Solid-dielectric Load Break Switch Catalog

G&W

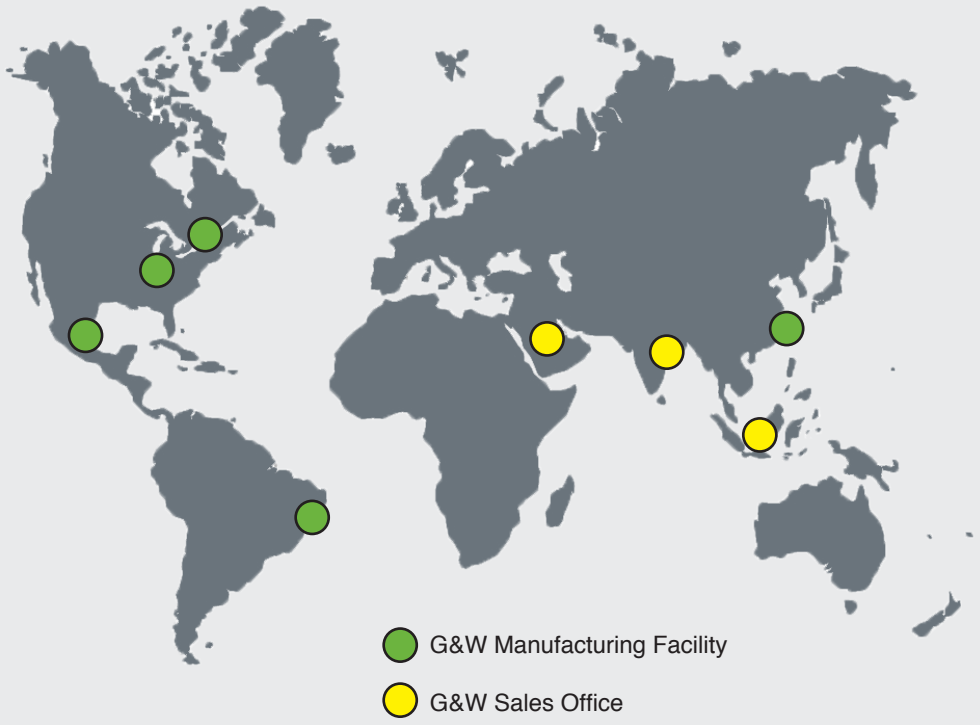
▲ *G&W headquarters in Bolingbrook, IL USA*

Company Profile

Since 1905, G&W Electric has helped energize the world with innovative power system solutions. With the introduction of the first disconnecting cable terminating device, G&W began to build a reputation for engineering custom solutions to meet the needs of system designers. Solutions which today have extended far beyond cable accessory products and into the latest in load and fault interrupting switchgear, reclosers, system protection equipment and distribution automation.

Headquarters

G&W headquarters is located in Bolingbrook, IL, USA, a suburb of Chicago. G&W also has manufacturing facilities or sales offices in China, Mexico, Canada, Dubai, India, Singapore and Brazil. G&W covers the globe with product installations and sales representation in over 100 countries and all seven continents.



G&W Electric Facilities:
G&W Electric Co. Headquarters (Bolingbrook, IL, USA)
G&W China (Shanghai)
G&W Canada (Brampton, Ontario)
G&W Mexico (San Luis Potosí)
G&W do Brasil (Salvador)
G&W sales office (Dubai)
G&W sales office (Delhi, India)
G&W sales office (Singapore)
Manufacturer's Brass and Aluminum Foundry (Blue Island, IL, USA)

Over 110 Years Serving our Markets

1905
G&W Electric Company founded by engineers Harry Gear and Paul Williams, introduces the first disconnecting porcelain pothead.

1916-1919
G&W expands to other products such as switching boxes, series cutouts and cable junction boxes.

1920-1929
G&W moves to larger manufacturing facilities in Chicago as new innovations and products help the company expand. Adds an aluminum and brass foundry in 1926.

