GeneratorJoe

Made in the USA!

Shown with optional equipment

Centurion "Defender 2" Series
Model: 400 DF2-3

Ratings

Single and/or Three Phase Available

		60 Hz	50 Hz
Standby:	kW	400.0	333.3
	kVA	500.0	416.7
Prime:	kW	360.0	300.0
	kVA	450.1	375.0

Features

- Single source responsibility for the generator set and accessories.
- Prototype and production tested to insure one step load acceptance per NFPA 110.
- Two year limited warranty on generator sets and accessories.
- Unit conforms to CSA, NEMA, EGSA, ANSI and other standards.
- Heavy duty 4 cycle industrial engine for reliability and fuel efficiency.
- Brushless rotating field generator with class H insulation.
- Heavy duty steel base with integral vibration isolators.
- EPA Tier 4 interim Certified Engine.

			Rich-Burn Natural Gas				Rich-Burn Natural LP Gas (Vapor)			
			Standby Rating		Prime Rating		Standby Rating		Prime Rating	
Voltage	Ph	Hz	kW/kVA	Amps	kW/kVA	Amps	kW/kVA	Amps	kW/kVA	Amps
120/208	3	60	400/500	1388	360/450	1249	265/331	919	240/300	833
127/220	3	60	400/500	1312	360/450	1181	260/325	853	235/294	771
120/240	3	60	400/500	1203	360/450	1083	265/331	797	240/300	722
139/240	3	60	400/500	1203	360/450	1083	260/331	782	235/294	707
220/380	3	60	400/500	760	360/450	684	265/331	503	240/300	456
240/416	3	60	400/500	694	360/450	625	265/331	460	240/300	416
277/480	3	60	400/500	601	360/450	541	260/325	391	235/294	353

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.
STANDBY RATINGS: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
PRIME POWER RATINGS: Prime power ratings apply to installations where utility power in unavailable or unreliable. At varying load the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS5514, AS2789, and DIN 6271. For limited running time and base load ratings consult the factory. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.
GENERAL GUIDELINES FOR DERATION: Altitude: Derate 0.5% per 100 m (328 ft.) elevation above 1000 m (3279 ft.)Temperature: Derate 1.0% per 10°C (18°F) temperature above 40°C (104°F).

21.9L

	Units		21.9L			
	Std	Metric	1500		1800	
General Engine Data						
Type	N/A		V-type 4 cycle			
Number of cylinders	N/A		12			
Aspiration	N/A		Turbo Charge Air Cooled			
Bore	in	mm	5.04	128	5.04	128
Stroke	in	mm	5.59	142	5.59	142
Displacement	in^3	L	1338.27	21.927	1338.27	21.927
Compression Ratio	N/A		10.5			
Mean Piston Speed	ft/min	m/s	1397.5	7.1	1677	8.52
Gross Power Rating, Per ISO 3046 at the Flywheel						
NG	Hp	kW	516	385	605	451
LP	Hp	kW	370	276	471	351
MEP (@ rated Load on NG)	psi	kPa	204	14.0	199	13.7
Rotation Viewed from Flywheel	N/A		Counter Clockwise			
Firing Order	N/A		1-12-5-8-3-10-6-7-2-11-4-9			
Dry Weight						
Fan to Flywheel	lb	kg	3638	1650	3638	1650
Rad to Flywheel	lb	kg	5238	2376	5238	2376
Wet Weight						
Fan to Flywheel	lb	kg	3813	1706	3813	1706
Rad to Flywheel	lb	kg	5884	2688	5884	2688
CG						
Distance from FW housing	in	mm	23.71	602.2	23.71	602.2
Distance above center of crankshaft	in	mm	7.17	182	7.17	182
Engine Mounting						
Maximum Allowable Bending Moment at Rear of Block	lb ft	N m				
Moment of Inertia About Roll Axis	lb ft^2	kg m^2				
Flywheel housing	N/A		SAE No.1			
Flywheel	N/A		No. 14			
Exhaust System						
Type						
Maximum allowable Back pressure	in HG	kPa	3	10.2	3	10.2
Standard Catalyst Back pressure	in HG	kPa	1.5	5.1	1.5	5.1
Exhaust Outlet Pipe Size						
Maximum Turbine Inlet Temperature	F	C	1382	750	1382	750
Exhuast Flow at Rated Power	lb/hr	kg/hr	3191	1448	3939	1787
Exhuast Flow at Rated Power @1350F	cfm	m^3/min	2427	68.7	2995	84.8
			1.70354		2.10177	
Air Induction System						
Maximum allowable Intake Air Restriction with Air Cleaner						
Clean	inH2O	kPa	5	1.24	5	1.24
Dirty	inH2O	kPa	15	3.74	15	3.74
Combustion Air required	lb/hr	kg/hr	3004	1362	3707	1682
Combustion Air required	cfm	m^3/min	681	19.9	841	24.6
Minimum Dirt Holding Capacity of Air Cleaner						
Electrical System						
Minimum Recommended Battery Capacity	AH		200			
Cold Cranking Current						
Engine only	CCA		1000			
Engine with Drive train	CCA		1000			
Maximum Allowable Resistance of Starting Circuit	Ohms		0.002			
Staring Motor Power	HP	kW	9.4	7	9.4	7
Battery Charging Alternator						
Voltage	Volts		24			
Current	Amps		45			
Cooling System						
Coolant Capacity						
Engine only	gal	L	12	52	12	52
Engine with Radiator	gal	L	64	291	64	291
Engine Coolant Flow	gal/min	L/min	145	550	174	660
Water Pump Speed	RPM					
Heat rejected to Cooling water at rated Load	btu/min	kcal/sec	21,451	90	25,760	108
Maximum Intake Air Temperature (IAT)	F	C	155	68	155	68

