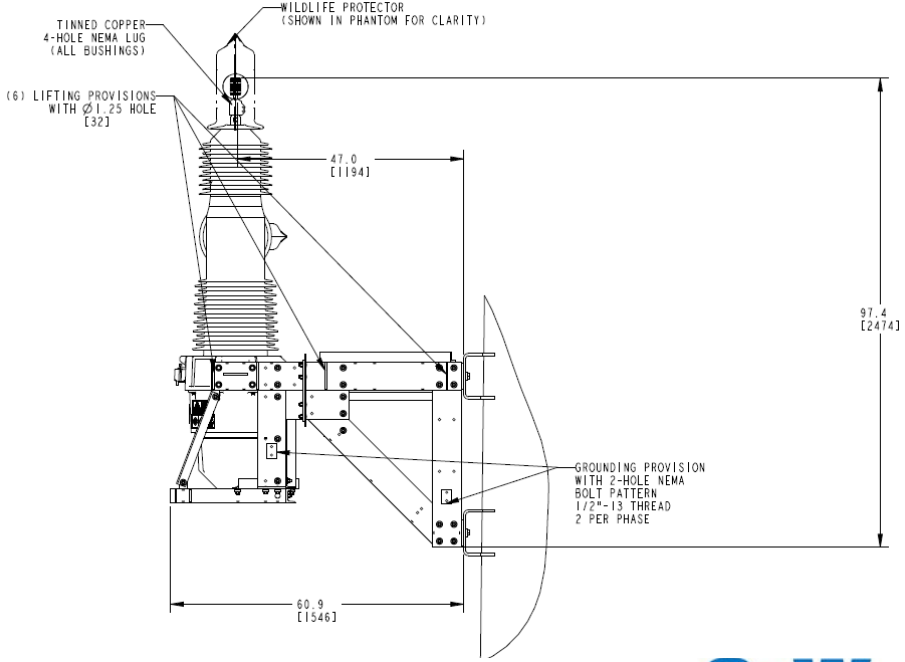
*Hubbell Protecta Lite 57kV MCOV Arresters*

