MID FLORIDA DIESEL

2215 HIGHWAY 60 EAST
BARTOW, FL. 33830
(863) 519-0107 FAX (863) 519-0109
WWW.MIDFLORIDADIESEL.COM

Bill of Material
For
Florida Sheriff Association
Item #135 - 500KW MOBILE GENERATOR PACKAGE

Blue Star Power Systems MODEL: (Qty. - 1) VD500-02FT4 TRAILER

GENERATOR: 500 kW, 625 kVA
VOLTAGE : Optional Voltage(s)Manual 2 Position Voltage Change Over Switch 120/208v and 480v
Engine Model: Volvo TWD1672GE 500kW Standby Power Rating at 1800 RPM

Selected Model Features Included:
Isochronous Governor + / - .25%
UL2200
EPA Tier II Certified
130 Degree Temperature Rise

Voltage: Optional Voltage(s)Manual 2 Position Voltage Change Over Switch 120/208v and 480v

Gen Model: Optional Generator Required

Control Panel: Blue Star DGC-2020 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
Optional Features Include: Generator Protection (Undervoltage, Overvoltage, Underfrequency, Overfrequency, Overcurrent)

Control Panel Options:
Voltage Adjust Rheostat (Switch) - Panel Mounted
Control Panel Battery Disconnect Switch

Enclosure: Level 3 (Sound Attenuated Enclosure) Powder Coated .090 Aluminum
Rugged and Durable 150 MPH Wind Rated Enclosure with Exhaust Hood
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)
Structural Steel Base with Mounting and Lifting Holes

Includes Pad Type Vibration Mounts to Isolate Unit from Mounting Surface

Enclosure Options:
Sound Attenuation Foam: Sound Attenuation Installed in Enclosure and Exhaust Hood
Cooling: Unit Mounted Radiator (50°C Ambient)
Coolant Drain Extension: Plumbed to Bulkhead Fitting in Base

Oil Drain Extension: Plumbed to Bulkhead Fitting in Base

Jacket Water Heater: Engine Block Heater 5000W 240VAC Rated for -20°F
Heater Installed with Isolation Valves and Wired to Terminal

Air Cleaner: Dry Single Stage
Air Restrictor Indicator: Installed in Air Filtration System

Silencer: Critical Grade Compact (CPJ Series) Silencer Mounted to Engine

Battery: 24 Volt System with Rack and Cables

Battery Charger: NRG 24 Volt 10 Amp Mounted and Wired to Terminal

TRAILER: T10000-2-DOT Approved

Tandem DEXTER-type 10000 lbs. axle
Hydraulic brakes with breakaway
3” Pintle ring hitch/ 2 5/16" x 30" safety chains with 3/8" hooks
Front Stabilizing Jack Set
Adjustable Rear Stabilizers (2 ea.)
Torsion Axles
Integral double wall fuel tank up to 250 gal.
Mechanical fuel gauge
DOT wiring enclosed in 1/2" steel conduit
Direct reading manual fuel gauge
7-way round trailer plug
Fuel fill and vent w/locking fuel cap
225/75R15 load range E trailer rated tires on
White spoke wheels
Fuel pick-up and return ports
Mounting rails- genset specific
Primed and painted semi-gloss black

Included Accessories:

Factory Test: Standard Commercial Testing Includes:

Owner's Manual: Print Copy (Qty 1) **Standard**
Warranty: 2 Year / 2000 Hour Limited
MISCELLANEOUS:

TRAILER (SEE FOLLOWING SPECIFICATIONS)
-Main Breaker shall be equipped with shunt trip.
-20 amp, 120vac, 1ph, male receptacle shall be provided to power the jacket water heater.
-20 amp, 120vac, 1ph, male receptacle shall be provided to power the battery charger.
-Two thumb screw type connection points shall be provided for remote auto start.
Certified Factory Test
Test Acceptance Run by Factory Trained Representative (Start Up)

BLUE STAR
Power Systems Inc.

Engineering Submittal

8/25/2020

Project Title	FSA- 500KW Trailer -Item #135
Quote Number:	0023574-2
Model:	VD550-02FT4 - 500 kWe Prime

Mid Florida Diesel
Joe Antonini
2215 Hwy 60 East
Bartow FL 33830
Office: 863-519-0107
Cell: 863-944-0400
Email: joe@midfloridadiesel.com

BLUE STAR
Power Systems Inc.

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BLUE STAR
Power Systems Inc.

Quote Date:	**8/28/2019 0023574-2**
Quote Number:	**FSA- 500KW Trailer -Spec**
Project Title:	**#125 Mid Florida Diesel**
Prepared for	

Unit Model	**VD550-02FT4 - 500 kWe Prime**	**Standby / Prime**	**Mobile Prime Power**
kWe Rating	**500 kWe**	**UL 2200 Listed**	**No**
Fuel	**Diesel**	**CSA Approved**	**No**
EPA	**Tier 4 Final**	**Paint Color**	**White**

Engine Model:	Volvo TWD1672GE 500W Prime Power Rating at 1800 RPM Governor - Electronic Isochronous
Voltage:	208/120V 3 PH
Gen Model:	Marathon 572RSL4031 12 Lead Wired 208V 3 Phase Low Wye 105°C Rise Over 40°C AmbientSpec calls out a 2-Position Voltage Selector Switch 120/208 3 phase and 277/480v. In Lieu of this requirement a Link Board will be used.
Voltage Regulator:	Marathon DVR2000E+ Digital Voltage Regulator with PMG Excitation
Control Panel:	Blue Star DGC-2020 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 Optional Features Include: Generator Protection (Undervoltage, Overvoltage, Underfrequency, Overfrequency, Overcurrent)
Control Panel Options:	Voltage Adjust Rheostat (Switch) - Panel Mounted Control Panel Battery Disconnect Switch
Unit Color:	White
Enclosure:	Level 3 (Sound Attenuated Enclosure) Powder Coated .090 Aluminum Rugged and Durable 150 MPH Wind Rated Enclosure with Exhaust Hood 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) Structural Steel Base with Mounting and Lifting Holes Includes Vibration Mounts to Isolate Unit from Base Rail
Sound Attenuation Foam:	Sound Attenuation Installed in Enclosure and Exhaust Hood
Enclosure Options:	Load Distribution Center for Single Point Accessory Wiring
Cooling:	Unit Mounted Radiator (50°C Ambient)
Coolant Drain Extension:	Plumbed to Bulkhead Fitting in Base
Oil Drain Extension:	Plumbed to Bulkhead Fitting in Base
Mainline Breaker:	2000 Amp 100% Rated 3 Pole 600 Volt Breaker Mounted & Wired in a NEMA 1 EnclosureShunt Trip
Jacket Water Heater:	Engine Block Heater 5000W 240VAC Rated for -20°F Heater Installed with Isolation Valves and Wired to Terminal
Air Cleaner:	Dry Single Stage
Silencer:	SCR Catalyst / Silencer Mounted to Engine

Battery:	24 Volt System with Rack and Cables
Battery Charger:	DSE 24 Volt 10 Amp Mounted and Wired to Terminal
Gen-Set Trailer Package:	T30000-3 Tandem Axle DOT Approved Trailer Package Including: 3" Pintle Eye, Safety Chains, Electric Brakes with Breakaway Kit Radial Tires, Fenders, Adjustable Tongue Jack, Rear Stabilizing Jacks
Trailer Package Options:	Exterior 120VAC Shore Power Connection For Heater(s) and Charger Front Stabilizing Jack Set Torsion Axles
Fuel Tank:	750 Gallon Single Wall Tank Including Supply & Return Connections Fuel Level Gauge 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:	Print Copy (Qty 1) **Standard**
Warranty:	1 Year / 1500 Hour Limited

Notes:

-2000A Buss Bar in a connection box
-2 thumb screw type connection points provided for remote auto start

BLUE STAR
Power Systems Inc.

Diesel Product Line

208-600 Volt

VD550-02FT4

60 Hz / 1800 RPM

550 kWe / 500 kWe

Standby / Prime

Ratings

	208V	240V	480V	600V
Phase	3	3	3	3
PF	0.8	0.8	0.8	0.8
Hz	60	60	60	60
Generator Model	572RSL4031	572RSL4031	572RSL4029	572RSS4272
Connection	12 LEAD WYE	12 LEAD DELTA	12 LEAD WYE	4 LEAD WYE
Standby				
kWe	550	550	550	550
AMPS	1911	1656	828	662
Temp Rise	130˚C / 27˚C	130˚C / 27˚C	130˚C / 27˚C	130˚C / 27˚C
Prime				
kWe	500	500	500	500
AMPS	1737	1505	753	602
Temp Rise	105˚C / 40˚C	105˚C / 40˚C	105˚C / 40˚C	105˚C / 40˚C

Standard Equipment

Engine

- Radiator Cooled Unit Mounted (55˚C)
- Blower Fan & Fan Drive
- Starter & Alternator
- Oil Pump & Filter
- Oil Drain Extension w/Valve
- Governor - Electronic Isochronous
- 24V Battery System & Cables
- Air Cleaner (Dry Single Stage)
- Flexible Fuel Connector
- EPA Certified - Tier 4 Final

Listing Certifications

- UL 2200 Listed
- cUL Listed
- CSA Certified
- Seismic Certified to IBC 2012

Generator

- Brushless Single Bearing
- Automatic Voltage Regulator
- ± .25% Voltage Regulation
- 4 Pole, Rotating Field
- 130˚C Standby Temperature Rise
- 105˚C Prime Temperature Rise
- 100% of Rated Load - One Step
- 5% Maximum Harmonic Content
- NEMA MG 1, IEEE and ANSI Standards Compliance for Temperature Rise

Additional

- Microprocessor Based Digital Control
- Interface Connection Box
- Control Panel Mounted in NEMA 12 Enclosure
- Base - Structural Steel
- Main Line Circuit Breaker Mounted & Wired
- SCR Catalyst / Silencer Mounted
- Battery Charger 24V 5 Amp
- Jacket Water Heater -20˚F 5000W 240V w/Isolation Valves
- Vibration Isolation Mounts
- Radiator Duct Flange (OPU Only)
- Single Source Supplier
- 2YR / 2000HR Standby Warranty
- 1YR / 1500HR Prime Warranty
- Standard Colors - White / Tan / Gray

Diesel Product Line

550 kWe / 500 kWe

BLUE STAR Power Systems Inc.

