

MID FLORIDA DIESEL



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Bill of Material For Florida Sheriff Association Item #116 - 150KW MOBILE GENERATOR PACKAGE

Mid Florida Diesel submits the following proposal for the project: Blue Star Trailer Mounted 150 KW DIESEL GENERATOR

Blue Star MODEL: (Qty - 1) – VD150-02FT4 Trailer

GENERATOR: 150 kW, 187 kVA
VOLTAGE: 4-Position Voltage Selector Switch
208,240,480 Volts Three-Phase & 120/240 Single Phase
ENGINE: Volvo TAD572VE, Diesel Enclosed, 60 Hz, 1800 RPM

Standard Features Included:

Microprocessor based, digital readout control system.
Engine vitals monitored by LCD display: Oil pressure, Running time, Engine temperature, Safety shutdowns (HWT, OC, OS, OP, LWL), Battery voltage, Generator AC voltage, AC amperage, Frequency.
Additional Features: Oil drain extension, Battery with rack & cable, Battery Charger, Critical muffler, Vibration isolation pads, Water heater, Fuel solenoid valve

Selected Model Features Included:

130 degree rise
Isochronous Governor + / - .25%
UL2200 Approved
EPA Tier III Certified

CONTROL PANEL:

DGC-2020 Control Panel (Expanded)

The expanded Digital Genset Controller (DGC-2020) utilizes microprocessor based technology to provide a versatile system for genset control, protection, monitoring and event logging. The DGC-2020 expanded model with standard LCD heater includes touch screen password protected programming capabilities and a standard USB communications port for re-programming and simple loading of software upgrades. This version is equipped with generator metering, engine monitoring, genset control, engine protection, generator protection (27, 59, 81O, 81U), BESTCOMSPlus PC software, automatic transfer switch control, suitable for use on rental gensets with Hi/Lo line sensing or Single or three phase sensing override, SAE J1939 Engine ECU communications, multilingual capability, remote communications to the KRDP-110 Remote Annunciator, 16 programmable contact

inputs, 15 contact outputs (3- 30A dc and 12 programmable 2 A dc), UL recognized, CSA certified, CE approved, HALT (Highly Accelerated Life Tests) tested, IP 54 Front Panel rating with integrated gasket, NFPA110 Level Compatible.

Accessories:

4-Position Voltage Selector Switch
Critical Low Fuel
Voltage Adjust Rheostat (switch)
ATS hook-up -Two Thumb screw type connections
Control Panel Battery Disconnect Switch
E-Stop on controller

COOLING SYSTEM:

Unit Mounted Radiator

Accessories:

Low Coolant Level Shutdown
Plumbed to bulkhead fitting at base and extended to skid base

CIRCUIT BREAKER:

600 Amp, Three Phase Circuit Breaker Mounted (Qty: 1)
Circuit Breaker - UL listed and CSA certified (80% rated) (Qty: 1)

Accessories:

Shunt Trip

BATTERY:

Lead Acid Battery, with rack

BLOCK HEATER: 2000 watt, 240VAC

-20F w/ Isolation valves

Included Accessories:

Mounted and Wired to Terminal Strip

VIBRATION ISOLATION:

Vibration Pads Isolator

BATTERY CHARGER:

NRG 12v-6A

Accessories:

Mount Battery Charger and Wire DC (1)

ENCLOSURE: Level III (Sound Attenuated) Weather Protective Enclosure- (67-69dba)

Powder Coated 14 Gauge Steel
Punched Intake with Baffle and Punched Exhaust Openings
Pitched Roof for Increased Structural Integrity and Improved Watershed
Lockable Handles Keyed Alike on Hinged Side and Rear Doors
Formed Steel Base with Mounting and Lifting Holes
Includes Vibration Mounts to Isolate Unit from Base Rail

Included Accessories:

Level 3 (SAE) with Exhaust Chamber 1.5" Thick Polydamp Type D Acoustical Foam (PAF)
A five point connection shall be provided for ease of connection of load leads
One 50amp, 120/240vac, 1 ph, twist lock receptacle
One 30amp, 120/240vac, 1 ph, RV type receptacle
Two 20amp, 120/240vac, 1 ph, duplex receptacle
Two 20amp, 120/240vac, 1ph, duplex GFI receptacle
Each receptacle is to be protected by a individual circuit breaker
Shore Power- receptacles provided to power both the jacket water heater and on board battery charger

MUFFLER:

Critical Grade Muffler Mounted inside enclosure

Included Accessories:**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:**MISCELLANEOUS:**

Oil drain plumbed to bulkhead fitting and extended to skid base
Paint – White
Testing - Standard Commercial Test
Manual One (1) Instruction Manual
Two (2) Year / 2000 Hour Limited Warranty
Test Acceptance Run by Factory Trained Representative

BLUE ST★R

Power Systems Inc.

Engineering Submittal

8/25/2020

Project Title	VD150-02FT4
Quote Number:	0044773-0
Model:	VD150-02FT4MP



Mid Florida Diesel
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- MC Series Circuit Breakers
- TPS Series Block Heaters
- Duralite Air Cleaner Single Stage
- Restriction Indicators
- Industrial Gen-Set Batteries
- Gen-Set Trailers
- 2yr 2000hr limited warranty

BLUE STAR

Power Systems Inc.

Quote Date: 8/28/2019 Spec#107
Quote Number: VD150-02FT4
Project Title: Mid Florida Diesel
Prepared for

Unit Model	VD150-02FT4MP	Standby / Prime	Mobile Standby Power
kWe Rating	150 kWe	UL 2200 Listed	No
Fuel	Diesel	CSA Approved	No
EPA	Tier 4 Final	Paint Color	White

Engine Model: Volvo TAD871VE 150W Standby Power Rating at 1800 RPM
Governor - Electronic Isochronous

Voltage: Multi-Voltage With 4 Position Selector Switch
480/277V 3 PH, 208/120V 3 PH, 240/120V 3 PH and 240/120V 1 PH

Gen Model: Marathon 431CSL6206 12 Lead 3 PH/1 PH Selectable 105°C Rise Over 40°C Ambient

Voltage Regulator: Marathon DVR2500 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), 15 Contact Outputs, RS-485 Communications, Control Panel Battery Disconn

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

Unit Color: White

Enclosure: Level 3 (Sound Attenuated Enclosure) Powder Coated 14 Gauge Steel
Rugged and Durable 200 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)
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 and Exhaust Hood

Enclosure Options: Load Distribution Center Wired to Receptacles Package
Includes: 2-50A 208/240VAC and 1-30A 208/240VAC, 2-20A 139/120VAC Receptacles

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: 600 Amp 3 Pole 600 Volt Breaker Mounted & Wired to Cam-Lok Receptacle Package
24VDC Shunt Trip Wired to Engine Shutdowns

Jacket Water Heater: Engine Block Heater 2500W 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

BLUE STAR

Power Systems Inc.

Diesel Product Line

208-600 Volt

VD150-02FT4

60 Hz / 1800 RPM

150 kWe / 150 kWe

Standby / Prime

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	431CSL6206	431CSL6204	431CSL6204	431CSL6204	431PSL6242
Connection	12 LEAD ZIG-ZAG	12 LEAD WYE	12 LEAD DELTA	12 LEAD WYE	4 LEAD WYE
Standby					
kWe	150	150	150	150	150
AMPS	625	521	452	226	181
Temp Rise	105°C / 40°C	105°C / 40°C	105°C / 40°C	105°C / 40°C	105°C / 40°C
Prime					
kWe	150	150	150	150	150
AMPS	625	521	452	226	181
Temp Rise	105°C / 40°C	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 2018
- ▶ NFPA 110 Compliant

Generator

- ▶ Brushless Single Bearing
- ▶ Automatic Voltage Regulator
- ▶ ± 1% Voltage Regulation
- ▶ 4 Pole, Rotating Field
- ▶ 105°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 - Formed Steel
- ▶ Main Line Circuit Breaker Mounted & Wired
- ▶ SCR Catalyst / Silencer Mounted
- ▶ Battery Charger 24V 5 Amp
- ▶ Jacket Water Heater -20°F 2500W 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

150 kWe / 150 kWe



Application Data

Engine		
Manufacturer:	Volvo Penta	Displacement - Cu. In. (lit): 470 (7.70)
Model:	TAD871VE	Bore - in. (cm) x Stroke - in. (cm): 4.33(11.0) x 5.31 (13.5)
Type:	4-Cycle	Compression Ratio: 17.5:1
Aspiration:	Turbo Charged, CAC	Rated RPM: 1800
Cylinder Arrangement:	6 Cylinder Inline	Max HP Stby (kWm): 252 (185)

Exhaust System	Standby	Prime
Gas Temp. (Stack): °F (°C)	709 (376)	709 (376)
Gas Volume at Stack Temp: CFM (m³/min)	886 (25.1)	886 (25.1)
Maximum Allowable Exhaust Restriction (Post SCR Cat.): in. H ₂ O (kPa)	32.0 (8.00)	32.0 (8.00)

Cooling System		
Ambient Capacity of Radiator: °F (°C)	131 (55.0)	131 (55.0)
Maximum Allowable Static Pressure on Rad. Exhaust: in. H ₂ O (kPa)	0.50 (0.12)	0.50 (0.12)
Water Pump Flow Rate: GPM (lit/min)	123 (465)	123 (465)
Heat Rejection to Coolant: BTUM (kW)	7,285 (128)	7,285 (128)
Heat Rejection to CAC: BTUM (kW)	1,666 (29.3)	1,666 (29.3)
Heat Radiated to Ambient: BTUM (kW)	2,135 (37.4)	2,135 (37.4)

Air Requirements		
Aspirating: CFM (m³/min)	445 (12.6)	445 (12.6)
Air Flow Required for Rad. Cooled Unit: CFM (m³/min)	16,961 (480)	16,961 (480)
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)	11.5 (43.5)	11.5 (43.5)
At 75% of Power Rating: gal/hr (lit/hr)	9.62 (36.4)	9.62 (36.4)
At 50% of Power Rating: gal/hr (lit/hr)	6.81 (25.8)	6.81 (25.8)
DEF Consumption (% of fuel consumption)	± 6.00%	± 6.00%

Fluids Capacity		
Total Oil System: gal (lit)	7.13 (27.0)	7.13 (27.0)
Engine Jacket Water Capacity: gal (lit)	4.50 (17.0)	4.50 (17.0)
System Coolant Capacity: gal (lit)	11.6 (43.9)	11.6 (43.9)
DEF Tank Capacity: gal (lit)	18.5 (70.0)	18.5 (70.0)

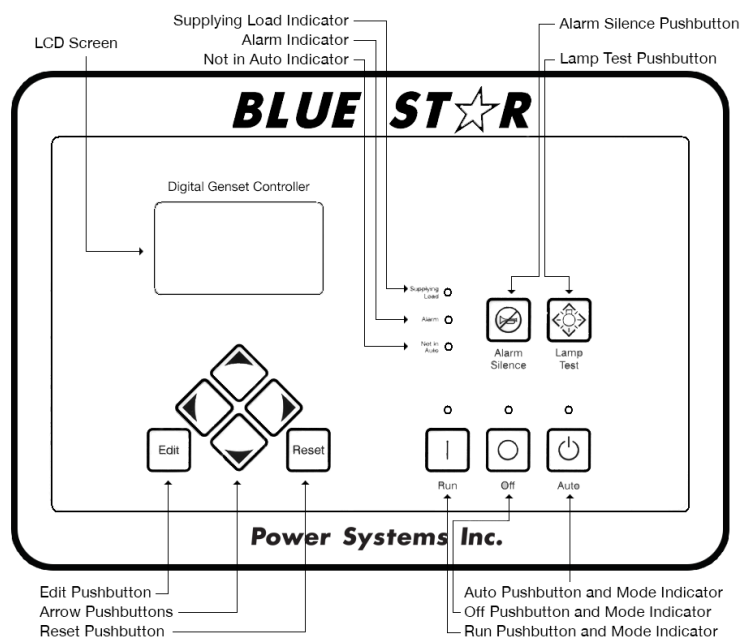
Deration Factors

Rated Power is available up to 4,921 Ft (1500m) at ambient temperatures to 122°F (50°C) standby and prime.
Consult factory for site conditions above these parameters.

DGC-2020 Control Panel

Standard Features

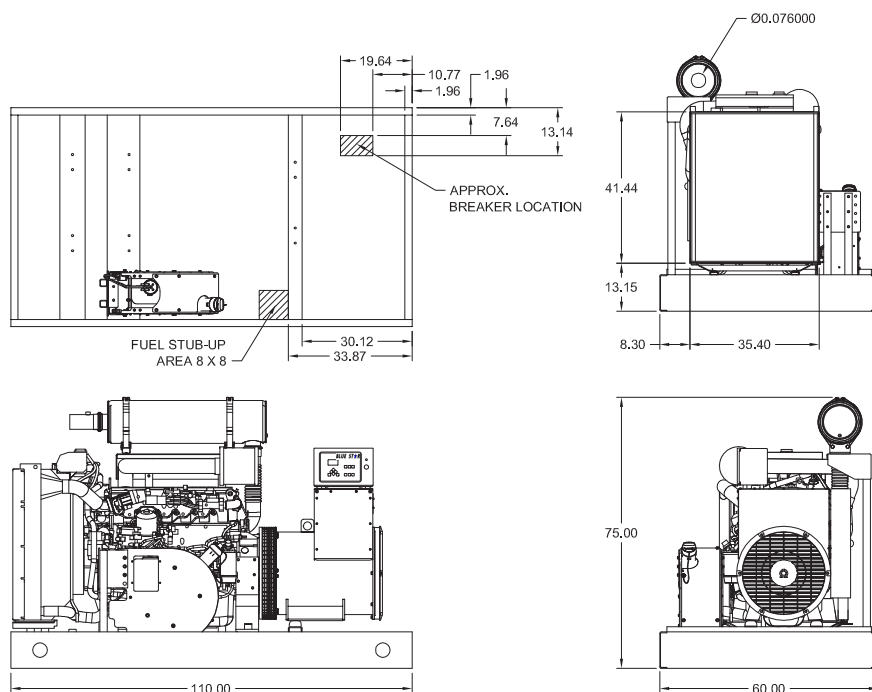
- ▶ Digital Metering
- ▶ Engine Parameters
- ▶ Generator Protection Functions
- ▶ Engine Protection
- ▶ CAN Bus ECU Communications
- ▶ Windows-Based Software
- ▶ Multilingual Capability
- ▶ Remote Communications to RDP-110 Remote Annunciator
- ▶ 16 Programmable Contact Inputs
- ▶ Up to 15 Contact Outputs (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	110 x 60 x 75 in	4,525
Level 1	134 x 60 x 82 in	5,450
Level 2	134 x 60 x 82 in	5,500
Level 3	174 x 60 x 82 in	5,775

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



	No Load	Full Load
OPU	79 dBA	82 dBA
Level 1	75 dBA	78 dBA
Level 2	71 dBA	74 dBA
Level 3	67 dBA	69 dBA

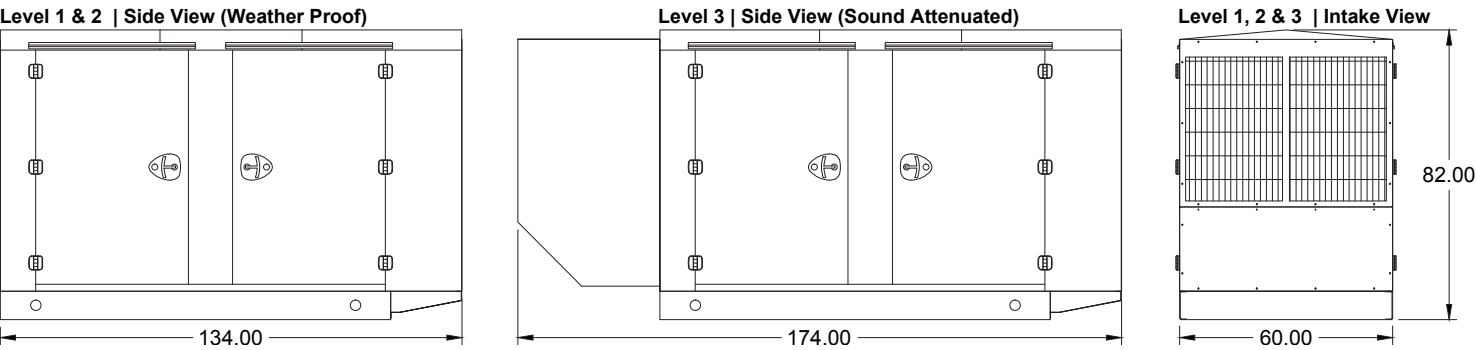
Drawings based on standard open power 480 volt standby generator. Lengths may vary with other voltages. Subject to change without notice.
Sound data as measured at 23 feet (7 meters) in accordance with ISO 8528-10 at standby rating.

