

# MB600

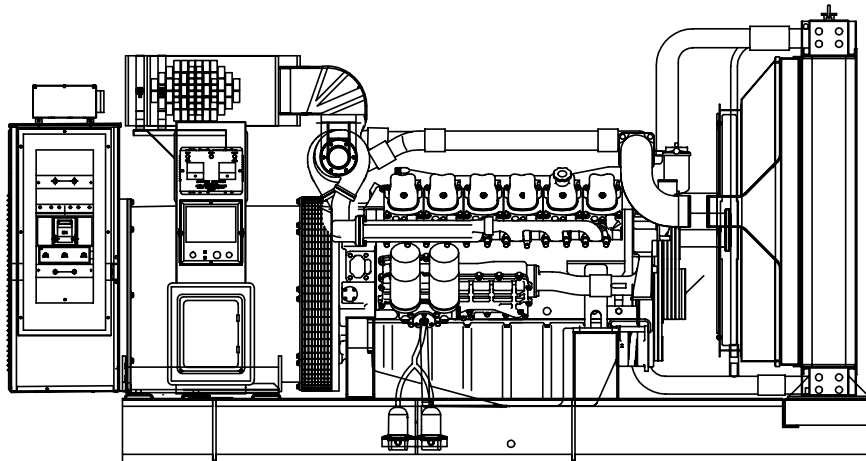
## Bi-Fuel Diesel For Modular Power System (MPS)

Standby Power Rating  
600KW 60 Hz

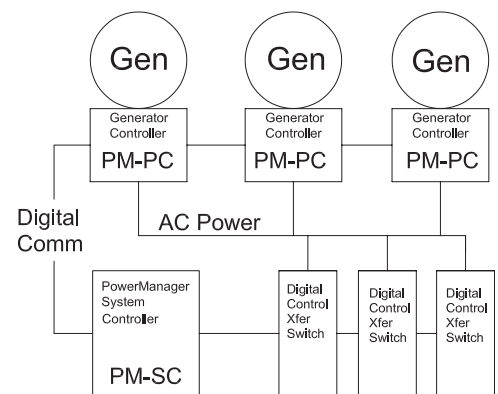
Prime Power Rating  
547KW 60 Hz

Power Matched

**GENERAC 22.0DTA ENGINE**  
Turbocharged / Aftercooled



### PowerManager® Digital Control Platform



## FEATURES

- **INNOVATIVE DESIGN & PROTOTYPE TESTING** are key components of GENERAC'S success in "IMPROVING POWER BY DESIGN." But it doesn't stop there. Total commitment to component testing, reliability testing, environmental testing, destruction and life testing, plus testing to applicable CSA, NEMA, EGSA, and other standards, allows you to choose GENERAC POWER SYSTEMS with the confidence that these systems will provide superior performance.
- **PARALLELING SYSTEM FEATURES:**
  - ✓ AUTO SYNCHRONIZATION
  - ✓ ISOCHRONOUS LOAD SHARING
  - ✓ REVERSE POWER PROTECTION
  - ✓ MAXIMUM POWER PROTECTION
  - ✓ ELECTRICALLY OPERATED MECHANICALLY HELD TRANSFER SYSTEM
  - ✓ REDUNDANT OPERATION AND INCREASED RELIABILITY
  - ✓ UL2200 LISTED
- **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 - 3000 kW.
- **SOLID STATE DIGITAL VOLTAGE REGULATOR** senses all 3 phases, electronically matches surge loads to the torque curve of the engine.
- **BI-FUEL** provides low cost, low volume fuel storage and operation along with a 40% reduction in fuel costs.
- **ECONOMICAL POWER.** Microprocessor controlled bi-fuel diesel/natural gas engine provides long, low cost, reliable life.
- **LONGER ENGINE LIFE.** Generac heavy-duty bi-fuel diesels provide long and reliable operating life.
- **SINGLE SOURCE SERVICE RESPONSE** from Generac's dealer network provides parts and service know-how for the entire unit, from the engine to the smallest electronic component. You are never on your own when you own a GENERAC POWER SYSTEM.
- **GENERAC TRANSFER SWITCHES, SWITCHGEAR AND ACCESSORIES.** Long life and reliability is synonymous with GENERAC POWER SYSTEMS. One reason for this confidence is that the GENERAC product line includes its own transfer systems, accessories, switchgear and controls for total system compatibility.