*Control with SEL 421*

# Viper-HV Configuration Details

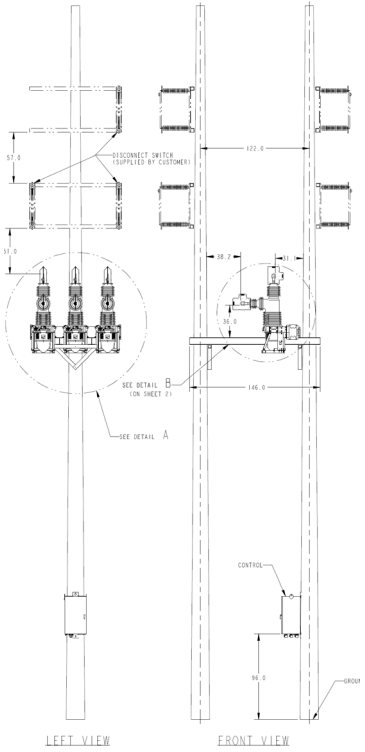
## Staggered Phase-Over-Phase Outline

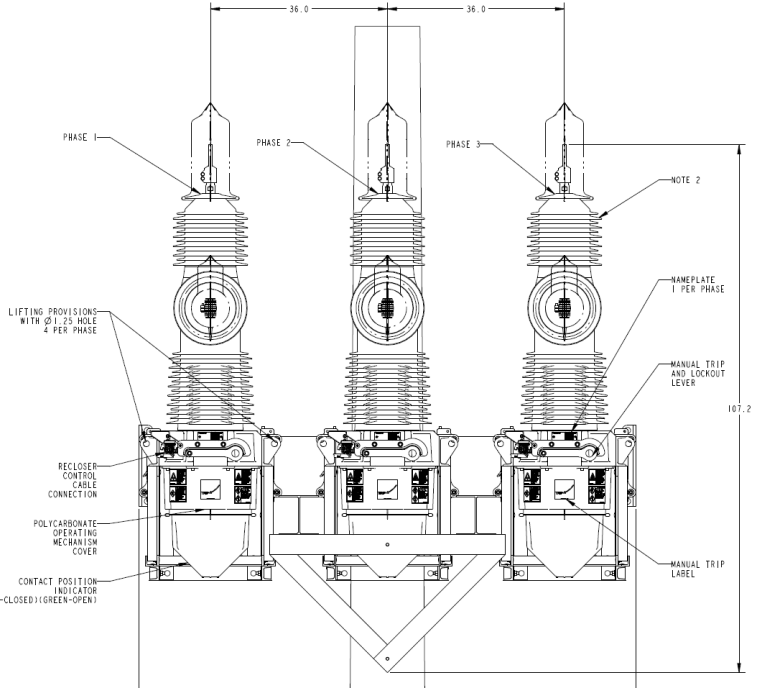


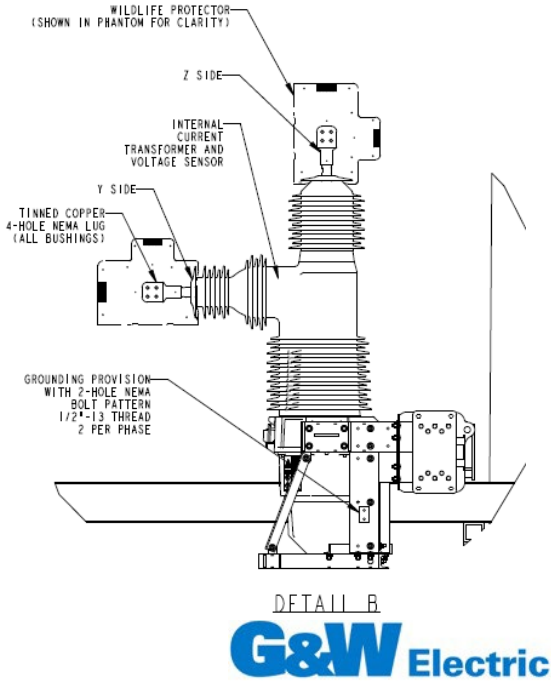



# Viper-HV Configuration Details

## Custom Frame Outline

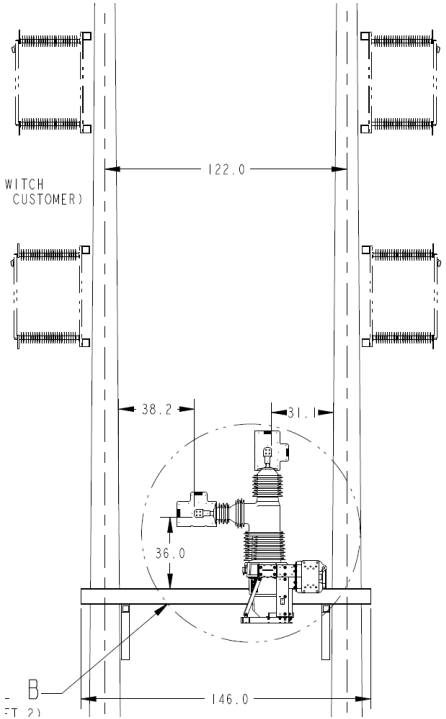


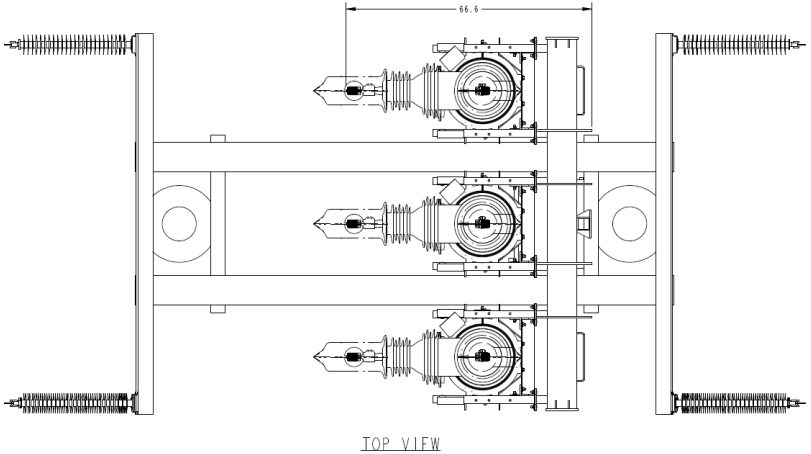



