BLUE STAR
Power Systems

SUBMITTAL

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BLUE STAR Power Systems

Sales Quote

BLUE STAR Power Systems

Prepared For: RCP Controls, Inc.
Project Title: CSDG
By: Robert Coulson
Quote Number: 207284-00
Quote Date: 6/03/2026 6:32:13 PM
Version: 1.00.19a

PROJECT OVERVIEW		
Unit Model: JD250-02	Standby / Prime: Emergency Stationary Standby	kWe Rating: 250 kWe
Fuel: Diesel	UL 2200 Listed: Yes	CSA Approved: Yes
EPA: Tier 3	Paint Color: White	

GENSET SPECIFICATIONS	
Engine Model:	John Deere 6090HF484 250kW Standby Power Rating at 1800 RPM Governor - Electronic Isochronous
Voltage:	208/120V 3 Phase 60 Hz 0.8 PF
Gen Model:	Stamford S4L1S-D4 12 Lead Wired 208V 3 Phase Low Wye 125ºC Rise Over 40ºC Ambient
Voltage Regulator:	Stamford MX321 Automatic Voltage Regulator with PMG Excitation
Control Panel:	Blue Star DCP7310 Microprocessor Based Gen-Set Controller Mounted Facing Left from Generator End (Unless Specified Otherwise) Standard Features: Low Oil Pressure, High Coolant Temp, Overspeed, Overcrank Shutdowns Emergency Stop Pushbutton, Audible Alarm Buzzer with Silencing Switch
Control Panel Options:	Low Water Level Sensor with Shutdown Break Glass E-Stop Station - Send Loose
Remote Annunciator:	Deep Sea DSE2548 (2x) Remote Annunciator with Enclosure (Surface Mounted)
Unit Color:	White
Enclosure:	Level 2 (Weather Proof with Foam) Powder Coated .090 Aluminum Rugged and Durable 200 MPH Wind Rated Pitched Roof for Increased Structural Integrity and Improved Watershed Punched Intake with Baffle and Punched Exhaust Openings Keyed Alike Lockable Doors with Draw Down Latches and Stainless Steel Component Hinges Additional 1.5” Thick Polydamp Type D Acoustical Foam (PAF) Formed Steel Base with Mounting and Lifting Holes Includes Vibration Mounts to Isolate Unit from Base Rail
Sound Attenuation Foam:	Sound Attenuation Installed in Enclosure
Cooling:	Unit Mounted Radiator (50ºC Ambient)
Oil Drain Extension:	Plumbed to Bulkhead Fitting in Base

Mainline Breaker:	1000 Amp 3 Pole 600 Volt Breaker Mounted & Wired in a NEMA 1 Enclosure
Jacket Water Heater:	Engine Block Heater 2500W 240VAC Rated for -20ºF Heater Installed with Isolation Valves and Wired to Terminal
Air Cleaner:	Dry Single Stage
Silencer:	Critical Grade Compact (CPJ Series) Silencer Mounted to Engine
Battery:	12 Volt System with Rack and Cables
Charger:	DSE 12 Volt 10 Amp Mounted and Wired to Terminal
Fuel Tank:	48 Hour / 1080 Gallon UL 142 Listed Sub-Base Fuel Tank with Stub-up Area Double Wall Construction with Secondary Containment Standard Includes: Supply & Return Connections, Fuel Level Gauge, Fuel Leak Switch and Fill & Vent Plumbing
Factory Test:	Standard Commercial Testing Includes: Verification of Alarm Shutdowns, Voltage Settings, Block Loading to Rated kWe and PF
Owner's Manual:	rcoulson@rcpcontrols.com
Warranty:	2 Year / 2000 Hour Limited

PRICING INFORMATION	
Payment Terms	Due Upon Receipt
Lead Time	25 Weeks (Contingent on component availability)

Terms & Conditions

• This quote is valid for a period of 15 days.

• This proposal is our interpretation of your requirements. It includes only the items listed on this quotation. Should there be other requirements or specifications, please revise or create new quote accordingly.

• Units are shipped wet to include lube oil and 50/50 water and antifreeze mix unless otherwise noted in this quotation.
• All extended piping, wiring, or other than listed above is performed by “others”.

• Seller is not quoting, offloading, performing job site startup, providing personnel instructions, conducting field testing, or providing unit installation.

• Quoted prices include normal testing, packaging, and instructional literature.

• It is the distributor/purchaser and end user’s responsibility to ensure that this equipment is operated in accordance with all applicable local, state, and federal laws and regulations governing the use and operation of this equipment.

• This document is not a legally binding order until signed by both the distributor/customer and Blue Star Power Systems and then acknowledged by Blue Star Power Systems.

• The distributor/customer acknowledges understanding of, and agrees to be bound by, Blue Star Power Systems Standard Terms and Conditions, Credit Application, Order Acknowledgement & Invoice Terms and Conditions, Standard Credit Terms and Collection Policy, and Product Warranty Policy & Warranty Submission Procedures, which may be updated from time to time.

Distributor Terms & Conditions

BLUE STAR
Power Systems

Diesel Product Line

208-600 Volt

JD250-02

60 Hz / 1800 RPM

250 kWe

Standby

Ratings

	240V	208V	240V	480V	600V
Phase	1	3	3	3	3
PF	1.0	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60
Generator Model	S4L1D-G41	S4L1S-D4	S4L1S-D4	S4L1S-D4	S4L1S-D4
Connection	12 LEAD DD	12 LEAD WYE	12 LEAD DELTA	12 LEAD WYE	4 LEAD WYE
kWe	250	250	250	250	250
AMPS	1042	868	753	376	301
Temp Rise	125˚C / 40˚C	125˚C / 40˚C	125˚C / 40˚C	125˚C / 40˚C	125˚C / 40˚C

Standard Equipment

Engine

- Radiator Cooled Unit Mounted (50˚C)
- Radiator Duct Flange (OPU Only)
- Blower Fan & Fan Drive
- Starter & Alternator
- Oil Pump & Filter
- Oil Drain Extension w/Valve
- Governor - Electronic Isochronous
- 12V Battery System & Cables
- Air Cleaner (Dry Single Stage)
- Critical Grade Silencer Mounted
- Flexible Fuel Connector
- EPA Certified Tier 3

Generator

- Brushless Single Bearing
- Automatic Voltage Regulator
- ± 0.50% Voltage Regulation
- 4 Pole, Rotating Field
- 125˚C Standby Temperature Rise
- 100% of Rated Load - One Step
- 5% Maximum Harmonic Content
- NEMA MG 1, IEEE and ANSI Standards Compliance for Temperature Rise

Additional

- Single Source Supplier
- UL 2200 & cUL Listed
- CSA Certified
- Seismic Certified to IBC 2021
- NFPA 110 / CSA C282 Compliant
- Microprocessor Based Digital Control Panel Mounted in NEMA 12 Enclosure
- Base - Formed Steel
- Main Line Circuit Breaker Mounted & Wired
- Battery Charger 12V 6 Amp
- Jacket Water Heater -20˚F 2500W 240V w/Isolation Valves
- Vibration Isolation Mounts
- 2 Year / 2000 Hour Standby Warranty
- Standard Colors - White / Gray

Application Data

Engine

Manufacturer:	John Deere	Displacement - Cu. In. (lit):	549 (9.00)
Model:	6090HF484	Bore - in. (cm) x Stroke - in. (cm):	4.70 (11.8) x 5.40 (13.6
Type:	4-Cycle	Compression Ratio:	16.0:1
Aspiration:	Turbo Charged, CAC	Rated RPM:	1800
Cylinder Arrangement:	4 Cylinder Inline	Max HP Stby (kWm):	422 (315)

Exhaust System	Standby
Gas Temp. (Stack): °F (°C)	1,180 (638)
Gas Volume at Stack Temp: CFM (m³/min)	2,084 (59.0)
Maximum Allowable Exhaust Restriction: in. H_2O (kPa)	30.0 (7.50)
Cooling System	
Ambient Capacity of Radiator: °F (°C)	122 (50.0)
Maximum Allowable Static Pressure on Rad. Exhaust: in. H_2O (kPa)	0.50 (0.12)
Water Pump Flow Rate: GPM (lit/min)	74.0 (280)
Heat Rejection to Coolant: BTUM (kW)	5,920 (104)
Heat Rejection to CAC: BTUM (kW)	5,009 (87.7)
Heat Radiated to Ambient: BTUM (kW)	4,941 (86.5)
Air Requirements	
Aspirating: CFM (m³/min)	901 (25.5)
Air Flow Required for Rad. Cooled Unit: CFM (m³/min)	15,333 (434)
Air Flow Required for Heat Exchanger/Rem. Rad. CFM (m³/min)	Consult Factory For Remote Cooled Applications
Fuel Consumption	
At 100% of Power Rating: gal/hr (lit/hr)	17.7 (66.9)
At 75% of Power Rating: gal/hr (lit/hr)	15.4 (58.3)
At 50% of Power Rating: gal/hr (lit/hr)	11.1 (41.9)
Fluids Capacity	
Total Oil System: gal (lit)	8.20 (31.0)
Engine Jacket Water Capacity: gal (lit)	4.25 (16.0)
System Coolant Capacity: gal (lit)	13.2 (50.0)

Deration Factors: Rated Power is available up to 1,677 ft (511 m) at ambient temperatures to 122°F (50°C).
Consult factory for site conditions above these parameters.

Diesel Product Line

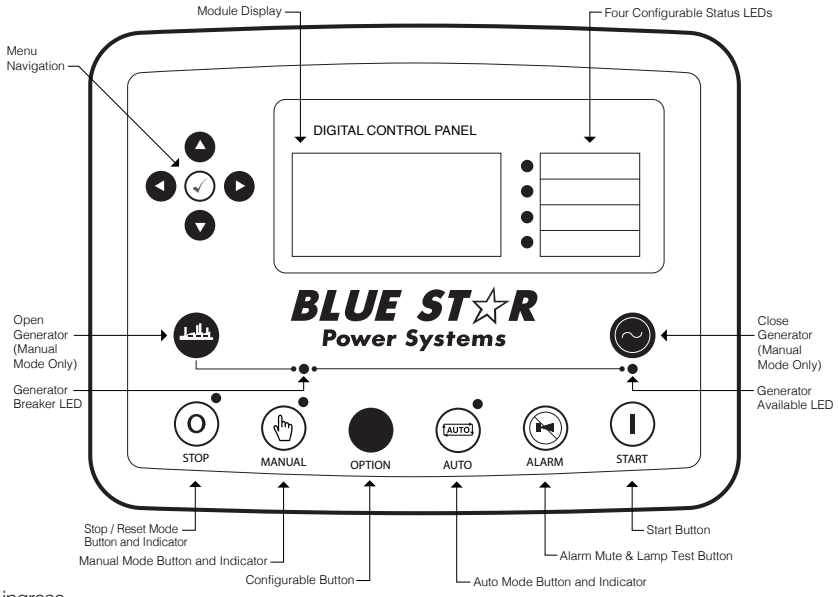
250 kWe

BLUE STAR Power Systems

DCP7310 Control Panel

Standard Features

- Digital Metering
- Engine Parameters
- Generator Protection Functions
- Engine Protection
- CAN Bus (J1939) ECU Communications
- Windows-Based Software
- Multilingual Capability
- Remote Communications to DSE2548 Remote Annunciator
- 8 Programmable Contact Inputs
- 10 Contact Outputs
- RS485 Communicator Interface
- cULus Listed, CE Approved
- Event Recording
- IP 65 rating (with supplied gasket) offers increased resistance to water ingress
- NFPA 110 Level 1 Compatible

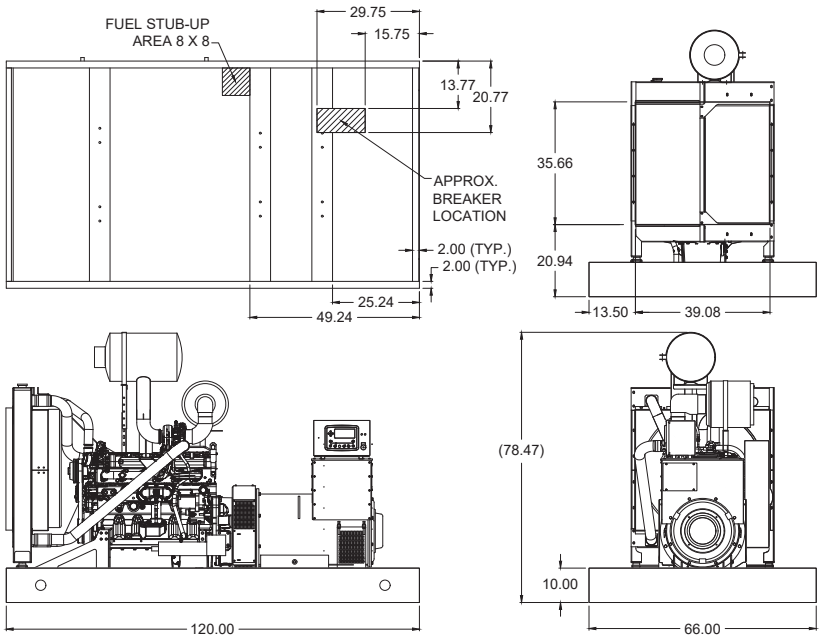


Weights / Dimensions / Sound Data

	L x W x H	Weight lbs
OPU	120 x 66 x 79 in	5,400
Level 1	156 x 66 x 94 in	6,650
Level 2	156 x 66 x 94 in	6,725
Level 3	196 x 66 x 94 in	7,100

Please allow 6-12 inches for height of exhaust stack.