Application Data

Engine			
Manufacturer:	Volvo Penta	Displacement - Cu. In. (lit):	984 (16.12)
Model:	TWD1672GE	Bore - in. (cm) x Stroke - in. (cm):	5.67 (14.4) x 6.50 (16.5)
Type:	4-Cycle	Compression Ratio:	16.8:1
Aspiration:	Turbo Charged, H_2O to Air CAC	Rated RPM:	1800
Cylinder Arrangement:	6 Cylinder Inline	Max HP Stby (kWm):	836 (615)

Exhaust System	Standby	Prime
Gas Temp. (Stack): °F (°C)	831 (444)	793 (423)
Gas Volume at Stack Temp: CFM (m^3/min)	4,347 (123)	4,025 (114)
Maximum Allowable Exhaust Restriction (Post SCR Cat.): in. H_2O (kPa)	40.0 (10.0)	40.0 (10.0)
Cooling System		
Ambient Capacity of Radiator: °F (°C)	131 (55.0)	131 (55.0)
Maximum Allowable Static Pressure on Rad. Exhaust: in. H_2O (kPa)	0.50 (0.12)	0.50 (0.12)
Water Pump Flow Rate: GPM (lit/min)	95.1 (360)	95.1 (360)
Heat Rejection to Coolant: BTUM (kW)	12,682 (223)	11,544 (203)
Heat Rejection to CAC: BTUM (kW)	11,715 (206)	10,635 (187)
Heat Radiated to Ambient: BTUM (kW)	4,253 (74.4)	3,842 (67.2)
Air Requirements		
Aspirating: CFM (m^3/min)	1,646 (46.6)	1,603 (45.4)
Air Flow Required for Rad. Cooled Unit: CFM (m^3/min)	29,894 (846)	29,894 (846)
Air Flow Required for Heat Exchanger/Rem. Rad. CFM (m^3/min)	Consult Factory For Remote Cooled Applications	
Fuel Consumption		
At 100% of Power Rating: gal/hr (lit/hr)	39.9 (151.0)	35.9 (136.0)
At 75% of Power Rating: gal/hr (lit/hr)	28.8 (109.0)	26.0 (98.0)
At 50% of Power Rating: gal/hr (lit/hr)	19.1 (72.0)	17.5 (66.0)
DEF Consumption (% of fuel consumption)	± 6.00%	± 6.00%
Fluids Capacity		
Total Oil System: gal (lit)	12.7 (48.0)	12.7 (48.0)
Engine Jacket Water Capacity: gal (lit)	8.70 (33.0)	8.70 (33.0)
System Coolant Capacity: gal (lit)	15.9 (60.0)	15.9 (60.0)
DEF Tank Capacity: gal (lit)	18.5 (70.0)	18.5 (70.0)

Deration Factors
Rated Power is available up to 2,300 ft (700m) at ambient temperatures to 122°F (50°C) standby and prime.
Consult factory for site conditions above these parameters.

Diesel Product Line

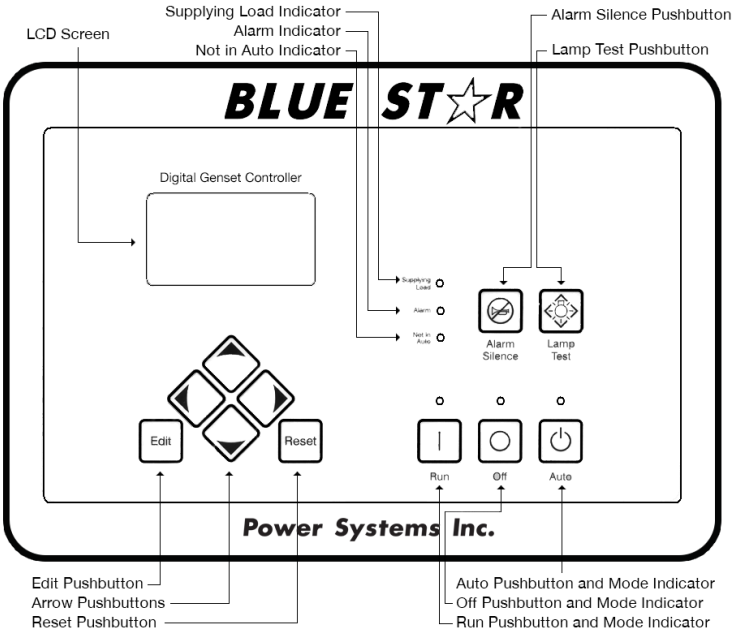
550 kWe / 550 kWe

BLUE STAR Power Systems Inc.

DGC-2020 Control Panel

Standard Features

- Digital Metering
- Engine Parameters
- Generator Protection Functions
- Engine Protection
- CAN Bus ECU Communications
- Windows-Based Software
- Multilingual Capability
- Remote Communications to RDP-110 Remote Annunciator
- 16 Programmable Contact Inputs
- Up to 15 Contact Outputs (7 standard)
- UL Recognized, CSA Certified, CE Approved
- Event Recording
- IP 54 Front Panel Rating with Integrated Gasket
- NFPA 110 Level 1 Compatible

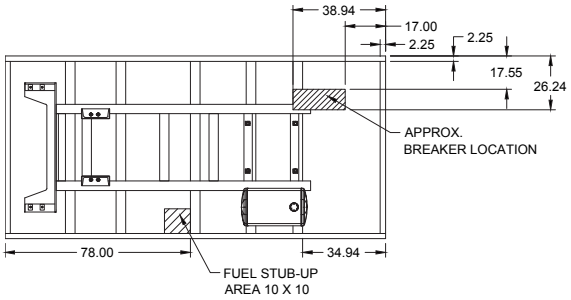


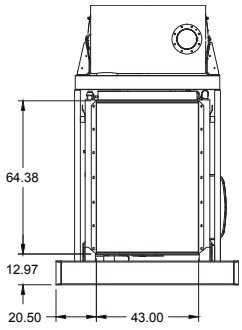
Weights / Dimensions / Sound Data

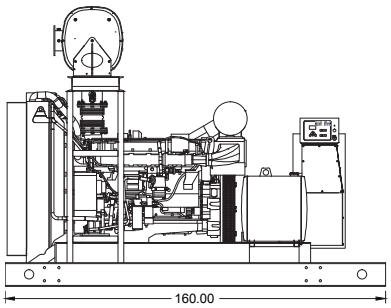
	L x W x H	Weight lbs
OPU	160 x 84 x 118 in	12,525
Level 1	198 x 84 x 122 in	14,450
Level 2	198 x 84 x 122 in	14,525
Level 3	252 x 84 x 122 in	15,175

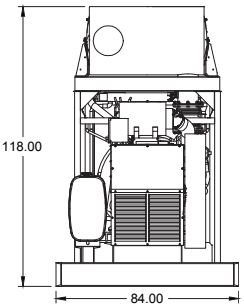
Please allow 6-12 inches for height of exhaust stack.

	No Load	Full Load
OPU	90 dBA	93 dBA
Level 1	85 dBA	88 dBA
Level 2	81 dBA	83 dBA
Level 3	73 dBA	75 dBA









Drawings based on standard open power 480 volt standby generator. Lengths may vary with other voltages. Subject to change without notice.
Sound data as measured at 23 feet (7 meters) in accordance with ISO 8528-10 at standby rating.

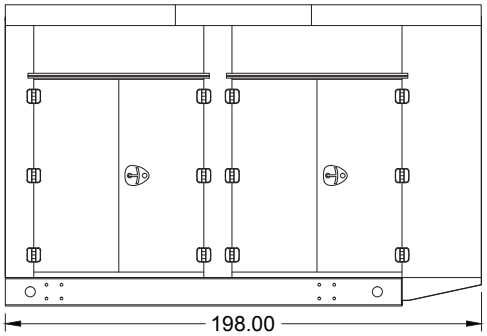
Diesel Product Line

550 kWe / 550 kWe

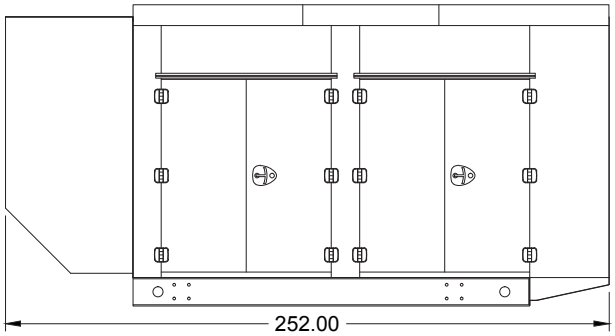
BLUE STAR Power Systems Inc.

Enclosures

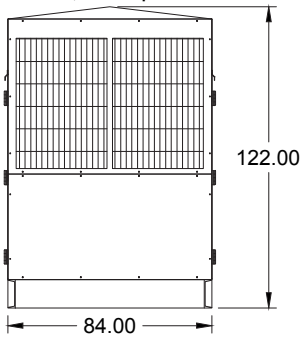
Level 1 & 2 | Side View (Weather Proof)



Level 3 | Side View (Sound Attenuated)



Level 1, 2 & 3 | Intake View

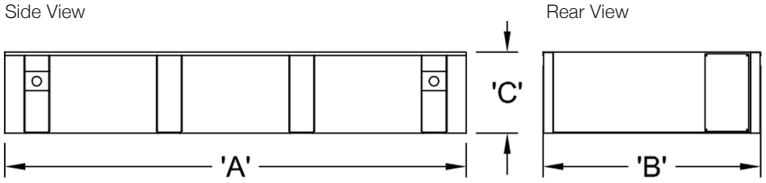


All enclosures are 150 MPH Wind Rated.
Level 2 & 3 enclosures include sound attenuation foam.
Level 3 enclosure includes frontal sound & exhaust hood.
*Enclosure height does not include exhaust stack.

