

# MB600 - GEM

Liquid Cooled Bi-Fuel Diesel  
Engine Generator Sets

Standby Power Rating  
600KW 60 Hz

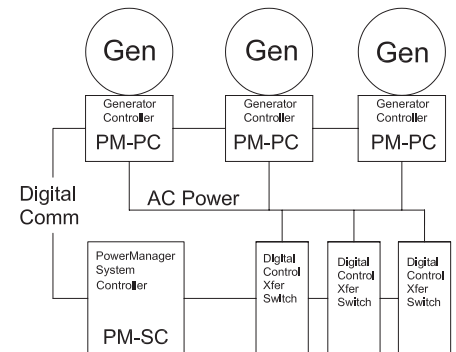
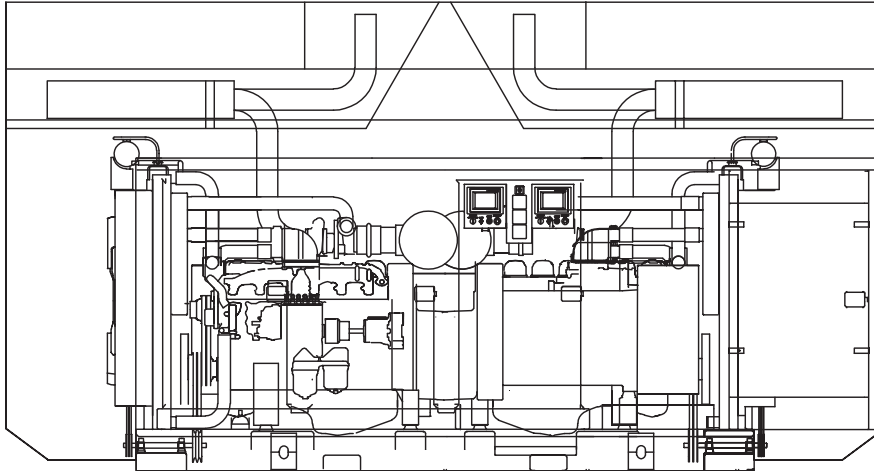
GEMINI Bi-Fuel Series

Power Matched

**GENERAC 12.0DTA ENGINES**

Turbocharged / Aftercooled

Natural Gas With  
Diesel Ignition



## FEATURES

- Twin 12 liter diesel 6 cylinder engines coupled with two 300 kW alternators with permanent magnet excitation on a single base.
- The two units are connected to a common generator bus through a switching mechanism to parallel to each other for combined power output.
- **POWERMANAGER® DIGITAL CONTROL PLATFORM.** The PowerManager® Digital Control Platform (PM-DCP) is a powerful control system built around a 32 bit industrial microprocessor. Standard factory programming controls the entire engine generator system while allowing the PM-DCP, with its onboard PLC, to be customized to meet any application requirement. The system is available on single unit gas, diesel or bi-fuel installations as well as Modular Paralleling Systems (MPS) from 200 kW - 3750 kW.
- Generator control panel on each engine combines with Generac's PowerManager® Digital Control Platform to start, parallel and transfer the load to the two units.
- Generac PowerManager® controls both engines and allows independent operation of a single set for maintenance or reduced load applications. PowerManager® will send a load-shed signal when one engine is unavailable.
- Bi-fuel provides low cost, low volume fuel storage and operation.
- Available with PowerManager® Parallel Controller and PowerManager® System Controller for single or multiple transfer switches.
- Remotely programmable via the available GenLink® Communications Software.
- Solid state digital voltage regulator senses all 3 phases, electronically matches surge loads to the torque curve of the engine.
- Alarm outputs from each engine are separate and remotely accessible.
- Sound attenuated, weather protective enclosure is standard equipment.
- Up to 5 Gemini units can be combined to provide up to 3750 kW of standby power.

# GENERAC®

# APPLICATION & ENGINEERING DATA

GEMINI BI-FUEL 600 KW

## GENERATOR SPECIFICATIONS (EACH GENERATOR)

TYPE .....	Four Pole Revolving Field
ROTOR INSULATION .....	Class H
STATOR INSULATION .....	Class H
ADDITIONAL INSULATION .....	Antifungal Coating
TOTAL HARMONIC DISTORTION .....	<5%
TELEPHONE INTERFERENCE FACTOR .....	<50
BEARINGS .....	Prelubed and Sealed
COUPLING .....	Direct Coupling
LOAD CAPACITY (Standby Rating) .....	100%
TEMPERATURE RISE .....	125°C
WINDING PITCH .....	2/3
ROTOR .....	Dynamically Balanced

## VOLTAGE REGULATOR

REGULATION .....	Digital ± 0.25%
SENSING .....	3 Phase
PARALLELING CAPABILITY .....	Yes

## CONTROL PANEL

PM-PC .....

