

Specifications

Dresser Waukesha Engine: F3524GSI, Four Cycle

Cylinders: Inline 6

Piston Displacement: 3520 cu. in. (58 L)

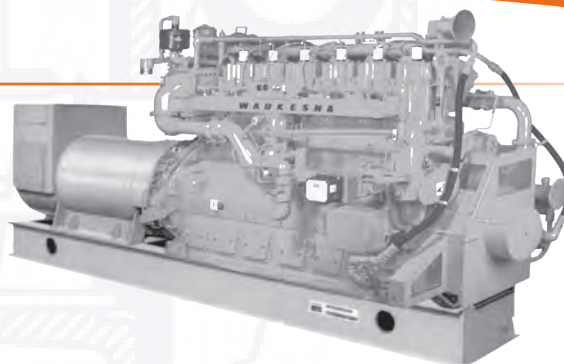
Bore & Stroke: 9.375" x 8.5" (238 x 216 mm)

Compression Ratio: 8:1

Jacket Water System Capacity: 48.5 gal. (184 L)

Lube Oil Capacity: 72 gal. (273 L)

Starting System: 24V electric



Standard Equipment

AIR CLEANER – Dry type with rain shield and service indicator.

AIR FUEL RATIO CONTROL (AFR) – Integrated ESM–AFR catalyst rich-burn control, main fuel gas regulators actuators, exhaust O2 sensor(s), and post turbocharger exhaust thermocouple. Factory mounted and tested. AFR maintains emissions through load and speed changes. The ESM–AFR meets Canadian Standards Association Class 1, Division 2, Group A, B, C & D (Canada & US) hazardous location requirements. Note: For dual fuel applications, ESM–AFR system will control the primary fuel source only.

BARRING DEVICE – Manual.

BEARINGS – Heavy duty, replaceable, precision type.

BREATHING – Closed system.

CONNECTING RODS – Forged steel, rifle drilled.

CONTROL SYSTEM – Waukesha Engine System Manager (ESM®) integrates spark timing control, speed governing, air/fuel ratio control, detonation protection, start-stop control, diagnostic tools, fault logging and engine safeties. The Engine Control Unit (ECU) is the central brain of the control system and main customer interface. Connection to the ESM is via a 25 foot (5.2 m) harness to a local panel, through MODBUS RTU slave RS-485 connection, and through the Electronic Service Program (ESP). Customer connections are only required to the local panel, fuel valve, and for 24V DC power supply. Compatible with Woodward load sharing module. ESM meets Canadian Standards Association Class 1, Division 2, Group A, B, C & D (Canada & US) hazardous location requirements.

COOLING SYSTEM – Choice of mounted radiator with pusher fan, core guard and duct adaptor, heat exchanger with expansion tanks, or connection for remote radiator cooling. (One shutdown level switch for each circuit included on radiator and heat exchanger units).

CRANKCASE – Integral crankcase and cylinder frame.

CRANKSHAFT – Counterweighted, forged steel, dynamically balanced, with sealed viscous vibration damper.

CYLINDER HEADS – Six interchangeable valve-in-head type. Four valves per cylinder head, with water cooled exhaust valve seat. Roller valve lifters and hydraulic push rods. Flange mounted ignition coils.

CYLINDERS – 9.375" (238 mm) bore x 8.5" (216 mm) stroke; Removable wet type cylinder liners, chrome plated on outer diameter. Number of cylinders – Six.

ELECTRONIC SERVICE PROGRAM (ESP) – Microsoft® Windows-based program provided on CD-ROM for programming and interface to ESM. Includes E-Help for troubleshooting any ESM faults. A serial cable is provided for connection from a customer-supplied PC to the ECU's RS-232 port.

ENGINE BASE – Engine, generator and radiator or heat exchanger are mounted and aligned on a welded steel, wide flange base, designed for solid mounting on an inertia block, with standard base lifting eyes.

ENGINE MONITORING DEVICES – Factory mounted and wired sensors for lube oil pressure and temperature, intake manifold temperature and pressure, jacket water temperature, and Exhaust O2 content, all accessible through ESM. ESM continually monitors combustion performance through individual knock sensors to provide detonation protection. Dual magnetic pick-ups are used for accurate engine speed monitoring. ESM provides advanced diagnostics of engine and all ESM sensors and logs any faults into non-volatile flash memory. Sensors meet Canadian Standards Association Class 1, Division 2, Group A, B, C, & D (Canada & US) hazardous location requirements.

