

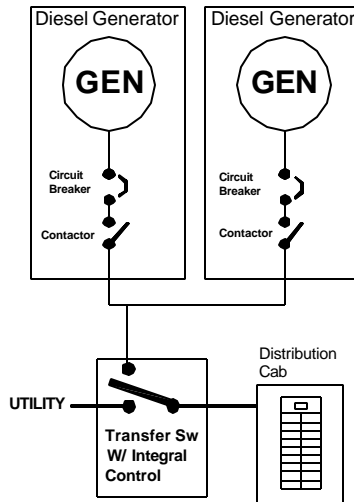
Modular Power System (MPS)

MPSG350
350 kW

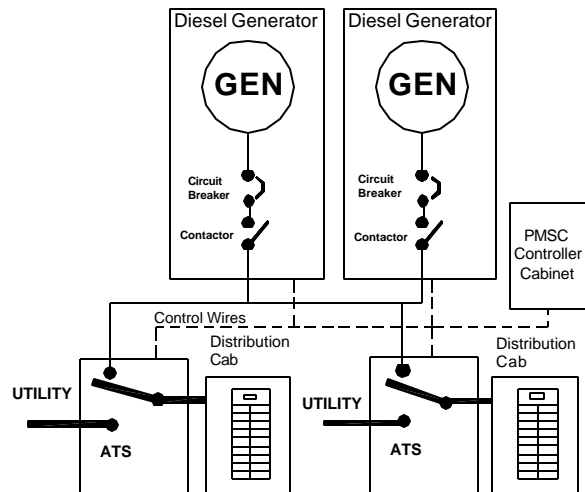
Standby Power Rating
350 KW 60 Hz

Prime Power Rating
280 KW 60 Hz

Powered with Generac's 13.3 Natural Gas Engine



Power Manager Integrated Controller Layout



Power Manager System Controller Layout

FEATURES

- The Generac Modular Paralleling system utilizes multiple small generators in a side by side parallel arrangement to achieve a larger combined power output.
- The proven 13.3 liter Generac generators can be combined up to 10 units to provide from 300 kW to 1 megawatts of reliable power.
- Paralleling System Features. The paralleling function is controlled by Generac's field proven Power Manager Control utilizing contractor switching technology resulting in cost effective reliable paralleling. The MPS control system provides automatic synchronization, adjustable load sharing between generators, reverse power protection and load shedding contacts.
- The optional cable interconnect cabinet is furnished with bus bar and lugs to allow easy cabling between the multiple gensets. Recommended for 3 or more gensets.
- The Generac "Power Manger Generator controller" provides complete engine monitoring and control along with alarm function and communication ability via a RS232 with a modem link to Generac's Genlink software or Modbus control. A RS485 link is also available.
- Flexibility. The Modular Power systems flexibility allows for a wide variety of configurations, including single or multiple automatic transfer switch arrangements roof application where better weight distribution is required and areas with specific height or depth limitations. Since MPS gensets need not be located together, space can be utilized wherever it is available. Smaller units are also easier to transport and place on the jobsite.
- Redundancy. N+1 means greater reliability with MPS. Backup power during scheduled maintenance. Simplified service which reduces maintenance costs.
- Single source service response from Generac's dealer network provides parts and service support for the entire unit. You are never on your own when you own a Generac Power System

GENERAC®
POWER SYSTEMS, INC.

**Modular Paralleling System
MPSG 350**

System Description

The Generac control system consists of the Power Manager™ System Controller (PM-SC) or the Power Manager Integrated Controller (PM-IC) along with the Power Manager Generator Controller (PM-GC). For single transfer switch installations with the Generac Transfer Switch, the PM-IC is integral with the transfer switch. For multiple transfer switch installations, the PM-SC interfaces with the PM-GC to provide start/stop commands based on utility power, proportional load sharing and safe paralleling of each individual genset to the main bus or transfer switch. Each individual genset has a built in heavy duty switch to complete the paralleling operation. This switch and it's control system replace the high cost switchgear and motor operated circuit breakers associated with standard paralleling systems.

System Components

Power Manager Generator Controller (PM-GC)

This control is installed on the generator set and monitors all the engine parameters, including oil pressure, coolant temperature, overspeed, kW and power factor. It also controls the governor, voltage regulator and the synchronizing connection to the bus.

Paralleling Switch

Installed in the generator set connection box
Heavy duty 3 pole solenoid actuated, mechanically held, with emergency trip to off position
Rated at 400 amps and 1000 amps continuous
35,000 and 42,000 amps interrupting capacity
Built in arc suppression

Power Manager System Control (PM-SC)

Up to 3 primary transfer switches with up to 6 individual steps for load sequencing, application or shedding with assignable kW values for each step in addition to the critical load ATS.
Unlimited number of secondary slave switches
The PM-SC is in an enclosure separate from the transfer switches.