# Viper-HV Configuration Details

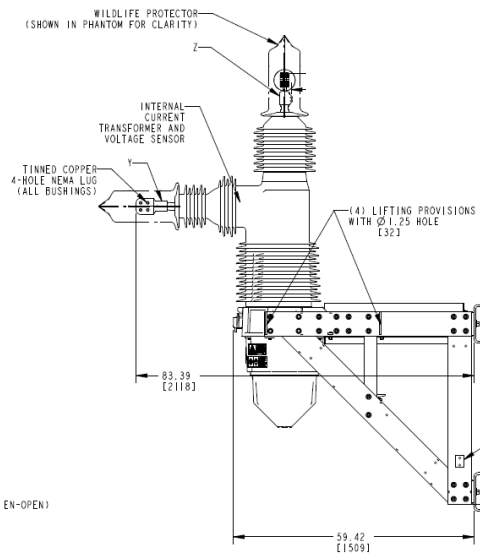
## Custom Frame Outline

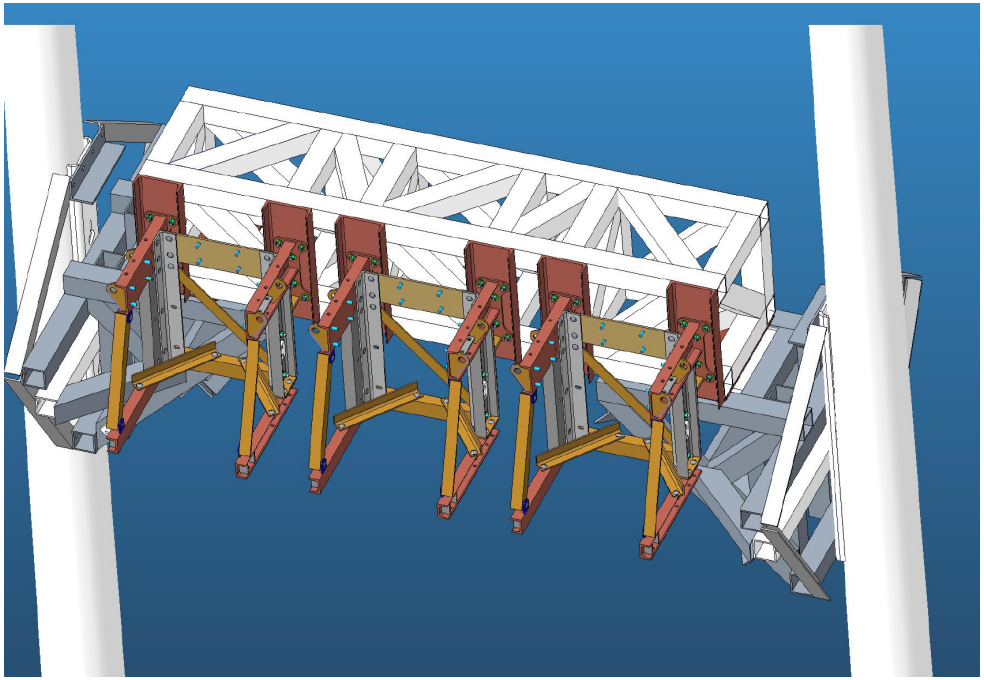


# Viper-HV Configuration Details

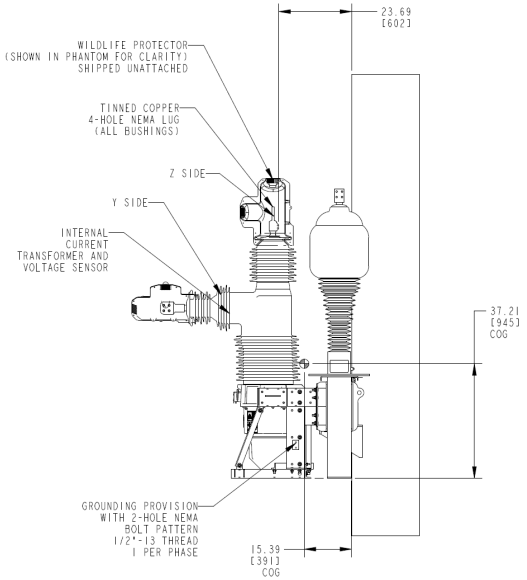
## Custom Horizontal H Frame Design

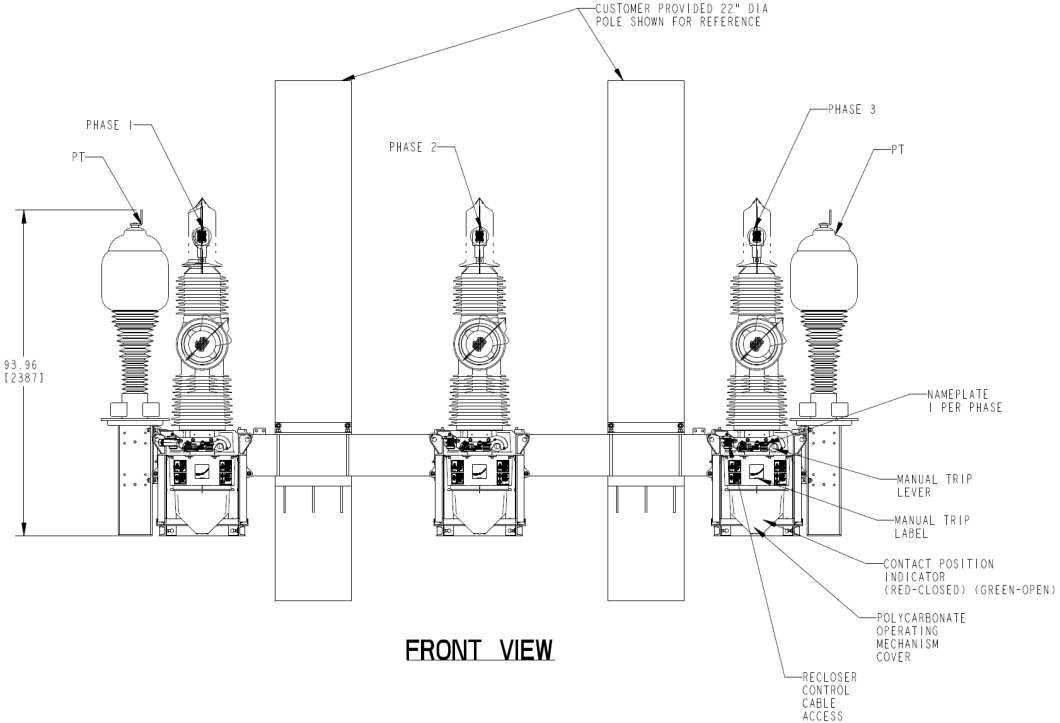


# Viper-HV Configuration Details

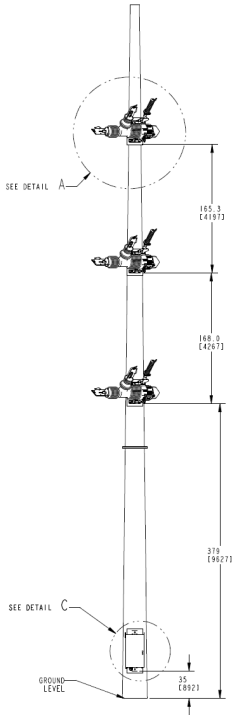