	No Load	Full Load
OPU	84 dBA	86 dBA
Level 1	80 dBA	82 dBA
Level 2	75 dBA	77 dBA
Level 3	69 dBA	71 dBA



Diesel Product Line

250 kWe

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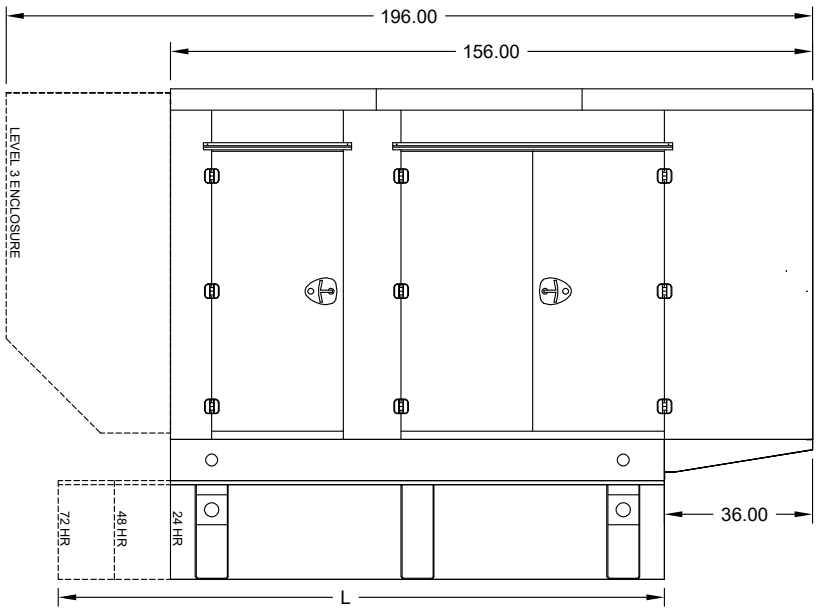
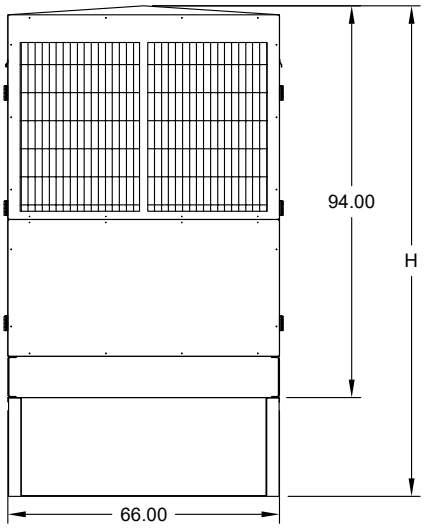
Enclosures & Fuel Tanks





- All enclosure models are 200 MPH wind rating certified in accordance with IBC2021 and ASCE/SEI 7-16 standards.
- Level 2 & 3 enclosures include sound attenuation foam
- Level 3 enclosure includes frontal sound & exhaust hood.
- Enclosure height does not include exhaust stack.

	24 Hour 540 Gallon	48 Hour 1080 Gallon	72 Hour 1620 Gallon
L	120.00	162.00	228.00
H	118.00	130.00	130.00

Notes

- All specification sheet dimensions are represented in inches.
- All drawings based on standard 480 volt standby generator. Lengths may vary with other voltages. All drawings and dimensions subject to change without notice.
- All enclosures and fuel tanks are based on the standard unit configuration. Any requested deviation can change dimensions.
- Sound data is measured at 23 feet (7 meters) in accordance with ISO 8528-10.
- All materials and specifications subject to change without notice.

Blue Star Power Systems

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Industrial Alternators

BLUE STAR Power Systems

Blue Star Power Systems utilizes the highest quality alternators available. Our industrial alternators provide consistent performance, quality design, and great durability required for long life and versatility. Alternators used by Blue Star Power Systems are UL and CSA Listed, which guarantees that each one meets the rigorous demands of industrial power generation and will provide safe and effective service for the life of the alternator. Blue Star Power Systems alternators range from 20 kWe through 2000 kWe.

Standard Features

- **Enhanced Ventilation**
  Created by a high-efficiency fan that optimizes internal airflow patterns, maximizes heat transfer, and minimizes hot spot differentials for extended winding life.
- **Fully Guarded**
  For operator safety and alternator protection. No rotating or electrically energized parts are exposed. All openings are covered by louvers or screens.
- **Large Conduit Box**
  Provides ample space for easy connections and allows load line access from all sides, top, or bottom.
- **Design Specs and Agency Approvals**
  All Blue Star Power Systems alternators are UL and CSA Listed (unless specified otherwise) and meet NEMA MG1-32, BS5000, CSA C22.2, IEC 34 and VDE 0530 requirements.
- **Class H Insulation System**
  Utilizes an unsaturated polyester varnish for optimal insulation life and superior moisture protection.
- **Optimized Windings**
  Provide low reactances and exceptional motor starting capability. The stator windings utilize a 2/3 pitch to minimize harmonic distortion and facilitate parallel operation.
- **Permanent Magnet Generator (optional)**
  Ensures 300% short circuit current during fault conditions and provides the regulator with input power isolated from load distortion.
- **Heavy-Duty Bearing**
  Resists contamination and gives a life expectancy up to 40,000 hours.
- **Automatic Voltage Regulator**
  Provides accurate 1% regulation, under-speed protection, stability adjustment to optimize transient performance, and EMI filtering to commercial standards. Fully encapsulated for rugged durability in virtually any environment.

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S4L1D-D41 Wdg.311 - Technical Data Sheet

Standards

STAMFORD industrial alternators meet the requirements of the relevant parts of the IEC 60034 and the relevant sections of other international standards such as BS5000-3, ISO 8528-3, VDE 0530, NEMA MG1-32, CSA C22.2-100 and AS 60034. Other standards and certifications can be considered on request.

Quality Assurance

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

Excitation and Voltage Regulators

Excitation System					
AVR Type	AS440	MX341	MX321	MX322	
Voltage Regulation	± 1%	± 1%	± 0.5%	± 0.5%	with 4% Engine Governing
Excitation Type	Self-Excited	PMG	PMG	PMG	

No Load Excitation Voltage (V)	12 - 9
No Load Excitation Current (A)	0.7 - 0.5
Full Load Excitation Voltage (V)	41 - 39
Full Load Excitation Current (A)	2.3 - 2.2
Exciter Time Constant (seconds)	0.105

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Electrical Data								
Insulation System	Class H							
Stator Winding	Double Layer Lap							
Winding Pitch	Two Thirds							
Winding Leads	12							
Winding Number	311							
Number of Poles	4							
IP Rating	IP23							
RFI Suppression	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. Refer to factory for others							
Waveform Distortion	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	12.29							
	50 Hz				60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air	0.83 m³/sec				0.99 m³/sec			
Voltage Star	380	400	415	440	416	440	460	480
Voltage Parallel Star	190	200	208	220	208	220	230	240
Voltage Series Delta	220	230	240	254	240	254	266	277
kVA Base Rating (Class H) for Reactance Values	300	310	310	290	344	370	375	390
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.15	2.94	2.73	2.27	3.60	3.46	3.21	3.07
X'd Dir. Axis Transient	0.20	0.19	0.17	0.14	0.22	0.21	0.20	0.19
X"d Dir. Axis Subtransient	0.14	0.13	0.12	0.10	0.15	0.14	0.13	0.12
Xq Quad. Axis Reactance	2.66	2.48	2.30	1.92	3.09	2.97	2.75	2.63
X"q Quad. Axis Subtransient	0.40	0.37	0.34	0.29	0.40	0.39	0.36	0.34
XL Stator Leakage Reactance	0.07	0.06	0.06	0.05	0.09	0.08	0.08	0.07
X2 Negative Sequence Reactance	0.27	0.25	0.23	0.19	0.28	0.27	0.25	0.24
X0 Zero Sequence Reactance	0.10	0.09	0.09	0.07	0.10	0.09	0.09	0.08
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.78	3.53	3.28	2.73	4.32	4.16	3.85	3.68
X'd Dir. Axis Transient	0.23	0.21	0.20	0.17	0.25	0.24	0.23	0.22
X"d Dir. Axis Subtransient	0.17	0.16	0.15	0.12	0.17	0.16	0.15	0.15
Xq Quad. Axis Reactance	2.74	2.55	2.37	1.97	3.18	3.06	2.84	2.71
X"q Quad. Axis Subtransient	0.48	0.45	0.41	0.34	0.48	0.46	0.43	0.41
XL Stator Leakage Reactance	0.08	0.07	0.07	0.05	0.10	0.09	0.09	0.08
Xlr Rotor Leakage Reactance	0.12	0.11	0.10	0.09	0.14	0.13	0.12	0.12
X2 Negative Sequence Reactance	0.32	0.30	0.28	0.23	0.34	0.32	0.30	0.29
X0 Zero Sequence Reactance	0.12	0.11	0.10	0.08	0.11	0.11	0.10	0.10

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Time Constants (Seconds)		
T'd TRANSIENT TIME CONST.	0.08	
T"d SUB-TRANSTIME CONST.	0.019	
T'do O.C. FIELD TIME CONST.	1.7	
Ta ARMATURE TIME CONST.	0.018	
T"q SUB-TRANSTIME CONST.	0.0077	
Resistances in Ohms (Ω) at 22^{0}C		
Stator Winding Resistance (Ra), per phase for series connected	0.0124	
Rotor Winding Resistance (Rf)	1.05	
Exciter Stator Winding Resistance	18	
Exciter Rotor Winding Resistance per phase	0.068	
PMG Phase Resistance (Rpmg) per phase	1.9	
Positive Sequence Resistance (R1)	0.0155	
Negative Sequence Resistance (R2)	0.017856	
Zero Sequence Resistance (R0)	0.0155	
Saturation Factors	400V	480V
SG1.0	0.31	0.31
SG1.2	1.25	1.25
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0.5, 1	N/A
Moment of Inertia	4.0771 kgm2	N/A
Weight Wound Stator	415 kg	N/A
Weight Wound Rotor	361 kg	N/A
Weight Complete Alternator	940 kg	N/A
Shipping weight in a Crate	1010 kg	N/A
Packing Crate Size	155 x 87 x 107(cm)	N/A
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	N/A
Bearing Non-Drive End	Ball 6314	N/A

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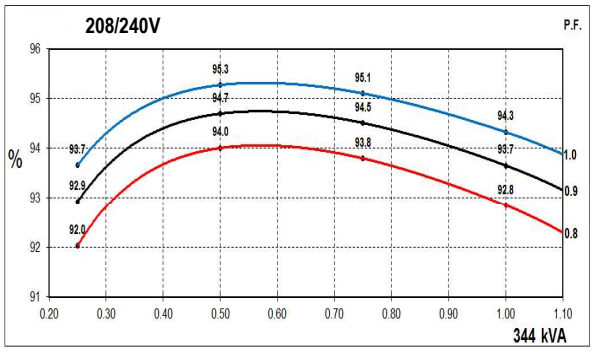
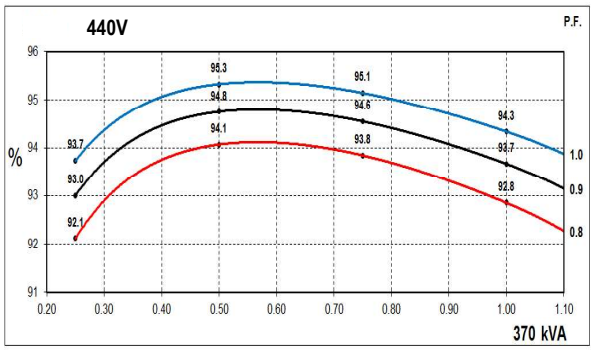
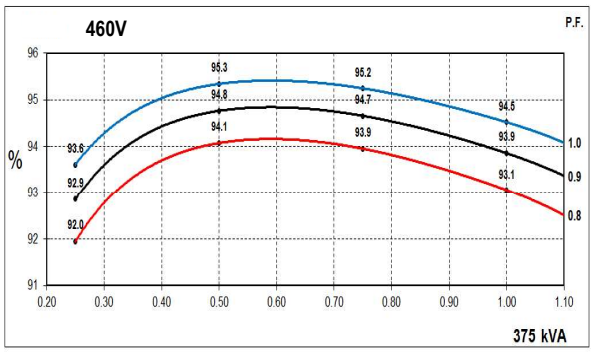
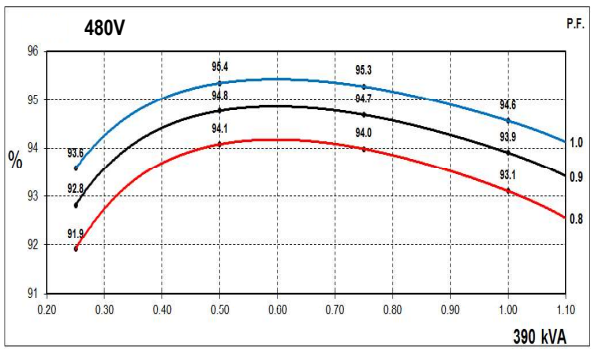
THREE PHASE EFFICIENCY CURVES

