



Power Solutions for the Renewable Energy Market

For wind farm and solar applications through 38kV



- SF6 Switchgear
- Reclosers
- System Protectors
- Tested to applicable IEEE and IEC Standards
- Arc resistant certified to IEC 62271-200
- GL certified designs



▲ 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.

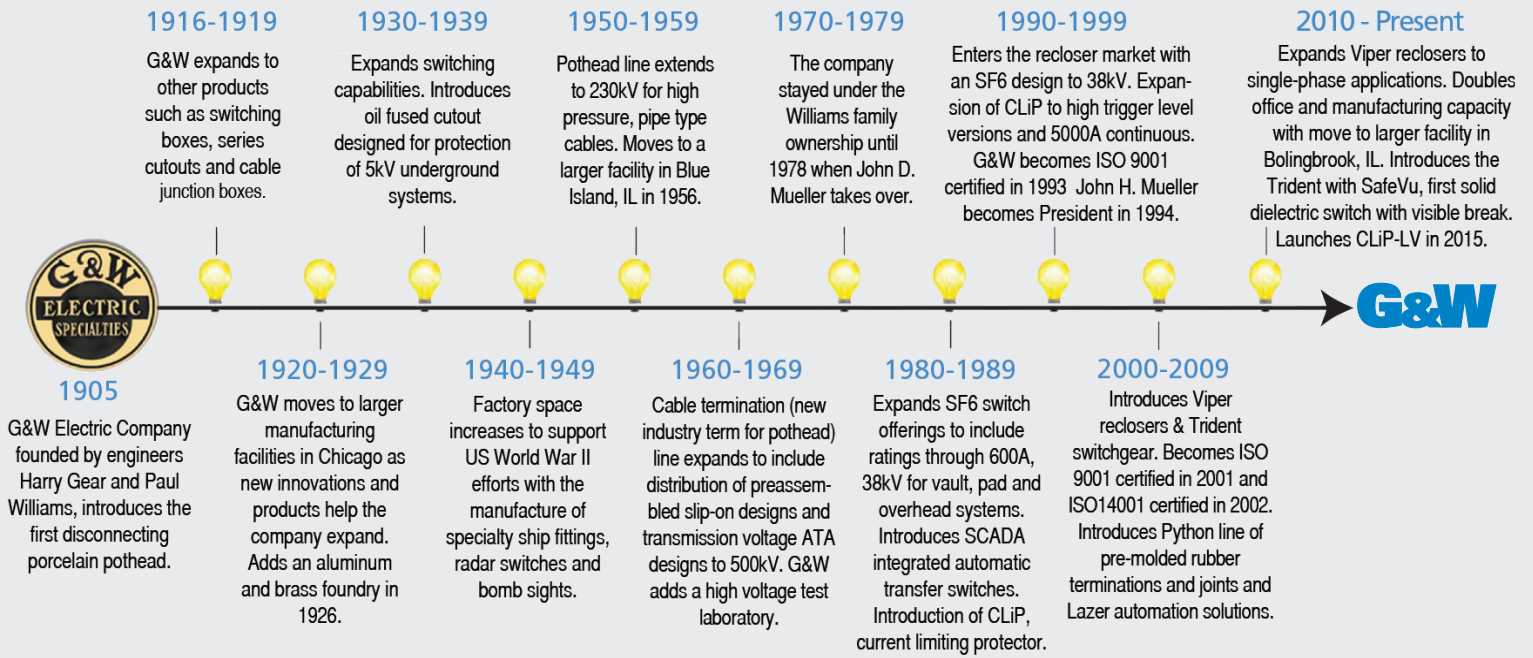
HEADQUARTERS

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



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



System Protection Equipment



Transmission and Distribution Cable Accessories

Load and Fault Interrupting Switchgear

G&W SF6 switches are available in a variety of multi-way configurations for either utility grid or turbine tower applications. Fault protection for the transformers can be provided using vacuum interrupters. An integral ground position on the switch operator is available which facilitates easy grounding of the system by simply rotating the operating handle.

