



SENTRY-PRO POWER SYSTEMS

By Gillette Generators, Inc.

MODEL
SP-410
60 HERTZ

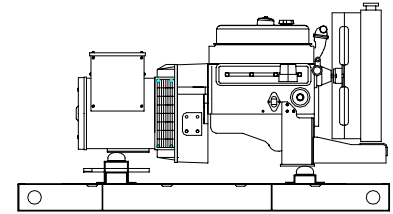
LIQUID COOLED LPG/NG ENGINE GENERATOR SET

KW POWER RATINGS RANGE FOR 60 HZ

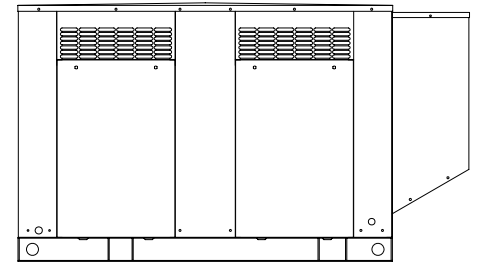
| Model | HZ | STANDBY 130°C RISE | | PRIME 105°C RISE | |
|------------------------|----|-----------------------|------|---------------------|------|
| | | LPG | N.G. | LPG | N.G. |
| SP-410-60 HERTZ | 60 | 41 | 38 | 40 | 31 |

STANDARD FEATURES

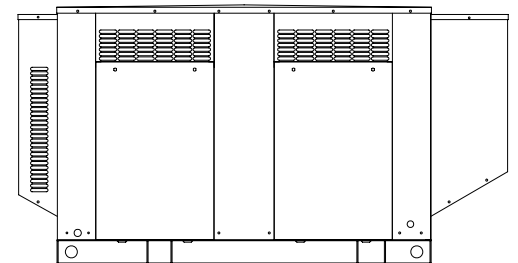
- All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.
- All generator sets will accept 100% rated load in one step, per NFPA-110.
- All generators are UL-1446 certified. Certain generator are UL 2200 certified.
- Solid state, frequency compensated voltage regulation is standard on all gen-sets.
- Electronic engine governor incorporates a throttle body actuator, which allows precise isochronous frequency regulation.
- A brushless rotating field generator design with shunt wound excitation system and connectable at 1 phase or a broad range of 3 phase voltages.
- SENTINEL "COMMAND" digital controller allows programming to basic engine functions in the field. Controller has stop-manual-auto mode and engine shutdowns, signaled by full text LCD indicators
- All generator set control systems components and accessories provide a 1-year limited warranty at time of initial start-up. Generators and engines are governed by separate warranties.
- "OPEN" Generator Sets: There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation Muffler and flexible exhaust hose are not supplied, as installation requirements are not known. However, these two items are available as optional equipment.
- "STANDARD" Housing: Full weather protection and above average sound attenuation for normal applications. Residential grade muffler standard.
- "SUPER-SILENT" Housing: Full weather protection and superior sound attenuation for specific low noise applications. Critical grade muffler is standard.



"OPEN" GEN-SET



"STANDARD" HOUSED GEN- SET



"SUPER-SILENT" HOUSED GEN-SET

GENERATOR RATINGS

| GENERATOR MODEL | VOLTAGE | | PH | HZ | LIQUID PROPANE GAS FUEL | | | | NATURAL GAS FUEL | | | |
|-----------------|---------|-----|--------|-----|------------------------------|-----|----------------------------|-----|------------------------------|-----|----------------------------|-----|
| | | | | | 130°C RISE STANDBY RATING | | 105°C RISE PRIME RATING | | 130°C RISE STANDBY RATING | | 105°C RISE PRIME RATING | |
| | L-N | L-L | KW/KVA | AMP | KW/KVA | AMP | KW/KVA | AMP | KW/KVA | AMP | | |
| SP-410-1-1 | 120 | 240 | 1 | 60 | 41/41 | 171 | 35/35 | 146 | 40/40 | 167 | 31/31 | 129 |
| SP-410-3-2 | 120 | 208 | 3 | 60 | 41/51 | 142 | 35/43.8 | 122 | 40/50 | 139 | 31/38 | 108 |
| SP-410-3-3 | 120 | 240 | 3 | 60 | 41/51 | 123 | 35/43.8 | 105 | 40/50 | 120 | 31/38 | 93 |
| SP-410-3-4 | 277 | 480 | 3 | 60 | 41/51 | 62 | 35/43.8 | 53 | 40/50 | 60 | 31/38 | 47 |
| SP-410-3-5 | 127 | 220 | 3 | 60 | 41/51 | 135 | 35/43.8 | 115 | 40/50 | 131 | 31/38 | 102 |

