

400KW Perkins Diesel Generator

Perkins Engine | Customizable Options | EPA Tier 3

General

Model	WDG-400-PER
Fuel Type	Diesel
Prime Rating	400 kW / 500 kVA
Standby Rating	450 kW / 563 kVA
Frequency	60 Hz
Voltage	Any voltage can be customized
Phase	Single Phase or Three Phase
Enclosure Type	Silent, Weatherproof
Engine Brand	Perkins
Alternator Brand	Stamford
Controller Model	Deep Sea DSE 7320/7310



Engine Data

Engine Model	Perkins 2506C-E15TAG1
Configuration	6 cylinder, in-line
Aspiration	Turbocharged & Air-to-air charge cooled
Bore x Stroke (in.)	5.3 x 6.7 (in.)
Rated Speed (RPM)	1800
Displacement (L)	15.2
Compression Ratio	16.0:1
Cooling Method	Water cooled
Governor	Electronic

Other Customization

- ☐ Open type without enclosure
- ☐ Silent type with enclosure
 - Options for:
 - Painted
 - Stainless Steel
 - Aluminum (MOQ required)

Alternator Data

Alternator Model	Stamford S4L1D-G4
Type	Self-excited, Brushless
Power Factor	0.8
Voltage Regulation	AVR
Insulation System	Class H
Protection Level	IP23

Size & Dimensions

Dimensions (L x W x H)	177 x 82 x 94 (in.)
Net Weight (lbs.)	7,600

Product Specifications for 2506C-E15TAG



Total Power Range

Gross Mechanical Output	412-623 kWm
Typical Electrical Output	455-687 kVA (364-550 kW _e)
Rated Speed	1500/1800 rpm

Emission Standards

Emissions	EU 97/68/EC Stage II, EPA Tier 2
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50 Hz Typical Electrical Output

Prime	455-500 kVA
Standby	500-550 kVA

60 Hz Typical Electrical Output

Prime	400-468 kW _e
Standby	450-550 kW _e

General

Number of Cylinders	6 vertical inline
Bore	137 mm
Stroke	171 mm
Displacement	15.2 l
Compression Ratio	16.0:1
Aspiration	Turbocharged and air-to-air chargecooled

Combustion System	Direct injection
Rotation from Flywheel End	Anti-clockwise
Cooling System	Liquid
Aftertreatment	-
Typical Alternator Efficiency	92%
Switchable	Yes

Electropak Dimensions

Length	2657 mm
Width	1120 mm
Height	1718 mm
Dry Weight	1633 kg

Disclaimer

Note 1	*Final dimensions dependent on selected options
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Definitions

Prime Power	Variable load. Unlimited hours usage with an average load factor of 80% of the published Prime Power rating over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours operation.
Standby Power	Variable load. Limited to 500 hours annual usage up to 300 hours of which may be continuous running. No overload is permitted.

2506C-E15TAG Standard Equipment

Air inlet system

Mounted air filter

Cooling system

Gear-driven circulating pump
Mounted belt-driven fan
Radiator incorporating air-to-air charge cooler, (supplied loose)
System designed for ambients up to 50°C (122°F)

Electrical equipment

3 level engine protection system
24 volt starter motor and 24 volt 70 amp alternator with DC output
ECM mounted on engine with wiring looms and sensors

Flywheels and flywheel housing

High inertia flywheel to SAE J620 size 14
SAE ½ flywheel housing

Fuel system

Fuel cooler
Governing to ISO 8528-5 class G3 with isochronous capability
Mechanically actuated electronically controlled unit fuel injectors with full authority electronic control
Replaceable 'Ecoplus' fuel filter elements with primary filter/water separator

Mountings

Front engine mounting bracket

Oil system

Full-flow replaceable 'Ecoplus' filter
Oil cooler integral with filter header
Wet sump with filler and dipstick

Optional equipment

110 volt/240 volt immersion heater
Additional speed sensor
Air filter rain hood
Closed circuit crankcase ventilation system
Temperature and pressure sensors for gauges
Tool kit
Twin starters/facility for second starter



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Standards

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

Quality Assurance

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



Excitation and Voltage Regulators

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

No Load Excitation Voltage (V)	12 - 10
No Load Excitation Current (A)	0.7 - 0.6
Full Load Excitation Voltage (V)	48 - 45
Full Load Excitation Current (A)	2.6 - 2.4
Exciter Time Constant (seconds)	0.105