FEATURES

- Ratings through 38kV, 900A load break, up to 25kA symmetric interrupting per IEEE C37.60.
- Resettable, electronically controlled fault interrupters.
- Multi-way configurations permit loop through of the turbine towers eliminating the need for separate cable junction points between the tower and the collector system.
- Dead-front, compact construction with some designs capable of fitting through a typical entrance opening of the tower.
- Manual, remote or total SCADA control.
- Visible break verification of switch contact position.
- Two position (open/close) and three position (close/open/ground) switches are available.
- Rear or side bushing location flexibility.
- Fully tested to applicable IEEE and IEC standards.
- IEEE 386 standard for 600A apparatus bushings and 200A deep well bushings.

RATINGS

Voltage class (kV)	15	25	35
Maximum design voltage (kV)	15.5	27	38
BIL Impulse (kV)	110	125	150
1 min withstand AC (kV)	35	60	70
1 min withstand production test rating AC (kV)	34	40	50
15 min withstand DC (kV)	53	78	103
Continuous and load break current (A)*	630	630	630
Momentary current (kA) asym	40	40	40
Fault-close 3-times (kA) asym	32	32	32
1 sec current (kA) sym	25	25	25
Mechanical endurance operations	2000	2000	2000

* Available 900A continuous and load break for load break switches only.



▲ Padmount switch installed outside the wind tower.



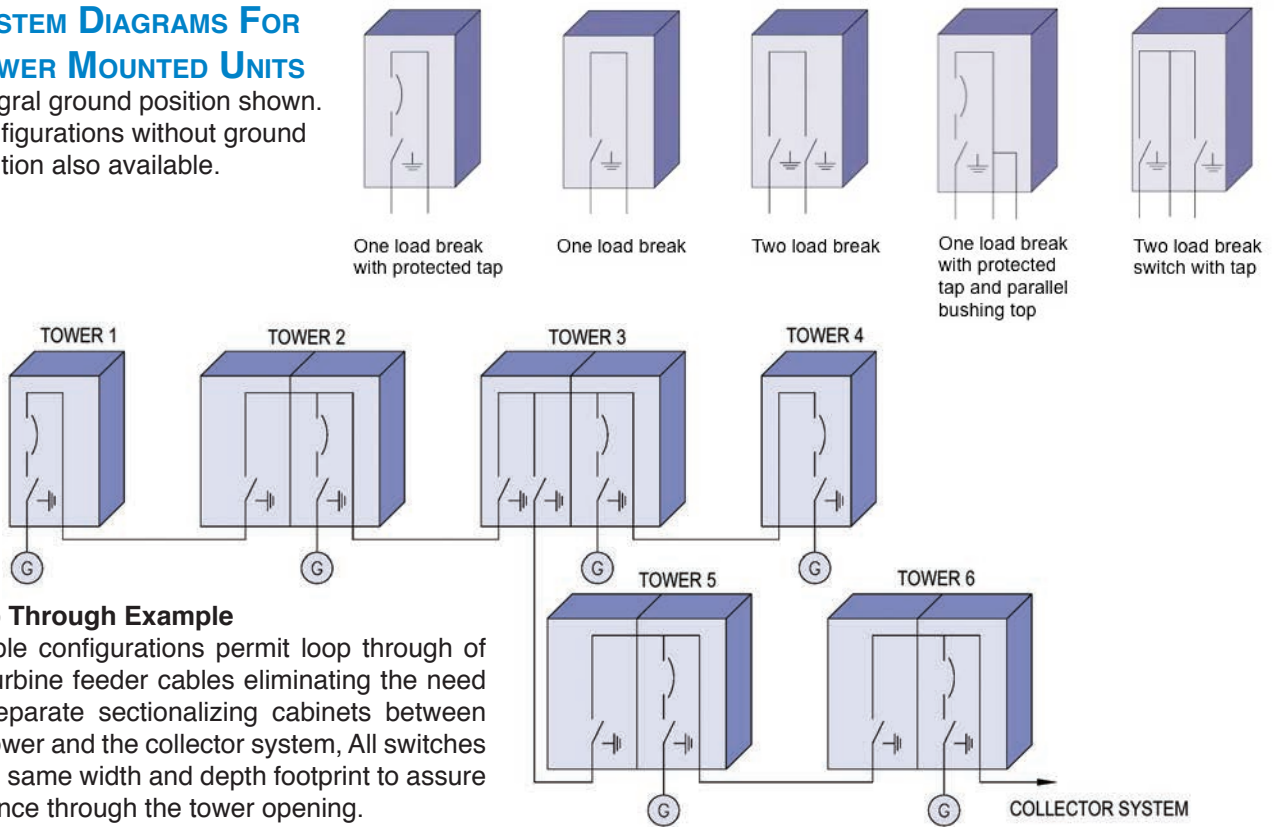
▲ Padmount switch installed in a solar application.