21.9L

	Units		21.9L			
	Std	Metric	1500		1800	
ECU IAT Warning	F	C				
ECU IAT Shutdown	F	C				
Maximum Coolant Friction Head External to the engine	psi	bar	5.8	0.4	5.8	0.4
Maximum Air Restriction Across a Radiator	inH2O	mmH2O	0.5	12.8	0.5	12.8
Standard Thermostat Range						
Cracking Temperature	F	C	160	71	160	71
Full Open Temperature	F	C	185	85	185	85
Maximum Output Pressure of Engine Water Pump						
Maximum Allowable Pressure Cap	psi	bar	14.7	1	14.7	1
Ambient Clearance Open Genset (water)						
Specified	F	C	122	50	122	50
Acutal	F	C				
Ambient Clearance (Oil)						
Specified	F	C	122	50	122	50
Acutal	F	C				
Maximum Allowable Top Tank Temperature	F	C	230	110	230	110
ECU Warning	F	C	220	104	220	104
ECU Shutdown	F	C	230	110	230	110
Fan Power	HP	kW	24	17.9	42	31.3
Fan Diameter, including blades	in	mm	52	1320.8	52	1320.8
Fan Speed	RPM		1200		1440	
Cooling Fan Air Flow @ 1" Static H2O Pressure and 125F @ radiator	CFM	m^3/min	34285.7	970.834	40000	1132.6
Charge Air Cooler						
Compressor Outlet Temperature	F	C	246	120	303	152
Compressor Flow Rate	CFM	m^3/min			1254	35.5
Lubrication System						
Oil Specification			SAE 15W-40 Low Ash Gas engine oil (.25-.5% by wt), API CD/CF or higher			
Oil Pressure						
Idle						
Min	Psi	Bar	13	0.9	13	0.9
Max	Psi	Bar	43.5	3	43.5	3
Rated Speed						
Min	Psi	Bar	43.5	3	43.5	3
Max	Psi	Bar	94.5	6.5	94.5	6.5
Maximum Allowable Oil Temperature	F	C	230	110	230	110
Engine Oil Capacity						
Min	Qts	L	34.75	32.9	34.75	32.9
Max	Qts	L	42.25	40.0	42.25	40.0
Oil Filter Capacity	Qts	L	7.5	7.1	7.5	7.1
Fuel System						
Low Pressure Dry Processed Natural Gas (Spec)						
Fuel Composition						
Maximum EPR Rated Pressure	psi	kPa	1	6.89	1	6.89
Maximum Running pressure to Electronic Pressure Regulator (EPR)	inH2O	kPa	11	2.74	11	2.74
Minimum Running pressure to EPR	inH2O	kPa	7	1.74	7	1.74
Minimum Gas Supply Pipe Size			2 x 2" NPT			
Low Pressure Vapor Propane (HD5)						
Fuel Composition						
Maximum EPR Rated Pressure	psi	kPa	1	6.89	1	6.89
Maximum Running Pressure to EPR	inH2O	kPa	11	2.74	11	2.74
Minimum Running Pressure to EPR	inH2O	kPa	7	1.74	7	1.74
Minimum LPG Supply Pipe Size			2 x 2" NPT			

The preceeding pipe sizes are only suggestions and piping sizes may vary with temperature, pressure, distance from supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the EPR.