# GENERAC®

# APPLICATION & ENGINEERING DATA

MB600 MPS

## GENERATOR SPECIFICATIONS

TYPE ..... Marathon Four-pole, revolving field PMG  
 ROTOR INSULATION ..... Class H  
 STATOR INSULATION ..... Class H  
 ADDITIONAL INSULATION ..... Antifungal Coating  
 TOTAL HARMONIC DISTORTION ..... <5%  
 TELEPHONE INTERFERENCE FACTOR (TIF) ..... <50  
 BEARINGS ..... Prelubed and Sealed  
 COUPLING ..... Direct Connected  
 LOAD CAPACITY(Standby Rating) ..... 100%  
 WINDING PITCH ..... 2/3

### VOLTAGE REGULATOR

Regulation ..... Digitally Controlled  $\pm$  0.25%  
 Sensing ..... Single or 3 Phase  
 Paralleling Capability ..... Yes

### CONTROL PANEL

Type ..... PowerManager Digital Control Platform

### DISPLAY

AC Volts ..... Line to Line and Line to Neutral  
 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 in RPM ..... 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  
 Gas Temperature ..... Digital Touchscreen LCD  
 Charge Air Cooler Valve Position ..... Digital Touchscreen LCD  
 Not in Auto ..... Digital Touchscreen LCD  
 Common Alarm ..... Digital Touchscreen LCD

### 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, Low, Critical Low Fuel Level ..... Digital Touchscreen LCD  
 Overcrank ..... Digital Touchscreen LCD  
 Sensor Failure ..... Digital Touchscreen LCD

### COMMUNICATION

Serial Communication RS232 and RS485  
 GenLink Software for PowerManager® Digital Control Platform

## ENGINE SPECIFICATIONS

MAKE ..... Generac / Doosan  
 MODEL ..... P222FE/6DWXL21.9UYA  
 CYLINDERS ..... V12  
 DISPLACEMENT ..... 22 Liter (1338 cu. in.)  
 BORE ..... 128 mm (5.04 in.)  
 STROKE ..... 142 mm (5.60 in.)  
 COMPRESSION RATIO ..... 15:1  
 INTAKE AIR ..... Turbocharged, Aftercooled  
 CYLINDER HEAD ..... (6) 1-Cylinder Cast Iron with Overhead Valve  
 PISTONS ..... Heat Resistant Aluminum Alloy

## ENGINE SPECIFICATIONS Cont.

### VALVE TRAIN

LIFTER TYPE ..... Solid  
 HARDENED VALVE SEATS ..... Replaceable

### ENGINE GOVERNOR

ELECTRONIC ..... Standard  
 FREQUENCY REGULATION, NO-LOAD TO FULL LOAD ..... 0.5%  
 STEADY STATE REGULATION .....  $\pm$ 0.25%

### LUBRICATION SYSTEM

TYPE OF OIL PUMP ..... Gear  
 OIL FILTER ..... Bypass and Full flow, cartridge  
 CRANKCASE CAPACITY ..... 42 Liters (11.1 U.S. gal.)