PowerManager Generator Control DISPLAY

AC VOLTS .....	L/L L/N
AC AMPS .....	Per Line
FREQUENCY .....	10-99 Hertz
OIL PRESSURE .....	Digital Touchscreen LCD
COOLANT TEMPERATURE .....	Digital Touchscreen LCD
FUEL LEVEL .....	Digital Touchscreen LCD
DC BATTERY VOLTAGE .....	Digital Touchscreen LCD
HOUR METER - RUN TIME HOURS .....	Digital Touchscreen LCD
ENGINE SPEED .....	Digital Touchscreen LCD
Generator Power (kW) .....	Digital Touchscreen LCD
Power Factor .....	Digital Touchscreen LCD
Turbo Pressure .....	Digital Touchscreen LCD
Gas Pressure .....	Digital Touchscreen LCD
Gas Flow (CFM) .....	Digital Touchscreen LCD
Air Temperature (Incoming) .....	Digital Touchscreen LCD
Air Temperature .....	Digital Touchscreen LCD
Gas Temperature .....	Digital Touchscreen LCD
Charge Air Cooler Valve Position ° .....	Digital Touchscreen LCD
Not In Auto .....	LED
Common Alarm .....	Flashing LED

## ALARMS

High/Low Generator Voltage .....	Digital Touchscreen LCD
High/Low Battery Voltage .....	Digital Touchscreen LCD
High/Low Frequency .....	Digital Touchscreen LCD
Low Oil Pressure & Prealarm .....	Digital Touchscreen LCD
High Oil Coolant Temp. & Prealarm .....	Digital Touchscreen LCD
Overcrank .....	Digital Touchscreen LCD
Sensor Failure .....	Digital Touchscreen LCD

## Communication

Serial Communication RS232 and RS485, GenLink® .....

Communication Software for PowerManager® Digital Control Platform is provided as standard equipment.

## INTERNAL DUAL CONTACTOR

RATING .....	(2) - 600 Amp
INTERRUPT RATING .....	22,000 Amp
TYPE .....	3 pole, solenoid actuated to a single output
PARALLELING CONTROLLER .....	Generac PowerManager® Controller
PROTECTIVE DEVICES .....	Over/Under Voltage, Over/Under Frequency, Reverse Current, Unequal Load Sharing

## ENGINE SPECIFICATIONS (EACH ENGINE)

MAKE .....	Generac
CYLINDERS .....	6 in-line
DISPLACEMENT - liter (cu. in.) .....	11.9 (729)
BORE / STROKE .....	5.11 / 5.91
ASPIRATION .....	Turbocharged and Aftercooled
COMPRESSION RATIO .....	16.5:1
STARTING MOTOR .....	24 Volt DC
BATTERY CHARGING ALTERNATOR .....	35 Amps 24 Volts
BATTERIES .....	(2) 12V, 700 CCA, 27F
FUEL .....	#2Diesel / Natural Gas 920 BTU/Ft³ LHV
GOVERNOR .....	Isochronous
LUBE OIL CAPACITY .....	8.2 Gallons
COOLANT HEATER .....	240 V, 2000 W
EXHAUST .....	Single Muffler per Engine, 5 inch Diameter Stack

## ENGINE FEATURES

### ECONOMICAL POWER

Microprocessor controlled bi-fuel diesel engine starts on diesel fuel and provides power from an air/natural gas mixture ignited by diesel injection and continuously monitored by the on board control

### EMISSIONS

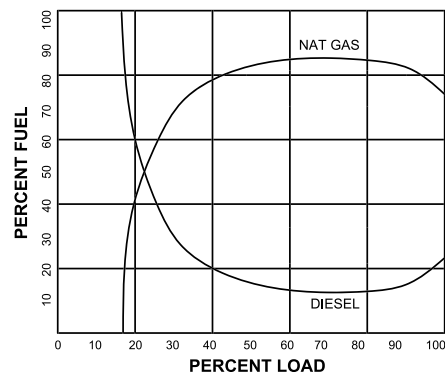
Capable of low particulate and Ox emission levels. Unit is registered with SCAQMD permitting program. (CEP# 414037)