NGE 21.9L Fuel Consumption Data

NG 60 Hz				
Power at Flywheel	kg/hr	m3/hr	ft3/hr	BTU/hr
453.40	95.87	119.84	4230.29	4272593
342.57	74.71	93.39	3296.73	3329696
225.87	52.44	65.55	2313.76	2336903
115.54	31.96	39.95	1410.37	1424471
14.75	13.38	16.73	590.50	596404

NG 50 Hz				
Power at Flywheel	kg/hr	m3/hr	ft3/hr	BTU/hr
416.88	85.64	107.05	3779.00	3816787
309.31	65.49	81.87	2889.94	2918840
201.05	45.12	56.40	1990.87	2010776
103.23	27.31	34.14	1205.17	1217220
42.68	16.07	20.08	708.94	716029

Gas Properties		
	kg/m3	BTU/ ft3
LP Density	1.882	2316
NG Density	0.8	1010

LP 60 Hz				
Power at Flywheel	kg/hr	m3/hr	ft3/hr	BTU/hr
304.64	75.04	39.87	1407.55	3259887
258.29	63.99	34.00	1200.21	2779697
160.00	43.13	22.91	808.88	1873370
78.89	27.19	14.45	509.97	1181085
33.81	18.50	9.83	347.03	803720

LP 50 Hz				
Power at Flywheel	kg/hr	m3/hr	ft3/hr	BTU/hr
268.25	63.21	33.59	1185.58	2745807
199.11	49.15	26.12	921.96	2135261
138.49	36.56	19.42	685.70	1588084
68.40	22.60	12.01	423.88	981714
25.70	14.33	7.61	268.76	622449

Power Ratings at Flywheel			
	Continuous	Prime	Stand-By
	kW	kW	kW
NG 50 Hz		350	385
NG 60 Hz		410	450
LP 50 Hz			262
LP 60 Hz			306

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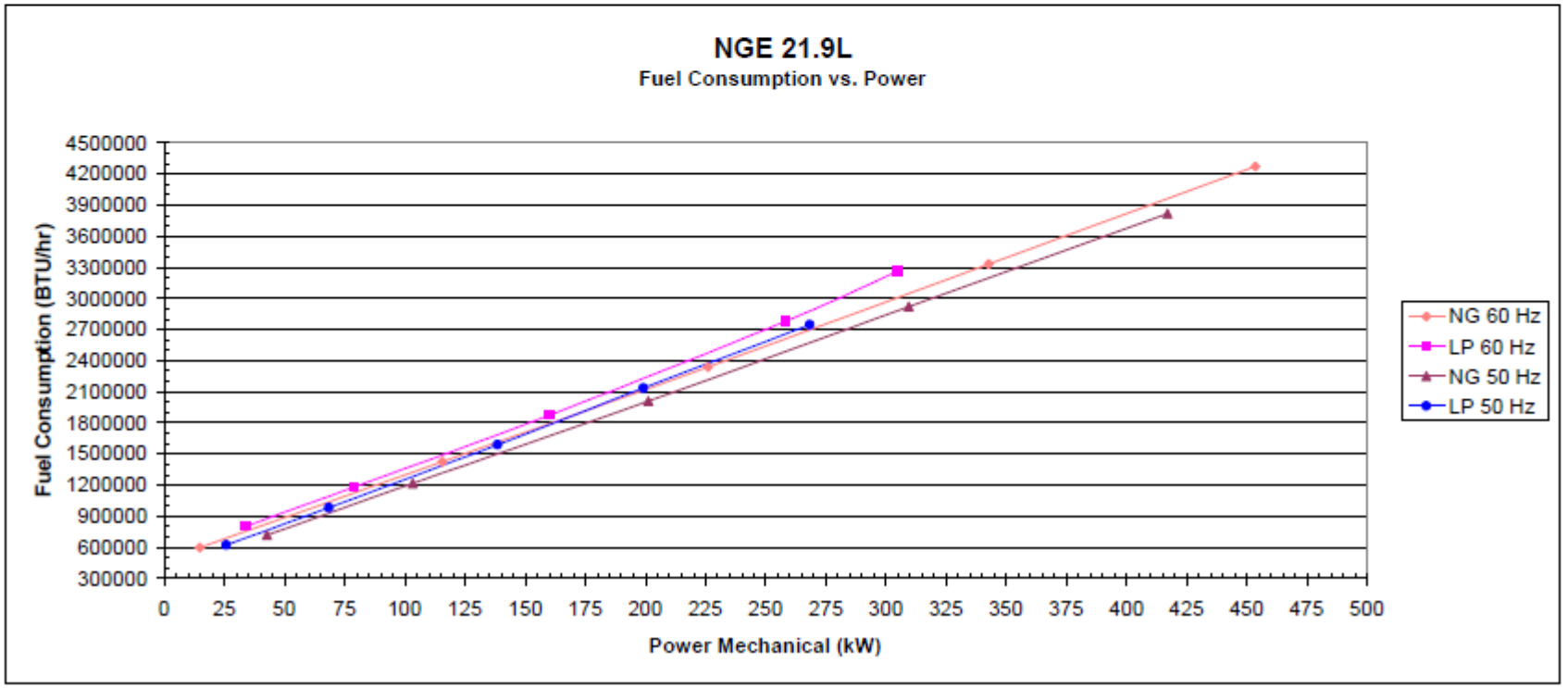


