



Powered by:

**Perkins**  
**STAMFORD**



GENERATING SET PERFORMANCE	50Hz	60Hz
VOLTAGE	V400	
PHASES	Three	
PRIME RATED POWER	2000kVA	
STANDBY RATED POWER	2200kVA	
POWER FACTOR	0.80 PF	
FUEL CONSUMPTION @ 75%	326L/hr	

The POWERGen Group Ltd:



**POWERGen**



**POWERServ**



**POWERPump**



**POWERGenHire**



**POWERGen Group Ltd**

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#### POSTAL ADDRESS

PO Box 14254  
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ENGINE	PERKINS	4016-TAG2A
PERFORMANCE	50Hz	60Hz
BASELOAD RATED POWER	1362KWm	
PRIME RATED POWER	1715KWm	
STANDBY RATED POWER	1886KWm	
FUEL CONSUMPTION	208g/KWh @ 100% 207g/KWh @ 75% 215g/KWh @ 50%	
TYPE	Diesel 4 stroke	
ASPIRATION	Turbocharged and air to air charge cooled	
INJECTION TYPE	Direct injection	
ENGINE GOVERNOR	Electronic governing	
CYLINDERS AND ARRANGEMENT	16 Vee	
BORE x STROKE	160 x 190mm	
COMPRESSION RATIO	13.6 : 1	
ELECTRICAL SYSTEM VOLTAGE	24 volt	
BATTERY TYPE	Lead acid, 24V	
DERATING FOR TEMPERATURE	40 deg C	
DERATING FOR ALITUDE	1000mm	
DERATING FOR HUMIDITY	90%	

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## ALTERNATOR

## STAMFORD

PERFORMANCE	50Hz	60Hz
MODEL	LV 804 W	
BASELOAD RATED POWER 40 deg C	3322kVA	
PRIME RATED POWER 40 deg C	3555kVA	
STANDBY RATED POWER 40 deg C	3800kVA	
STANDBY RATED POWER 27 deg C	3910kVA	
EFFICIENCY	96.5%	
STANDARD WINDING CONNECTIONS	Star Delta	
EXCITER	Separately excited by P.M.G	
POLES	4 poles	
PHASES	3 phases	
WIRES	6 leads	
VOLTAGE REGULATION	+/- 0.5%	
INSULATION CLASS	Class H	
ENCLOSURE	IP23	
MAXIMUM OVERSPEED	150%	
STANDARD AVR MODEL	MA330	
OPTIONAL AVR MODEL	TBA	
DERATING FOR TEMPERATURE	40 deg C	
DERATING FOR ALTITUDE	1000m	

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**POWER**Gen

PREMIUM SERIES GENERATORS

# Generator Specification Sheet

## DIMENSIONS

### DIMENSIONS AND CAPACITY

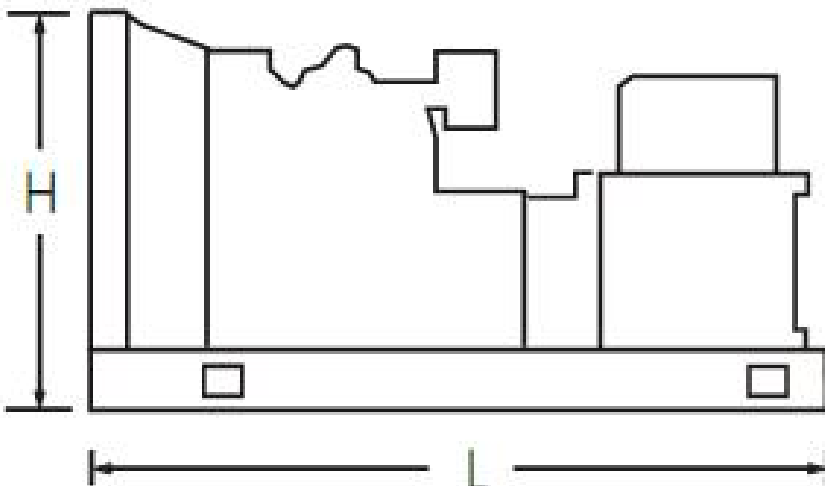
#### STANDARD MODELS

	INTEGRATED FUEL TANK CAPACITY		WEIGHT	DIMENSIONS		
	STANDARD	OPTIONAL	KG	LENGTH	WIDTH	HEIGHT
OPEN SKID TYPE	N/A	N/A	18970kg	6370mm	2800mm	3520mm

### GENERATOR SET EQUIPMENT

#### STANDARD MODELS

- Heavy duty steel base frame
- Pad type anti- vibration dampers
- Integrated fuel tank, base mounted
- 24V battery
- Key start switch
- Emergency stop button
- Silencer industrial type (open skid type)



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**DSE7320****AUTOMATIC MODELS– EQUIPMENT**

4 poles 3200ABB circuit breaker, electronic control unit DeepSea 5320, control panel box key, emergency stop button, water jacket heaters,

**AUTOMATIC MODELS– PROTECTORS**

Low oil pressure, low fuel level, overload, over/ under frequency, unbalanced load, low voltage, over/ under battery voltage belt breakage, charge alternator fail, Independent earth fault trip.