▲ Compact vertical design fits through the typical entrance opening for installation after the tower is constructed.

SYSTEM DIAGRAMS FOR TOWER MOUNTED UNITS

Integral ground position shown. Configurations without ground position also available.



SOLAR OPTIONS

- 900A Bus w/ 900 A utility feed
- Revenue metering
- Bus or cable connecting provisions to customer supplied metering cabinet
- Voltage indication via sensors attached to elbow connection of cables
- Automation ready with motors for remote operations
- Now meets arc resistance IEC62271-200 for 25 kA Sym / .25 seconds (no venting)



▲ 900A Bus with 900 A Utility Feed

Load and Fault Interrupting Switchgear

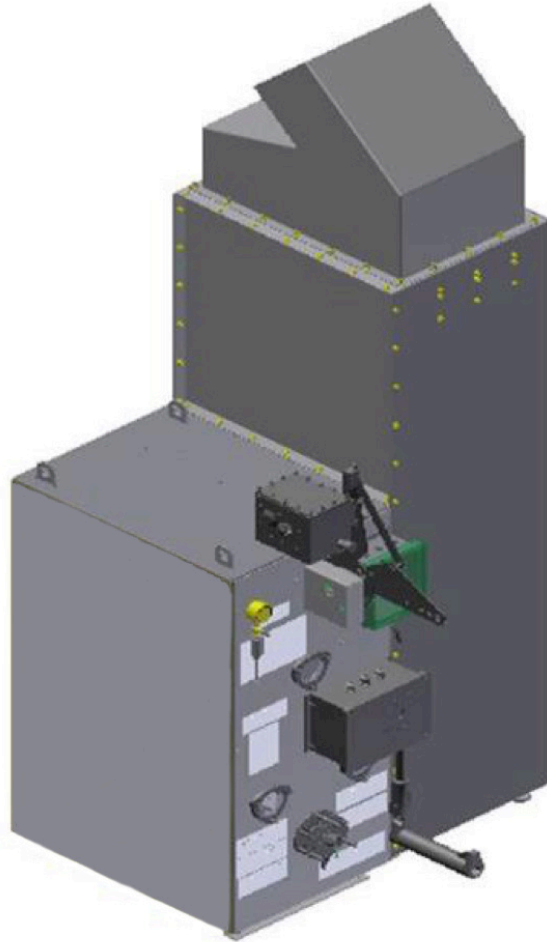
ARC RESISTANT SWITCHGEAR

An internal arcing fault is an unintentional discharge of electrical energy within an enclosed structure. When the arcing fault occurs, the available short circuit current will flow through the arc between phases and/or from phase(s) to ground. The released energy from an electrical arc heats the SF6 gas or air within an enclosed structure, resulting in a pressure rise.

While incidence of an internal fault in medium voltage switches is very rare, when an arc fault occurs it may seriously damage the electrical equipment and its surroundings. There are two design strategies that can be used to create arc resistant switches that will prevent this from occurring:

- 1) Containment: The switch is able to withstand the pressure rise during the internal arc fault without rupture. No hot gases escape from the switch.
- 2) Rupture and vent: The switch is equipped with a rupture disc that ruptures at the preset pressure. Hot gases escape from the switch into the exhaust compartment where they will be either contained or directed away from the operator by a system of channels and vent flaps.

To maximize operator safety, G&W has created a distinct switch tank geometry to contain an internal arc fault of 25kA for 0.25 seconds in SF6 according to IEC62271-200 standard. The tank is able to withstand an internal pressure of 170psi maximum without rupturing. The ability to contain this pressure rise makes this tank design ideal for use in pad-mount and vault applications requiring no exhaust compartments, vents, or channels.