## 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.

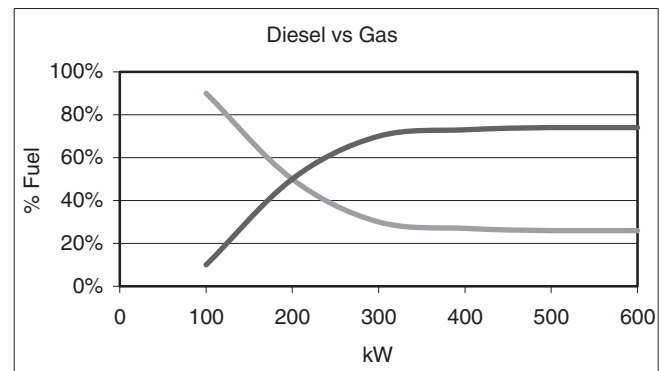
**LONGER ENGINE LIFE** Generac heavy duty bi-fuel diesels provide long and reliable operating life along with low emissions.

**EMISSIONS** Capable of low particulate and NOx emission levels.

### HOW DOES A BI-FUEL ENGINE WORK?

The diesel engine is equipped with a metering system that feeds natural gas into the incoming air supply. The standard diesel injection system 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 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 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 1 psi FUEL CONSUMPTION



Load kW	Gal/Hr Diesel w/Nat Gas	Gal/Hr Straight Diesel	% Nat Gas	Cu.Ft./hr. Nat Gas
100	8	8.9	10%	125
200	8.5	17.0	50%	1187
300	7.5	24.8	70%	2431
400	8.5	31.4	73%	3206
500	9.7	37.2	74%	3843
600	11	43.3	74%	4480

## MB600 MPS

### OPERATING DATA

		STANDBY	
		MB600	
GENERATOR OUTPUT VOLTAGE/KW—60Hz		KW	Rated AMP
277/480V, 3-phase, 0.8 pf	NOTE: Consult your Generac dealer for additional voltages.	600	902
600V, 3-phase, 0.8 pf		600	722
<b>MOTOR STARTING KVA</b>		<b>480V</b>	
Locked rotor kVA at 35% instantaneous voltage dip with standard alternator; 60 Hz-kVA		2100	
with alternate alternator; 60 Hz-kVA		3450	
* see note 1			
<b>FUEL</b>			
Natural gas pressure		1 psi +.025 psi -.001 psi	
Fuel pump lift		(920 BTU/ft <sup>3</sup> minimum) 48	
<b>COOLING</b>			
Coolant capacity	System - lit./gal.	131 (34.6)	
	Engine - lit./gal.	36 (9.5)	
	Radiator - lit./gal.	95 (25.0)	
Coolant flow/min.	60 Hz - lit./gal.	1098 (290)	
Heat rejection to coolant	60 Hz - BTU/hr.	1,740,000	
Radiator air flow	60 Hz - m <sup>3</sup> /min. (cfm)	665 (23,500)	
Max. operating air temp to radiator	°C (°F)	60 (140) * see note #5	
Max. operating ambient temp	°C (°F)	50 (122) * see note #5	
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 - m <sup>3</sup> /min. (cfm)	55.5 (1959)	
<b>EXHAUST</b>			
Exhaust flow at rated output	60 Hz - m <sup>3</sup> /min. (cfm)	182 (6419)	
Maximum recommended back pressure	kPa (" Hg)	5.1 (1.5)	
Exhaust temperature at rated output	°C (°F)	704 (1300)	
Exhaust outlet size		2 - 8" ANSI Flange (Dual Exhaust) or 1 - 10" ANSI Flange (Single Exhaust)	
<b>ENGINE</b>			
Rated RPM	60 Hz	1800	
HP at rated kWe (gross)	60 Hz	864	
Piston speed	60 Hz - m/sec. (ft./min)	8.5 (1677)	
BMEP	60 Hz - psi	284	
<b>POWER ADJUSTMENTS FOR AMBIENT CONDITIONS</b>			
Temperature	-4.5% for every 10° C above - C° -2.5% for every 10°F above - F°	40 104	
Altitude	-0.8% for every 100 m above - m -2.5% for every 1000 ft. above - ft.	1067 3500	

### SYSTEM DESCRIPTION

Multiple generators are paralleled to a common generator bus through a unit-mounted switching mechanism to provide the total power output. The control system consists of the PowerManager® Digital Control Platform (PM-DCP) along with a PowerManager® Parallel Controller (PM-PC) for each 600 kW genset. The PowerManager System Controller (PM-SC) is provided in a separate NEMA 1 wall mount enclosure. It interfaces with the generator controllers to provide start-stop commands based on utility power, proportional load sharing and provides safe paralleling of each unit to the common generator bus.