1930-1939
Expands switching capabilities. Introduces oil fused cutout designed for protection of 5kV underground systems.

1940-1949
Factory space increases to support US World War II efforts with the manufacture of specialty ship fittings, radar switches and bomb sights.

1950-1959
Pothead line extends to 230kV for high pressure, pipe type cables. Moves to a larger facility in Blue Island, IL in 1956.

1960-1969
Cable termination (new industry term for pothead) line expands to include distribution of preassembled slip-on designs and transmission voltage ATA designs to 500kV. G&W adds a high voltage test laboratory.

1970-1979
The company stayed under the Williams family ownership until 1978 when John D. Mueller takes over.

1980-1989
Expands SF6 switch offerings to include ratings through 600A, 38kV for vault, pad and overhead systems. Introduces SCADA integrated automatic transfer switches. Introduction of CLiP, current limiting protector.

1990-1999
Enters the recloser market with an SF6 design to 38kV. G&W becomes ISO 9001 certified in 1993. Opens a manufacturing operation in Shanghai, China in 1997. John H. Mueller becomes President in 1994.

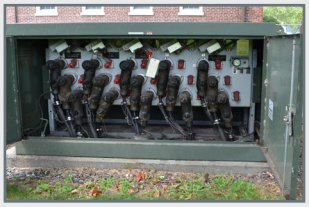
2000-2009
Introduces Viper reclosers & Trident switchgear. Becomes ISO 9001 certified in 2001 and ISO14001 certified in 2002. Introduces Python line of pre-molded rubber terminations and joints and Lazer automation solutions.

2010-2012
Expands Viper reclosers to single-phase applications. Doubles office and manufacturing capacity with move to larger facility in Bolingbrook, IL. Introduces the Trident with SafeVu, first solid dielectric switch with visible break.

G&W Product Overview

Single and Three Phase Solid-dielectric Reclosers

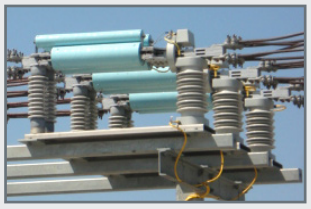
Solid-dielectric Underground Distribution Switchgear



SF6 Underground Distribution Switchgear

System Automation and Smart Grid Solutions

Three Phase Overhead Load Break Switches



System Protection Equipment

Transmission and Distribution Cable Accessories

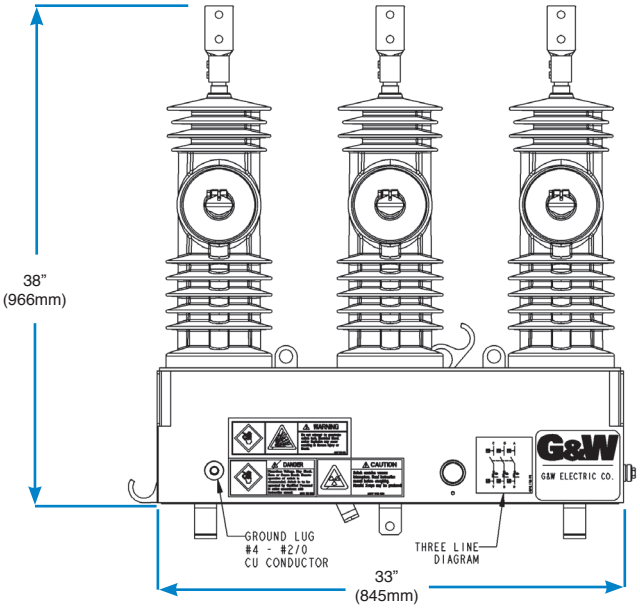
The **Diamondback** switch is a solid-dielectric, three-phase load break switch for overhead applications. The Diamondback switch combines the time-proven reliability of vacuum interrupter technology with the maintenance-free benefits of a solid-dielectric insulated device. The Diamondback is designed for three phase automatic or manual switching operations providing circuit isolation for systems rated up to 29.3 kV, 630 A continuous current. The compact, light-weight design provides ease of installation. The Diamondback has been designed and tested to comply with the IEEE C37.74 and IEC 62271-103 (formerly IEC 60265-1:1998) standards.