Double Wall UL 142 Listed Fuel Tanks

Side View

Rear View



	24 Hour 1000 Gallon	48 Hour 2000 Gallon	72 Hour 3000 Gallon
A	160.00	204.00	294.00
B	84.00	84.00	84.00
C	24.00	36.00	36.00

All specification sheet dimensions are represented in inches.
All enclosures and fuel tanks are based on the standard standby unit configuration. Any deviation can change dimensions.
Materials and specifications subject to change without notice.

A USA COMPAN

Distributed By:

Blue Star Power Systems, Inc.
52146 Ember Road
Lake Crystal, Minnesota 56055
Phone + 1 507 726 2508
bluestarps.com
quote.bluestarps.com
sales@bluestarps.com

Important

This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with ⚠ are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalities as described in the Clean Air Act.

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel. Turbocharged

Number of cylinders			6
Displacement, total		litre in^3	16,12 983,9
Firing order			1-5-3-6-2-4
Bore		mm in	144 5,67
Stroke		mm in	165 6,50
Compression ratio			16,8:1
Wet weight (Not including after treatment system)	Engine only	kg lb	1810 3990
	Engine incl. cooling system and air filtration system	kg lb	2217 4888
	Frame	kg lb	550 1213
	Compensator and Mixer pipe	kg lb	25 55
	EATS Muffler	kg lb	188 414

Performance			rpm	1500	1800
Prime Power		without fan	kW	NA	562
			hp	NA	764
		with fan	kW	NA	532
			hp	NA	724
Standby Power		without fan	kW	NA	615
			hp	NA	836
		with fan	kW	NA	585
			hp	NA	796
Torque at:	Prime Power		Nm	NA	2982
			lbft	NA	2199
	Standby Power		Nm	NA	3263
			lbft	NA	2406
Mean piston speed			m/s	NA	9,9
			ft/sec	NA	32,6
Effective mean pressure at:	Prime Power		MPa	NA	2,3
			psi	NA	337
Effective mean pressure at:	Standby Power		MPa	NA	2,5
			psi	NA	369
Max combustion pressure at:	Prime Power		MPa	NA	21
			psi	NA	3046
Max combustion pressure at:	Standby Power		MPa	NA	21,8
			psi	NA	3162
Total mass moment of inertia, J (mR^2)			kgm^2	2,50	
			$lbft^2$	59,3	
Total mass moment of inertia, J (mR^2) without flywheel			kgm^2	1,92	
			$lbft^2$	45,6	
Friction Power			kW	NA	51
			hp	NA	69,4

Derating due to altitude - see Technical Diagrams

Engine noise emission
Test Standards: ISO 3744-1981 (E) sound power
Tolerance ± 0.75 dB(A)

		rpm	1500	1800
Measured sound power Lw	No load	dB(A)		118,1
	Prime Power	dB(A)		118,4
	Standby Power	dB(A)		118,5
Calculated sound pressure Lp at 1 m	No load	dB(A)		101,1
	Prime Power	dB(A)		101,4
	Standby Power	dB(A)		101,5

Test conditions for load acceptance data

Warm engine.	**Generator**		**Model**	**Type of AVR**	
	Stamford		HCM534F1	MX341	
AVR Settings	UFRO (Hz):	57	DIP (%)*: 50	DWELL (%)*:	N/A
	Stability (%)*:	According to Stamford instructions	Voltage (V): 400	Load factor:	1.0

Applies to Stamford nomenclature,
(%)* : % of max potentiometer setting range
Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

Abbreviation:	**Full name:**	**Descriptions**
AVR	Automatic Voltage Regulator	Generator performance and safty control unit
UFRO	Under Frequency Roll Off	Overheating protection at under frequency
DIP		Controls the slope of voltage drop when the UFRO is active
DWELL		Controls the slope of voltage recovery when the UFRO is active.

Single step load performance at 1800 rpm - PRIME (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	2,2	1,3	0,6	0,0	20-100	9,3	2,9	16,8	1,6
0-40	4,4	1,8	2,1	0,6	40-100	5,7	2,4	7,3	1,2
0-60	6,4	2,3	8,4	1,2	60-100	3,9	1,9	2,5	1,0
0-65	7 (G3)	2,4	9,3	1,2	65-100	3,7	1,8	2,1	0,8
0-80	10 (G2)	2,9	16,4	1,2	74-100	2,3	1,3	1,3	0,3
0-100	14,7	3,2	26,1	1,8					
100-0	4,3	1,4	8,6	1,9					

Single step load performance at 1800 rpm - STAND BY (Resistiv load)

Load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)	Remaining load (%)	Speed diff (%)	Speed Recovery time (s)	Voltage diff (%)	Voltage Recovery time (s)
0-20	2,4	1,4	1,1	0,0	20-100	10,2	3,2	19,8	1,6
0-40	4,6	2,1	4,1	1,2	40-100	6,2	2,5	9,8	1,6
0-59	7 (G3)	2,4	10,7	1,3	59-100	4,6	2,2	3,8	1,2
0-60	7,1	2,3	10,7	1,2	60-100	4,5	2,1	3,4	1,3
0-74	10 (G2)	2,9	17,2	1,2	74-100	3,1	1,6	2,0	0,8
0-80	12,0	3,1	21,1	1,3	80-100	2,6	1,4	1,6	0,3
0-100	17,0	3,5	30,5	2,0					
100-0	4,8	1,6	8,9	1,8					

Cold start performance

				rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20		s	NA	4,3
		5		s	NA	5,3
		-15 *		s	NA	5,3
		-30 **		s	NA	5,7
		Min start temp*		°C	-31,0	

* With manifold heater 4 kW engaged, lubrication oil 15W/40 and block heater.
** With manifold heater 4 kW engaged, lubrication oil 5W/30 and block heater, Fuel MK-1.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
Volvo part No: 22454340 P01	Calix	1.5 kW	10h ambient temp-30 C	-2°C 28°F

Lubrication system

				rpm	1500	1800
Lubricating oil consumption	Prime Power			litre/h US gal/h	NA	0,10 0,026
	Standby Power			litre/h US gal/h	NA	0,11 0,029
Oil system capacity including filters				litre US gal	48 12,7	
Oil sump capacity:		max		litre US gal	42 11,1	
		min		litre US gal	32 8,5	
Oil change intervals/specifications:	VDS-3*			h	500	
				h		
				h		
Engine angularity limits:		front up		°	30	
		front down		°	30	
		side tilt		°	30	
Oil pressure at rated speed				kPa psi		399 58
Lubrication oil temperature in oil sump:		max		°C °F	130 266	
Oil filter micron size				µ	40	

* See also general section in the sales guide

Fuel system			rpm	1500	1800
Prime Power	25%	g/kWh		NA	234
Specific **fuel** consumption at:		lb/hph		NA	0,379
	50%	g/kWh		NA	205
		lb/hph		NA	0,332
	75%	g/kWh		NA	197
		lb/hph		NA	0,319
	100%	g/kWh		NA	195
		lb/hph		NA	0,316
% adBlue consumption at:	25%	%		NA	6,1
(Compare to Fuel consumption by Volyme)	50%	%		NA	6,6
	75%	%		NA	7,1
	100%	%		NA	7,1

Standby Power	25%	g/kWh		NA	229
Specific **fuel** consumption at:		lb/hph		NA	0,371
	50%	g/kWh		NA	203
		lb/hph		NA	0,329
	75%	g/kWh		NA	196
		lb/hph		NA	0,317
	100%	g/kWh		NA	196
		lb/hph		NA	0,317
% adBlue consumption at:	25%	%		NA	6,2
(Compare to Fuel consumption by Volyme)	50%	%		NA	6,6
	75%	%		NA	7,3
	100%	%		NA	6,6

Fuel system		rpm	1500	1800
See front page for important information ⚠	ASTM D975 (2D)			
Fuel to conform to				
System supply flow at:		litre/h	NA	210,0
		US gal/h	NA	55,5
Fuel supply line max restriction		kPa	NA	30,0
(Measured at fuel inlet connection)		psi	NA	4,4
Fuel supply line max pressure, engine stopped		kPa	NA	0,0
		psi	NA	
System return flow		litre/h	NA	25,0
		US gal/h	NA	6,6
Fuel return line max restriction		kPa	NA	20,0
(Measured at fuel return connection)		psi	NA	2,9
Maximum allowable inlet fuel temp		°C	NA	60
(Measured at fuel inlet connection)		°F	NA	140
Prefilter / Water separator micron size		µ	10	
Fuel filter micron size		µ	5	
Governor type/make, standard		Volvo/EMS 2.3		
Injection pump type/make		Unit injector hybrid		

Intake and exhaust system		rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Prime Power	m^3/min	NA	46,06
		cfm	NA	1627
	Standby Power	m^3/min	NA	48,22
		cfm	NA	1703
See front page for important information ⚠ Max allowed air intake restriction including piping		kPa	NA	5
		psi	NA	0,7
Air filter restriction clean Volvo Penta filter		kPa	NA	1,4
		psi	NA	0,2
Heat rejection to exhaust at:	Prime Power	kW	NA	409
		BTU/min	NA	23259
	Standby Power	kW	NA	454
		BTU/min	NA	25792
Exhaust gas temperature after turbine at:	Prime Power	°C	NA	423
		°F	NA	793
	Standby Power	°C	NA	444
		°F	NA	831
See front page for important information ⚠ Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: mm	Prime Power	kPa	NA	19
		psi	NA	2,7
	Standby Power	kPa	NA	20
		psi	NA	2,9
See front page for important information Max allowable temperature drop between turbine and SCR muffler inlet. ⚠	Prime Power	Δ°C	NA	10
		Δ°F	NA	18
	Standby Power	Δ°C	NA	10
		Δ°F	NA	18
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)	Prime Power	kPa	NA	9
		psi	NA	1,3
	Standby Power	kPa	NA	10
		psi	NA	1,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Prime Power	m^3/min	NA	114,0
		cfm	NA	4025
	Standby Power	m^3/min	NA	123,1
		cfm	NA	4347