The PowerManager Digital 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 individual 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 its switching mechanism.
5. When all gensets are paralleled to the bus, the PM-SC will signal the transfer switch or 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 up will connect 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 noncritical 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 to disconnect from the bus. Each PM-PC will operate its generator for the cool-down period and then issue a shutdown command.

#### Notes:

1. Motor starting kVA adds directly for each generator on the bus. With Generac's PowerManager® Digital Control Platform, the load is shared proportionally.

- High Coolant Temperature Automatic Shutdown
- Low Coolant Level Automatic Shutdown
- Low Oil Pressure Automatic Shutdown
- Overspeed Automatic Shutdown (Solid-state)
- Crank Limiter (Solid-state)
- Oil Drain Extension
- Radiator Drain
- Factory-Installed Cool Flow Radiator
- Radiator Duct Adapter On Open Genset
- Closed Coolant System
- UV/Ozone Resistant Hoses
- Rubber-Booted Engine Electrical Connections
- Stainless Steel Flexible Exhaust Connection
- Battery Charge Alternator
- Battery Cables
- Battery Tray
- 24 Volt, Solenoid-activated Starter Motor
- Air Cleaner
- Fan Guard
- Control Console
- Isochronous Governor
- Jacket water heater
- Autosynchronizer
- Isochronous Load Sharing Module
- Reverse Power Protection Relay
- Dead Bus Sensing
- Sync Check Relay
- Main Line Circuit Breaker
- 2 Year Warranty

## 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/output genset functions. The open architecture used allows customizing the controls to meet any customer requirement, yet maintaining the simplicity of operating 'as is' with the factory default programming. (see Generac bulletin #0168840SBY)

## GENERATOR CONNECTIONS

1. 4 Wire load connections from Paralleling Switch to optional connection box bus or transfer switch bus. Paralleling Switch has 4 lugs per phase – each lug will accept 4/0 to 350MCM aluminum or copper conductor.
2. 2 wire shielded cable (RS485) to PowerManager System Control.
3. 2 wire twisted pair from transfer switch (when multiple transfer switches are used). Can also go to the PowerManager System Controller
4. 120Volt 15 amp input circuit for battery charger.
5. 240Volt 20 amp input for coolant heater.

## OPTIONS

- **OPTIONAL FUEL ACCESSORIES**
  - Base Tank Low Fuel Alarms
  - Secondary Fuel Filters, Heaters and Water Alarms
  - UL Listed Fuel Tanks / Daytanks
  - Electric Fuel Transfer Pump System
- **OPTIONAL ELECTRICAL ACCESSORIES**
  - 10A Dual Rate Battery Charger
  - Battery, 24 Volt
  - Battery Warmer
- **OPTIONAL ALTERNATOR ACCESSORIES**
  - Alternator Heater
- **OPTIONAL EXHAUST ACCESSORIES**
  - Critical, Residential or Industrial Exhaust Silencers
  - Installed Low-Profile Critical Muffler (available on sound attenuated enclosure)
  - Single Exhaust System (available on open genset)
- **GENERAC POWERMANAGER® SYSTEM CONTROLLER FOR COORDINATION OF GENERATOR(S) AND TRANSFER SWITCHE(S)**
  - See Spec 0169060SBY For Additional Information
- **ADDITIONAL OPTIONAL EQUIPMENT**
  - 21 Light Remote Annunciator
  - Remote Relay Panels
  - Oil Heater
  - 5 Year Warranties
  - GenLink® Communications Software
- **OPTIONAL ENCLOSURES**
  - Weather Protective
  - Sound Attenuated
  - Aluminum

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