

# GENERAC®

POWER SYSTEMS, INC.

## The Natural Gas Standby Power Solution— Generac's QT Series Commercial Product Line

### WHITE PAPER



### INTRODUCTION

Generac's QT Series commercial product line is a significant new offering in the standby power market. These gaseous-fueled gensets, with outputs ranging from 15 to 150 kilowatts, encompass advances in design, manufacturing and performance that will make them a superior, high value solution for a wide range of applications:

- Medical offices
- Dental offices
- Service stations
- Convenience stores
- Fast food outlets
- Restaurants
- Schools
- Manufacturing facilities
- Automotive repair shops
- Office buildings
- Strip malls
- Printers / copy centers
- Movie theaters
- Supermarkets
- Farms and ranches
- Fitness centers
- Churches
- Municipal buildings
- Pumping stations
- Auto dealers
- Specialty stores
- Apartment buildings
- Senior living centers
- Police / fire stations

For a variety of reasons, these automatic standby power systems are especially suitable and attractive for small and medium-sized businesses. Retail enterprises such as drug stores, restaurants, gas stations, convenience stores, supermarkets and other kinds of storefront businesses will find them particularly cost-effective compared to previous backup power options. For those who have not yet invested in standby power generation to protect their business because of the cost, the economics should now be compelling.

In all of its products, Generac Power Systems strives to ensure quality and maximize customer value. This commercial line embodies our philosophy by combining technical innovation with attractive pricing in a product that is designed for easy installation by most electrical contractors. We believe that combination will have a significant and positive impact on the market and be of great benefit to our customers.

## **GASEOUS-FUELED GENSETS —THE BEST CHOICE FOR STANDBY POWER**

For standby power systems, gaseous fuels — natural gas or liquid propane (LP) vapor - are vastly superior to diesel fuel, for a variety of reasons:

### **Disadvantages of Diesel Fuel**

- Diesel tanks require refueling, which is often problematic during an extended power outage
- Diesel fuel requires storage on-site in expensive double-walled tanks
- On-site fuel storage may be limited by local ordinance
- Placement of a diesel fuel tank will require local permits
- Underground diesel storage tanks are subject to increasingly stringent restrictions and greater cost
- On-site diesel fuel presents a risk of spillage and consequential liability
- Diesel fuel requires maintenance to prevent deterioration over time
- Diesel fuel emits an odor generally deemed unpleasant

### **Advantages of Gaseous Fuel**

- Natural gas is delivered reliably and continuously underground
- Natural gas demand drops significantly during a power outage, assuring more than adequate supply
- Historically, natural gas has cost less than diesel fuel
- Gaseous engines are quieter than diesel engines in terms of noise, vibration and harshness
- Spark ignited engines start more easily than diesel engines in cold climates
- Gaseous engines emit far fewer pollutants than diesel engines and are environmentally friendly

Due to the implementation of Tier III emission regulations mandated by the Environmental Protection Agency, new diesel-powered equipment is going to be even more costly than current diesel offerings. It is anticipated that manufacturers of diesel engines will increase prices on the new versions that incorporate the advanced technology to recover their considerable development costs. When considered in that light, gaseous-fueled products represent an even greater value.

## **GENERAC'S COMMERCIAL PRODUCT LINE MODELS**

In meeting the needs of this market, Generac has created an array of models covering a broad range of power outputs from 15 to 150 kilowatts. Depending upon the model and output rating, these products feature a variety of different characteristics:

- 2 pole or 4 pole alternator
- 1800 or 3600 rpm operation via direct drive, or intermediate speeds via gearbox
- All models have electronic governors
- Three control options
  - R-100 standby control panel with new enhancements
  - PowerManager® G-200 paralleling digital control panel with SC-200 system controller
  - PowerManager® H-100 single generator digital controller
    - Single phase outputs, 120 / 240 V (up to 70 kW)
    - Three phase outputs, 120 / 208 V, 277 / 480V (70 kW and above)

### 4 Pole Direct Drive Models

Engine Type	Power Output	Engine Speed	Type Of Controls
1.5 L Mitsubishi I-4	15 kW	1800 rpm	R-100
2.5 L Ford I-4	20 kW	1800 rpm	R-100
2.5 L Ford I-4	25 kW	1800 rpm	R-100
3.0 L Ford V-6	30 kW	1800 rpm	R-100
3.9 L Chrysler V-6	40 kW	1800 rpm	R-100
5.4 L Ford V-8	55 kW	1800 rpm	H-100
6.8 L Ford V-10	70 kW	1800 rpm	H-100