Diesel Product Line

150 kW_e / 150 kW_e



Enclosures



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 375 Gallon	48 Hour 750 Gallon	72 Hour 1125 Gallon
A	110.00	120.00	168.00
B	60.00	60.00	60.00
C	22.00	36.00	36.00

Not Included

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.




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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 penalties as described in the Clean Air Act.

General

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

Number of cylinders			6
Displacement, total		liters in ³	7,70 470
Firing order			1-4-2-6-3-5
Bore		mm in	110 4,33
Stroke		mm in	135 5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg	737
		lb	1625
	Power pac	kg	947
		lb	2088

Performance

				rpm	1500	1800	2000	2200
ICFN Power	185 kW	without fan		kW	181	185	185	185
				hp	246	252	252	252
		with fan 650 mm pull		kW	172	169	166	161
				hp	234	230	225	219
Torque at:		ICFN Power 185 kW		Nm	1150	982	884	803
				lbf ft	848	724	652	592
Max torque at engine speed	ICFN Power		1200 rpm	Nm lbf ft	1160 856			
Power tolerance				%	±3			
Mean piston speed				m/s ft/sec	6,8 22,1	8,1 26,6	9,0 29,5	9,9 32,5
Effective mean pressure at:		ICFN Power 185 kW		MPa psi	1,88 273	1,60 232	1,44 209	1,31 190
Total mass moment of inertia, J (mR ²) (not including flywheel)				kgm ² lbft ²	0,398 9,4			
Friction Power				kW hp	17 23	23 31	29 39	35 48
Derating see Technical Diagrams								

Engine brake performance (only engines with engine brake)

Engine brake performance (only engines with engine brake)		rpm	1500	2200	2500	2800
Brake power:	without fan	kW	70	121	145	170
		hp	95	165	197	231
Brake torque:	without fan	Nm	448	524	555	580
		lbf ft	330	386	409	428
Engine speed range for engine brake activation:		rpm	900-2800			
Min engine speed with engine brake still active:		rpm	900			
Min oil temperature for engine brake activation:		°C	55			

Cold start performance

*Cold start limit temperature	without starting aid	°C	-15			
		°F	5			
	with manifold heater 4 kW	°C	-30			
		°F	-22			
	with manifold heater 4 kW and block heater	°C	-35			
		°F	-31			
*Specify oil quality	Above -15°C; 15W40 Above -25°C; 10W30 Below -25°C; 5W30					
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block		
	Volvo	1,5				

* See also general section in the sales guide




Lubrication system

Lubricating oil consumption (average)		Vol%	0,05			
Oil system capacity including filters		liter	27			
		US gal	7,13			
Oil pan capacity:	Max	liter	24			
		US gal	6,34			
	Min	liter	19			
		US gal	5,02			
Oil change intervals/specifications	VDS4	h	500			
		h				
Engine angularity limits:	front up	°	40			
	front down	°	45			
	side tilt	°	40			
Oil pressure at rated power		kPa	425			
		psi	62			

Lubrication system

Lubrication oil temperature in sump:	max	°C	125			
		°F	257			
Oil filtration efficiency (in accordance with ISO 4548-12)	97%	μ	36			
	50%	μ	14			



Fuel system		rpm	1500	1800	2000	2200
Urea consumption (vol% of diesel consumption)		vol%	6%			
Fuel to conform to			EU EN590 US D975, 1-D and 2-D (Max 15ppm sulphur and 7% FAME)			
System supply flow at max. speed		liter/h US gal/h	122 32,2			
Fuel supply line max. restriction (Measured at fuel inlet connection)		kPa psi	25 3,6			
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)		kPa psi	20 2,9			
System return flow at max. speed		liter/h US gal/h	60,0 15,9			
Fuel return line max. restriction (Measured at fuel return connection)		kPa psi	15 2,2			
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	80 176			
Prefilter / Water separator filtration efficiency	99%	μ	30			
Main fuel filter filtration efficiency (in accordance with ISO 19438)	98%	μ	5			
	96%	μ	4			
Governor type/make, standard		Volvo/ EMS 2.3				
Injection pump type/make		Denso HP4				

Intake and exhaust system		Inlet air temp	rpm	1500	1800	2000	2200
Charge air consumption at: (+25°C and 100kPa)	ICFN Power 185 kW	25°C 77°F	m³/min cfm	11,6 410	12,6 445	14,4 509	15,2 537
 See front page for important information							
Max allowable air intake restriction including piping			kPa psi	6 0,9			
Heat rejection to exhaust at:	ICFN Power 185 kW	kW BTU/min		90 5135	99 5653	108,6 6176	118,7 6750
Exhaust gas temperature after turbine at:	ICFN Power 185 kW	°C °F		371 700	376 709	362 684	374 705
 See front page for important information							
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 102 mm			kPa psi	15 2,2	17 2,5	20 2,9	22 3,2
 See front page for important information							
Max allowable temperature drop between turbine and SCR muffler inlet.			Δ°C Δ°F	15 27			
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)			kPa psi	10 1,5	11 1,6	13 1,9	14 2,0
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 185 kW	m³/min cfm		23,4 826	25,1 886	27,3 964	28,9 1021

Cooling system

Cooling system		rpm	1500	1800	2000	2200	
Heat rejection radiation from engine at:		ICFN Power 185 kW	kW BTU/min	5 307	5 290	4,8 273	5,2 296
Heat rejection to coolant at:		ICFN Power 185 kW	kW BTU/min	116 6585	123 6995	124 7040	133 7581
Radiator cooling system type				Closed circuit			
Standard radiator core area		ICFN Power 185 kW	m² foot²	0,6 6,46			
Fan diameter	650 mm	ICFN Power 185 kW	mm in	650 25,59			
Fan power consumption	650 mm pull		kW hp	9,3 13	15,8 21	19,3 26	23,9 33
Fan drive ratio	fan Ø650			1.4:1			
Coolant capacity:	engine		liter US gal	17 4,5			
	engine + standard radiator, hoses and expansion tank		liter US gal	51 13,5			
	Coolant pump		drive/ratio	belt/1,40:1			
Coolant flow with standard system			l/s US gal/s	5,4 1,4	6,5 1,7	7,2 1,9	8,0 2,1
Minimum coolant flow			l/s US gal/s				6,0 1,6
Maximum outer circuit restriction incl. piping			kPa psi	40,0 5,8			
Thermostat:	start to open		°C °F	85 185			
		fully open		°C °F	95 203		
	Maximum static pressure head (expansion tank height + pressure cap setting)		kPa psi	85 12,3			
	Minimum static pressure head (expansion tank height + pressure cap setting)			kPa psi	75 10,9		
Standard pressure cap setting			kPa psi	75 10,9			
Maximum top tank temperature			°C °F	107 225			
Recommended Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still are functioning			liter US gal	2 0,5			

Charge air cooler system

		rpm	1500	1800	2000	2200
Heat rejection to charge air cooler	ICFN Power 185 kW	kW	29,8	29,3	33,8	35,5
		BTU/min	1695	1666	1922	2019
Charge air mass flow	ICFN Power 185 kW	kg/s	0,229	0,249	0,285	0,3
Charge air inlet temp.	ICFN Power 185 kW	°C	178	166	168	167
(Charge air temp after turbo compressor)		°F	352	331	334	333
						
See front page for important information						
Max allowable Charge air outlet temp.		°C	49	49	50	50
(Charge air temp after charge air cooler)		°F	120	120	122	122
						
See front page for important information						
Maximum pressure drop over charge air cooler incl. piping		kPa	7	9	11	12
		psi	1,02	1,31	1,60	1,74
Charge air pressure		kPa	203	182	180	174
(After charge air cooler)		psi	29,44	26,40	26,11	25,24
Standard charge air cooler core area		m²	0,5			
		foot²	5,38			

Cooling performance: 0,6 m² radiator and 650mm fan, pull

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

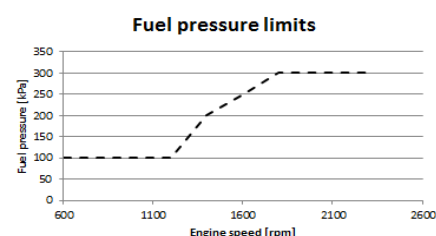
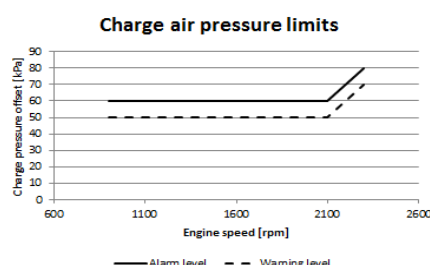
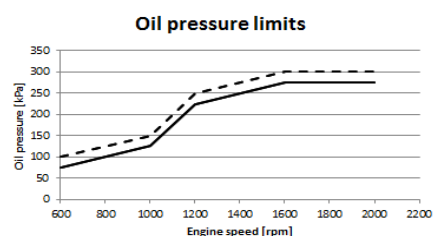
		ICFN Power 185 kW					
Engine speed	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m³/s	ft³/s	Pa	psi
1500	181 246	62	143	7,4	261,3	0	
		61	141	7,2	254,3	100	0,015
		58	137	6,7	236,6	200	0,029
		54	130	6,1	215,4	300	0,044
2200	185 252	63	146	9,4	332,0	0	
		63	145	9,3	328,4	100	0,015
		62	144	9	317,8	200	0,029
		61	141	8,6	303,7	300	0,044

Engine management system

Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	125	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	800	rpm	600
Stop function				Replaced by "Ignition of stop engine"
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Lamp test				No lamp test, not used any longer
Ignition of stop engine	Yes	No		No

Engine sensors and switch settings		Alarm level		Engine protection	
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp	°C		125	125	Derate/Shut down
Oil pressure	Low idle		75,0	75	Shut down.
	Rated speed		275	275	Shut down.
Oil level			Low level		
Coolant temp	°C		107	107	Derate/Shut down
Coolant level		See cooling system	On	Low level	Derate/Shut down
Fuel feed pressure	Low idle		100		
	Rated speed		300		
Water in fuel			Alarm when closed		
EGR temp	°C		210	210	Derate/Shut down
Air filter pressure drop			5kPa		
Altitude, above sea	m			700	Automatic derating, see section derating
Charge air temp	°C		85	85	Derate/Shut down
Charge air pressure	kPa		Alarm map value	Alarm map value	Derate/Shut down
SCR temp	°C		515	515	Derate

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after 5 sec	Forced shut down after 0 sec
Coolant temp	102°C	107°C	107°C	112°C		
Oil temp	120°C	125°C	125°C	130°C		
Low oil pressure	Warning map value	Alarm map value				Alarm map value
High charge air temp	80°C	85°C	85°C	90°C		
High charge air pressure	Warning map value	Alarm map value		Alarm map value		
EGR temp	200°C	210°C	210°C	220°C		



Electrical system

Voltage and type			24V
Alternator:	make		MELCO
	output	A	110/130
	tacho output	Hz/alternator rev.	
	drive ratio		
Starter motor:	make		MELCO
	type		85P50/90P55
	output	kW hp	5 / 5.5 6.8 / 7.5
Number of teeth on:	flywheel		137
	starter motor		10 / 12 teeth
Inlet manifold heater (at 20 V)		kW	4
Power relay for the manifold heater		A	200

Conditions: (5 mΩ main circuit resistance@ 20°C)	Temperature	°C		25	0	-15
	Battery	Ah / CCA		140/800	140/800	140/800
Crank speed		rpm		185	160	120
Crank current		A		220	300	470
Starter input power during crank		kW		4,91	5,90	6,94
Battery power during crank		kW		5,15	6,31	7,50
Min battery @ 0°C		Ah / CCA				

Power take off		rpm	1400	1800	2000	2200
Front end in line with crank shaft max:*	0.02 kgm ²	Nm lbf ft	1064,0 785	743,0 548	740 546	833 614
	0.03 kgm ²	Nm lbf ft	1030,0 760	706,0 521	697 514	786 580
	0.04 kgm ²	Nm lbf ft	996,0 735	663,0 489	654 482	729 538
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW hp	45,0 61	57,9 79	64,3 87	70,7 96
	max down	kW hp	45,0 61	58,0 79	64,3 87	70,7 96
	max right	kW hp	21,1 29	27,2 37	30,2 41	33,2 45
Maximum power on Rear PTO on top of flywheel housing(REPTO):*		kW hp	75 102			
Speed ratio direction of rotation viewed from flywheel side			1:1 Counter clockwise			
Maximum torque on PTO at compressor position:*		Nm lbf ft	200 148			
Speed ratio direction of rotation viewed from flywheel side			1.026:1 Counter clockwise			
Timing gear at hydraulic pump PTO max:*		Nm lbf ft	80 59			
Speed ratio direction of rotation viewed from flywheel side			1.3:1 Clockwise			
Max allowed bending moment in flywheel housing SAE2		Nm lbf ft	4600 3393			
Max. rear main bearing load		N lbf	4250 955,4			

* Maximum allowed torque at individual PTO's.