60Hz









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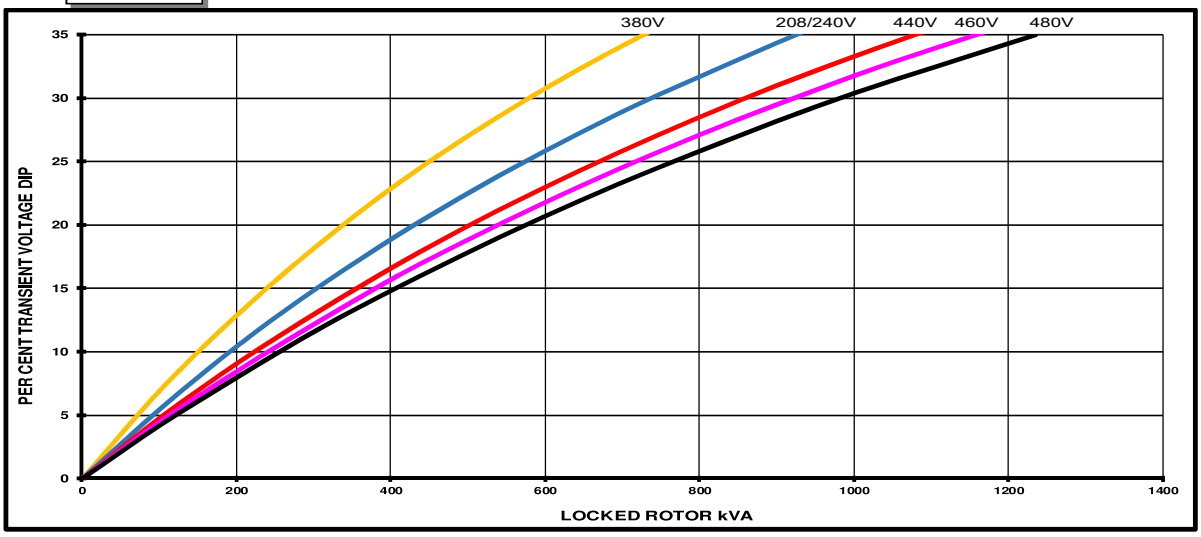
Locked Rotor Motor Starting Curves - Separately Excited

60Hz



Transient Voltage Dip Scaling Factor	
Lagging PF	Factor
<= 0.4	1.00
0.5	0.95
0.6	0.90
0.7	0.86
0.8	0.83
0.9	0.75
0.95	0.70
1	0.65

Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.25
0.5	1.20
0.6	1.15
0.7	1.10
> 0.7	1.00

Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

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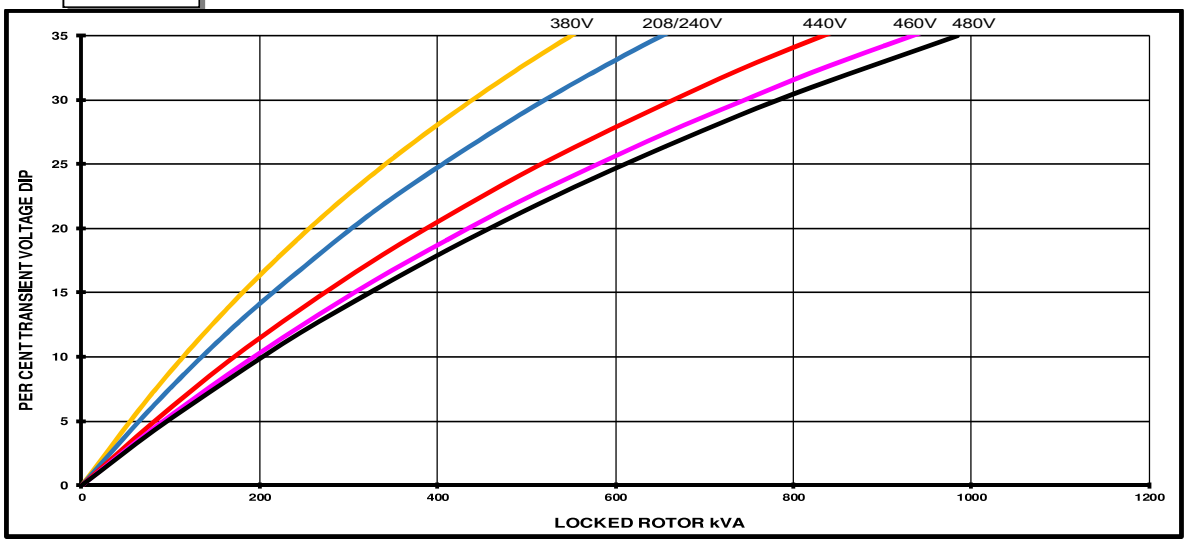
Locked Rotor Motor Starting Curves - Self Excited

60Hz



Transient Voltage Dip Scaling Factor	
Lagging PF	Factor
<= 0.4	1.00
0.5	0.95
0.6	0.90
0.7	0.86
0.8	0.83
0.9	0.75
0.95	0.70
1	0.65

Transient Voltage Rise Scaling Factor	
Lagging PF	Scaling Factor
<= 0.4	1.25
0.5	1.20
0.6	1.15
0.7	1.10
> 0.7	1.00

Note: To determine % Transient Voltage Dip or Voltage Rise at various PF, multiply the % Voltage Dip from the curve directly by the Scaling Factor.

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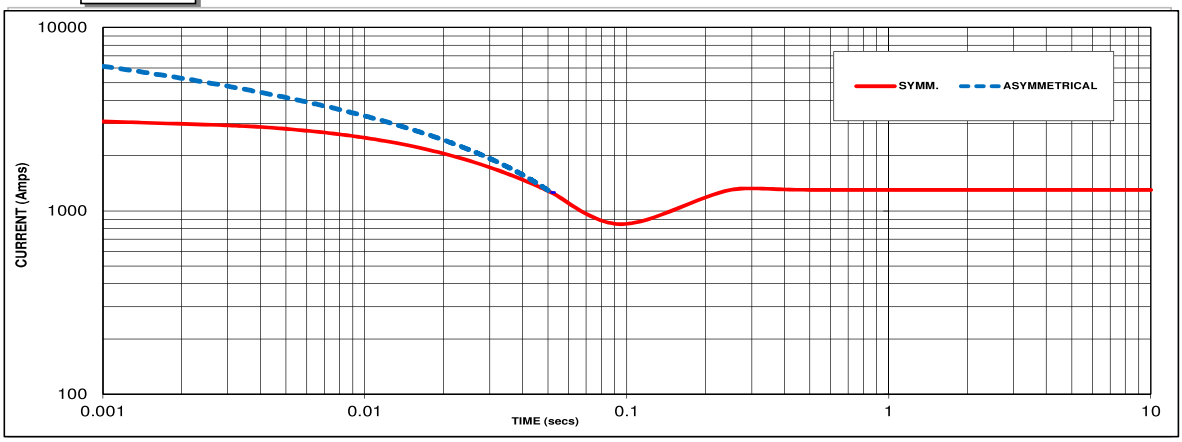
Three-phase Short Circuit Decrement Curve

60Hz



Sustained Short Circuit = 1300 Amps

Note 1
The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		**60Hz**	
Voltage	Factor	Voltage	Factor
380V	X 1.00	416V	X 1.00
400V	X 1.05	440V	X 1.06
415V	X 1.09	460V	X 1.10
440V	X 1.16	480V	X 1.15

The sustained current value is constant irrespective of voltage level

If MX322 or digital AVR is used, the sustained short circuit current value is to be multiplied by a factor of 1.1.

Note 2
The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

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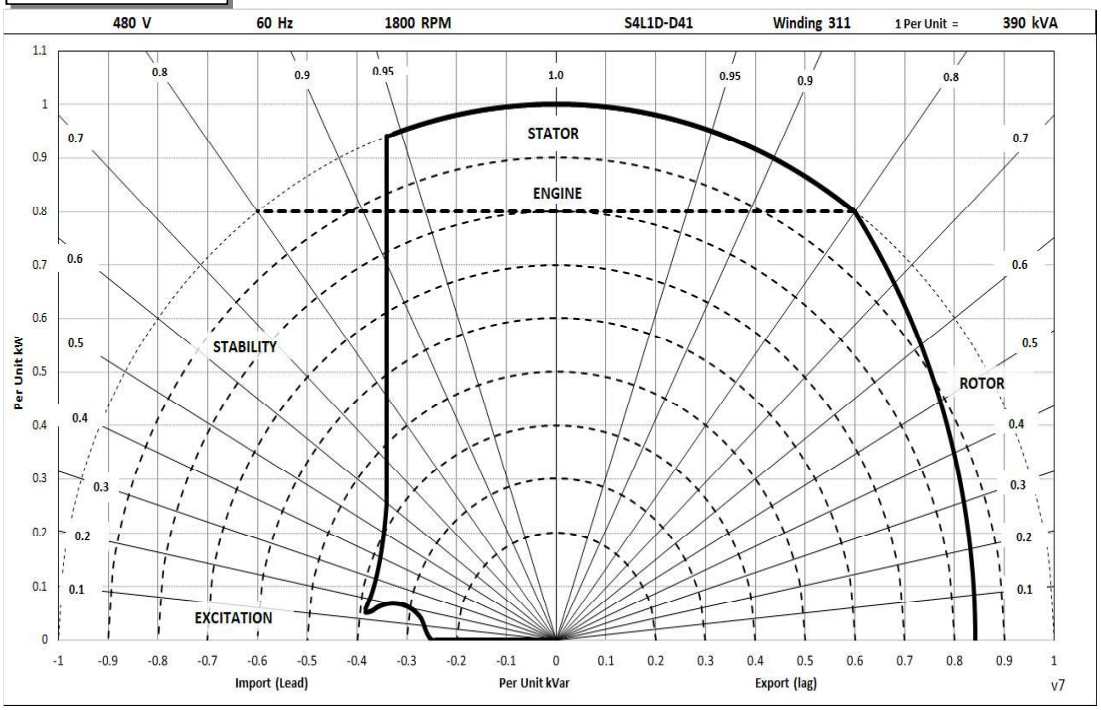
Typical Alternator Operating Charts

480V/60Hz



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S4L1D-D41 Wdg.311

RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Standby - 163/27℃				Standby - 150/40℃				Cont. H - 125/40℃				Cont. F - 105/40℃			
60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	375	410	415	430	365	400	400	415	344	370	375	390	315	340	345	355
	kW	300	328	332	344	292	320	320	332	275	296	300	312	252	272	276	284
	Efficiency (%)	92.4	92.2	92.5	92.6	92.5	92.4	92.7	92.8	92.8	92.9	93.1	93.1	93.2	93.2	93.4	93.5
	kW Input	325	356	359	372	316	346	345	358	296	319	322	335	270	292	295	304

De-Rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5℃ by which the operational ambient temperature exceeds 40℃
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60℃ and altitude exceeding 4000 meters must be referred to applications.

Dimensional and Torsional Drawing

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (http://stamford-avk.com/)

Note: Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.