Generator Controller Options

Digital Control Panel
The DGC-2020 digital GenSet controller provides integrated engine-GenSet control, protection, and metering. Microprocessor based technology allows for exact measurement, set point adjustment, and timing functions. Front panel 3 position controls and indicators enable quick and simple operation. The panel is also equipped with a emergency stop push button and an Alarm Horn with silence button. A wide temperature-range liquid crystal display (LCD) with backlighting can be viewed under a wide range of ambient light and temperature conditions down to 40° C.

Features SAE J1939 Engine ECU communications, Multilingual capability, Remote RS-485 communications for Optional RDP-110 Remote Annunciator, Extremely rugged, fully encapsulated design with 4 programmable contact inputs and 10 contact outputs (2 ADC rated). It also features Modbus Communications with RS-485, Battery Backup for Real Time Clock, UL recognized, CSA certified, CE approved, HALT (Highly Accelerated Life Tests) tested, IP 54 Front Panel rating with integrated gasket, and NFPA 110 Level 1 Compatible.

Analog Top Mount Controller

This Generator control panel has analog instruments to monitor AC voltage, AC frequency, percent of load and, run time/hour meter. Safety shutdowns provide red LED indication for overspeed, overcrank, low oil pressure, and high coolant temperature. Provide green LED indication of engine running. Control switch is provided for local and remote starting with 3 position run/off/remote switch.
There is also an engine mounted emergency by-pass key switch with mechanical oil pressure and coolant temperature gauge.

AC Alternator Specifications

STANDARDS
Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as B55000, VDE 0530, NEMA MG1-32, 1EC34, CSA C22.2-100, A51359.
Other standards and certifications can be considered on request.

VOLTAGE REGULATORS
MX341AVR
With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

(Optional) AS440 AVR
With this self-excited system the main stator provides power via the AVR to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.
The AS440 will support a range of electronic accessories, including a droop Current Transformer (CT) to permit parallel operation with other AC generators.

WINDINGS & ELECTRICAL PERFORMANCE
All generator stators are wound to *2/3* pitch. This eliminates triplen (3rd, 9th, 15th **...)** harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The *2/3* pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A frilly connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

SHAFT
The generator rotor is dynamically balanced to better than B56861:Part 1 Grade 2.5 for minimum vibration in operation.

INSULATION/IMPREGNATION
The insulation system is class H.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE
Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

Standard Features and Optional Accessories

Standard Features

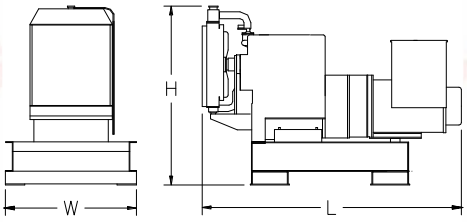
- **Heavy duty steel base**
- **Vibration isolators**
- **Oil drain valve with extension**
- **Battery rack**
- **Battery cables**
- **Water jacket heater**
- **Owners manual**
- **Electronic Isochronous Governor**
-

Optional Accessories

- ☐ Critical Exhaust Silencer
- ☐ Flex Exhaust Connector
- ☐ Top Mount Analog Control Panel
- ☐ End Mount Analog Control Panel
- ☐ DGC2020 Digital Control Panel
- ☐ DynaGen Digital Control Panel
- ☐ Modem for DGC2020
- ☐ Enhanced Gen Protection for DGC2020
- ☐ Surface Mount Remote Annunciator Panel for DGC2020
- ☐ Flush Mount Remote Annunciator Panel for DGC2020
- ☐ Remote Mount Break Glass E-Stop Switch
- ☐ Line Circuit Breaker
- ☐ 3 phase sensing
- ☐ Radiator duct flange for open unit
- ☐ Weather Enclosure with internal muffler
- ☐ Sound Attenuated weather enclosure
- ☐ Oil Pan Heater
- ☐ Battery
- ☐ Battery Charger
- ☐ Battery Heaters
- ☐ Flexible Fuel Lines

Weights and Dimensions

Overall Size, L x W x H, in.: 148 in. x 84 in. x 96 in.
Weight (Wet): 12,000 lbs.
Note: Dim and weights reflect standard open unit with no options



Note: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

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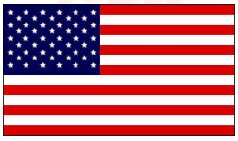

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Model: 400 DF2-3