If more then one PTO output is used simultaniusly, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

Performance	Power (kW)	Rpm
ICFN Power	185	2200

Sensors Alarm	Signal	Range	Alarm switch	Alarm Level	Derating level	Condition/Delay	Derating
Boost pressure	0,5-4,5 V	50 - 500 kPa	N/A	Alarm map value	Warning map value		Yes 100% of Eng_prot_map
Boost temperaure	50-0 kΩ	-40° - 130 °C	N/A	85°C	85°C		See soft derate 3
Coolant level switch	Digital		Alarm when closed	Low	Low		Yes 100% of Eng_prot_map
Coolant temperature	50-0 kΩ	-40° - 140 °C	N/A	107°C	107°C		See soft derate 1
Engine Speed Cam	Frequency	0-4000 rpm	N/A	Lost sign			
Engine Speed Crank	Frequency	0-4000 rpm	N/A	Lost sign			
EGR gas temp	0-0.8 kΩ	-40 - 850°C	N/A	210°C	210°C		See soft derate 4
Oil level sensor			N/A	Low level	N/A		
Oil temperature	50-0 kΩ	-40° - 140 °C	N/A	125°C	125°C		See soft derate 2
Water In fuel switch	Digital		Alarm when closed	Water in Fuel			

VOLVO PENTA TAD871VE 185kW/2200rpm	Document No 22341444	Issue Index 08
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Sensors Alarm	Signal	Range	rpm Map					Condition	Derating
Fuel pressure	0,5-4,5 V	0-700 kPa	0 rpm	600 rpm	1000 rpm	1800 rpm	1900 rpm		
Warning Level			0	100	100	300	300		
Alarm Level			N/A	N/A	N/A	N/A	N/A		
Oil pressure	0,5-4,5 V	0-700 kPa	550 rpm	600 rpm	1000 rpm	1200 rpm	1600 rpm		
Warning Level			-50	100	150	250	300		
Alarm Level			-75	75	125	225	275		Engine shutdown

Remarks

1) Soft derate Coolant temp	Speed / °C	107°C	109.5°C	112°C	
Remaining torque in %	600	100%	88%	77%	
	1500	100%	80%	61%	
	2200	100%	88%	76%	

2) Soft derate Oil temp	Speed / °C	125°C	127.5°C	130°C	
Remaining torque in %	600	100%	88%	77%	
	1500	100%	80%	61%	
	2200	100%	88%	76%	

3) Soft derate Boost Temp	Speed / °C	85°C	87.5°C	90°C	
Remaining torque in %	600	100%	88%	77%	
	1500	100%	80%	61%	
	2200	100%	88%	76%	

4) Soft derate EGR temp	Speed / °C	210°C	215°C	220°C	
Remaining torque in %	600	100%	88%	77%	
	1200	100%	80%	61%	
	1800	100%	88%	76%	

Max Torque High Map R2	600	700	900	1000	1100	1200	1300	1400	1450	1500	1600	[rpm]
	653	750	1000	1100	1150	1160	1150	1150	1150	1150	1100	[Nm]
	1700	1750	1900	2000	2100	2200	2300	2400	2500			[rpm]
	1040	1011	930	884	842	803	536	268	0			[Nm]

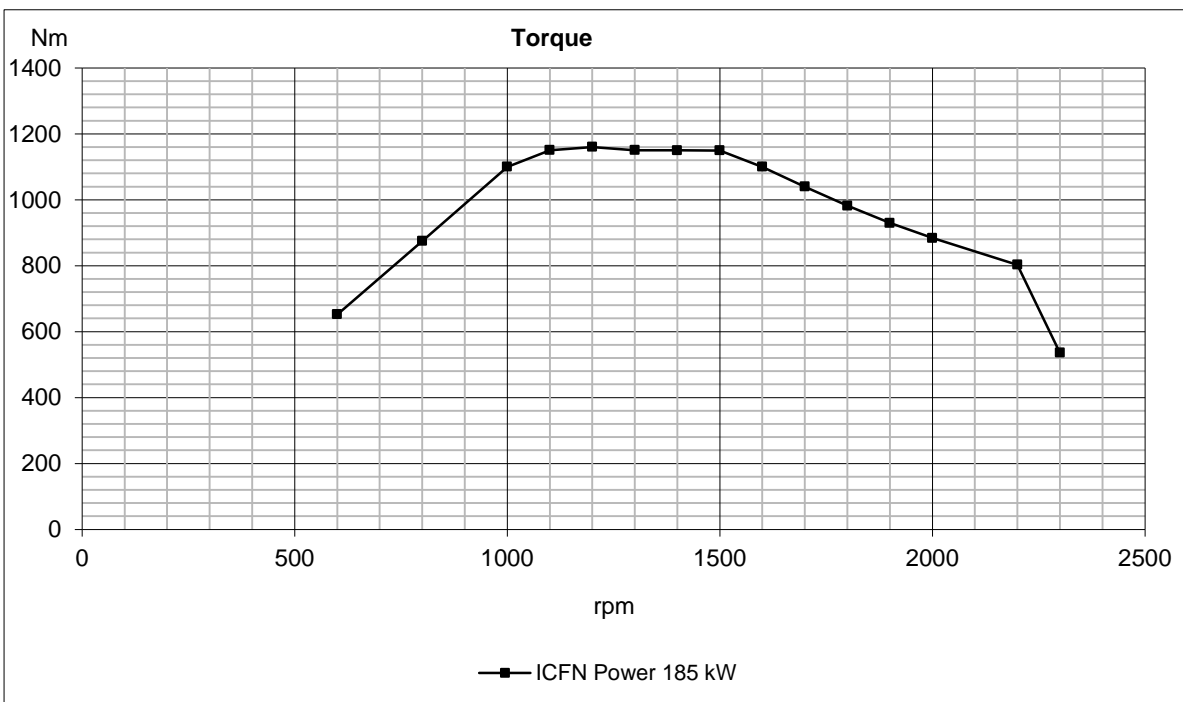
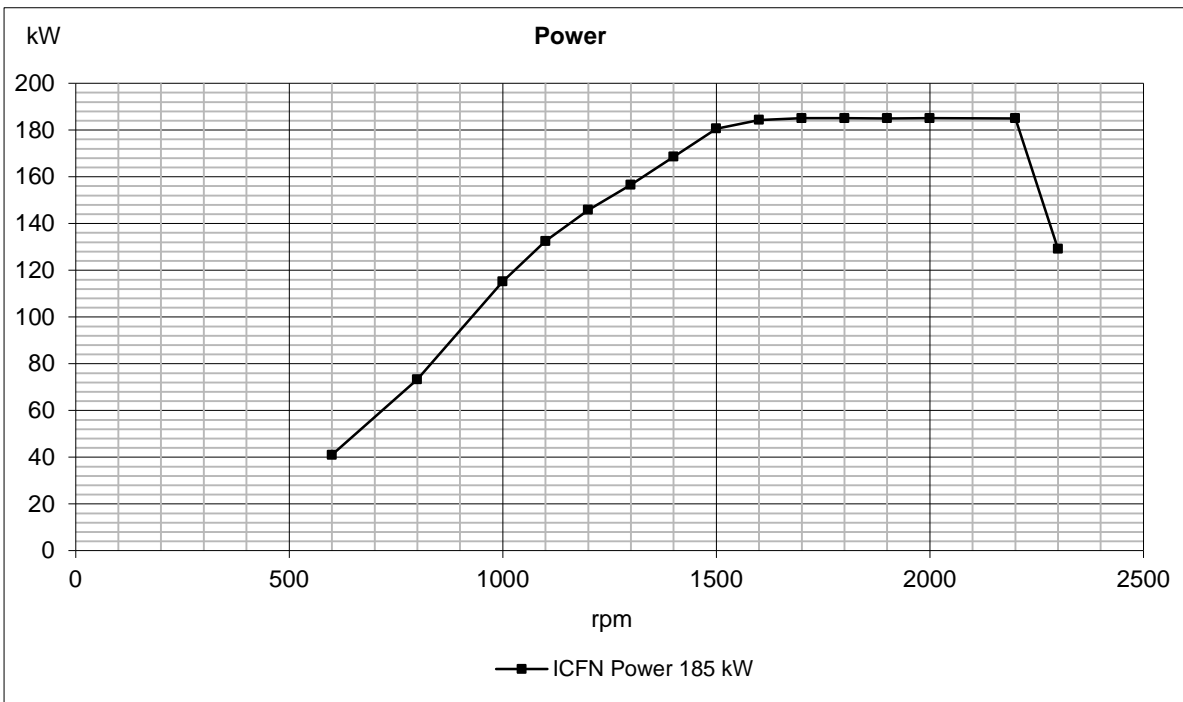
Max Torque Engine Protection Map R2	600	800	900	1000	1100	1200	1600	1700	1900	2000	2100	2200	[rpm]
	500	545	580	620	660	700	700	685	655	640	625	610	[Nm]

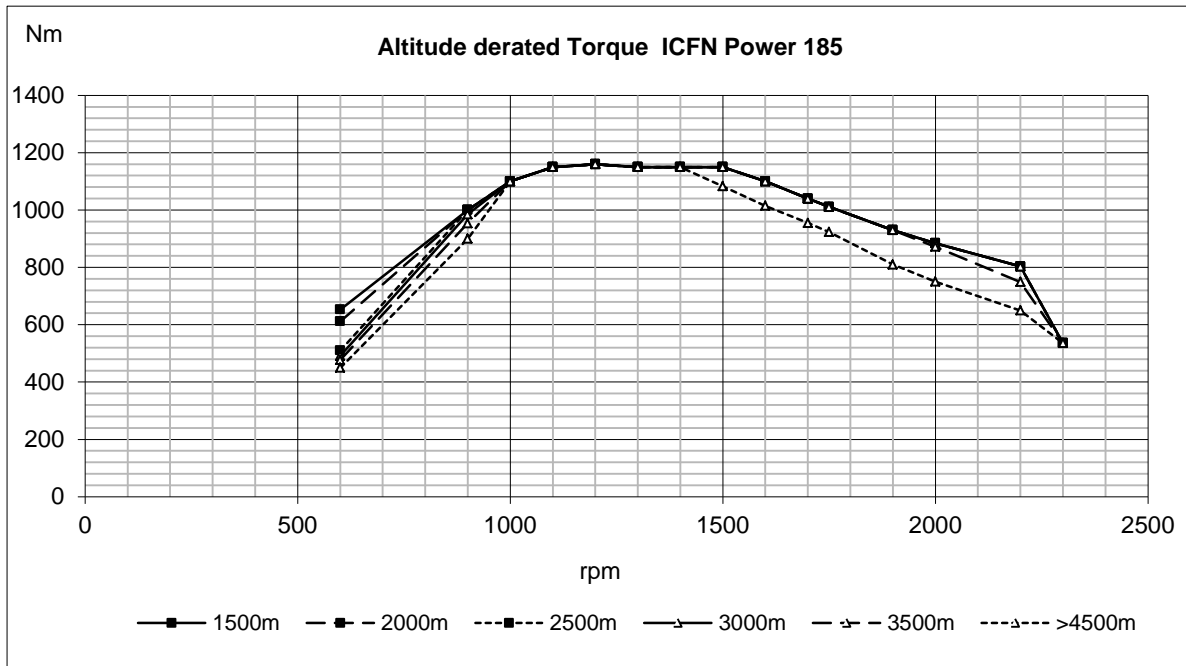
Derate map R2				
°C	107	109,5	112	
%	0	50	100	

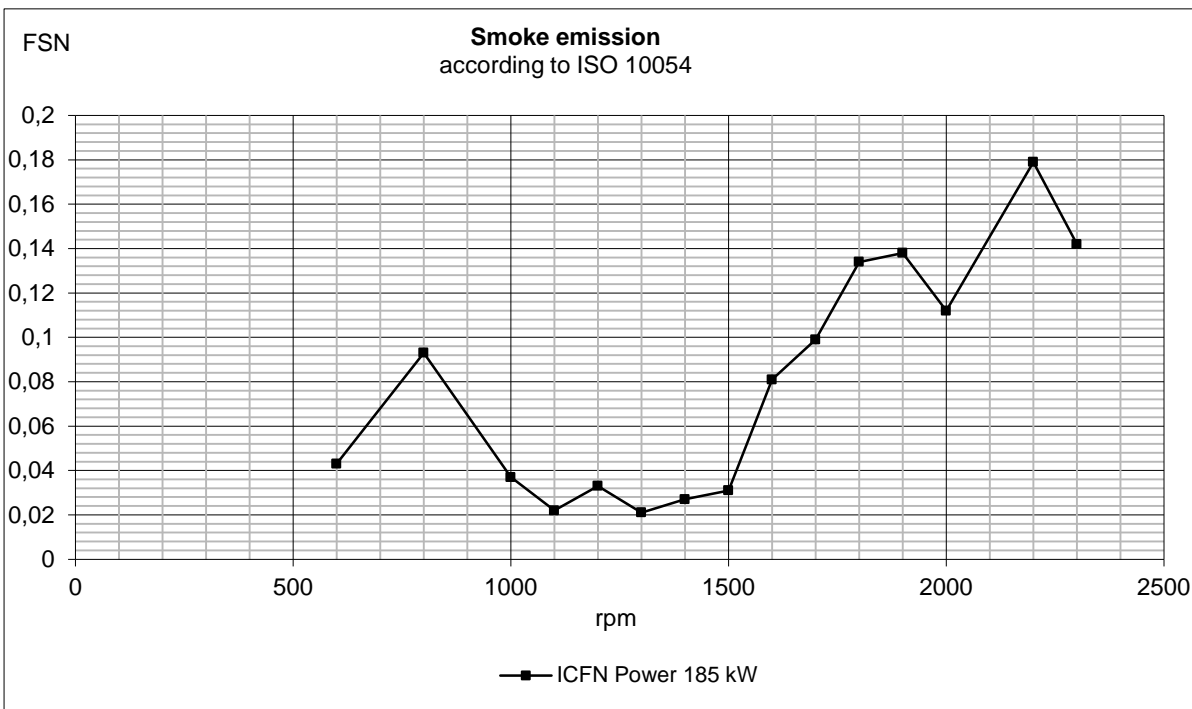
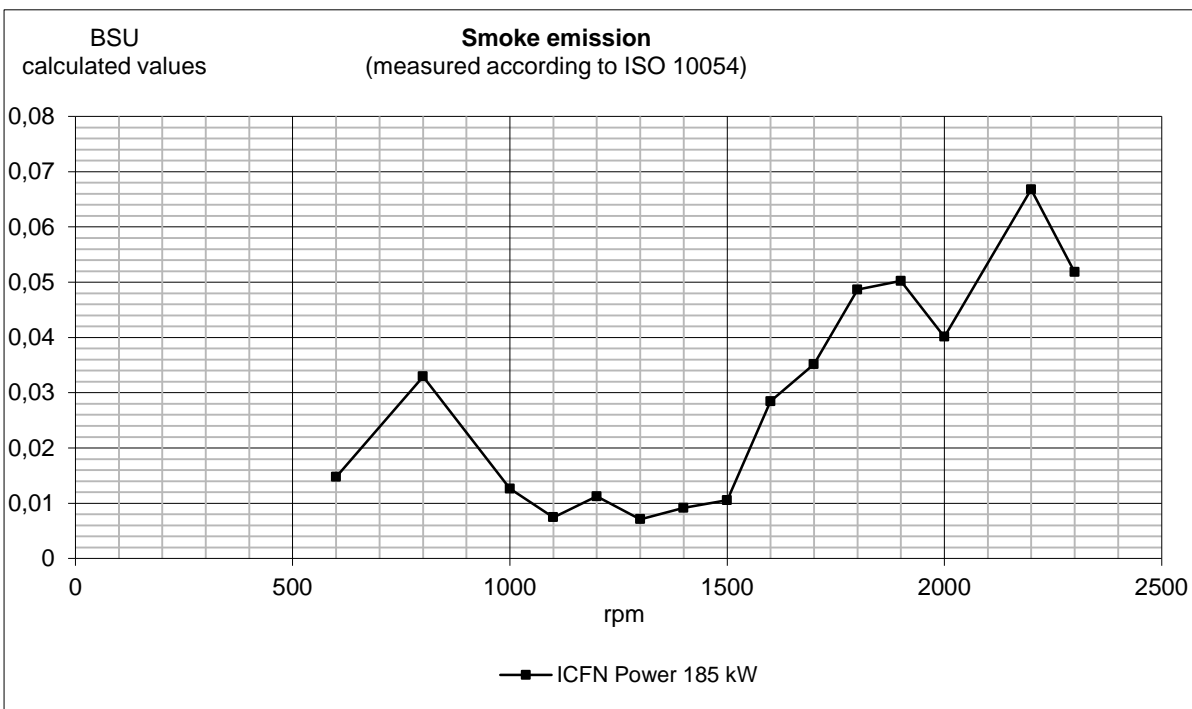
Derate map R2				
°C	125	127,5	130	
%	0	50	100	

