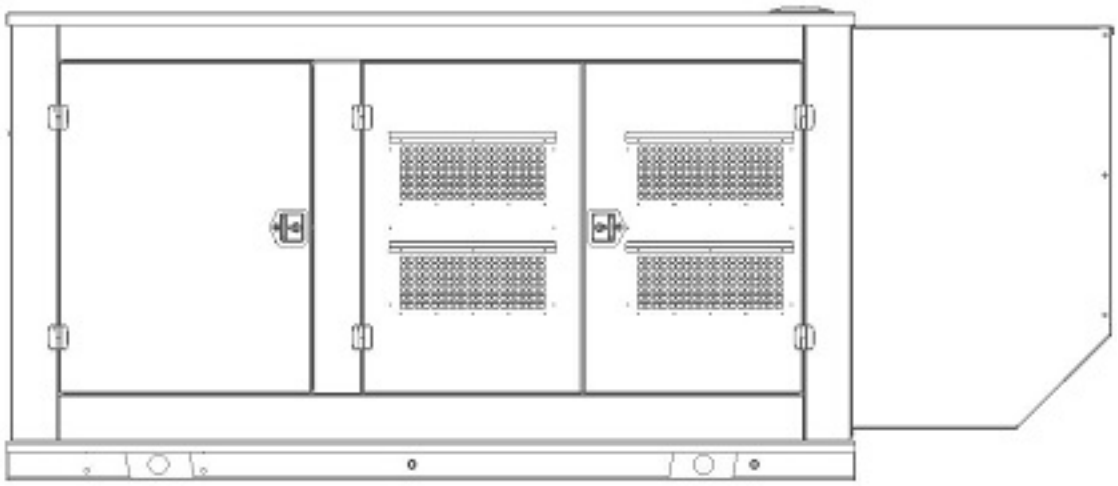
HIPOWER®
A YANMAR COMPANY

Technical Specification and Scope of Supply

HDI 130F T6U



HIMOINSA POWER SYSTEMS, INC.
16600 South Theden Street I Olathe, KS 66062
TEL: 913-495-5557 I Fax: 913-495-5575 I Call us (toll free) at: 1 866-710-2988 I info@hipowersystems.com I www.hipowersystems.com

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System Description

Product Type	HDI 130F T6U
Application Group	Stationary

Power as per HiPOWER Data sheet

Power per genset (ISO 8528)	0	kWel
Engine Make	FPT	
Engine Type	N67TM1X	
Engine Speed	1800	rpm
Frequency	60	Hz
Generator voltage	120/208 & 240/120 - 3ø	V
Noise, Open	TBA	
Noise, Enclosed	74 dBA @ 23 ft. (L1)	
Weight, Open	3,120 lbs.	
Weight, Enclosed	4,520 lbs. (L1)	
Dimensions, Open	109" x 46.3" x 53"	
Dimensions, Enclosed	142.1" x 46.3" x 60.1" (Level1)	
Phase	Three	
Unit Specification	UL2200, CSA	
Temp Rise	120	°C
Exhaust Emissions (EPA)	Tier 3	
Radiator Design Temperature	50	°C

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1 SYSTEM CONFIGURATION

1.1 System Description

HDI 130F T6U Diesel Engine Generator Set. 130KW @ 120/208 VAC. Standby

1.2 GENERATOR SET ENCLOSURE

LEVEL 2 - Sound Attenuated Enclosure

1.3 CIRCUIT BREAKER CONFIGURATION

MLCB 600 Amps ABB T6NQ600TW - TMA - 100% RATED ($2,172.37) x 1

1.4 STARTING AIDS

KIT INCLUDES: 10A Battery Charger - Water Jacket Heater - 16 LED Remote Annunciator - Low Coolant Switch - Remote E-Stop

2 ENGINE CONFIGURATION

2.1 Engine Description

FPT-IVECO N67TM1X, Long-life, heavy-duty, 4-cycle, direct injection engine. EPA Certification Tier Level 3

2.2 FUEL SYSTEM

ULC 142-24 hrs - ULC 142 Double wall Aboveground Flammable Liquid Tanks

3 GENERATOR END CONFIGURATION

3.1 Generator End Desciption

STAMFORD UCI274F (WDG 311) Brushless, Four Pole Rotating Field, Class H Insulation (125 °C Temp. Rise), IP23. Single Bearing. 2/3 Pitch Winding. Automatic voltage regulator

3.2 GENERATOR END OPTIONS

AS440

4 CONTROL PANEL CONFIGURATION

4.1 Cont. Panel Description

Digital controller with auto and manual start capability. with push button reset. LCD Display that offers AC metering, protective relaying and engine and generator control and monitoring. Engine and generator controls, diagnostics, and operating information are accessible via the control panel keypads

4.2 CONTROLLERS

DSE7410-Controller Upgrade with RS485-RS232-Ethernet connections

5 PAINTING

5.1 Painting Details

HIPOWER Systems uses Interpon A4700 primer for a base coat on all powder coated parts.
HIPOWER Systems canopies are coated with Interpon 600 HIPOWER matte gray. Interpon 600 series
coatings are designed for exterior exposure and offers excellent light and weather resistance. This
coating coupled with the A4700 primer offer 5 mils of premium coating to all our canopies.

- Base skid is epoxy-polyester powder painted - Standard RAL9005 color
- Enclosure is epoxy-polyester powder painted - Standard RAL7035 color
- Other colors available upon request

6 ADDITIONAL OPTIONS CONFIGURATION

7 SERVICE AND AFTER SALES

7.1 Details

HIPOWER® is committed to offer a Superior Customer Service for an Outstanding Experience, from pre-sales, sales, and after sales support

8 MISCELLANEOUS

8.1 Details

One copy of Electrical Schematics, Control Panel manual, Warranty Statements, Engine manual, Generator end manual and Generator set manuals is provided with the unit

9 FUNCTIONAL TESTS

9.1 Tests

Standard acceptance testing performed under HIPOWER quality specification

9.2 TESTING

Standard test 1 hour at 1.0 pf

10 SHIPPING CONDITIONS

10.1 Details

All units are shipped wet, with all the fluid included minus fuel supply (unless otherwise specified)

11 SALES TERMS AND CONDITIONS

11.1 Details

Standard Terms and Conditions apply. Read carefully attached HIPOWER® Terms and Conditions of Sale

12 WARRANTY

12.1 WARRANTY DETAILS

Standard Limited Warranty 2 years / 2000 hours

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Submittal Documents for Model Selected

Item	Description
1	Genset Data Sheet
1a	Engine Data Sheet
1b	Alternator Data Sheet
1c	EPA Certification
1d	Electrical Drawing
1e	UL/CSA Certification
1f	Terms and Conditions
1g	Derating Table
2	Sound Attenuated Enclosure - LEVEL 2 Enclosure drawing
3	NFPA110 UPGRADE - NFPA110 Kit description
4	Control panel configuration - DSE7410 Datasheet
5	Voltage Regulator Options - SX460 Datasheet - AS440 Datasheet
6	Fuel Tank - Fuel tank drawing
7	MLCB Configuration (MLCB No Longer Included in Base Price) - T6NQ600TW
8	Warranty - Warranty Documentation

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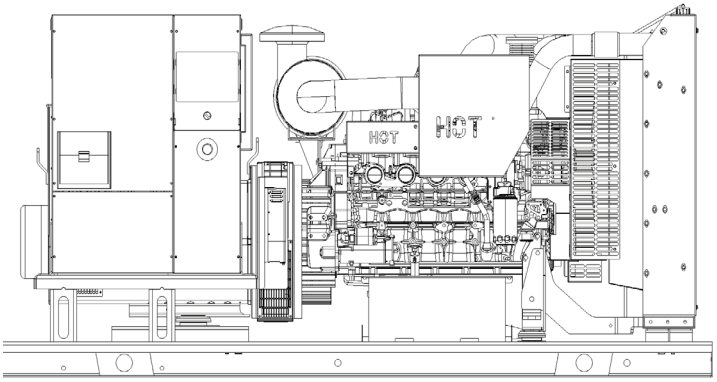
HIPOWER®
A YANMAR COMPANY

Heavy Duty Industrial DIESEL GENERATOR

MODEL
HDI-130F

60Hz STANDBY POWER RATINGS

130kW/60Hz//1800RPM



VOLTAGE VAC	120/240V	120/208V	139/240V	277/480V	347/600V
RATING	Standby	Standby	Standby	Standby	Standby
PHASE	1	3	3	3	3
PF	1.0	0.8	0.8	0.8	0.8
HZ	60	60	60	60	60
KW	128	130	130	130	130
KVA	128	162.5	162.5	162.5	162.5
AMPS	533	451	391	195	156

Description

HIPOWER® Heavy Duty Industrial generators are an efficient, reliable and versatile source of back-up electrical power that have been designed to operate in the most extreme working conditions. All HIPOWER® Heavy Duty Industrial generators combine an innovative design and the use of high quality materials that provide the user with the most dependable power that can be relied on for non-stop power with easy to operate controls.

Powered by a radiator-cooled, industrial FPT Diesel engine that meets current Environmental Protection Agency (EPA) TIER 3 exhaust emission regulations, driving a single bearing, four-pole, three-phase alternator, with IP23 protection. The Emergency Power kVA rating is given with a 125 degree °C alternator winding temperature rise.

HIPOWER® Features and Benefits

FTP Diesel Engine: Long-life, heavy-duty, 4-cycle, direct injection engine for economy of operation and maximum reliability and durability.

Cooling: Radiator with belt driven pusher fan.

Air Filter: Heavy-duty replaceable element air-cleaner.

Alternator: Single bearing, rotating field, self-excited, self-ventilated, 12-wire re-connectable, 60Hz brushless alternator and Class H insulation. Automatic voltage regulator (AVR) providing close voltage regulation and skVA starting capability for electric motor loads.

Enclosure: Fully sound attenuated enclosure, manufactured using 7-gauge steel and thicker for the base; 12-gauge and 14-gauge for the enclosure, Interpon A4700 primer, in combination with Interpon 600 series coatings, are designed for exterior exposure and offers excellent light and weather resistance exceeding 1400-hr salt spray test. A 1" thick layer of durable sound insulating, oil and fire resistant foam material is installed all around the inside of the enclosure to allow high-pressure water cleaning. Vertical air discharge for quiet operation. Wide steel lockable access doors with rubber seals, easy access for maintenance and service activities, lift off Die Cast Zinc hinges textured black powder coat and corrosion resistant hardware and fasteners.

Exhaust: Low noise, steel residential-type exhaust silencer with rain cap.

Fuel Filtration: Standard and secondary water separator with visible level on fuel filters.

Controls: Digital control panel with manual and automatic start and stop features. Many programmable automatic functions for local and remote controls with LED lights and tamper proof engine hour recorder.

Certification: Generator set is UL 2200 Listed and CSA certified and meets ISO 8528-5.

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Codes and Standards Compliances used where applicable

APPLICATION DATA

ENGINE SPECIFICATION		LUBRICATION SYSTEM	
Manufacturer	FPT - Iveco	Oil pan capacity - gal (L)	3.2 (12)
Model	N67TM1X	Oil pan capacity with filter - gal (L)	4.5 (17.2)
EPA certified	Tier 3	Oil cooler	Liquid
Crankshaft speed	1,800 rpm	Recommended lubricating oil grade	SAE 10W-30 / ACEA E3/E5 (refer to owners manual)
Type	Diesel, 4-stroke	Oil consumption at full load	< 0.1% of fuel consumption
Injection	Direct	Oil pressure – psi (kPA)	72.6 (500)
Aspiration	Turbocharged aftercooled air/air	ENGINE ELECTRICAL SYSTEM	
Number of Cylinders	6	Starting motor voltage	12 volt
Cylinder arrangement	In-line	Cold Cranking Amps - minimum	650 Amp
Displacement CID (liters)	408.9 (6.7)	Battery charging Alternator	90 Amp
Bore and Stroke ins (mm)	4.1 x 5.2 (104 x 132)	Battery capacity	650CCA 850CA 115RC GROUP SIZE 24F
Nominal power	198.5 hp		
Cooling	Liquid		
Governor	Electronic		
Governor Regulation Class	ISO 8528 Part 1 Class G3		
Frequency Regulation	Isochronous		
Starting motor & alternator	12 Volt		
Compression ratio	17.5:1		
Air cleaner type	Heavy duty - single cartridge		
ALTERNATOR SPECIFICATION			
Manufacturer	STAMFORD		
Model 120/240V Single phase	UCI274F		
Model 120/208V Three phase	UCI274F		
Model 277/480V Three phase	UCI274E		
Model 347/600V Three phase	UCI274E		
Alternator Type	Four pole, rotating field		
Excitation System	Brushless		
Power factor	0.8		
Number of leads	12 leads, reconnectable		
Stator Pitch	2/3		
Insulation	Class H		
Windings – Temperature Rise	Class H (125/40° C)		
Enclosure (IEC-34-S)	IP23		
Bearing	Single, sealed		
Coupling	Flexible disc		
Amortisseur windings	Full		
Voltage regulation – no load to full load with AS440 AVR	± 1%		
TIF	<50		
Radio Frequency Emissions compliance	Meets requirements of most industrial and commercial applications		
Line harmonics	5% maximum		

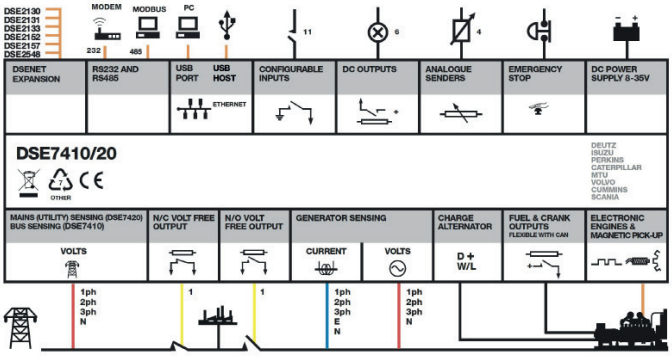
HDI130F - 130Kw
Heavy Duty Industrial

STANDARD FEATURES

Enclosure (If selected)	Engine System	Fuel System
Rust-Proof Fastener with Nylon Washers Protect Finish	Oil Drain Extension	Primary Fuel Filter
High Performance Sound-Absorbing Material (L1)	Air Cleaner	Flexible fuel lines
Gasketed Doors	Fan Guard	**Generator set**
Air Discharge Hoods for Radiators-Upwards Pointing	Factory Filled Oil	
Lift Off Door Hinges	Battery Charging Alternator	Separation of Circuits – Multiple Breakers (load center)
Stainless Steel Lockable Handles	**Alternator Systems**	Separation of Circuits – High / Low Voltage
Textured Polyester Powder Coat	12 Leads (3-Phase, Non 600V)	Internal Genset Vibration Isolation
Cooling System	Class H Insulation Material	Wrapped Exhaust Piping
Factory-Installed Radiator	Vented Rotor	Standard Factory Testing
Radiator Drain Extension	2/3 Pitch	2 Year/2000 hours Limited Warranty
50/50 Ethylene Glycol Antifreeze	Full Load Capacity Alternator	Silencer Mounted in the Discharged Hood (Enclosed Only)
Electrical Systems	Protective Thermal Switch	Emergency Stop
Battery Cables and Battery Tray	Permanent Magnet Excitation	
Batteries	Skewed Stator	

CONTROL SYSTEM

- Charge alternator failure alarm
- 4-Line back-lit LCD text display
- Front panel editing with PIN protection
- Customizable status screens
- Power save mode
- 11 configurable inputs
- 8 configurable outputs
- Flexible sensor inputs
- Configurable timers and alarms
- 3 configurable maintenance alarms
- Multiple date and time scheduler
- Configurable event log (250)
- "Protections disabled" feature
- kW protection
- Reverse power (kW) protection
- LED and LCD alarm indication
- Power monitoring (kWh, kVAr, kVAh, kVArh)
- Load switching (load shedding and dummy load outputs)
- Independent Earth Fault trip
- Fuel usage monitor and low fuel alarms
- Configurable display languages
- User selectable simultaneous RS232, RS485 & Ethernet communications
- MODBUS RTU & TCP support
- Configurable MODBUS pages
- Fully configurable via DSE Configuration Suite PC software
- Data logging to assist with fault finding
- PLC editor allows user configurable functions to meet specific application requirements
- License-free PC software
- Multiple date and time scheduler
- DSENet® expansion compatible



HDI130F - 130Kw
Heavy Duty Industrial

CONFIGURABLE OPTIONS

ENCLOSURE	ENGINE SYSTEM	ELECTRICAL SYSTEM
Open Skid	Oil heater	Battery Warmer
Weather Enclosure	120V-1ph Water Jacket Heater (with Isolation Valves)	10A Battery Charger
Level 1 Sound attenuated	208V-3ph Water Jacket Heater (with Isolation Valves)	6A Battery Charger
Level 2 Sound attenuated	**CIRCUIT BREAKER OPTIONS**	10 Positions Load Center (100Amps)
ALTERNATOR SYSTEM	Thermal-Magnetic trip 80% & 100 % rated	Remote ESTOP with N3R break glass
Anti-condensation heater	LS/I Electronic trip 80% and 100% rated	120V GFCI receptacle
Alternator upsizing	LSI Electronic trip 80% and 100% rated	10A Relay common alarm
Rheostat	LSIG Electronic trip 80% and 100% rated	10A Run Relay
MX321 AVR	Shunt trip	8 Led Remote Annunciator on Surface mounted Box
	Auxiliary Contacts for Main and Secondary Breaker	16 Led Remote Annunciator on Surface mounted Box
	Second Main Line Circuit Breaker	24 Led Remote Annunciator on Surface mounted Box
	Mechanical Lugs	

GENERATOR SET
Extended Factory Load Testing
Extended Warranty
Seismic Mounts

ENGINEERED OPTIONS

ENCLOSURE	ENGINE SYSTEM	ELECTRICAL SYSTEM
Snow Hood (only with L2)	Fluid Containment Pan	AC/DC Enclosure Lighting Kit with Timer
Air Outlet Gravity dampers		Enclosure Heater
Air Inlet motorized dampers (only with L2)		240V Twist lock receptacle
CIRCUIT BREAKER OPTIONS	**CONTROL SYSTEM**	**GENERATOR SET**
3rd Breaker system	Spare inputs (x4) / output (x4)	Special Testing
Shunt Trip on 3rd Breaker	DSE8610 - Parallel controller with motorized CB	**ALTERNATOR SYSTEM**
Auxiliary contact on 3rd Breaker	DSE2130 - DSENet Input Expansion Module	Tropical coating
FUEL TANK	DSE2157 - DSENet Output Expansion Module	
Custom Size – 72hr and 96hr	DSE855 - DSENet USB to Ethernet ModBus TCP/IP Communication Module	
Custom type to meet State spec.	DSE892 - DSENet USB to Ethernet ModBus TCP/IP - SNMP Comm. Module	
Vent Extensions	DSE2520 - Remote Display Module	
Overfill Protection Valve		

OPERATING DATA

FUEL SYSTEM	
Recommended fuel	# 2 - ULSD
Fuel supply line, min. ID mm (in.)	9.5 - (3/8")
Fuel return line, min. ID, mm (in.)	9.5 - (3/8")
Max. lift, fuel pump, type, m (ft)	TBD
Fuel filter	Secondary 5 Microns @ 98% Efficiency

FUEL CONSUMPTION		(Standby Power Rating)
100% load	US Gal/hr (L/hr)	10 (38)
75% load	US Gal/hr (L/hr)	7.5 (28.5)
50% load	US Gal/hr (L/hr)	5 (19)
25% load	US Gal/hr (L/hr)	2.5 (8)

COOLING SYSTEM		
Engine cooling air flow	cfm (m^3/min)	8,052 (228)
Alternator cooling flow	cfm (m^3/min)	1,307 (37)
Combustion air flow	cfm (m^3/min)	389 (11)
Total cooling air flow (engine+alternator+combustion)	cfm (m^3/min)	9,748 (276)
Total cooling capacity	US gallons (liters)	3.96 (15)
Max. Operating Temperature	°F (°C)	122 (50)

EXHAUST		
Exhaust gas flow	cfm (m^3/min)	910 (25.8)
Max. Exhaust temp at full load degrees	°F (°C)	896 (480)
Max. permissible back pressure	in H2O (kPA)	20 (5)

Starting Capabilities (sKVA)

	120/240V (1PH)					277/480V					208/240V					347/600V				
Alternator	10%	15%	20%	25%	30%	10%	15%	20%	25%	30%	10%	15%	20%	25%	30%	10%	15%	20%	25%	30%
Standard	85	140	190	255	325	115	185	260	350	445	100	165	230	310	400	115	185	265	350	450
Upsized	105	165	230	305	395	135	215	305	405	520	170	265	380	500	640	125	200	280	380	485

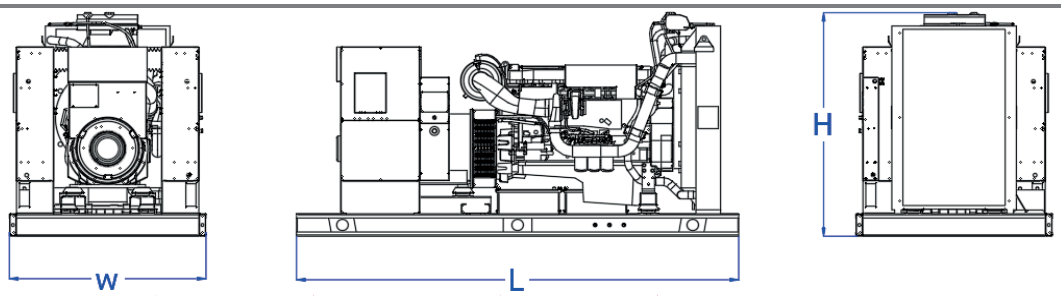
Circuit Breaker

	120/240V (1PH)	277/480V	120/208V	120/240V	347/600V
Make and model	ABB T6N600TW	ABB XT3NU3200AFF000XXX	ABB T5N600BW	ABB T5N400TW	ABB XT3NU3175AFF000XXX
Amps	600 A	200 A	600 A	400 A	150 A

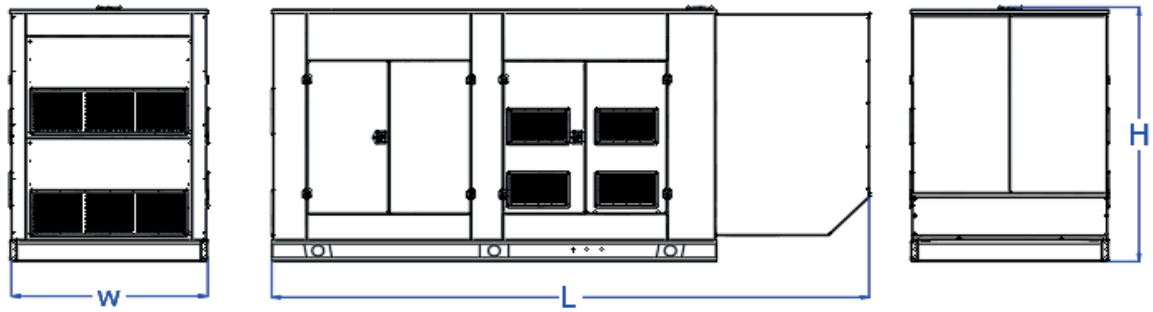
HDI130F - 130Kw

Heavy Duty Industrial

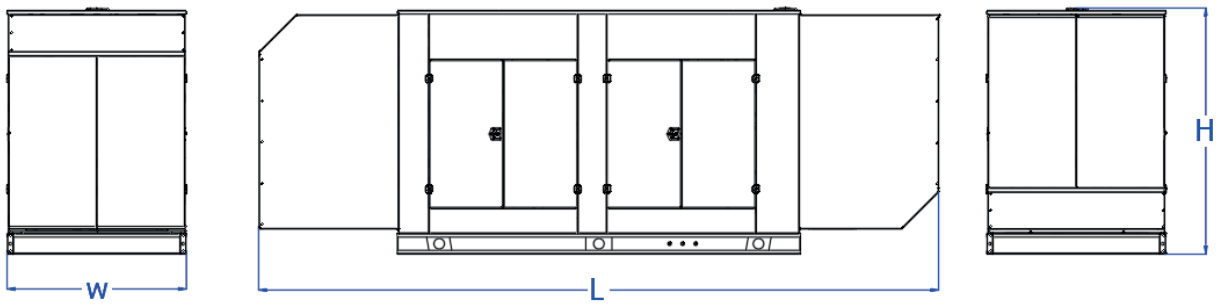
DIMENSIONS, WEIGHTS & SOUND LEVELS



CONFIGURATION	RUN TIME (HOURS)	USABLE CAPACITY (Gal.)	L = Length	W = Width	H = Height	Weight lbs	dBA
OPEN SET	No Tank	-	109"	46.3"	53"	3,120	N/A
	34	330	166"	46.3"	18"	1,700	
	68	660	166"	46.3"	34"	2,400	



CONFIGURATION	RUN TIME (HOURS)	USABLE CAPACITY (Gal.)	L = Length	W = Width	H = Height	Weight lbs	dBA
WEATHER ENCLOSURE	No Tank	-	142.1"	46.3"	60.1"	4,500	77
	34	330	166"	46.3"	18"	1,700	
	68	660	166"	46.3"	34"	2,400	
LEVEL 1 ENCLOSURE	No Tank	-	142.1"	46.3"	60.1"	4,520	74
	34	330	166"	46.3"	18"	1,700	
	68	660	166"	46.3"	34"	2,400	



CONFIGURATION	RUN TIME (HOURS)	USABLE CAPACITY (Gal.)	L = Length	W = Width	H = Height	Weight lbs	dBA
LEVEL 2 ENCLOSURE	No Tank	-	175.2"	46.3"	60.1"	4,620	71
	34	330	199.2"	46.3"	18"	1,700	
	68	660	199.2"	46.3"	34"	2,400	

* All measurements are approximate and for estimation purposes only. Weights are without fuel tank. Sound levels measured at 23ft (7m) and does not account for ambient site conditions.

Intertek

Conforms to UL STD 2200
Certified to CSA STD C22.2#100
Certified to CSA STD C22.2#14

REV-02

N67 TM1X

141 kW @ 1800 rpm
Tier 3

Specifications

Thermodynamic cycle		Diesel 4 stroke
Air intake		TAA
Arrangement		6L
Bore x Stroke	mm	104 x 132
Total displacement	l	6.7
Valves per cylinder		2
Injection system		Mechanical
Speed governor		mechanical
Cooling system		liquid (water - paraflu 50%)
Flywheel housing/flywheel	type	SAE 3 / 11" 1/2
Direction of rotation (seen from flywheel side)		CCW
Oil specifications		ACEA E3-E5
Oil consumption		<0.1% of fuel consumption
Fuel specifications		EN 590
Oil and filter maintenance interval for replacement	hours	600
Specific fuel consumption at:	rpm	1800
	100% load l/h (g/kWh)	33.3 (207.4)
	80% load l/h (g/kWh)	29.2 (216.1)
	50% load l/h (g/kWh)	20.1 (225.3)
Coolant capacity: engine only	l	~10.5
engine+radiator	l	~25.5
ATB (without canopy)	°C	51

No remote cooling radiator allowed

Lube oil total system capacity including pipes, filters etc.	l	~17.2
Electric system		12 Vcc
Starting batteries: recommended capacity	Ah	1 x 100
Discharge current (EN 50342)	A	650
Cold starting: without air preheating	°C	-10
with air preheating	°C	-25

Performances

Ratings[1]		1800 rpm	
		PRIME	STAND-BY
Rated Output[2]	kWm	128	141

1) Ratings in accordance with ISO 8528. For duty at temperature over 40°C and/or altitude over 1000 meters must be considered a power derating factor. Contact the FPT sales organization.
2) Net power at flywheel available after 50 hours running with a ±3% tolerance.

PRIME POWER: The prime power is the maximum power available with varying loads for an unlimited number of hours. The average power output during a 24h period of operation must not exceed 80% of the declared prime power between the prescribed maintenance intervals and at standard environmental conditions. A 10% overload is permissible for 1 hour every 12 hours of operation.

STAND-BY POWER: The stand-by power is the maximum power available for a period of 500 hours/year with a mean load factor of 90% of the declared stand-by power. No kind of overloads is permissible for this use.

CONTINUOUS POWER: Contact the FPT sales organization.