Cooling system			rpm	1500	1800
Heat rejection radiation from engine at:		Prime Power	kW	NA	24
			BTU/min	NA	1365
		Standby Power	kW	NA	26
			BTU/min	NA	1479
Coolant		Volvo Penta coolant "ready mix or Volvo Penta coolant mixed with fresh water 40/60			
Radiator cooling system type			Closed circuit		
Standard radiator core area			m²	NA	1,68
			foot²	NA	18,08
Fan diameter			mm	NA	965
			in	NA	37,99
Fan power consumption			kW	NA	30
			hp	NA	41
Fan drive ratio					1.04:1
Coolant capacity,	Engine only		litre	NA	33
			US gal	NA	8,72
	CACs (Charge Air Coolers)		litre	NA	10
			US gal	NA	2,64
	Coolant radiators incl piping, Engine circuit		litre	NA	48
			US gal	NA	12,68
	coolant radiators incl piping, CAC- circuit		litre	NA	48
			US gal	NA	12,68
	Expansion tank, Engine circuit		litre	NA	20
			US gal	NA	5,28
	Expansion tank, CAC circuit		litre	NA	7
			US gal	NA	1,85
Coolant pump, Engine circuit			drive/ratio	Belt / 1,85:1	
Coolant pump, CAC circuit			drive/ratio	Belt / 2,29:1	
Thermostat, Engine circuit		Start to open	°C	NA	82
			°F	NA	180
		Fully open	°C	NA	92
			°F	NA	198
Thermostat, CAC circuit		Start to open	°C	NA	40
			°F	NA	104
		Fully open	°C	NA	52
			°F	NA	126
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	NA	100
			psi	NA	14,5
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	NA	70
			psi	NA	10,2
Standard pressure cap setting			kPa	NA	75
			psi	NA	10,9
Maximum top tank temperature			°C	NA	107
			°F	NA	225
Charge air pressure (after charge air coolers)			kPa	NA	360
			psi	NA	52,2
See front page for important information Max allowed Charge air outlet temp. At air inlet temp. 25°C ⚠	Prime Power		°C	NA	50
			°F	NA	122
	Standby Power		°C	NA	50
			°F	NA	122

OEM cooling system design:

- move of standard radiatorts		**rpm**	**1500**	**1800**
Maximum additional coolant, Engine circuit with standard expansion tank		litre	NA	15
		US gal	NA	3,96
Maximum additional coolant, CAC circuit with standard expansion tank		litre	NA	5
		US gal	NA	1,32
Maximum distans in vertikal direction with standard pressure cap		m	NA	2,5
(75 kPa)		ft	NA	8,20
Maximum additional pressure drop due to move		KPa	NA	10
		psi	NA	1,5
- replacement of standard radiators				
Heat rejection to coolant	Prime Power	kW	NA	203
engine radiator at:		BTU/min	NA	11544
	Standby Power	kW	NA	223
		BTU/min	NA	12682
Heat rejection to coolant	Prime Power	kW	NA	187
CAC radiator at:		BTU/min	NA	10635
	Standby Power	kW	NA	206
		BTU/min	NA	11715
Minimum coolant flow **engine radiator** (at fully open thermostat)		litre/s	NA	6
		US gal/s	NA	1,59
Minimum coolant flow **CAC radiator** (at fully open thermostat)		litre/s	NA	2,5
		US gal/s	NA	0,66
Maximum coolant pressure drop over **engine radiator** incl. Piping		kPa	NA	70
(at coolant flow above)		psi	NA	10,2
Coolant pressure drop over complete engine circuit cooling system		kPa	NA	160
(at coolant flow above)		psi	NA	23,2
Coolant pressure drop over complete CAC circuit cooling system		kPa	NA	135
(at coolant flow above)		psi	NA	19,6
Nominal coolant pressure before engine circuit coolant pump		kPa	NA	30
		psi	NA	4,4
Nominal coolant pressure before CAC circuit coolant pump		kPa	NA	30
		psi	NA	4,4

Cooling performance

Standard fan: Fan ratio: 1 : 1.04 Fan type: FIX

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% antifreeze.
Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed	Air on temp	PRIME POWER		STANDBY POWER	
rpm	°C	Air flow	External restriction	Air flow	External restriction
		m^3/s	Pa	m^3/s	Pa
1800	63	15,2	0		
	62	14,5	100	15,2	0
	61	14,1	200		
	60	13,6	300		
	59			14,5	100
	58			13,9	200
	57			13,6	300

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous / droop	Isochronous
Governor droop	N/A	N/A
Governor response	Adjustable PID-constants (VODIA)	
Dual speed	Single Speed 1800rpm , 60Hz	1800,0
Idle speed	600-1200rpm	900,0
Fine speed adjustment	+-90rpm	0,0
Preheating function	On / Off	Off