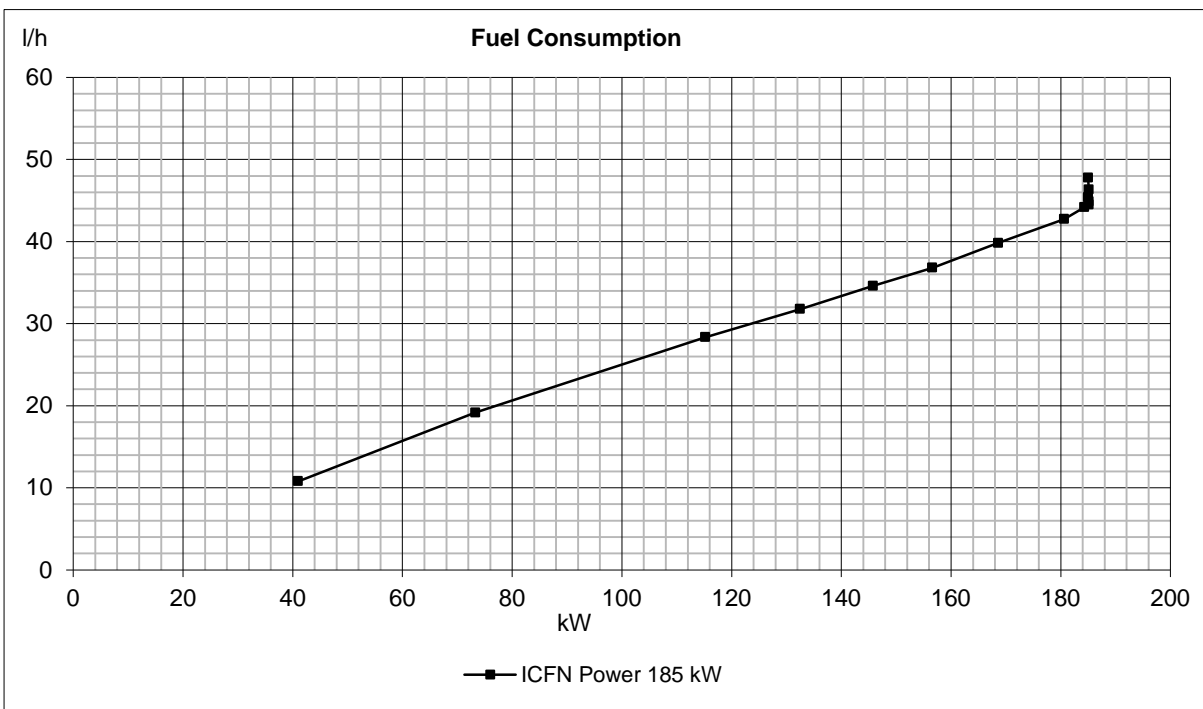
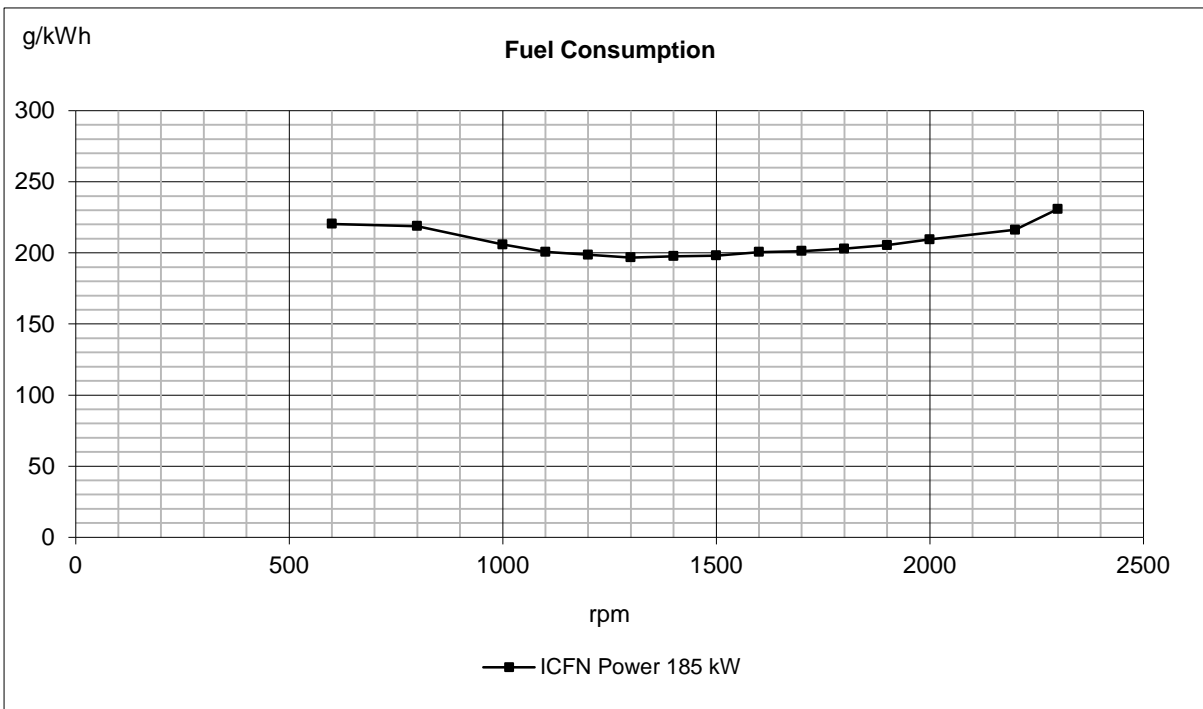
Derate map R2				
°C	85	87,5	90	
%	0	50	100	

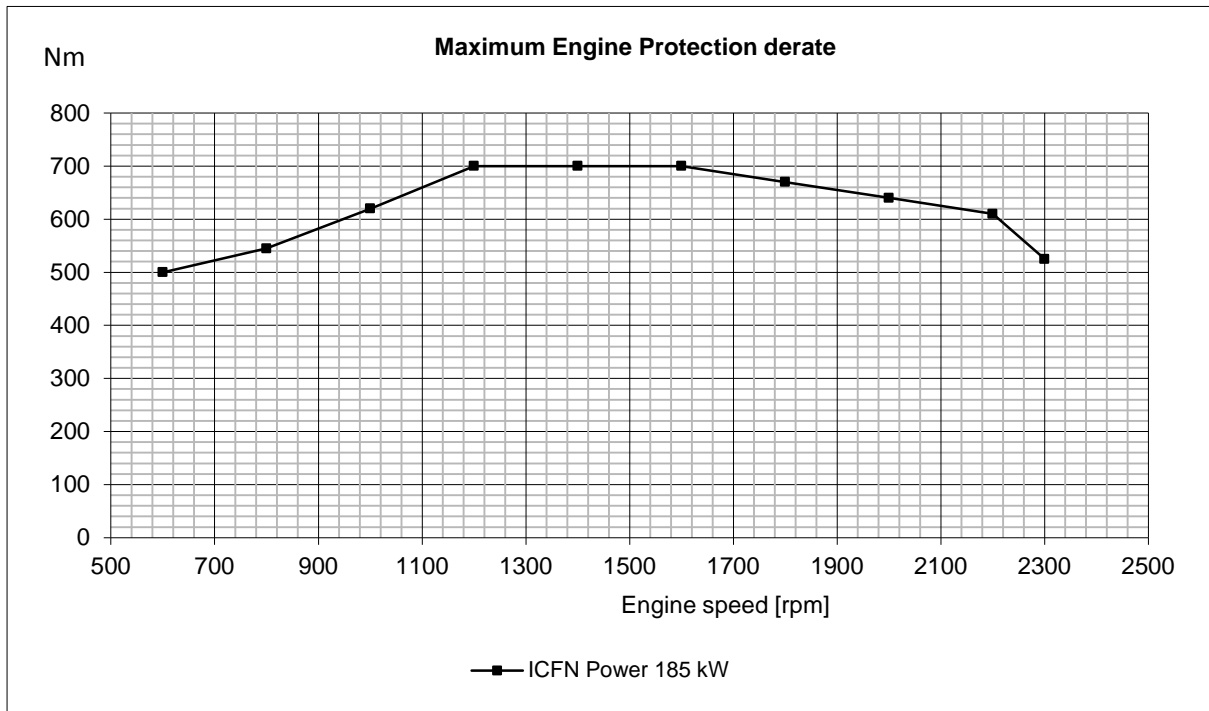
Derate map R2					
°C	210	215	220		
%	0	50	100		

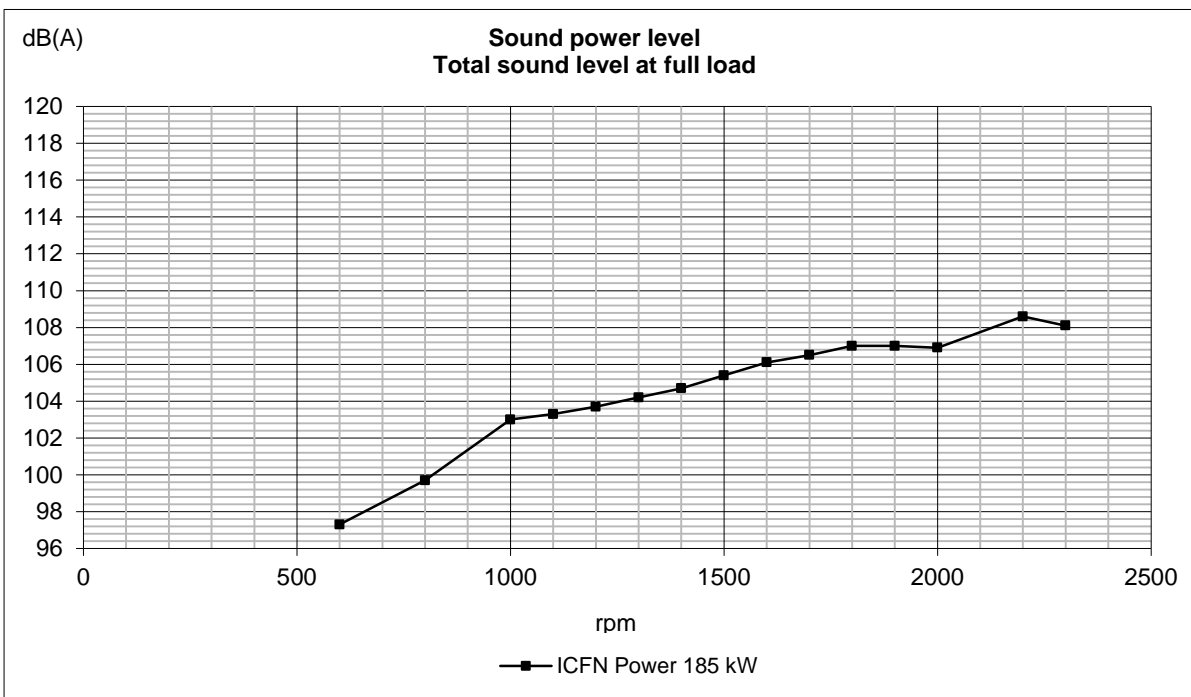
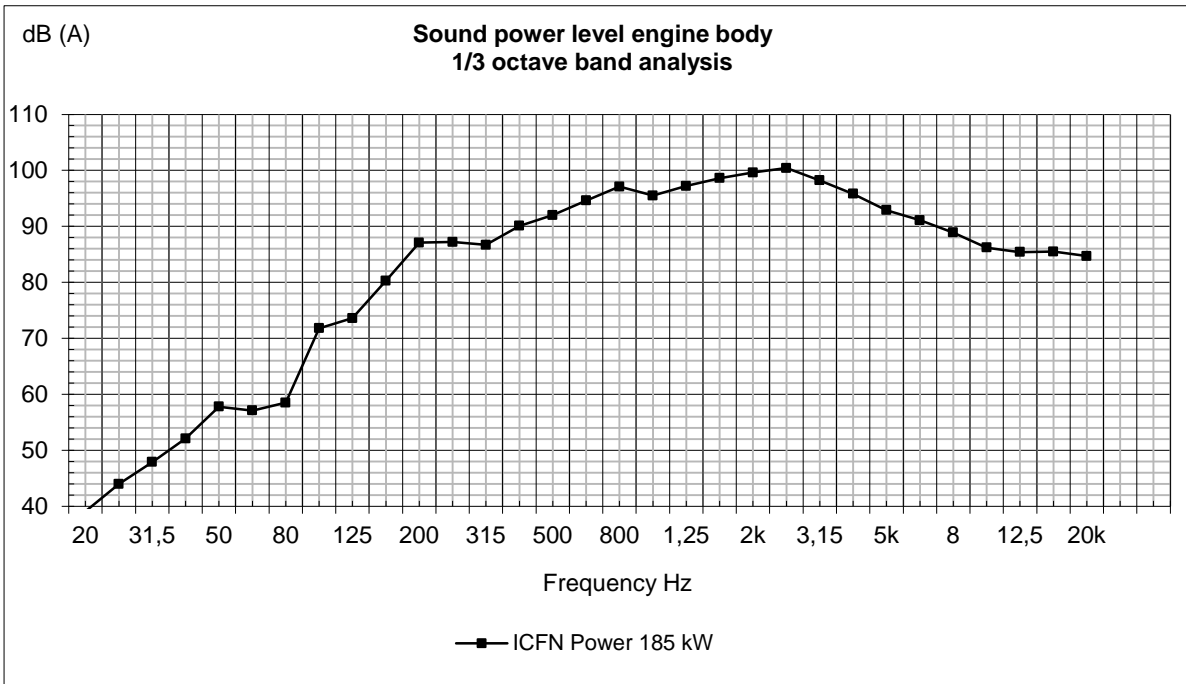