### 4 Pole Gear Drive Models

Engine Type	Power Output	Engine Speed	Type Of Controls
5.4 L Ford V-8	80 kW	2650 rpm	H-100
6.8 L Ford V-10	100 kW	2350 rpm	H-100 or G-200 option
6.8 L Ford V-10	130 kW	3000 rpm	H-100

### 2 Pole Direct Drive Models

Engine Type	Power Output	Engine Speed	Type Of Controls
1.5 L Mitsubishi I-4	20 kW	3600 rpm	R-100
1.5 L Mitsubishi I-4	25 kW	3600 rpm	R-100
3.0 L Ford V-6	50 kW	3600 rpm	R-100
3.9 L Chrysler V-6	70 kW	3600 rpm	R-100
5.4 L Ford V-8	100 kW	3600 rpm	H-100
6.8 L Ford V-8	150 kW	3600 rpm	H-100 or G-200 option

The 2 pole and gear driven units are smaller and lighter in weight than competing units, making them easier and less costly to install.

## SOUND REDUCTION & MITIGATION

Considerable attention has been given to reducing the noise characteristics of these units:

- All models feature sound attenuated enclosures and internal mufflers.
- Baffles for both intake and exhaust air are designed for sound attenuation on all units.
- The design, selection and integration of fans and radiators have been given special attention to maximize cooling effectiveness and reduce fan noise.
- Fan drives are assisted by thermally activated slip clutches on all 1800 rpm units that will speed up the fan (to 2000+ rpm) to optimize cooling when the engine is loaded. During exercise, the fan will operate at a lower and quieter speed (1000+ rpm).
- All models have insulated exhaust pipes.

## QUIET-TEST™ EXERCISE FEATURE

Because generators typically run for fifteen to twenty minutes once a week during a self-exercising routine, noise outputs during that time may be of concern. To obviate harsh or unpleasant sound, Generac has developed its new Quiet-Test™ exercise feature, which can be selected using the control panel keyboard. The 'QT' product line takes its name from this patent pending feature, which is not offered by any other manufacturer.

The Quiet-Test routine is initiated whenever the genset is operating and normal utility power is present. The generator starts up and operates at a reduced speed while exercising, reducing sound output by as much as 12 decibels for units that normally run at higher speeds under load.

This enhancement is especially beneficial in commercial areas where retail stores are clustered and / or residences are nearby.

## **MODULAR POWER SYSTEM CAPABILITIES**

Two three-phase models in the QT Series (100 and 150 kW) offer an optional G-200 paralleling digital controller with SC-200 system controller. That configuration gives them onboard paralleling capability, making them fully compatible as elements of a Generac Modular Power System (MPS). This means that multiple gensets of this or any other MPS type can be easily combined and paralleled to create higher output systems.

This capability is particularly effective in creating MPS natural gas systems that cost significantly less than large, single engine alternatives. The MPS approach also provides additional benefits at no extra cost — redundancy, scalability, flexibility and availability.

For instance, a 600 kW single engine natural gas genset from another manufacturer, with a sixteen week lead time, costs approximately \$140,000. It is a heavy, bulky and expensive piece of machinery that is one-dimensional in its capabilities.

The Generac MPS alternative combines four 150 kW QT gensets, and is available in just six weeks (or less) at an approximate cost of \$66,000 — a savings of \$74,000, or 52%. The suggested retail prices and lead times cited here are for comparison purposes, but are representative. Actual costs and delivery times may vary, but the price differential is significant and the lead time is far shorter.

The smaller and lighter Generac MPS gensets can be placed in any configuration on site — side by side, end to end, together or apart. Because they offer the smallest size and lightest weight per kilowatt in the industry, they're also more suitable for roof mounting, where the weight can be more evenly distributed.

Because of their modular nature, these gensets can be purchased as needed, providing the benefit of system scalability. For a growing enterprise, instead of making a large initial expenditure to match anticipated needs that may or may not develop, the MPS solution allows the system to expand as power needs increase.