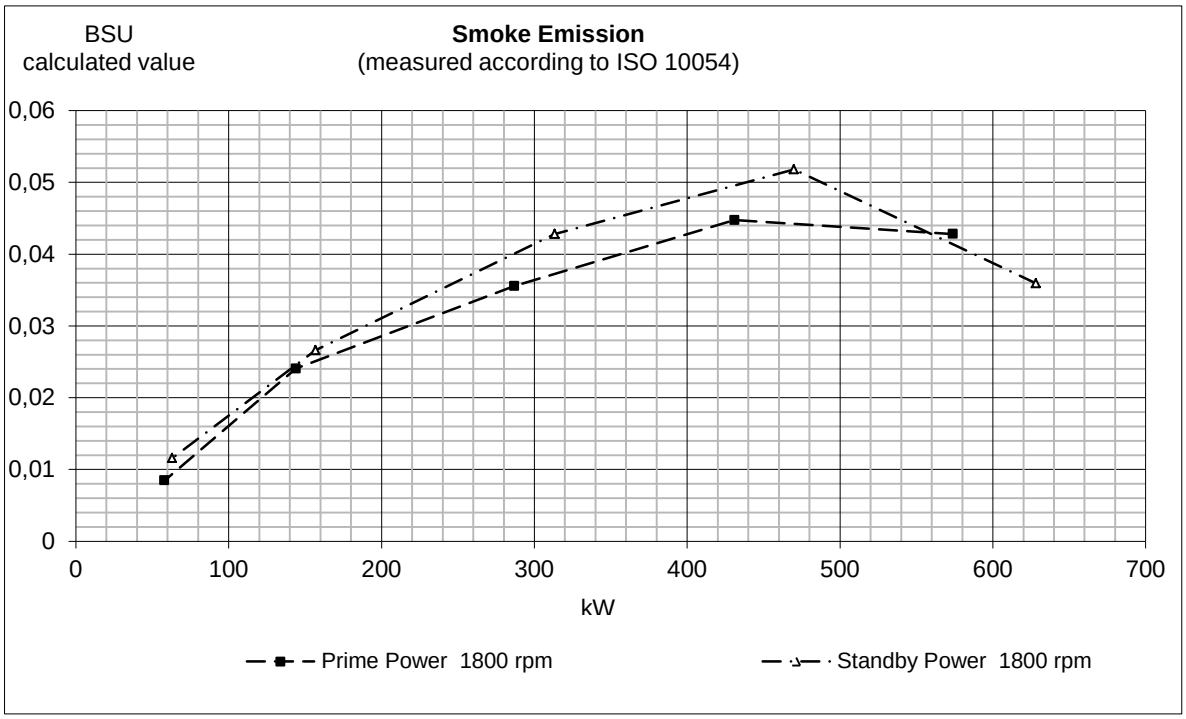
Engine sensor and switch settings

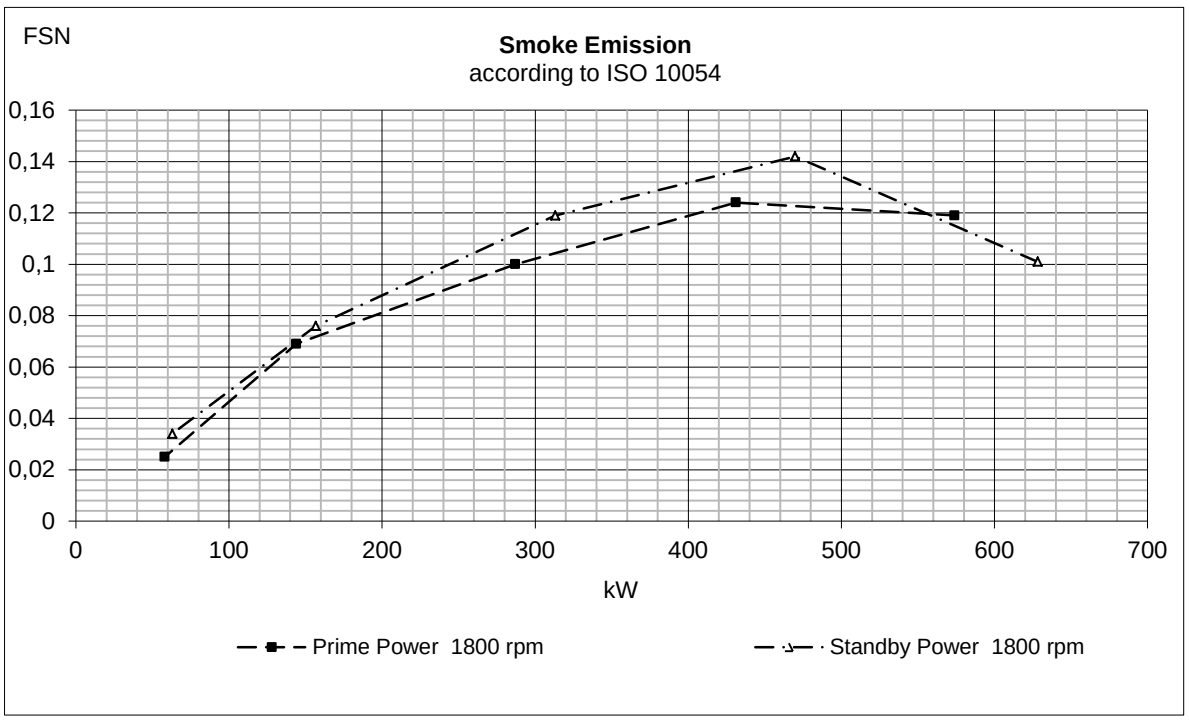
			Alarm level		Engine protection	
Parameter		Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp		°C	120 - 130	125	Setting +2.5	Shutdown after 10s
Oil pressure	Low idle 900 rpm	kPa	NA	170	145	Shutdown
	1800 rpm	kPa	NA	300	275	Shutdown
Oil level			NA	Min level		
DEF dosing injection failure			NA	On	Low level	Shutdown after 10s
Coolant temp		°C	95 - 101	103	Setting +4	Shutdown after 10s
Coolant level			See cooling system	On	Low level	Shutdown after 10s
Fuel feed pressure	Low idle	kPa	NA	Min level		
	>1400 rpm	kPa	NA	Min level		
Water in fuel			NA	Max level		
Crank case pressure		kPa	NA	Rapid increase	Rapid increase	Shutdown
Air filter pressure drop		kPa	NA	5		
Altitude, above sea		m				Automatic derating, see section Smoke, Fuel & Derating
Charge air temp		°C	NA	80	82,5	Shutdown after 10s
Charge air pressure		kPa	NA	25 above demand	35 above demand	Shutdown after 10s
Engine speed		rpm	100 - 120% of rated speed	115% of rated speed	Alarm level	Shutdown.
Exhaust Temperature (before SCR volume)		°C	NA	530	550	Shutdown after 10s
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy						

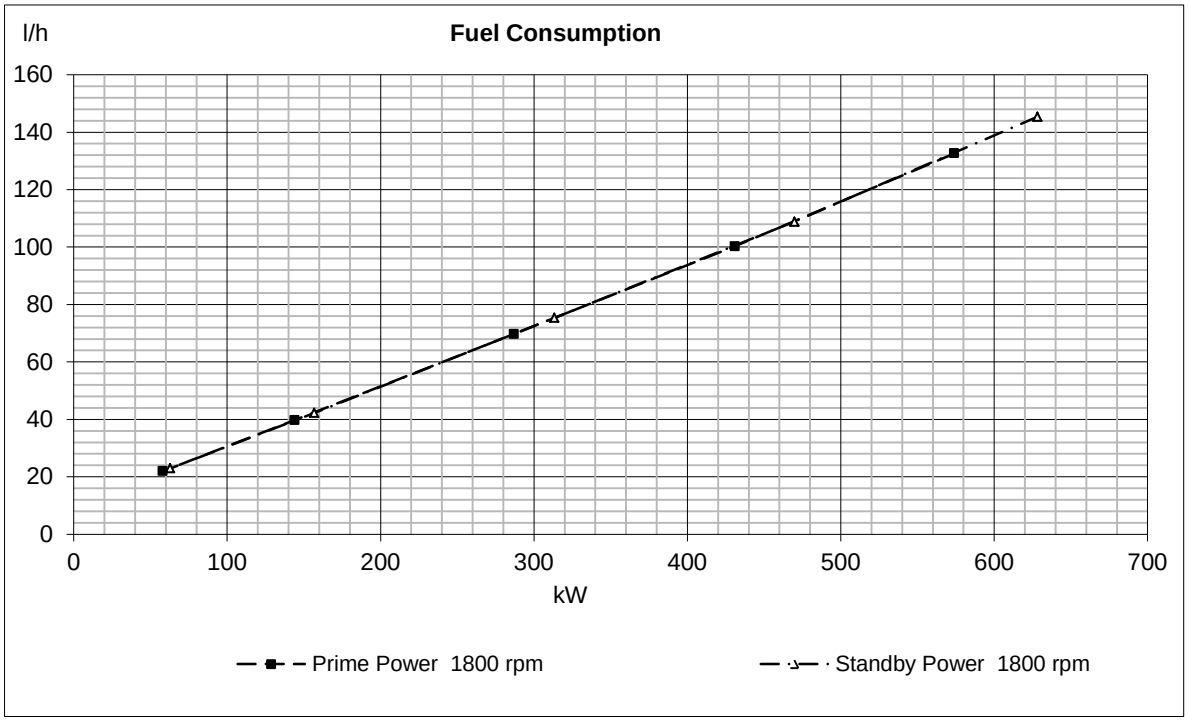
Electrical system

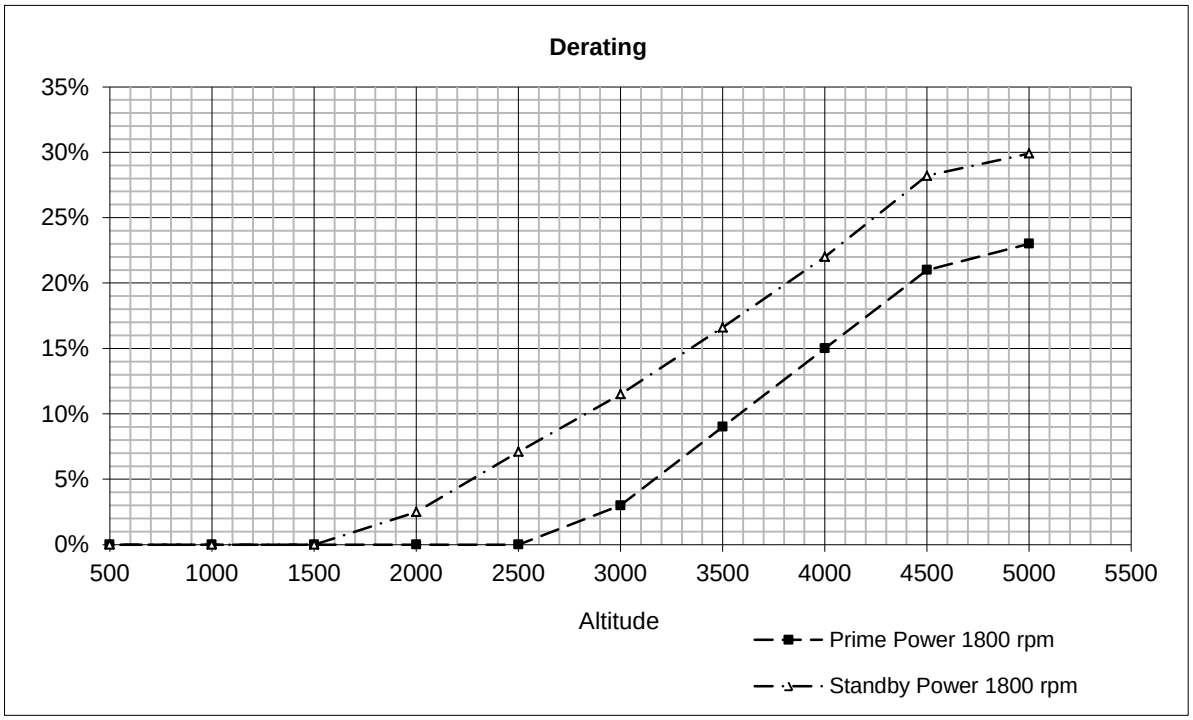
Voltage and type		24V / insulated from earth	
Alternator:	make/output	A	Bosch / 80
	tacho output	Hz/alt. Rev	6
	drive ratio		3,94 : 1
Starter motor		make	Mitsubishi Electric
		type	24V7.0KW12/3.175F
		kW	7,0
Number of teeth on:	flywheel		153
	starter motor		12
Max wiring resistance main circuit		mΩ	
Cranking current at +20°C		A	300
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	max	Ah/A	2x225
	min at +5°C	Ah/A	
Inlet manifold heater (at 20 V)		kW	4,0
Power relay for the manifold heater		A	1