N67 TM1X

141 kW @ 1800 rpm

Tier 3

Standard configuration

FPT engine N67 TM1X equipped with:

- Mounted radiator incorporating air-to-air charge cooler
- Mounted belt driven pusher fan
- Fan guard
- Mounted air filter with replaceable cartridges
- Fuel filter
- Primary fuel filter/water separator
- Replaceable oil filter
- Front engine mounting brackets
- Flywheel housing SAE3 and flywheel 11" 1/2
- Re-directable exhaust gas elbow
- Recirculed oil breather system
- Oil dipstick
- HWT and OP sensor
- 12Vdc electrical system
- User's handbook

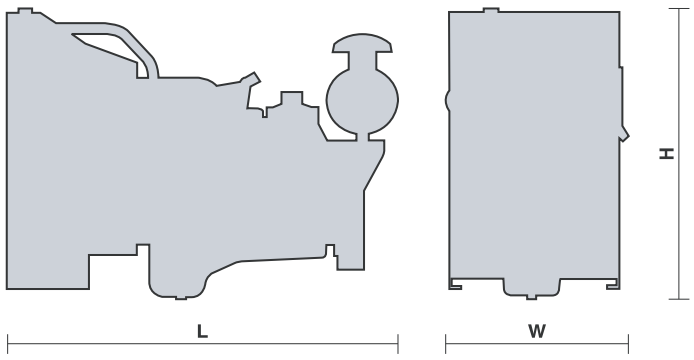
THE ENGINE IS SUPPLIED WITHOUT LIQUIDS

Optional equipment:

On request the engine can be supplied with:

- Oil drain pump
- Oil drain valve
- 120/230 Volt water jacket heater
- WT and OP sensors for gauges
- Low water level sensor
- Turbo and exhaust gas guards
- Exhaust gas flexible joint

Overall dimensions:



L = 1697 mm
W = 789 mm
H = 1318 mm
Dry weight ~ 640 kg

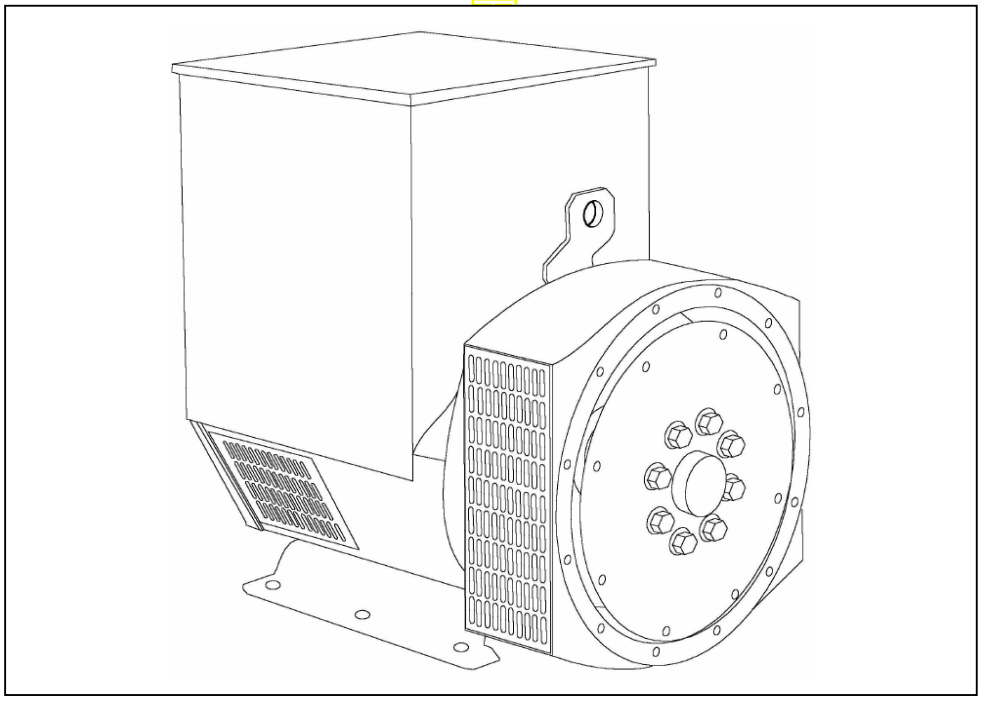
Publication P4A06N016E - 01.12
Specifications subject to change without notice.
Illustrations may include optional equipment.

FPT POWERTRAIN TECHNOLOGIES

STAMFORD®

UCI274F - Winding 311

Technical Data Sheet



SPECIFICATIONS & OPTIONS

STANDARDS

Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.
Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX460 AVR - STANDARD

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

AS440 AVR

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

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.
If three-phase sensing is required with the PMG system the MX321 AVR must be used.
We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

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

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation.
Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

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

QUALITY ASSURANCE

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

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

DE RATES

All values tabulated on page 8 are subject to the following reductions

5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5°C by which the operational ambient temperature exceeds 40°C.
Note: Requirement for operating in an ambient exceeding 60°C must be referred to the factory.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

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STAMFORD

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H						
PROTECTION	IP23						
RATED POWER FACTOR	0.8						
STATOR WINDING	DOUBLE LAYER CONCENTRIC						
WINDING PITCH	TWO THIRDS						
WINDING LEADS	12						
STATOR WDG. RESISTANCE	0.024 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED						
ROTOR WDG. RESISTANCE	1.52 Ohms at 22°C						
EXCITER STATOR RESISTANCE	20 Ohms at 22°C						
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE AT 22°C						
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others						
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%						
MAXIMUM OVERSPEED	2250 Rev/Min						
BEARING DRIVE END	BALL. 6315-2RS (ISO)						
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)						
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	530 kg				545 kg			
WEIGHT WOUND STATOR	200 kg				200 kg			
WEIGHT WOUND ROTOR	188.67 kg				177.71 kg			
WR² INERTIA	1.555 kgm^2				1.5044 kgm^2			
SHIPPING WEIGHTS in a crate	563 kg				577 kg			
PACKING CRATE SIZE	123 x 67 x 103(cm)				123 x 67 x 103(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.514 m³/sec 1090 cfm				0.617 m³/sec 1308 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	160	160	160	N/A	181.3	190	190	206.3
Xd DIR. AXIS SYNCHRONOUS	2.24	2.02	1.88	-	2.53	2.37	2.17	2.16
X'd DIR. AXIS TRANSIENT	0.19	0.17	0.16	-	0.21	0.20	0.18	0.18
X"d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.11	-	0.14	0.13	0.12	0.12
Xq QUAD. AXIS REACTANCE	1.38	1.25	1.16	-	1.53	1.43	1.31	1.31
X"q QUAD. AXIS SUBTRANSIENT	0.17	0.15	0.14	-	0.20	0.19	0.17	0.17
X_L LEAKAGE REACTANCE	0.07	0.06	0.06	-	0.09	0.08	0.08	0.08
X_2 NEGATIVE SEQUENCE	0.14	0.13	0.12	-	0.16	0.15	0.14	0.14
X_0 ZERO SEQUENCE	0.08	0.08	0.07	-	0.10	0.09	0.09	0.09
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.035 s							
T"d SUB-TRANSTIME CONST.	0.011 s							
T'do O.C. FIELD TIME CONST.	0.9 s							
Ta ARMATURE TIME CONST.	0.009 s							
SHORT CIRCUIT RATIO	1/Xd							

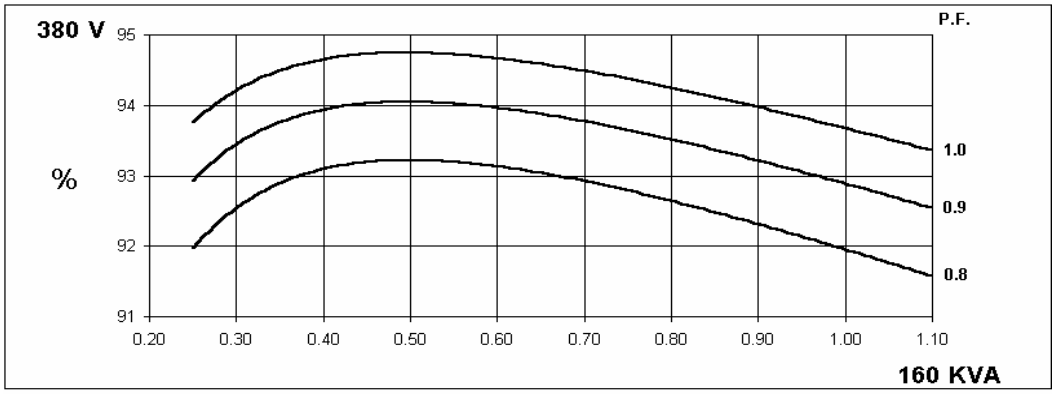
50 Hz

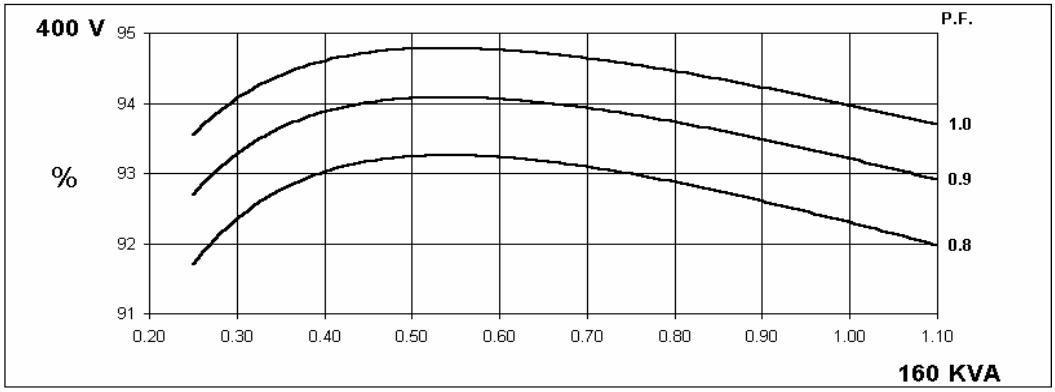
UCI274F

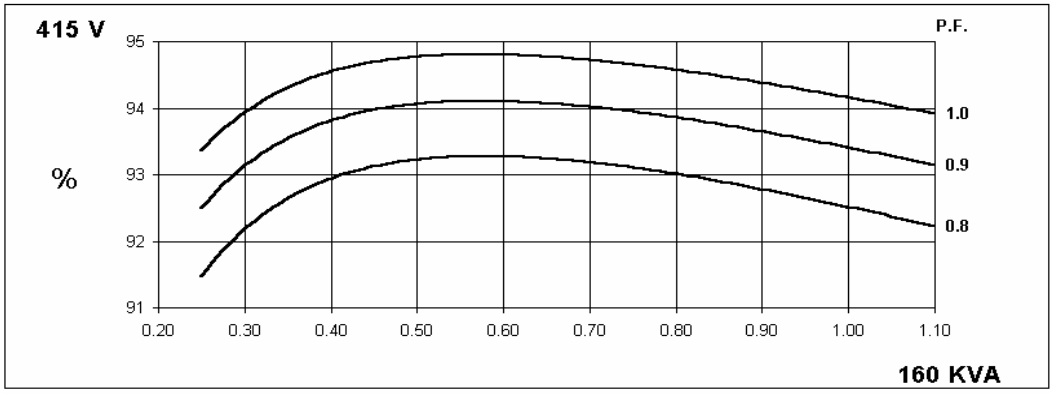
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES







60 Hz

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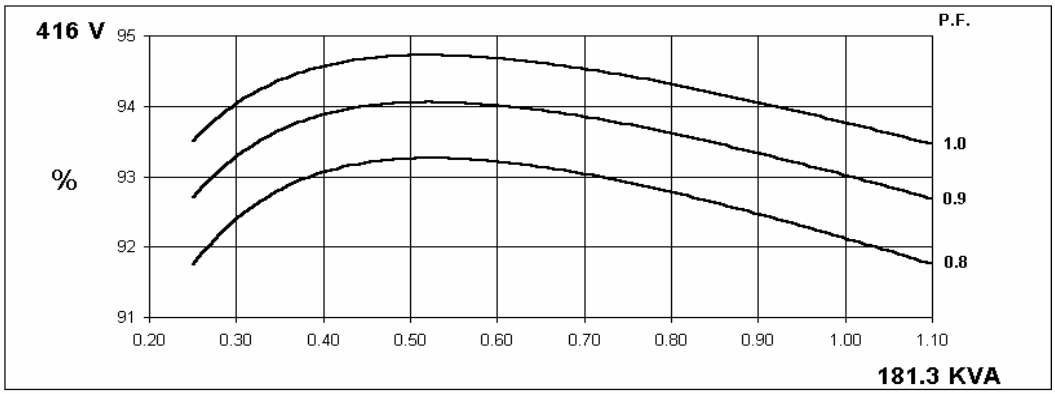
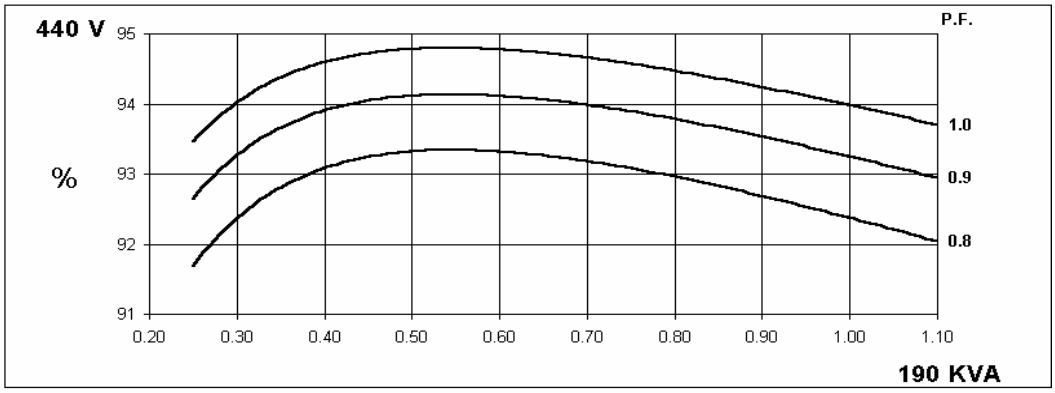
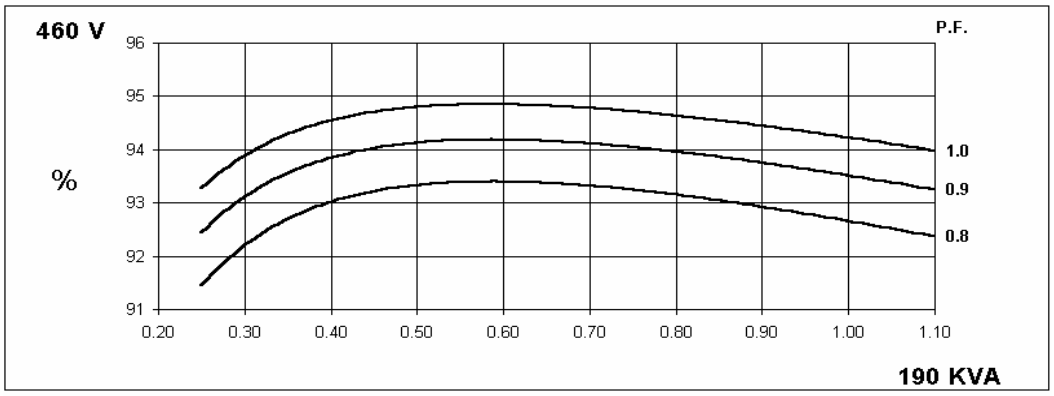
Winding 311

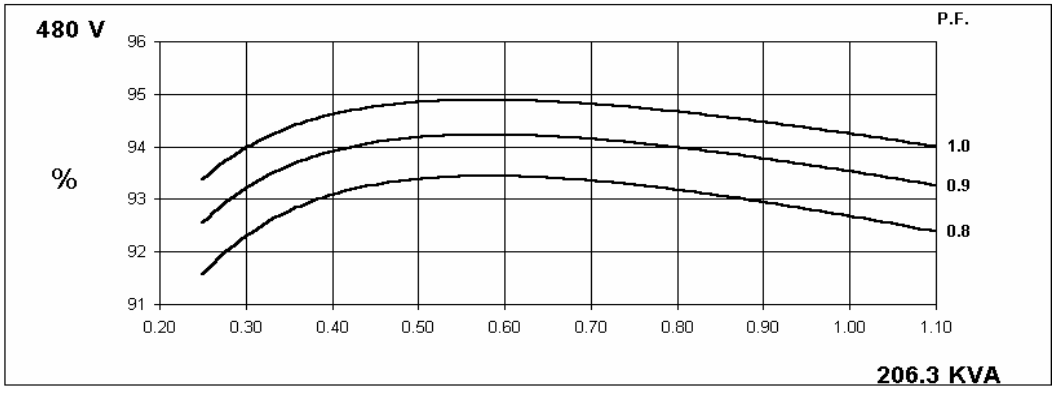
STAMFORD

THREE PHASE EFFICIENCY CURVES









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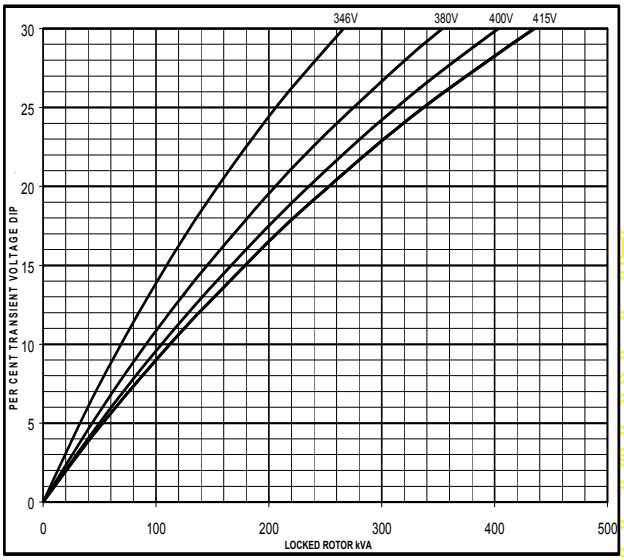
Winding 311

Locked Rotor Motor Starting Curve

50 Hz

MX



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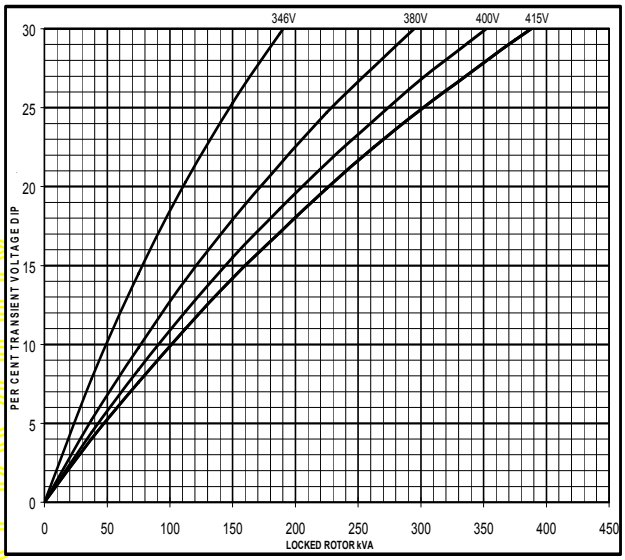
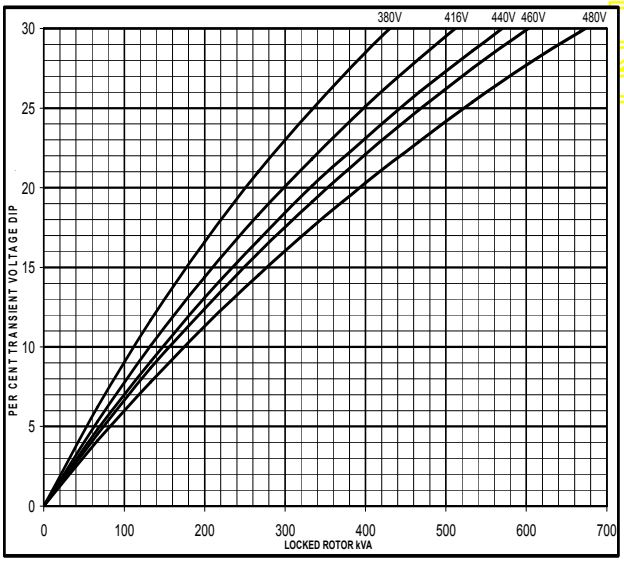


60 Hz

MX



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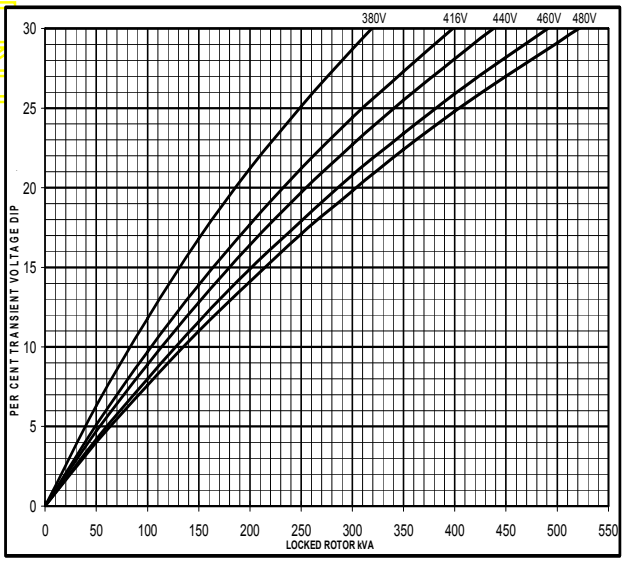
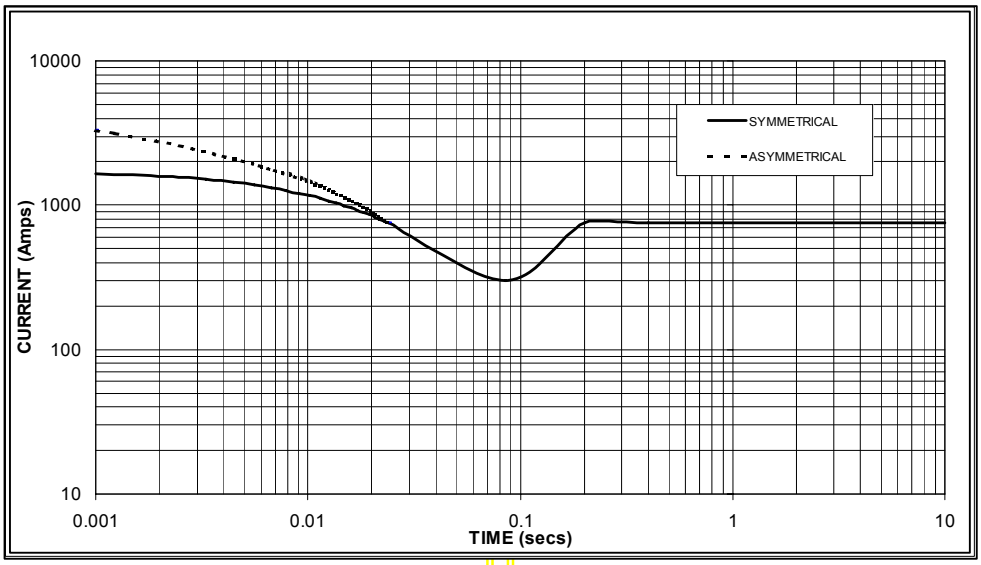


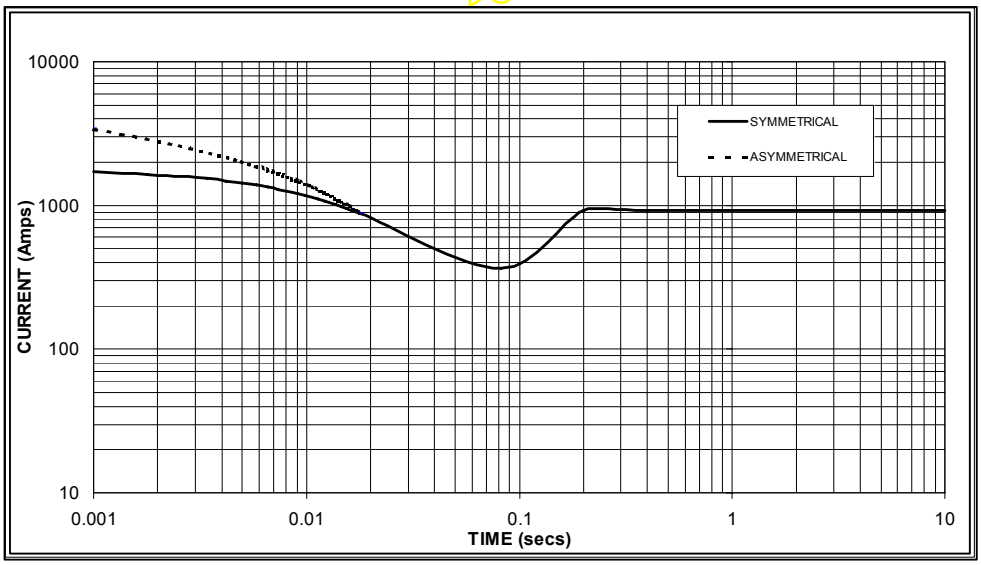
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 750 Amps

60 Hz



Sustained Short Circuit = 920 Amps

Note 1

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

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.07	440v	X 1.06
415v	X 1.12	460v	X 1.12
		480v	X 1.17

The sustained current value is constant irrespective of voltage level

Note 2

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

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

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

UCI274F

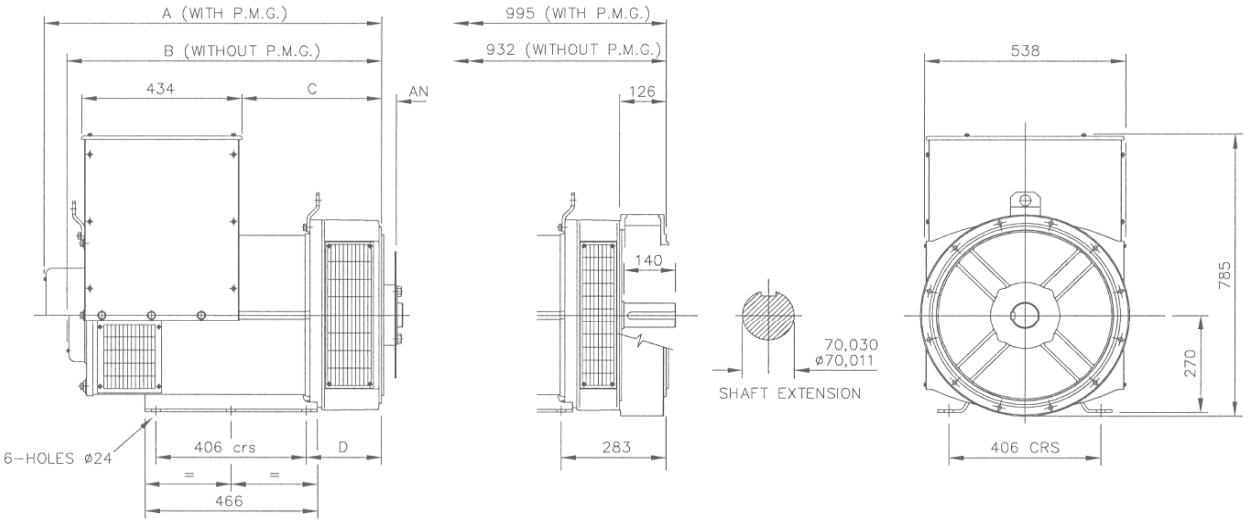
STAMFORD

Winding 311 / 0.8 Power Factor

RATINGS

	Class - Temp Rise	Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	145.0	145.0	145.0	N/A	160.0	160.0	160.0	N/A	170.0	170.0	170.0	N/A	175.0	175.0	175.0	N/A
	kW	116.0	116.0	116.0	N/A	128.0	128.0	128.0	N/A	136.0	136.0	136.0	N/A	140.0	140.0	140.0	N/A
	Efficiency (%)	92.3	92.6	92.8	N/A	92.0	92.3	92.5	N/A	91.7	92.1	92.3	N/A	91.6	92.0	92.2	N/A
	kW Input	125.7	125.3	125.0	N/A	139.1	138.7	138.4	N/A	148.3	147.7	147.3	N/A	152.8	152.2	151.8	N/A
60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	162.5	172.5	172.5	187.5	181.3	190.0	190.0	206.3	187.5	200.0	200.0	212.5	192.5	206.3	206.3	218.8
	kW	130.0	138.0	138.0	150.0	145.0	152.0	152.0	165.0	150.0	160.0	160.0	170.0	154.0	165.0	165.0	175.0
	Efficiency (%)	92.5	92.7	92.9	92.9	92.1	92.4	92.7	92.7	92.0	92.2	92.5	92.6	91.9	92.1	92.4	92.5
	kW Input	140.5	148.9	148.5	161.5	157.5	164.5	164.0	178.0	163.0	173.5	173.0	183.6	167.6	179.2	178.6	189.2

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	928,3	865,3	389,3	216,3
SAE 2	914	851	375	202
SAE 3	914	851	375	202

COUPLING DISCS	
DISC	AN
SAE 10	53,98
SAE 11,5	39,68
SAE 14	25,40

APPROVED DOCUMENT

STAMFORD

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Fax: +44 (0) 1780 484100

www.cumminsgeneratortechnologies.com

UC274F-311-TD-EN-SG-A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2021 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **FPT Industrial S.p.A.**
(U.S. Manufacturer or Importer)

Certificate Number: **MFPXL06.7DGS-002**

Effective Date: 05/26/2020

Expiration Date: 12/31/2021

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 05/26/2020

Revision Date: N/A

Model Year: 2021
Manufacturer Type: Original Engine Manufacturer
Engine Family: MFPXL06.7DGS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 130<=kW<225
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: No Non-After Treatment Devices Installed

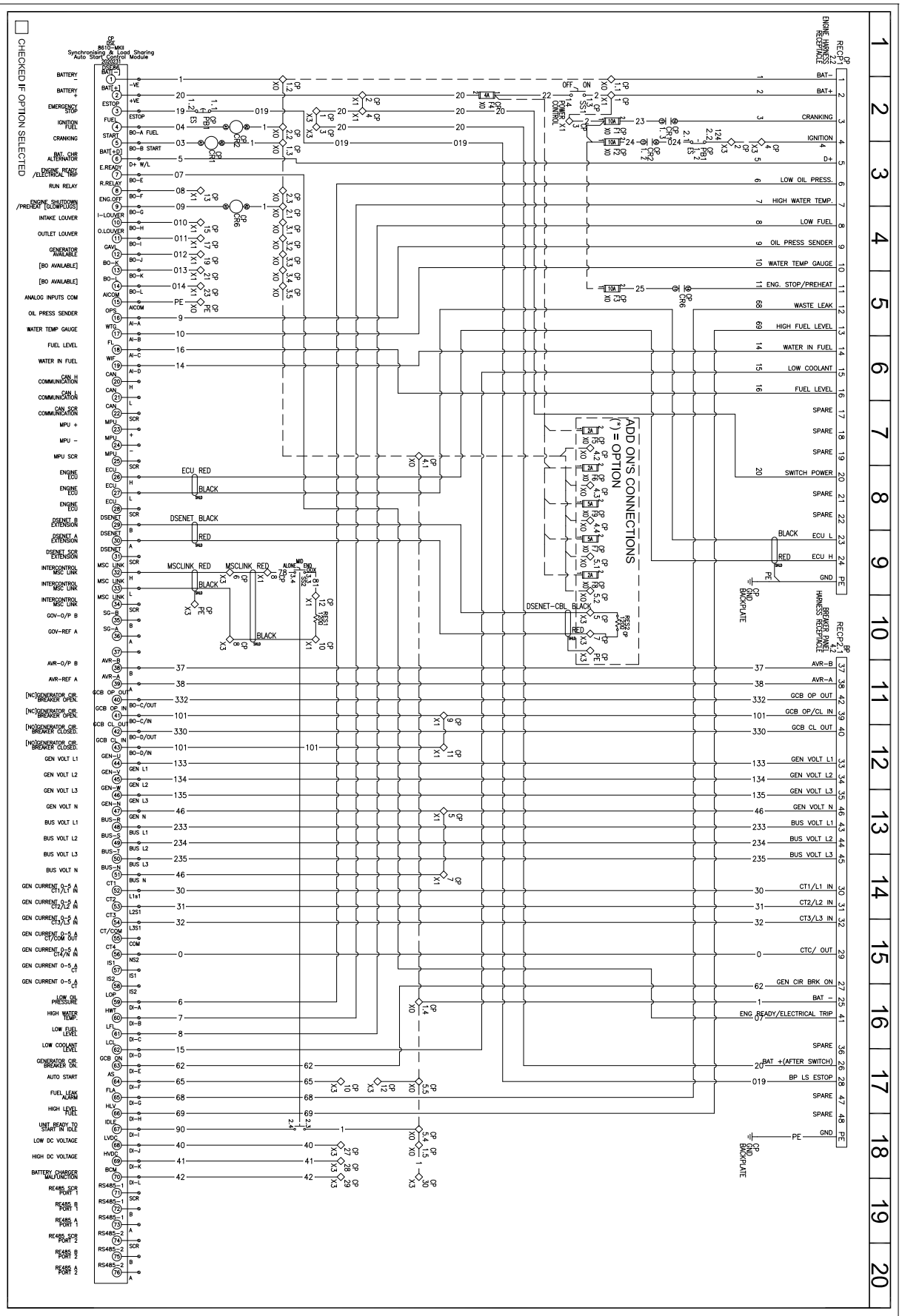
Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.