ENGINE PERFORMANCE CURVE

JOHN DEERE

Rating: Gross Power
Application: Generator
Target: 275 kWe Standby Market
1800 RPM (60 Hz)

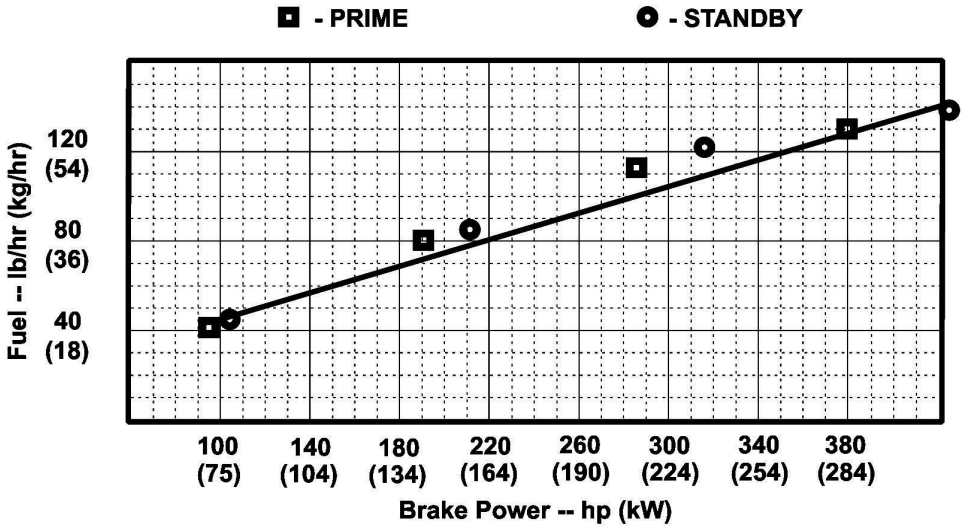
PowerTech™ E 9L Engine
Model: **6090HF484**
JD Electronic Control

381 hp (284 kW) Prime
422 hp (315 kW) Standby

Nominal Engine Power @ 1800 RPM			
Prime		**Standby**	
HP	kW	HP	kW
381	284	422	315

Generator Efficiency %	Fan Power (6% of Standby)		Power Factor	Prime Rating		Standby Rating		ISO 8528 G2 Block Load Capability
	hp	kW		kW	kVA	kW	kVA	
90-94	33.9	25.3	0.8	242-253	303-316	266-278	333-348	NA

Note 1: Based on nominal engine power.



STANDARD CONDITIONS

Air Intake Restriction ..... 12 in.H_2O (3 kPa)
Exhaust Back Pressure ..... 30 in.H_2O (7.5 kPa)

Gross power guaranteed within + or - 5% at SAE J1995 and ISO 3046 conditions:
- 77 °F (25 °C) air inlet temperature
- 29.31 in.Hg (99 kPa) barometer
- 104 °F (40 °C) fuel inlet temperature
- 0.853 fuel specific gravity @ 60 °F (15.5 °C)

Conversion factors:
- Power: kW = hp x 0.746
- Fuel: 1 gal = 7.1 lb, 1 L = 0.85kg
- Torque: N·m = lb-ft x 1.356

All values are from currently available data and are subject to change without notice.

Notes:
*All OEM Gen Set Engine Applications must be pre-screened for torsional vibration compatibility with the respective alternator end hardware. OEM Engine Application Engineering will perform this computer-based analysis work upon request. **

Tier-3 Emission Certifications:	Certified by:
• CARB • EPA Ref: Engine Emission Label	Vincenzo Pendola 02-25-'08

* Revised Data
Curve 6090HF484_A_S0_R0

Engine Installation Criteria

General Data

6	Cylinders
118.4 mm	Bore
136.0 mm	Stroke
9 L	Displacement
16.0 : 1	Compression Ratio
2/2	Valves per Cylinder
1-5-3-6-2-4	Firing Order
HPCR	Combustion System
In-line, 4-Cycle	Engine Type
Air-to-Air Aftercooled	Aspiration
Air-to-Air	Charge Air Cooling System
Open	Engine Crankcase Vent System

Physical Data

434.4 mm	X-axis, Center of Gravity Location
2.24 mm	Y-axis, Center of Gravity Location
201.4 mm	Z-axis, Center of Gravity Location
1113 mm	Height
1208 mm	Length
82 °C	Max. Continuous Damper Temp
8600 N	Continuous, Thrust Bearing Load Limit Forward
13000 N	Intermittent, Thrust Bearing Load Limit Forward
4000 N	Continuous, Thrust Bearing Load Limit Rearward
6000 N	Intermittent, Thrust Bearing Load Limit Rearward
901 kg	Weight- with oil and no coolant
630 mm	Width
814 N·m	Max. Allowable Static Bending Moment
0.25 DDA	Front of Crank

Electrical System

105 °C	Max. ECU Temperature
125 °C	Max. Harness Temperature
NA	Max. VTG Actuator Surface Temp
6 volts	Min. Voltage at ECU during Cranking- 12V
10 volts	Min. Voltage at ECU during Cranking- 24V
1100 amps	Recommended Battery Capacity- 12V
750 amps	Recommended Battery Capacity- 24V
920 amps	At 0 °C - 12V, Starter Rolling Current
600 amps	At 0 °C - 24V, Starter Rolling Current
1300 amps	At -30 °C - 12V, Starter Rolling Current
700 amps	At -30 °C - 24V, Starter Rolling Current
0.0012 Ohm	Max. Allowable Start Circuit Resistance- 12V
0.002 Ohm	Max. Allowable Start Circuit Resistance- 24V
0.15 volts	Maximum Voltage From Engine Crankshaft- 12V
0.15 volts	Maximum Voltage From Engine Crankshaft- 24V

Charge Air Cooling System

252	Intake Manifold Pressure Prime
256	Intake Manifold Pressure Standby
88 °C	Intake Manifold Temperature at which Power De-rate Occurs
86.5 kWbhp	Air/Air Exch'r. Heat Rej. Prime
88.0 kWbhp	Air/Air Exch'r. Heat Rej. Standby
223 °C	Compressor Discharge Temperature @ 77°F (25°C) Ambient Air Prime
225 °C	Compressor Discharge Temperature @ 77°F (25°C) Ambient Air Standby
255 °C	Compressor Discharge Temperature @ 117° F(47°C) 80 kPa Barametric pressure Prime
258 °C	Compressor Discharge Temperature @ 117° F(47°C) 80 kPa Barametric pressure Standby
13 kPa	Maximum Pressure Drop through CAC
NA	Minimum Pressure Drop through CAC
NA	Minimum Temperature Out of Charge Air Cooler Prime
NA	Minimum Temperature Out of Charge Air Cooler Standby
45 °C	Maximum Temperature Out of Charge Air Cooler Prime
45 °C	Maximum Temperature Out of Charge Air Cooler Standby

Engine Installation Criteria

Cooling System

16 Liter	Engine Coolant Capacity
94 °C	Thermostat Fully Open
82 °C	Thermostat Start to Open
110 °C	Max. Top Tank Temperature Prime
110 °C	Max. Top Tank Temperature Standby
14 kPa	Max. Radiator System Restriction
12 L/min	Minimum Coolant Fill Rate
100 kPa	Min. Pressure Cap
30 kPa	Min. Pump Inlet Pressure
280 L/min	Coolant Flow
94 kW/min	Engine Heat Rejection Prime
104 kW/min	Engine Heat Rejection Standby
-30 kPa	Max. Water Pump Inlet Restriction
47 °C	Min. Air-to-Boil Temperature Prime
47 °C	Min. Air-to-Boil Temperature Standby

Exhaust System

7.0 N·m	Max. Bending Moment on Turbo Outlet
11 kg	Max. Shear on Turbo Outlet
7.5 kPa	Maximum Allowable Exhaust Restriction
NA	Minimum Allowable Exhaust Restriction
58.5 m^3	Exhaust Flow Prime
59.0 m^3	Exhaust Flow Standby
638 °C	Exhaust Temperature Prime
638 °C	Exhaust Temperature Standby

Fuel System

L14 Controller	ECU Description
Denso HP4	Fuel Injection Pump
Electronic	Governor Type
20 kPa	Max. Fuel Inlet Pressure
20 kPa	Max. Fuel Inlet Restriction
80 °C	Max. Fuel Inlet Temperature
20 kPa	Max. Fuel Return Pressure
59.3 kg/hr	Fuel Consumption Prime
63.2 kg/hr	Fuel Consumption Standby
37 °C	Fuel Temperature Rise, Inlet to Return Prime
37 °C	Fuel Temperature Rise, Inlet to Return Standby
204 kg/hr	Total Fuel Flow Prime
204 kg/hr	Total Fuel Flow Standby

Lubrication System

0.5 kPa	Max. Crankcase Pressure
40 L/min	Max. Airflow in Blow-By
3 g/hr	Max. Oil Carryover in Blow-By
190 kPa	Oil Pressure at Low Idle
260 kPa	Oil Pressure at Rated Speed

Air Intake System

8 °C	Maximum Allowable Temp Rise--Ambient Air to Engine Inlet
25.5 m^3	Engine Air Flow Prime
25.5 m^3	Engine Air Flow Standby
99.9 %	Air Cleaner Efficiency
3.75 kPa	Clean Air Cleaner, Maximum Air Intake Restriction
6.25 kPa	Dirty Air Cleaner, Maximum Air Intake Restriction

Engine Installation Criteria

	Performance Data
29.0:1	Prime, Air:Fuel Ratio
27.0:1	Standby, Air:Fuel Ratio
0.5	Smoke @ Rated Speed Prime
0.3	Smoke @ Rated Speed Standby
1677 m	Altitude Capability Prime
1677 m	Altitude Capability Standby
24 kW	Friction Power @ Rated Speed
1000 rpm	Low Idle Speed
91.1 dBa	Noise @ 1 m Prime
91.3 dBa	Noise @ 1 m Standby
284 kW	Rated Power Prime
315 kW	Rated Power- Standby
1800 rpm	Rated Speed
1671 N·m	Rated Torque Standby
1504 N·m	Rated Torque Prime
2333 kPa	Standby BMEP
2100 kPa	Prime BMEP
59.3 kg/hr	100%Power Prime
18.8 kg/hr	25%Power Prime
36.3 kg/hr	50%Power Prime
51.2 kg/hr	75%Power Prime
63.2 kg/hr	100%Power Standby
20.0 kg/hr	25%Power Standby
38.7 kg/hr	50%Power Standby
54.6 kg/hr	75%Power Standby

UL 2200 Summary

What Is UL 2200 Listing & Why Is It Important?

Underwriters Laboratories Inc. (UL) is the leading independent product safety certification organization in the United States. Founded in 1894, UL is an impartial and not-for-profit organization devoted to safety testing of a wide assortment of products. The UL Listing mark is widely recognized as a standard for various electrical and building codes and is often called for as a specification.

The UL 2200 Listing is a comprehensive safety standard encompassing the design, construction and performance of stationary generators. This benchmark will be increasingly important to manufacturers, specifying engineers and end users alike, since national and municipal electrical codes will mandate the UL 2200 Listing for all standby installations in coming years.

When manufacturers bring their products to UL, they are subjecting them to extremely rigorous safety testing. Manufacturers not only enhance the value of their products, they are also strengthening their own brands among consumers who perceive a manufacturers commitment to safety. Because of the many rigorous tests, a manufacturer must follow stringent UL guidelines in creating, building and testing its products in-house to UL's uncompromising standards. The Listing process involves numerous steps: creation of product, construction descriptions, process reviews, design modifications as needed and product testing. It is a comprehensive procedure focused upon manufacturing standards and product safety. With a complete offering of UL 2200 Listed products, Blue Star Power Systems has positioned itself as a leader in providing state-of-the-art electrical power generation and energy solutions.

Blue Star Power Systems has a complete offering in both Diesel and Gaseous models ranging from 20-2000 kWe that are UL 2200 listed.

MX321 Voltage Regulator

BLUE STAR Power Systems

MX321 is a three phase sensed Automatic Voltage Regulator and forms part of the excitation system for a brush-less generator. Excitation power is derived from a three-phase permanent magnet generator (PMG), to isolate the AVR control circuits from the effects of nonlinear loads and to reduce radio frequency interference on the generator terminals. Sustained generator short circuit current is another feature of the PMG system.

Voltage Adjustment

The screwdriver adjustable potentiometer adjusts the generator output voltage. Adjustment clockwise increases the generator output voltage.

When using a remote voltage adjust rheostat, remove the jumper wire across terminals 1 and 2 and install a 1k ohm 1 watt rheostat. This will give ±10% voltage variation from the nominal.

Stability Adjustment

The AVR includes a stability or damping circuit to provide good steady state and transient performance of the generator.

A jumper link selector is provided to optimize the response of the stability circuit to various size generators. The link should be positioned as shown in the diagram according to the kW rating of the generator.

The correct setting of the Stability adjustment can be found by running the generator at no load and slowly turning the stability control anti-clockwise until the generator voltage starts to become unstable.