## Crossarm Outline

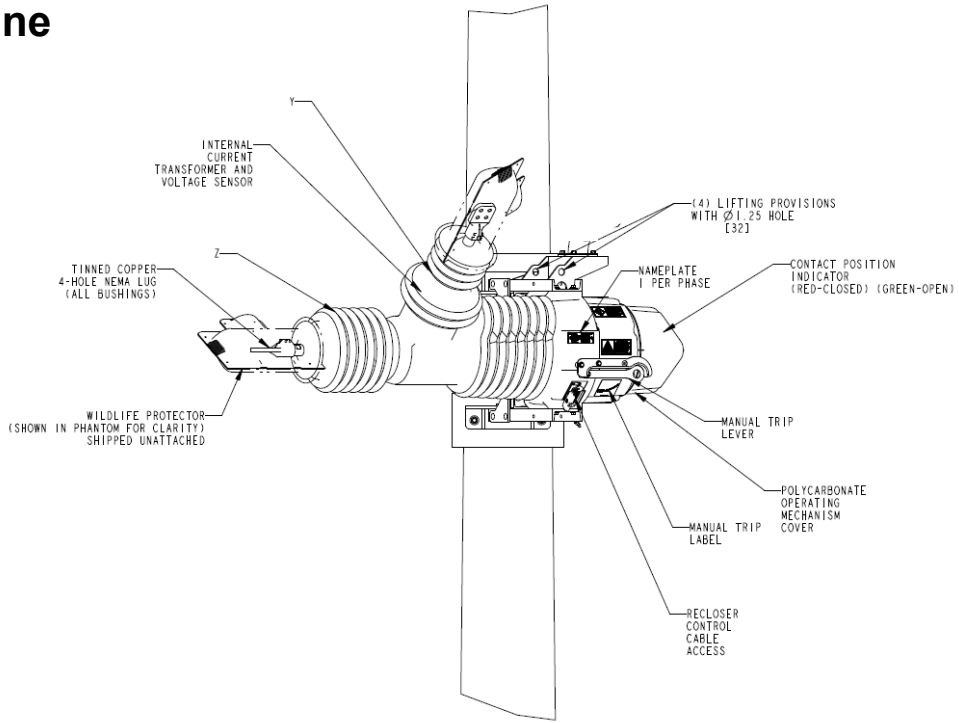


# Viper-HV Configuration Details

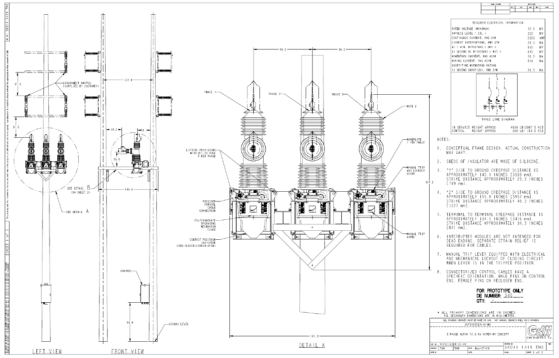
## Horizontal Phase-Over-Phase Outline

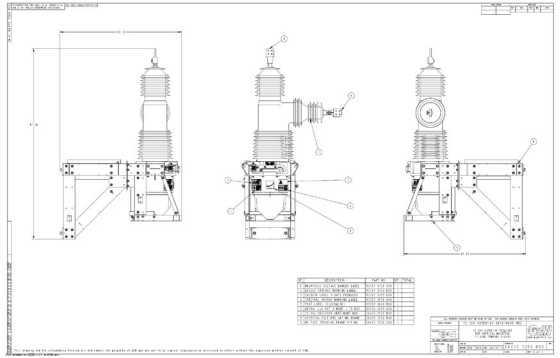


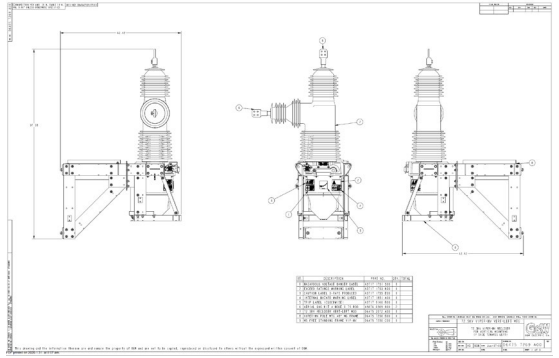



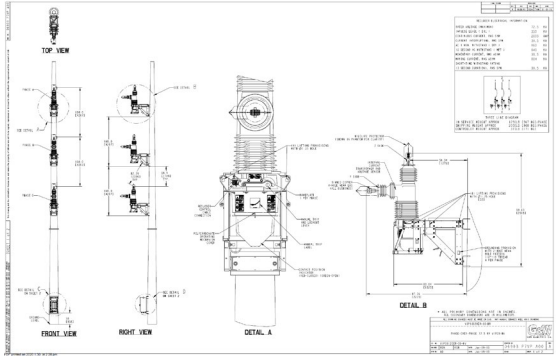
# Viper-HV Configuration Details

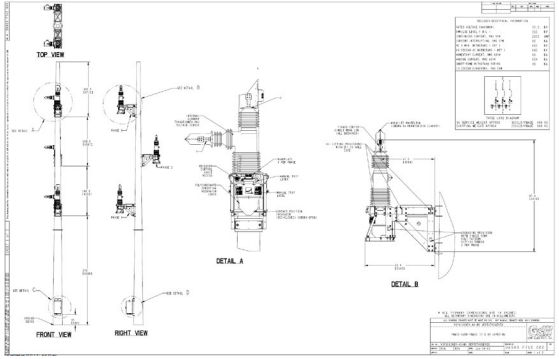