EXHAUST SYSTEM – Water cooled exhaust manifold with single vertical exhaust at rear. Flexible stainless steel exhaust connection; 8" (203 mm) long with 6" (152 mm) outlet flange.

FUEL SYSTEM (GSI) – One natural gas, 4" (102 mm) updraft carburetors and one mounted Fisher 99, 2" (51 mm) gas regulator, one 2" NPT flexible connection (shipped loose), and one 2" NPT Magnatrol gas solenoid valve (shipped loose). Fuel pressure – 30 PSIG minimum and 50 PSIG maximum.

FUEL SYSTEM (GSID) – One natural gas 4" updraft carburetor, one Fisher 133L gas regulator (shipped loose), one 3.5" 125 lb. flanged flexible connection (shipped loose), and one 3" NPT Magnatrol gas solenoid valve (shipped loose). Fuel pressure – 1 PSIG minimum and 50 PSIG maximum.

GENERATOR – Open, drip-proof, direct connected, fan cooled, 2/3 pitch, A.C. revolving field type, single bearing generator with brushless exciter, short circuit sustain (PMG type maintains 270% of rated generator current for up to 10 seconds on 105°C temperature rise generators; maintains 250% of current on 130°C rise generators) and damper windings. TIF and Deviation Factor within NEMA MG–1.32. Voltage 480/277, 3 phase, 4 wire, Wye 60 Hz and 400/230, 3 phase, 4 wire, Wye 50 Hz. Other voltages are available, consult factory. Insulation material NEMA Class F. Temperature rise within NEMA (105°C) for continuous power duty, within NEMA (130°C) for standby duty. All generators are rated 0.8 Power Factor, are mounted on the engine flywheel housing and have multiple steel disc flexible coupling drive. Includes space heater, 115/230 V, 1 phase.

GOVERNOR – Electric throttle actuator controlled by ESM with throttle position feedback. Governor tuning is performed using ESP. ESM includes option of a load-coming feature to improve engine response to predictable step loads.

IGNITION SYSTEM – Ignition Power Module Diagnostics (IPM-D) – controlled by ESM, with spark timing optimized for varying speed-load conditions. Dual voltage energy levels automatically controlled by ESM to maximize spark plug life and improve starting. The diagnostics feature of ESM can be used to help monitor spark plug life via predictive maintenance. Shielded ignition components meet Canadian Standard Association Class 1, Division 2, Group A, B, C & D (Canada & US) hazardous location requirements.

INTERCOOLER – Air to water.

JUNCTION BOXES – Separate AC and DC junction boxes for engine wiring and external connections.

LUBRICATION – Full pressure, positive displacement pump. Full flow oil filter (shipped loose) and flexible connections (shipped loose). Microspin® bypass filter and flexible connections. 50 or 60 Hz, 230 volt AC, single phase electric motor driven intermittent prelube pump with motor starter (other voltages can be specified).

OIL COOLER – Shell and tube type (mounted).

OIL PAN – Cast alloy iron base type with removable doors.

PAINT – Oilfield Orange.

PISTONS – Aluminum with floating pin. Oil cooled.

STARTING EQUIPMENT – Two 24V DC electric starting motors.

TURBOCHARGER – Water cooled bearing housing with adjustable wastegate.

VOLTAGE REGULATOR (shipped loose) – SCR static automatic type providing 1% regulation from no load to full load, three phase sensing and automatic subsynchronous speed protection. Includes voltage adjustment rheostat (shipped loose).

WATER CIRCULATING SYSTEM, AUXILIARY CIRCUIT – Belt driven water circulating high capacity pump for intercooler and lube oil cooler. See S6543–19 performance curve for use with standard 10" diameter crankshaft pulley.

WATER CIRCULATING SYSTEM, ENGINE JACKET – Belt driven water pump, 175 – 180° F (79 – 82°C) thermostatic temperature regulation full flow bypass. Single 4" ANSI flange connections for inlet and outlet on water connect units.