The optimum or critically damped position is slightly clockwise from this point (i.e. where the machine volts are stable but close to the unstable region).

Under Frequency Roll Off (UFRO) Adjustment

The AVR incorporates an underspeed protection circuit which gives a volts/Hz characteristic when the generator speed falls below a presettable threshold known as the “knee” point.

The red Light Emitting Diode (LED) gives indication that the UFRO circuit is operating.

The UFRO adjustment is preset and sealed and only requires the selection of 50 or 60Hz and 4 pole or 6 pole, using the jumper link as shown in the diagram.

For optimum setting, the LED should illuminate as the frequency falls just below nominal, i.e. 47Hz on a 50Hz system or 57Hz on a 60Hz system.

Specifications

Sensing Input	
Voltage	190 to 264VAC max, 1 or 3 phase
Frequency	50 to 60 Hz Nominal
Power Input (PMG)	
Voltage	170 to 220VAC, 3 phase
Current	3A
Frequency	100 to120 Hz Nominal
Output	
Voltage	max 120VDC
Current	Continuous 3.7A Intermittent 6A for 10 secs
Resistance	15 ohms Minimum
Regulation +/- 0.5% RMS	
Thermal Drift 0.02% per 1ºC change in AVR ambient	
Soft Start Ramp Time 0.4 - 4 seconds	
Typical System Response	
AVR Response	10 ms
Field Current to 90%	80 ms
Machine Volts to 97%	300 ms
External Voltage Adjustment +/-10% with 1k ohm 1 watt trimmer	
Under Frequency Protection	
Set Point	95% Hz
Slope	100 to 300% down to 30 Hz
Max. Dwell	20% volts/S Recovery
Unit Power Dissipation 18 watts Maximum	
Analog Input	
Maximum Input	+/- 5VDC
Sensitivity	1V for 5% Generator Volts (Adjustable)
Input Resistance	1k ohm
Quadrature Droop Input 10 ohms Burden	
Max. Sensitivity	0.22A for 5% Droop 0PF
Max. Input:	0.33A
Current Limit Input 10 ohms burden	
Sensitivity Range	0.5 to 1A
Over Voltage Detection Input 10 ohms Burden	
Set Point	300V Time Delay: 1 sec (Fixed)
CB Trip Coil Volts	10 to 30VDC
CB Trip Coil Resistance	20 to 60 ohms
Time Delay	1 second (Fixed)
Over Excitation Protection	
Set Point	75VDC
Time Delay	8 to 15 seconds (Fixed)

DCP7310 Control Panel

BLUE STAR Power Systems

The DCP7310 is an Auto Start Control Module suitable for a wide variety of single, diesel or gas, generator set applications. The 7310 provides generator set control, transfer switch control, metering, monitoring & protection.

Key Benefits

- Real-time clock provides accurate event logging
- Multiple date and time scheduler
- Set maintenance periods can be configured to maintain engine performance
- Can be integrated into building management systems (BMS) using MODBUS
- Increased input and output expansion capability via DSENet®
- Licence-free PC software
- IP65 rating (with supplied gasket) offers increased resistance to water ingress
- PLC functionality
- Data logging to assist with fault finding and diagnosis
- cULus Listed

Advanced Features

- 4-Line back-lit LCD text display
- Five key menu navigation
- Front panel editing with PIN protection
- Customizable status screens
- Power save mode
- 8 Configurable inputs
- 6 Configurable DC outputs
- 2 configurable volt-free relay outputs
- Flexible sensor inputs
- Configurable timers and alarms
- 3 configurable maintenance alarms
- Multiple date and time scheduler
- Configurable event log (250 events)
- CAN engine support through FT4
- Integral PLC editor
- Easy access diagnostic page
- CAN and Magnetic Pick-up/Alt. inputs
- Fuel usage monitor and low fuel alarms
- Charge alternator failure alarm
- Load monitoring (kW, frequency, voltage)
- Support for 0V to 10V & 4mA to 20mA sensors
- LED and LCD alarm indication
- Power monitoring (kWh, kVAr, kVAh, kVArh)
- Load switching (load shedding and dummy load outputs)
- Unbalanced load protection
- USB connectivity
- Backed up real time clock
- Fully configurable via DSE Configuration Suite PC software
- Remote SCADA monitoring via DSE Configuration Suite PC software
- User selectable simultaneous RS232, RS485
- Configurable MODBUS pages
- MODBUS RTU & TCP support
- Advanced SMS messaging (additional external modem required)
- Additional display screens to enhance with modem diagnostics
- Idle control for starting
- DSENet® expansion compatible

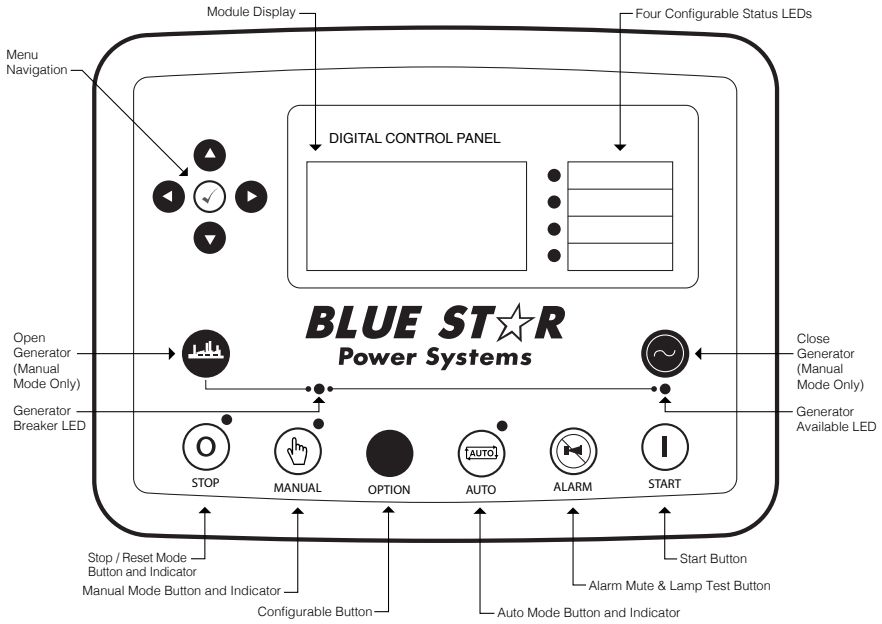
Specifications

DC Supply	
Continuous Voltage Rating	8V to 35V Continuous
Cranking Dropouts: Able to survive 0V for 100mS, providing supply was at least 10V before dropout and supply recovers to 5V. This is achieved without the need for internal batteries.	
Maximum Operating Current	510mA at 12V, 240mA at 24V
Maximum Standby Current	330mA at 12V, 160mA at 24V
Charge Fail/Excitation Range	0V to 35V
Outputs	
Output A (Fuel)	15ADC at Supply Voltage
Output B (Start)	15ADC at Supply Voltage
Outputs C & D (Volt free)	8A at 250VAC
Aux Outputs E to J	2ADC at Supply Voltage
Generator	
Voltage Range (L-L)	26V to 719VAC
Voltage Range (L-N)	15V to 415VAC
Frequency Range	3.5 Hz to 75 Hz
Bus	
Voltage Range	15V to 415VAC (L-N)
Frequency Range	3.5 Hz to 75 Hz
Magnetic Pickup	
Voltage Range	+/- 0.5V to 70V
Frequency Range	10,000 Hz (max)
Display	
LCD Heated Display	-40°F to 158°F

DCP7310 Control Panel

Front Panel LED Indicators:

- Manual: Indicates controller is in the MANUAL mode
- Stop: Indicates controller is in the STOP mode
- Auto: Indicates unit is in the AUTO mode
- Generator Available: Indicates when the generator is available to take load
- Generator Breaker: Indicates system is supplying current to a connected load
- Four Configurable Status LEDs: Configurable via DSE Configuration Suite PC software



Standard Engine Protection Functions

Pre-Alarms (Warnings)

- Low Oil Pressure
- High Coolant Temperature
- Low Coolant Temperature
- Battery Overcharge (High Voltage)
- Weak Battery (Low Voltage)
- Low Load
- Def Level
- Battery Charger Failure
- Engine Sender Unit Failure
- Engine kWe Overload
- Maintenance Interval Timer
- Low Fuel Level
- Fuel Leak Detect

Alarms (Shutdowns)

- Low Oil Pressure
- High Coolant Temperature
- Overspeed
- Overcrank
- Fuel Sender Failure
- Def Level

All alarms and pre-alarms can be configured via the DSE Configuration Suite PC software or the front panel.

Optional Features

- Generator Protection - 27(2), 32, 40Q, 51(2), 59(2), 81O, 81U
- Enhanced Generator Protection - 51 and 47
- Selection of Integrating Reset or Instantaneous Reset Characteristics for Overcurrent Protection
- Ethernet and 4G (GSM) remote monitoring and communications via DSE WebNet Software
- Automatic Transfer Switch Control
- Remote Emergency Stop
- Multilingual Capability
- High Fuel Level Pre-Alarm
- Critical Low Fuel Level Alarm
- Analog Meters

Generator Protection

- Undervoltage (27)
- Overvoltage (59)
- Underfrequency (81U)
- Overfrequency (81O)
- Overcurrent (51)
- Reverse Power (32)
- Loss of Excitation (400)
- Phase Imbalance (47)

All generator protection features are programmable as alarms or pre-alarms.

DCP7310 Control Panel

BLUE STAR Power Systems

DRP2510 Remote Display Panel

The DRP2510 is a display module designed to work with the DCP7310 Auto Start. Up to three display modules can be connected to one host control module, and can be positioned up to a maximum distance of 3,280 (1km) away. All remote displays connected to the same system, will show the same information at any one time, while the host controller is able to display different information. The modules are simple to operate, and feature the same user-friendly, menu layout as the host module. All communications and configuration are done via the host module only. The remote devices simply mirror the configuration of the host module, making the system quick and easy to install.

DSE2548 DSENET® Remote Annunciator

The DSE2548 is an LED expansion module that can be used with all DSENet® compatible control modules. The module has been designed to display a maximum of height individual LED indications up to a maximum distance of 3,280 (1km). The DSE2548 is presented in a vertical enclosure. It includes an alarm sounder that is triggered when the host controller detects an alarm condition. The alarm can be muted directly from the DSE2548 using the front push button. The DSE2548 includes individual LEDs for each channel and a 'Power On' LED that flashes when the link with the host controller is lost.

DSE890 MKII DSEWebNet® Gateway 4G (GSM/Ethernet) Remote Communications Interface

The DSE890 MKII 4G gateway is used in conjunction with supported DSE controllers to provide remote monitoring and communications data via the DSEWebNet® software. The DSE890 MKII gateway communicates with a maximum of five connected DSE controllers, monitoring their instrumentation and operating states. The DSEWebNet® software is accessed using an internet browser or mobile app connection. Users are able to perform multiple tasks including: monitoring equipment, clearing alarm conditions and starting/stopping equipment at the click of a button.

DSE2157 DSENET® Output Expansion Module

The DSE2157 is an output relay expansion module for use with DSENet® compatible control modules. The DSE2157 has been designed to extend a host module's output capabilities. A maximum of 10 DSE2157's can be connected to an individual module at any one time. All outputs are configurable via the host controller. The additional output capabilities of the DSE2157 give OEMs the flexibility to meet increasingly complex industry specifications.

DSE2130 DSENET® Input Expansion Module

The DSE2130 is an input expansion module for use with DSENet® compatible control modules. The additional input capabilities of the DSE2130 give OEMs the flexibility to meet increasingly complex industry specifications. The DSE2130 provides an additional eight digital inputs, with four of these configurable for use as analog inputs. All inputs are configured within the host controller.

DSE2133 DSENET® RTD / Thermocouple Input Expansion Module

The DSE2133 Input Expansion Module is used in conjunction with supported DSENet controllers to provide 8 additional configurable inputs. Up to four modules can be linked together to provide up to 32 additional inputs. The inputs can be configured as RTD or Thermocouple inputs in the 'host controller'.

DSE2131 Ratiometric Input Expansion Module

The DSE2131 Ratiometric Input Expansion module is used in conjunction with supported DSENet controllers to provide additional, flexible, input functionality. The ratiometric inputs can be configured in a number of ways to connect to digital switches, resistive sensors, 0 to 10VDC signals or 4 to 20 mA signals.

DSE2152 Analog Output Expansion Module

The DSE2152 Analog Output Expansion Module is used in conjunction with supported DSENet controllers to provide 6 additional outputs. The outputs can be individually configured as 0 to 10V or 4 to 20mA, via the "host controller". Up to four DSE2152 modules can be linked together to provide up to 24 additional outputs. An ID switch is provided on the module for identification.