## Available PDF and STP Drawings

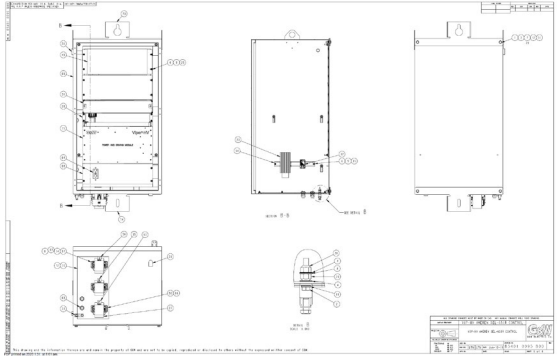






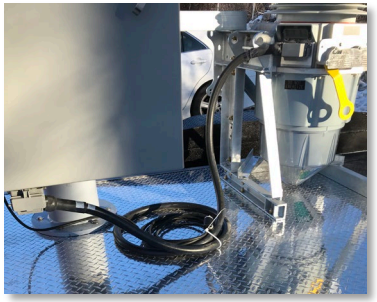


# Viper-HV Configuration Details

**Mobile Demo/Training Unit**



# Typical Target Installation Sites

# Viper-HV Control Options

- Provided as a package, paired with a relay
  - SEL-651R2 Advance Recloser relay (Standard)
  - SEL-421 High Speed Line Protection (Option)
  - Includes a Power & Drive Module (PDM)
    - Internal power supply for all Vdc powering
    - Integrated battery backup system with 68AH battery in case of loss of AC - Approximately 8 hours
  - All are automation-ready
    - Customer Specified Communication Equipment Installed and/or Provisions provided
- AC powered from PT
  - External 120Vac or 230Vac required