PERFORMANCE: VHP3604GSI/GSID Gas Enginotor® Generating System

Heat Exchanger/Water Connection Cooling Intercooler Water: 130°F (54°C)		Continuous Power		Standby Power	
		1200 rpm 60 Hz	1000 rpm 50 Hz	1200 rpm 60 Hz	1000 rpm 50 Hz
	kW Rating	600	540	600	540
Heat Balance	BSFC Btu/bhp-hr (kJ/kW-hr)	7895 (11168)	8243 (11660)	7895 (11168)	8243 (11660)
	Fuel Consumption Btu/hr x 1000 (kW)	6632 (1942)	5770 (1690)	6632 (1942)	5770 (1690)
	Heat to Jacket Water Btu/hr x 1000 (kW)	2046 (600)	1773 (520)	2046 (600)	1773 (520)
	Heat to Lube Oil Btu/hr x 1000 (kW)	297 (87)	248 (73)	297 (87)	248 (73)
	Heat to Intercooler Btu/hr x 1000 (kW)	114 (33)	79 (23)	114 (33)	79 (23)
	Heat to Radiation Btu/hr x 1000 (kW)	379 (111)	346 (101)	379 (111)	346 (101)
	Total Exhaust Heat Btu/hr x 1000 (kW)	1905 (558)	1581 (463)	1905 (558)	1581 (463)
Intake/Exhaust System	Induction Air Flow scfm (Nm³/hr)	1236 (1861)	1076 (1620)	1236 (1861)	1076 (1620)
	Exhaust Flow lb/hr (kg/hr)	5752 (2609)	5005 (2270)	5752 (2609)	5005 (2270)
	Exhaust Temperature °F (°C)	1196 (647)	1144 (618)	1196 (647)	1144 (618)
Radiator Cooling - Mounted Intercooler Water: 130°F (54°C)					
	kW Rating	560	500	560	500
Heat Balance	BSFC Btu/bhp-hr (kJ/kW-hr)	7895 (11168)	8243 (11660)	7895 (11168)	8243 (11660)
	Fuel Consumption Btu/hr x 1000 (kW)	6632 (1942)	5770 (1690)	6632 (1942)	5770 (1690)
	Heat to Jacket Water Btu/hr x 1000 (kW)	2046 (600)	1773 (520)	2046 (600)	1773 (520)
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	Exhaust Temperature °F (°C)	1196 (647)	1144 (618)	1196 (647)	1144 (618)
Emissions	Radiator Air Flow scfm (m³/min)	57000 (1614)	54000 (1529)	57000 (1614)	54000 (1529)
	NOx g/bhp-hr (mg/nm³ @ 5% O₂)	15.60 (5795)	15.50 (5748)	15.60 (5795)	15.50 (5748)
	CO g/bhp-hr (mg/nm³ @ 5% O₂)	12.80 (4755)	12.40 (4578)	12.80 (4755)	12.40 (4578)
	THC g/bhp-hr (mg/nm³ @ 5% O₂)	0.50 (203)	0.60 (215)	0.50 (203)	0.60 (215)
	NMHC g/bhp-hr (mg/nm³ @ 5% O₂)	0.15 (57)	0.16 (58)	0.15 (57)	0.16 (58)

Typical heat data is shown, however no guarantee is expressed or implied. Consult your Dresser Waukesha Application Engineering Department for system application assistance.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV, with a 91 WKI®. For conditions or fuels other than standard, consult the Dresser Waukesha Application Engineering Department.

Data based on standard conditions of 77°F (25°C) ambient temperature, 29.53 inches Hg (100kPa) barometric pressure, 30% relative humidity (0.3 inches HG / 1 kPa water vapor pressure).

Fuel consumption based on ISO3046/1-1995 with a tolerance of +5% for commercial quality natural gas having a 900 BTU/ft³ (35.3 MJ/nm³) SLHV.

Heat data based on fuel consumption +2%.

Heat rejection based on cooling exhaust temperature to 77°F (25°C).

Rating Standard: The Waukesha Enginotor ratings are based on ISO 3046/1-1995 with an engine mechanical efficiency of 90% and auxiliary water temperature Tcr as specified limited to ±10°F (±5°C). Ratings also valid for ISO 8528 and DIN 6271, BS 5514 standard atmospheric conditions.

Continuous Power Rating: The highest electrical power output of the Enginotor available for an unlimited number of hours per year, less maintenance. It is permissible to operate the Enginotor with up to 10% overload for two hours in each 24 hour period.

Standby Power Rating: This rating applies to those systems used as a secondary source of electrical power. This rating is the electrical power output of the Enginotor (no overload) 24 hours a day, for the duration of a power source outage.

Cooling Equipment	L in (mm)	W in (mm)	H in (mm)	Avg. Wt. lb (kg)
Heat Exchanger	205 (5180)	68 (1730)	106 (2690)	24750 (11225)
Water Connection	188 (4780)	66 (1680)	106 (2690)	23750 (10775)
Radiator	217 (5510)	85 (2160)	124 (3150)	27500 (12475)