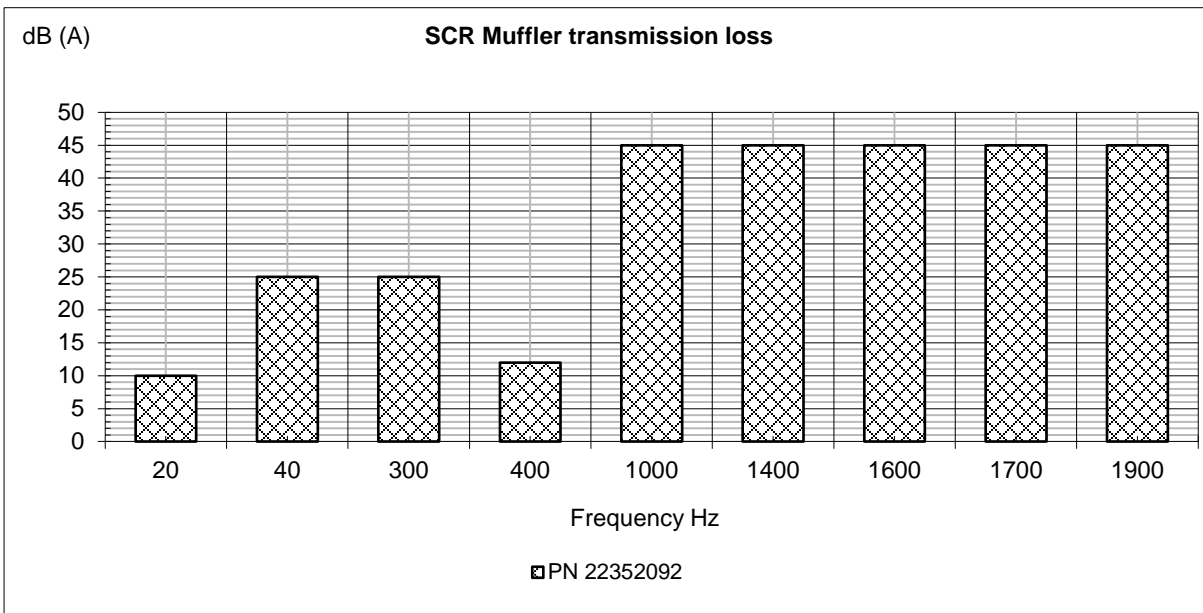


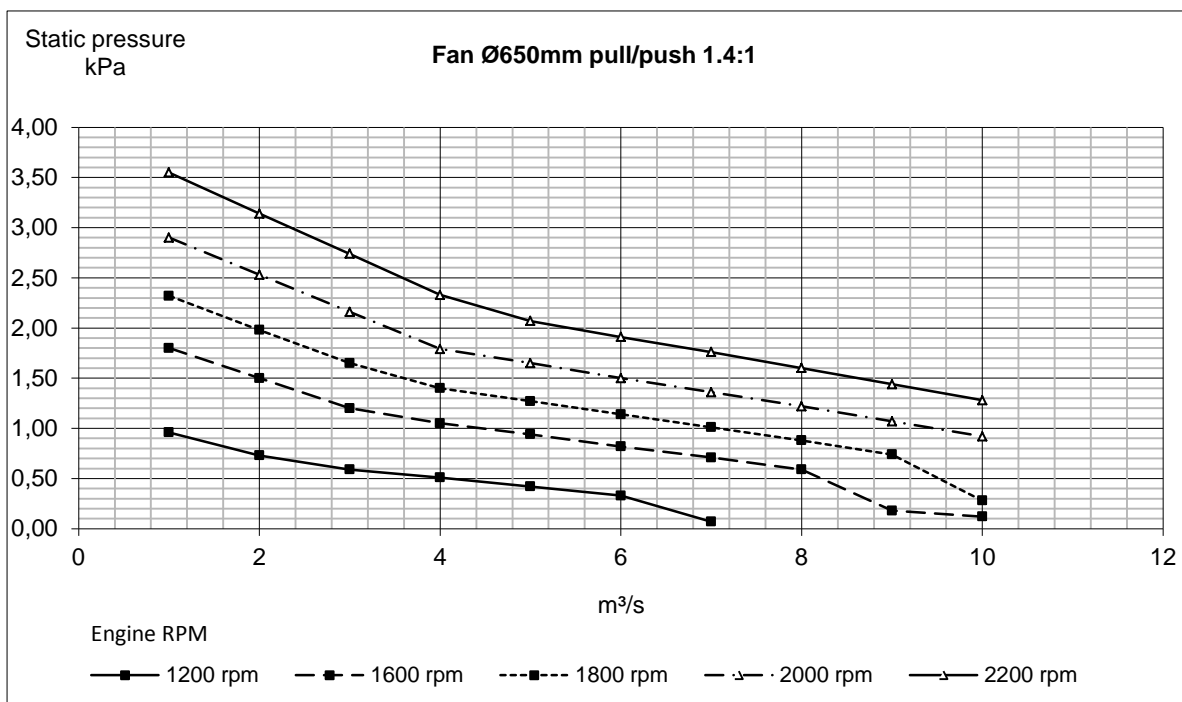
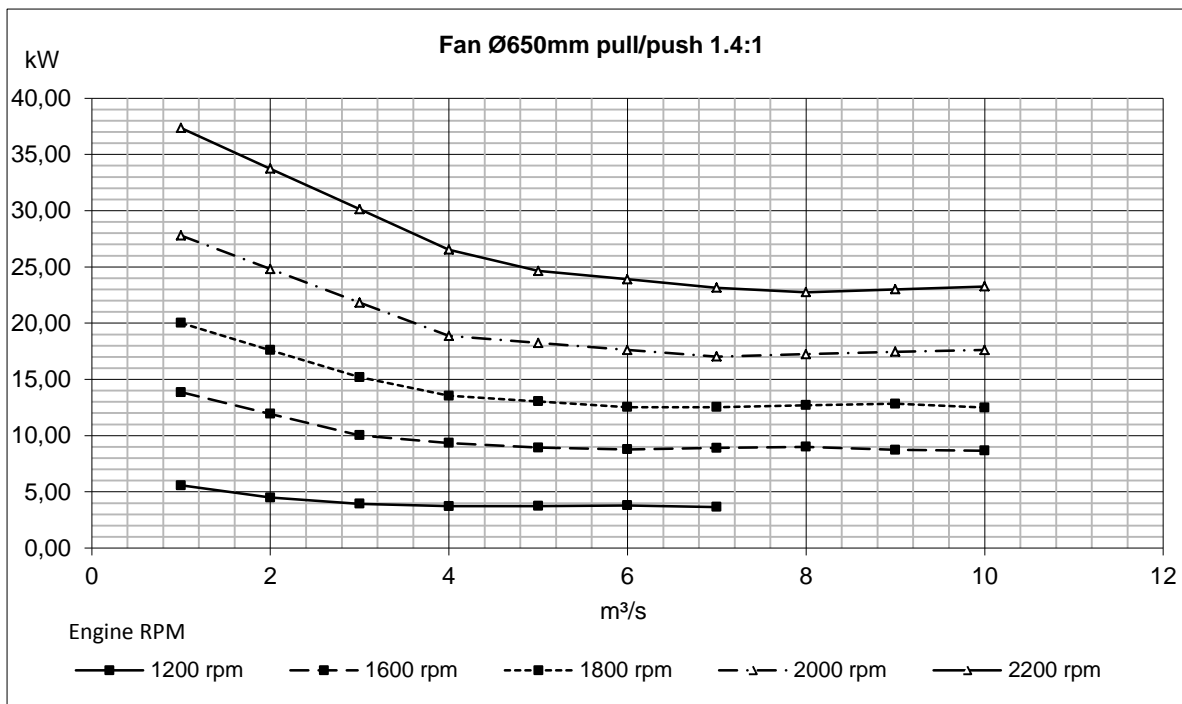


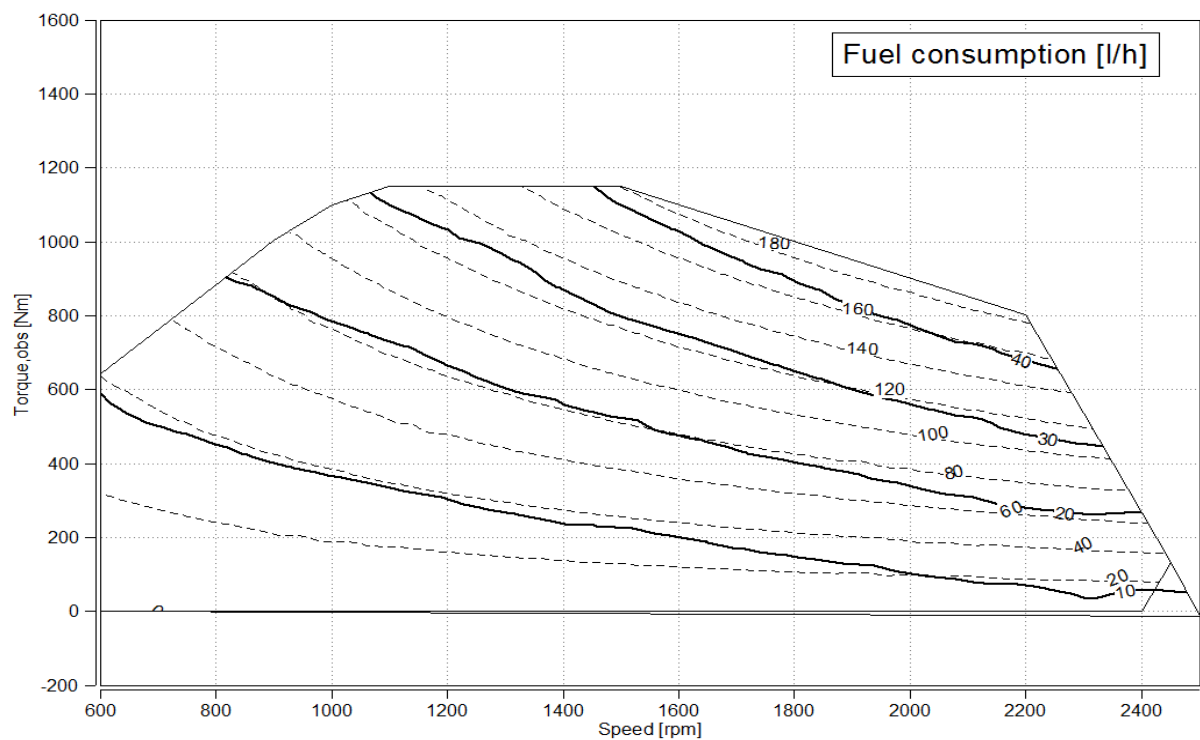
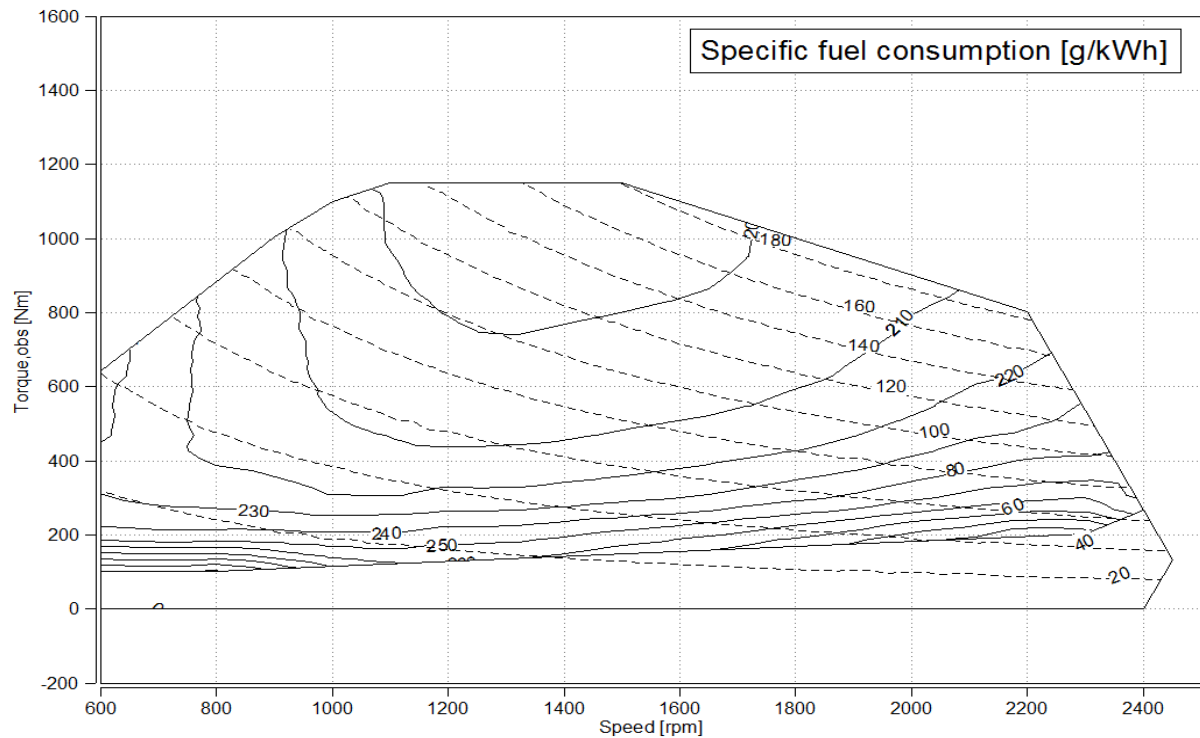












Blue Star Power Systems, Inc. utilizes the highest quality generators available. Our industrial generators provide consistent performance, quality design, and great durability required for long life and versatility. Generators used by Blue Star Power Systems, Inc. are UL and CSA Listed (unless specified 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.