### HOW A BI-FUEL ENGINE WORKS

The diesel engine is equipped with a metering system that feeds natural gas into the incoming air supply. The standard diesel injection pump is used and the injector sprays diesel fuel into the cylinder at the correct time. The diesel fuel ignites and thus ignites the natural gas charge. Total power is derived from a combination of natural gas and diesel fuel as shown in the chart below. The ratio of natural gas to diesel fuel is a function of several factors, including load and intake air temperature. The system is programmed to avoid pre-ignition, but should it occur due to a transient event such as sudden loading or fuel variation, a knock sensor will signal the controller to reduce the flow of natural gas and the diesel injectors will take over to maintain engine speed and required power. The higher thermal efficiency of diesel engines and the lower cost of natural gas, along with low emission levels, combine to make the bi-fuel engine a very economical choice.

### FUEL PRESSURE - NAT. GAS 2 psi MINIMUM FUEL CONSUMPTION

kW	Natural Gas@2PSI		Diesel	
	Ft³/Hr	Gal/Hr	Gal/Hr	Straight Diesel Gal/Hr
150	1019	7.06	13.6	
300	3326	4.07	22.4	
450	4710	3.63	35.4	
600	5008	10.6	42.8	



Fuel usage as a percentage of load\*

Rating definitions - Standby: Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. (All ratings in accordance with BS5514, ISO3046 and DIN6271.) Prime power is not available at this time for Gemini units. \* Percentages and consumption can vary with air temperature and heat content of fuel.

## GEMINI BI-FUEL 600 KW

### OPERATING DATA

	STANDBY	
	kW	RatedAMP
<b>GENERATOR OUTPUT VOLTAGE/KW—60Hz</b> 277/480V, 3-phase, 0.8 pf 600V, 3-phase, 0.8 pf	600 600	902 722
<b>GENERATOR PARAMETERS</b>		
Subtransient Reactance pu.		0.13
Transient Reactance pu.		0.15
Synchronous Reactance pu.		3.12
<b>MOTOR STARTING TOTAL</b>		
Locked rotor kva at 480 Volts		<b>kVA</b>
Instantaneous voltage dip 60 Hz	10%	506
	20%	1126
	30%	1816
	35%	2184
<b>COOLING</b>		
Coolant Capacity System - gal.	22	Total Unit 44
Coolant Flow gallons/min.	59.4	
Heat rejection to coolant BTU/hr.	895,000	1,790,000
Radiator air flow 60 Hz - ft <sup>3</sup> /min	22,000	44,000
Max. operating air temp. onto radiator °F**		140
Max. operating ambient temp. °F**		122
Max. external pressure drop after radiator in. H <sub>2</sub> O		0.5
<b>COMBUSTION AIR REQUIREMENTS</b>		
Flow at rated power 60 Hz - ft <sup>3</sup> /min.	Each Engine 886	Total Unit 1,772
<b>EXHAUST</b>		
Exhaust flow at rated output 60 Hz - cfm	Each Engine 2,494	Total Unit 4,988
Maximum recommended back pressure "Hg		1.5
Exhaust temperature at rated output °F		1330
Exhaust outlet size		5"
<b>ENGINE</b>		
Rated RPM 60 Hz		1800
HP at rated kW <sub>e</sub> (gross) 60 Hz		444 (Each Engine)
Piston speed 60 Hz - ft./min		1772
BMEP 60 Hz - psi		264
<b>POWER ADJUSTMENT FOR AMBIENT CONDITIONS</b>		
Temperature		
-4.5% for every 10 °C above - °C		40
-2.5% for every 10 °F above - °F		104
Altitude		
-0.8% for every 100 m above - m		1066
-2.5% for every 1000 ft. above - ft.		3500

\* Note: Percentages and consumption can vary depending on air temperature and heat content of fuel

\*\* Note: Values given are maximum temperatures to which power rating adjustments can be applied. Consult your Generac representative if operating conditions exceed these maximums.