HIMOINSA POWER SYSTEMS, INC. OFFICE: 913-495-5557 WWW.HIPOWERSYSTEMS.COM

DRAWING NO.	9000003
SHEET	1 OF 1
DRAWN BY	C.S.
CHECKED BY	
DATE	01/14/2020
APPROVED BY	
DATE	01/14/2020
SCALE	NTS

CONTROL PANEL WIRING

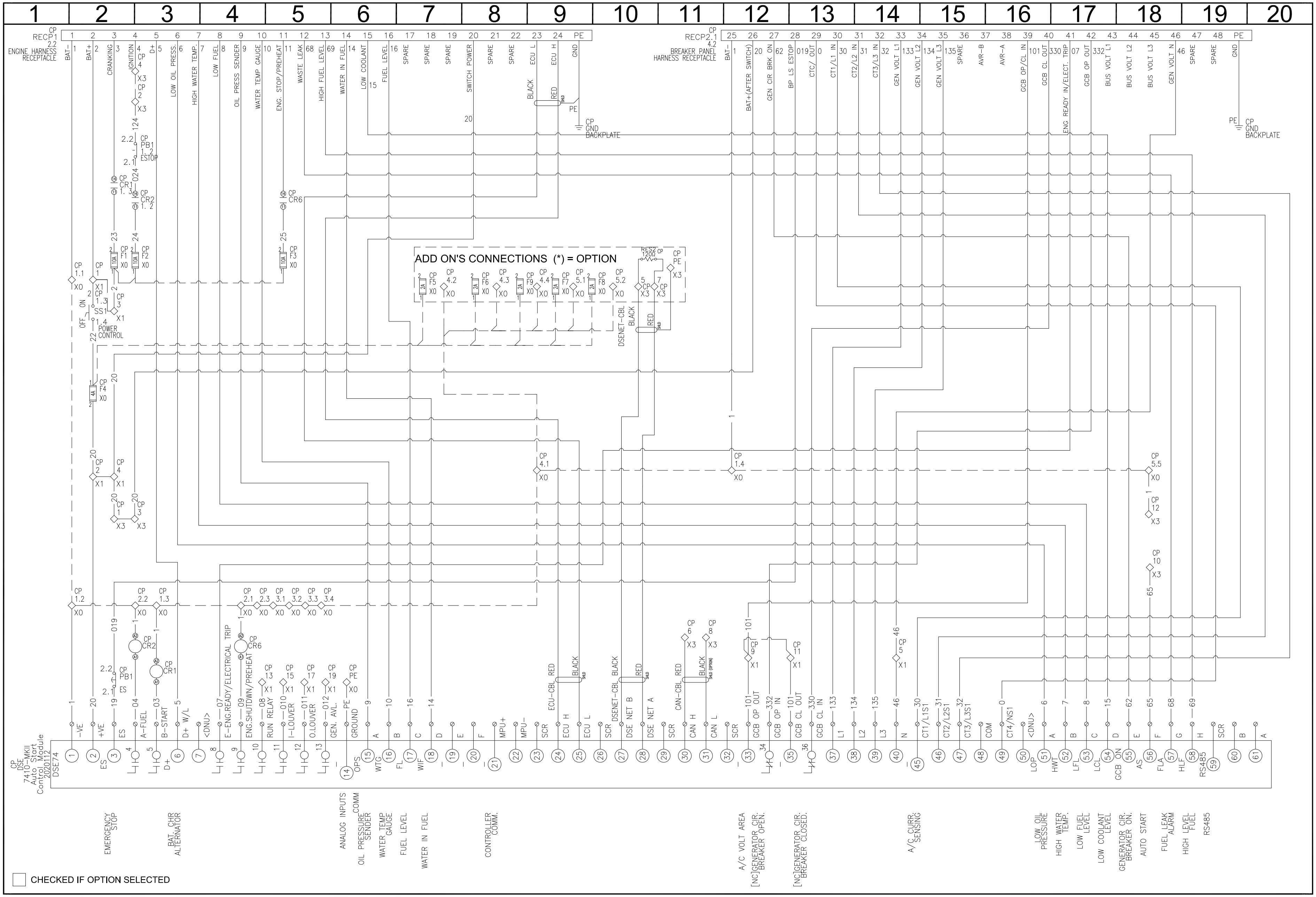
DSE 8610 MKII

ELECTRICAL DOCUMENTATION

HEAVY DUTY INDUSTRIAL

NO.	DATE	REVISION	BY
R0	01/14/2020	INITIAL RELEASE	C.S.
R1			
R2			
R3			
R4			
R5			

HIPOWER® generating sets



HIMOINSA POWER SYSTEMS, INC.

OFFICE: 913-495-5557

WWW.HIPOWERSYSTEMS.COM

HIPOWER generating sets

NO.	DATE	REVISION	BY
01	06/03/19	INT	S.S.

HEAVY DUTY ELECTRICAL PANEL

DSE 7410 MKII

CONTROL PANEL WIRING

DRAWN BY: S.S.	CHECKED BY: C.S.
DRAWING DATE: 06-07-2019	CHECKED DATE: 06/03/19
STATUS: WIP	SYMBOLOGY: NEC

ELEC PANEL CODE: 9000022

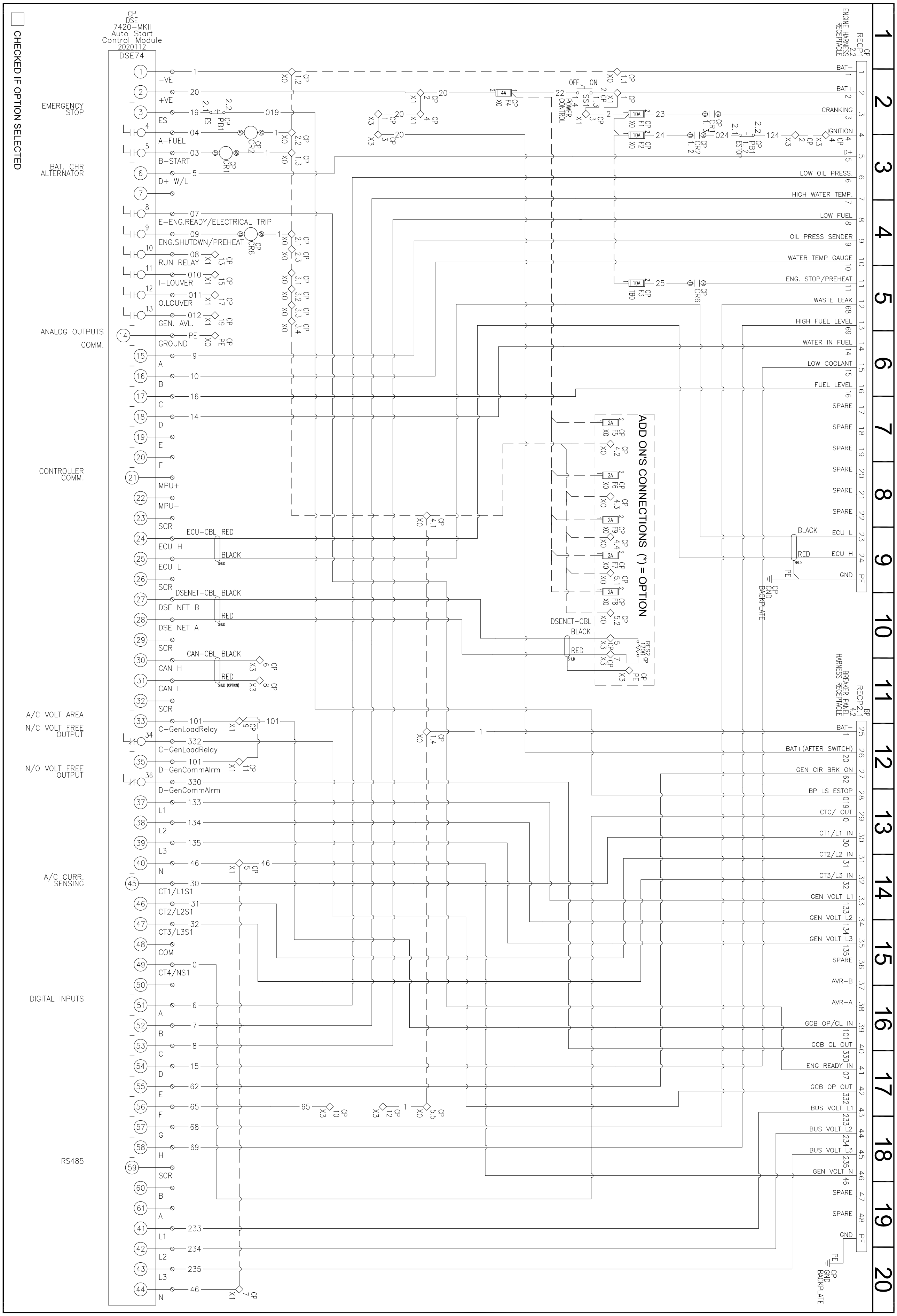
SHEET NO: 1 OF 1

HIMOINSA POWER SYSTEMS, INC.

OFFICE: 913-495-5557

WWW.HIPOWERSYSTEMS.COM

☐ CHECKED IF OPTION SELECTED



DRAWN BY	S.S.
CHECKED BY	C.S.
DATE	09-16-2020

HEAVY DUTY ELECTRICAL PANEL

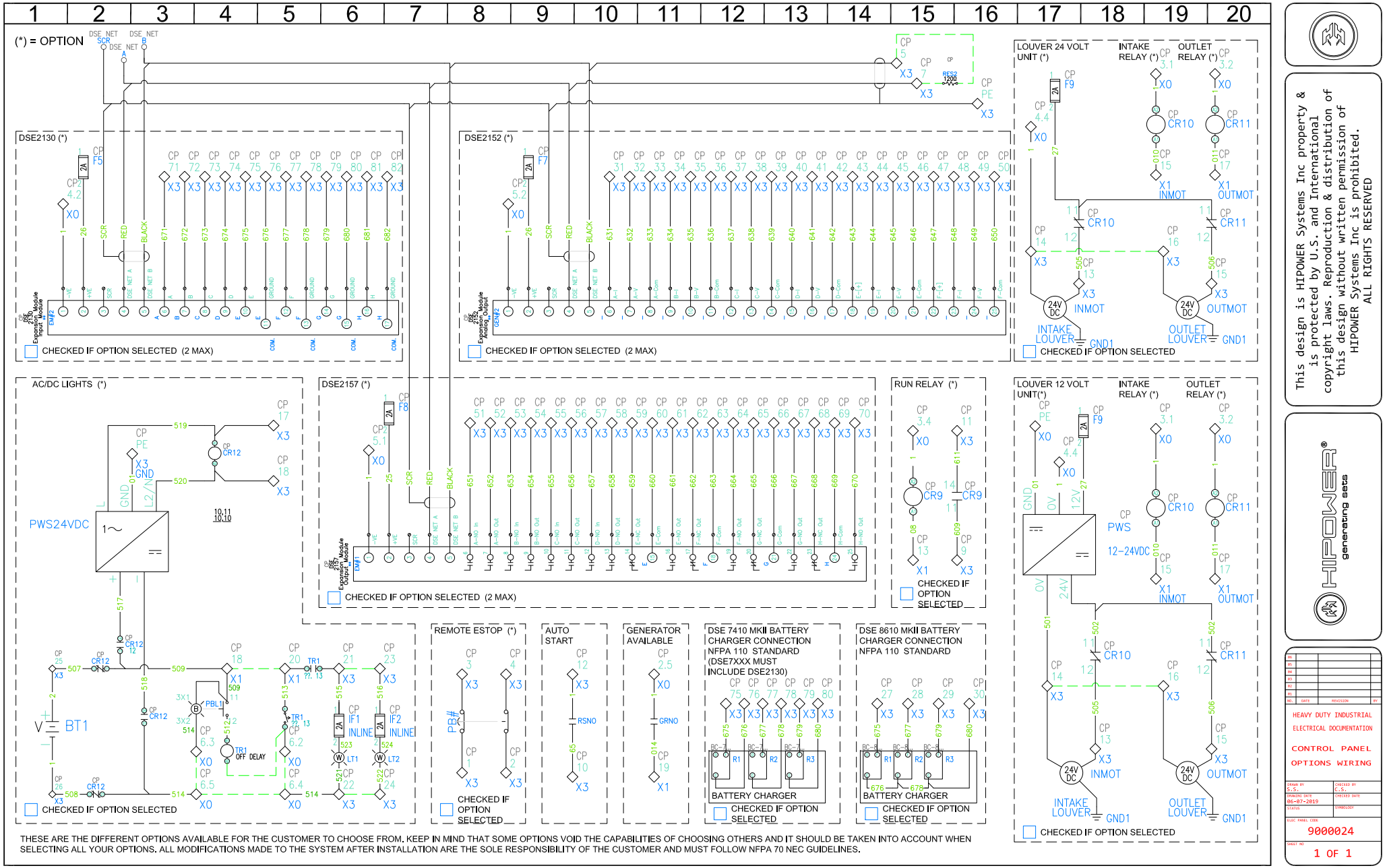
DSE 7420 MKII

CONTROL PANEL WIRING

9000034

1 OF 1

HIPOWER® generating sets



THESE ARE THE DIFFERENT OPTIONS AVAILABLE FOR THE CUSTOMER TO CHOOSE FROM. KEEP IN MIND THAT SOME OPTIONS VOID THE CAPABILITIES OF CHOOSING OTHERS AND IT SHOULD BE TAKEN INTO ACCOUNT WHEN SELECTING ALL YOUR OPTIONS. ALL MODIFICATIONS MADE TO THE SYSTEM AFTER INSTALLATION ARE THE SOLE RESPONSIBILITY OF THE CUSTOMER AND MUST FOLLOW NFPA 70 NEC GUIDELINES.

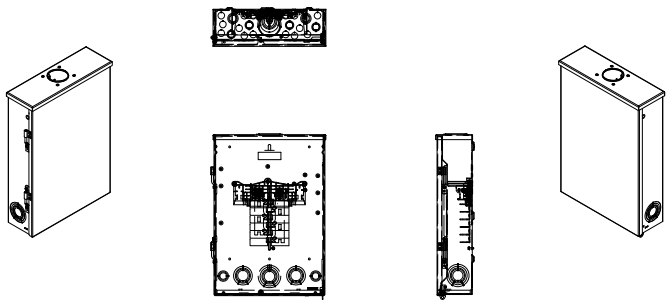
HEAVY DUTY INDUSTRIAL ELECTRICAL DOCUMENTATION

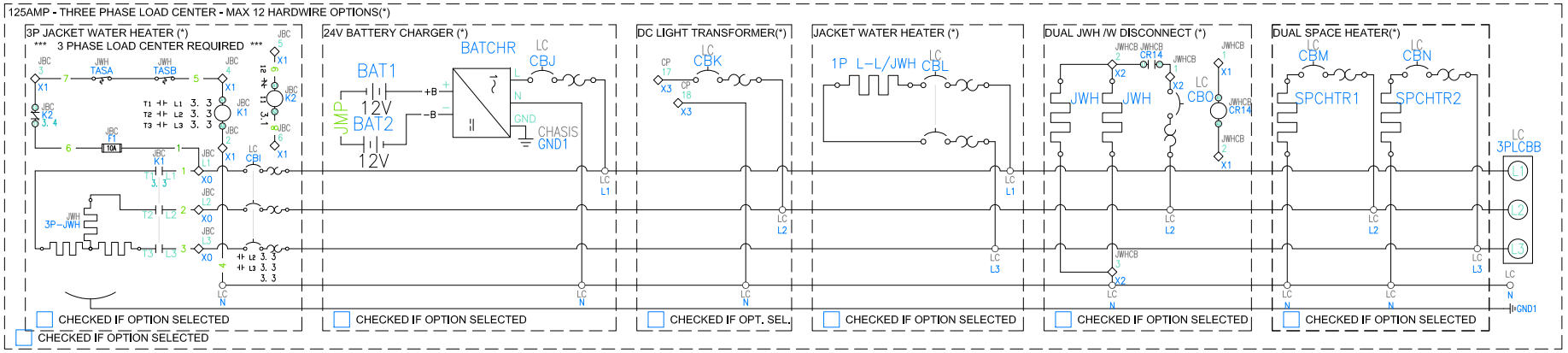
CONTROL PANEL OPTIONS WIRING

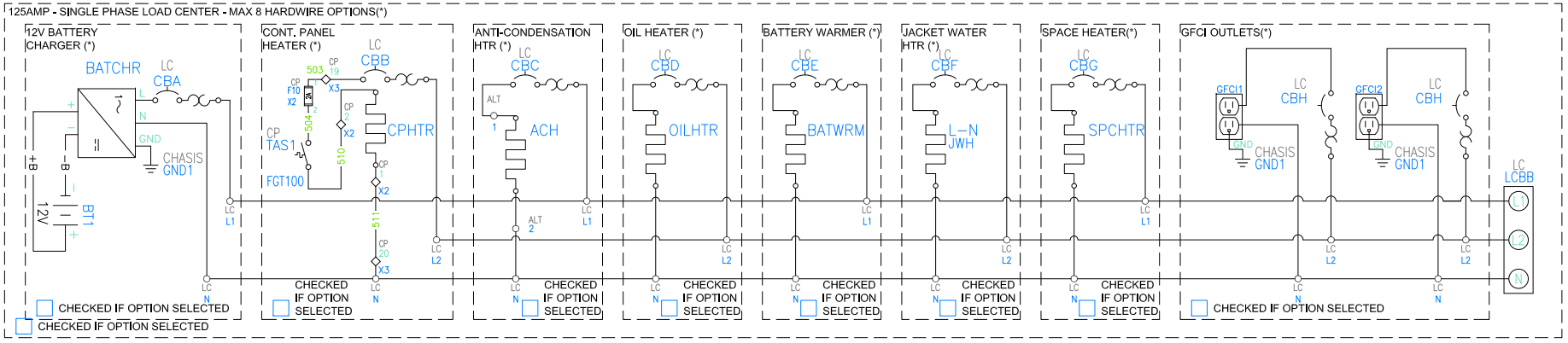
DRAWN BY	CHECKED BY
S.S.	C.S.
DRAWING DATE	CHECKED DATE
06-07-2019	
STATUS	SYMBOLOGY

ELEC PANEL CODE: 9000024

SHEET NO: 1 OF 1





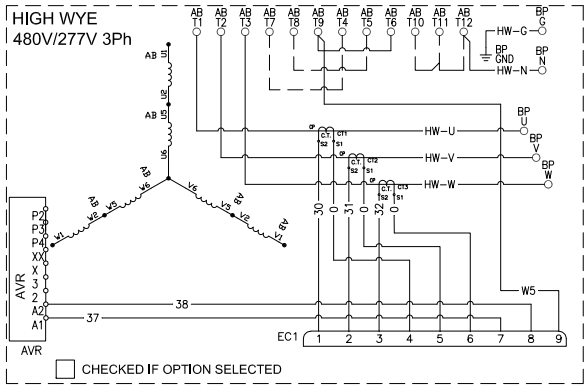


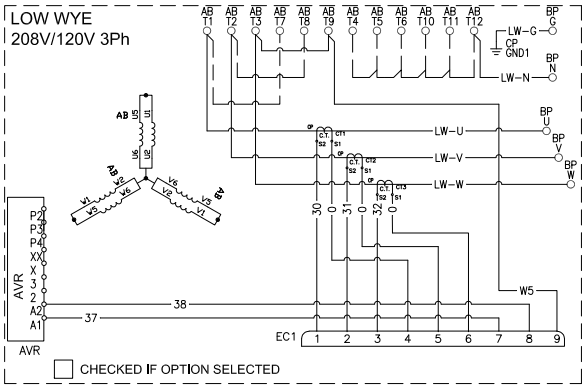
THESE ARE THE DIFFERENT OPTIONS AVAILABLE FOR THE CUSTOMER TO CHOOSE FROM. KEEP IN MIND THAT THREE PHASE BREAKERS AS WELL AS LINE TO LINE BREAKERS TAKE MULTIPLE HARDWIRE SPOTS AND IT SHOULD BE TAKEN INTO ACCOUNT WHEN SELECTING ALL YOUR OPTIONS IN ORDER NOT TO EXCEED THE MAXIMUM. ALSO NOTE THE MAX AMPERAGE OF THE LOA D CENTER AND AVOID EXCEEDING IT AS WELL. ALL MODIFICATIONS MADE TO THE SYSTEM AFTER INSTALLATION ARE THE SOLE RESPONSIBILITY OF THE CUSTOMER AND MUST FOLLOW NFPA 70 NEC GUIDELINES.

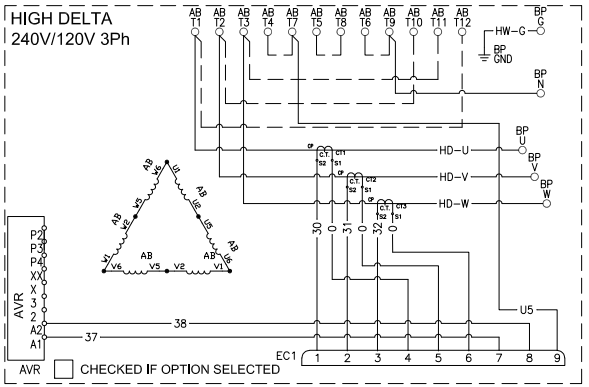
HIPOWER generating sets

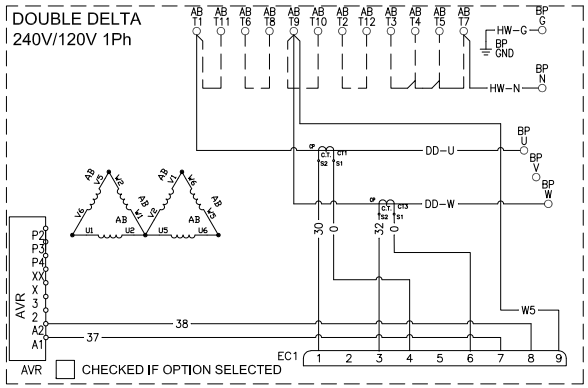
HEAVY DUTY
ELECTRICAL PANEL
LOAD CENTER
OPTIONS WIRING

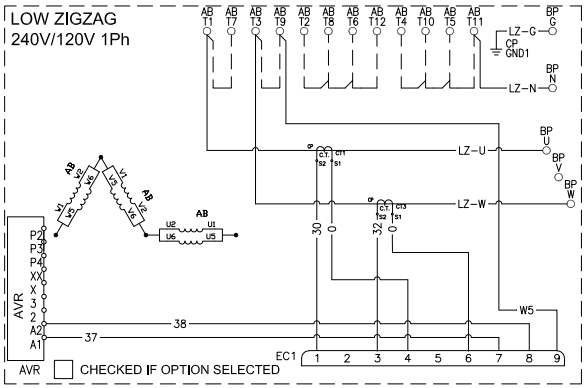
DRAWN BY: S.S.
CHECKED BY: C.S.
DRAWING DATE: 06-07-2019
CHECKED DATE:
STATUS:
SYMBOLOGY:
SLSC PANEL CODE: 9000025
SHEET NO: 1 OF 1

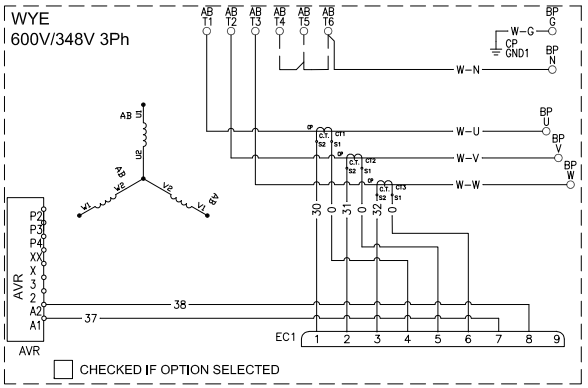


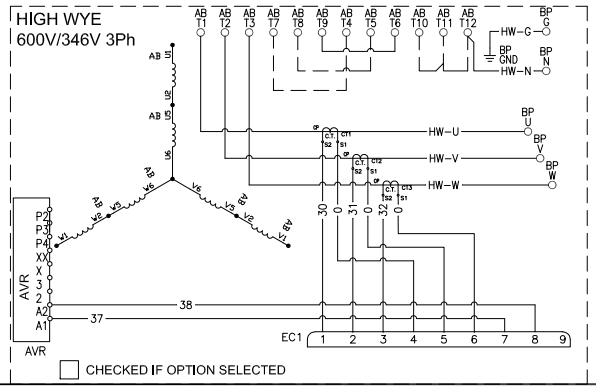


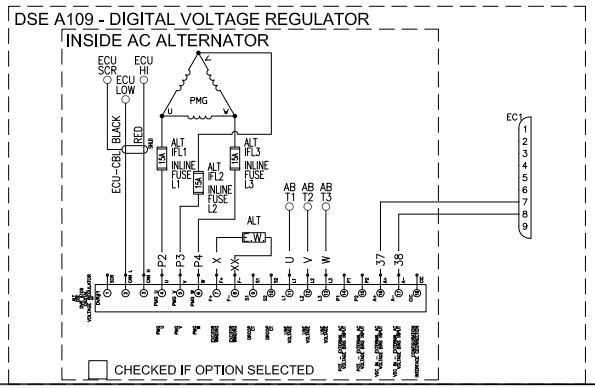












TERMINAL MARKINGS	
METRIC	NEMA
U	L1
V	L2
W	L3
N	N
U1	T1
U2	T4
U5	T7
U8	T10
V1	T2
V2	T5
V5	T8
V8	T11
W1	T3
W2	T6
W5	T9
W8	T12

HIPOWER® generating sets

NO.	DATE	REVISION	BY
X0			
X1			
X2			
X3			
X4			
X5	08-18-2020	INIT.	S.S.