## **GENERATOR CONTROL OPTIONS**

Generac's three control systems offer a variety of capabilities and are designed to provide decades of reliable service. Within the controllers and throughout the genset wiring, Generac uses sealed electrical connectors to ensure the viability of the electronic command and sensor signals.

### **R-100 Digital Controller**

The R-100 digital controller is an enhanced version of Generac's well-proven automatic home standby control panel. This new model features a 16-bit microprocessor that allows the R-100 to provide comprehensive system control of engine, generator and transfer switch functions.

The R-100 digital controller features additional sensor functions and seven indicator lights that denote operating conditions and aid in basic diagnostic testing:

- System ready
- Low fuel pressure
- Low oil pressure
- Low battery strength
- High coolant temperature
- Overspeed
- Overcrank

## **PowerManager® H-100**

The PowerManager® H-100 controller is a Digital Control Platform that represents a single point of control for engine, generator and transfer switch functions. Housed in a heavy-duty sealed casing is a 32-bit microprocessor that smoothly manages the entire system.

The H-100 features two display screens for easy monitoring of engine, generator, transfer switch and utility power status. In addition to six primary menu pages, there are numerous diagnostic displays that offer a more detailed look at the system's different functions. Remote monitoring is made easy via Generac's GenLink® software and an optional phone line modem.

## **PowerManager® G-100 & G-200**

The PowerManager® G-100 and G-200 controllers operate single or multiple gensets, respectively. They are also Digital Control Platforms with an array of capabilities that include performance logging, maintenance tracking and in-depth diagnostic access. The G-200 works in conjunction with the SC-200 System Controller, which facilitates the operation, monitoring, and paralleling of two or more gensets.

These are state of the art controllers that incorporate the latest digital technology within a robust, integrated communication system. Signal integrity is ensured through the use of 4 to 20 milliamp (mA) control signals, which are resistant to electromagnetic interference. This reduces "false alarms" that cause unnecessary shutdown of the generator due to signal or sensor interference.

The PowerManager® System architecture uses a 32-bit microprocessor that provides centralized processing of many generator functions:

- Engine monitoring
- Governor control
- Voltage regulation
- Protection
- Synchronization of multiple units
- Load sharing for multiple units
- Automatic transfer switch control

Internal electronics of the PowerManager® System are enclosed within sealed aluminum casings to protect against:

- Vibration
- Dust
- Heat
- Moisture
- Corrosion
- Electromagnetic interference
- Radio frequency interference
- Static discharge

## **UL 2200 LISTING FROM UNDERWRITERS LABORATORIES**

Underwriters Laboratories Inc. (UL) is the leading independent product safety certification organization in the United States. The UL mark is widely recognized as a standard for various electrical and building codes, and is often called for as a specification.

The UL 2200 Listing is a comprehensive safety standard encompassing the design, construction, and performance of stationary engine generators producing up to 600 volts. It is also an independent verification of the electrical output of such generators, ensuring they are capable of producing power equal to their claimed kilowatt rating. For buyers, this is an important certification because not all manufacturers are able to offer it, making their published kilowatt output ratings questionable.

All Generac gensets are UL 2200 Listed, including the new QT Series products.

## MAXIMIZING CUSTOMER VALUE

As a vertically integrated manufacturer, Generac is able to control quality, cost, and the flow of materials throughout the manufacturing process. This manufacturing strength has been a positive driver in the development of the commercial product line.

During the conception, design and manufacturing process, considerable attention is given to maximizing customer value by offering superior products at the most competitive prices. This has been accomplished through innovative product design, reduced production cost and shorter lead times.