**MARATHON ELECTRIC
SYNCHRONOUS AC GENERATOR
TYPICAL DYNAMIC CHARACTERISTICS**

Base Model 431CSL6206

Winding: WC1902

Date: 3/28/13

Kilowatt ratings at		1800 RPM		60 Hertz		12 Leads				
kW (kVA)		3 Phase		0.8 Power Factor		Dripproof or Open Enclosure				
Voltage*	Class B	Class F					Class H			
	80° C ①	90° C ①	95° C ①	105° C ②	105° C ①	130° C ①	125° C ②	125° C ①	150° C ①	
	Continuous	Lloyds	ABS	British Standard	Continuous	Standby	British Standard	Continuous	Standby	
	240/480	165 (206)	180 (225)	186 (233)	200 (250)	200 (250)	215 (269)	205 (256)	211 (264)	225 (281)
	230/460	170 (213)	185 (231)	190 (238)	200 (250)	200 (250)	220 (275)	205 (256)	215 (269)	225 (281)
	220/440	172 (215)	185 (231)	191 (239)	200 (250)	200 (250)	220 (275)	205 (256)	212 (265)	226 (283)
208/416	170 (213)	180 (225)	183 (229)	191 (239)	191 (239)	210 (263)	197 (246)	202 (253)	217 (271)	
190/380	156 (195)	165 (206)	170 (213)	176 (220)	176 (220)	191 (239)	182 (228)	185 (231)	200 (250)	

① Rise by resistance method, Mil-Std-705, Method 680.1b.

② Rating per BS 5000.

Submittal Data: 240/480 Volts*, 269 kVA, 1800 RPM, 60 Hz, 3 Phase

Mil-Std-705B			Mil-Std-705B		
Method	Description	Value	Method	Description	Value
301.1b	Insulation Resistance	> 1.5 Meg	505.3b	Overspeed	2250 RPM
302.1a	High Potential Test		507.1c	Phase Sequence CCW-ODE	ABC
	Main Stator	2000 Volts	508.1c	Voltage Balance, L-L or L-N	0.2%
	Main Rotor	1500 Volts	601.4a	L-L Harmonic Maximum - Total	5.0%
	Exciter Stator	1500 Volts		(Distortion Factor)	
	Exciter Rotor	1500 Volts	601.4a	L-L Harmonic Maximum - Single	3.0%
	PMG Stator	1500 Volts**	601.1c	Deviation Factor	5.0%
401.1a	Stator Resistance, Line to Line		---	TIF (1960 Weightings)	<50
	High Wye Connection	0.0371 Ohms	625.1c	Mechanical Strength (High Wye	
	Rotor Resistance	0.679 Ohms		Connection, Sustained 3 Phase	
	Exciter Stator	18.5 Ohms		Short Circuit Current) ⁽³⁾	< 300%
	Exciter Rotor	0.116 Ohms	652.1a	Shaft Current	< 0.1 ma
	PMG Stator	2.1 Ohms**	652.1a	Main Stator Capacitance to	
410.1a	No Load Exciter Field Amps			Ground	0.011 mfd
	at 480 Volts Line to Line	0.68 A DC			
420.1a	Short Circuit Ratio	0.493		Additional Prototype Mil-Std Methods	
421.1a	Xd Synchronous Reactance	2.976 pu		are Available on Request.	
422.1a	X2 Negative Sequence				
	Reactance	0.202 pu	--	Generator Frame	431
423.1a	X0 Zero Sequence Reactance	0.04 pu	--	Type	Ext. Voltage Regulated, Brushless
425.1a	X'd Transient Reactance	0.152 pu	--	Insulation	Class H
426.1a	X''d Subtransient Reactance	0.148 pu	--	Coupling - Single Bearing	Flexible
--	Xq Quadrature Synchronous		--	Amortisseur Windings	Full
	Reactance	1.284 pu	--	Cooling Air Volume	1200 CFM
427.1a	T'd Transient Short Circuit		--	Exciter	Rotating
	Time Constant	0.061 sec.	--	Voltage Regulator	SE350***
428.1a	T''d Subtransient Short Circuit		--	Voltage Regulation	1%***
	Time Constant	0.019 sec.	--	Sensing	1 Phase***
430.1a	T'do Transient Open Circuit				
	Time Constant	1.02 sec.			
432.1a	Ta Short Circuit Time				
	Constant of Armature Winding	0.019 sec.			

⁽³⁾ Excitation support system or PMG required to sustain short circuit currents.

* Voltage refers to wye (star) connection, unless otherwise specified.

**Not supplied as standard equipment.

***DVR®2000E+ voltage regulator supplied with PMG option. DVR®2000E+ voltage regulation 1/4%, 1 or 3 Phase sensing.

www.marathonelectric.com

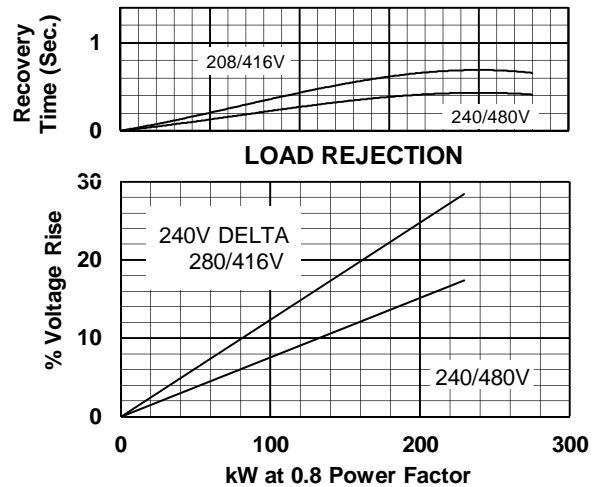
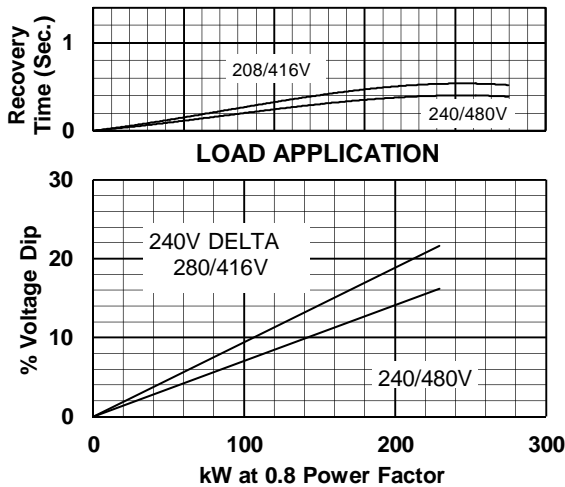


**MARATHON ELECTRIC
SYNCHRONOUS AC GENERATOR
TYPICAL DYNAMIC CHARACTERISTICS**

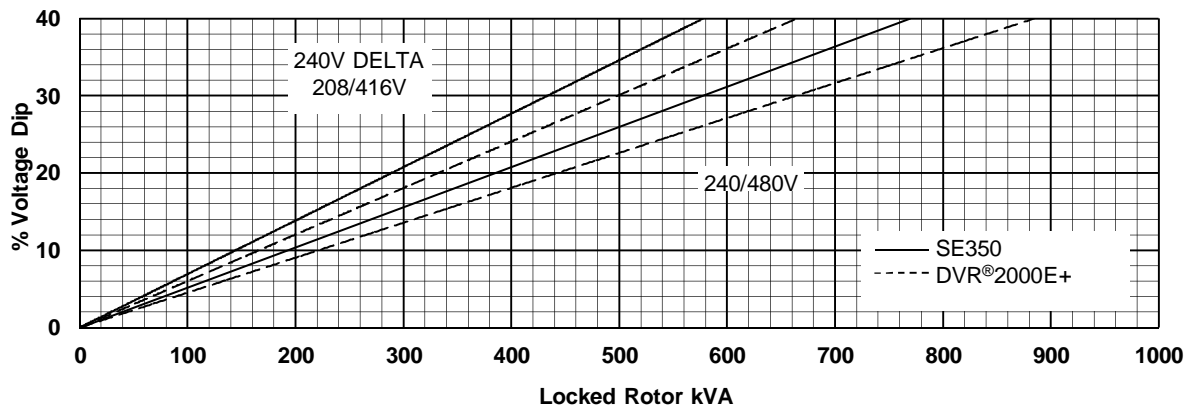
Base Model 431CSL6206

Date: 3/28/13

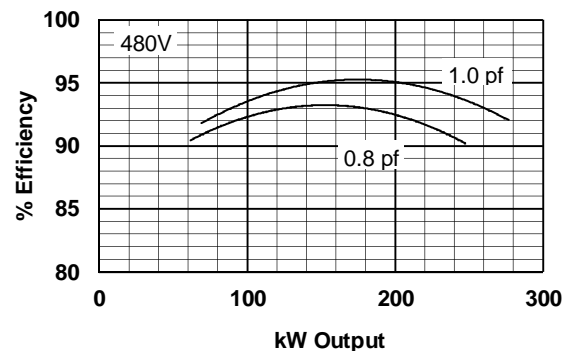
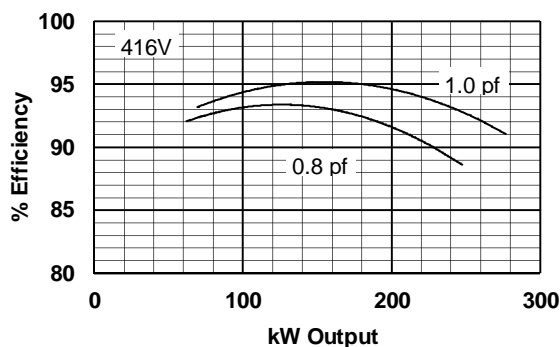
60 HERTZ



TYPICAL MOTOR STARTING CHARACTERISTICS



TYPICAL GENERATOR EFFICIENCY



Voltage refers to wye (star) connection, unless otherwise specified.

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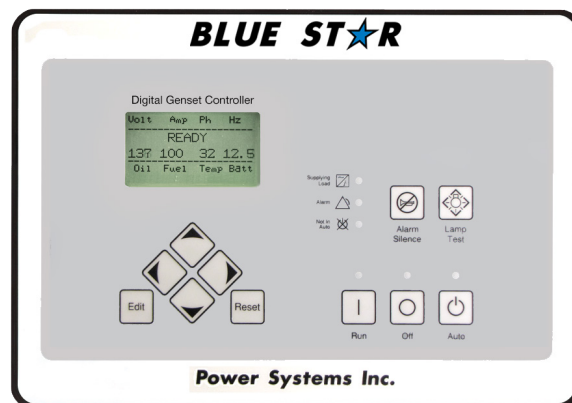
DGC-2020 Gen-Set Controller



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
- ▶ Remote communication options
- ▶ Microprocessor based
- ▶ Rugged encapsulated construction
- ▶ Complete system metering



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

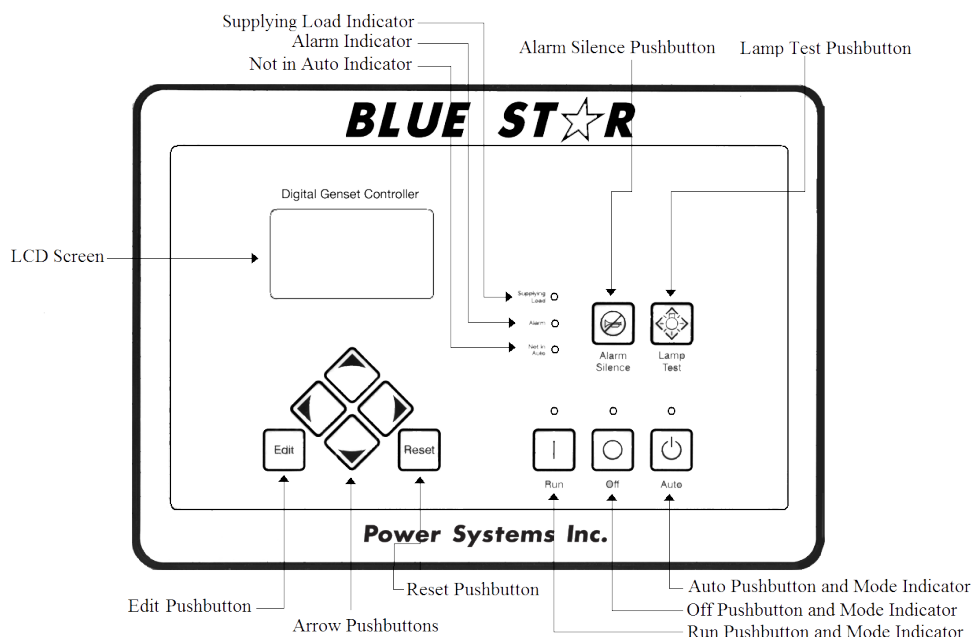
- ▶ Alarm Time Delay for Sender Failure
- ▶ Arming Time Delays After Crank Disconnect:
 - Low Oil Pressure
 - High Coolant Temperature
 - Pre-Crank Delay
- ▶ Continuous/Cyclic Cranking Timing Sequence

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
- ▶ All alarms and pre-alarms can be configured via the BESTCOMSPlus PC software or the front panel.

Alarms (Shutdowns)

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

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)
- ▶ Underfrequency (81U)
- ▶ Overcurrent (51)
- ▶ Reverse Power (32)
- ▶ Phase Imbalance (47)
- ▶ Overvoltage (59)
- ▶ Overfrequency (81O)
- ▶ Phase Imbalance (57)
- ▶ Loss of Excitation (400)
- ▶ Generator Overcurrent (51)

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

DGC-2020 Gen-Set Controller



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.