**AUTOMATIC MODELS– INSTRUMENTATION**

Voltmeter, ammeter (3 phases), frequency meter, hour meter, battery voltage meter, fuel level

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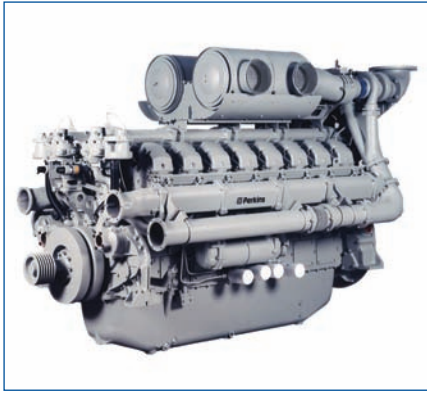
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# 4000 Series

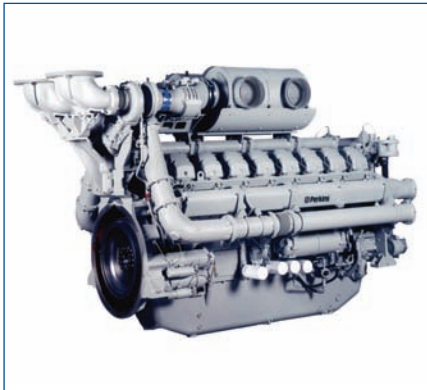
## 4016TAG2

## 4016TAG2A

### Diesel Engine – Electro Unit

1540 kWm 1200 rev/min

1886 kWm 1500 rev/min



The Perkins 4000 Series family of 8, 12 and 16 cylinder diesel engines was designed in advance of today's uncompromising demands within the power generation industry and includes superior performance and reliability.

The 4016TAG2/2A are turbocharged, air to air charge cooled, 16 cylinder vee form diesel engines. Their premium design and specification features provide economic and durable operation as well as exceptional power to weight ratio, improved serviceability, low gaseous emissions, overall performance and reliability essential to the power generation market. The 4016TAG2A is specially tuned for improved load acceptance response in standby duty.

### Economic power

- Individual 4 valve cylinder heads give optimised gas flows, while unit fuel injectors ensure ultra fine fuel atomisation and hence controlled rapid combustion for efficiency and economy.
- Commonality of components with other engines in 4000 Series family allows reduced parts stocking levels.

### Reliable power

- Developed and tested using latest engineering techniques.
- Piston temperatures are controlled by an advanced gallery jet cooling system.
- All engines are tolerant of a wide range of temperatures without derate.

### Clean, efficient power

- Exceptional power to weight ratio and compact size for easier transportation and installation.
- Designed to provide excellent service access for ease of maintenance.
- Engines designed to comply with major international standards.
- Low gaseous emissions for cleaner operation.

### Product support

- Perkins actively pursues product support excellence by ensuring our distribution network invest in their territory - strengthening relationships and providing more value to you, our customer
- Through an experienced global network of distributors and dealers, fully trained engine experts deliver total service support around the clock, 365 days a year. They have a comprehensive suite of web based tools at their fingertips covering technical information, parts identification and ordering systems, all dedicated to maximising the productivity of your engine
- Throughout the entire life of a Perkins engine, we provide access to genuine OE specification parts and service. We give 100% reassurance that you receive the very best in terms of quality for lowest possible cost .. wherever your Perkins powered machine is operating in the world

Engine Speed (rev/min)	Type of Operation	Typical Generator Output (Net)		Engine Power			
				Gross		Net	
		kVA	kWe	kWm	bhp	kWm	bhp
1200 4016 TAG2	Baseload Power	1329	1063	1166	1563	1108	1485
	Prime Power	1680	1344	1458	1954	1400	1877
	Standby (maximum)	1848	1478	1598	2148	1540	2065
1500 4016 TAG2A	Baseload Power	1634	1307	1413	1894	1362	1826
	Prime Power	2058	1646	1766	2367	1715	2300
	Standby (maximum)	2263	1811	1937	2596	1886	2529

Note: 4016TAG2A is offered for 50Hz operation only.

The above ratings represent the engine performance capabilities guaranteed within plus or minus 3% at the reference conditions equivalent to those specified in ISO 8528/1, ISO 3046/1, BS 5514/1.

Ratings conditions: 25°C air inlet temperature, barometer pressure 100 kPa, relative humidity 30%. Please consult your distributor or the factory for ratings in ambient conditions.

Note: For full ratings please refer to Perkins Engines Company Limited. All electrical ratings are based on an average alternator efficiency and a power factor of 0.8.

Fuel specification: BS 2869 Class A1 + A2 or ASTM D975 No 2D.

#### Rating Definitions

**Baseload Power:** Power available for continuous full load operation. No overload is permitted.

**Prime Power:** Power available for variable load with an average load factor not exceeding 80% of the prime power rating in any 24 hour period. Overload of 10% permitted for 1 hour in every 12 hours operation.

**Standby (maximum):** Power available at variable load in the event of a main power network failure for a maximum of 500 hours per year. No overload is permitted.