Power Manager Integrated Control (PM-IC)

Integrated Control (IC) is installed in the same enclosure as the single Generac Transfer Switch

Features: PM-IC & PM-SC

Programmable and viewable via Genlink
Provides up to 3 load shed contacts
Failsafe protective functions for reverse power and synchronous paralleling control.
Exercise controller
Backup battery
RS232 for Modem connection
RS485 Data Highway

Transfer Switch (PM- IC System)

1000 amp, 1600 amp, 2600 amp (UL)3200 Amp (non UL)
For smaller switch ratings use the PM-SC control
42,000 AIC – 1000 Amp, 65,000 AIC – 1600 Amp,
85,000 AIC – 2600 - 3200 Amp
NEMA 12/3R enclosure
66"H x 36"W x 30" D – 1000 Amp
78"H x 48"W x 24" D – 1600 Amp
80" H x 48" W x 48" D – 2600 –3200 Amp
Wire access – top, side, bottom
NEMA 3R or 4X Optional
Wt. 1250 lbs. –1000-1600 Amp. 1850 lbs. 2600-3200 Amp

Connection Cabinet (Optional)

NEMA 12/3R
80" H x 48" W x 48" D
Lug capacity –16 for Generator Controller (GC), 12 for ATS. Each lug accepts (4) #4 to 750 MCM (see Dwg. OD4482)
Floor mounting
Aluminum or Copper Wire compatible – 4500 amp bus

Sequence of Operations

1. The PM-IC or a transfer switch in the PM-SC configuration detects a Utility failure and issues a start command. In the PM-IC, the command goes direct to each PM-GC and with multiple transfer switches the command goes to the PM-SC which then issues a start command to the PM-GC's
2. Each Generator will start on its own.
3. The first generator that attains rated frequency and voltage is connected to the main bus or transfer switch terminals via the paralleling switch in the individual genset.
4. The remaining generators will synchronize with the bus and the respective paralleling switch will close into the bus.
5. When all the gensets are paralleled to the main bus, the System or Integrated Controller will signal the transfer switch to transfer to the load. If multiple transfer switches are installed, the PM-SC will connect these switches in 3 separate programmed steps.
6. If a 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) selected generators can be programmed off line.
9. When Utility supply returns, the PM-SC or PM-IC will issue commands to transfer loads back to the Utility. It then issues commands to the individual PM-GC's to disconnect from the bus. Each PM-GC will operate its generator for the cool-down period and then issue a shutdown command.

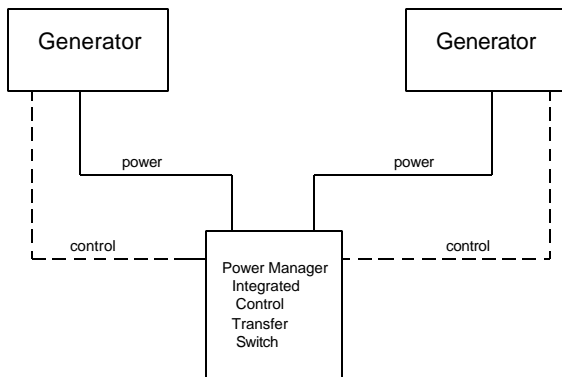
System Configuration

Any KW configuration that equals the required load kW can be used. The following page details a common engine configuration and the most economical configuration utilizing the MG150, MG200. But, depending on load parameters any number of units up to 10 can be paralleled together.
Additional units and transfer switches can easily be added at a later date.