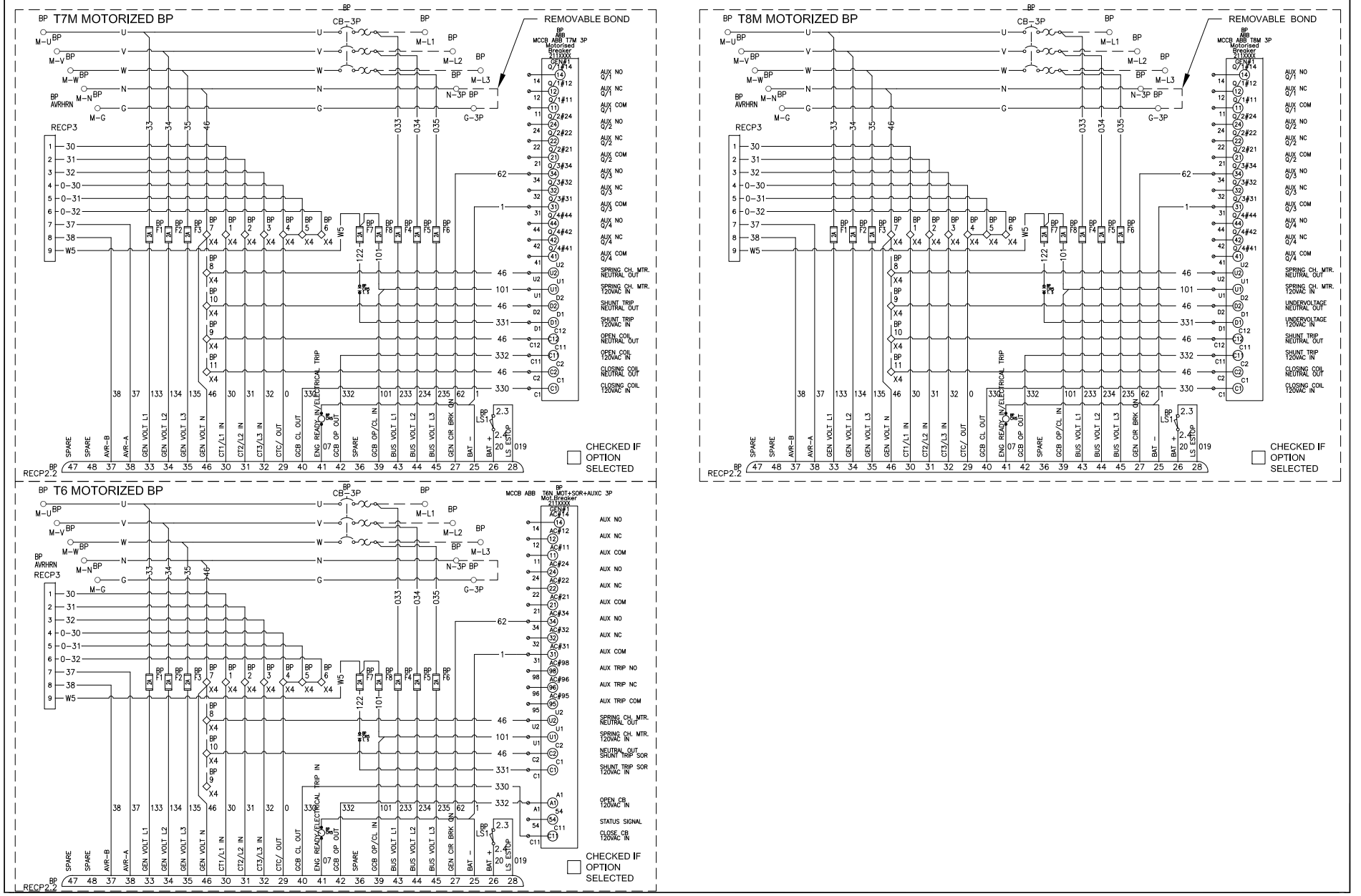
HEAVY DUTY INDUSTRIAL
ELECTRICAL DOCUMENTATION

ALTERNATOR WINDING
CONNECTION DIAGRAM

DRAWN BY: S.S.	CHECKED BY: C.S.
DRAWING DATE: 08-18-2020	CHECKED DATE: 08-18-2020
STATUS: WIP	SYMBOLOGY: NEC
SALES PANEL CODE:	

9000030

SHEET NO: 1 OF 1



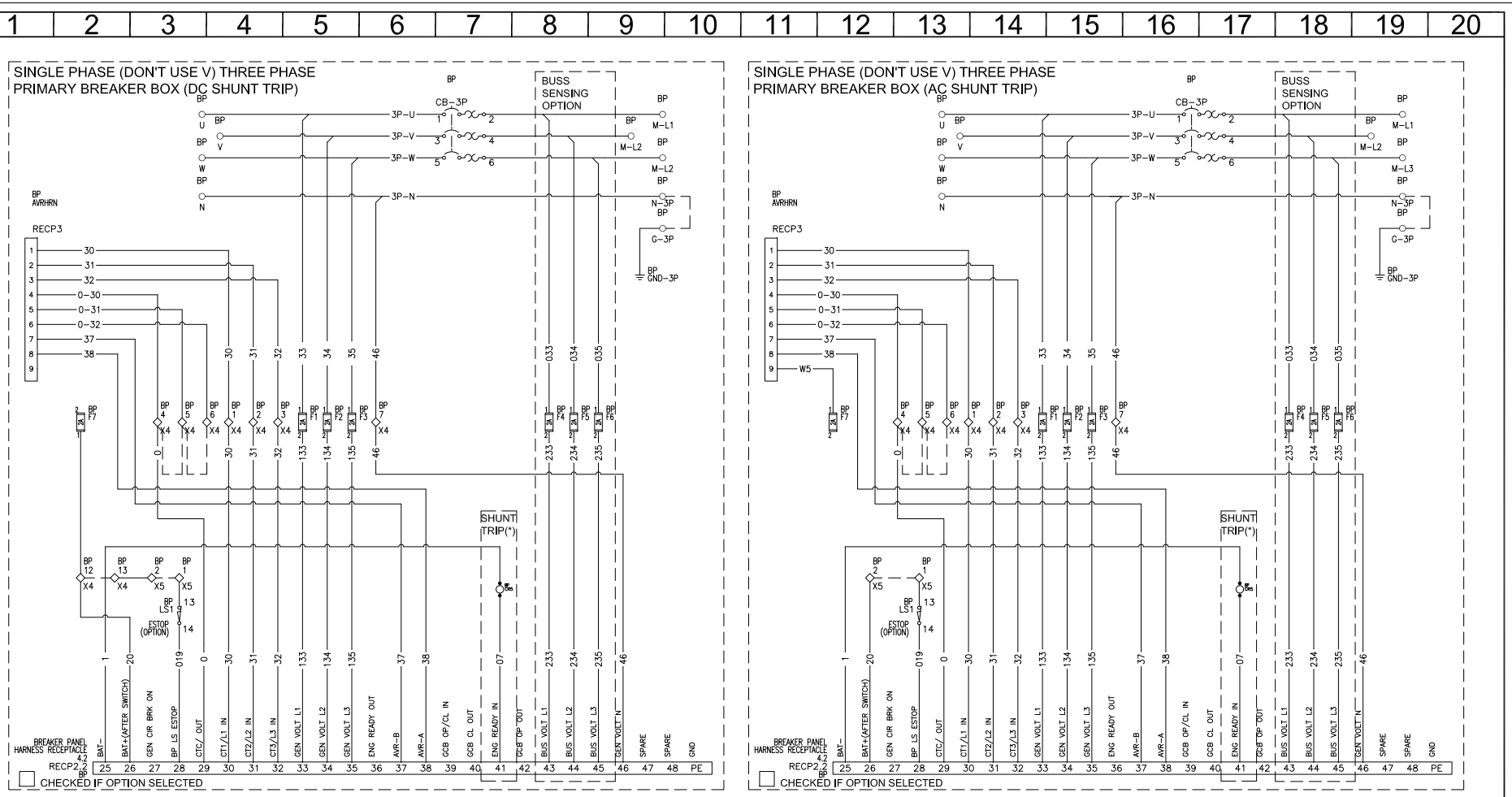
HIPOWER® generating sets

NO.	DATE	REVISION	BY
R1	03/12/2020	DRT.	C.S.

HEAVY DUTY INDUSTRIAL
ELECTRICAL DOCUMENTATION

MOTORIZED BREAKER
PANEL OPTIONS WIRING

DRAWN BY: S.S.	CHECKED BY: C.S.
DRAWING DATE: 03/12/2020	CHECKED DATE: 03/12/2020
STATUS: WIP	SCHEMATIC: NEC
ELEC PANEL CODE: 9000029	
SHEET NO: 1 OF 1	



HIPOWER generating sets

NO.	DATE	REVISION	BY
X1	03/12/2020	INT.	C.S.

HEAVY DUTY
ELECTRICAL PANEL
BREAKER PANEL
OPTIONS WIRING

DRAWN BY: S.S.	CHECKED BY: C.S.
DRAWING DATE: 03/12/2020	CHECKED DATE: 03/12/2020
STATUS: WIP	SUPERVISOR: NEC
SALC PANEL CODE: 9000023	
DRWG NO: 1 OF 1	

AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant:	Himoinsa Power Systems Inc	**Manufacturer:**	Himoinsa Power Systems Inc
Address:	16600 South Theden Street Olathe, KS 66062	**Address:**	16600 South Theden Street Olathe, KS 66062
Country:	USA	**Country:**	USA
Contact:	Celso Sanchez	**Contact:**	Celso Sanchez
Phone:	(866) 710-2988	**Phone:**	(866) 710-2988
FAX:	NA	**FAX:**	NA
Email:	csanchez@hipowersystems.com	**Email:**	csanchez@hipowersystems.com

Party Authorized To Apply Mark: Same as Manufacturer
Report Issuing Office: Dallas, TX

Control Number: *4008009* **Authorized by:** Genevieve Tollobsin
for L. Matthew Snyder, Certification Manager

This document supersedes all previous Authorizations to Mark for the noted Report Number.

Intertek Testing Services NA Inc.
545 East Algonquin Road, Arlington Heights, IL 60005
Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

Standard(s):	Stationary Engine Generator Assemblies [UL 2200:2012 Ed.2+R:29Jul2015] Motors And Generators [CSA C22.2#100:2014 Ed.7+U1] Industrial Control Equipment>Expires on: 11Apr2023< [CSA C22.2#14:2013 Ed.12]
Product:	Generator Sets
Brand Name:	Hipower
Models:	One letter followed by D; followed by G or I; followed by 60, 80, 100, 130, 160, 180, 200, 230, 250, 300, 350, 400, 515 or 600; followed by F or V; followed by T or M; followed by 6; followed by U.

ENGINE DERATING based on Altitude and Ambient temperature

Genset	Engine	Temp Derate	Alt Derate
HDI60	NEF45SM2X	Temperature Greater than 40C lose 3% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. 3000 Meters and above lose 6% per 500 Meters
HDI80	NEF45TM2X	Temperature Greater than 40C lose 3% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. 3000 Meters and above lose 6% per 500 Meters
HDI100	NEF67TM1X	Temperature Greater than 40C lose 2% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. 3000 Meters and above lose 6% per 500 Meters
HDI130			
HDI160	N67TE2X	Temperature Greater than 40C lose 2% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. For 3000 Meters and above lose 6% per 500 Meters
HDI200	C87TE1D	Temperature Greater than 40C lose 3% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. 3000 Meters and above lose 6% per 500 Meters
HDI230			
HDI250			
HDI300	C10TE1D	Temperature Greater than 40C lose 3% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. For 3000 Meters and above lose 6% per 500 Meters
HDI350	C13TE3X	Temperature Greater than 40C lose 4% per every 5C	1000 Meters or below standard. Between 1000 and 3000 Meters lose 3% per 500 Meters. For 3000 Meters and above lose 6% per 500 Meters

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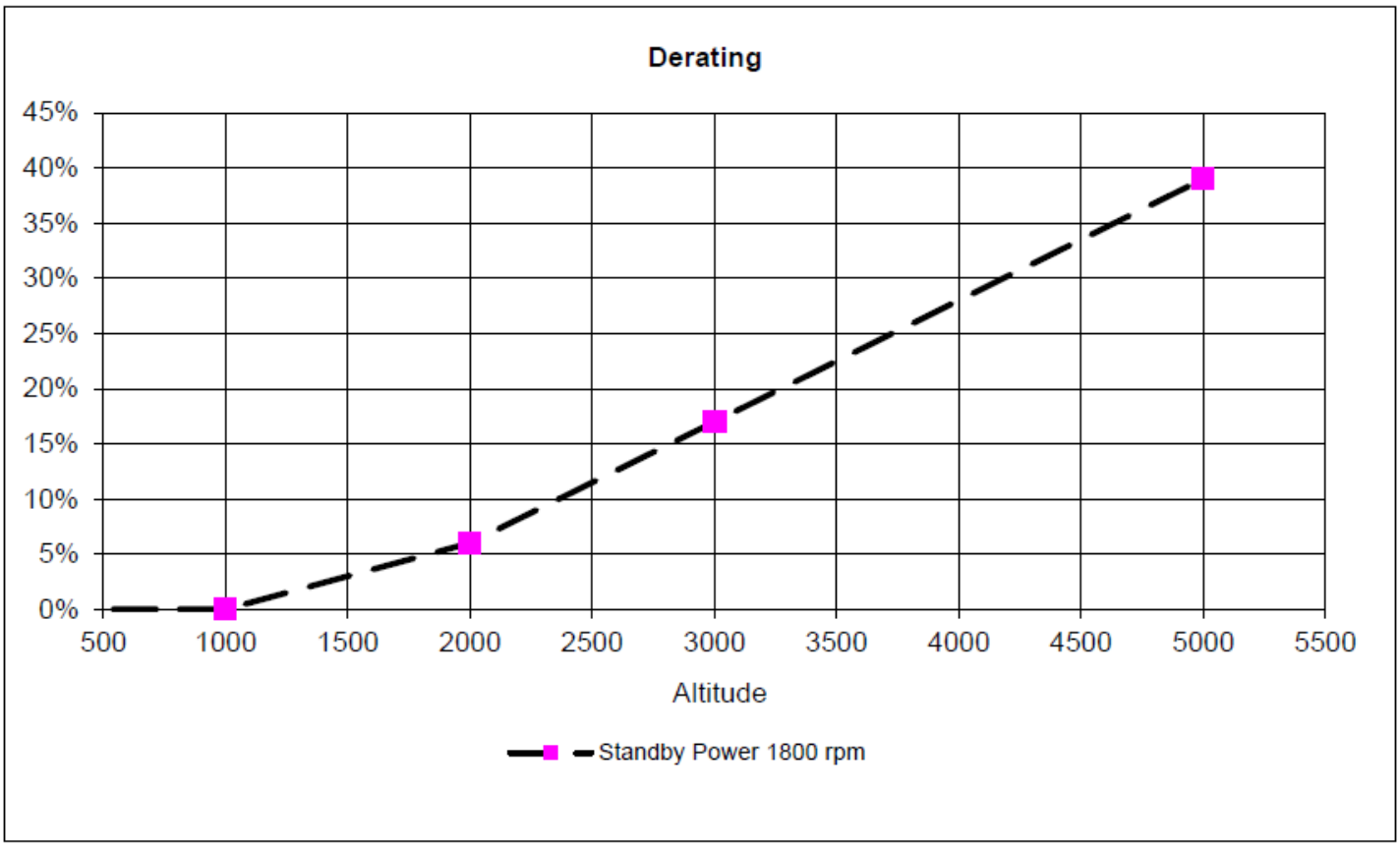
VOLVO PENTA

HDI400 – TAD1353GE



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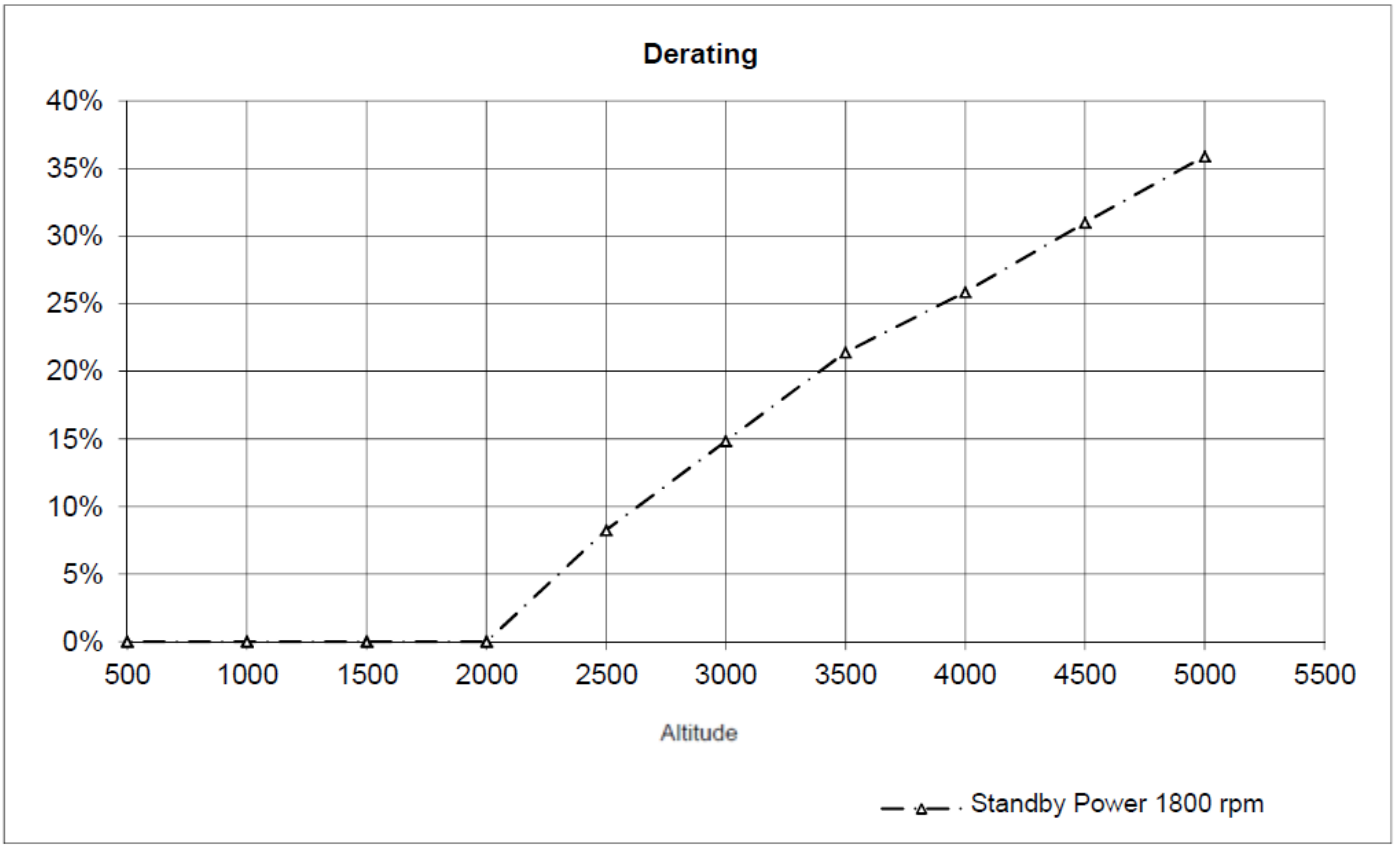
VOLVO PENTA

HDI515 – TAD1641GE



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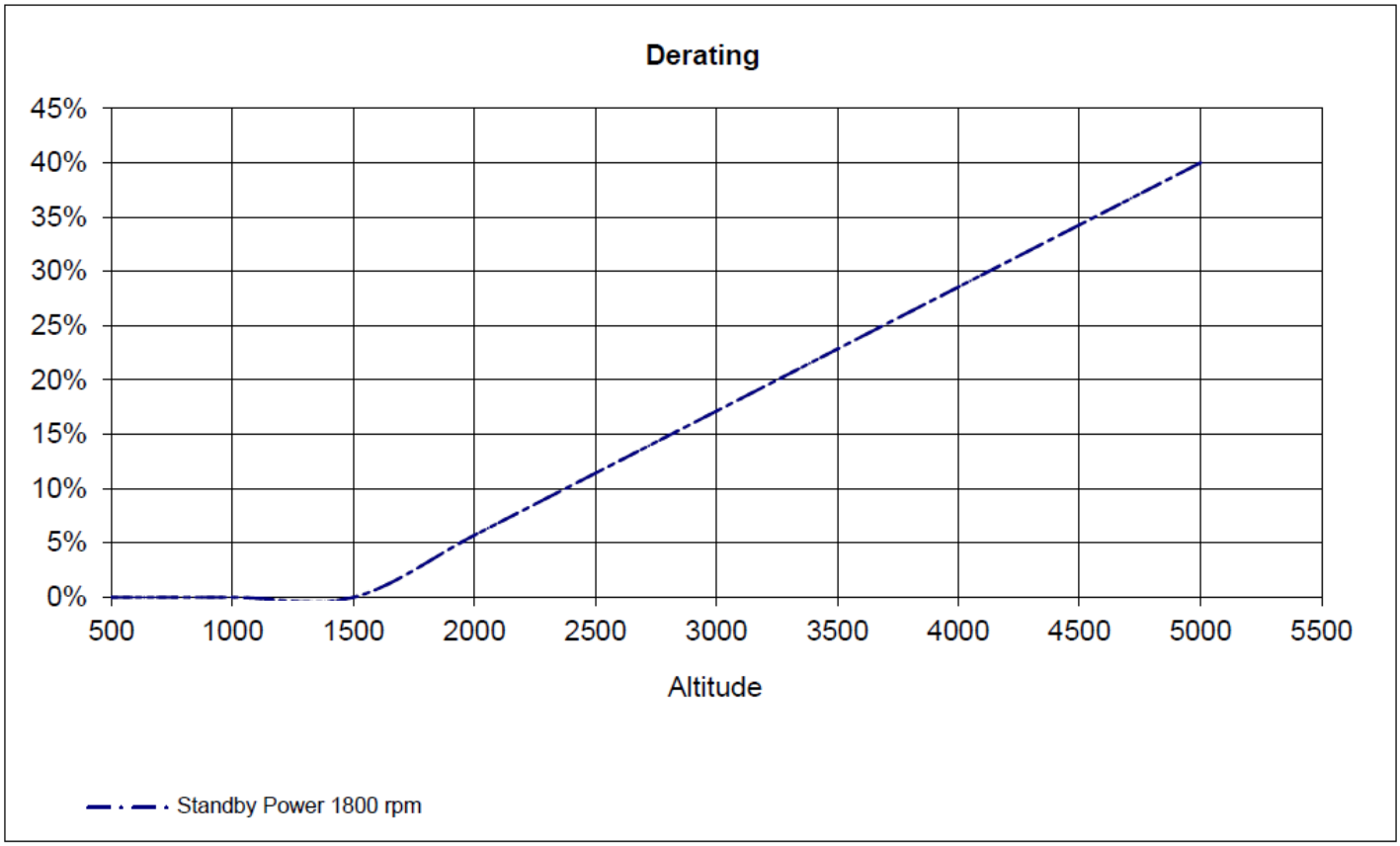
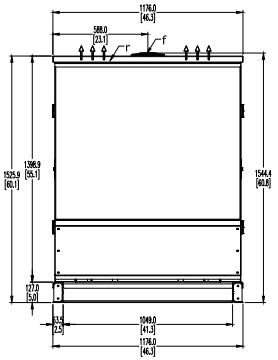
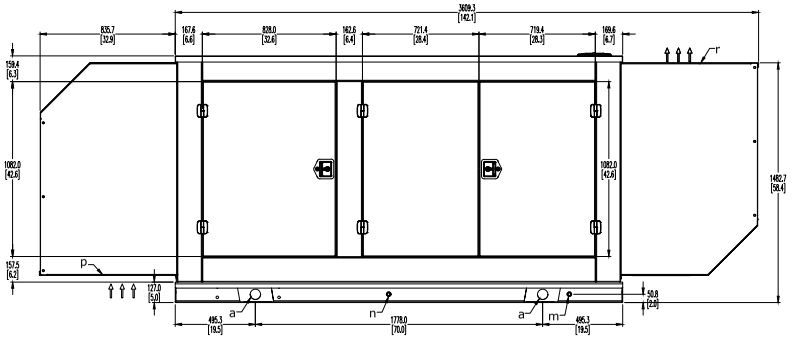
VOLVO PENTA

HDI600 – TWD1644GE

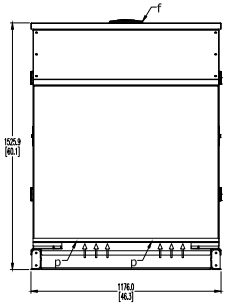




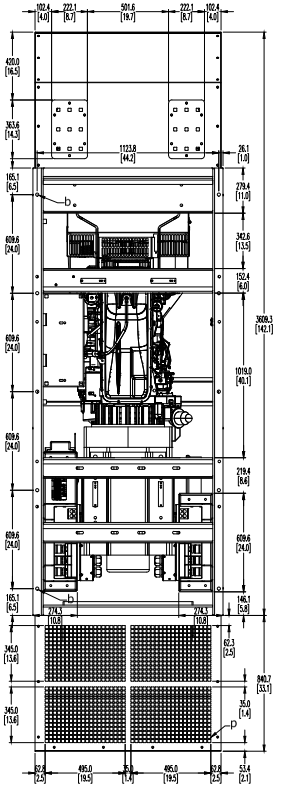
FRONT VIEW



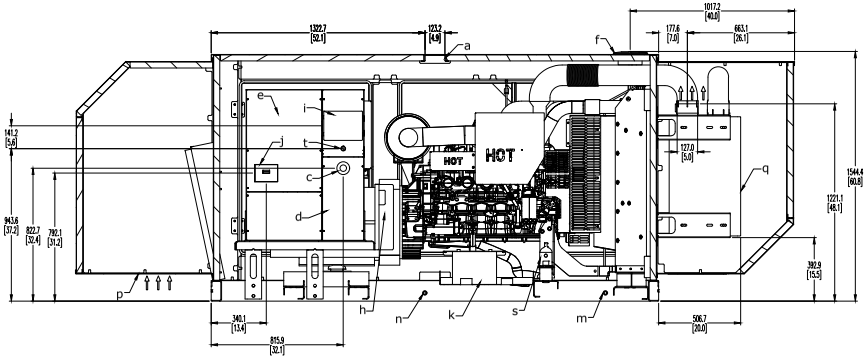
RIGHT SIDE VIEW



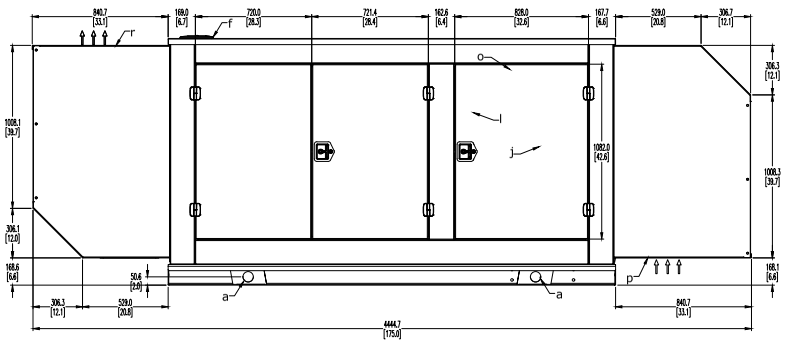
REAR VIEW



BOTTOM VIEW



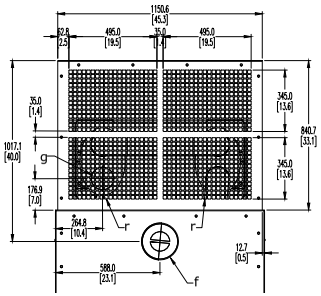
SECTION VIEW



LEFT SIDE VIEW

	NOTES
a	LIFTING POINT
b	FASTENING HOLES, 10x .75" (19.05 mm) DIA.
c	EMERGENCY STOP
d	CONTROL PANEL
e	BREAKER PANEL
f	RADIATOR ACCESS
g	EXHAUST OUTLET, 5" (127 mm) DIA. O.D.
h	BATTERY CHARGER 10A
i	DSE 7410 CONTROLLER
j	AUXC - MLCB AUXILIARTY CONTACT (OPTION)
k	BATTERY
l	LOAD CENTER (OPTION)
m	COOLANT DRAIN
n	OIL DRAIN
o	SECONDARY BREAKER PANEL (OPTION)
p	AIR INLET
q	SILENCER, 2x
r	AIR OUTLET
s	WATER JACKET HEATER (OPTION)
t	ON/OFF SWITCH

Engine	Engine model
ELECTROPACK	N67TM1X
Alternator	Alternator model
CGT	UCI 274E



TOP FRONT SECTION

	DATE:	NAME:		OLD CODE:
DESIGNED:	2/5/20	S.S.S.		NEW CODE:
REVISED:	2/5/20	S.S.S.		
APPROVED:	2/5/20	C.S.		