RATINGS

Voltage Class (kV)	15	25	35
Maximum Voltage (kV)	15.5	27	38
BIL Impulse (kV)	110	125	150
1 Min Withstand AC (kV)	35	60	70
1 Min Withstand Production test rating AC (kV)	34	40	50
15 Min Withstand DC (kV)	53	78	103
Continuous and load break current (A)*	630*	630*	630*
Momentary Current (kA) asym	40	40	40
Fault-Close 3-times (kA) asym	32**	32**	32**
1 Sec Current (kA) sym	25	25	25
Mechanical Operations	2000	2000	2000

* 900A continuous available

** 40kA available

System Protection

CURRENT LIMITING PROTECTORS

For Utility Grid Application

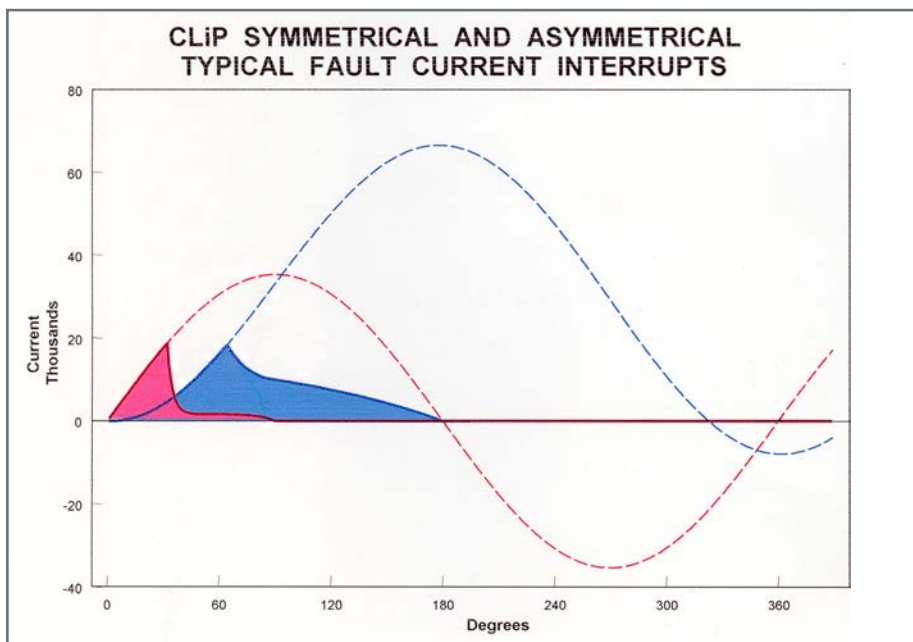
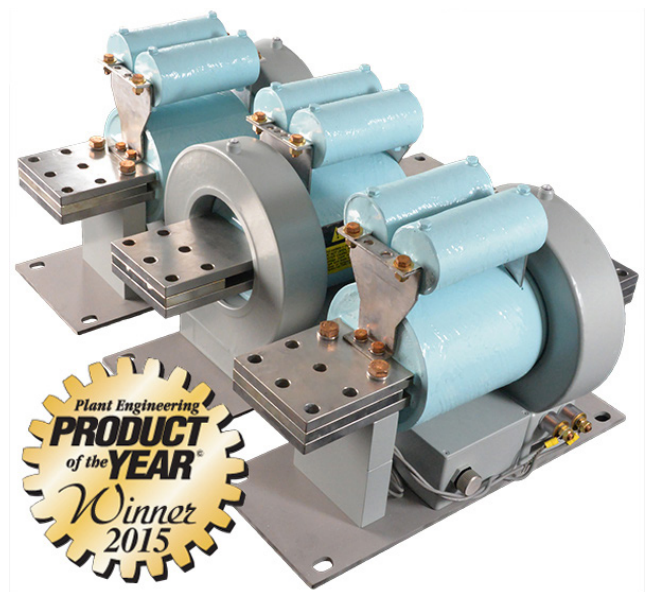
G&W's Current Limiting Protector (CLiP®) offers the benefits of current limitation to systems through 38kV, 5000A continuous current and provides fault interruption to 120kA and beyond. This unique device can be used to protect both the utility grid from excessive wind farm fault contributions and the wind farm system from any massive utility grid fault currents. G&W's CLiP limits the current which can protect under-rated switchgear or even permit the use of less expensive, lower rated gear.

The CLiP allows any overloads and lower level faults to be cleared by other existing devices and acts as catastrophic protection for the system by limiting the peak fault currents as well as minimizing let-through energy.

These devices can be particularly effective when placed at the collector locations. They can protect the low rated gear on the generation side. This permits use of lower impedance grid transformers which will improve the output efficiency of the whole wind or solar farm for the life of that system.