Relay Module Panel Options

# Viper-HV Control Options

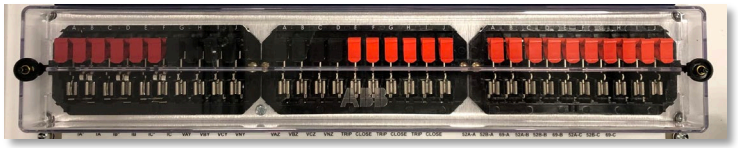
## SEL Relay Modules

*SEL 651R2*

*SEL 421*

## Power Delivery Module


## Control Accessories

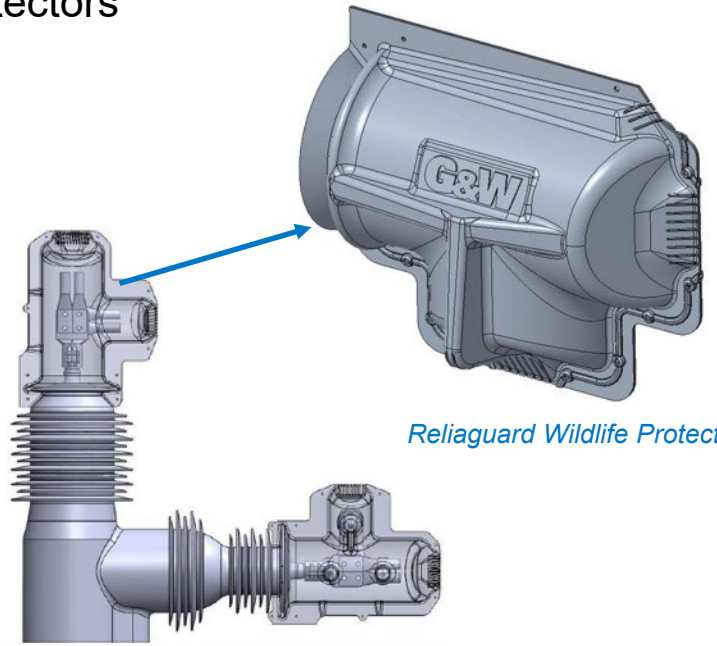


*Standard Test Switches*


*Optional Operating Interface Panel*

# Site-Ready Options

- Customer fit wildlife protectors
- Powering transformers
- Isolation switches
- Bypass switches




*Reliaguard Wildlife Protector*

*Ritz Power Transformer*

# Packaging and Shipment Details

- Depending on the configuration and local requirements packaging be coordinated as:
  - Individual crating of phases and components
  - Phases assembled on main support

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# Viper-HV Installation of Equipment


# Viper-HV Installation of Equipment


# Online Configurator Functionality

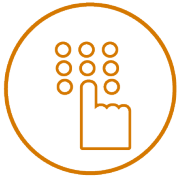
Installation Type

Voltage

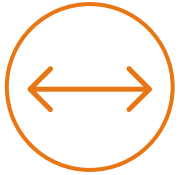
Select Frame

Terminal Pad

Wildlife Protector



Control Options



Cable Length

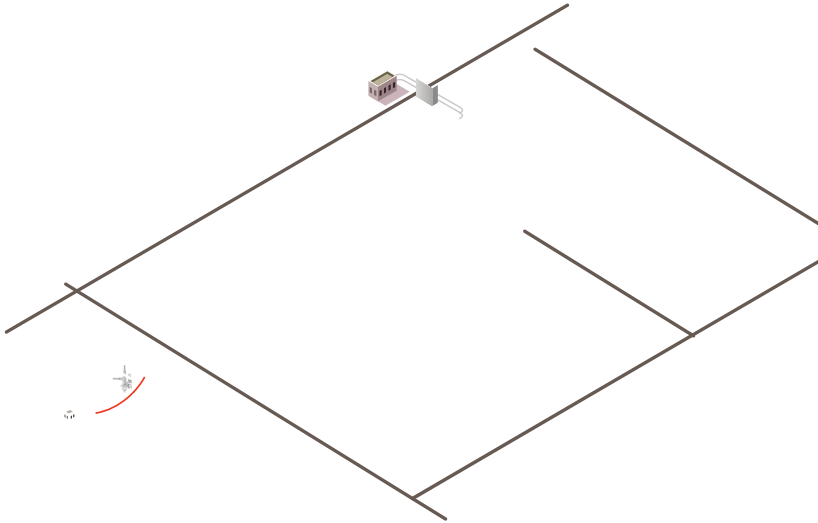
Customer Approval



G&W Electric

# Power Grid Solutions for Your Every Need

Our full line of robust electrical distribution products means that you'll find a solution for any application need. And since we design all our products with safety, integrity and quality in mind, you can rest assured knowing your solutions are built to last.



# Value-Add Services – Our Personal Touch

At G&W Electric, we strive to deliver complete customer satisfaction by offering the following technical support and services:

- Custom Engineering
- Custom Programming
- Factory Acceptance Testing
- 24-Hour Technical Support
- Training and Education

# Request a Consultation

At G&W Electric, we strive to understand your application and ask the right questions to develop solutions that exactly match your needs.

Email:
**XXXX@gwelectric.com**

Phone: XXX-XXX-XXXX

Learn more at
**www.gwelectric.com**

Sales Reps to add
their contact info here

# Thank you

G&W Electric