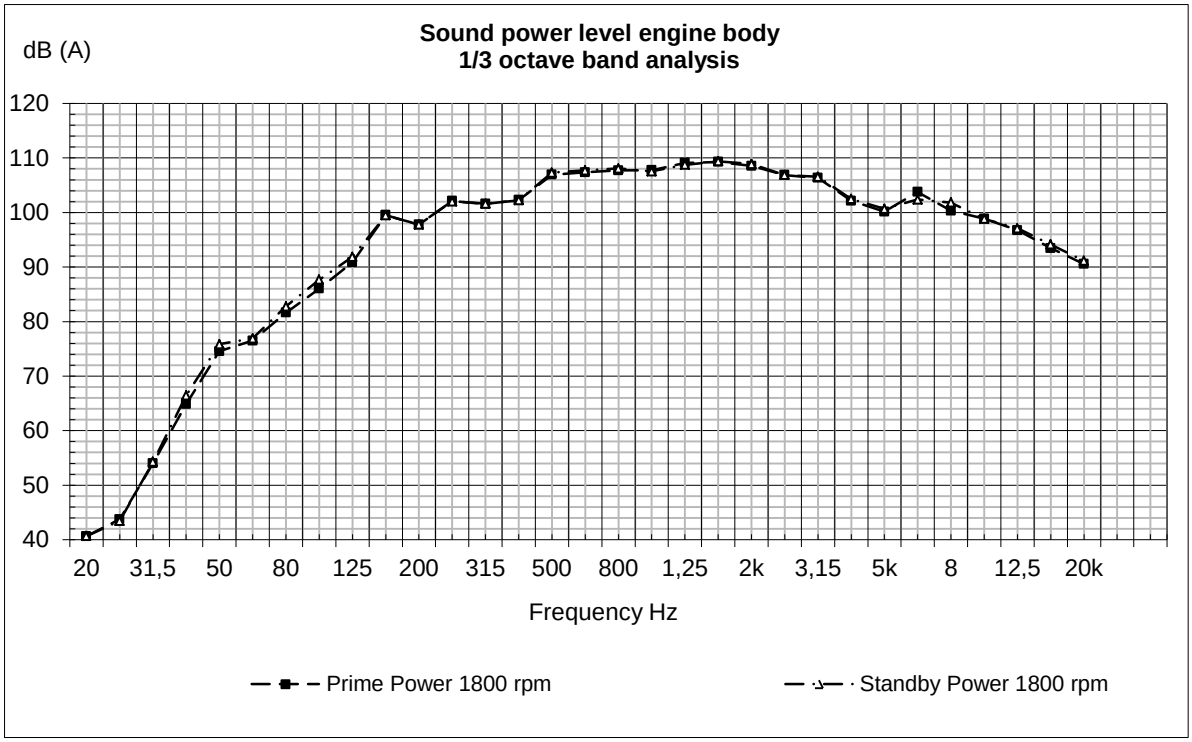
Power take off		**rpm**	**1500**	**1800**
Front end in line with crank shaft max:		Nm	NA	NA
		lbft	NA	NA
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	NA	NA
		hp	NA	NA
	max down	kW	NA	NA
		hp	NA	NA
	max right	kW	NA	NA
		hp	NA	NA
Timing gear at compressor PTO max:		Nm	NA	NA
		lbft	NA	NA
Speed ratio direction of rotation viewed from flywheel side		0,91:1/clockwise		
Timing gear at servo pump PTO max:		Nm	NA	NA
		lbft	NA	NA
Speed ratio direction of rotation viewed from flywheel side		1,58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm	NA	NA
		lbft	NA	NA
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending moment in flywheel housing		Nm	15000	
		lbft	11063	
Max. rear main bearing load		N	NA	NA
		lbf	NA	NA

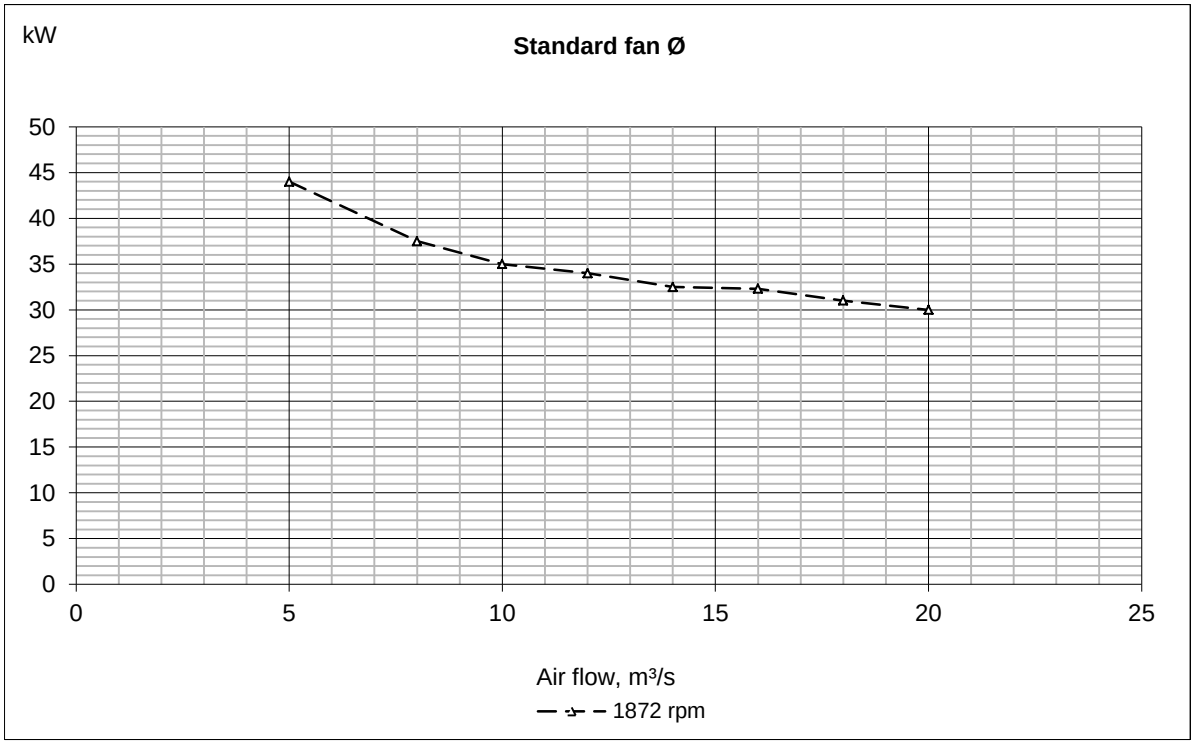

BSU
calculated value
Smoke Emission
(measured according to ISO 10054)
0,06
0,05
0,04
0,03
0,02
0,01
0
0
100
200
300
400
500
600
700
kW
Prime Power 1800 rpm
Standby Power 1800 rpm

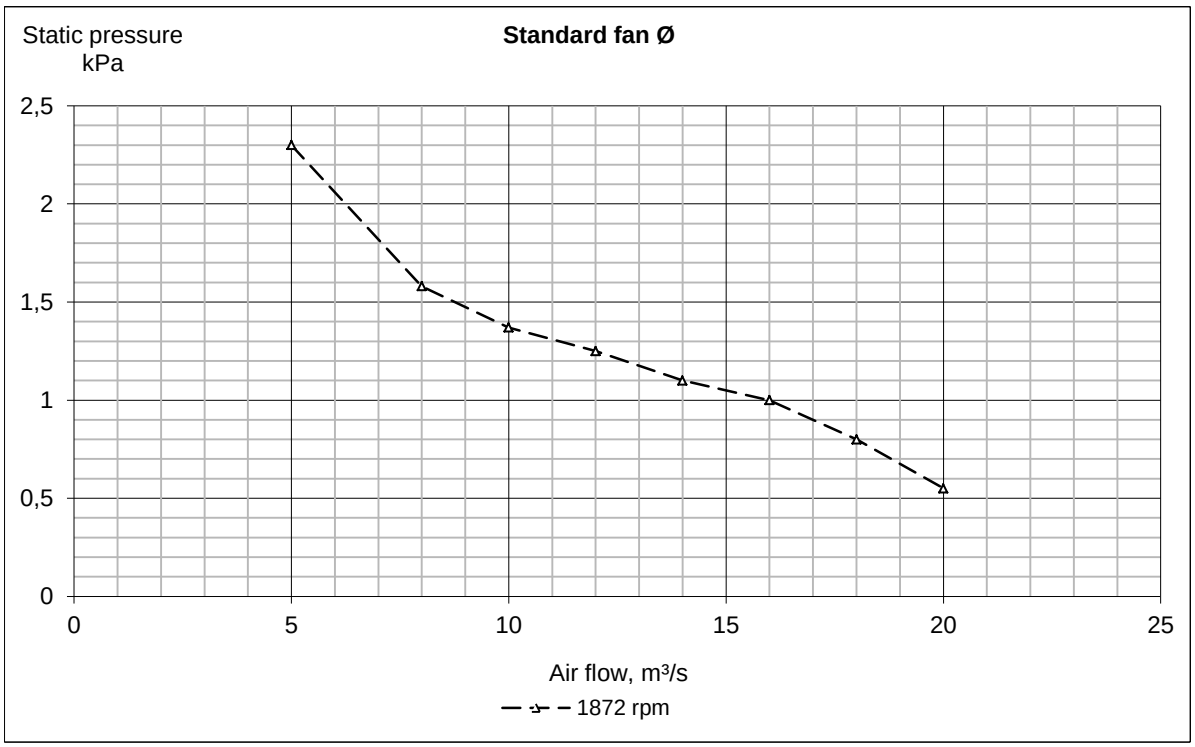

FSN
Smoke Emission
according to ISO 10054
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
0
100
200
300
400
500
600
700
kW
Prime Power 1800 rpm
Standby Power 1800 rpm


Fuel Consumption
l/h
160
140
120
100
80
60
40
20
0
0
100
200
300
400
500
600
700
kW
Prime Power 1800 rpm
Standby Power 1800 rpm


Derating
35%
30%
25%
20%
15%
10%
5%
0%
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
Altitude
Prime Power 1800 rpm
Standby Power 1800 rpm


Sound power level engine body
1/3 octave band analysis
dB (A)
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
Prime Power 1800 rpm
Standby Power 1800 rpm


kW
Standard fan Ø
50
45
40
35
30
25
20
15
10
5
0
0
5
10
15
20
25
Air flow, m³/s
1872 rpm


Static pressure
kPa
Standard fan Ø
2,5
2
1,5
1
0,5
0
0
5
10
15
20
25
Air flow, m³/s
1872 rpm

Industrial Generators

BLUE STAR Power Systems Inc.

Blue Star Power Systems, Inc. utilizes the highest quality generators available. Our industrial generators provide consistent performance, quality design, and great durability required for long life and versatility. Generators used by Blue Star Power Systems, Inc. are UL and CSA Listed (unless specified otherwise), 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 generator. Blue Star Power Systems, Inc. generators 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 generator 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, Inc. generators are UL and CSA Listed (unless specified otherwise) and meet NEMA MG1-22, BS5000, CSA C22.2, IEC 34-1 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.
- **Shielded Heavy-Duty Bearing**
  Resists contamination and gives a minimum B-10 life of 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.

DVR2000E+
Digital Voltage Regulator

BLUE STAR Power Systems Inc.