All information in this document is substantially correct at time of printing and may be altered subsequently

Publication No. 2181/11/08 Produced in England ©2005 Perkins Engines Company Limited

# 4000 Series

## 4016TAG2

## 4016TAG2A

### Standard Electro Unit Specification

#### Air inlet

- Mounted air filters and turbochargers

#### Fuel system

- Unit fuel injectors with lift pump and hand stop control
- Electronic governor to ISO 3046 Part 4 class A1
- Full-flow spin-on fuel oil filters

#### Lubrication system

- Wet sump with filler and dipstick
- Full-flow spin-on oil filters
- Engine jacket water/lub oil temperature stabiliser

#### Cooling system

- Twin gear driven circulating pumps
- Two twin thermostats
- Crankshaft pulley for fan drive

#### Electrical equipment

- 24 volt starter motor and 24 volt/40 amp alternator with integral regulator and DC output
- 24 volt combined high coolant temperature/low oil pressure switch
- Overspeed switch and magnetic pickup
- Turbine inlet temperature shutdown switch
- 24 volt stop solenoid (energised to run)
- Flywheel and Housing
- Flywheel to SAE J620 size 18
- SAE 00 flywheel housing

### Optional Equipment

The following optional equipment is available to make up the specifications to Perkins ElectropaK specification:

Tropical radiator including: Water pipes, clips and hoses  
Fan, fan guards and belts

#### Other optional extra equipment available

Twin heavy duty air cleaner – paper element with pre-cleaner

Changeover lubricating oil filters

Changeover fuel oil filters

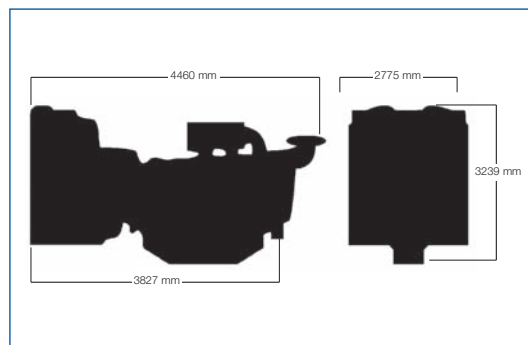
Immersion heater with thermostat

Water pipes, clips and hoses for radiator

Air starters

Instrument panel

NB This list is not exhaustive, further options may be available to meet to particular applications on enquiry to Perkins Sales Department



Fuel Consumption (g/kWh)		
Engine Speed	1200 rev/min	1500 rev/min
	4016TAG2	4016TAG2A
Standby Maximum Rating	212	212
Prime Power Rating	208	209
Baseload Power Rating	207	205
75% of Prime Power Rating	207	203
50% of Prime Power Rating	215	202
25% of Prime Power Rating	251	212

### General Data

Number of cylinders	16
Cylinder arrangement	60° Vee form
Cycle	4 stroke
Induction system	Turbocharged
	Air to air charge cooled
Combustion system	Direct injection
Cooling system	Water-cooled
Displacement	61.123 litres
Bore and stroke	160 x 190 mm
Compression ratio	13.6:1
Direction of rotation	Anti-clockwise, viewed from flywheel end
Firing order	1A, 1B, 3A, 3B, 7A, 7B, 5A, 5B, 8A, 8B, 6A, 6B, 2A, 2B, 4A, 4B
Total lubrication system capacity	237.2 litres
	<b>Electro Unit</b> <b>ElectropaK</b>
Total coolant capacity	95 litres   316 litres
Length	3302 mm   4460 mm
Width	1723 mm   2775 mm
Height	2128 mm   3239 mm
Total weight (dry)	5570 kg   8010 kg

Final weight and dimensions will depend on completed specification



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Distributed by

# Technical Data

## 4000 Series

Diesel Engine - Electrounit

## 4016TAG1A

## 4016TAG2A

Emission compliant engines

### Basic technical data

Number of cylinders ... 16  
 Cylinder arrangement ... 60° Vee  
 Cycle ... 4 stroke, compression ignition  
 Induction system ... Turbocharged  
 Compression ratio ... 13,6:1 nominal  
 Bore ... 160 mm  
 Stroke ... 190 mm  
 Cubic capacity ... 61,123 litres  
 Direction of rotation ... Anti-clockwise viewed on flywheel  
 Firing order ... 1<sup>A</sup>,1<sup>B</sup>,3<sup>A</sup>,3<sup>B</sup>,7<sup>A</sup>,7<sup>B</sup>,5<sup>A</sup>,5<sup>B</sup>,8<sup>A</sup>,8<sup>B</sup>,6<sup>A</sup>,6<sup>B</sup>,2<sup>A</sup>,2<sup>B</sup>,4<sup>A</sup>,4<sup>B</sup>  
 Cylinders 1 are furthest from flywheel.

**Cylinders designated 'A' are on the left side of the engine when viewed from the front (opposite end to flywheel)**

Total weight Electrounit (engine only) ... (dry) 5570 kg  
 ... (wet) 5847 kg  
 Overall dimensions ... Height 2128 mm  
 ... Length 3302 mm  
 ... Width 1723 mm  
 Moment of inertia ... Engine 11,15 kgm<sup>2</sup>  
 ... Flywheel 9,57 kgm<sup>2</sup>  
 Cyclic irregularity for engine/flywheel (Prime power):  
 4016TAG1A ... 1500 rev/min. ... 1,300  
 4016TAG2A ... 1500 rev/min. ... 1,277

### Ratings

Steady state speed stability at constant load ... ± 0,25%  
 Electrical ratings are based on average alternator efficiency and are for guidance only (0,8 power factor being used).

### Operating point

Engine speed ... 1500 rev/min  
 Static injection timing ... see below  
 Cooling water exit temp ... <93 °C

### Fuel data

To conform to BS2869 class A1, A2.

### Performance

Estimated sound pressure level 1500 rev/min ... 106/112 dBA  
**Note:** All data based on operation to ISO 3046/1, BS 5514 and DIN 6271 standard reference conditions.