DSE2548 Remote Annunciator

BLUE STAR Power Systems

The DSE2548 is a powerful remote display to match Blue Star Power Systems DCP7310 control panel. It may be powered from the engine starting batteries at 12V, 24VDC, or AC to DC converter. The DSE2548 uses DSENET communications between itself and the DCP to reduce the number of wires required to activate all the alarms. The DSENET communications can be used on remote displays up to 3,280 (1km) feet away from the DCP. The DSE2548 has 9 LEDs per annunciator for a total of 18 LEDs to indicate Alarms, Pre-Alarms and operating conditions of the emergency standby generator system. The DSE2548 also comes complete with a box for easy installation. The DSE2548 is available in two mounting configurations: surface and semi-flush mount. These panels comply with the requirements of NFPA 110.

Key Benefits

- Annunciation of 16 alarms and pre-alarms as detected by the DCP
- Annunciation of 2 status indicators
- Audible alarm horn
- Lamp Test and Alarm Silence switches
- Power supply inputs for 12V or 24VDC
- DSENET communications
- Two mounting configurations
- Box included
- Designed for use in harsh environments
- Works up to 3,280 (1km) from the host controller
- 10 modules can be linked together to one host controller
- Eight configurable LEDs

ID Switch

The rotary ID switch is used to select the address of the DSE2548 expansion module, as the host control module is capable of giving instructions to a number of DSE2548 expansion modules at the same time.

Operating Range

- Up to 3280 ft. from the DCP7310
- Recommended Wire - Belden 9841

Specifications

DC Supply	
Continuous Voltage Rating	8V to 35V Continuous
Cranking Dropouts: Able to survive 0V for 50mS, providing supply was at least 10V before dropout and supply recovers to 5V. This is achieved without the need for internal batteries. LEDs and backlight will not be maintained during cranking.	
Maximum Operating Current	112mA at 12V, 53mA at 24V
Maximum Standby Current	74mA at 12V, 35mA at 24V

Dimensions	
Overall	14"W x 10"H x 5.45"D 355.6 mm x 254 mm x 138.4 mm
Panel Cut-Out	12.50"L x 8.50"H 317.5 mm x 215.9 mm
Panel Thickness	1.45" 36.8 mm

Environmental Testing Standards

Electro-Magnetic Compatibility	
BS EN 61000-6-2	EMC Generic Immunity Standard for the Industrial Environment
BS EN 61000-6-4	EMC Generic Emission Standard for the Industrial Environment

Electrical Safety	
BS EN 60950	Safety of Information Technology Equipment, including Electrical Business Equipment

Temperature	
BS EN 60068-2-1	Ab/Ae Cold Test -30°C
BS EN 60068-2-2	Bb/Be Dry Heat +70°C

Vibration	
BS EN 60068-2-6	Ten sweeps in each of three major axes 5 Hz to 8 Hz @ +/-7.5mm, 8 Hz to 500 Hz @ 2 gn

Humidity	
BS EN 60068-2-30	Db Damp Heat Cyclic 20/55°C @ 95% RH 48 Hours
BS EN 60068-2-78	Cab Damp Heat Static 40°C @ 93% RH 48 Hours

Shock	
BS EN 60068-2-27	Three shocks in each of three major axes 15 gn in 11 mS

Degrees of Protection Provided by Enclosures	
BS EN 60529	IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

Paint & Powder Coat

BLUE STAR Power Systems

Generator Set

Blue Star Power Systems completely paints all of its generator sets in our state-of-the-art downdraft paint booth. It begins with an extensive cleaning of the unit through sanding and a full wipe down using an alkaline-based cleaner. Once completely clean, the unit is then painted with Cardinal Industrial Semigloss paint. Electrostatic paint equipment ensures correct and even coverage. The unit then receives a complete covering of Cardinal Industrial Clear Coat in a hammer texture to provide extra protection and a durable long-lasting easy-to-clean finish.

Performance Characteristics

- 3.0+ Mils TDFT
- Xenon Arc 1100 hours - Excellent Weatherability
- 1000 Hour Salt Spray - Over Primer - Passed (3.0 Mils Total TDFT)
- Adhesion, Crosshatch - 5B
- Gloss 90+ @ 60˚

Generator Set Enclosure

Blue Star Power Systems provides Cardinal Industrial Hammer Textured Semi-Gloss Polyester Powder Coating as standard on all our enclosures. Long term exterior durability, high performance mechanical properties and high gloss are standard characteristics of Cardinal Powder Coating. Cardinal TGIC Polyester Coating exceeds UL 2200 & CSA requirements.

Performance Characteristics

- Cured Powder Properties 2.0+ Mils DFT
- PCI Powder Smoothness 1 Mil
- Pencil Hardness 2H+
- Flexibility 1/8 in Diameter - No Fracture
- Salt Spray ASTM-B117 1000 Hours - Pass
- Humidity ASTM-02247 1000 Hours - Pass
- Adhesion, Crosshatch - 5B
- Gloss 90+ @ 60˚

Standard Colors

White | T012-WH260

Gray | C013-GR08

Custom Colors

Custom Colors: Blue Star Power Systems offers custom color options for your generator set enclosure. Cardinal is licensed by PANTONE® to accurately simulate both the PANTONE MATCHING SYSTEM® colors and the PANTONE® Textile Color System® with our powder and liquid coatings. Additional Charges apply.

Sub-Base Fuel Tanks

Blue Star Power Systems provides either Diamond Vogel Nexgen Technology Paint or Cardinal Industrial Hammer Textured Semi-Gloss Polyester Powder Coat on all of our sub-base fuel tanks. Nexgen and Cardinal Industrial both offer excellent coverage and performance characteristics. Nexgen and Cardinal Industrial both exceed UL requirements.

Performance Characteristics

- 3.0+ Mils TDFT
- Xenon Arc 1100 Hours
- 500 Hour Salt Spray - Over Primer - Passed (3.0 Mils Total TDFT)
- Adhesion Crosshatch - 5B
- Gloss 90+ @ 60˚

Standard Color

Jet Black | IB-9541

Enclosures

BLUE STAR Power Systems

Blue Star Power Systems enclosures are specifically designed for optimal protection against the elements. They are designed to protect the entire system from even the most extreme environments, and to reduce sound levels to most specified requirements. Blue Star Power Systems' vast flexibility allows the design of standard enclosures to meet most specifications or requirements. All standard enclosure models are constructed of 14 gauge steel and feature a pitched roof for increased structural integrity and superior watershed. All enclosures feature a rugged UL listed hammer powder coat finish as standard for a long lasting and durable finish in standard white or gray. Custom colors are available as specified.

Enclosure Design Features

- UL 2200 & CSA Listed as standard
- All enclosure models are 200 MPH wind rating certified in accordance with IBC2018 and ASCE/SEI 7-16 standards.
- Lockable gasketed doors with draw down latches and Stainless Steel component hinges
- All Stainless Steel fasteners
- UL & CSA listed extreme-wear hammer powder coat finish
- Pitched roof for high structural integrity and superior watershed
- Above-door drip guards
- Optimal airflow means no cooling system de-rates on most models
- Internally mounted exhaust silencers standard up to 600 kWe
- Sound attenuation options
- Stainless Steel and Aluminum enclosure options

Level 1

Weather Proof Enclosure

Blue Star Power Systems Level 1 enclosures have the rugged construction and weather proof protection required for most outdoor environments. These enclosures will effectively protect the gen-set through high wind (200 MPH), rain, snow, and other extreme weather conditions. Weather proof enclosures feature standard hinged lockable doors, a pitched roof to prevent water accumulation and improved structural integrity. The enclosure is painted with extreme-wear UL and CSA listed hammer powder coat finish.

Level 2

Weather Proof Enclosure with Foam

Blue Star Power Systems Level 2 enclosures include all of the same great features of the Level 1 enclosures, and include even more. With the addition of high performance 1.5" Type D Sound Attenuating Foam, our Level 2 Enclosures offer an even lower dBA rating with the same great weather proof protection.

Level 3

Sound Attenuated Enclosure

Blue Star Power Systems Level 3 enclosures feature the same great weather proof protection and standard features as the Level 1 & 2 enclosure models, but with a greater emphasis on reducing sound levels. Standard Level 3 features include the same high performance 1.5" type D sound attenuating foam, and also feature the addition of a separate frontal exhaust sound chamber and dual rear air intake to ensure that your system runs exceptionally quiet. These features make this enclosure among the best in the industry for noise reduction and quality.

Sound Attenuation Foam

BLUE STAR Power Systems

Polydamp® Type D Acoustical Foam, (PAF) is an acoustical grade, open cell, flexible ether based urethane foam designed to give maximum sound absorption for a given thickness. It has excellent resistance to heat, moisture and chemicals. All applications use 1.5” foam as standard.

Foam Characteristics

Sound Absorption: Nominal values of random incidence sound absorption coefficient per ASTM C384-77 for Plain/Tuffylm

Foam Thickness	125	250	500	1000	2000	4000
(1.5 in) 38.1 mm	15/20	27/49	60/96	77/93	90/82	98/67
(2.0 in) 50.8 mm	20/30	40/66	90/98	100/96	96/85	100/75

	Test Standard	U.S. Standard
Density, Nominal: (lb/ft3-kg/m3)	ASTM-D-3574-91	1.85
Tensile Strength: (PSI-KPa)	ASTM-D-3574-91	12
Elongation, %	ASTM-D-3574-91	120
Tear Resistance: (lb/in - N/M)	ASTM-D-3574-91	1.3
IFD: (PSI - KN/M2)	ASTM-D-3574-91	30
Compression Set (50%): %	ASTM-D-3574-91	10
Air Permeability (Tested at 1” thickness): (Rayles/M)	ASTM C-522	
Thermal Conductivity		
(BTU/hr. ft2, ˚F/in.)	ASTM C-177	0.25

Service Temperature	
Continuous	-45˚F (-43˚C) TO 212˚F (100˚C)
Intermittent	250˚F (121˚C)
Flame Resistance	
UL94	HF-1
FAR.853(B)	PASS
SAEJ-369(B)	PASS
MVSS-302	PASS
DIN	PASS

Humidity Resistance

Excellent; no significant decrease in tensile strength or elongation after 5 hrs. of steam autoclave at 250˚F (121˚C) per ASTM D3574-86, Test J.

Chemical Resistance

Excellent - no significant change in strength after 4 weeks immersion in common solvents, alkalies, acids, and water.

Estimated Service Life:

Min. 10 years at 80F (27˚C) and 95% R.H.

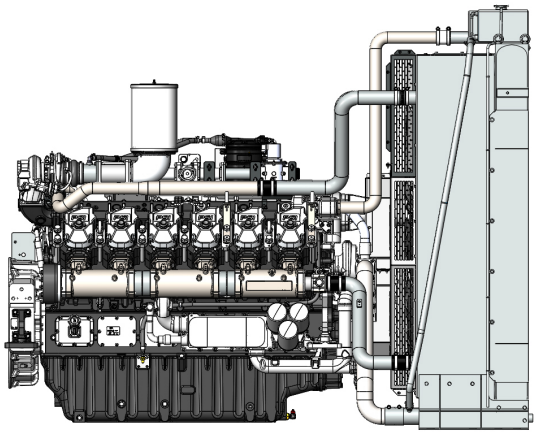
Adhesive Characteristics

P4 is a high performance unsupported acrylic pressure sensitive adhesive exhibiting aggressive tack, high peel and shear, and good heat resistance. In addition, it has good chemical and plasticizer resistance as well as excellent long term aging and the ability to withstand environmental extremes.

Adhesive Thickness (Nominal)	0.004”
Color of Adhesive	Water Clear
Release Liner	76 lb Polycoated bleached kraft paper
Service Temperature	-40˚F +200˚F

Radiators

Blue Star Power Systems radiators offer a variety of styles and configurations including radiator and charged air assemblies, radiator and aftercooler assemblies with durable core construction. Our radiators are compact and efficient meeting the most stringent enclosure footprint requirements. All radiators are sized for 50˚C (122˚F) ambient. The single-source design ensures a perfect match with your generator set package.