The CLiP is quite effective as an Arc Flash and Arc Blast mitigation tool. Energy levels are commonly reduced to less than 1% of that from a 5 cycle breaker. Flame suits do not reduce the explosive blast, whereas the CLiP can minimize the concussion as well as lower the required PPE category.

CLiPs can be remotely enabled or disabled. The units provide a remote indication of operation feature permitting integration into a SCADA or other automation scheme to initiate secondary responses set by the utility after a trip has occurred.



RATINGS

Voltage Class (kV)	Up to 38kV*
Continuous Current (A, rms, sym)	Up to 5,000*
Interrupting Rating (A, rms, sym)	Up to 200kA*
Peak let-thru current @ 40kA rms, sym @ 14kA trip level	21kA
Available trip levels kA instantaneous	Up to 42*

*Consult factory for higher ratings.

Solid Dielectric Reclosers

PRODUCT FEATURES:

G&W offers a variety of solid dielectric reclosers designed to provide overcurrent protection on distribution systems rated 15.5 through 38kV, 800A continuous current and 12.5kA symmetrical interrupting. The units are comprised of epoxy encapsulated vacuum interrupters attached through a drive rod to a high speed magnetic actuator. Tradenamed “Viper” reclosers, there are four models available.

- G&W Viper reclosers are maintenance-free. There is no gas or oil insulation levels to inspect or test on a regular basis.
- In comparison to SF₆ or metal enclosed switchgear, Padmounted Viper reclosers are a more economical solution. Continuous currents and fault duty ratings of Viper reclosers are sufficient for most applications.
- Designed to operate for a service life of 30 years. This includes up to 10,000 full-load operations, giving the site owner the ability to open and close the circuit depending on fluctuations in utility rates.

Other G&W benefits considered and deemed critical to the success of this installation include:

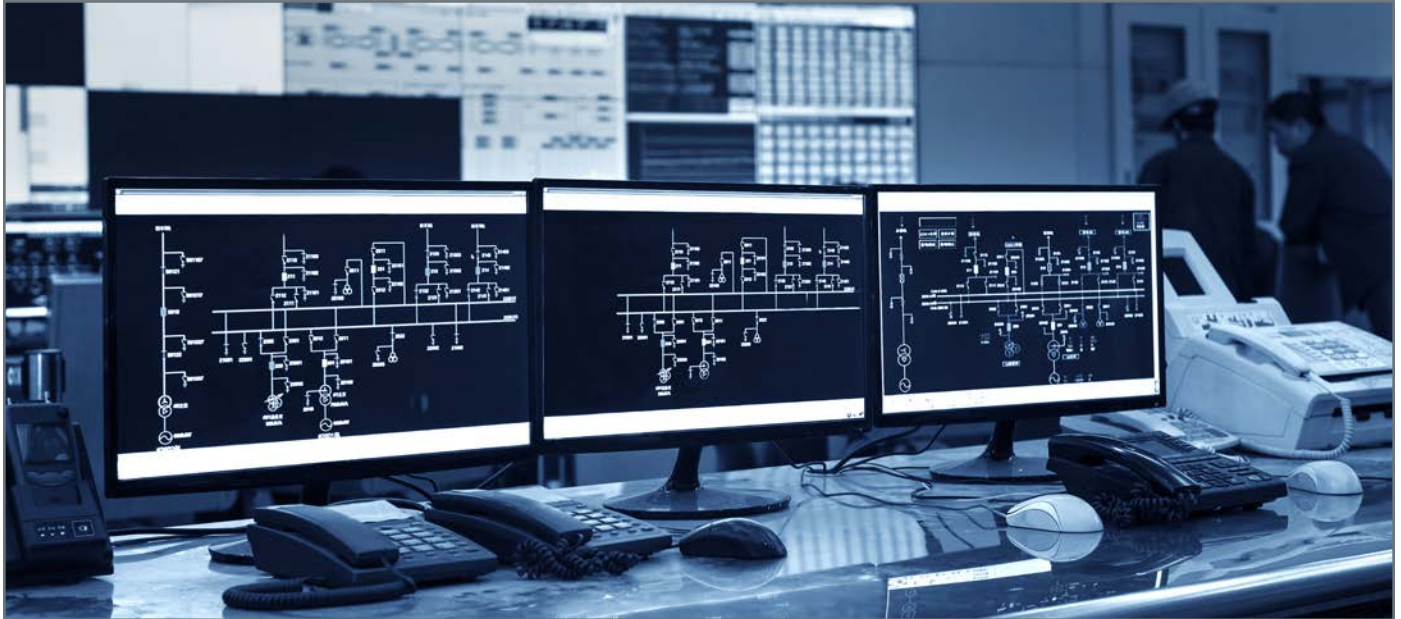
- Six integral voltage sensors make it easy for the customer to monitor PV and utility voltage even when the interconnect point is open
- The Viper’s fully grounded solid dielectric insulation provides a dead front design for safety, limiting operator exposure to energized parts
- Interrupter module shape flexibility allows the customer to orient the G&W recloser in accordance with existing cable construction. Cables can be brought in on one or both sides of the medium voltage compartment.
- Integration of the SEL 651R2 relay control provides a familiar and highly capable platform which the developer is using to manage protection requirements and remote communications.
- With over 30,000 Viper reclosers installed worldwide, G&W offers a field-proven solution familiar to many utilities