### Test conditions

Air temperature ... 25 °C  
 Barometric pressure ... 100 kPa  
 Relative humidity ... 30%  
 Air inlet restriction at maximum power (nominal) ... 2,5 kPa  
 Exhaust back pressure (nominal) ... 3,0 kPa

### General installation 4016TAG1A

Designation	Units	Spill timing 12°					
		50Hz 1500 rev/min			60Hz 1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Gross engine power	kWb	1270	1588	1741	-	-	-
Fan power	kWm	51			-	-	-
Net engine power	kWm	1219	1537	1690	-	-	-
BMEP gross	bar	16,6	20,8	22,8	-	-	-
Combustion air flow	m <sup>3</sup> /min	107	132	140	-	-	-
Exhaust gas temperature max (after turbo)	°C	400	460		-	-	-
Exhaust gas flow max (after turbo)	m <sup>3</sup> /min	252	353		-	-	-
Boost pressure ratio max (after turbo)	-	3,0	3,30	3,50	-	-	-
Mechanical efficiency	%	88	91	92	-	-	-
Overall thermal efficiency	%	41	41	41	-	-	-
Friction power and pumping losses	kWm	160			-	-	-
Mean piston speed	m/s	9,5			-	-	-
Engine coolant flow (min)	l/s	19			-	-	-
Typical Genset electrical output 0,8 pf 25 °C (100 kPa)	kVA	1463	1844	2028	-	-	-
	kWe	1170	1476	1622	-	-	-
Assumed alternator efficiency	%	96			-	-	-



## General installation 4016TAG2A

Designation	Units	Spill timing 14°					
		50Hz 1500 rev/min			60Hz 1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Gross engine power	kWb	1413	1766	1890	-	-	-
Fan power	kWm	51			-	-	-
Net engine power	kWm	1362	1715	1839	-	-	-
BMEP gross	bar	18,5	23,1	25,4	-	-	-
Combustion air flow	m <sup>3</sup> /min	117	137	145	-	-	-
Exhaust gas temperature max (after turbo)	°C	450	493		-	-	-
Exhaust gas flow (max)	m <sup>3</sup> /min	275	393		-		
Boost pressure ratio	-	3,0	3,49	3,80	-	-	-
Mechanical efficiency	%	88	92	92	-	-	-
Overall electrical efficiency	%	41	40	40	-	-	-
Friction power and pumping losses	kWm	160			-	-	-
Mean piston speed	m/s	9,5			-		
Engine coolant flow (min)	l/s	19			-	-	-
Typical Genset electrical output 0,8 pf 25 °C (100 kPa)	kVA	1634	2058	2206	-	-	-
	kWe	1307	1646	1765	-	-	-
Assumed alternator efficiency	%	96			-	-	-

**Note:** Not to be used for CHP design purposes. (Indicative figures only). Consult Perkins Engines Co. Ltd. Assumes complete combustion.

**Continuous Baseload rating** Power available for continuous full load operation. **Prime Power rating** is available for unlimited hours per year with a variable load of which the average engine load factor is 80% of the published prime power rating. **Standby Power rating** is for the supply of emergency power at variable load for the duration of the non-availability of the mains power supply. NO OVERLOAD capacity is available at this rating. Engines must not be allowed to have facilities for parallel operation with the mains supply. This rating should be applied only when reliable mains power is available. Should this not be the case then refer to Prime Power rating. A standby rated engine should be sized for an average load factor of 80% based on published standby rating for 500 operating hours per year. Standby ratings should never be applied except in true emergency power failure conditions.

On 16 cylinder engines used for baseload operation, the following items must be incorporated:

1. Auto lubricating oil pump (extra price, see options).
2. Centrifugal by-pass filter to be baseframe mounted (extra price, see options).
3. Electrically driven radiators on separate baseframe (customer supply).
4. Start/stop sequence as follows:

START - 4 minutes priming.

2 minutes start and no load 1500 rev/min.

Synchronise and ramp to full load over 3 minutes.

STOP - Ramp down to no load 1500 rev/min.

5 minutes no load and running.

Stop engine and run oil priming pump for 4 minutes.

## Energy balance

**Note:** Not to be used for CHP design purposes. (Indicative figures only). Consult Perkins Engines Co. Ltd. Assumes complete combustion.

### 4016TAG1A

	Units	Spill timing 12°			1800 rev/min		
		1500 rev/min			1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Energy in fuel	kWt	3200	3903	4347	-	-	-
Energy in power output (gross)	kWb	1270	1588	1741	-	-	-
Energy to cooling fan	kWm	51	51	51	-	-	-
Energy in power output (net)	kWm	1219	1537	1690	-	-	-
Energy to exhaust	kWt	947	1138	1289	-	-	-
Energy to coolant and oil	kWt	520	580	629	-	-	-
Energy to radiation	kWt	58	97	117	-	-	-
Energy to charge coolers	kWt	405	500	571	-	-	-

### 4016TAG2A

	Units	Spill timing 14°			1800 rev/min		
		1500 rev/min			1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Energy in fuel	kWt	3535	4514	4853	-	-	-
Energy in power output (gross)	kWb	1413	1766	1890	-	-	-
Energy to cooling fan	kWm	51	51	51	-	-	-
Energy in power output (net)	kWm	1362	1715	1839	-	-	-
Energy to exhaust	kWt	1048	1346	1513	-	-	-
Energy to coolant and oil	kWt	550	677	690	-	-	-
Energy to radiation	kWt	68	130	150	-	-	-
Energy to charge coolers	kWt	456	595	610	-	-	-

## Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. For combined heat and power systems and where there is no likelihood of ambient temperatures below 10 °C then clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system. The inhibitor is available in bottles under Perkins Part No. 21825 735.