Radiator Features

Standard Radiator Package

- Engine-specific tank design with variant coolant connection locations and sizes (dependant on engine size)
- Complete cooling package with mounting foot and plumbing kit
- All steel construction of top and bottom tanks
- Dual Core designs -
    - Jacket Water / Charged Air Circuit
    - Jacket Water / After Cooler Circuit
- Individual radiators designed to meet manufacturer's specific requirements
- Top tank has built in expansion capacity - no need for an external recover tank
- Full or partial deration system built into the top tank
- Standard cooling package includes fan shroud & fan guard
- Corrosion preventive options:
    - Hot dipped galvanizing on all steel parts or stainless steel
    - Epoxy coated cores

Fan-On Radiator Design

- Engine-specific tank design with variant coolant connection locations and sizes (dependant on engine size)
- Rigid built construction for fan support
- High speed bearings within pillow blocks
- Dual Core designs with variable jacket water / after cooler circuit designs
- All steel construction of top and bottom tanks
- Individual radiators designed to meet manufacturer's specific requirements

Circuit Breakers

BLUE STAR Power Systems

Blue Star Power Systems MC (Molded Case) Series Circuit Breakers are the highest quality in the industry. They will protect the power system and corresponding equipment from damaging fault currents circuits and overloads.

80% Rated Circuit Breakers

80% rated breakers can only be applied continuously at 80% of the rated breaker. Tripping of the circuit breaker if the current goes above 80% will depend on the amount of current and the duration.

100% Rated Circuit Breakers

100% rated breakers can be applied at 100% of their current rating continuously.

Accessories

Shunt Trip - Provides a means of tripping the circuit breaker from a remote source by energizing a solenoid in the breaker. This can be achieved through the panel faults such as engine shutdowns, overcurrent, etc. The circuit breaker will have to be reset locally in the event of a tripped breaker.

Bell Alarm / Alarm Switch - Provides remote indication of whether the circuit breaker is in a tripped position. The bell alarm will remain unchanged during on-off operations and during operation by the Push-to-Trip button on the circuit breaker.

Auxiliary Switch/Contacts - Provides remote indication of whether the circuit breaker is in an open or closed state.

Ground Fault Indication/Alarm - Adjustable relay that indicates a ground fault condition with adjustable time delay.

Trip Unit

LI Breakers - Includes adjustable Long-Time pickup and delay and adjustable Instantaneous pickup.
LSI Breakers - Includes features of LI Breakers with addition of Short-Time pickup and delay.

Breaker Model	Amperage	Percentage Rated	Maximum Voltage Rating (AC)	UL Listed Interrupting Rating (kA)			Lug Qty. and Size (Cu & Al)
				240	480	600	
H-Frame	15-150	80% or 100%	600	25	18	14	(1) #14-3/0
Q-Frame	70-250	80%	240	10	-	-	(1) #4-300 kcmil
J-Frame	150-175 200-250	80% or 100%	600	25	18	14	(1) #4-4/0 (1) 3/0-350 kcmil
L-Frame	125-400 200-600	80% or 100% 80%	600 600	65	35	18	(2) 2/0-500 kcmil
M-Frame	300-800	80%	600	65	35	18	(3) 3/0-500 kcmil

Breaker Model	Frame Size	Percentage Rated	Maximum Voltage Rating (AC)	UL Listed Interrupting Rating (kA)			Lug Qty. and Size (Cu & Al)
				240	480	600	
P-Frame	600 800 1000 1200	80% or 100%	600	65	35	18	(3) 3/0-500 kcmil (4) 3/0-500 kcmil
R-Frame (LSI Standard)	1600 2000 2500 3000	100%	600	65	35	18	(12) 3/0-750 kcmil (15) 3/0-750 kcmil (18) 3/0-750 kcmil (21) 3/0-750 kcmil

CB / CL Series Block Heaters

BLUE STAR Power Systems

Features

- Constant circulation of coolant through the engine achieves even heat distribution
- One-piece, heavy-duty, pressure die-cast aluminum tank with a bolt-on flange element assembly
- Fixed thermostat ON: 100˚F, OFF: 120˚F (optional temp ranges available)
- All parts replaceable - easy to service
- CSA and cULus approved
- Classified weather tight
- Models available for Class I, Group D (Hazardous Locations) applications
- Various voltages and 3 phase units available

Easy Starts

- Saves warm-up time
- Saves fuel
- Prolongs battery life
- Protects the Environment
- Reduces “white smoke” upon start-up
- Engine is ready for full power operation
- Reduces noise pollution

Reduces Engine Wear

- 90% of engine wear is due to low jacket water temp upon start-up
- Stops destructive condensation
- Extends engine life

Specifications

Part Number	Volts	Watts	Phase	Amps
10591	120	2500	1	20.8
11376	208	2500	1	12.0
10592	240	2500	1	10.4
14208	480	2500	1	5.2
11136	120	3000	1	25.0
11137	208	3000	1	14.4
10593	240	3000	1	12.5
11138	480	3000	1	6.3
11139	208	4000	1	19.2
10594	240	4000	1	16.7
11140	480	4000	1	8.3
11141	208	5000	1	24.0
10595	240	5000	1	20.8
11142	480	5000	1	10.4

Single Stage Air Cleaner

BLUE STAR Power Systems

Single Stage Air Cleaners are tough, non-metallic, lightweight, self-supporting and completely disposable. They are also easy to install, durable, and reliable. They are designed to function well under high and severe pulsation conditions found in many applications. Vibration-resistant media is potted into molded housings of rugged ABS plastic – so they don't fall apart as other designs might. They can be mounted vertically or horizontally.

Specifications

- No serviceable parts - Air cleaner housing and filter are one unit
- Designed to withstand severe intake pulsation
- Economical replacement cost
- Self-supporting, sturdy
- Very reliable: only one critical seal
- Lightweight and compact in size
- Non-metallic, non-corrosive
- Completely disposable - acceptable for normal trash pick-up (should not be incinerated)
- Easily installed and maintained
- Minimal removal clearance needed: only 1.5"
- Three airflow styles available to fit virtually any engine intake configuration
- Various media available for specific generator set applications: high pulsation, high humidity, etc.
- Temperature tolerance: 180°F/83°C continuous 220°F/105°C intermittent

CPJ Series Critical Grade Silencers

BLUE STAR Power Systems

Blue Star Power Systems “CPJ” Series is the accumulation of research and development offering a compact silencer without compromising performance. It incorporates a unique combination of resonator chambers, acoustically packed internal components and diffusers to achieve a stunning level of performance for its size. All CPJ series silencers are critical grade silencers and are packed with insulation to greatly reduce radiated noise and exterior shell temperature.

Standard Construction Features

- Available in sizes from 2 inch to 12 inch
- Multitude of inlet/outlet design styles to meet almost any requirement
- Packed with fiberglass insulation to reduce shell temperature and noise levels
- Fully welded double shell carbon steel weldment construction, corrosive resistant
- High density fiberglass acoustic blanket good to 1500°F, wrapped with 304 Stainless Steel wire mesh cloth and encased in a carbon steel perforated facing
- Black phenolic resin based finish paint

Optional Construction Features and Accessories

- Stainless Steel construction
- Aluminum construction
- Aluminized Steel construction
- Vertical mounting legs
- Round mounting bands
- Horizontal mounting saddles
- Horizontal and vertical shell lugs
- Special finish per specification
- Air leak test
- ASME code construction
- Oversized flanges
- Acoustic shell lagging
- High temperature acoustic pack material
- Contact factory for additional features to meet your requirements

Model #	Part #	Outlet Size	Flanged Connection	WT (lbs)
CPJS-02	10660	2.0” OD	No	12
CPJS-25	10661	2.5” OD	No	18
CPJS-03	10662	3.0” OD	No	20
CPJS-35	10663	3.5” OD	No	30
CPJS-04	10664	4.0” OD	No	31
CPJS-05	10665	5.0” OD	No	50
CPJS-06	10666	6.0” OD	Yes	50
CPJS-08	10667	8.0” OD	Yes	120
CPJS-10	10668	10.0” OD	Yes	180

Industrial Batteries

BLUE STAR Power Systems

Engine Starting Batteries

Blistering heat and bitter cold are ruthless battery killers. That's why Blue Star Power Systems utilizes a pioneered climatized battery. Designed to offer you long-life and high-performance starting power that will get your gen-set running even under extreme conditions. Blue Star Power Systems "all-climate" batteries stand up to the harshest temperatures and are available in sizes and configurations to fit almost any application.

Standard Features

- Unique Manifold Vent - Virtually eliminates corrosion by venting gases away from terminals and cables
- Exclusive TRP™ Construction – Rib reinforced TRP™ container significantly improves the vibration and impact resistance
- Armored Plate Cell Bonding - Vibration is the number one killer of commercial batteries. To solve this problem, the cells of every battery are bonded
- Polyethylene Enveloped Separator Design – Super tough polyethylene material reduces electrical resistance and provides higher cranking performance
- Center Lug Design - Suppresses the vibration inherent in traditional construction for improved performance (where applicable)
- TTP™ - Through-the-Partition inter-cell connectors create a shorter current path to deliver more power to the terminals
- Heavy Duty Cases - Reinforced polyethylene or hard rubber cases stand up to the demands of standby gen-sets
- Convenient Lifting Slots - a handle is built in the top of the battery for easy carrying and transportation
- Protective Bottom Design - Waffled bottom design provides protection against nuts, bolts, or stones that might become lodged under the battery
- Computer Designed Radical Grids - An improved state-of-the-art design which adds power and resists vibration
- Threaded Accessory Ports - Features a sealed "O" ring that does not work loose during severe service (78DT only)

Specifications

	NEMA Type			Dimensions (Inches)			
BCI Group Size	Part Number	CCA at 0˚F	CCA at 32˚F	Length	Width	Height	Weight (lbs.)
78DT	78DT-HD	800	960	10-11/16	7-1/16	8-1/8	54
4D	4D-HD	1000	1200	19-9/16	8-5/16	10	95
8D	8D-HD	1300	1560	20-3/4	11	10	117

Deep Sea Battery Charger

BLUE STAR Power Systems

The DSEBC2410Ei is an enclosed intelligent battery charger designed to work with multiple battery types across a wide range of applications.

The advanced technology has been developed to automatically detect system settings and charging profiles including cell voltage and boost voltage to provide high-levels of charging support.

A comprehensive range of input and output protections ensure a continued safe charging environment also enabling the use of the charger as a power supply.

Key Benefits

- Fully flexible to maximize the life of the battery
- Suitable for a wide range of battery types
- NFPA110 Compliant
- Fault output
- Maximum 91% operating efficiency
- No external intervention for boost mode
- Multiple chargers can be linked together to provide larger current output
- Can be permanently connected to battery and utility supply. No need to disconnect through high load conditions.
- cULus Listed

Advanced Features

- Intelligent two, three and four stage charging profiles
- 12V / 24V auto voltage detection for multiple battery types
- Adjustable current limit
- Can be used as a battery charger, power supply or both at the same time
- Automatic or Manual boost and storage charge functions to help maintain battery condition
- Digital Microprocessor Technology
- Temperature compensation for battery charging
- Low Output Ripple and superb line regulation
- Available in two variants (LCD display or LCD display & analog meters)
- Full Protection
- AC input Under voltage | AC input Over voltage
- Battery charger output Over voltage | Battery charger output Over current
- Battery temperature compensation with over temperature protection
- Output short circuit and inverse polarity protection with auto recovery
- Automatic power de-rating at high ambient temperatures
- Battery charger failure indication
- Automatic Boost Mode boosts and equalizes cell charge improving battery performance and life
- Power Save Mode
- Once the battery is fully charged the chargers switch to Eco-Power to save energy consumption
- Can be integrated into external systems through MODBUS RTU using RS485
- Fully configurable via DSE Configuration Suite PC Software
- DSE2541 External remote display option

Specifications

AC Supply	
Voltage Range	90V to 305V (L-N)
Frequency Range	48 Hz to 64 Hz (L-N)
DC Output Rating	
Output	10ADC at 12V & 24VDC
Ripple and Noise	<1%
Efficiency	>86%
Auxiliary Output	100mA at 12VDC
Regulation	
Line	<0.5%
Load	2%
Temperature Sensor Input - PT1000	
Protections	
Short Circuit	DC Over and Under Voltage
DC Over Current	Reverse Polarity
Over Temperature	AC Under & Over Voltage
Battery Charger Failure	
Charge Failure Relay - 3A at 30VDC Volt Free Relay	
Temperature Rating	
Operating Temp Rating	-30°C to +55°C (-22°F - 131°F)
Compatible Battery Profiles	
- Lead Acid - Lead Crystal - Ni-Cad 18 Cell - Ni-Cad 20 Cell	- Calcium - Lithium Phosphate - VRLA-AGM - VRLA-GEL

Sub-Base Fuel Tanks

Blue Star Power Systems sub-base fuel tanks are listed and manufactured under UL 142 & ULC-S601 standards for steel above ground tanks, which guarantees that every fuel tank meets the structural and mechanical integrity requirements for mounting a generator set directly on top of the tank. This provides a convenient, efficient, and safe way to store fuel for your generator set.