Single pole connectors

Cam-Lok™ J-Series E1016 receptacles

Cable Size #6 AWG – 250 MCM
600V AC/DC, Up to 400A Continuous
NEMA 3R

J-Series E1016, elastomeric, threaded stud

Features

- Double cam principle provides a positive, vibration-proof connection.
- Self-compensating for wear.
- No moving contact surfaces, eliminating arcing or burning.
- Superior electromechanical connections.
- Locked contacts will withstand a pulling force of 1,000 lbs.
- 1/3 of a turn assures a high pressure contact approaching 600 lbs. per sq. in. providing minimum resistance.
- Contacts carefully machined from a high conductivity brass to a smooth sliding fit and easy locking action.
- Watertight elastomeric body molded from colorfast material, color-coded for easy phase identification.
- Recessed contacts protected by insulating jacket that extends beyond contact ends for safety.
- Receptacles are safety insulated for direct mounting to steel panels.

INSULATED RECEPTACLES - 1 1/8" THREADED STUD

COLOR	MALE COMPLETE PART NO.	FEMALE COMPLETE PART NO.
BLACK	E1016-1600S	E1016-1631S
RED	E1016-1602S	E1016-1633S
GREEN	E1016-1604S	E1016-1635S
WHITE	E1016-1605S	E1016-1636S
BLUE	E1016-1612S	E1016-1643S
BROWN	E1016-1619S	E1016-1687S
ORANGE	E1016-1603S	E1016-1634S
YELLOW	E1016-1601S	E1016-1632S

Stud Size: 1/2"-13, Maximum Torque: 40 ft. lbs.



E1016-1602S 1 1/8"

INSULATED RECEPTACLES - 3/4" THREADED STUD

COLOR	MALE COMPLETE PART NO.	FEMALE COMPLETE PART NO.
BLACK	E1016-1600	E1016-1631
RED	E1016-1602	E1016-1633
GREEN	E1016-1604	E1016-1635
WHITE	E1016-1605	E1016-1636
BLUE	E1016-1612	E1016-1643
BROWN	E1016-1619	E1016-1687
ORANGE	E1016-1603	E1016-1634
YELLOW	E1016-1601	E1016-1632

Stud Size: 1/2"-13, Maximum Torque: 40 ft. lbs.



E1016-1600 3/4"

To order single packaged products, add a "K" suffix to the complete part number.

To order tapped through holes, add "T" suffix to the complete part number.

For E1016 Threaded Stud Receptacle Drawings, see page 35.

Custom threaded stud lengths available.

CERTIFICATIONS

- Listed to UL 1691
- Listed to CSA C22.2 No. 1691-12
- CSA certified to C22.2, No. 182.3 LR13963
- NEMA 3R

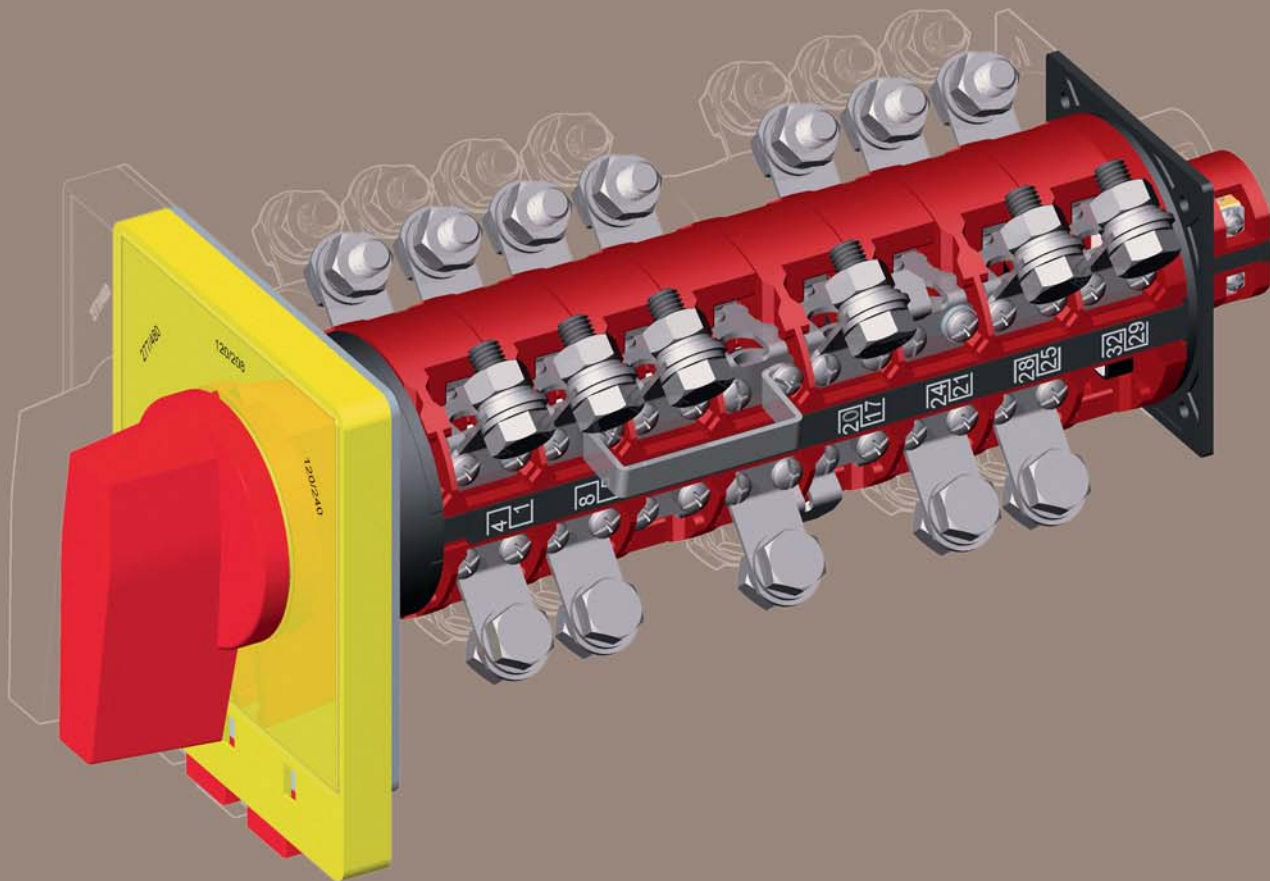
MATERIALS

- Body: TPE

TEMPERATURE RATING

- Operating ambient: -40° C to 105° C

VOLTAGE SELECTIVE SWITCHES



Front mounting + locking



Rear mounting + locking



Padlock device




Auxiliary contacts



Door coupling + main switch
with emergency

- * Use for breaking, changing-over, making and starting of circuits with inductive or resistive electrical loads
- * Rated loads from 40 up to 1200 A
- * High resistance to mechanical stress and to tracking, dimensional stability
- * Double break silver alloy contact
- * Switches with auxiliary contacts

- * Custom built to generator specs.
- * Convenience and practical use
- * High circuit-breaking capacity during continuous operation
- * Switch conforms to requirements UL 508, CSA - C22.2; IEC 947; VDE 0660
- * Solenoid locking option available
- *  approved or pending

GENERAL

Control Switches International have been designing and selling cam switches for over 50 years. Their voltage selector switches stand above the competition because of their rugged industrial grade designs. Due to their small dimensions and 4-hole mounting construction, they are ideal for almost any application. All models come standard with a lockable design, that can be locked in any position to prevent costly damage to equipment. These switches integrate high quality insulation material with silver alloy contacts.

This results in high making and breaking capacities and a long operating life. These switches are available in a large range of switching capacities, from 40 to 1200 A, with ratings up to 600 V AC. They are available to withstand surge capacities up to 18000A. These voltage selector switches are built to customer specifications.

TECHNICAL DATA

SWITCH TYPE			N40	N63	N125	A200	Z315	A400	Z630	Z900	Z1200	
Rated insulation voltage U _i	*UL/CSA	V	600	600	600	600	600	600	600	600	600	
	IEC/VDE	V	690	690	690	690	690	690	690	690	690	
Rated thermal current I _{th}	*UL/CSA	A	35	55	100	200	315	400	630	900	1200	
	IEC/VDE	A	40	63	125	200	315	400	630	900	1200	
Rated short-time withstand current I _{cw}	1 sec	A	1000	1600	2100	3300	5200	6500	8000	14500	18000	
	3 sec	A	600	800	1300	2000	3200	3800	6500	9200	12000	
	10 sec	A	300	400	700	1100	1800	2000	3600	5500	8000	
	60 sec	A	130	160	300	460	800	850	1500	2400	3600	
General use AC1/AC21		600 V	A	35	55	100	200	315	400	630	900	1200
Motor switch AC3 DOL 3 phase UL/CSA	120 V	hp	5	7,5	15	-	-	-	-	-	-	
	240 V	hp	10	15	25	-	-	-	-	-	-	
	480 V	hp	20	25	50	-	-	-	-	-	-	
	600 V	hp	20	25	40	-	-	-	-	-	-	
Max. conductor size	Stranded wire 2x	AWG	8	6	-	-	-	-	-	-	-	
	Flexible wire 2x	AWG	10	8	1/0	-	-	-	-	-	-	
	Cable lug 1x	AWG	-	-	1/0	3/0	400	500	1500	-	-	
	Flat connection 2x	mm	-	-	-	-	20x5	30x5	40x5	60x5	80x5	

***UL APPROVED OR PENDING**



CONTROL SWITCHES INTERNATIONAL INCORPORATED

2425 MIRA MAR AVENUE, LONG BEACH, CA 90815 * P O BOX 92349, LONG BEACH, CA 90809
 (562) 498-7331 * (800) 521-1677 * fax (562) 498-5894
 web site: www.controlswitches.com * e-mail: sales_info@controlswitches.com



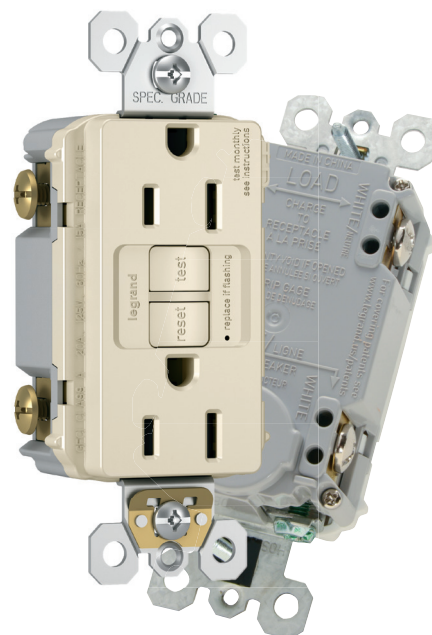
PASS & SEYMOUR® Specification Grade Self-Test GFCIs 15 & 20A, 125VAC

1597, 2097, 1597NTLTR, 2097NTLTR, 1597TR, 2097TR,
1597TRWR, 2097TRWR, 1597TRR, 2097TRR, 1597TRA,
2097TRA, 1597IGTR, 2097IGTR, 1597SWTTR, 2097NA,
1597TRNA, 2097TRNA, 1597TRWRNA, 2097TRWRNA

Reinventing Safety All Around

The new Pass & Seymour® Self-Test GFCI receptacle with SafeLock® Protection conducts an automatic test every three seconds, ensuring it's always ready to protect. If the device fails the test, the indicator light flashes to signal that the GFCI should be replaced. It also has our proven SafeLock Protection feature: if critical components are damaged and protection is lost, power to the receptacle is disconnected.

For Hospital Grade, refer to SF708R5.



FEATURES & BENEFITS

Patented SafeLock® Protection:
if critical components are damaged and ground fault protection is lost, power to the receptacle is disconnected.

Tamper-resistant automatic shutter system prevents young children from inserting common household objects.

The indicator light flashes if the device fails the self-test, signalling that the GFCI should be replaced.

Side or internal screw-pressure-plate back wire termination with #14 – #10 AWG stranded or solid, copper or copper-clad conductors.

Captive screws make for easier installation.

Ground terminal clamp allows for fast installation.

Two back-wire holes per termination add wiring flexibility, eliminate pigtail and save box space.

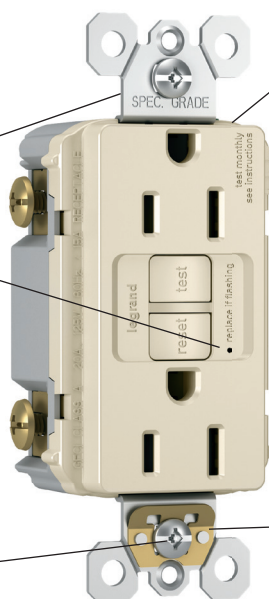
Prevents line-load reversal miswire:
No power to the face or downstream receptacles if wired incorrectly.

High-impact-resistant, thermoplastic construction for superior strength and durability.

Thinner profile speeds installation by leaving more room for wires in the box.

Auto-ground clip assures a positive ground to metal box.

The most durable GFCI available.
Exceeds UL943 voltage surge requirements.