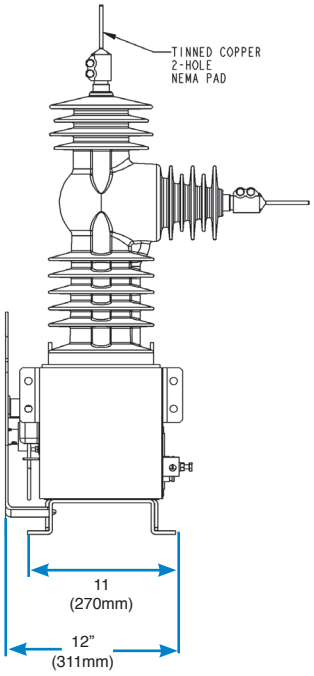
▲ *G&W Diamondback load break switch*

SOLID-DIELECTRIC MODULES

The solid-dielectric modules utilize a time-proven solid dielectric epoxy insulation to fully encapsulate each of the three vacuum interrupters. The operating temperature range of the switch is -40ºC to +65ºC (-40ºF to +149ºF). A 1000:1 ratio current transformer with +/-1% accuracy is encapsulated into each solid-dielectric module. There are six (6) internal voltage sensors that allow for voltage measurement on both the source and load side of the device. These voltage sensors are encapsulated inside the solid dielectric modules and have an accuracy of +/-2%.

Dimensions





◀ *Mechanical open/ close handle*

Features and Benefits

Features	Benefits
Solid-dielectric Insulation, uses no oil, or SF6 gas.	No maintenance or monitoring system necessary, common with oil of SF6 insulation. Solid-dielectric provides lowest total lifecycle cost.
	Solid-dielectric material is inert, environmentally friendly
Easy to automate with control options	Smart Grid Ready
Integrated six voltage sensors	Less equipment & weight on pole reduces future maintenance. Less congestion on pole improves reliability. Enables full line monitoring capability for Smart Grid applications.
Compact size and lightweight construction	Allows for installation in tight areas and eases handling during installation
Site-ready Designs	Enable faster installations and the convenience of a single source supplier. Designs include factory installed and wired options such as lightning arrestors and potential transformers.

Electrical Ratings

Rated Maximum Voltage		29.3kV
Rated Continuous Current		630A
Frequency		50Hz/60Hz
Rated Short-Time Current Withstand (rms, 3sec)		12.5kA
Rated Peak Withstand Current (rms, asym)		32.5kA
Rated Momentary Current, (rms, asym)		32.5 kA
Switching Performance Tested per IEEE C37.74-2014/ IEC 62271-103	100% Load Current Switching	630A
	50% Load Current Switching	315A
	10% Load Current Switching	63 A
	Loop Current Switching	630A
	100% Cable Charging Current Switching	25A
	30% Cable Charging Current Switching	7.5A
	Line Charging Current Switching	1.5A
	Magnetizing Current Switching	22A
Mechanical Operations Switching Performance		5,000 times
Impulse Withstand Voltage (1.2X50µs)		150 kV
Power Frequency Withstand Voltage (1 min)		60 kV

ORDERING INFORMATION

Standard:

- Three (3) internal current transformers, 1000:1 ratio
- Six (6) Internal Voltage Sensors
- Stainless Steel tank
- One (1) operating mechanism, three phase operation
- One (1) manual operation handle
- One (1) lockout handle
- One (1) Control cable
- One (1) Power cable
- One piece packaging for switch and control

Options (check all that apply):

___ Clamp style lugs
___ NEMA 2 hole lugs
___ NEMA 4 hole lugs
___ Wildlife Protectors
___ Reversible Alley Arm Frame
___ Center Mount Frame
___ Auxiliary contacts
___ Diamondback with SEL-651RA Relay
___ Diamondback FTU-P200 Control

CONTROL CONNECTIONS

The 37-pin connector and control cable make the connection between the Diamondback switch and the control, providing operations, status, and current and voltage monitoring capabilities. Two cables are provided: (1) power cable, and (1) control cable.