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Electrical Data								
Insulation System	H							
Stator Winding	Double Layer Lap							
Winding Pitch	2/3							
Winding Leads	12							
Winding Number	311							
Number of Poles	4							
IP Rating	IP23							
RFI Suppression	BS EN 61000-6-2 & BS EN 61000-6-4, VDE 0875G, VDE 0875N. Refer to factory for others							
Waveform Distortion	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	15.16							
50 Hz					60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air Flow	0.78 m³/sec				0.94 m³/sec			
Voltage Series Star (V)	380	400	415	440	416	440	460	480
Voltage Parallel Star (V)	190	200	208	220	208	220	230	240
Voltage Series Delta (V)	220	230	240	254	240	254	266	277
kVA Base Rating (Class H) for Reactance Values (kVA)	430	450	450	430	500	535	540	562.5
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.39	3.20	2.97	2.53	3.94	3.77	3.48	3.33
X'd Dir. Axis Transient	0.18	0.17	0.16	0.13	0.21	0.20	0.18	0.17
X" d Dir. Axis Subtransient	0.11	0.10	0.09	0.08	0.12	0.12	0.11	0.11
Xq Quad. Axis Reactance	2.63	2.48	2.31	1.96	3.06	2.93	2.70	2.59
X" q Quad. Axis Subtransient	0.32	0.30	0.28	0.24	0.37	0.36	0.33	0.31
XL Stator Leakage Reactance	0.09	0.09	0.08	0.07	0.10	0.10	0.09	0.09
X2 Negative Sequence Reactance	0.19	0.18	0.17	0.15	0.23	0.22	0.20	0.19
X0 Zero Sequence Reactance	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.03
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	4.07	3.84	3.57	3.03	4.73	4.53	4.18	4.00
X'd Dir. Axis Transient	0.20	0.19	0.18	0.15	0.24	0.23	0.21	0.20
X" d Dir. Axis Subtransient	0.13	0.12	0.11	0.09	0.15	0.14	0.13	0.12
Xq Quad. Axis Reactance	2.71	2.56	2.38	2.02	3.15	3.02	2.78	2.66
X" q Quad. Axis Subtransient	0.38	0.36	0.34	0.29	0.45	0.43	0.39	0.38
XL Stator Leakage Reactance	0.10	0.10	0.09	0.08	0.12	0.11	0.10	0.10
Xlr Rotor Leakage Reactance	0.11	0.11	0.10	0.09	0.13	0.13	0.12	0.11
X2 Negative Sequence Reactance	0.23	0.22	0.21	0.17	0.27	0.26	0.24	0.23
X0 Zero Sequence Reactance	0.03	0.03	0.03	0.02	0.04	0.04	0.03	0.03

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Time Constants (Seconds)		
T'd Transient Time Const.	0.068	
T''d Sub-Transient Time Const.	0.014	
T'do O.C. Field Time Const.	2.100	
Ta Armature Time Const.	0.016	
T''q Sub-Transient Time Const.	0.0092	
Resistances in Ohms (Ω) at 22 ⁰ C		
Stator Winding Resistance (Ra), per phase for series connected	0.00660	
Rotor Winding Resistance (Rf)	1.44	
Exciter Stator Winding Resistance	18	
Exciter Rotor Winding Resistance per phase	0.068	
PMG Phase Resistance (Rpmg) per phase	1.9	
Positive Sequence Resistance (R1)	0.0083	
Negative Sequence Resistance (R2)	0.0095	
Zero Sequence Resistance (R0)	0.0083	
Saturation Factors	400V	480V
SG1.0	0.24	0.24
SG1.2	0.99	0.99
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than ISO 21940-11 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearing
SAE Adaptor	SAE 0.5, 1	
Moment of Inertia	5.6754 kgm²	-
Weight Wound Stator	561kg	-
Weight Wound Rotor	482kg	-
Weight Complete Alternator	1190kg	-
Shipping weight in a Crate	1260kg	-
Packing Crate Size	155 x 87 x 107(cm)	-
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	-	-
Bearing Non-Drive End	Ball 6314	-

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RATINGS AT 0.8 POWER FACTOR

Class - Temp Rise		Standby - 163/27°C				Standby - 150/40°C				Cont. H - 125/40°C				Cont. F - 105/40°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	475	500	500	475	455	480	480	455	430	450	450	430	390	410	410	390
	kW	380	400	400	380	364	384	384	364	344	360	360	344	312	328	328	312
	Efficiency (%)	92.8	92.8	93.0	93.4	93.1	93.0	93.2	93.6	93.3	93.3	93.5	93.7	93.7	93.7	93.8	94.0
	kW Input	409	431	430	407	391	413	412	389	369	386	385	367	333	350	350	332

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	565	600	600	625	535	575	575	600	500	535	540	563	455	485	490	510
	kW	452	480	480	500	428	460	460	480	400	428	432	450	364	388	392	408
	Efficiency (%)	92.9	92.9	93.1	93.2	93.2	93.1	93.3	93.3	93.4	93.4	93.6	93.6	93.7	93.8	93.9	93.9
	kW Input	487	517	515	537	459	494	493	514	428	458	462	481	388	414	418	435

De-rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C @ Class H temperature rise (please refer to applications for ambient temperature de-rates at other temperature rise classes)
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60°C and altitude exceeding 4000 meters (for <690V) or 1500 meters (for >690V) must be referred to applications.