HIPOWER generating sets

DESIGNATION:
HD02 HDI130F_LEVEL 2_SOUND ATTENUATION

DRAWING Nº:CD-0018-20 LEVEL 2

CODE: CD-0018-20

REVISION: 01 DIN-A2

UNIT: mm [in] SCALE: 1/22

DSE2548 LED expansion module

INTRODUCTION

The DSE2548 LED expansion module is used in conjunction with compatible DSE controllers to provide additional LED indication functionality. The LEDs are configured in the 'host DSE controller'. The only configuration for the DSE2548 is the 'ID switch' detailed below.
For further details on configuring the 'host DSE controller', refer to the relevant DSE Configuration. Suite PC Software Manual.

LED INDICATIONS

LED	COLOUR	ACTION
Status 1 to 8	Red	Lit when the corresponding item is active
Power On / Link Lost	Red	Flashing when the DC supply is connected and the data connection to the host DSE controller is not operating. Steady when DC supply is connected and data is being received from the host DSE controller.

INTERNAL SOUNDER

The DSE2548 LED expansion module has an integral sounder which may be activated upon a signal from the 'host DSE controller'. The controller may activate the sounder when an alarm becomes active and be silenced when the alarm mute button is pressed.

MUTE/LAMP TEST BUTTON

Pressing the  (Mute/Lamp Test) button causes all the LEDs on the DSE2548 expansion module to light and silences the internal sounder. If configured to do so, the host DSE controller also performs a lamp test and mute function.

DSENET ID SWITCH

The rotary ID switch is used to select the DSENet 'identification' of the DSE2548 expansion module as the host DSE controller is capable of giving instructions to multiple DSE2548 expansion modules at the same time.

The switch must be operated using a small screwdriver and set to match the required ID set in the host DSE module's configuration.

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16002 West 110th Street I Lenexa, KS 66219-1312
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NOTE: The ID MUST be a unique number that is different from the ID of any other DSE2548 module connected to the host DSE controller. If two or more DSE2548 expansion modules are required to 'mimic' each other they must be configured with different IDs, and both IDs configured the same way the host DSE controller.

NOTE: The selection of the ID of other types of expansion modules DO NOT interfere/clash with the ID of the DSE2548. For instance, if the DSE2548 is set to ID 4, it is acceptable to have a different type of expansion module (for instance DSE2130) set to ID 4 also.

REQUIREMENTS FOR UL CERTIFICATION

Specification	Description
Screw Terminal Tightening Torque	• 4.5 lb-in (0.5 Nm)
Conductors	• Terminals suitable for connection of conductor size 13 AWG to 20 AWG (0.5 mm² to 2.5 mm²). • Conductor protection must be provided in accordance with NFPA 70, Article 240 • Low voltage circuits (35 V or less) must be supplied from the engine starting battery or an isolated secondary circuit. • The communication, sensor, and/or battery derived circuit conductors shall be separated and secured to maintain at least ¼" (6 mm) separation from the generator and mains connected circuit conductors unless all conductors are rated 600 V or greater.
Communication Circuits	• Must be connected to communication circuits of UL Listed equipment
Mounting	• Suitable for flat surface mounting in Type 1 Enclosure Type rating with surrounding air temperature -22 ºF to +122 ºF (-30 ºC to +50 ºC)
Operating Temperature	• -22 ºF to +122 ºF (-30 ºC to +50 ºC)

DIMENSIONS
180 mm X 116 mm X 43 mm
(7.1" X 4.6" X 1.7")

WEIGHT
0.36 kg
(0.79 lb)

TEMPERATURE
Operating: -40 ºC to +70 ºC
(-40 ºF to +158 ºF)
Storage: -40 ºC to +80 ºC
(-40 ºF to +176 ºF)

PANEL CUTOUT
154 mm X 98 mm
(6.0" X 3.9")

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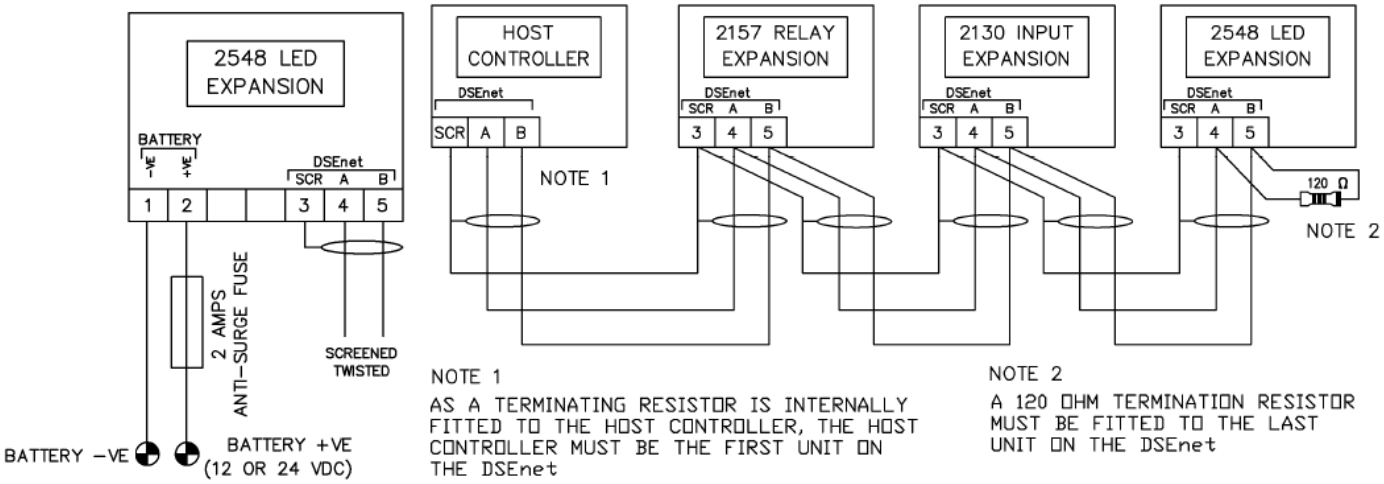
TYPICAL WIRING DIAGRAM



POWER SUPPLY

Minimum supply voltage	8V continuous, 4V for up to 5 minutes.
Cranking dropouts	Able to survive 0V for 50mS providing the supply was at least 10V before the dropout and recovers to 5 volts afterwards.
Maximum supply voltage	35V continuous (protection to 60V)
Maximum operating current	112mA at 12V, 53mA at 24V Conditions: All LED's lit and sounder active.
Maximum standby current	74mA at 12V, 35mA at 24V Conditions: All LED's off and sounder inactive.

TERMINAL SPECIFICATION

Connection type	Screw terminal, rising clamp, no internal spring
Min cable size	0.5mm² (AWG 20)
Max cable size	2.5mm² (AWG 14)
Recommended cable size	Refer to table below

DSENET®

DSEnet is the interconnection cable between the host controller and the expansion module(s) and must not be connect to any device other than DSE equipment designed for connection to the DSEnet.

Cable type	Two core screened twisted pair
Cable characteristic impedance	120Ω
Recommended cable	Belden 9841 Belden 9271
Maximum cable length	1000m (1km) when using Belden 9841 or direct equivalent. 500m (0.5km) when using Belden 9271 or direct equivalent.
DSEnet topology	Bus with no stubs (spurs)
DSEnet termination	Maximum cable length 1000m (1km) when using Belden 9841 or direct equivalent.
Maximum expansion modules	500m (0.5km) when using Belden 9271 or direct equivalent.

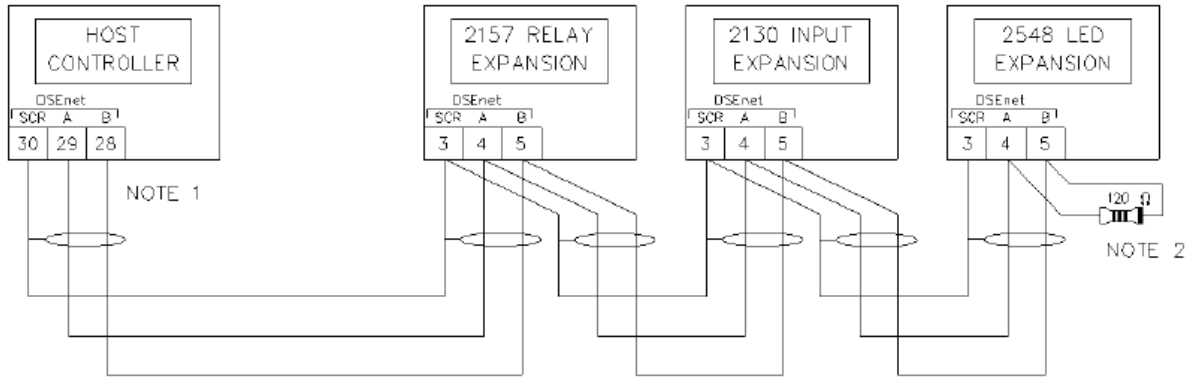
NOTE : As a termination resistor is internally fitted to the host controller, the host controller must be the 'first' unit on the DSEnet. A termination resistor MUST be fitted to the 'last' unit on the DSEnet. See the section entitled *'Typical Wiring Diagram'* elsewhere in this manual for details.

APPLICABLE STANDARDS

BS EN 60068-2-1 (Minimum temperature)	-30°C (-22°F)
BS EN 60068-2-2 (Maximum temperature)	+70°C (158°F)
BS EN 60950	Safety of information technology equipment, including electrical business equipment
BS EN 61000-6-2	EMC Generic Immunity Standard (Industrial)
BS EN 61000-6-4	EMC Generic Emission Standard (Industrial)
BS EN 60529 (Degrees of protection provided by enclosures)	IP65 when mounted into panel with optional gasket IP42 when mounted into panel WITHOUT gasket
UL508 **NEMA rating**	Enclosure type 2 when mounted into panel WITHOUT gasket Enclosure type 12 when mounted into panel with gasket

USER CONNECTIONS

Terminal	Function	Recommended size	
1	DC supply positive	1.0mm² (AWG 18)	
2	DC supply negative	1.0mm² (AWG 18)	
3	Screen		DSEnet only
4	A	0.5mm² (AWG 20)	DSEnet only
5	B	0.5mm² (AWG 20)	DSEnet only



NOTE 1

AS A TERMINATING RESISTOR IS INTERNALLY FITTED TO THE HOST CONTROLLER, THE HOST CONTROLLER MUST BE THE FIRST UNIT ON THE DSEnet

NOTE 2

A 120 OHM TERMINATION RESISTOR MUST BE FITTED TO THE LAST UNIT ON THE DSEnet

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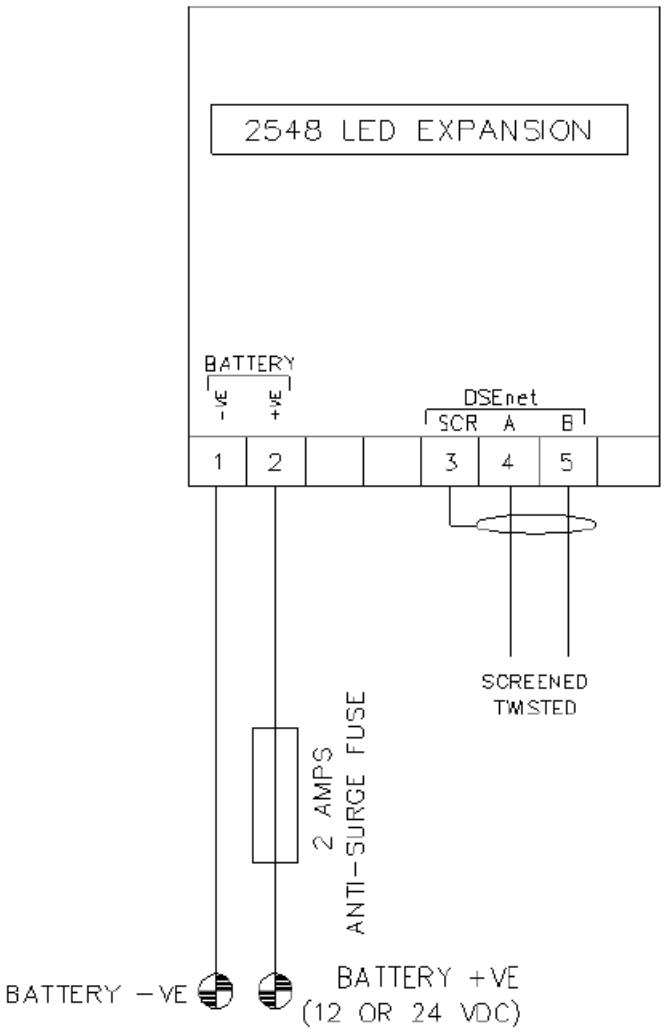
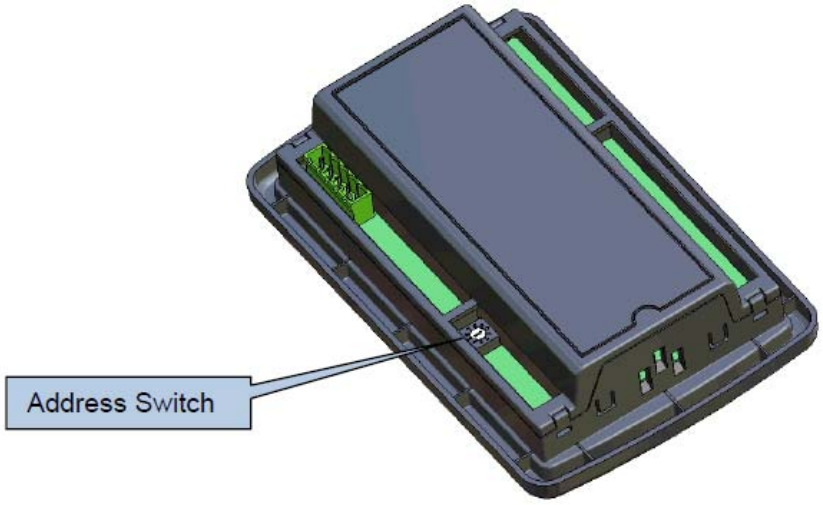
TYPICAL WIRING DIAGRAM



CONTROLS AND INDICATIONS



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LED INDICATIONS

Function	Colour	Action
Power on / Link lost	RED	Steady when DC supply is connected and data is being received from the host controller. Flashing when the DC supply is connected and the data connection to the host controller is not operating.
Status 1-8	RED	Lit when the corresponding channel is active

SOUNDER

The 2548 LED expansion module has an integral sounder, activated upon a signal from the 'host controller'. The controller will activate the sounder when an alarm becomes active and silence the sounder when an alarm mute button (local or remote) is pressed.

ID SWITCH

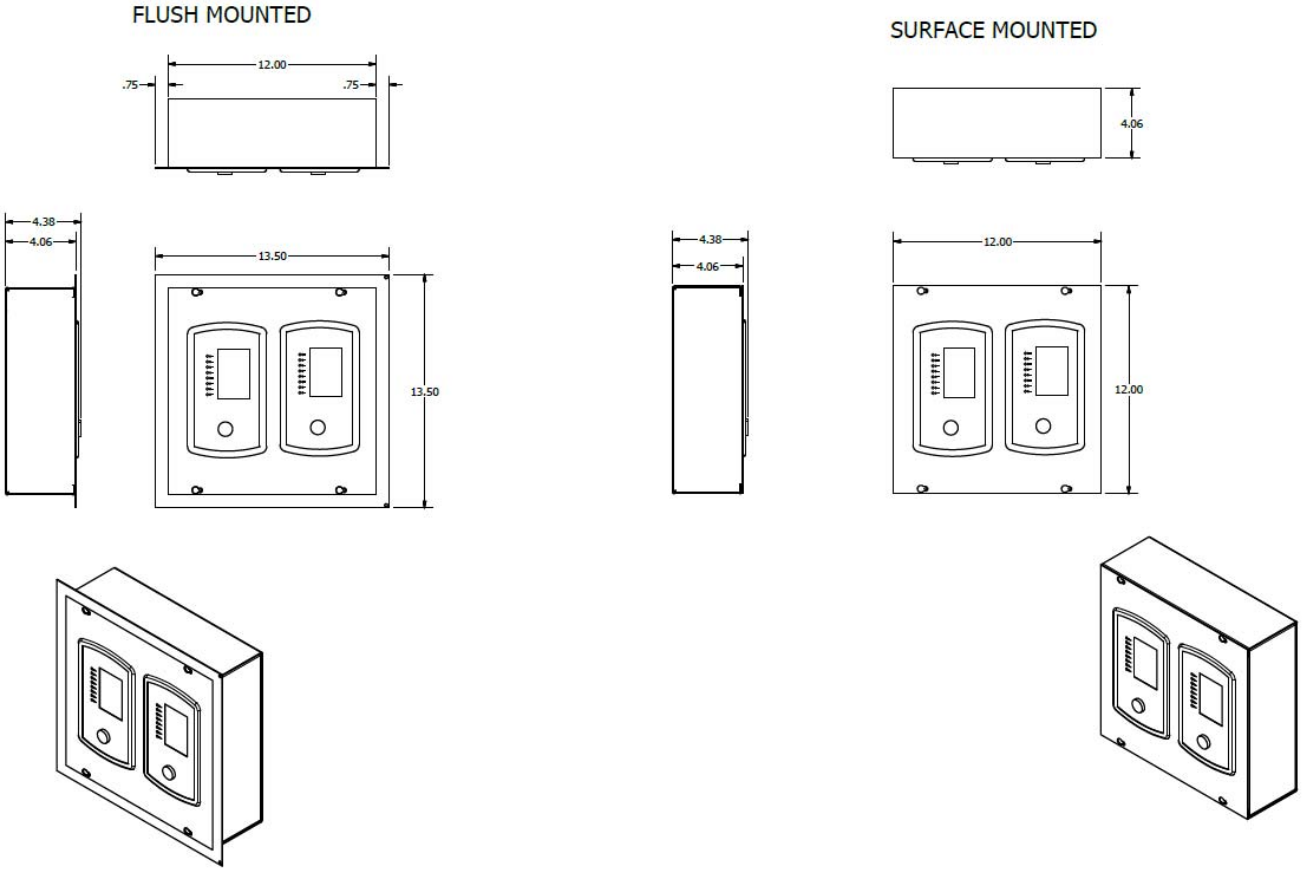
The rotary ID switch is used to select the 'Identification' of the 2548 expansion module as the host controller is capable of giving instructions to a number of 2548 expansion modules at the same time (Consult relevant modules instructions for further details on number of supported expansion units).

The switch (located at the rear of the module) should be operated using a small screwdriver and set to match the required ID.

NOTE: The ID MUST be a unique number, different from the ID of any other 2548 module connected to the host controller.
If two or more 2548 controllers are required to 'mimic' each other then they should be configured with different IDs, and both configured the same in the host controller.

NOTE: The selection of the ID of *other types* of expansion modules WILL NOT interfere/clash with the ID of the 2548. For instance if the 2548 is set to ID4, it is acceptable to have a *different type* of expansion module (for instance 2130) set to ID4 also.

Box dimensions



For more information please read the DSE operation manual

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- **Fast, accurate, mission-critical charging** – gives best starting reliability
- **4-rate, temperature-compensated output** – offers longest battery life
- **Replace nearly any charger** – without planning ahead
- **Industry-first battery-fault alarm** – helps dispatch service early
- **Lasting reliability** – field MTBF > 1 million hours with industry-best warranty
- **IBC seismic certification** – meets latest building codes, no installation delays
- **Optional OSHPD pre-approval** – already approved for California hospital projects

ISO 9000 · c UL us LISTED · CE · IEC 61000-6-2 · IBC 2006 · oshpd PRE-APPROVED

SENS®
STORED ENERGY SYSTEMS

www.sens-usa.com • info@sens-usa.com • Toll-free 866.736.7872 • 303.678.7500

NRG Battery Charger Benefits and Features

Failure to start due to battery problems is the leading cause of inoperable engine generator sets.

SENS NRG battery charger maximizes starting system reliability while slashing genset servicing costs:

One NRG replaces almost any charger without extra site visits. Installers can select or change at any time 120, 208 or 240 volts AC input, 12 or 24-volt battery and output settings optimized for nearly any lead-acid or nickel cadmium battery.

Easy to understand user interface provides state-of-the-art system status – including digital metering, NFPA 110 alarms and a battery fault alarm that can send service personnel to the site before failure to start.

Batteries charged by NRG give higher performance and last longer. In uncontrolled environments precision charging by SENS increases battery life and watering intervals 400% or more.

NRG meets all relevant industry standards – including UL, NFPA 110 and CE. Seismic Certification per International Building Code (IBC) 2000, 2003, 2006. All units are C-UL listed. 50/60 Hz units add CE marking to UL agency marks.

***EnerGenius* reliability technology built into every charger includes:**

- All-electronic operation with generous component de-rating
- Disconnected/reversed/incorrect voltage battery alarm and protection
- Protection of connected equipment against load dump transients
- Widest temperature rating, and overtemperature protection
- Superior lightning and voltage transient protection
- Demonstrated field MTBF > 1 million hours
- Standard 3-year warranty (10 years magnetics and power semiconductors) and available 10-year complete warranty with reimbursement of field service costs

Earn the best return on your charger investment – choose SENS NRG

NRG Specifications

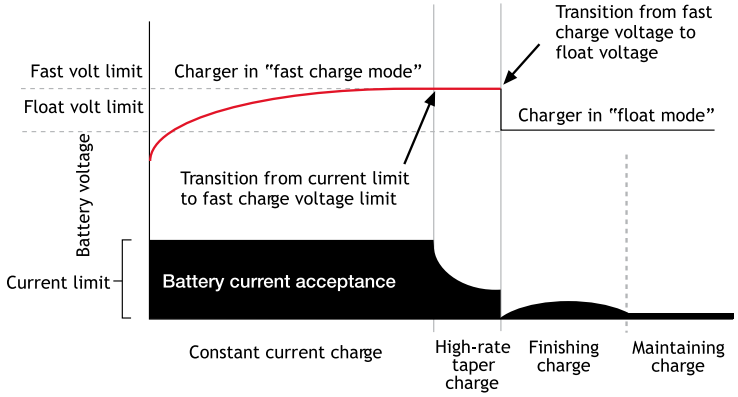
AC Input

Voltage	110-120/208-240 VAC, ±10%, single phase, field selectable
Input current	10A charger: 6.6/3.3 amps maximum 20A charger: 12.6/6.3 amps maximum
Frequency	60 Hz ±5% standard; 50/60 Hz ±5% optional
Input protection	1-pole fuse, soft-start, transient suppression

Charger Output

Nominal voltage ratings	12 or 24 volt nominal
Optional voltage rating	12/24 volt, field selectable
Battery settings	Six discrete battery voltage programs - Low or high S.G. flooded - Low or high S.G. VRLA - Nickel cadmium 9, 10, 18, 19 or 20 cells
Regulation	±0.5% (1/2%) line and load regulation
Current	10 or 20 amps nominal
Electronic current limit	105% rated output typical – no crank disconnect required
Charge characteristic	Constant voltage, current limited, 4-rate automatic equalization
Temperature compensation	Enable or disable anytime, remote sensor optional
Output protection	Current limit, 1-pole fuse, transient suppression

Standard 4-rate charging



User Interface, Indication and Alarms

Digital meter	Automatic meter alternately displays output volts, amps[1]
Accuracy	±2% volts, ±5% amps
Alarms	LED and Form C contact(s) per table:

Front panel status display

Alarm System Functions

	Alarm code "C" (meets requirements of NFPA 110)
AC good	LED
Float mode	LED
Fast charge	LED
Temp comp active	LED
AC fail	LED and Form C contact[2]
Low battery volts	LED and Form C contact[2]
High battery volts	LED and Form C contact[2]
Charger fail	LED and Form C contact[2]
Battery fault[3]	LED and Form C contact[2]

1. Three-position jumper allows user to select from three display settings: alternating volts / amps (normal), constant volts, or constant amps
2. Contacts rated 2A @ 30 VDC resistive
3. Battery fault alarm indicates these fault conditions:
   - Battery disconnected - Battery polarity reversed - Mismatched charger battery voltage - Open or high resistance charger to battery connection - Open battery cell or excessive internal resistance

Controls

AC input voltage select	Field-selectable switch
Optional 12/24-volt output select	Field-selectable two-position jumper
Battery program select	Field-selectable six-position jumper
Meter display select	Field-selectable three-position jumper
Fast charger enable/disable	Field-selectable two-position jumper
Temp compensation enable	Standard. Can be disabled or re-enabled in the field
Remote temp comp enable	Connect optional remote sensor to temp comp port

Simple field adjustments

Environmental

Operating temperature	-20C to +60C, meets full specification to +45C
Over temperature protection	Gradual current reduction to maintain safe power device temperature
Humidity	5% to 95%, non-condensing
Vibration (10A unit)	UL 991 Class B (2G sinusoidal)
Transient immunity	ANSI/IEEE C62.41, Cat. B, EN50082-2 heavy industrial, EN 61000-6-2
Seismic Certification	IBC 2000, 2003, 2006, 2009 Maximum S_{ds} of 2.28 g, Optional OSHPD pre-approval

Agency Standards

Safety	C-UL listed to UL 1236 (required for UL 2200 gensets), UL Category BBGQ, CSA standard 22.2 no. 107.2-M89 CE: 50/60 Hz units DOC to EN 60335
Agency marking	60 Hz: C-UL-US listed 50/60 Hz: C-UL-US listed plus CE marked
EMC	Emissions: FCC Part 15, Class B; EN 50081-2 Immunity: EN 61000-6-2
NFPA standards	NFPA 70, NFPA 110. (NFPA 110 requires Alarms "C")
Optional agency compliance	OSHPD pre-approval

Construction

Housing/configuration	Material: Non-corroding aluminum. C-UL listed enclosure.
Dimensions	See Drawings and Dimensions page for details
Printed circuit card	Surface mount technology, conformal coated
Cooling	Natural convection
Protection degree	Listed housing: NEMA-1 (IP20). Optional IP21 drip shield. Optional NEMA 3R enclosure
Damage prevention	Fully recessed display and controls
Electrical connections	Compression terminal blocks

Warranty

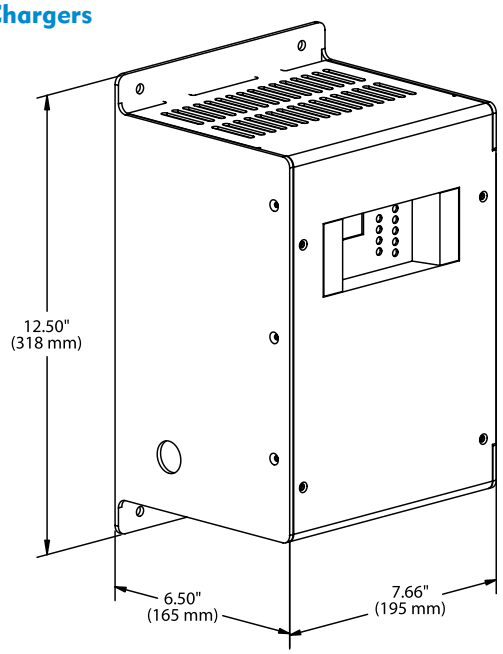
Standard warranty	Three year parts and labor warranty (10 years magnetics and power semiconductors) from date of shipment
Optional warranty	If specified at time of order, warranty coverage can be increased to reimburse customer's documented field service costs up to the original charger price or increased to 5 or 10 years with field service cost reimbursement. Contact the factory for full details

Optional features

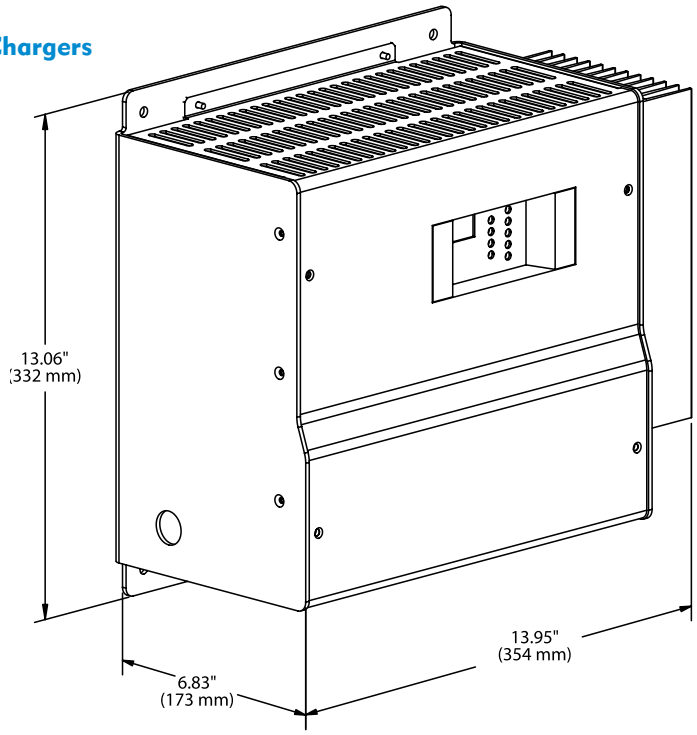
Input	Input frequency, 50/60 Hz
Remote temp comp sensor	Recommended where battery and charger are in different locations
Drip shield meets s/b (IP21)	Protects from dripping water
NEMA 3R housing	Enables outdoor installation (remote temp sensor recommended)
Field service warranty	Reimbursement of customer field service expenses up to charger price for 3, 5, or 10 years

Drawings and Dimensions

10A Chargers



20A Chargers



Housing Dimensions Table			
Amps	**Width**	**Depth**	**Height**
10	**7.66" (195 mm)**	**6.50" (165 mm)**	**12.50" (318 mm)**
20	**13.95" (354 mm)**	**6.83" (173 mm)**	**13.06" (332 mm)**

NRG Ordering Information

Output volts	Output amps	Model	NFPA 110 Alarms	Lbs/Kg	Shipping Lbs/Kg
12	10	NRG12-10-RC	Yes	23 / 10.4	25 / 11.4
24	10	NRG24-10-RC	Yes	23 / 10.4	25 / 11.4
12/24	10	NRG22-10-RC	Yes	23 / 10.4	25 / 11.4
12	20	NRG12-20-RC	Yes	39 / 17.7	43 / 19.5
24	20	NRG24-20-RC	Yes	42 / 19.1	46 / 20.9
12/24	20	NRG22-20-RC	Yes	42 / 19.1	46 / 20.9

All models offer field-selectable input 120/208-240 volts. 60 Hz input is standard with C-UL listing. Optional 50/60 Hz input includes C-UL listing and adds CE mark.