▲ Padmount Viper-S recloser

RATINGS

Voltage Class (kV)	15	25	35
Max System Voltage (kV)	15.5	27	38
BIL (kV)	110	125	150
Continuous Current (A)	800	800	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
Temperature Range	- 40° C to +65° C (-40° F to 150° F)		



The 'nerve center' for a renewable generation facility is the control and data acquisition system. It allows the individual turbines, substation, and the meteorological sensors to be integrated into a central location for monitoring, control, reporting, and optimization. Most well known turbine manufacturers have their own proprietary SCADA systems but lack the flexibility to integrate other equipment including protective devices and turbines or customize the user interface. G&W's Lazer Automation solution, Lazer Renewables, incorporates these features by utilizing a platform that has been in the energy business for over 45 years. G&W and our sister company, Survalent Technology, have partnered to provide a Lazer Automation SCADA solution that is ideally suited to renewable energy generation facilities. It is based on Survalent's WorldView software which has one of the most user friendly, and customizable, interfaces in the industry. The Lazer Renewables package includes the software, customized for the Renewable Industry, any necessary hardware, and G&W expertise for training, commissioning, and customization.

User Friendly

The software interface consists of a high-resolution map of the owner's system that can be developed or imported directly from an existing GIS system. From there the operator can zoom in to specific areas or equipment, with each view being custom configurable from an existing library, imported (DWG / DXF and all bitmap formats), or developed in-house. The software also supports a high level report generation capability that allows custom formatting and scheduling of on-demand and periodic reports. The reports include data from both the real-time and historical databases.

In addition to the set up flexibility, operators can view the system map and information from any networked device

using the WebSurv application. WebSurv is a powerful, secure web-browser based application which provides real-time SCADA information across an entire enterprise. It acts as an instant, out-of-the-box solution providing unparalleled ease of use and access to information as well as reducing the need for additional software licenses.

Flexible and Secure

The Lazer Renewables package was designed around open hardware platforms, protocols, and standard database exchange standards. This means it can easily incorporate any RTU or processor that communicates a standard protocol such as ModBus, DNP, or others. No more proprietary vendor communication that locks you into a single manufacturer when it is time to expand. In addition to that, the system can easily exchange data with other software systems through ICCP and MultiSpeak.

Open architecture is important but security is critical. Lazer Renewables features user account passwords with a minimum 128-bit encryption and are neither stored nor transmitted in plain text. Access is settable for individual users to view, control, or have full administrative rights. Other features include the ability to set password change frequency, inactivity timeout, disable account, deny remote access, and logging of account access.

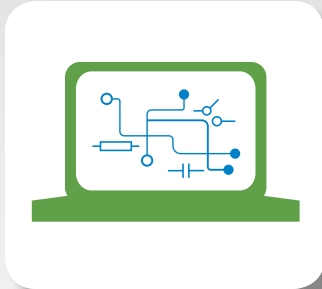
The Lazer Renewables package also offers security from cascading communication failures and natural disasters. Each site's master control can be run in parallel with up to three additional identical controls (quad-redundant) running which can be either on site or at a remote location. These additional controls will take over if the master control fails for any reason giving maximum reliability under any condition.

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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