TOTAL SYSTEM PARAMETERS		350 kW	437.5 kVA	MPSG350
Output Voltage 60 Hz.		Rated Amps		
120/208		1214		
277/480		526		
600		421		
Combinations		1 - 200 kW, 1 - 150 kW		
Motor Starting		208 Volt Parallel Wye Network		480 Volt Series Wye Network
Inst Dip	15%	415		459
kVA	20%	581		637
	25%	711		804
	30%	784		958
	35%	890		1098
Alternator Parameters				
Alternator Models		1-200 kW plus 1 - 150 kW 520 mm PMG Generac Alternators		
Sub Transient Reactance		0.16		
Transient Reactance		0.23		
Synchronous Reactance		3.1		
Zero Sequence Reactance		0.07		
Neg Sequence Reactance		0.18		
Time Constant Seconds		0.0078		
Phase Sequence		CBA		
Voltage Balance		0.5%		
Max Harmonics		3.50%		
Efficiency % @		<u>208 Volts 1.0 PF</u>		<u>480 Volts 1.0 PF</u>
	60% Load	90.40%		90.70%
	80% Load	90.70%		91.10%
	100% Load	90.50%		90.90%
Engine Fuel Consumption @		Natural Gas 950 BTU /Cu.Ft		
% of Rated Load		kW	Cu Ft / Hr	Therms/Hr.
	25%	87.5	1,209	11.49
	50%	175	2,329	22.12
	75%	262.5	3,429	32.58
	100%	350	4,467	42.44
Engine Cooling		350 kW		
Heat Rejection to Coolant(Full Load)		1,206,000 BTU/Hr. Total for the 2 units 1@ 700,000 btu/hr 1@ 506,000btu/Hr.		
Coolant Capacity (total)		15.4 gallons for the 2 units 77 Gallons per unit		
Inlet Cooling Air CFM		34,400 for the 3 units 17,200 for each unit		
Maximum External Press Drop on Rad		0.5 inches H2O		
Max air temp to radiator ° F (derates apply)		140 ° F		
Max ambient temperature ° F (derates apply)		120 ° F		
Combustion Air Requirements				
Flow at Rated Power (cfm)		1174 cfm Total. 618 cfm + 556 cfm		
Exhaust				
Exhaust Flow @ FL		4017 CFM for the 2 units 2257 CFM + 1760 CFM		
Exhaust Temperature (Average)		1128		
Exhaust Outlet per engine		1 @ 4.0" NPT		
Power Adjustments		350 kW Standby		
Temperature 2% for every 10 ° C above		40 ° C		
1.0% for every 10 ° F above		104 ° F		
Altitude 0.7% for every 100 m above		1066 Meters		
2.0% for every 1000 ft above		3500 Feet		

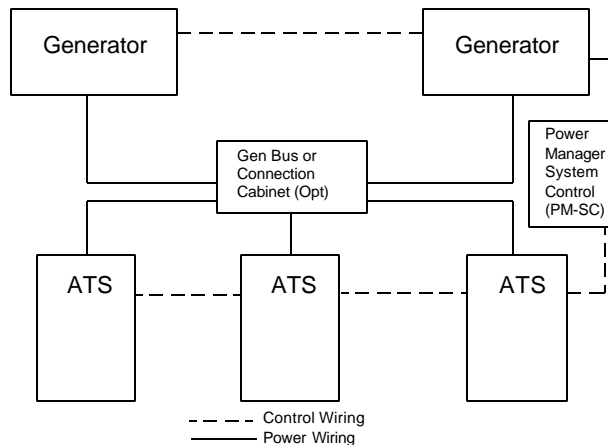
* Note: Temperatures will require necessary derates be applied. Unless otherwise noted, all data at 480 volt wye - 1.0 PF.

**INTERCONNECTION DIAGRAM
PMIC Power Manager Integrated Control**



The PM-IC is part of the Generac Transfer Switch
A connection box for the power wires is an option.

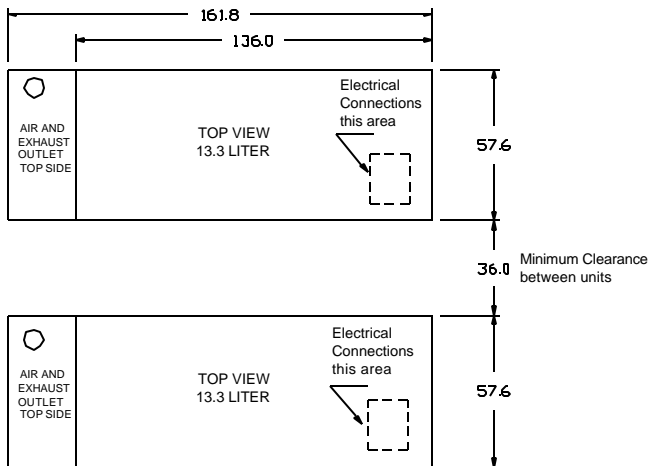
PMSC Power Manager System Control



The PM-SC can control 3 transfer switches and any number of slave switches. The main connection box would be configured for the size and number of wires for the specific application.

**1 - 200 kW 13.3 Liter
+ 1 - 150 kW 13.3 Liter Gas
Powered Generator
Modules**

Standard Enclosed units shown.
Sound attenuated package adds an additional 26" to the length.
Units can also be non-enclosed for indoor installations.



Typical Installations

Area Space Requirements.

Units can be placed end to end, side by side or wherever room is available. The transfer switch or switches are generally placed close to the main electric service. Consult State, Federal and Local codes for specific installation requirements.

Power Connections are in one area in the left rear quadrant of the genset.

All controls are through a single 2 wire RS485 connection that can be daisy chained between generators.

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