◀ *37-pin connector for control connection and 3-pin for AC power connection.*

▲ *Diamondback with SEL-651RA Relay*

▲ *Diamondback FTU-P200 Automated Controller*

SEL-651RA RELAY:

Measurement & Status Monitoring

Diamondback with SEL-651RA relay is equipped to control and monitor measurement and status of the Diamondback load break switch. Instantaneous and demand metering are available with programmable integration intervals.

- Voltage, Current, and Phase Angle
  - Six voltage inputs
  - Fault Passage Indication
  - Over/under Voltage
  - Phase Sync Fail Detection
- Battery charging and status monitoring

Distribution Automation Ready

Integrate the Diamondback with SEL-651RA relay into SCADA or distribution automation systems with ease. Communications interfaces include RS232/RS485 serial ports, USB, Ethernet (metallic), or Ethernet (fiber). Communications protocols supported include DNP 3.0, Modbus, and IEC 61850. Automation programming applications include:

- Sectionalizing
- Auto Open
- Auto Close/Tie

Data & Fault Analysis

Analyze grid performance with event and fault recording.

- Fault waveform recording
  - 60 cycle length, 128 samples/cycle event reports
  - Waveform evaluation software
- Sequence of Events (SOE) and Event History

FTU-P200 CONTROL:

Measurement & Status Monitoring

The FTU-P200 control is equipped to control and monitor measurement and status of the Diamondback load break switch. Instantaneous and demand metering are available with programmable integration intervals.

- Voltage, Current, and Phase Angle
  - Six voltage inputs
  - Fault Passage Indication
  - Over/under Voltage
  - Phase Sync Fail Detection
- Harmonics (up to 31st)
- Battery charging and status monitoring
- Auto Sectionalizing

SCADA Communications

Integrate the FTU-P200 control into SCADA or distribution automation systems with ease. RS232/RS485 serial port and Ethernet port connectivity are available. Communications protocols supported include the DNP 3.0 protocol, and the IEC 60870-5-101 and IEC 60870-5-104 protocols.

SWITCH APPLICATIONS

Switches play a fundamental role in improving distribution reliability. By applying Diamondback switches in strategic locations on the distribution system, faults can be isolated to minimize the outage area, loads can be distributed according to system conditions, critical loads can be kept on-line, individual protective devices or sections off-line can be bypassed during routine maintenance, and loads can be dropped to prevent overloading the source. In short, switches are typically used to reconfigure a distribution system to minimize outages and increase system reliability.

MANUAL SWITCHING

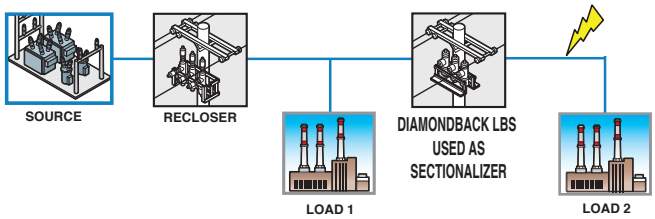
By installing manually operated switches, a user can economically redistribute power during times of planned outages for routine line maintenance, equipment replacement, or even seasonal load adjustments. Manual switches can also be used to isolate faults in areas where immediate power restoration is not necessary, or to perform an emergency sectionalizing function to quickly restore power to the customers affected by a power outage. The Diamondback switch does not require de-energizing the system prior to switching so customer service is not disrupted.