Dimensional and Torsional Drawing

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

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

DSE7310/20 MKII

AUTO START & AUTO MAINS FAILURE CONTROL 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
- Multiple Display Languages
- Five key menu navigation
- LCD alarm indication
- Heated display option available
- Customisable power-up text and images
- DSENet expansion compatibility
- Data logging facility
- Internal PLC editor
- Protections disable feature
- Fully configurable via PC using USB, RS232 & RS485 communication
- Front panel configuration with PIN protection
- Power save mode
- 3 phase generator sensing and protection
- 3 phase mains (utility) sensing and protection (DSE7320 MKII only)
- Automatic load transfer control (DSE7320 MKII only)
- Generator current and power monitoring (kW, kvar, kVA, pf)
- Mains current and power monitoring (kW, kvar, kVA, pf) (DSE7320 MKII only)
- kW and kvar overload and reverse power alarms
- Over current protection
- Unbalanced load protection
- Independent earth fault protection
- Breaker control via fascia buttons
- Fuel and start outputs configurable when using CAN
- 6 configurable DC outputs
- 2 configurable volt-free relay outputs
- 6 configurable analogue/digital inputs
- Support for 0 V to 10 V & 4 mA to 20 mA sensors
- 8 configurable digital inputs
- Configurable 5 stage dummy load and load shedding outputs
- CAN, MPU and alternator frequency speed sensing in one variant
- Real time clock
- Manual and automatic fuel pump control
- Engine pre-heat and post-heat functions
- Engine run-time scheduler
- Engine idle control for starting & stopping
- Fuel usage monitor and low fuel level alarms
- Simultaneous use of RS232 and RS485 communication ports
- True dual mutual standby using RS232 or RS485 for accurate engine hours balancing.
- MODBUS RTU support with configurable MODBUS pages.
- Advanced SMS messaging (additional external modem required)
- Start & stop capability via SMS messaging
- 3 configurable maintenance alarms
- Compatible with a wide range of CAN engines, including tier 4 engine support
- Uses DSE Configuration Suite PC Software for simplified configuration
- Licence-free PC software
- IP65 rating (with supplied gasket) offers increased resistance to water ingress
- Modules can be integrated into building management systems (BMS) using MODBUS RTU

KEY BENEFITS

- Automatically transfers between mains (utility) and generator (DSE7320 MKII only) for convenience.
- Hours counter provides accurate information for monitoring and maintenance periods
- User-friendly set-up and button layout for ease of use
- Multiple parameters are monitored & displayed simultaneously for full visibility
- The module can be configured to suit a wide range of applications for user flexibility
- PLC editor allows user configurable functions to meet user specific application requirements.

SPECIFICATIONS

DC SUPPLY

CONTINUOUS VOLTAGE RATING

8 V to 35 V Continuous
5 V for up to 1 minute

CRANKING DROPOUTS

Able to survive 0 V for 100 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. LEDs and backlight will not be maintained during cranking.

MAXIMUM OPERATING CURRENT

510 mA at 12 V, 240 mA at 24 V

MAXIMUM STANDBY CURRENT

330 mA at 12 V, 160 mA at 24 V

CHARGE FAIL/EXCITATION RANGE

0 V to 35 V

GENERATOR & MAINS (UTILITY)

VOLTAGE RANGE

15 V to 415 V AC (Ph to N)
26 V to 719 V AC (Ph to Ph)

FREQUENCY RANGE

3.5 Hz to 75 Hz

MAGNETIC PICKUP

VOLTAGE RANGE

+/- 0.5 V to 70 V

FREQUENCY RANGE

10,000 Hz (max)

INPUTS

DIGITAL INPUTS A TO H

Negative switching

ANALOGUE INPUTS A & F

Configurable as:
Negative switching digital input
0 V to 10 V sensor
4 mA to 20 mA sensor
Resistive sensor

ANALOGUE INPUTS B, C, D & E

Configurable as:
Negative switching digital input
Resistive sensor

OUTPUTS

OUTPUT A & B (FUEL & 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

DIMENSIONS

OVERALL

245 mm x 184 mm x 51 mm
9.6" x 7.2" x 2.0"

PANEL CUT-OUT

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

HEATED DISPLAY VARIANT

-40 °C to +70 °C
-40 °F to +158 °F

RELATED MATERIALS

TITLE

DSE7310 MKII & DSE7320 MKII Installation Instructions
DSE7310 MKII & DSE7320 MKII Operator Manual
DSE7310 MKII & DSE7320 MKII Configuration Suite PC Manual

PART NO.

053-181
057-253
057-243

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DSE7310/20 MKII

AUTO START & AUTO MAINS FAILURE CONTROL MODULES

The DSE7310 MKII is an Auto Start Control Module and the DSE7320 MKII is an Auto Mains (Utility) Failure Control Module suitable for a wide variety of single, diesel or gas, gen-set applications.

Monitoring an extensive number of engine parameters, the modules will display warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LEDs, remote PC and via SMS text alerts (with external modem).

The DSE7320 MKII will also monitor the mains (utility) supply. The modules include USB, RS232 and RS485 ports as well as dedicated DSENet® terminals for system expansion.

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

The extensive list of features includes enhanced event and performance monitoring, remote communications & PLC functionality. Dual mutual standby is now available on both the DSE7310 MKII & DSE7320 MKII using RS232 or RS485 communications. This provides for a simpler and more convenient installation with more advanced features such as true engine hours balancing.

The modules can be easily configured using the DSE Configuration Suite PC 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 at +/-7.5 mm,
8 Hz to 500 Hz at 2 gn

HUMIDITY

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