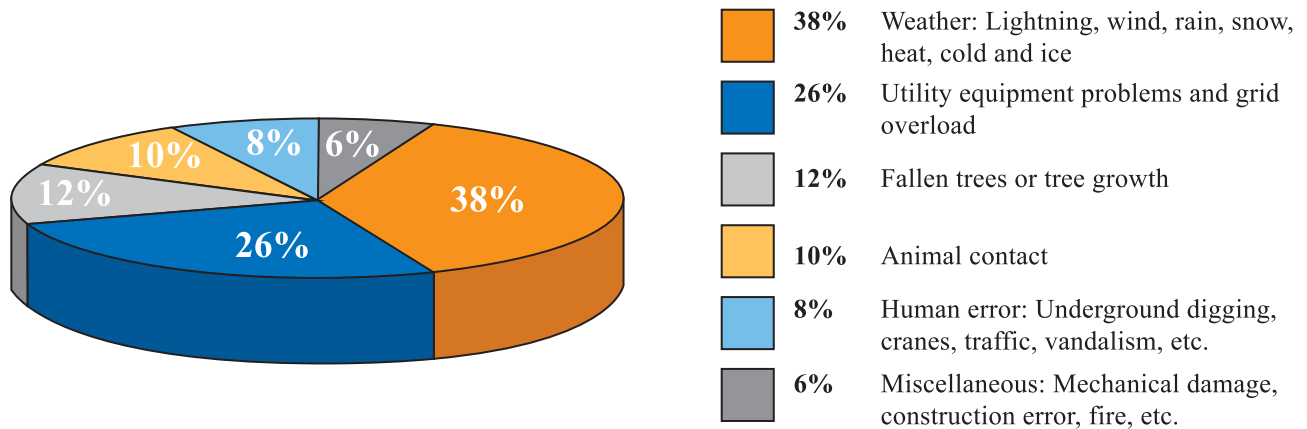
- The QT Series has been created with a commonality of design and components.
- Certain internal parts are galvanized to bolster corrosion protection.
- Manufacturing resources have been devoted to producing these products in the most efficient manner and with the shortest possible lead times.

## MOTHER NATURE PLAYS NO FAVORITES

No matter the geographic location, there are devastating events that can interrupt utility power and bring life — and business — to a standstill.

- Lightning storms
- Tornadoes
- Wind storms
- Hurricanes
- Ice storms
- Wildfires

Even though severe weather is the primary cause of utility power loss, just 38% of all outages are weather related. There are a myriad of other problems that can trigger an outage at any moment, making a backup generator a valuable form of business protection.



Those in an area prone to severe weather may be more likely to experience an outage, but no one is immune to a potential blackout. Everyone is vulnerable.

## BUSINESS ECONOMICS 101 — THE STANDBY POWER ADVANTAGE

When it comes to investing in backup power, the cost / benefit analysis is surprisingly simple — a standby power system will pay for itself during the first extended outage.

Without power, businesses are in trouble. Cash registers and computers shut down. Employees are idled. Manufacturing processes are disrupted. Customers are inconvenienced, or worse yet, turned away to competitors. Refrigerated goods spoil.

When an outage persists for more than a few hours, it becomes far more than just a nuisance. Costs mount quickly and revenue stops coming in. Customer goodwill is negatively impacted. It's a nightmare that doesn't end until the power is back on, and there is no way to predict when that might be.

In computing losses, running the numbers is easy — and so is the answer to this potential problem. By comparing the lost revenue per hour to the approximate installed cost of a standby power system, the payback becomes crystal clear.

<b>Business</b>	<b>Lost Sales Per Hour</b>	<b>Typical kW</b>	<b>Approximate Installed Generator Cost</b>	<b>Payback Hours</b>
Gas / convenience store	\$445	30	\$11,800	26
High volume restaurant	\$705	50	\$12,900	18
Drug store	\$1,400	70	\$15,600	12
Supermarket	\$3,510	150	\$29,550	9
Home center retailer	\$6,525	150 x 3 (MPS)	\$75,350	12

Though the numbers cited are only approximations, the conclusion is evident. This is an investment well worth making, from a loss avoidance standpoint alone. There are additional benefits if competitors are closed during an outage and their customers can be served by the business that is operating on standby power.

Best of all, investing in a standby power system is a cost-effective long-term solution. With just a modest outlay for scheduled maintenance, a Generac standby power system will provide decades of reliable service.

## **CONCLUSION**

The QT Series is a superior standby power solution for a wide variety of 15 to 150 kilowatt applications. Higher kW requirements can be satisfied using the 100 or 150 kilowatt models that feature Generac's built-in paralleling technology, at a price that is far less than traditional solutions.

Natural gas is the fuel of the future, and these gensets are cleaner and more affordable than traditional diesel alternatives. They also embody the latest in Generac's industry-leading technologies and are designed for durability, long life and quieter operation.

Generac is focused on maximizing customer value and offers industry-leading pricing. By making reliable standby power as affordable as possible, we believe that businesses will no longer regard a generator as too expensive, or something they can do without. For a wide variety of enterprises, this effective, long-term solution will be a wise business investment that will provide benefits for years to come.