AUTOMATED SWITCHING

By adding a controller to the Diamondback switch, the user can perform all of the functions of a manually operated switch without having to dispatch a crew to the switch site. Additionally, current and voltage can be monitored via SCADA.

Fault Isolation

When combined with a controller, the Diamondback switch can be used as an automatic sectionalizing device for automatic fault isolation. Six voltage sensors and three current transformers are provided as a standard feature on the Diamondback switch. Most logic schemes require a fault interrupting device to be upstream from the sectionalizing switches. The protective device must be either locked out or programmed for a specific reclose interval plus a time safety factor to allow the switch to operate.



▲ *Application example: Diamondback paired with a recloser*

Application Example: Diamondback paired with a Recloser

1. A fault occurs between Diamondback and Load 2
2. The recloser starts reclosing sequence: trips open, closes, trips open
3. The Diamondback opens after 2nd overcurrent trip
4. The recloser closes and restores power on the line between the recloser and Diamondback

Tie Switches

For tie applications, the Diamondback switch control senses a voltage loss on either the source or the load side to determine whether or not to close in from a normally open condition between two different sources. Once the voltage on one source has been lost for a pre-programmed period of time, the tie switch will close in restoring power to the de-energized line. Current transformers "tell" the controller that a fault exists when the main contacts are closed. For a normally open tie, the tie may close into a fault upon loss of voltage on one feeder. The control “knows” of the faulted condition and would not open unless it detects a loss of voltage on the faulted feeder side, signifying the upstream protective device has operated.

On a normally closed tie, the switch control would use similar logic, but no fault closing would be necessary prior to isolating the fault. Tie switches can also be applied to automatically bypass a feeder which has been locked out due to a failure, planned outage or a faulted line. If the switch closes into a fault, the tie switch would open once the upstream protective device has opened, de-energizing the line.

Loop Schemes

Loop schemes generally consist of two or more sources tied into a distribution system to ensure backup power is available when the primary feeder is lost. The scheme utilizes sectionalizing and tie switches to automatically isolate the fault and restore power to all areas unaffected by the fault quickly and reliably using the same principles and methods described previously.

Automatic Transfer

For critical load applications such as hospitals, processing plants, military bases, etc., automatic transfer schemes are common. For overhead systems, this scheme requires two switches, voltage sensors and current transformers and a voltage-time controller. A loss of voltage on the primary source is sensed and initiates the controller to open the primary and close the alternate source switch to automatically restore power.

SCADA / Distribution Automation

Switches can perform the above functions either autonomously or through a SCADA system where the switch controls incorporate FTUs for interfacing with a master station. A variety of SCADA applications are available which employ either a master-slave or peer-to-peer communications architecture.

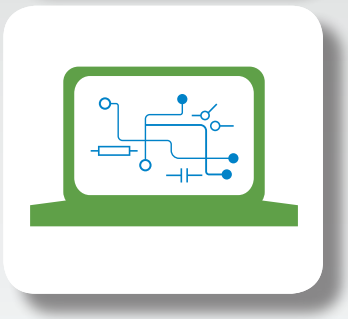
Lazer Automation

The distribution automation expertise and products of G&W and the high end software knowledge of Survalent Technology, our software company, have been combined to provide a state of the art solution – Lazer Automation. Three levels of Lazer solutions are available; Lazer I for peer-to-peer product applications, Lazer II for stand-alone controller based systems, and Lazer III for total system wide management and control.

G&W offers
Technical Support and Services:

Custom Engineering

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



Custom Programming

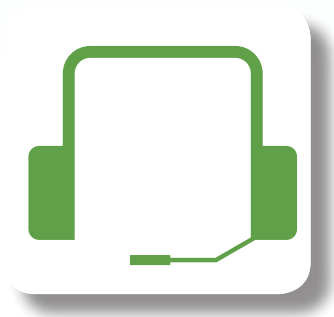
Our automation engineers can provide tailored relay programs to meet any specified needs.

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.

G&W
Engineered to order. Built to last.

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