### SYSTEM DESCRIPTION

The Gemini system consists of twin 300 kW gensets mounted on a common baseframe within a single patented sound-attenuated enclosure. The two generators are paralleled to a common generator bus through a unit-mounted switching mechanism to provide 600 kW of total power output. The control system consists of the PowerManager® System Controller (PM-SC) along with a PowerManager Paralleling Controller (PM-PC) for each 300 kW genset. The PM-SC is provided in a separate NEMA 1 wall-mount enclosure. It interfaces with the two generator controllers to provide start-stop commands based on utility power, proportional load sharing and safe paralleling of each unit to the common generator bus.

The PowerManager control system, including generator controllers, can be locally or remotely viewed and programmed via Generac GenLink® Communications Software. PowerManager also offers upstream digital communications via RS485/Modbus to other supervisory control systems.

### TYPICAL OPERATIONAL SEQUENCE

1. A transfer switch detects a utility failure and issues a start command. The command goes to the PM-SC which then issues a start command to the Generator Controller (PM-PC).
2. Each generator will start on its own.
3. The first generator that attains rated frequency and voltage is connected to the common generator bus via the switching mechanism.
4. The second generator will synchronize and close into the bus via the switching mechanism.
5. When both gensets are paralleled to the bus, the PM-SC will signal the transfer switches to transfer to the load. There is a maximum of 3 programmed steps available for connection of multiple transfer switches.
6. If an NFPA requirement for 10 second start exists, the first unit connects to the bus. This causes the controller in a separate emergency transfer switch to immediately transfer to the NFPA load.
7. If a single generator fails, load shed contacts are available to disconnect selected non critical loads.
8. If load conditions are reduced (night time operation), one generator can be programmed off line (optional).
9. When utility supply returns, the PM-SC will issue commands to transfer loads back to the utility. It then issues commands to the individual PM-PC's to disconnect from the bus. Each PM-PC will operate its generator for the cool-down period and then issue a shutdown command.

# STANDARD FEATURES

# GEMINI BI-FUEL 600 KW

- 12 Liter 1800 RPM Diesel Engines
- 12 Lead 300 kW 60 Hz Generators
- Dual PM-GC Paralleling Controllers
- High Coolant Temperature Automatic Shutdown
- Low Coolant Level Automatic Shutdown
- Low Oil Pressure Automatic Shutdown
- Overspeed Automatic Shutdown
- Crank Limiter (Solid-state)
- Pre-alarms
- Emergency Stop Button
- Serial RS232 and RS485 Output
- Isochronous Governors
- 0.25% Digital Voltage Regulators
- Fuel Shut off Solenoid
- Primary Fuel Filters
- Factory Installed Cool-Flow Radiators
- 2000 Watt Coolant Heater Per Engine
- UV/Ozone Resistant Hoses
- Rubber-Booted Engine Electrical Connections
- 35 Amp DC Engine Driven Alternator Per Engine
- Air Cleaners
- Dual Oil Filters
- Vibration Isolators
- Oil and Antifreeze
- 10 Amp Battery Charger Per Engine
- Batteries (2 – 135 Amp-Hr. Per Engine)
- Stainless Steel Flex Exhaust Connections
- Flex Fuel Lines
- 3 Sets of Owner's Manuals
- Mainline Circuit Breaker (One at each Generator)
- Two Year Warranty
- Sound Attenuated Weather Protective Enclosure
- Critical Grade Muffler (2)
- GenLink® Communications Software
- UL2200 Listed

## POWERMANAGER® DIGITAL CONTROL PLATFORM

The PowerManager Paralleling Controller (PM-PC) is a fully programmable, integrated digital generator control console, using a 32-bit industrial microprocessor to handle all control, monitoring, input and output genset functions. The open architecture used allows customizing the control to meet any customer requirements, yet maintaining the simplicity of operating 'as is' with the factory default programming. (see Generac bulletin #0168840SBY)

## OPTIONS

- **OPTIONAL FUEL ACCESSORIES**
  - Secondary Fuel Filters and Heaters
  - UL Listed Double Wall Base Tanks
  - Base Tank Emergency Vent
- **OPTIONAL ELECTRICAL ACCESSORIES**
  - Battery Warmer
- **OPTIONAL ALTERNATOR ACCESSORIES**
  - Alternator Tropicalization
  - Alternator Heater
- **ADDITIONAL OPTIONAL EQUIPMENT**
  - 21 Light Remote Annunciator
  - Remote Relay Panel
  - 2 and 5 Year Extended Warranties
  - Analog Gauges

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