Maximum jacket water pressure in crankcase .. 1,7 bar

The following is a guide based on ambient air conditions of 52 °C on a Perkins supplied radiator.

Total coolant capacity:

Electrounit (engine only) ... 95 litres

ElectropaK (engine/radiator) ... 316 litres

Pressure cap setting ... 0,69 bar

Fan ... Incorporated in radiator

Diameter ... 1905 mm (pusher)

Ambient cooling clearance (open ElectropaK Prime power) based on air temperature at fan 3 °C above ambient.

### 4016TAG1A

Maximum additional restriction (duct allowance) to cooling airflow (Prime power) and resultant minimum airflow					
Ambient clearance 50% glycol		Duct allowance mm H <sub>2</sub> O		Min airflow m <sup>3</sup> /min	
rev/min		rev/min		rev/min	
1500	1800	1500	1800	1500	1800
52 °C	-	17	-	2394	-

### 4016TAG2A

Maximum additional restriction (duct allowance) to cooling airflow (Prime power) and resultant minimum airflow					
Ambient clearance 50% glycol		Duct allowance mm H <sub>2</sub> O		Min airflow m <sup>3</sup> /min	
rev/min		rev/min		rev/min	
1500	1800	1500	1800	1500	1800
52 °C	-	15	-	2430	-

Coolant pump speed and

method of drive ... 1,4 x e rev/min, gear driven

Maximum static pressure head on pump

above engine crank centre line ... 7 m

Maximum external permissible restriction

to coolant pump flow ... 20 kPa

Thermostat operating range ... 71-85 °C

Shutdown switch setting ... 96 °C rising

Coolant immersion heater capacity ... 4 kW x 2

Jacket cooling water data	Units	1500 rev/min	1800 rev/min
Coolant flow	l/s	19	-
Coolant exit temperature (max)	°C	93	-
Coolant entry temperature (min)	°C	70	-
Coolant entry temperature (max)	°C	80	-

## Lubrication system

Recommended lubricating oil to conform with the specification of API CG4.

Lubricating oil capacity:

Sump maximum ... 214 litres

Sump minimum ... 147 litres

Lubricating oil temperature maximum to bearings ... 105 °C

Lubricating oil pressure at 80 °C temperature

to bearing gallery (minimum) ... 0,34 MPa

Oil consumption	Units	1500 rev/min 4016TAG1A	1500 rev/min 4016TAG2A
After running-in*	g/kWhr	0,50	0,52
Oil flow rate from pump	l/s	6,70	6,70

\*Typical after 250 hours

Sump drain plug tapping size ... G1

Oil pump speed and

method of drive ... 1,4 x e rev/min, gear driven

Oil pump flow 1500 rev/min ... 6,70 litres/sec

Shutdown switch setting ... 1,93 bar falling

Normal operating angles

Fore and aft ... 5°

Side tilt ... 10°

## Fuel system

Recommended fuel ... To conform to BS2869 1998 Class A1, A2

Type of injection system ... Direct injection

Fuel injection pump ... Combined unit injector

Fuel injector ... Combined unit injector

Fuel injector opening pressure ... 234 bar

Fuel lift pump ... Tuthill TCH 5

Delivery/hour at 1500 rev/min ... 1380 litres

Delivery/hour at 1800 rev/min ... N/A

Heat retained in fuel to tank ... 12,0 kW

Temperature of fuel at lift pump to be less than ... 58 °C

Fuel lift pump pressure ... 3,0 bar

Fuel lift pump maximum suction head ... 2,5 m

Fuel lift pump maximum pressure head (see Installation Manual)

Fuel filter spacing ... 18 microns

Governor type ... Electronic

Torque at the governor output shaft ... 1,631 kgm

Static injection timing ... See engine number plate

Tolerance on fuel consumption ... +5%

### 4016TAG1A

Fuel consumption (gross)				
Designation	g/kWh		Litres/hr	
rev/min	1500	1800	1500	1800
At Standby Max power rating	210	-	430	-
At Prime Power rating	208	-	389	-
At Continuous Baseload rating	206	-	308	-
At 75% of Prime Power rating	205	-	287	-
At 50% of Prime Power rating	205	-	191	-
At 25% of Prime Power rating	222	-	104	-

### 4016TAG2A

Fuel consumption (gross)				
Designation	g/kWh		Litres/hr	
rev/min	1500	1800	1500	1800
At Standby Max power rating	216	-	488	-
At Prime Power rating	213	-	447	-
At Continuous Baseload rating	210	-	349	-
At 75% of Prime Power rating	209	-	326	-
At 50% of Prime Power rating	204	-	212	-
At 25% of Prime Power rating	216	-	112	-

Induction system

Maximum air intake restriction of engine:  
Clean filter... 127 mm H<sub>2</sub>O  
Dirty filter ... 380 mm H<sub>2</sub>O  
Air filter type ... MF&T 5000-00-00

Exhaust system

Maximum back pressure for total system at standby max power

Designation	Units	1500 rev/min	1800 rev/min
4016TAG1A	mm H <sub>2</sub> O	949	-
4016TAG2A	mm H <sub>2</sub> O	673	-

Exhaust outlet flange size... 2 x 254 mm (table 'D')  
For recommended pipe sizes refer to Installation Manual.