Model Number Breakout - 10 Amp Models

NRG □□–10–□C□

Model

Output voltage
12: 12 volts
24: 24 volts
22: 12/24-volt field selectable

AC input
R: 120/208-240 VAC, 60 Hz
H: 120/208-240 VAC, 50/60 Hz

Option code
E: OSHPD Pre-Approved

Model Number Breakout - 20 Amp Models

NRG □□–20–□CLS□

Model

Output voltage
12: 12 volts
24: 24 volts
22: 12/24-volt field selectable

AC input
R: 120/208-240 VAC, 60 Hz
H: 120/208-240 VAC, 50/60 Hz

Option code
E: OSHPD Pre-Approved

All NRG models are C-UL Listed to UL1236

All NRG models provide LEDs and Form C contacts to meet NFPA 110

The Smart Choice for Mission-Critical Engine Starting

Additional Information

Contact SENS or your local sales representative for additional specification, engineering and installation information. Check the SENS web site for latest available data. Specification is subject to change without notice.

ISO 9000 · c UL us LISTED · CE · IBC 2006 · oshpd PRE-APPROVED · PRODUCT YEAR

Contact Information

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www.sens-usa.com • info@sens-usa.com
1840 Industrial Circle, Longmont, CO 80501 USA

SENS®
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ENGINE PREHEATER TANK STYLE

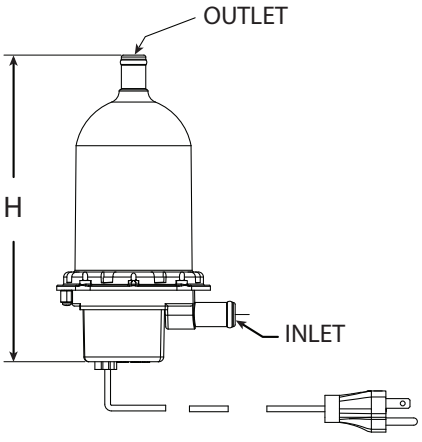
Simple to install and very lightweight, the HOTSTART TPS engine preheater features a built-in thermostat and heats engines up to 12L displacement. Thermosiphon circulation of the coolant delivers heat throughout the entire engine.

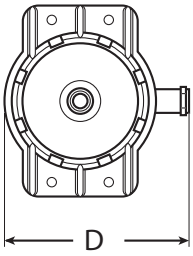
APPLICATION

The TPS engine preheater is designed to preheat diesel and gas engines in genset, heavy duty mobile equipment, marine and industrial applications.

SPECIFICATIONS

- Heating Fluid: Engine coolant (50% glycol/50% water)
- Power: 0.5, 1, 1.5, 1.8 and 2 kW*
- Rated Voltage: 1 Phase 120 and 240 VAC
- Tank Material: Polyphenylensulfid PPS
- Heating Element: Incoloy 800
- Enclosure: IP41
- Fluid Capacity: 0.11gl (416 cm3)
- Max Pressure: 90PSI (6.2 bar)
- Inlet /Outlet: 0.625" (15.9mm)





* 2kW available at 240V only

Dimensions & Weight			
Height (H)	In (mm)	7.9	(200)
Depth (D)	In (mm)	4.6	(117)
Weight	lbs (g)	1.7	(771)

FEATURES

- UL-C/US listed
- CE compliant
- Various temperature settings available, including adjustable thermostat 90° - 130°F (32° - 54°C)
- Can be delivered with UL marked 120 or 240V NEMA plug or CE marked 240V Schuko plug

HOTSTART® ENGINE HEATING

Thermosiphon Engine Heaters

TPS Model Single Phase

500-2000 Watts

Temperature Range ON	Temperature Range OFF	Numerical Code
80°F (27C)	100°F (38C)	8
100°F (38C)	120°F (49C)	10
120°F (49C)	140°F (60C)	12

Engine Displacement	Watts	Model Number 120V	Amps	Model Number 240V	Amps	Model Number 277V	Amps
150cid 2.5L	500	TPS051GT8-000 TPS051GT10-000 TPS051GT12-000 —	4.2 4.2 4.2 —	TPS052GT8-000 TPS052GT10-000 TPS052GT10-**013** TPS052GT12-000	2.1 2.1 2.1 2.1	TPS057GT10-000	1.8
350cid 5.7L	1000	TPS101GT8-000 TPS101GT10-000 TPS101GT12-000 —	8.4 8.4 8.4 —	TPS102GT8-000 TPS102GT10-000 TPS102GT10-**013** TPS102GT12-000	4.2 4.2 4.2 4.2	TPS107GT10-000	3.6
350 - 500cid 5.7 - 8.2L	1500	TPS151GT8-000 TPS151GT10-000 TPS151GT12-000 —	12.5 12.5 12.5 —	TPS152GT8-000 TPS152GT10-000 TPS152GT10-**013** TPS152GT12-000	6.3 6.3 6.3 6.3	TPS157GT10-000	5.4
500 - 700cid 8.2 - 11.5L	1800	TPS181GT8-000 TPS181GT10-000 TPS181GT12-000	15 15 15	—	—	—	—
	2000	—	—	TPS202GT8-000 TPS202GT10-000 TPS202GT10-**013** TPS202GT12-000	8.3 8.3 8.3 8.3	TPS207GT10-000	7.2

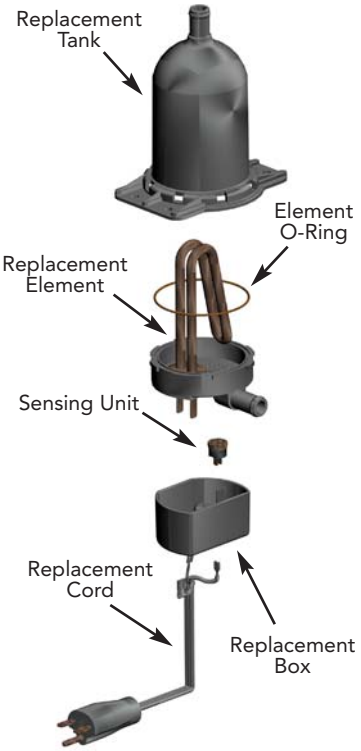
Power cord length on all models — 48" (1219mm)

TPS engine preheaters include a fixed setting thermostat. A single or double digit numeral at the end of the model number prefix designates the temperature range. **Example:** TPS101GT**10**-000 (see chart in left column)

-013 Engine preheater features 2 meter round cord and Shucko plug - CE compliant

Replacement Parts

For TPS Models



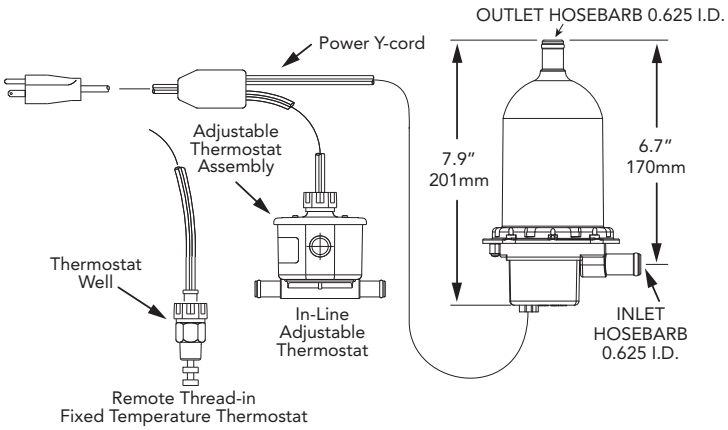
Model Number	Replacement Parts					
	Sensing Unit	Element	Tank	Box	Power Cord	Element O-ring
TPS051GT8-000	LSU-8	REPS051T8	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS051GT10-000	LSU-10	REPS051T10	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS051GT12-000	LSU-12	REPS051T12	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS052GT8-000	LSU-8	REPS052T8	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS052GT10-000	LSU-10	REPS052T10	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS052GT10-**013**	LSU-10	REPS052T10	TPS-T	CPS-2	21SCH81UU	TPS-BOR
TPS052GT12-000	LSU-12	REPS052T12	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS057GT10-000	LSU-10	REPS057T10	TPS-T	CPS-1	16H48UU	TPS-BOR
TPS101GT8-000	LSU-8	REPS101T8	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS101GT10-000	LSU-10	REPS101T10	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS101GT12-000	LSU-12	REPS101T12	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS102GT8-000	LSU-8	REPS102T8	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS102GT10-000	LSU-10	REPS102T10	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS102GT10-**013**	LSU-10	REPS102T10	TPS-T	CPS-2	21SCH81UU	TPS-BOR
TPS102GT12-000	LSU-12	REPS102T12	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS107GT10-000	LSU-10	REPS107T10	TPS-T	CPS-1	16H48UU	TPS-BOR
TPS151GT8-000	LSU-8	REPS151T8	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS151GT10-000	LSU-10	REPS151T10	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS151GT12-000	LSU-12	REPS151T12	TPS-T	CPS-1	11P48UU	TPS-BOR
TPS152GT8-000	LSU-8	REPS152T8	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS152GT10-000	LSU-10	REPS152T10	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS152GT10-**013**	LSU-10	REPS152T10	TPS-T	CPS-2	21SCH81UU	TPS-BOR
TPS152GT12-000	LSU-12	REPS152T12	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS157GT10-000	LSU-10	REPS157T10	TPS-T	CPS-1	16H48UU	TPS-BOR
TPS181GT8-000	LSU-8	REPS181T8	TPS-T	CPS-1	12P16H48UU	TPS-BOR
TPS181GT10-000	LSU-10	REPS181T10	TPS-T	CPS-1	12P16H48UU	TPS-BOR
TPS181GT12-000	LSU-12	REPS181T12	TPS-T	CPS-1	12P16H48UU	TPS-BOR
TPS202GT8-000	LSU-8	REPS202T8	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS202GT10-000	LSU-10	REPS202T10	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS202GT10-**013**	LSU-10	REPS202T10	TPS-T	CPS-2	21SCH81UU	TPS-BOR
TPS202GT12-000	LSU-12	REPS202T12	TPS-T	CPS-1	21P48UU	TPS-BOR
TPS207GT10-000	LSU-10	REPS207T10	TPS-T	CPS-1	16H48UU	TPS-BOR

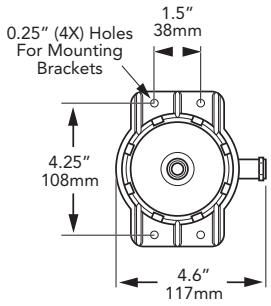
Engine Displacement	Model Number	Volts	Watts	Phase	Amps	Thermostat Range On	Thermostat Range Off
150cid 2.5L	TPS051GT12-**001**	120	500	1	4.2	100°F (38C)	120°F (49C)
	TPS051GT12-A00	120	500	1	4.2	ADJUSTABLE	
	TPS052GT12-**001**	240	500	1	2.1	100°F (38C)	120°F (49C)
	TPS052GT12-A00	240	500	1	2.1	ADJUSTABLE	
350cid 5.7L	TPS101GT12-**001**	120	1000	1	8.4	100°F (38C)	120°F (49C)
	TPS101GT12-A00	120	1000	1	8.4	ADJUSTABLE	
	TPS102GT12-**001**	240	1000	1	4.2	100°F (38C)	120°F (49C)
	TPS102GT12-A00	240	1000	1	4.2	ADJUSTABLE	
350 - 500cid 5.7 - 8.2L	TPS151GT12-**001**	120	1500	1	12.5	100°F (38C)	120°F (49C)
	TPS151GT12-A00	120	1500	1	12.5	ADJUSTABLE	
	TPS152GT12-**001**	240	1500	1	6.3	100°F (38C)	120°F (49C)
	TPS152GT12-A00	240	1500	1	6.3	ADJUSTABLE	
500 - 700cid 8.2 - 11.5L	TPS181GT12-**001**	120	1800	1	15	100°F (38C)	120°F (49C)
	TPS181GT12-A00	120	1800	1	15	ADJUSTABLE	
	TPS202GT12-**001**	240	2000	1	8.3	100°F (38C)	120°F (49C)
	TPS202GT12-A00	240	2000	1	8.3	ADJUSTABLE	

-001 Remote thread-in fixed temperature thermostat

Adjustable 90-130°F (32-54°C)
On differential – 20°F (-7°C)

In-line thermostat options:





Model Number	Volts	Watts	Replacement Parts: Sensing Unit	Element	Power Y-cord	Thermostat Well
TPS051GT12-**001**	120	500	LSU-10	REPS051T12	TPS-YC1	TW2374-1
TPS051GT12-A00	120	500	RSU90-130	REPS051T12	#	#
TPS052GT12-**001**	240	500	LSU-10	REPS052T12	TPS-YC2	TW2374-1
TPS052GT12-A00	240	500	RSU90-130	REPS052T12	#	#
TPS101GT12-**001**	120	1000	LSU-10	REPS101T12	TPS-YC1	TW2374-1
TPS101GT12-A00	120	1000	RSU90-130	REPS101T12	#	#
TPS102GT12-**001**	240	1000	LSU-10	REPS102T12	TPS-YC2	TW2374-1
TPS102GT12-A00	240	1000	RSU90-130	REPS102T12	#	#
TPS151GT12-**001**	120	1500	LSU-10	REPS151T12	TPS-YC1	TW2374-1
TPS151GT12-A00	120	1500	RSU90-130	REPS151T12	#	#
TPS152GT12-**001**	240	1500	LSU-10	REPS152T12	TPS-YC2	TW2374-1
TPS152GT12-A00	240	1500	RSU90-130	REPS152T12	#	#
TPS181GT12-**001**	120	1800	LSU-10	REPS181T12	12P16H54S54X10UU	TW2374-1
TPS181GT12-A00	120	1800	RSU90-130	REPS181T12	#	#
TPS202GT12-**001**	240	2000	LSU-10	REPS202T12	TPS-YC2	TW2374-1
TPS202GT12-A00	240	2000	RSU90-130	REPS202T12	#	#

-001 Remote thread-in fixed temperature thermostat

Call Factory

Thermosiphon Engine Heaters

TPS Model w/in-line adjustable and remote thread-in fixed thermostat.

Single Phase

Remote Adjustable Thermostat Assembly	
Part Number	TFTA-5/8HB

Replacement Parts

For TPS Model w/in-line adjustable and remote thread-in fixed thermostat.

Single Phase

Common replacement parts for all TPS engine preheaters:
— Tank
— Box
— Element O-ring

See table on page 6

SIEMENS

Data sheet 3SU1000-1HB20-0AA0

EMERGENCY STOP mushroom pushbutton, 22 mm, round, plastic, red, 40 mm, positive latching, acc. to EN ISO 13850, rotate-to-unlatch

product brand name	SIRIUS ACT
product designation	EMERGENCY STOP mushroom pushbuttons
design of the product	Actuating/signaling element
product type designation	3SU1
product line	Plastic, black, 22 mm
Enclosure	
number of command points	1
Actuator	
design of the actuating element	positive latching
principle of operation of the actuating element	latching
product extension optional	
● light source	No
● contact module	Yes
color	
● of the actuating element	red
material of the actuating element	plastic
shape of the actuating element	round
outer diameter of the actuating element	40 mm
type of unlocking device	rotate-to-unlatch mechanism
number of switching positions	2
Front ring	
product component front ring	No
General technical data	
product function	
● positive opening	Yes
● EMERGENCY OFF function	Yes
● EMERGENCY STOP function	Yes
protection class IP	IP66, IP67, IP69(IP69K)
degree of protection NEMA rating	1, 2, 3, 3R, 4, 4X, 12, 13
shock resistance	
● acc. to IEC 60068-2-27	Sinusoidal half-wave 50g / 11 ms
● for railway applications acc. to DIN EN 61373	Category 1, Class B
vibration resistance	
● acc. to IEC 60068-2-6	10 ... 500 Hz: 5g
● for railway applications acc. to DIN EN 61373	Category 1, Class B
operating frequency maximum	600 1/h
mechanical service life (switching cycles) typical	300 000

reference code acc. to IEC 81346-2	S
Substance Prohibitance (Date)	01.10.2014 00:00:00
Safety related data	
B10 value with high demand rate acc. to SN 31920	100 000
proportion of dangerous failures	
• with low demand rate acc. to SN 31920	20 %
• with high demand rate acc. to SN 31920	20 %
failure rate [FIT] with low demand rate acc. to SN 31920	100 FIT
T1 value for proof test interval or service life acc. to IEC 61508	20 y
Ambient conditions	
ambient temperature	
• during operation	-25 ... +70 °C
• during storage	-40 ... +80 °C
environmental category during operation acc. to IEC 60721	3M6, 3S2, 3B2, 3C3, 3K6 (with relative air humidity of 10 ... 95 %)
Installation/ mounting/ dimensions	
shape of the installation opening	round
mounting diameter	22.3 mm
positive tolerance of installation diameter	0.4 mm
mounting height	45.3 mm
installation width	40 mm
installation depth	26.3 mm

Certificates/ approvals

General Product Approval | **Declaration of Conformity**

Miscellaneous

Test Certificates | **Marine / Shipping**

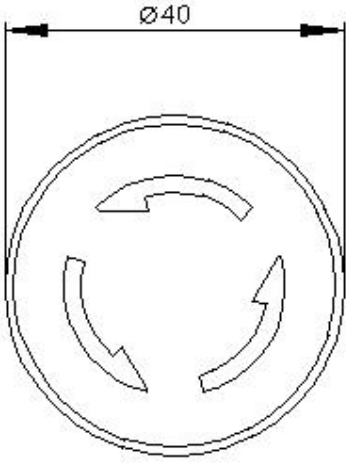
Special Test Certific-ate | Type Test Certific-ates/Test Report

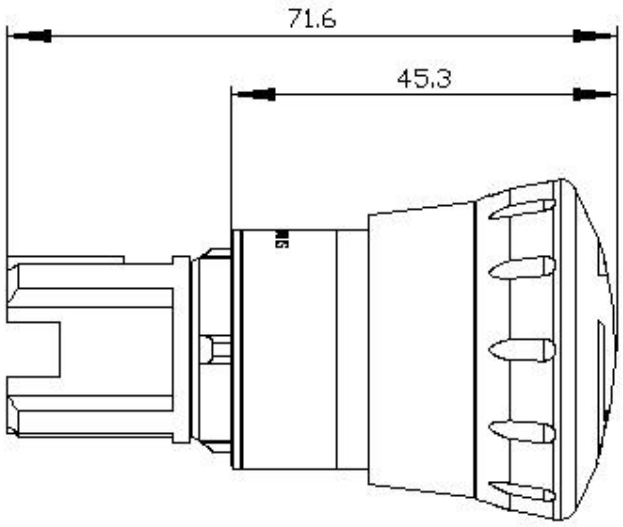
Marine / Shipping | **other**

Confirmation

Further information

Information- and Downloadcenter (Catalogs, Brochures,…)
https://www.siemens.com/ic10
Industry Mall (Online ordering system)
https://mall.industry.siemens.com/mall/en/en/Catalog/product?mlfb=3SU1000-1HB20-0AA0
Cax online generator
http://support.automation.siemens.com/WW/CAXorder/default.aspx?lang=en&mlfb=3SU1000-1HB20-0AA0
Service&Support (Manuals, Certificates, Characteristics, FAQs,...)
https://support.industry.siemens.com/cs/ww/en/ps/3SU1000-1HB20-0AA0
Image database (product images, 2D dimension drawings, 3D models, device circuit diagrams, EPLAN macros, ...)
http://www.automation.siemens.com/bilddb/cax_de.aspx?mlfb=3SU1000-1HB20-0AA0&lang=en

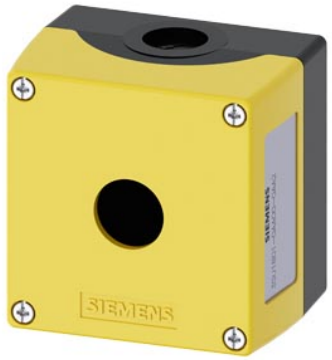




last modified: 12/21/2020

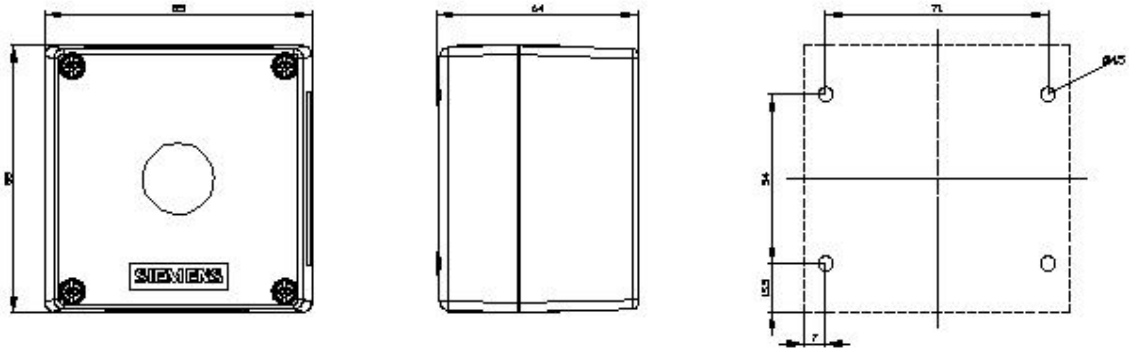
SIEMENS

Data sheet 3SU1801-0AA00-0AA2



Enclosure for command devices, 22 mm, round, Enclosure material plastic, Enclosure top part yellow, 1 control point plastic, Control point in center, without equipment

product brand name	SIRIUS ACT
product designation	Enclosures
product type designation	3SU1
Enclosure	
design of the housing	Command point in center
shape of the enclosure front	Square
material of the enclosure	plastic
number of command points	1
product component protective collar	No
color of the enclosure top part	yellow
fastening method of the enclosure	Vertical / horizontal
General technical data	
protection class IP	IP66, IP67, IP69(IP69K)
degree of protection NEMA rating	1, 2, 3, 3R, 4, 4X, 12, 13
shock resistance for railway applications acc. to DIN EN 61373	Category 1, Class B
vibration resistance for railway applications acc. to DIN EN 61373	Category 1, Class B
Substance Prohibitance (Date)	01.10.2014 00:00:00
cable entry type	Without
Connections/ Terminals	
type of electrical connection on enclosure	Cable routing above and below, both 1 x M20
tightening torque of fixing screws in the enclosure cover	1.5 ... 1.7 N·m
Ambient conditions	
ambient temperature	
● during operation	-25 ... +70 °C
● during storage	-40 ... +80 °C
environmental category during operation acc. to IEC 60721	3M6, 3S2, 3B2, 3C3, 3K6 (with relative air humidity of 10 ... 95 %, no condensation in operation permitted for all devices behind front panel)
Installation/ mounting/ dimensions	
fastening method of modules and accessories	Floor mounting
height	85 mm
width	85 mm
depth	64 mm
mounting diameter	22.3 mm
positive tolerance of installation diameter	0.4 mm
Certificates/ approvals	



last modified: 12/21/2020

DSEGenset®

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

KEY FEATURES

- Configurable power-up mode
- MPU fail delay
- Enhanced graphical user interface
- Drag & drop advanced PLC editor
- MSC ID within PLC GenComm override
- 4-Line back-lit LCD text display
- Five key menu navigation
- Front panel editing with PIN protection
- Customisable status screens
- Power save mode
- 11 configurable inputs
- 8 configurable outputs
- Flexible sensor inputs
- Configurable timers and alarms
- 3 configurable maintenance alarms
- Multiple date and time scheduler
- Configurable event log (250)
- Tier 4 CAN engine support
- Integral PLC editor
- Easy access diagnostic page
- CAN and Magnetic Pick-up/Alt. sensing
- Fuel usage monitor and low fuel alarms
- Charge alternator failure alarm
- Manual speed control (on compatible CAN engines)
- Manual fuel pump control
- Engine exerciser
- "Protections disabled" feature
- kW protection
- Reverse power (kW) protection
- LED and LCD alarm indication
- Power monitoring (kW h, kV Ar, kV A h, kV Ar h)
- Load switching (load shedding and dummy load outputs)
- Automatic load transfer (DSE7420)
- Unbalanced load protection
- Independent Earth Fault trip
- USB connectivity
- Backed up real time clock
- Fully configurable via DSE Configuration Suite PC software
- Configurable display languages
- Remote SCADA monitoring via DSE Configuration Suite PC software
- User selectable simultaneous RS232, RS485 & Ethernet communications
- Configurable MODBUS pages
- MODBUS RTU & TCP support
- Advanced SMS messaging (additional external modem required)
- Additional display screens to help with modem diagnostics
- Idle control for starting
- DSENet® expansion compatible
- 20 parameter data logging

KEY BENEFITS

- 132 x 64 pixel ratio display for clarity
- Real-time clock provides accurate event logging
- Multiple date and time scheduler
- Set maintenance periods can be configured to maintain optimum engine performance
- Built in ethernet communications provides advanced remote monitoring
- Modules can be integrated into building management systems (BMS) using MODBUS
- Increased input and output expansion capability via DSENet®
- Licence-free PC software
- IP65 rating (with supplied gasket) offers increased resistance to water ingress
- PLC editor allows user configurable functions to meet specific application requirements
- Data logging to assist with fault finding

RELATED MATERIALS

TITLE	PART NO.
DSE7410 Installation Instructions	053-085
DSE7420 Installation Instructions	053-088
DSE74xx Quick Start Guide	057-162
DSE74xx Operator Manual	057-161
DSE74xx PC Configuration Suite Manual	057-160

SPECIFICATIONS

DC SUPPLY

CONTINUOUS VOLTAGE RATING
8 V to 35 V Continuous

CRANKING DROPOUTS
Able to survive 0 V for 50 mS, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries

MAXIMUM OPERATING CURRENT
260 mA at 12 V, 130 mA at 24 V

MAXIMUM STANDBY CURRENT
120 mA at 12 V, 65 mA at 24 V

CHARGE FAIL/EXCITATION RANGE
0 V to 35 V

OUTPUTS

OUTPUT A (FUEL)
15 A DC at supply voltage

OUTPUT B (START)
15 A DC at supply voltage

OUTPUTS C & D
8 A AC at 250 V AC (Volt free)

AUXILIARY OUTPUTS E,F,G,H,I & J
2 A DC at supply voltage

GENERATOR

VOLTAGE RANGE
15 V to 333 V AC (L-N)

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAINS (UTILITY) (DSE7420)

VOLTAGE RANGE
15 V to 333 V AC (L-N)

FREQUENCY RANGE
3.5 Hz to 75 Hz

BUS (DSE7410)

VOLTAGE RANGE
15 V to 333 V AC (L-N)

FREQUENCY RANGE
3.5 Hz to 75 Hz

MAGNETIC PICK UP

VOLTAGE RANGE
+/- 0.5 V to 70 V

FREQUENCY RANGE
10,000 Hz (max)

DIMENSIONS

OVERALL
240 mm x 181 mm x 42 mm
9.4" x 6.8" x 1.6"

PANEL CUTOUT
220 mm x 160 mm
8.7" x 6.3"

MAXIMUM PANEL THICKNESS
8 mm
0.3"

STORAGE TEMPERATURE RANGE
-40 °C to +85°C
-40 °F to +185 °F

OPERATING TEMPERATURE RANGE
-30 °C to +70 °C
-22 °F to +158 °F

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TELEPHONE +44 (0) 1723 890099
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EMAIL usasales@deepseaelectronics.com **WEBSITE** www.deepseaelectronics.com

Registered in England & Wales No.01319649
VAT No.316923457

055-108/12/20 (5)

DSEGenset®

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

The DSE7410 is an Auto Start Control Module and the DSE7420 is an Auto Mains (Utility) Failure Control Module suitable for a wide variety of single, diesel or gas, gen-set applications.