Advanced Features

- **CAN Bus Communication -** Allows for the integration of the DVR2000E+ as a node on a CAN Network for the purpose of controlling or monitoring regulator performance
- **True RMS Single and Three Phase Voltage Sensing -** Connect in the sensing mode required per the application. Sense 100 to 600 Volts ±10% at 50 or 60 Hz
- **True Three Phase Power Monitoring -** Additional CT inputs monitor current on all three phases if required
- **Generator Soft Start -** Controlled increase to rated voltage limits overshoot during voltage build-up in AVR regulation modes if required
- **Frame Specific PID Selection -** Regulator tuned to specific frame size and gain settings
- **Four Digit HMI Display -** Clearly displayed whether changing settings or monitoring regulator status
- **Expandable Platform -** Features include shunt power capability and RTD monitoring through expansion modules

Specifications

- **Voltage Regulation** – 0.25% over the entire load range at rated power factor and constant generator frequency
- **Output Power** – 75VDC, 3.0ADC continuous rating and 150VDC, 7.5ADC forcing capability for one minute
- **Exciter Field DC Resistance** – 18 to 25Ω range
- **Voltage Adjustment** – Minimum of ±10% of nominal voltage range. Remote adjustment can be made from up to 150 feet from voltage regulator
- **Input Power** – 180 to 240VAC, 250 to 300 Hz PMG power supply
- **Operating Temperature** – From -40°C to +70°C (-40°F to +158°F)
- **Storage Temperature** – From -40°C to +85°C (-40°F to +185°F)
- **Ingress Protection** – IP52 (front side mounted in conduit box); IP10 (rear side with protective cover)
- **Shock** – 20g in 3 perpendicular planes
- **Vibration** – 1 G at 5 to 26 Hz; 0.050” double amplitude (27 to 52 Hz); 7g at 53 to 500 Hz
- **Weight** – 3 lb. (1361g)
- **Humidity Testing** – Per MIL-STD-705B, Method 711-D
- **Salt Fog Testing** – Per MIL-STD- 810E
- **CAN Protocol** – SAE J1939
- **Regulator Sensing** – 100 to 600VAC, 50/60 Hz, 1-phase/3-phase
- **EMI Compatibility**
  Immunity - Meets EN 61000-6-2: 2005 Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
  Emission - Meets EN 61000-6-4: 2007 Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
- **EMI Compatibility Tests**
  Immunity - Electrostatic Discharge (ESD): IEC 61000-4-2 | Radiated RF: IEC 61000-4-3 | Electrical Fast Transient (EFT) / Burst: IEC 61000-4-4 Conducted RF: IEC 61000-4-6 | Power Frequency and Magnetic Field: IEC 61000-4-8
  Emission - Radiated RF: EN 61000-6-4: 2007, 30 MHz to 1000 MHz

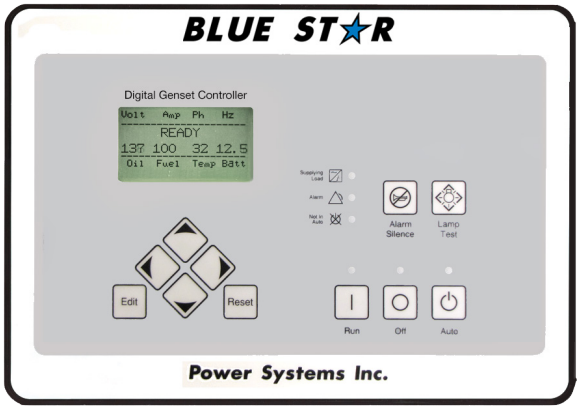
This regulator meets MIL-STD-461C, Part 9 for radiated and conducted emissions and radiated susceptibility when mounted in the generator conduit box.

Blue Star Power Systems, Inc. | 52146 Ember Road, Lake Crystal, Minnesota 56055 | Phone + 1 507 726 2508 | bluestarps.com

DGC-2020 Gen-Set Controller

BLUE STAR Power Systems Inc.

Blue Star Power Systems, Inc's Digital Gen-Set Controller (DGC-2020) is a highly advanced integrated gen-set control system. The DGC-2020 is perfectly focused, combining rugged construction and microprocessor technology to offer a product that will hold up to almost any environment and flexible enough to meet your application's needs. This device provides gen-set control, transfer switch control, metering, protection and programmable logic in a simple, easy to use, reliable, rugged, and cost effective package.



Highlights

- UL Recognized, CSA & CE approved
- Microprocessor based
- Complete system metering
- Remote communication options
- Rugged encapsulated construction

Standard Features

- Generator Metering
- Engine Metering
- Gen-set Control
- Engine Protection:
  - Oil Pressure
  - Engine Temperature
  - Overspeed
  - Overcrank
- BESTCOMS Plus:
  - Programming and Setup Software
  - Intuitive and Powerful
  - Remote Control and Monitoring
  - Programmable Logic
  - USB Communications
- SAE J1939 Engine ECU Communications (Where Applicable)
- Extremely Rugged, Fully Encapsulated Design
- 16 Programmable Inputs
- 7 Contact Outputs: (3) 30ADC and (4) Programmable 2ADC Rated Contacts
- Wide Ambient Temperature Range
- UL Recognized, CSA Certified, CE Approved
- HALT (Highly Accelerated Life Test) Tested
- IP54 Front Panel Rating with Integrated Gasket
- NFPA110 Level One Compliant
- Real Time Clock with Battery Backup and Event Log
- Emergency Stop Pushbutton
- Current Sensing: 5A CT inputs
- Generator Frequency: 50/60 Hz
- LCD Display Heater to -40˚F
- Event Recording (up to 99 occurrences)

Standard Gen-Set Monitoring

- Generator parameters: voltage, current, frequency, real power (Watts), apparent power (VA), and power factor
- Engine parameters: oil pressure, coolant temperature, RPM, battery voltage, fuel level, engine runtime, and various J1939 supported parameters where applicable

Standard Engine Control Functions

Cranking Control

- Cyclic or Continuous (Fully Programmable)

Successful Start Counter

- Counts and Records Successful Engine Starts

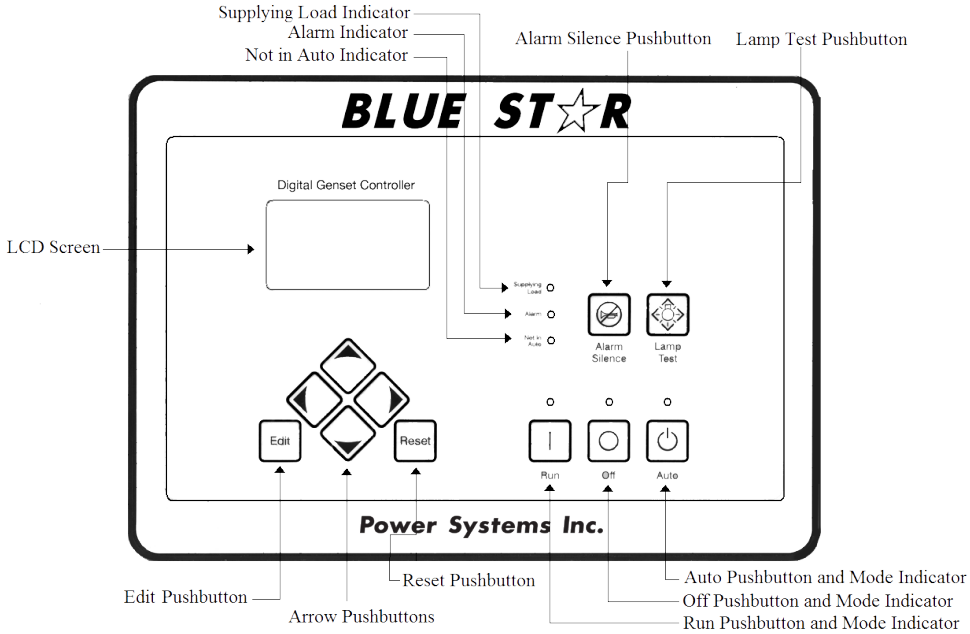
Timers

- Engine Cooldown Timer (Specify)
- Engine Maintenance Interval Timer (Specify)
- Pre-Alarm Time Delays for Weak/Low Battery Voltage
- Alarm Time Delay for Overspeed
- Alarm Time Delay for Sender Failure
- Arming Time Delays After Crank Disconnect:
  - Low Oil Pressure
  - High Coolant Temperature
  - Pre-Crank Delay
- Continuous/Cyclic Cranking Timing Sequence

DGC-2020 Gen-Set Controller

Front Panel LED Indicators:

- Run: Green – Indicates controller is in the RUN mode
- Off: Red – Indicates controller is in the OFF mode
- Auto: Green – Indicates unit is in the AUTO mode
- Not in Auto: Red – Indicates DGC-2020 is not in AUTO mode
- Supplying Load: Green – Indicates system is supplying current to a connected load
- Alarm: Red – Indicates an alarm situation by continuous illumination
  A pre-alarm will flash



Standard Engine Protection Functions

Pre-Alarms (Warnings)

- Low Oil Pressure
- High Coolant Temperature
- Low Coolant Temperature
- Battery Overcharge (High Voltage)
- Weak Battery (Low Voltage)
- 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

- All alarms and pre-alarms can be configured via the BESTCOMSPlus 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
- Remote Communication to RDP-110 / NFPA-110 Compliant Remote Annunciator
- Additional (8) Programmable 2ADC Contacts
- Remote Dial-out and Dial-in Capability with Modem
- Modbus Communications with RS-485
- Expandable I/O Capability via J1939 CANBUS
- 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)
- Phase Imbalance (57)
- Reverse Power (32)
- Loss of Excitation (400)
- Phase Imbalance (47)
- Generator Overcurrent (51)

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

Contact Outputs

For those applications where more output contacts are needed, the DGC-2020 can be adapted to include 8 additional 2ADC rated dry contact outputs. These are real contacts and not the solid-state type that require additional external circuitry to properly operate. These contacts are fully programmable via the easy-to-use BESTCOMSPlus PC software and can be assigned to numerous user-defined functions.