Electrical system

Type ... Insulated return  
Alternator ... 24 volts with integral regulator  
Alternator output ... 40 amps at a stabilised output 28 volts at 20 °C ambient  
  
Starter motor ... 24 volts  
Starter motor power ... 16,4 kW  
Number of teeth on flywheel ... 156  
Number of teeth on starter motor... 12  
Minimum cranking speed at 0 °C ... 120 rev/min  
Pull-in current of each starter motor solenoid ... 30 amps at 24 volts  
Hold-in current of each starter motor solenoid ... 9 amps at 24 volts  
Engine stop solenoid... 24 volts  
Pull-in current of stop solenoid... 60 amps at 24 volts  
Hold-in current of stop solenoid ... 1,1 amps at 24 volts

Engine mounting

Position of centre of gravity (wet engine)  
forward from rear face of crankcase ... 1117 mm  
Engine vertical centre line above crankshaft centre line ... 50 mm  
Maximum additional load applied to flywheel due to all rotating components... 850 kg

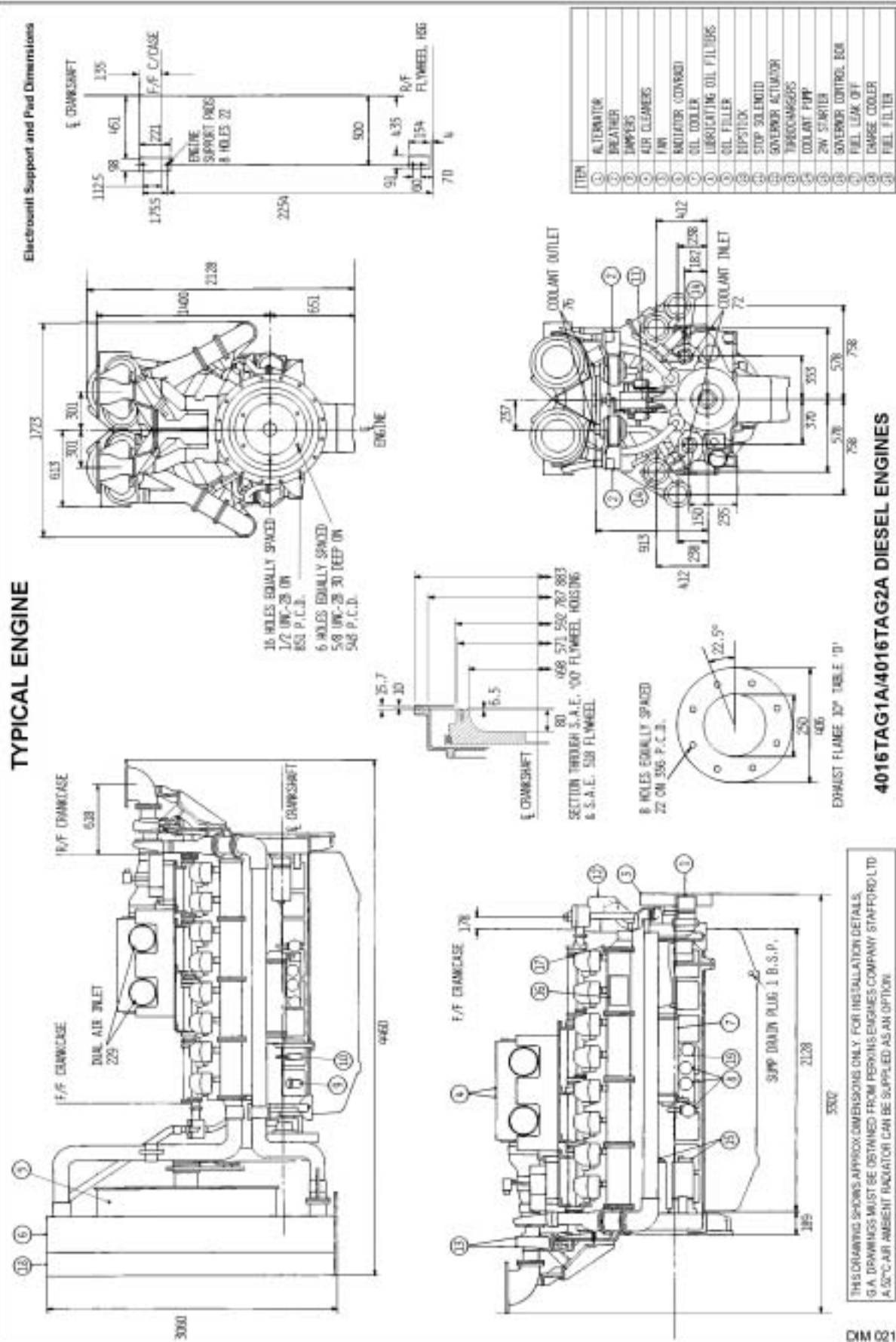
Starting requirements

Temperature range	
Range Down to 0 °C (32 °F)	Oil: SAE 30 Starter: 2 x 24V Battery: 4 x 12 volts x 286 Ah Max breakaway current: 2000 amps Cranking current: 957 amps Aids: Not necessary Starter cable size: 120 mm Maximum length: 6 m

- Notes:
- Battery capacity is defined by the 20 hour rate at 0 °C.
  - The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater.
  - Breakaway current is dependent on battery capacity available. Cables should be capable of handling the transient current which may be up to double the steady cranking current.