Sub-Base Fuel Tank Standard Features

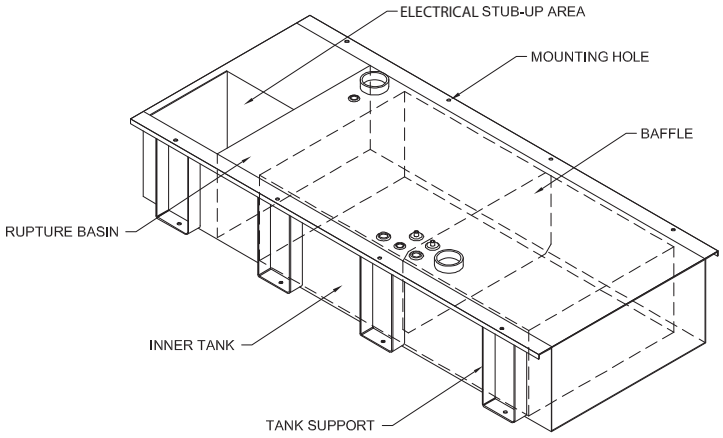
- Double walled secondary containment UL 142 & ULC-S601 Listed
- Electrical stub-up openings are standard to provide generator set wiring provisions through the base tank
- Heavy gauge steel construction
- Diamond Vogel Nexgen Technology Paint or Cardinal Industrial Hammer Textured Semi-Gloss Polyester Powder Coat
- Standard fittings: fuel supply with check valve (sized per unit), fuel return (sized per unit), 2" NPT for normal vent, 2" - 6" NPT for emergency vent (sized per unit), 2" NPT for manual fill, 1 1/2" NPT for fuel level gauge, and 3/8" NPT basin drain (plugged). Removable 1/2" supply dip tube standard (size may vary with gen-set model). 1 1/2" NPT for leak detection
- Interior tank baffle: Separates cold engine supply fuel from hot returning fuel
- Direct reading fuel level gauge
- Low fuel level and fuel leak alarms

Design Options

- High and critical low fuel level shutdowns or alarms
- Full pumping control systems for a true day tank system with a full array of electrical options
- Additional Tank Fittings
- Custom Fuel Tank Designs (sizes and shapes)
- Fuel Heater
- Fill / Spill Containment

Blue Star Power Systems offers two distinctive types of double wall sub-base fuel tanks, those with an electrical stub up area (standard) and those without. Each type can be customized to any specification to meet your specific requirements.

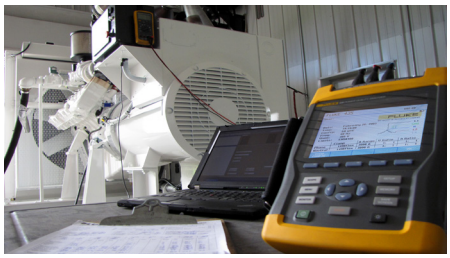
UL 142 & ULC-S601 double wall secondary containment sub-base fuel tank with stub-up.



Factory Load Test

BLUE STAR Power Systems

Blue Star Power Systems factory testing is performed with the same extreme diligence and attention to detail that is given to the prototype testing process. Every engine generator set receives a complete factory load test that certifies and ensures that the set will function in accordance to every specific application. Test metering will have an accuracy of 1.3% or better. This metering equipment is calibrated annually, and is directly traceable to the National Institution of Standards & Technology (NIST). All test procedures are conducted in accordance with MIL-STD-705C where applicable.



Factory Acceptance Testing Procedures

- Insulation Resistance Test (301.1c)*
- High Potential Test (302.1b)*
- Alternator Over Speed
- Complete Engine Inspection
- Generator Inspection
  - Winding Resistance Test (401.1b)
  - Exciter Field Stator
  - Main Field Stator
- Mounting & Coupling Inspection
- Engine Fuel System Inspection
- Engine Lube Oil System Inspection
- Engine Cooling System Inspection
- DC Charging System Inspection
- Main Output Circuit Breaker Inspection
- Anticipatory Alarms and Shutdowns Test (505.2b, 515.1b, 515.2b)
- Optional Equipment Inspection (513.2a)
- Load Test (640.1d
  - Regulator Range Test (511.1d)
  - No Load
  - MAX Load © 1.0 P.F. (640.2d)
  - MAX Load @ 0.8 P.F.
  - Block Loads @ 0-25%, 0-50%, 0-75%, 0-100% of rated load tests (640.2d)
- 1.0 Power Factor Max Load
- 1.0 Power Factor Max Block Load Pickup
- Full Name Plate Rated Load.
- Standard Readings Taken Every 5 Minutes.

* Performed By Alternator OEM

Standard Reading Recorded During Load Test Inspection

Run Time	**AC Frequency**
AC Voltage	**Exciter Field Voltage**
AC Amperage	**Exciter Field Current**
kVA	**Lube Oil Pressure**
kWe	**Engine Coolant Temp.**
Power Factor	**Ambient Temp.**

Factory Load Test Summary

All engine generator sets are visually inspected prior to testing. This includes a complete visual/mechanical inspection to ensure that all fasteners and electrical connections are secure, that all rotating components are free of obstruction/ interference and are properly guarded.

Once the unit is started, the AC voltage and frequency are set to rated values. The unit is operated at no load while all of the safety shutdowns and warnings are verified and tested. The unit is then restarted and run at 25%, 50% and 100% of rated load and power factor until the engine temperature has stabilized for at least ten minutes. During the rated and maximum load pickup portion of the test, the voltage regulator gain, stability and under frequency compensation adjustments are set for optimal performance. All test procedures are performed in accordance with MIL-STD-705C where applicable.

Throughout these test procedures the AC parameters, engine oil pressure, engine temperature, exhaust temperature, timing and air/fuel ratio (gaseous units) are monitored and recorded. The unit and all installed accessory equipment are continually examined for oil and coolant leaks, excessive vibration and foreign noises.

Once all test procedures are performed and recorded, the unit is allowed a cool down period prior to being shut down. The unit is once again inspected for leaks, loose fasteners and connections prior to leaving the test facility.

The unit receives another complete final inspection process prior to packaging and shipment.

Note: All units are tested after the painting process is complete to prevent unforeseen difficulties resulting from the painting process being performed after testing.

Witnessed Factory Load Test

Standard witnessed factory load testing must be scheduled and approved at least four weeks prior to the engine generator sets scheduled shipping date. Any requests for witnessed factory load testing after this four week period may incur additional charges.

Witnessed Extended Run Factory Load Test

Witnessed extended run factory load testing must be scheduled and approved at the time of order placement. Any requests for witnessed extended run factory load testing after this time could be denied and would if approved incur additional cost.

All units are built and tested to cUL, CSA and NFPA 110 standards.

Engine Generator Set Two (2) Year 2000 Hour Standby Limited Warranty

BLUE STAR Power Systems Inc.

Your Blue Star Power Systems, Inc. product has been designed and manufactured with care by people with many years of experience. Blue Star Power Systems, Inc. warrants to its buyer that the product is free from defects in materials and/or workmanship for the period of time outlined below. If the product should prove defective within the time period outlined below, it will be repaired, adjusted or replaced at the option of Blue Star Power Systems, Inc., provided that the product, upon inspection by Blue Star Power Systems, Inc., has been properly installed, maintained and operated in accordance with Blue Star Power Systems, Inc.'s Generator Set Installation Guide and Operating Instructions. This limited warranty is not valid or enforceable unless: (1) all supporting maintenance records are kept on file with the end user and made available upon request from factory, and (2) the generator set is routinely exercised in accordance with operating instructions. This warranty does not apply to malfunctions caused by physical damage, misuse, improper installation, repair or service by unauthorized persons, or normal wear and tear. The warranty is not assignable.

Blue Star Power Systems, Inc. product warranty period: Engine generator set: Parts and Labor for two (2) years from the date of factory invoice or 2000 hours (whichever occurs first). Accessories (installed on the engine generator set or shipped loose): Parts and Labor for one (1) year from the date of factory invoice or 2000 hours (whichever occurs first). Transfer Switches: If purchased with a generator set (same order number): Parts and Labor for two (2) years from the date of factory invoice or 2000 hours (whichever occurs first).

The start of the warranty period can be adjusted to the date of unit start-up (limited to 180 days from invoice date) provided that the following information is provided to Blue Star Power Systems, Inc. within 30 days of start-up. The warranty will not be effective unless a copy of the Blue Star Power Systems, Inc. Start-Up Instructions & Warranty Validation form is properly filled out and returned to Blue Star Power Systems, Inc. within 30 days of start-up. If the Start-Up Instructions & Warranty Validation Form is received after 365 days (1 year) from invoicing date, all unit warranties will be void. Additionally, the engine manufacturer's engine registration form must be completed and returned to the engine manufacturer as stated in the instructions with the registration form.

To obtain warranty service: Contact your nearest Blue Star Power Systems, Inc. Service Representative. For assistance in locating your nearest authorized service representative, contact Blue Star Power Systems, Inc, at warranty@bluestarps.com.

Warranty service may be performed by authorized Blue Star Power Systems, Inc. service providers only. Service work performed by unauthorized persons will void all warranties and not be paid.

Blue Star Power Systems, Inc. shall not be liable for any claim in amount greater than the purchase price of the product. In no event shall Blue Star Power Systems, Inc. be held liable for any special, indirect, consequential or liquidated damages including but not limited to: loss of profits, loss of time, increased overhead, delays, loss of business opportunity, good will, or any commercial or economic loss.

Blue Star Power Systems, Inc. shall not be liable for any claim that requires replacement of engine, part, or component of the gen-set that is no longer manufactured or available. Additionally, Blue Star Power Systems, Inc. will not be liable for any engine replacement that may require emissions tier level change.

THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE DESCRIBED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR OTHERWISE CREATED UNDER THE UNIFORM COMMERCIAL CODE, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, OR WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE.

The following items and/or circumstances are excluded from this limited warranty:

– Improper installation or operation as outlined in the Generator Set Installation Guide and Operating Instructions.
– Misapplication and misuse of the equipment outside the original design parameters as stated on the nameplate of the equipment.
– Equipment purchased at the standby rating that is being used in a prime power application(s).
– Failure to properly exercise and maintain your equipment per manufacturer's specifications will void all warranty.
– Any equipment or components adding including fuel tanks and enclosures not installed at the Blue Star Power Systems, Inc. factory.
– Equipment modifications made without the written consent of Blue Star Power Systems, Inc. will void all warranty.
– Damages caused by acts of nature, such as lightning, wind, flood, or earthquake.
– Any damage due to situations beyond the control of the manufacturing and/or workmanship of the product.
– Engine starting batteries: The battery manufacturers' warranty applies. Consult your local battery supplier for warranty service.
– Fuel system and/or governing system adjustments performed during or after start-up.
– Normal maintenance items and consumable items such as belts, filters, fluids, and hoses.
– Adjustments and tune–ups performed during start-up or thereafter. Start-up, training, tuning, and adjustments for any paralleling or bi-fuel system.
– Loose connections (electrical and mechanical) before and after unit start-up. Including fittings, connectors, clamps and fasteners.
– Diesel engine "Wet Stacking" due to lightly loaded diesel engines. Regeneration issues, aftertreatment exhaust systems, including DEF related issues.
– All fluid level related items found before, during, or after unit start up.
– Use of steel enclosure within 25 miles of the coast.
– Requested rental generators used while warranty work is being performed.
– Charges, fees, and site delays due to a replacement components availability with the product manufacturer.
– Any labor charges deemed excessive by Blue Star Power Systems, Inc. factory or component manufacturer.
– Travel labor and mileage for mobile generator sets.
– Additional trips to the site due to a service vehicle was not stocked with normal service parts.
– Any special access fees, equipment, requirements or after hours scheduling to gain access to the equipment for warranty service purposes.
– Lodging expense associated with unit repair and excessive mileage charges (limit to 300 miles and 6 hours travel round trip from nearest service center).
– Shipping damage of any type. All equipment is shipped F.O.B. Blue Star Power Systems, Inc. and risk of loss transfers to the carrier once loaded for shipment. It is the responsibility of the receiving party to sign for the receipt of and note any shipping damage to the equipment. Freight damage claim filing is the responsibility of the receiving party. In the rare event that damage occurs resulting from shrink wrap during shipment, Blue Star Power Systems, Inc. will not warrant any damage to the unit.

This agreement is deemed made and executed in North Mankato, Nicollet County, Minnesota and shall be construed and interpreted in accordance with the laws of the state of Minnesota without giving effect to its conflicts of laws principals. Each of the parties submits to the exclusive personal jurisdiction and venue with respect to any action or proceeding arising out of, in connection with, relating to, or by reason of this agreement before the district court of the state of Minnesota, located in Nicollet County and agrees that all claims in respect of the action or proceeding may be heard and determined in any such court.