A sophisticated module monitoring an extensive number of engine parameters, the DSE74xx will annunciate warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LED, remote PC, and audible alarms. The module includes RS232, RS485 & Ethernet ports as well as dedicated terminals for system expansion.

The DSE7400 Series modules are compatible with electronic (CAN) and non-electronic (magnetic pick-up/ alternator sensing) engines and offer a comprehensive number of flexible inputs, outputs and extensive engine protections so the system can be easily adapted to meet industry requirements.

The modules can be easily configured using the DSE Configuration Suite Software. Selected front panel editing is also available.

ENVIRONMENTAL TESTING STANDARDS

ELECTRO-MAGNETIC COMPATIBILITY
BS EN 61000-6-2
EMC Generic Immunity Standard for the Industrial Environment
BS EN 61000-6-4
EMC Generic Emission Standard for the Industrial Environment

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

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

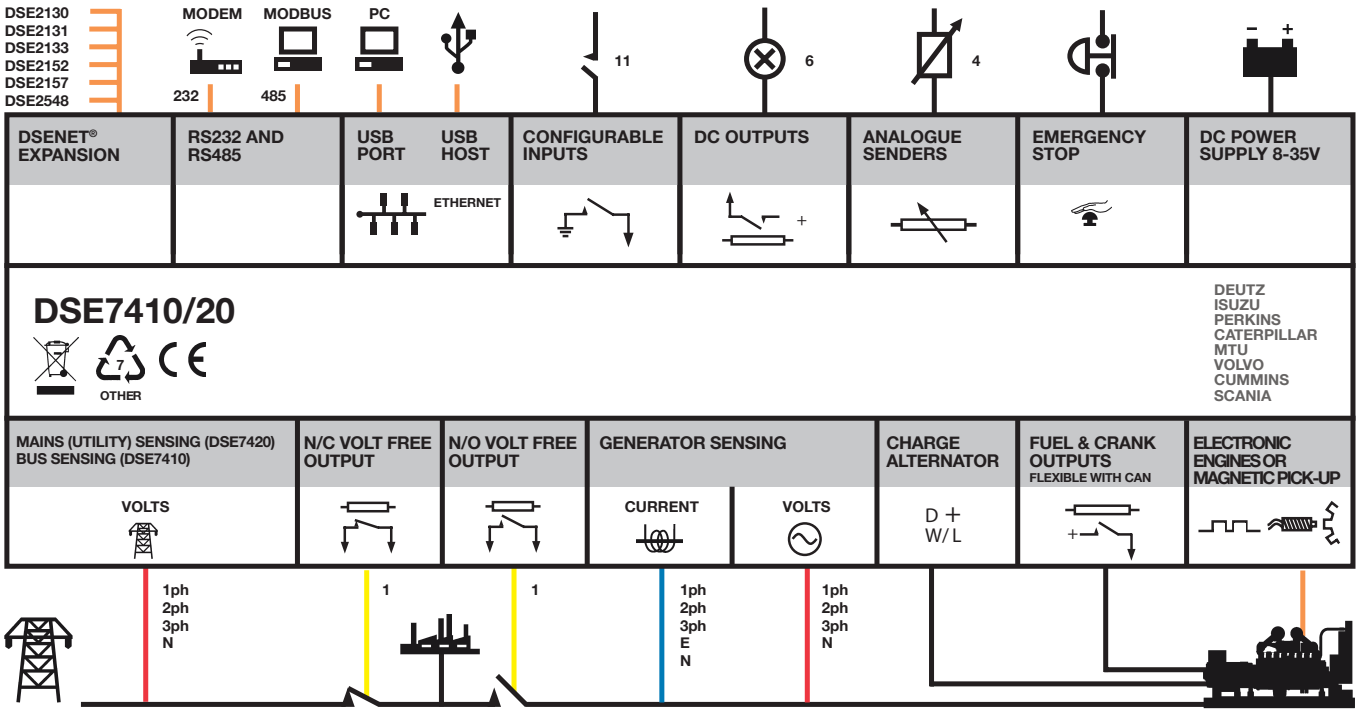
VIBRATION
BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm,
8 Hz to 500 Hz @ 2 gn

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

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

DEGREES OF PROTECTION PROVIDED BY ENCLOSURES
BS EN 60529
IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

COMPREHENSIVE FEATURE LIST TO SUIT A WIDE VARIETY OF GEN-SET APPLICATIONS



LISTED

SX460 AUTOMATIC VOLTAGE REGULATOR (AVR)

SPECIFICATION, INSTALLATION AND ADJUSTMENTS

General description

SX460 is a half-wave phase-controlled thyristor type Automatic Voltage Regulator (AVR) and forms part of the excitation system for a brush-less generator.

In addition to regulating the generator voltage, the AVR circuitry includes under-speed and sensing loss protection features. Excitation power is derived directly from the generator terminals.

Positive voltage build up from residual levels is ensured by the use of efficient semiconductors in the power circuitry of the AVR.

The AVR is linked with the main stator windings and the exciter field windings to provide closed loop control of the output voltage with load regulation of +/- 1.0%.

In addition to being powered from the main stator, the AVR also derives a sample voltage from the output windings for voltage control purposes. In response to this sample voltage, the AVR controls the power fed to the exciter field, and hence the main field, to maintain the machine output voltage within the specified limits, compensating for load, speed, temperature and power factor of the generator.

A frequency measuring circuit continually monitors the generator output and provides output under-speed protection of the excitation system, by reducing the output voltage proportionally with speed below a pre-settable threshold. A manual adjustment is provided for factory setting of the under frequency roll off point, (UFRO). This can easily be changed to 50 or 60 Hz in the field by push-on link selection.

Provision is made for the connection of a remote voltage trimmer, allowing the user fine control of the generator's output.

Technical specification

INPUT

Voltage	Jumper selectable 95-132V ac or 190-264V ac
Frequency	50-60 Hz nominal
Phase	1

OUTPUT

Voltage	max 90V dc at 207V ac input
Current	continuous 4 A dc Intermittent 6 A for 10 secs
Resistance	15 ohms minimum

REGULATION

+/- 1.0% (see note 1)

THERMAL DRIFT

0.05% per deg. C change in AVR ambient (note 2)

TYPICAL SYSTEM RESPONSE

AVR response	20 ms
Filed current to 90%	80 ms
Machine Volts to 97%	300 ms

EXTERNAL VOLTAGE ADJUSTMENT

+/-10% with 1 k ohm 1 watt trimmer (see note 3)

UNDER FREQUENCY PROTECTION

Set point	95% Hz (see note 4)
Slope	170% down to 30 Hz

UNIT POWER DISSIPATION

10 watts maximum

BUILD UP VOLTAGE

4 Volts @ AVR terminals

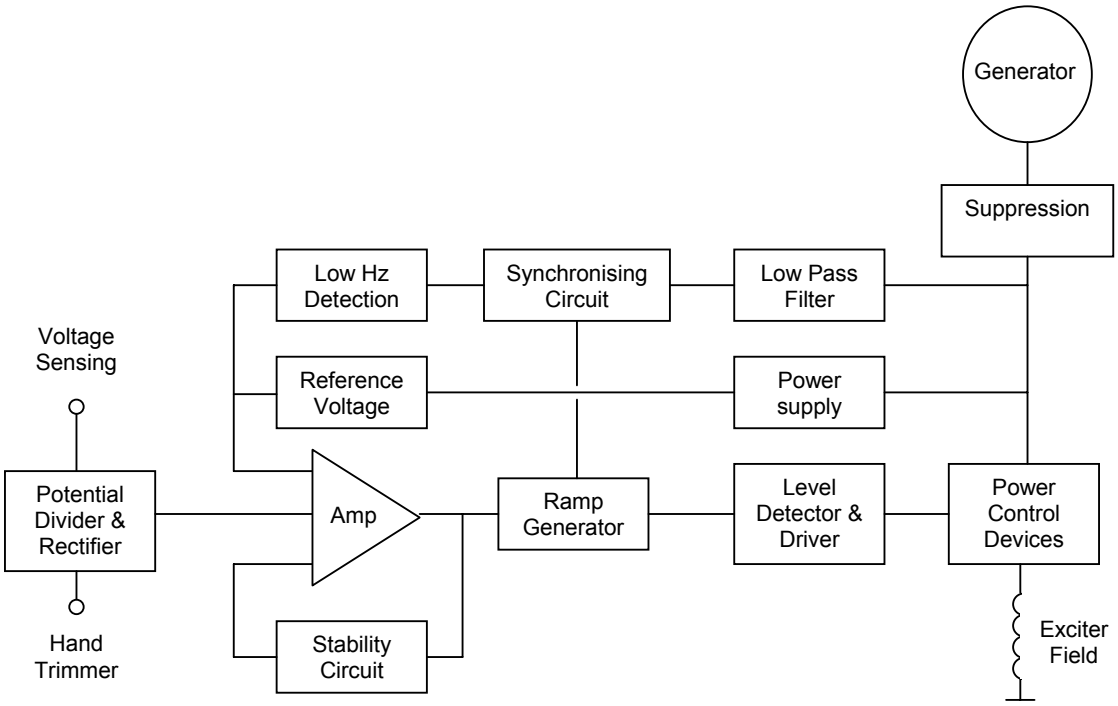
ENVIRONMENTAL

Vibration	20-100 Hz	50mm/sec
	100Hz – 2kHz	3.3g
Operating temperature		-40 to +70°C
Relative Humidity 0-70°C		95% (see note 5)
Storage temperature		-55 to +80°C

NOTES

1. With 4% engine governing
2. After 10 minutes.
3. Applies to Mod status F onwards. Generator de-rate may apply. Check with factory.
4. Factory set, semi-sealed, jumper selectable
5. Non condensing.

DESIGN DETAIL



The main functions of the AVR are:

Potential Divider and Rectifier takes a proportion of the generator output voltage and attenuates it. This input chain of resistors includes the range potentiometer and hand trimmer which adjust the generator voltage. A rectifier converts the a.c. into d.c. for further processing.

The Amplifier (Amp) compares the sensing voltage to the Reference Voltage and amplifies the difference (error) to provide a controlling signal for the power devices. The Ramp Generator and Level Detector and Driver infinitely control the conduction period of the Power Control Devices and hence provides the excitation system with the required power to maintain the generator voltage within specified limits.

The Stability Circuit provides adjustable negative ac feedback to ensure good steady state and transient performance of the control system.

The Low Hz Detector measures the period of each electrical cycle and causes the reference voltage to be reduced approximately linearly with speed below a presettable threshold. A Light Emitting Diode gives indication of underspeed running.

The Synchronising circuit is used to keep the Ramp Generator and Low Hz Detector locked to the generator waveform period.

The Low Pass Filter prevents distorted waveforms affecting the operation of the AVR.

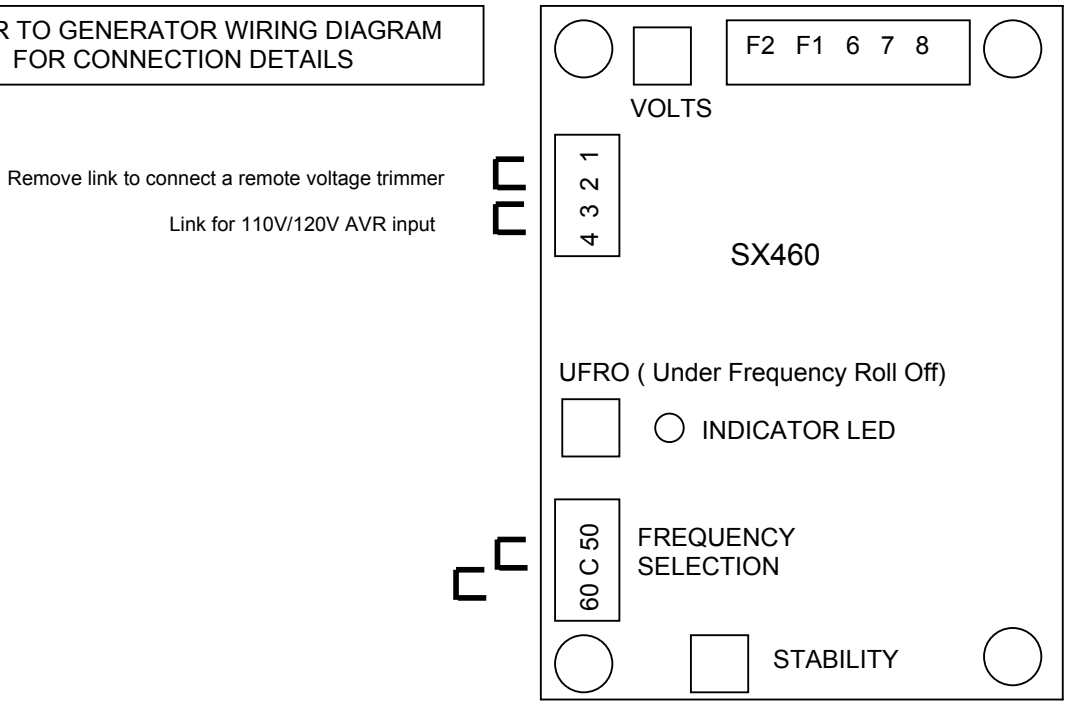
Power Control Devices vary the amount of exciter field current in response to the error signal produced by the Amplifier.

Suppression components are included to prevent sub cycle voltage spikes damaging the AVR components and also to reduce the amount of conducted noise on the generator terminals.

The Power Supply provides the required voltages for the AVR circuitry.

FITTING AND OPERATING

REFER TO GENERATOR WIRING DIAGRAM
FOR CONNECTION DETAILS



SUMMARY OF AVR CONTROLS		
CONTROL	**FUNCTION**	**DIRECTION**
VOLTS	TO ADJUST GENERATOR OUTPUT VOLTAGE	CLOCKWISE INCREASES OUTPUT VOLTAGE
STABILITY	TO PREVENT VOLTAGE HUNTING	CLOCKWISE INCREASE THE DAMPING EFFECT
UFRO	TO SET THE UFRO KNEE POINT	CLOCKWISE REDUCES THE KNEE POINT FREQUENCY

ADJUSTMENT OF AVR CONTROLS

VOLTAGE ADJUSTMENT

The generator output voltage is set at the factory, but can be altered by careful adjustment of the VOLTS control on the AVR board, or by the external hand trimmer if fitted. Terminals 1 and 2 on the AVR will be fitted with a shorting link if no hand trimmer is required. Terminals 3 and 4 are linked only for special low voltage applications.

CAUTION Do not increase the voltage above the rated generator voltage. If in doubt, refer to the rating plate mounted on the generator case.
CAUTION Do not ground any of the hand trimmer terminals as these could be above earth potential. Failure to observe this could cause equipment damage.

If a replacement AVR has been fitted or re-setting of the VOLTS adjustment is required, proceed as follows:

CAUTION
1. Before running generator, turn the VOLTS control fully anti-clockwise.
2. Turn remote volts trimmer (if fitted) to midway position.
3. Turn STABILITY control to midway position.
4. Connect a suitable voltmeter (0-300V ac) across line to neutral of the generator.
5. Start generator set, and run on no load at nominal frequency e.g. 50-53Hz or 60-63Hz.
6. If the red Light Emitting Diode (LED) is illuminated, refer to the Under Frequency Roll Off (UFRO) adjustment.
7. Carefully turn VOLTS control clockwise until rated voltage is reached.
8. If instability is present at rated voltage, refer to stability adjustment, then re-adjust voltage if necessary.
9. Voltage adjustment is now completed.

STABILITY ADJUSTMENT

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

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

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

UNDER FREQUENCY ROLL OFF (UFRO) ADJUSTMENT

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

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

The UFRO adjustment is preset and sealed and only requires the selection of 50 / 60Hz using the jumper link.

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

STAMFORD

Barnack Road • Stamford • Lincolnshire • PE9 2NB
Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100

STAMFORD

AS440 AUTOMATIC VOLTAGE REGULATOR (AVR)

SPECIFICATION INSTALLATION AND ADJUSTMENTS

General description

AS440 is a half wave phase controlled thyristor type AVR and forms part of the excitation system for a brushless generator. The design employs Surface Mount Technology (SMT) for high integration of features in a small footprint AVR.

Positive voltage build up from residual levels is ensured by the use of efficient semiconductors in the power circuitry of the AVR. The power and voltage sensing circuits have separate terminals, allowing the excitation power to be derived directly from the stator winding for basic applications or from an auxiliary winding if sustained short circuit performance is required.

The AVR is linked with the main stator windings and the exciter field windings to provide closed loop control of the output voltage with load regulation of +/- 1.0%.

The AVR voltage sensing terminals continuously sample the output windings for voltage control purposes. In response to this sample voltage, the AVR controls the power fed to the exciter field, and hence the main field, to maintain the machine output voltage within the specified limits, compensating for load, speed, temperature and power factor, of the generator.

A frequency measuring circuit continually monitors the generator output and provides under-speed protection of the excitation system, by reducing the output voltage proportionally with speed below a pre-settable threshold. A manual adjustment is provided for factory setting of the under frequency roll off point, (UFRO). This can easily be changed to 50 or 60 Hz in the field by push-on link selection.

Over excitation conditions are limited to a safe period by a protection circuit within the AVR.

Provision is made for the connection of a remote voltage trimmer, allowing the user fine control of the generator's output.

An analogue input is provided allowing connection to the Power Factor controller or other external devices with compatible output.

The AVR has the facility for droop CT connection, to allow parallel running with other similarly equipped generators.

Technical specification

SENSING INPUT

Voltage	Jumper selectable 100-130 Vac 1 phase or 190-264 Vac 1 phase
Frequency	50-60 Hz nominal

POWER INPUT

Voltage	100-264 V ac 1 phase
Frequency	50-60 Hz nominal

OUTPUT

Voltage	82 V d.c. @ 200 V a.c.
Current	continuous 4A (see note 1). transient 7.5A for 10 secs.
Resistance	15 ohms min (10 ohms min when input volts is less than 175 ac)

REGULATION

+/- 1.0% (see note 2)

THERMAL DRIFT

0.03% per deg. C change in AVR ambient (see note 3)

TYPICAL SYSTEM RESPONSE

AVR response	20 ms
Filed current to 90%	80 ms
Machine Volts to 97%	300 ms

EXTERNAL VOLTAGE ADJUSTMENT

+/-10% with 1 k ohm 1 watt trimmer (see note 4)
Increasing resistance lowers voltage.

UNDER FREQUENCY PROTECTION

Set point 94 -98% Hz (see note 5)

UNIT POWER DISSIPATION

12 watts maximum

BUILD UP VOLTAGE

4 Volts @ AVR terminals

ANALOGUE INPUT

Maximum input	+/- 5 Vdc (see note 6)
Sensitivity	1V for 5% Generator Volts (adjustable)
Input resistance	1k ohm

QUADRATURE DROOP INPUT

10 ohms burden
Max. sensitivity: 0.07 A for 5% droop 0PF
Max. input: 0.33 A

OVER EXCITATION PROTECTION

Set point	65 V dc
Time delay	10-15 seconds (fixed)

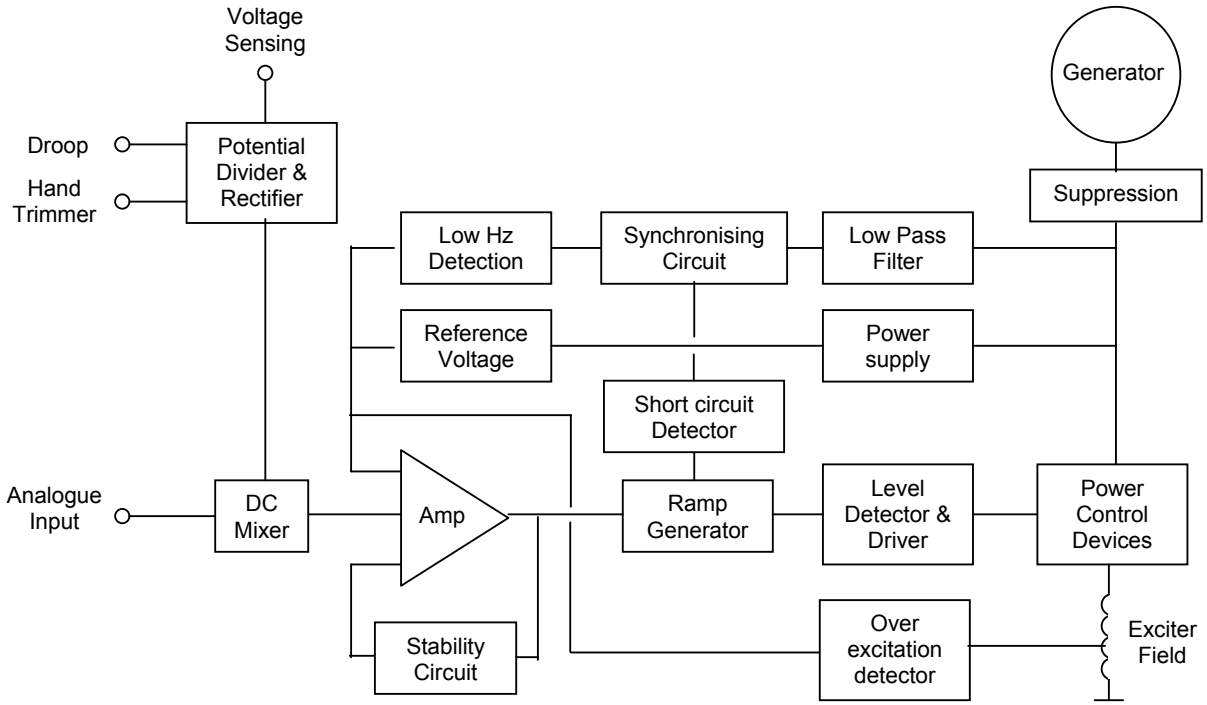
ENVIRONMENTAL

Vibration	20-100 Hz	50mm/sec
	100Hz – 2kHz	3.3g
Operating temperature		-40 to +70C (note 7)
Relative Humidity 0-70C		95% (note 8)
Storage temperature		-55 to +80C

NOTES

1. De-rate by 12% if mounted in 'portrait' orientation.
2. With 4% engine governing.
3. After 2 minutes.
4. Generator de-rate may apply. Check with factory.
5. Factory set, semi-sealed, jumper selectable.
6. Any device connected to the analogue input must be fully floating (galvanically isolated from ground), with an insulation strength of 500V ac.
7. De-rate output current by 5% per degree C above 60C.
8. Non condensing.

DESIGN DETAIL



The main functions of the AVR are:

Potential Divider and Rectifier takes a proportion of the generator output voltage and attenuates it. The potential divider is adjustable by the AVR Volts potentiometer and external hand trimmer (when fitted). The output from the droop CT is also added to this signal. A rectifier converts the a.c. input signal into d.c. for further processing.

The DC Mixer adds the Analogue input signal the Sensing signal.

The Amplifier (Amp) compares the sensing voltage to the Reference Voltage and amplifies the difference (error) to provide a controlling signal for the power devices. The Ramp Generator and Level Detector and Driver infinitely control the conduction period of the Power Control Devices and hence provides the excitation system with the required power to maintain the generator voltage within specified limits.

The Stability Circuit provides adjustable negative ac feedback to ensure good steady state and transient performance of the control system.

The Low Hz Detector measures the period of each electrical cycle and causes the reference voltage to be reduced approximately linearly with speed below a presettable threshold. A Light Emitting Diode gives indication of underspeed running.

The Synchronising circuit is used to keep the Ramp Generator and Low Hz Detector locked to the generator waveform period.

The Low Pass Filter prevents distorted waveforms affecting the operation of the AVR control circuit.

The Short Circuit Detector senses the presence of a short circuit on the generator output and forces the Power Control Devices into full conduction. This only occurs when the AVR is powered from an auxiliary winding.

Power Control Devices vary the amount of exciter field current in response to the error signal produced by the Amplifier.

Suppression components are included to prevent sub cycle voltage spikes damaging the AVR components and also to reduce the amount of conducted noise on the generator terminals.

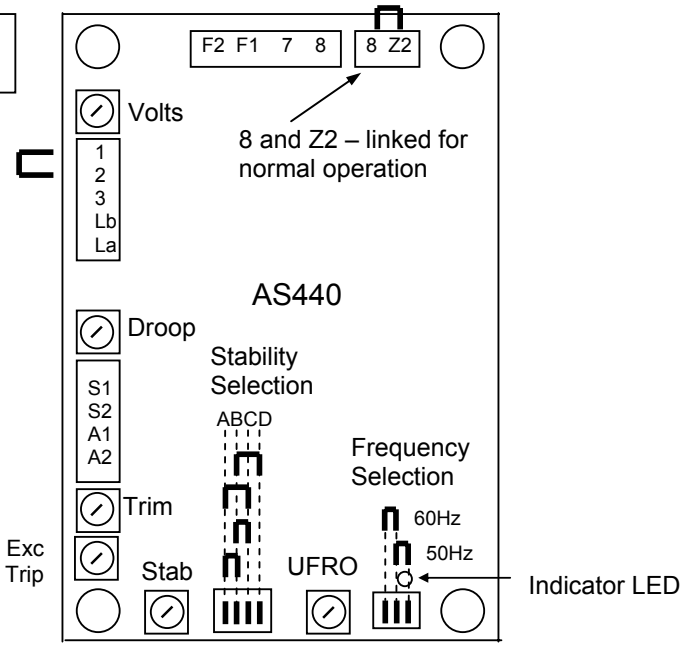
The Over Excitation Detector continuously monitors the exciter field voltage and provides signals, to collapse the output voltage if an over excitation condition persists for the specified time period.

The Power Supply provides the required voltages for the AVR circuitry.

FITTING AND OPERATING

REFER TO GENERATOR WIRING DIAGRAM FOR CONNECTION DETAILS

Hand trimmer terminals. Remove link before fitting hand trimmer. Link must be fitted when hand trimmer is not required.



Stability Selection Table

No.	Power range	Response
B-D	< 100kW	Slow
A-C	< 100kW	Fast
B-C	100-550kW	Fast
A-B	> 550kW	Fast

SUMMARY OF AVR CONTROLS		
CONTROL	**FUNCTION**	**DIRECTION**
VOLTS	TO ADJUST GENERATOR OUTPUT VOLTAGE	CLOCKWISE INCREASES OUTPUT VOLTAGE
STABILITY	TO PREVENT VOLTAGE HUNTING	CLOCKWISE INCREASE THE DAMPING EFFECT
STAB SWITCH	TO OPTIMISE TRANSIENT PERFORMANCE	SEE TABLE ABOVE
UFRO	TO SET THE UFRO KNEE POINT	CLOCKWISE REDUCES THE KNEE POINT FREQUENCY
DROOP	TO SET THE GENERATOR DROOP TO 5% AT 0PF	CLOCKWISE INCREASES THE DROOP
VTRIM	TO OPTIMISE ANALOGUE INPUT SENSITIVITY	CLOCKWISE INCREASES THE GAIN OR SENSITIVITY
EXC TRIP	TO SET OVER EXCITATION TRIP CUT OFF LEVEL	CLOCKWISE INCREASES THE CUT OFF LEVEL

ADJUSTMENT OF AVR CONTROLS

VOLTAGE ADJUSTMENT

The generator output voltage is set at the factory, but can be altered by careful adjustment of the VOLTS control on the AVR board, or by the external hand trimmer if fitted. If major adjustment is necessary or you lose stability, follow the 'VOLTAGE SETUP PROCEDURE'.
Terminals 1 and 2 on the AVR will be fitted with a shorting link if no hand trimmer is required. Terminals La and Lb are linked only for special low voltage applications.

WARNING! Do not increase the voltage above the rated generator voltage. If in doubt, refer to the rating plate mounted on the generator case.

WARNING! Do not ground any of the hand trimmer terminals as these could be above earth potential. Failure to observe this could cause equipment damage.

WARNING!
If a replacement AVR has been fitted or re-setting of the VOLTS adjustment is required, turn the VOLTS control fully anti-clockwise before running generator.

VOLTAGE SETUP PROCEDURE

For major adjustments and replacing the AVR.
Read and understand this procedure before attempting to follow it.

1. Before running generator, turn the VOLTS control fully anti-clockwise.
2. Turn remote volts trimmer (if fitted) to midway position.
3. Turn STABILITY control to midway position.
4. Connect a suitable voltmeter (0-300V ac) across line to neutral of the generator.
5. Start generator set, and run on no load at nominal frequency e.g. 50-53Hz or 60-63Hz.
6. If the red Light Emitting Diode (LED) is illuminated, refer to the Under Frequency Roll Off (UFRO) adjustment.
7. Carefully turn VOLTS control clockwise until rated voltage is reached.
8. If instability is present at rated voltage, refer to stability adjustment, then re-adjust voltage if necessary.
9. Voltage adjustment is now completed.

STABILITY ADJUSTMENT

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

A switch is provided to change the response of the stability circuit to suit different frame size generators and applications. The table shows the options available.
The slow response settings may prove helpful in reducing lamp flicker.