## TYPICAL ENGINE

### Electrode Support and Pad Dimensions





## Load acceptance (cold)

### 4016TAG1A

1500 rev/min

Initial load application when engine reaches rated speed (15 seconds max after engine starts to crank)				Second load application immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Prime power %	Load kWm/kWe	Transient frequency deviation %	Frequency recovery time seconds	Prime power %	Load kWm/kWe	Transient frequency deviation %	Frequency recovery time seconds
67	1030/989	≤ -10	5	33	307/487	≤ -10	5

### 4016TAG2A

1500 rev/min

Initial load application when engine reaches rated speed (15 seconds max after engine starts to crank)				Second load application immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Prime power %	Load kWm/kWe	Transient frequency deviation %	Frequency recovery time seconds	Prime power %	Load kWm/kWe	Transient frequency deviation %	Frequency recovery time seconds
57	978/938	≤ -10	5	43	737/708	≤ -10	5

Above complies with requirements of Classifications 3 & 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5.

The above figures were obtained under test conditions as follows:

Engine block temperature ... 45 °C

Alternator efficiency ... 96%

Minimum ambient temperature ... 10 °C

Isochronous governing.

Under Frequency Roll Off (UFRO) set to 1 Hz below rated frequency.

Typical alternator inertia. ... 50 kgm<sup>2</sup>

All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.

## Emissions chart

### 4016TAG1A

Spill timing 12°					
@ 50 Hz conform to					
Rating	German TA-Luft 1 to 3 MW	German ½ TA-Luft Limit @ >3 MW	German TA-Luft Limit @ >3 MW	French Limits 2000 @ <500 hours/year	French Limits 1500 @ >500 hours/year
Baseload	N/A	No	Yes	Yes	No
Prime power	N/A	N/A	Yes	Yes	No
Standby	N/A	N/A	Yes	Yes	No

### 4016TAG2A

Spill timing 14°					
@ 50 Hz conform to					
Rating	German TA-Luft 1 to 3 MW	German ½ TA-Luft Limit @ >3 MW	German TA-Luft Limit @ > 3 MW	French Limits 2000 @ <500 hours/year	French Limits 1500 @ >500 hours/year
Baseload	N/A	No	Yes	Yes	No
Prime power	N/A	N/A	Yes	Yes	No
Standby (107%)	N/A	N/A	Yes	Yes	No

Noise level

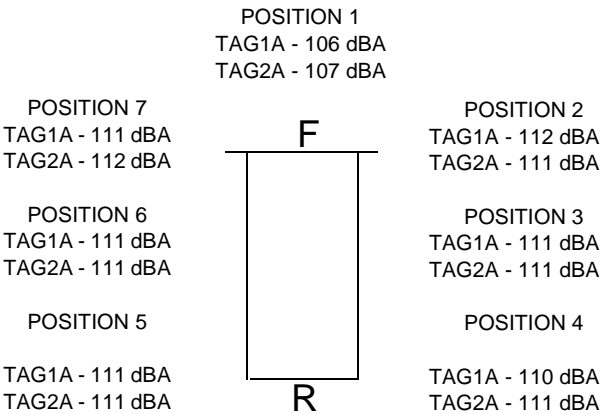
The figures for total noise levels are typical for an engine running at Prime Power rating in a semi-reverberant environment and measured at a distance of one metre from the periphery of the engine.

Octave analysis

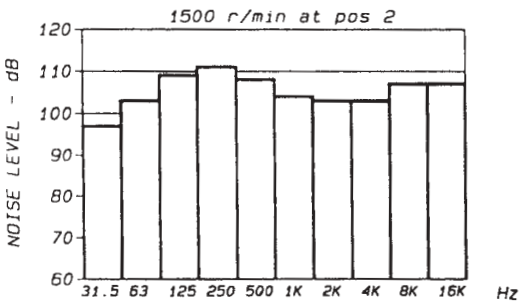
The following histograms show an octave band analysis at the position of the maximum noise level.

Total noise level

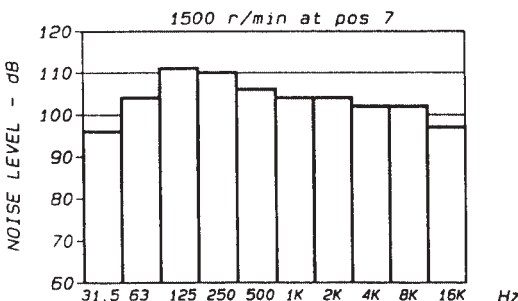
Sound pressure level re:  $-20 \times 10^{-6}$  pa.  
Speed 1500 r/min.....Ambient noise level 75 dBA.  
Octave analysis performed at the position of maximum noise.



4016TAG1A



4016TAG2A



The information given on technical data sheets is for standard ratings only. For ratings other than shown contact Perkins Engines Company Limited, Stafford.