Meets 2015 UL Requirements

2097LA

FIELD USES/VERTICAL MARKETS

- | | | | |
|--------------|--------------|-----------------------|---------------------|
| ■ Industrial | ■ Healthcare | ■ Education | ■ Institutional |
| ■ Retail | ■ Office | ■ Hospitality/Lodging | ■ Multiple Dwelling |

SF1101R6 — Updated December 2015 — For latest specs visit www.legrand.us/passandseymour



PASS & SEYMOUR®

Specification Grade Self-Test GFCIs 15 & 20A, 125VAC

ORDERING INFORMATION

Catalog Number	Description	Ratings	Colors	NEMA Config.
Specification Grade Self-Test GFCI Receptacles				
1597TR*	TradeMaster/Spec Grade Tamper-Resistant 15 Amp Duplex GFCI	15A 125V	I, W, -, BK, LA, NI, AB, DB	5-15R
1597*	TradeMaster/Spec Grade 15 Amp Duplex GFCI	15A 125V	I, W, -, GRY, BK, RED, LA	5-15R
1597TRA*	TradeMaster Audible Alarm Tamper-Resistant Duplex GFCI	15A 125V	I, W, -, BK LA	5-15R
1597SWTTR*CC4	Combination Tamper-Resistant Switch/GFCI (No Federal Specification)	15A 125V	I, W, BK, LA	5-15R
1597NTLTR*CC4	Combination Tamper-Resistant 15 Amp Night Light/GFCI	15A 125V	I, W, BK, LA, NI, AB, DB	5-15R
1597TRWR*	TradeMaster/Spec Grade Weather-Resistant 15 Amp Duplex GFCI	15A 125V	I, W, -, GRY, BK, LA	5-15R
1597TRR*	RoHS-Compliant TradeMaster/Spec Grade Tamper-Resistant 15 Amp Duplex GFCI	15A 125V	I, W, LA	5-15R
2097TR*	Spec Grade Tamper-Resistant 20 Amp Duplex GFCI	20A 125V	I, W, -, GRY, BK, RED, LA	5-20R
2097*	Spec Grade 20 Amp Duplex GFCI	20A 125V	I, W, -, GRY, BK, RED, LA	5-20R
1597IGTR*	Spec Grade Isolated Ground Tamper-Resistant Duplex GFCI	15A 125V	I, W, LA, O	5-15R
2097IGTR*	Spec Grade Isolated Ground Tamper-Resistant Duplex GFCI	20A 125V	I, W, GRY,	5-20R
2097NTLTR*	Combination Tamper-Resistant 20 Amp Night Light/GFCI	20A 125V	I, W, GRY, LA	5-20R
2097TRWR*	Spec Grade Weather-Resistant 20 Amp Duplex GFCI	20A 125V	I, W, -, GRY, BK, LA	5-20R
2097TRA*	Spec Grade Audible Alarm Tamper-Resistant 20 Amp Duplex GFCI	20A 125V	I, W, -, GRY, BK, RED, LA	5-20R
2097TRR*	RoHS-Compliant TradeMaster/Spec Grade Tamper-Resistant 20 Amp Duplex GFCI	20A 125V	I	5-20R
1597TRNA*	NAFTA-Compliant TradeMaster/Spec Grade Tamper-Resistant Duplex GFCI	15A 125V	I, W, -, GRY, BK, LA	5-15R
2097TRNA*	NAFTA-Compliant TradeMaster/Spec Grade Tamper-Resistant Duplex GFCI	20A 125V	I, W, GRY, LA	5-20R
2097NA*	NAFTA-Compliant TradeMaster/Spec Grade 20 Amp Duplex GFCI	20A 125V	I, W, -, GRY, LA, BL	5-20R
1597TRWRNA*	NAFTA-Compliant Tamper-Resistant Weather-Resistant Duplex GFCI	15A 125V	I, W, -, LA	5-15R
2097TRWRNA*	NAFTA-Compliant Tamper-Resistant Weather-Resistant Duplex GFCI	20A 125V	I, W, -, GRY, LA	5-20R



NEMA
5-15R



NEMA
5-20R

*Color Designation

I	Ivory	-	Brown	BK	Black	LA	Light Almond
W	White	GRY	Gray	RED	Red	NI	Nickel
AB	Antique Brass	DB	Dark Bronze	O	Orange	BL	Blue

For more information on these and other P&S products refer to our Catalog or visit our web site.

PASS & SEYMOUR®

Specification Grade Self-Test GFCIs

15 & 20A, 125VAC



TECHNICAL SPECIFICATIONS

3rd Party Compliance

cULus Listed File Number E42190, Standard UL498 Attachment Plugs and Receptacles, UL943 GFCIs. Federal Specification WC596, Hospital Grade. Standard CSA C22.2 No. 42 General Use Receptacles, CSA C22.2 No. 144 GFCIs. Conforms to NEMA WD-1 and WD-6.

Performance

Electrical

Dielectric Voltage	Withstands 1500V minimum
Trip Level	4 to 6 mA
Trip Time	.025 Second Nominal
Frequency	60 Hz
Maximum Working Voltage	125VAC
Voltage Range	102-132VAC

Mechanical

Terminal Identification	Terminals identified in accordance with UL498 (Hot, White, Green)
Terminal Accommodation	#14 AWG – #10 AWG solid or stranded copper conductor only
Product Identification	Ratings are a permanent part of device

Environmental

Operating Temperature	-35°C to +66°C
Maximum Humidity	95%
Flammability	UL94 V2

Material Specs

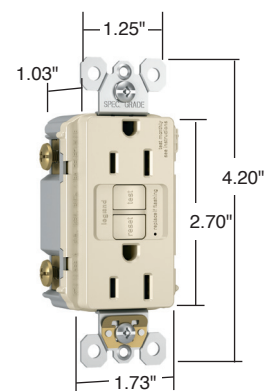
Face: Nylon
 Body: Nylon
 Contacts: .03" Brass (.8)
 Mounting Straps: Galvanized Steel
 Terminal Screws: Nickel-Plated Steel #8 - 32
 Hex Head Grounding Screw: Steel (Green)
 Flat Head Mounting Screws: Zinc-Plated Steel
 Test/Reset Buttons: Nylon
 Auto-Ground Clip: Brass Alloy
 *Nightlight Lens: Lexan®
 **Tamper-Resistant Shutter: Thermoplastic

*For 1597NTL and 2097NTL Nightlight versions only.

**For 1597TR and 2097TR Tamper-Resistant versions only.

Warranty

1 Year



Dimensions for
15 & 20 Amp



Audible Alarm



Nightlight/GFCI



Weather-Resistant



Tamper-Resistant

ALSO AVAILABLE...

- | | | | |
|--|--------------------------------------|-------------------------------|-------------------------------|
| ■ USB Charging Devices | ■ Ground Continuity Monitoring (GCM) | ■ Turnlok® Locking Devices | ■ IEC 309 Industrial Products |
| ■ PlugTail® Devices | ■ Straight Blade Plugs & Connectors | ■ Weatherproof Boxes & Covers | ■ Flexcor® Wire Mesh Grips |
| ■ Surge Protective & Isolated Ground Devices | | | ■ Night Lights |



Electrical Wiring Systems

P.O. Box 4822
Syracuse, NY 13221-4822
Phone: 1.800.776.4035
www.legrand.us/passandseymour

570 Applewood Crescent
Vaughan, Ontario L4K 4B4
Phone: 905.738.9195
www.legrand.ca

Product Datasheet

[Catalog Home](#)[Home Page](#)[Search](#)

L1530R -- Locking Receptacle



Hubbell-Pro locking devices provide a safe disconnect solution between an equipment load and a power source. These devices incorporate a locking interface that is engaged and disengaged simply by rotating the device assuring a safe and reliable electrical connection.

Product Specifications

SELECTSPEC Product Type	Locking Devices
Locking Device Product	Receptacle
Locking Device Rating	30A, 3PH 250V AC
Locking Device Wiring Scheme	3 Pole, 4 Wire Grounding
Locking Device NEMA Configuration	L15-30R
Locking Device Color	Black
Locking Device Listings and Approvals	UL Listed, CSA Certified
Features	Nylon Construction, Visible NEMA Ratings, Nickel Plated Receptacle Strap
Face	High Impact-Resistant Chemical-Resistant Nylon
Base	Reinforced Thermoplastic Polyester
Contacts/Blade Material	Rivetless Copper Alloy
Mounting Yoke	Nickel Plated Steel
Dielectric Voltage	Withstands 3,000V per UL498
Max Working Voltage	600V AC, 250V DC
Current Interrupting	Capable of withstanding a fault level of 1000A circuit, per UL 498.
Temperature Rise	Maximum 30 deg C. temperature rise at full rated current after 50 cycles overload at 150% rated current for either AC or DC applications per UL 498
Overload	Minimum 4.8 times rated current for 100 cycles.
Terminal Identification	Terminals identified in accordance with UL 498 (Brass, White, Green).
Terminal Accommodation	#14 to #8 AWG Solid or Stranded Copper Wire.
Product Identification	Ratings and NEMA identification are permanently marked on device.
Flammability	UL 94 V2 Minimum
Operating Temperatures	Continuous use without impact -40 deg C to 85 deg C
Link to Drawing Library	Click here for Library
Link to PDF Catalog	Click here for Catalog



Twist-Lock® Devices

50A, 125/250V AC, 3 Pole, 4 Wire Grounding

Receptacle



- Features
- Thermoset construction offers high heat resistance
 - Armored housing provides superior impact resistance
 - One piece contacts provide low operating temperatures

Ordering Information			
Description	Device Color	UPC	Catalog Number
Phenolic	Black	783585828107	CS6369

Standards

Listed to UL 498

Certified to CSA C22.2 No.42

Specifications	
Body	Phenolic
Face	Phenolic
Contacts	Brass
Terminal Screws	Steel
Insulator	Phenolic

Performance	
Electrical	
Current Interrupting	Certified for current interrupting at full rated current
Dielectric Voltage	Withstands 2,000V minimum
Mechanical	
Terminal Accommodation	#10 AWG - #6 AWG solid or stranded copper wire only
Environmental	
Flammability	UL 94 V0
Operating Temperatures	Maximum continuous 75°C; minimum -40°C (w/o impact)

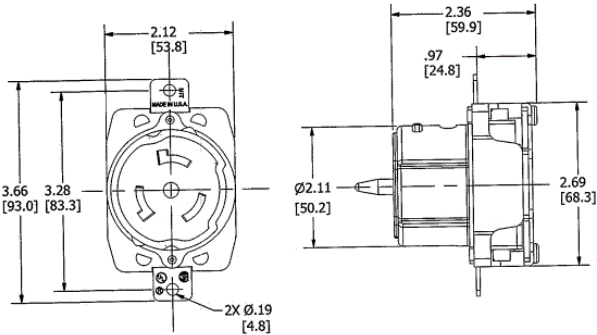
Accessories	
Plug	CS6365C
Weatherproof Lift Cover	HBL7774WO
Single Gang Stainless Steel Wallplate	SS750
4" Square Raised Cover	HBL50SC

Online Resources

Customer Use Drawing

eCatalog

Installation Instructions



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 kW
- ▶ 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



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	Frequency (Hz)					
	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

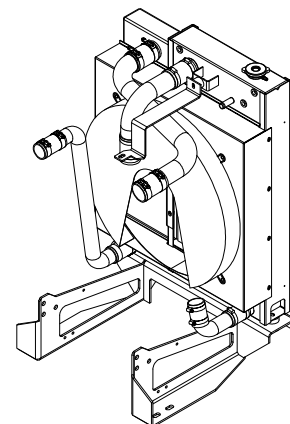
P4 is a high performance unsupported acrylic pressure sensitive adhesive exhibiting aggressive tack, high peel and shear, and good heat resistance. In addition, it has good chemical and plasticizer resistance as well as excellent long term aging and the ability to withstand environmental extremes.

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

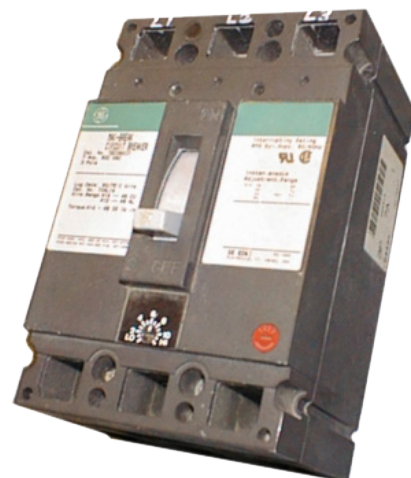
MC Series Circuit Breakers



Blue Star Power Systems, Inc's 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.

MC Series Features

- ▶ UL 489 listed
- ▶ Broad product line to meet virtually any application need
- ▶ Reduced downtime: tripped breakers can be easily spotted and immediately reset
- ▶ Eliminates single phasing: a common trip bar disconnects all poles simultaneously
- ▶ Offers flexibility through use of a wide variety of accessory devices and attachments
- ▶ Repetitive operation: no fuses to replace
- ▶ Breakers can be easily tested: fuses must be destroyed to confirm calibration accuracy



Circuit Breaker Type	Ampere Rating	No. Poles	Maximum Voltage Rating	UL Listed Interrupting Ratings (kA)						Dimensions (in.)		
				VAC								
			AC	120	120/240	240	277	480	600	H	W	D
TEB	10-100	2	240	-	-	10	-	-	-	6.3125	2.75	3.375
		3									4.125	
TED	10-150	2	480	-	-	18	-	18	-	6.3125	2.75	3.375
		3	480						14		4.125	
			600									
TQD	100-225	2	240	-	10	10	-	-	-	6.5625	2.75	2.625
	100-225	3	240		-	10					4.125	2.625
SFH	70-250	2	480	-	-	65	-	35	-	10.12	4.12	3.81
		3	600						22			
TJD	250-400	2	240	-	22	22	-	-	-	10.125	8.25	3.8125
		3	240		-	22						
TJJ	125-400	2	600	-	-	42	-	30	22	10.125	8.25	3.8125
		3										
TJK6	250-600	2	600	-	-	42	-	30	22	10.125	8.25	3.8125
		3										
SKHA	300-800	2	600	-	-	42	-	30	22	15.5	8.25	5.5
		3										
SKHA	600-1200	2	600	-	-	42	-	30	22	15.5	8.25	5.5
		3										

TPS Series Block Heaters



The TPS engine block heater is designed to preheat diesel and gaseous engines. It is simple to install, lightweight, and heats engines up to 12L displacement. Thermosiphon circulation of the coolant delivers even heat throughout the entire engine block.

Features

- ▶ cULus Listed
- ▶ CE Compliant
- ▶ Various temperature settings available, including an optional adjustable thermostat 90° - 130°F (32° - 54°C)
- ▶ Can be supplied with UL marked 120 or 240V NEMA plug



Specifications

Part Number	Volts	Watts	Amps	Male Plug	Outlet Size (Inches)
13224	120	500	4.2	Yes	5/8
14209	240	500	2.1	Yes	5/8
10014	120	1000	8.4	Yes	5/8
10015	240	1000	4.2	Yes	5/8
10016	120	1500	12.5	Yes	5/8
10017	240	1500	6.3	Yes	5/8
10018	120	1800	15	Yes	5/8
10019	240	2000	8.3	Yes	5/8

DuraLite Air Cleaner (Single Stage)



DuraLite 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 (DuraLite 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 genset applications: high pulsation, high humidity, etc.
- ▶ Temperature tolerance: 180°F/83°C continuous 220°F/105°C intermittent

Restriction Indicators



ServiSignal™ Mini Indicator

Small enough to fit just about anywhere (only 42 mm high), the Donaldson ServiSignal™ shows a highly visible, bright red flag in the full-view window when restriction limit is reached. Resets manually via top button after air cleaner service.

The Informer™ for Graduated, Continuous Readings

The Informer, when mounted on the air cleaner provides a continuous reading whether the engine is running or is shut down. Reset button is on top.



Mechanical Indicators

Part Number	Restriction Limits			Fitting
	mbar	Pa	In H2O	
ServiSignal™ Mini Indicators				
X002250	37	3700	15	1/8" - 27 NPT
X002251	50	5000	20	1/8" - 27 NPT
X770052	62	6200	25	1/8" - 27 NPT
X002254	75	7500	30	1/8" - 27 NPT
Informer™ Indicators				
X002278	50	5000	20	1/8" - 27 NPT
X002277	62	6200	25	1/8" - 27 NPT
X002275	75	7500	30	1/8" - 27 NPT

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

BCI Group Size	Part Number	CCA at 0°F	CCA at 32°F	Dimensions (Inches)			Weight (lbs.)
				Length	Width	Height	
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

Gen-Set Trailers



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.

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



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 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. 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.
- ▶ Equipment purchased at the standby rating that is being used in a prime power application(s).
- ▶ 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.