RATINGS: All single phase gen-sets are dedicated 4 lead wiring, rated at unity (1.0) power factor. All three phase gen-sets are 12 lead wiring, rated at .8 power factor. 130°C "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. 105°C "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation on PRIME RATED systems. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 130°C (standby), and 105°C (prime) R/R winding temperature, within a maximum 30°C ambient condition. Generators operated at standby power ratings must not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

APPLICATION AND ENGINEERING DATA FOR MODEL SP-410-60 HZ

GENERATOR SPECIFICATIONS

Type 4 Pole, revolving field design
 Exciter Brushless, shunt excited
 Voltage Regulator Solid State, HZ/Volts
 Voltage Regulation ½%, No load to full load
 Frequency Field convertible, 60 HZ to 50 HZ
 Frequency Regulation ½% (½ cycle, no load to full load)
 Unbalanced Load Capability 100% of standby amps
 One Step Load Acceptance 100% of nameplate rating
 Motor Starting 35% Dip on specific voltages
 Total Stator and Load Insulation Class H, 180°C
 Temperature Rise 130°C R/R, standby rating @ 30°C amb.
 105°C R/R, prime rating @ 30°C amb.
 1 Ø Motor Starting @ 35% Voltage Dip (240V) 120 KVA
 3 Ø Motor Starting @ 35% Voltage Dip (208-240V) 100 KVA
 3 Ø Motor Starting @ 35% Voltage Dip (480V) 152 KVA
 Bearing 1, Pre-lubed and sealed
 Power Leads 12 Leads re-connectable for three phase
 or 4 Leads for dedicated single phase
 Coupling Direct flexible disc.
 Total Harmonic Distortion Max 3½% (MIL-STD705B)
 Telephone Interference Factor Max 50 (NEMA MG1-22)
 Deviation Factor Max 5% (MIL-STD 405B)
 Alternator Self ventilating and drip-proof
 Ltd. Standby Warranty 24 Months from date of start-up or
 1000 hours use, which ever comes first

GENERATOR FEATURES

- Full alternator protection with SENTINEL “COMMAND” controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Alternator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 listing on all alternators. Certain generators are UL 2200 certified.
- Complete engine-alternator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-alternator sets, before shipping.

ENGINE SPECIFICATIONS AND APPLICATIONS DATA

ENGINE

Manufacturer General Motors
 Model and Type Ind. Power Train, Vortec, 4.3L, 4 cycle
 Aspiration Natural
 Cylinder Arrangement 6 Cylinders, V-6
 Displacement Cu. In. (Liters) 262 (4.3)
 Bore & Stroke In. (Cm.) 4 x 3.48 (10.2 x 8.4)
 Compression Ratio 9.05:1
 Main Bearings & Style 4, Babbitt
 Cylinder Head Cast Iron
 Pistons 6, Silicon Aluminum
 Crankshaft Nodular Iron
 Exhaust Valve Forged Steel
 Governor Electronic
 Frequency Reg. (no load-full load) Isochronous
 Frequency Reg. (steady state) ± 1/4%
 Air Cleaner Dry, Replaceable Cartridge
 Engine Speed 1800 rpm
 Piston Speed, ft/min (m./min) 1044 (318)
 Max Power, bhp (kwm) Standby /LPG 65 (49)
 Max Power, bhp (kwm) Standby /NG 59 (44)
 Ltd. Warranty 12 Months or 2000 hrs., first to occur

FUEL SYSTEM

Type LPG or NAT. GAS, Vapor Withdrawal
 Fuel Pressure (kpa), in. H₂O* (1.74-2.74), 7”-15”
 Secondary Fuel Regulator LPG or NG Vapor System
 Auto Fuel Lock-Off Solenoid Standard on all sets
 Fuel Supply Inlet Line 1” NPTF
 * Measured at gen-set fuel inlet, downstream of any dry fuel accessories.

FUEL CONSUMPTION

| LP GAS: FT ³ /HR (M ³ /HR) | STANDBY | PRIME |
|---|-----------|-----------|
| 100% LOAD | 240 (6.9) | 230 (6.5) |
| 75% LOAD | 200 (5.6) | 180 (5.0) |
| 50% LOAD | 145 (4.0) | 140 (4.0) |
| LPG = 2500 BTU X FT ³ /HR = Total BTU/HR LPG Conversion: 8.50 FT ³ = 1 LB. : 36.4 FT ³ = 1 GAL. | | |

| NAT. GAS: FT ³ /HR (M ³ /HR) | STANDBY | PRIME |
|--|----------|------------|
| 100% LOAD | 584 (17) | 550 (15.6) |
| 75% LOAD | 485 (14) | 450 (12.8) |
| 50% LOAD | 375 (10) | 340 (9.6) |
| NG = 1000 BTU X FT ³ /HR = Total BTU/HR | | |