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

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

UNDER FREQUENCY ROLL OFF (UFRO) ADJUSTMENT

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

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

The UFRO adjustment is preset and sealed and only requires the selection of 50/60Hz using the jumper link.

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

DROOP ADJUSTMENT

Generators intended for parallel operation are fitted with a quadrature droop C.T. which provides a power factor dependent signal for the AVR. The C.T. is connected to S1, S2 on the AVR.

The DROOP adjustment is normally preset in the works to give 5% voltage droop at full load zero power factor.

Clockwise increases the amount of C.T. signal injected into the AVR and increases the droop with lagging power factor (cos Ø). With the control fully anti-clockwise there is no droop.

TRIM ADJUSTMENT

An analogue input (A1 A2) is provided to connect to a Power Factor Controller or other devices. It is designed to accept dc signals up to +/- 5 volts.

WARNING! Any devices connected to this input must be fully floating and galvanically isolated from ground, with an insulation capability of 500 Vac. Failure to observe this could result in equipment damage.

The dc signal applied to this input adds to the AVR sensing circuit. A1 is connected to the AVR 0 volts. Positive on A2 increases excitation. Negative on A2 decreases excitation.

The TRIM control allows the user to adjust the sensitivity of the input. With TRIM fully anti-clockwise the externally applied signal has no effect. Clockwise it has maximum effect.

Normal setting is fully clockwise when used with a Power Factor Controller.

OVER EXCITATION (EXC TRIP) ADJUSTMENT

The adjustment is set and sealed in the works and should not be altered.
An over excitation condition is indicated on the common LED which also indicates under speed running.
The generator must be stopped to reset an over excitation condition.

ISOLATING THE EXCITATION CIRCUIT

In some applications it is desirable to isolate the excitation circuit. There are two different ways of doing this depending on the AVR connection to the generator stator.

The modifications mentioned below must be done with the generator at rest.

If the AVR is fitted with a link across the 2 way terminal block Z2 & 8, then the AVR power circuit is connected to the main stator winding. In this case a switch with a Nominal rating of 240vac 10 Amps can be connected across the AVR terminals Z2 & 8 after removing the link.

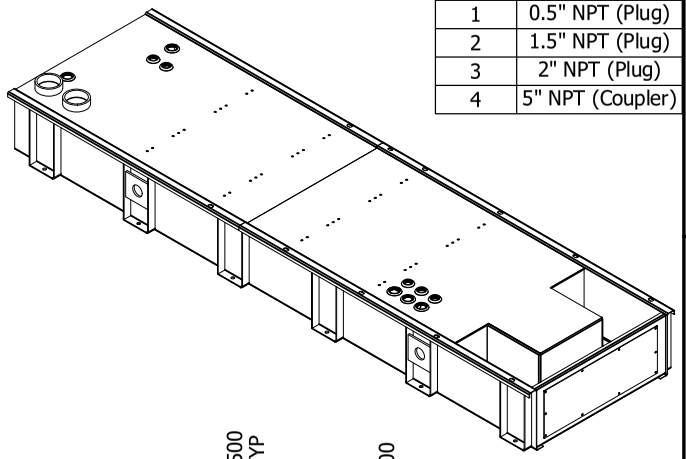
When the switch is open, the excitation circuit is isolated. The link should be kept for future use if required.

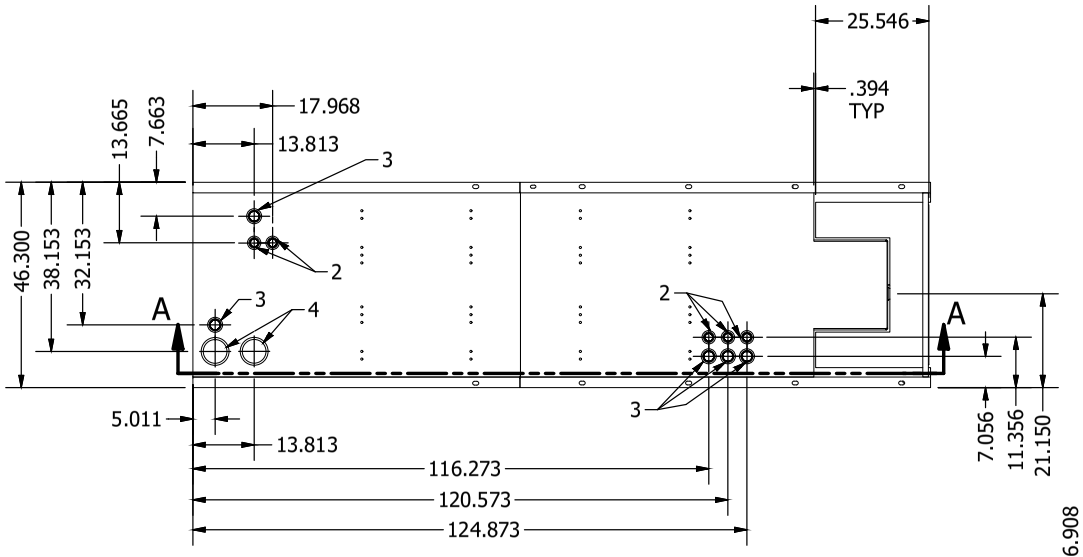
If the AVR has a wire connected to terminal Z2 (wire labeled Z2), then the AVR power circuit is connected to an auxiliary winding. In this case a switch with a nominal rating of 240vac 10 Amps can be connected in series with the wire Z2.
When the switch is open, the excitation circuit is isolated

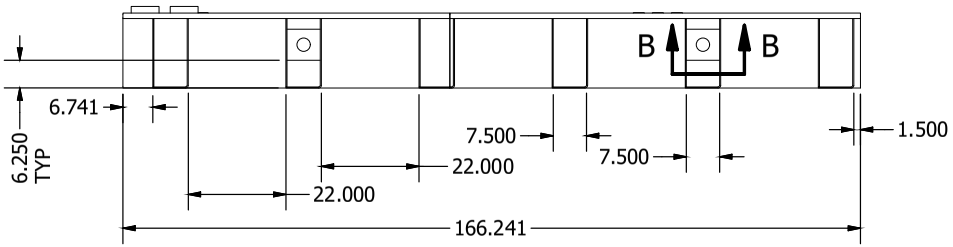
STAMFORD

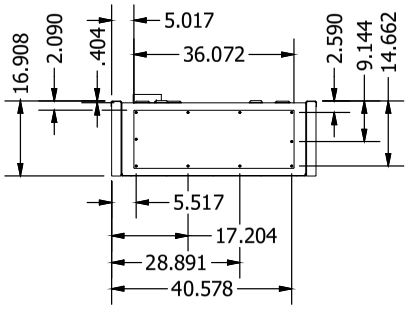
Barnack Road • Stamford • Lincolnshire • PE9 2NB
Tel: 00 44 (0)1780 484000 • Fax: 00 44 (0)1780 484100

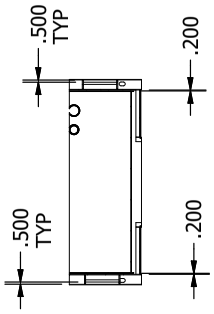
PORT	DESCRIPTION
1	0.5" NPT (Plug)
2	1.5" NPT (Plug)
3	2" NPT (Plug)
4	5" NPT (Coupler)



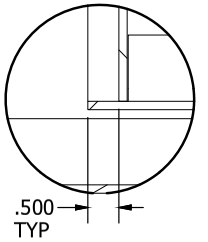




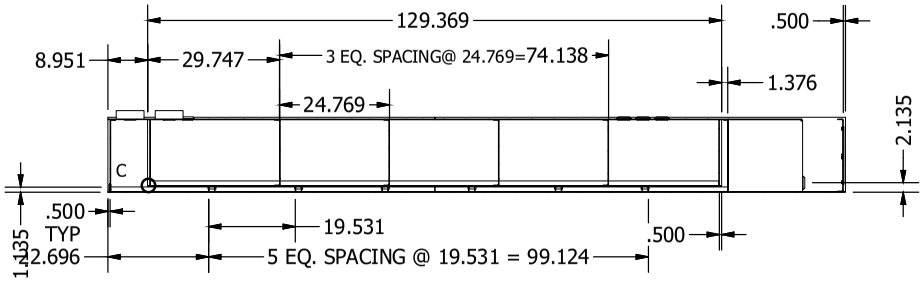




SECTION B-B



DETAIL C
SCALE 1/2



SECTION A-A

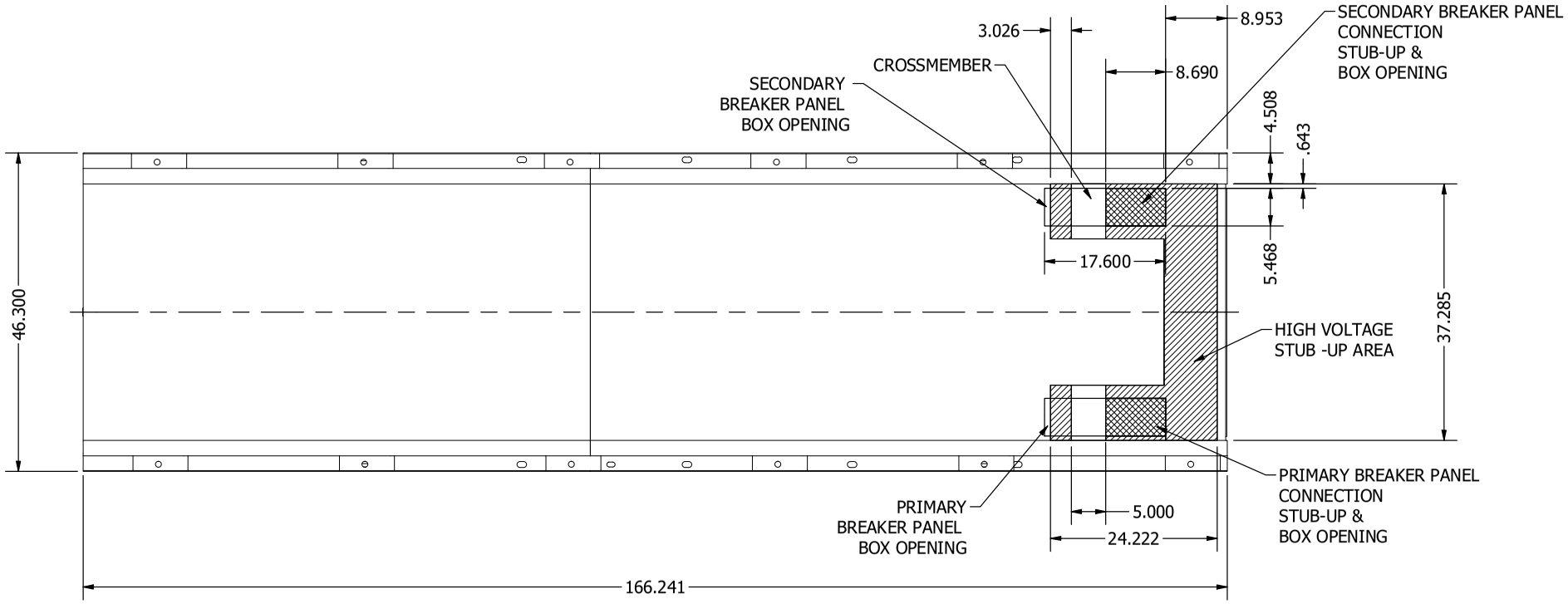
	DATE:	NAME:	
CREATED:	5/20/2020	S.T.	
DESIGNED:	5/18/2020	S.T.	
APPROVED:	5/19/2020	C.S.	

*Welding nomenclature according to **ISO 2553 Type A***
*Welding quality level according to **ISO 5817:***
*>Quality for structural joints: ***C***
*>Quality for non-structural joints: ***D***

HIPOWER generating sets

U.O.M:	DESCRIPTION:	CODE: W2055065
inch		
SCALE: 1/28	ULC142 DW 24 HOURS (320 GALLONS) HDI180F (HD02) U-STUB-UP WELDED	WEIGHT: 1500.614 lbmass
		REVISION: 01

RECOMENDED ELECTRICAL STUB-UP	
HIGH VOLTAGE STUB UP	
BREAKER PANEL CONNECTION BOX OPENING	



HIPOWER® generating sets

	DATE	NAME
DESIGNED:	5/19/2020	S.T.
REVISED:	5/20/2020	S.T.
APPROVED:	5/20/2020	C.S.

DESCRIPTION:
ULC142 DW 24 HOURS (320 GALLONS) HDI180F
(HD02) U-STUB-UP

CODE:	2055065
SCALE:	1 / 15
PROJECT:	
REV:	01
UNIT:	inch

Tmax T ranges

Ordering details T6

Tmax T6 Thermal Magnetic protection (Molded case circuit breaker)

Standard version

Thermal magnetic adjustable trip unit				IC	N	S	H	L
Frame size [A]	Therm. adj. [A]	Mag. adj. [A]	Poles	Rating (600V)	20 kA Part number	25 kA Part number	35 kA Part number	42 kA Part number
600	420...600A	3000...6000A	3		T6N600TW	T6S600TW	T6H600TW	T6L600TW
			4		T6N600TW-4	–	T6H600TW-4	–
800	560...800A	4000...8000A	3		T6N800TW	T6S800TW	T6H800TW	T6L800TW
			4		T6N800TW-4	–	T6H800TW-4	–

100% rated version

Thermal magnetic adjustable trip unit				IC	NQ	SQ	HQ	LQ
Frame size [A]	Therm. adj. [A]	Mag. adj. [A]	Poles	Rating (600V)	20 kA Part number	25 kA Part number	35 kA Part number	42 kA Part number
600	420...600A	3000...6000A	3		T6NQ600TW	T6SQ600TW	T6HQ600TW	T6LQ600TW
800	560...800A	4000...8000A	3		T6NQ800TW	T6SQ800TW	T6HQ800TW	T6LQ800TW

Tmax T6 Electronic protection (Molded case circuit breaker)

Standard PR221DS LS/I version

Electronic trip unit				IC	N	S	H	L
Frame size [A]	L adj. [A]	I adj. [A]	Poles	Rating (600V)	20 kA Part number	25 kA Part number	35 kA Part number	42 kA Part number
600	240...600A	600...6000A	3		T6N600BW	T6S600BW	T6H600BW	T6L600BW
			4		T6N600BW-4	–	T6H600BW-4	–
800	320...800A	800...8000A	3		T6N800BW	T6S800BW	T6H800BW	T6L800BW
			4		T6N800BW-4	–	T6H800BW-4	–

Standard PR222DS LSI version

Electronic trip unit				IC	N	S	H	L
Frame size [A]	L adj. [A]	I adj. [A]	Poles	Rating (600V)	20 kA Part number	25 kA Part number	35 kA Part number	42 kA Part number
600	240...600A	600...6000A	3		T6N600CW	T6S600CW	T6H600CW	T6L600CW
			4		T6N600CW-4	–	T6H600CW-4	–
800	320...800A	800...8000A	3		T6N800CW	T6S800CW	T6H800CW	T6L800CW
			4		T6N800CW-4	–	T6H800CW-4	–

Standard PR222DS LSIG version

Electronic trip unit				IC	N	S	H	L
Frame size [A]	L adj. [A]	I adj. [A]	Poles	Rating (600V)	20 kA Part number	25 kA Part number	35 kA Part number	42 kA Part number
600	240...600A	600...6000A	3		T6N600EW	T6S600EW	T6H600EW	T6L600EW
			4		T6N600EW-4	–	T6H600EW-4	–
800	320...800A	800...8000A	3		T6N800EW	T6S800EW	T6H800EW	T6L800EW
			4		T6N800EW-4	–	T6H800EW-4	–

HIPOWER®
A YANMAR COMPANY

WARRANTY CERTIFICATE

Number:

DISTRIBUTOR / CUSTOMER INFORMATION

Company:	
Address:	
City:	
State/Province:	
Zip Code:	
Country	
Phone:	
E-mail:	

EQUIPMENT DETAILS

Machine number:	
Engine number:	
Alternator number:	
Machine data:	
Detail type of machine	

STAMP & SIGNATURE

KEY DATES TO RECORD & NOTE REGARDING THIS WARRANTY CERTIFICATE

ISSUE DATE		WARRANTY START		START-UP DATE		WARRANTY END	

NOTE: For this warranty to be effective and valid, a copy of this warranty certificate must be returned to HIMOINSA Power Systems at the time of machine start-up.

Warranty Coverage: Warranty period starts on ship date. However, it may be adjusted to the date of commissioning of the generator set if completed within (6) months of the ship date from factory. HIPOWER* shall not be liable for any claim greater in amount than the purchase price of the product, in respect of which such claim is made, and in no event shall HIPOWER be liable for any special, indirect or consequential damages.

HEAVY DUTY INDUSTRIAL STATIONARY GENERATORS

Product Line	Warranty
Heavy Duty Industrial Stationary Diesel	2 years or 2000 hours (whichever occurs first) parts and labor
Heavy Duty Industrial Stationary Gas	2 years or 2000 hours (whichever occurs first) parts and labor

Your HIPOWER* generator set has been manufactured and inspected with great effort by qualified personnel to ensure superb quality. If you are the original customer, Himoinsa Power Systems Inc. warrants each product to be free from defects in materials and workmanship for the period indicated above. This warranty is extended to the first and end user, and no warranty is made nor authorized to be made assignable to resale by the first end user. Repair, replacement or appropriate adjustment at Himoinsa Power Systems, Inc.'s option will be furnished if the product, upon Himoinsa Power Systems, Inc.'s inspection, is properly installed, maintained and operated in accordance with Himoinsa instruction manuals. This warranty does not apply to malfunctions caused by damage, unreasonable use, misuse, repair or service by unauthorized persons or normal wear and tear. A valid warranty requires that: (1) The Warranty Certificate Form must be completed, returned an on file at Himoinsa Power Systems, Inc. (2) Service and maintenance records must be kept on file with the end user and made available upon Himoinsa request from factory. (3) The generator set must be routinely exercised in accordance with the factory's operating instructions. (4) Diesel engine sets that are to remain out of service for a period longer than two (2) months are subject to special arrangements. Contact Himoinsa Power Systems Inc. Service and Warranty Department for instructions. For a description of accessories and exclusions from this limited warranty, review the listing below. **TO OBTAIN WARRANTY SERVICE:** Contact your nearest authorized Himoinsa Power Systems, Inc. Service Representative by calling, emailing or writing Himoinsa Power Systems at: Himoinsa Power Systems, Inc. Attn: Service and Warranty Department 16600 S. Theden Street, Olathe, KS 66062-9607; Main # 913-495-5557 / Email service@hipowersystems.com

Guidelines:

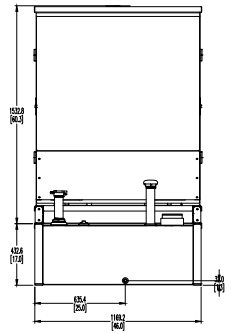
1. All warranty repairs, must be performed by HIPOWER or an authorized HIPOWER service providers only. Service work performed by unauthorized persons will void all warranties.
2. All warranty expense allowances are subject to the conditions defined in HIPOWER'S claim policy.
3. Damage to any covered components or consequential damages caused by the use of a non-OEM part will not be covered by the warranty.
4. Block heater controls and circulating pumps are only covered during the first year of warranty
5. HIPOWER may choose to repair, replace, or refund a piece of equipment.
6. Warranty Labor Rates are based on normal working hours. Additional cost for overtime, emergency labor costs for repairs outside of normal business hours will be the responsibility of the customer.
7. Battery and batteries of any type or kind. The battery manufacturer's warranty applies to these only. Any warranty for such should be handled with the manufacturer according to their policies.
8. Excessive mileage charges. Any HIPOWER authorized distributor may provide warranty service anywhere but will only be paid travel from the nearest service center up to 240 miles round trip of the generator's permanent location at the IRS Standard Mileage Rate.
9. Verification of maintenance records may be required for warranty coverage.
10. Engines, Alternators and Controllers used in HIPOWER mobile generators carry a separate manufacturer's (OEM) warranty, unless otherwise expressly stated. All warranty claims for defects in material and /or workmanship on HIPOWER product components should be directed through HIPOWER SYSTEMS. (OEM) Warranties may vary and are subject to change. HIPOWER shall have no liability under OEM warranties.
11. Rates- Labor rate is $85.00 per hour. Portal to Portal Drive Labor Time rate is $30 per hour with a 4-hour maximum. Portal to Portal Mileage is based on IRS yearly rate for a maximum of 240 miles.
12. A valid warranty requires that: (1) HIPOWER's warranty certificate form must be completed, returned and on file at Himoinsa Power System, Inc. (2) Generator sets that are to remain out of service for a period longer than six months are subject to special preservation requirements.
13. Unit enclosure is only covered against rust and corrosion the first year of the warranty provision.
14. The owner is responsible for the performance of regular maintenance services as specified in the operator's manual applicable to the engine.

The following will NOT be covered by this warranty:

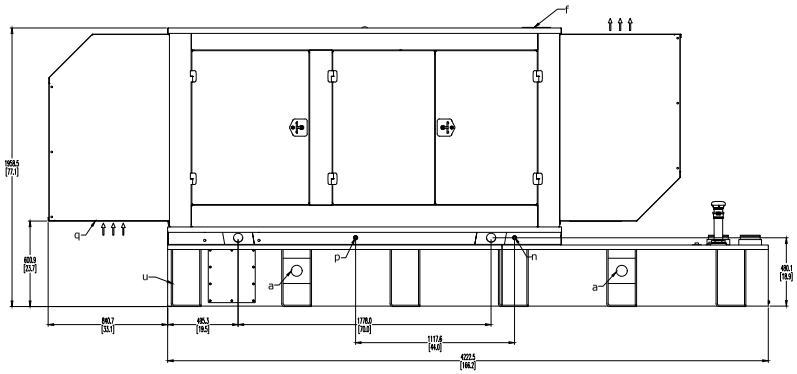
1. Cost of normal maintenance (i.e. tune-ups, associated part(s), adjustments, loose/leaking clamps, installation and start-up).
2. Any failure caused by contaminated fuels, oils, coolants/antifreeze or lack of proper fuels, oils or coolants/antifreeze.
3. Failures caused by any act of God or external cause such as, but not limited to, collision, fire, theft, freezing, vandalism, riot or wars, lighting, earthquake, hurricane, terrorist acts or nuclear holocaust, or any other matters which are reasonably beyond the manufacturer's control.
4. Products that are modified or altered in a manner not authorized by HIPOWER in writing.
5. Failures due, but not limited to, normal wear and tear, accident, misuse, abuse, negligence, or improper installation or sizing.
6. Any incidental, consequential or indirect damages caused by defects in materials or workmanship, or any delay in repair or replacement of the defective part(s).
7. Damage related to rodent and/or insect infestation.
8. Overnight freight costs for replacement part(s).
9. Failure due to misapplication, misrepresentation, or bi-fuel conversion.
10. Any special access fees required gaining access to HIPOWER equipment not limited to but including, lodging, training or safety policy, planes, ferries, railroad, buses, helicopters, snowmobiles, snow-cats, off-road vehicles or any other mode of transport or living quarters deemed abnormal.
11. Telephone, facsimile, cellular phone satellite, internet, or any other communication expenses.
12. Rental equipment used while warranty repairs are being performed (i.e. rental generators, cranes, etc.)
13. The warranty does not cover sales tax or any incidental costs including, without limitation, shipping or associated transportation charges, travel to and from repair sites, damages related to the loss of use, lost rentals, rental expenses and damages to property or equipment.
14. Any and all expenses incurred investigating performance complaints unless defective HIPOWER materials and/or workmanship were the direct cause of the problem.
15. Any failed components warranted by the OEM (i.e. engine, generator, starting batteries, etc.)
16. Normal maintenance and/or wear items (i.e. bearings, belts, bulbs, brakes, filters, fuses, fluids, hoses, tires, etc.)
17. Trailers and UL listed sub base fuel tanks will be covered under the original equipment manufacturer's warranty.
18. Housing Lights and light switches.
19. Cords, receptacles, and cord reels.
20. Any repair labor time that is determined to be excessive: e.g., such as two or more persons performing a one-person job.

***HIPOWER is s registered brand of Himoinsa Power Systems, Inc.**

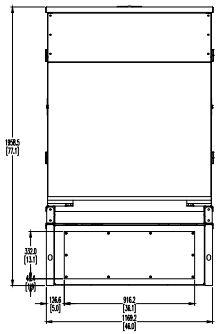
This warranty is in place of all other warranties, expressed or implied, specifically HIPOWER makes no other warranties as to the merchantability or fitness for a particular purpose. Any implied warranties which are allowed by law, shall be limited in duration to the terms of the express warranty provided herein. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to purchaser/owner. HIPOWER's only liability shall be the repair or replacement of part(s) as stated above. In no event shall HIPOWER be liable for any incidental or consequential damages, even if such damages are a direct result of HIPOWER's negligence. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. You agree to make no claims against HIPOWER based on negligence. This warranty gives you specific legal rights. You may also have other rights under applicable law.



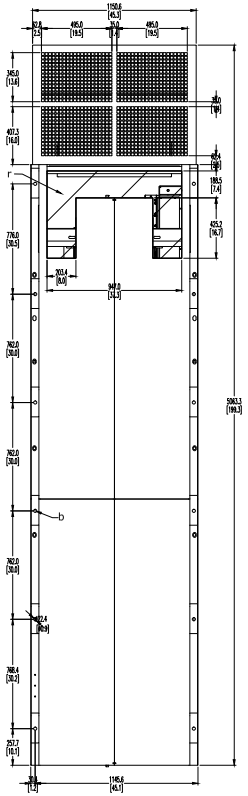
FRONT VIEW



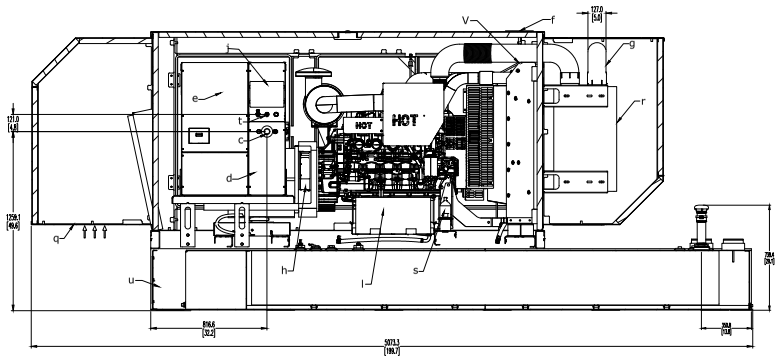
RIGHT SIDE VIEW



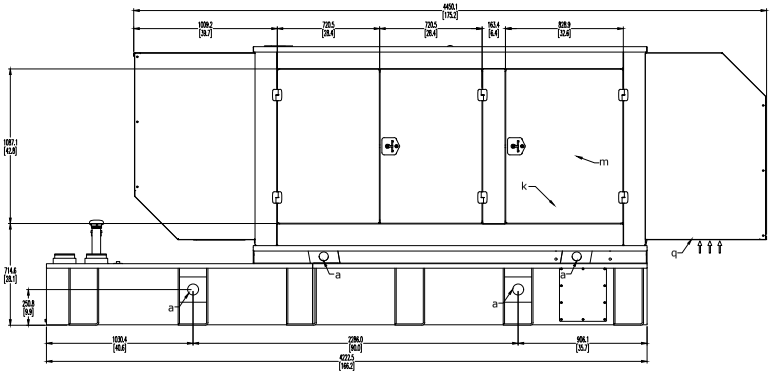
REAR VIEW



BOTTOM VIEW



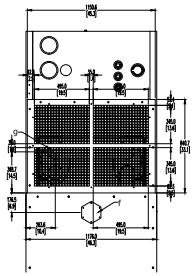
SECTION VIEW



LEFT SIDE VIEW

NOTES	
a	LIFTING POINT
b	FASTENING HOLES, 12x .9" (22.4 mm) DIA.
c	EMERGENCY STOP
d	CONTROL PANEL
e	BREAKER PANEL
f	RADIATOR ACCESS
g	EXHAUST OUTLET, 5" (127 mm) DIA. O.D.
h	BATTERY CHARGER 10A
j	DSE 7410 CONTROLLER
k	AUXC - MLCB AUXILIARY CONTACT
l	BATTERY
m	LOAD CENTER
n	COOLANT DRAIN
p	OIL DRAIN
q	AIR INLET
r	SILENCER
s	WATER JACKET HEATER
t	ON/OFF SWITCH
u	FUEL TANK
v	LOW COOLANT SWITCH

Engine	Engine model
FPT	NEF67 TM1X
Alternator	Alternator model
CGT	UCI274F



TOP FRONT SECTION

TANK CAPACITY: 320 GAL

	DATE:	NAME:		OLD CODE:
DESIGNED:	01/05/2022	S.T.		NEW CODE:
REVISED:	01/05/2022	S.T.		
APPROVED:	01/05/2022	S.S.S.		

HIPOWER® A YANMAR COMPANY

DESIGNATION:
HDI130FT6UD3326CA + BC10 + LCS + MLCB100 + WJH + 24HR

DRAWING Nº: 1501764 + 2050362

CODE: CD-21-0029

REVISION: 01

DIN-A2

UNIT: mm [in]

SCALE: 1/25