DC Voltage Panel Mounted Modem

The DGC-2020 can provide long distance communication by adding a modem. When a modem is used, the user can access the DGC-2020 from virtually anywhere via a dedicated telephone line. The user can monitor and control the gen-set as if standing right in front of it. The DGC-2020 can also dial out for pre-programmed circumstances to alert the user of selected situations.

RS-485 Communication

When the RS-485 option is selected, the user can send and receive information from the DGC-2020 via the RS-485 communications port and Modbus protocol. This feature allows the DGC-2020 to be fully integrated into the building management system. Please see the instruction manual for the Modbus register list.

Enhanced Generator Protection

In addition to the standard generator protection (27, 59, 81O, 81U) the DGC-2020 can be equipped with a more sophisticated generator protection system. This option provides an overcurrent element (51) with 17 selectable time current characteristic curves and a voltage phase balance protection function.

Transfer Switch Control (Mains Failure)

The DGC-2020 monitors utility (mains) and determines if it is providing power that is suitable for the loads. If the utility supply goes outside of predetermined levels, the generator is started and the utility is disconnected from the load and the generator is connected. When the utility returns to acceptable levels for a sufficient time, the generator is disconnected and the utility is reconnected to the load. It also includes appropriate adjustable timers or time delays for establishing stable utility operation.

Contact Expansion Module (CEM)

The CEM add-on module increases the contact input and contact output capability adding 10 contact inputs and 24 form C contact outputs. This module communicates to the DGC-2020 via SAE J1939 CANBUS and allows the user to program the functionality of these inputs and outputs in the BESTCOMS programmable logic program. The user can add labels for the inputs and outputs that appear on BESTCOMS front panel, and in the programmable logic. All the functionality can be assigned to these inputs and outputs as if they were an integrated part of the DGC-2020. The CEM-2020 module has all of the environmental ratings, like the DGC-2020, including a model for UL Class1 Div2 applications (consult price list for part number). The output ratings of the form C contacts are: (12 contacts) 10A @ 30VDC and (12 contacts) 2A @ 30VDC. The 2A rated contacts are gold flash contacts for low current circuits. The CEM-2020 terminals accept a maximum wire size of 12 AWG while the chassis ground requires 12 AWG wire. The CEM-2020 provides the user with the flexibility to use the same model DGC-2020 gen-set controller for simple applications or more complicated applications that require contact functionality or duplication of contacts for remote annunciation. Flexibility is one of the benefits of the DGC-2020, and this add-on module enhances that benefit even further.

ModBus TCP/RTU (NetBiter RTU-TCP Gateway)

NetBiter® RTU-TCP Gateway connects the fully enhanced DGC-2020 with Ethernet and mobile networks. The gateway acts as a transparent bridge translating DGC-2020 Modbus registers allowing control systems, such as PLCs, SCADA, etc. to communicate over Ethernet. One gateway is required per generator allowing multiple generator sets to be accessed and monitored simultaneously. Note: This option does not interface with BESTCOMSPlus software. Features include: connectivity between serial Modbus devices and the Modbus TCP; RS-232, RS-485 and RS-422 connectivity; Ethernet and mobile network connectivity; 10/100 Mbit/s Ethernet; web-based configuration; DIN rail mounting; and network and serial status indicators.

Load Share Module 2020 (LSM-2020)

The LSM is an easy to connect and use add-on module for the DGC-2020 to allow the DGC-2020 to control the kW load sharing of multiple generator sets. The LSM-2020 is remotely mounted and communicates to the DGC-2020 via J1939 CANbus communications.

Gen-Set Enclosures

Blue Star Power Systems, Inc. gen-set 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, Inc's 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, tan or gray. Custom colors are available as specified.

Enclosure Design Features

- UL 2200 & CSA Listed as standard
- All enclosures are 150 MPH wind rated
- 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

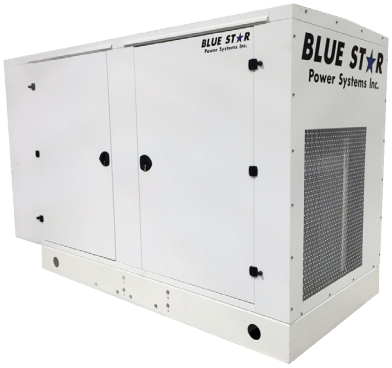
Weather Proof Enclosure

Blue Star Power Systems, Inc. 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 (150 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, Inc. Level 2 enclosures include all of the same great features of the Level 1 enclosures. 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, Inc. 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 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 Inc.

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

	Frequency (Hz)					
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.

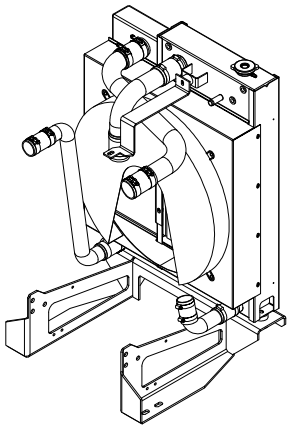
Adhesive Characteristics

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, Inc. 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 genset 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

CB / CL Series Engine Block Heaters

BLUE STAR Power Systems Inc.

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

Industrial Gen-Set Batteries

BLUE STAR Power Systems Inc.

Engine Starting Batteries

Built to Handle Extreme Conditions

Blistering heat and bitter cold are ruthless battery killers. That's why Blue Star Power Systems, Inc. utilizes the Exide 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, Inc.'s "all-climate" Exide 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 Exide 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

				Dimensions (Inches)			
BCI Group Size	Part Number	CCA at 0˚F	CCA at 32˚F	Length	Width	Height	Weight (lbs.)
78DT	78DT-72	850	1000	10-3/16	6-13/16	8-1/8	54
4D	COM-4D-P	1000	1200	19-9/16	8-5/16	10	95
8D	COM-8D-P	1155	1380	20-7/8	11	10	117

Blue Star Power Systems, Inc. | 52146 Ember Road, Lake Crystal, Minnesota 56055 | Phone + 1 507 726 2508 | bluestarps.com

Gen-Set Trailers

BLUE STAR Power Systems Inc.

Mobile Power

Blue Star Power Systems, Inc. gen-set trailers are specifically designed and manufactured for the transportation of mobile generators. All trailers are built to last with heavy duty steel construction. Blue Star Power Systems, Inc. offers custom trailers to fit almost any size or specification up to 600 kWe. Rental grade mobile generators and options available upon request.

Standard Features

- All Steel Formed or Structural Channel Construction
- Adjustable Tongue Mounted Jack
- 2 5/16" Ball Coupler or 3" Pintle Eye
- Safety Chains
- DOT Lighting / DOT Reflective Tape
- License Plate Mount with Light
- Six Pole Connector Plug
- Breakaway Kit (Electric Brakes Only)
- Spring Axles
- Radial Tires With Rims
- Two (2) Adjustable Rear Stabilizing Jacks
- Tie Down Brackets for Shipping
- Jeep Style Fenders
- Durable Two Part Catalyzed Epoxy Paint Finish

Design Options:

- Single or Double Wall Tank Integral to Trailer
- Hydraulic Surge Brakes
- Spare Tire With Mounting Bracket
- Cable/Storage Box, Lockable
- Bolt-On Fenders
- Drop or Torsion Axles
- Wheel Chocks
- LED Lighting Package
- Powder Coat Finish
- Galvanneal Construction
- Single Point Lift
- Two (2) Adjustable Front Stabilizing Jacks
- Power Distribution Center
- Diamond Plate Accessories

Blue Star Power Systems, Inc. offers trailer designs according to the gross vehicle weight. Blue Star Power Systems, Inc.'s flexibility allows for custom designed trailers to fit almost any unique specification or requirement. All trailers meet DOT requirements. Trailer option voids UL 2200 Listing and CSA Certification.

Available Models

Model	Number of Axles	Gross Vehicle Weight Rating
T7000-2	Two	7000 lbs.
T10000-2	Two	10000 lbs.
T12000-2	Two	12000 lbs.
T16000-2	Two	16000 lbs.
T20000-2	Two	20000 lbs.
T30000-3	Three	30000 lbs.

Unit with Level 1 enclosure mounted on tandem axle trailer equipped with front storage option.

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Engine Generator Set One (1) Year
1500 Hour Prime Power 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 Installation and Operating Manuals. 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 one (1) year from the date of factory invoice or 1500 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 1500 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. at the time of start-up. The warranty will not be effective unless a copy of the Blue Star Power Systems Inc. start-up validation checklist is properly and completely filled out and returned to Blue Star Power Systems Inc. within 30 days of start-up. 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., Attention: Service Department (see contact information below).

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.

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.

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:

- 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: Consumable items such as belts, filters and hoses.
- Adjustments and tune–ups performed during start-up or thereafter.
- Loose connections (electrical and mechanical) not found during start-up.
- All fluid level related items including low coolant not found during start-up or checked during regular maintenance intervals.
- Equipment modifications made without the written consent of Blue Star Power Systems Inc. will void all warranties.
- Shipping damage of any type. All equipment is shipped F.O.B. factory 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 during shipment, Blue Star Power Systems Inc. will not warrant any damage to the unit resulting from shrink wrap.
- Any special access fees, requirements or after hours scheduling to gain access to the equipment for warranty service purposes.
- Buyer requested rental generators used while warranty work is being performed.
- 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.
- Use of non-protected steel enclosure within 10 miles of the coast.
- Improper installation or operation as outlined in the Installation and Operation Manuals.
- Misapplication of the equipment such as usage outside the original design parameters as stated on the nameplate of the equipment.
- Diesel engine "Wet Stacking" due to lightly loaded diesel engines.
- All travel labor and mileage on portable equipment must be approved before any work is performed.

Terms of warranty shall be deemed made and executed in Lake Crystal, Blue Earth County, Minnesota. Venue for all legal proceedings shall be in Blue Earth County, Minnesota.