OIL SYSTEM

Type Full Pressure
 Oil Pan Capacity qt. (L) 5.0 (4.7)
 Oil Pan Cap. W/ filter qt. (L) 6.5 (6.2)
 Oil Filter 1, Replaceable Spin-On

ELECTRICAL SYSTEM

Ignition System Electronic
 Eng. Alternator and Starter:
 Ground Negative
 Volts DC 12
 Max. Amp Output of Alternator 70
 Recommended Battery to -18°C (0°F): 12 VDC, Size BCI# 27 or #27F, Max Dimensions: 12 1/4" lg X 7" wi X 9"hi, with standard round posts. Max output at 800 CCA. Battery holder, hold down straps, battery cables, and battery charger, is furnished. Installation of (1) starting battery is required, with possible higher AMP/HR rating, as described above, if normal environment averages -13°F (-25°C) or cooler.

APPLICATION AND ENGINEERING DATA FOR MODEL SP-410-60 HZ

COOLING SYSTEM

| | |
|---|------------------------------|
| Type of System | Pressurized, closed recovery |
| Coolant Pump | Pre-lubricated, self-sealing |
| Cooling Fan Type (no. of blades) | Pusher (10) |
| Fan Diameter inches (cm) | 21" (533) |
| Ambient Capacity of Radiator °F (°C)..... | 125 (51.6) |
| Engine Jacket Coolant Capacity Gal (L)..... | 1.8 (6.8) |
| Radiator Coolant Capacity (including engine)Gal. (L) .. | 5.2 (19.7) |
| Maximum Restriction of Cooling Air Intake and discharge side of radiator in. H ₂ O (kpa)..... | .5 (.125) |
| Water Pump Capacity gpm (L/min)..... | 28 (106) |
| Heat Reject Coolant: Btu/min (kw) | 2320 (40.8) |
| Low Radiator Coolant Level Shutdown..... | Standard |
| Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50 (water/antifreeze) mix. | |

COOLING AIR REQUIREMENTS

| | |
|---|-------------|
| Combustion Air, cfm (m ³ /min) | 98 (2.78) |
| Radiator Air Flow cfm (m ³ /min) | 5000 (142) |
| Heat Rejected to Ambient: | |
| Engine: kw (btu/min)..... | 19.2 (1100) |
| Alternator: kw (btu/min)..... | 7.5 (422) |

EXHAUST SYSTEM

| | |
|---|---------------|
| Emissions LPG (NG); THC+NOx : g/kW-hr..... | 8.17 (7.03) |
| Emissions LPG (NG); CO : g/kW-hr..... | 32.02 (21.96) |
| Emissions LPG (NG); bsfc : g/kW-hr..... | 234.1 (225.7) |
| Muffler Inlet – Outlet Size..... | 2.5" |
| Max. Back Pressure in. hg (KPA)..... | 3" (10.2) |
| Exhaust Flow, at rated kw: cfm (m ³ /min)..... | 330 (9.4) |
| Exhaust Temp., at rated kw: °F (°C) | 1240 (652) |
| Engines are EPA certified for LPG and Natural Gas. | |

SOUND LEVELS

| | Open Set | Std. Encl. | Super-Silent Encl. |
|--|----------|------------|--------------------|
| dB(A), Residential Muffler, no load | 78 | 73 | N/A |
| dB(A), Residential Muffler, full load..... | 80 | 75 | N/A |
| dB(A), Critical Muffler, no load | 74 | 70 | 68 |
| dB(A), Critical Muffler, full load..... | 75 | 72 | 69 |

Note: Open sets (no enclosure) has no furnished muffler system due to unknown job-site applications. Standard enclosure has installed residential muffler. Super-Silent enclosure has installed critical muffler. Standard enclosure sets can be upgraded from residential to critical muffler. Sound tests are averaged from several test points and taken at 23 ft. (7 m) from source of noise.

DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft.(305m) above 3000 ft.(914m) from sea level

DERATE GENERATOR FOR TEMPERATURE

2% per 10°F (5.6°C) above 85°F (29.4°C)

DIMENSIONS AND WEIGHTS

| | Open Set | Standard Enclosure | Super-Silent Enclosure |
|-----------------------------|------------|--------------------|------------------------|
| Length in (cm)..... | 78 (198) | 94 (239) | 110 (280) |
| Width in (cm)..... | 42 (107) | 42 (107) | 42 (107) |
| Height in (cm)..... | 36 (91) | 53 (134) | 53 (134) |
| 1 Ø Net Weight lbs (kg) .. | 1326 (601) | 1806 (819) | 1986 (901) |
| 1 Ø Ship Weight lbs (kg) .. | 1406 (638) | 1936 (878) | 2146 (973) |
| 3 Ø Net Weight lbs (kg) .. | 1316 (597) | 1796 (815) | 1906 (865) |
| 3 Ø Ship Weight lbs (kg) .. | 1396 (633) | 1956 (887) | 2066 (937) |

SENTINEL COMMAND DIGITAL MICROPROCESSOR CONTROLLER



SENTINEL COMMAND

The “Command” controller is an auto start control module and the upgrade “Command Elite” controller is an auto mains (utility) failure, module, for single gen-set applications.

Both controllers include a backlit LCD display which continuously displays the status of engine and generator at all times. Both will also monitor speed, frequency, voltage, current, oil pressure, coolant temp., and fuel levels. These modules have been designed to display warning and shut down status. They also include: (6) digital inputs • (3) analog inputs • (6) outputs • voltage monitoring (utility mains included on “Command Elite”) • (10) event logs • configurable timers • automatic shutdown or warning during fault detection via red LED indicators • remote start (on or off load) • engine preheat • advanced metering capability • hour meter • text LCD displays • protected solid state outputs • test buttons for: stop/reset • manual mode • auto mode • lamp test • start button.

This controller (installed on all generator models as standard equipment) can be accessed via PC laptop using any standard USB cable and downloadable software.



SENTINEL COMMAND ELITE CONTROLLERS :

The “Command Elite” controller is an auto-mains (utility) failure control module that has almost all the Sentinel “Command” controller features, plus the additional capability of

being able to monitor a mains (utility) power supply. It is also used where remote annunciation is required.

All controllers are simple to operate and feature a user friendly menu layout for improved clarity. Enhanced features include a real time clock, better event, and performance monitoring, plus Ethernet communications for lower cost monitoring.

STANDARD AND OPTIONAL FEATURES FOR MODEL SP-410-60 HZ

CONTROL PANEL:

SENTINEL "COMMAND" digital microprocessor with logic allows programming in the field. Controller has:

- STOP-MANUAL-AUTO modes and automatic engine shutdowns, signaled by full text LCD indicators:
- Low oil pressure
- High engine temp
- Low Radiator Level
- Three auxiliary alarms
- Battery fail alarm
- Engine fail to start
- Engine over speed
- Engine under speed
- Over & under voltage

Also included is tamper-proof engine hour meter

ENGINE:

Full flow oil filter • Air filter • Oil pump • Solenoid type starter motor • Hi-temp radiator • Jacket water pump • Thermostat • Pusher fan and guard • Exhaust manifold • Residential Silencer • 12 VDC battery charging alternator • Flexible exhaust connector • "Isochronous" duty, electronic governor • Secondary dry fuel regulator • Dry fuel lock-off solenoid • Vibration isolators • Closed coolant recovery system with 50/50 water to anti-freeze mixture • flexible oil & radiator drain hose.

GENERATOR:

AC generator • Shunt excited • Brushless design • Single bearing • Direct connection to engine with flex disc • Class H, 180°C insulation • Self ventilated • Drip proof construction

VOLTAGE REGULATOR:

½% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

ELECTRICAL:

Battery tray • Battery cables • Battery hold down straps • 2-stage battery float charger

WEATHER/SOUND PROOF STEEL HOUSING CORROSION RESISTANT PROTECTION CONSISTING OF:

- 9 Heated And Agitated Wash Stages.
- Zinc Phosphate Etching-coating Stage
- E-Coat: Electrostatic Emerging
- Final Baked On Enamel Powder Coat

ACCESSORY ITEMS

- Engine Coolant Heater with automatic 60°F on, 80°F off, thermostat
- Starting Battery Heater Blanket with automatic 60°F on, 80°F off, thermostat
- Battery Charger, float type, 12 VDC at max. charge, with ammeter.
- External Permanent Magnet Generator (PMG) for increased induction motor starting capacity on 1Ø or 3 Ø sets, and to meet NFPA-110 requirements.
- Exhaust Silencer (Critical Grade) installed on "OPEN" sets or standard housing.

- Circuit Breaker installed and wired on gen-set. Note: NEMA-3R Breakers are shipped loose.
- All aluminum or stainless steel weather and sound deadening housing for coastal areas.
- SENTINEL COMMAND ELITE Controller with all features of Sentinel COMMAND, plus allowing full telemetry remote control annunciation, and utility power monitoring.
- Remote Annunciator for up to (10) reporting functions. An additional relay expansion module, plus a second Annunciator adds another (10) reporting functions. Note: SENTINEL COMMAND ELITE must be selected, to achieve remote annunciation