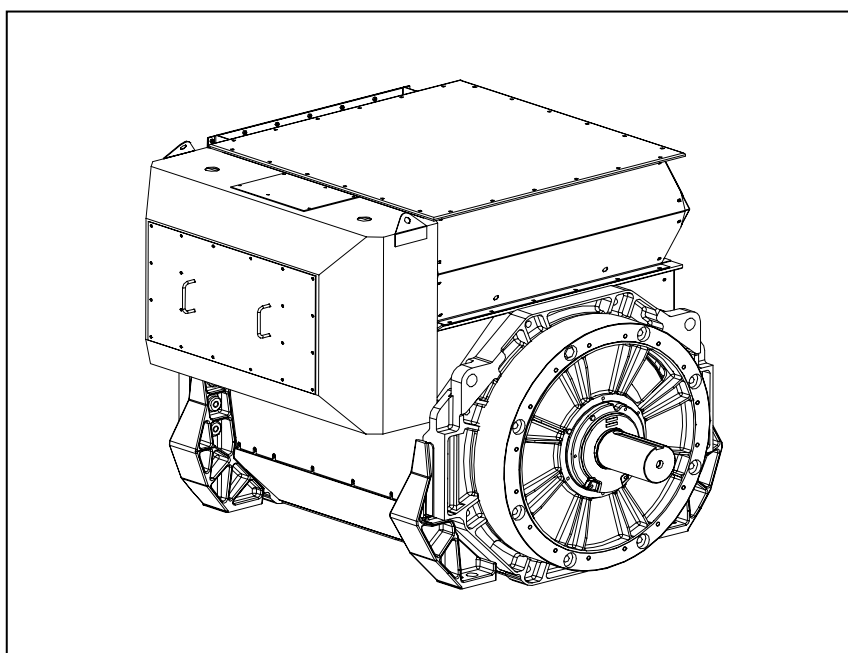
Notes

**Perkins**  
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Stafford ST16 3UB United Kingdom  
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Fax +44 (0)1785 215110  
www.perkins.com

All information in the document is substantially correct at the time of printing but may be subsequently altered by the company.

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## LV 804 W WDG 12 - Technical Data Sheet



# FRAME LV 804 W

## SPECIFICATIONS & OPTIONS

**STAMFORD | AvK**

### STANDARDS

Cummins Generator Technologies industrial generators meet the requirements of BS EN 60034 and the relevant sections of other national and international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC60034, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

### DESCRIPTION

The STAMFORD PI range of synchronous ac generators are brushless with a rotating field. They are separately excited by the STAMFORD Permanent Magnet Generator (PMG). This is a shaft mounted, high frequency, pilot exciter which provides a constant supply of clean power via the Automatic Voltage Regulator (AVR) to the main exciter. The main exciter output is fed to the main rotor, through a full wave bridge rectifier, protected by surge suppression.

### VOLTAGE REGULATORS

The P range generators complete with a PMG are available with an analogue AVR as standard. The AVR has soft start voltage build up and built in protection against sustained over-excitation, which will de-excite the generator after a minimum of 8 seconds. Underspeed protection (UFRO) is also provided on both AVRs. The UFRO will reduce the generator output voltage proportional to the speed of the generator below a pre-settable level.

The **MA330 AVR** is full wave rectified, 3 phase rms sensed with a voltage regulation of 0.5% rms (see the note on regulation). The UFRO circuit has adjustable slope and dwell for controlled recovery from step loads. An over voltage protection circuit will shutdown the output device of the AVR, it can also trip an optional excitation circuit breaker if required. As an option, short circuit current limiting is available with the addition of current transformers.

The MA330 AVR needs a generator mounted current transformer to provide quadrature droop characteristics for load sharing during parallel operation. Provision is also made for the connection of the STAMFORD power factor controller, for embedded applications, and a remote voltage trimmer.

### 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. 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 levels of voltage waveform distortion.

### TERMINALS & TERMINAL BOX

Standard generators feature a main stator with 6 ends brought out to the terminals, which are mounted on the frame 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.

### NOTE ON REGULATION

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%.

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 is typical of the product range.

# FRAME LV 804 W

## WINDING 12

**STAMFORD | AvK**

RATINGS	REFER TO SALES AND SERVICE BRIEFING
MAXIMUM ALTITUDE	1000 METRES ABOVE SEA LEVEL
MAXIMUM AMBIENT TEMPERATURE	40° C

CONTROL SYSTEM SERIES 3	SEPARATELY EXCITED BY P.M.G.
A.V.R.	FULL WAVE RECTIFIED
VOLTAGE REGULATION	± 0.5% WITH 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES OF THIS SECTION

INSULATION SYSTEM	CLASS H
PROTECTION	IP23 STANDARD
RATED POWER FACTOR	0.8
STATOR WINDING	DOUBLE LAYER LAP
WINDING PITCH	2/3
WINDING LEADS	6
R.F.I. SUPPRESSION	BS EN 50081/2-1/2 VDE 0875G VDE 0875N For other standards apply to the factory
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 3.0%
MAXIMUM OVERSPEED	2250 Rev/Min
BEARING DRIVE END	ISO 6236 C3
BEARING NON DRIVE END	ISO 6324 C3
EFFICIENCY	REFER TO EFFICIENCY CURVES OF THIS SECTION

FREQUENCY	50Hz				60Hz			
TELEPHONE INTERFERENCE	THF < 2%				TIF < 50			
COOLING AIR	4.0 m <sup>3</sup> /sec				4.5 m <sup>3</sup> /sec			
VOLTAGE STAR (Y)	380	400	415	440	416	440	460	480
kVA BASE RATING FOR REACTANCE VALUES	3375	3555	3555	3340	3590	3800	3969	4142
X <sub>d</sub> DIRECT AXIS SYNCHRONOUS	2.95	2.80	2.60	2.17	3.12	2.95	2.82	2.70
X' <sub>d</sub> DIRECT AXIS TRANSIENT	0.206	0.196	0.182	0.152	0.220	0.208	0.199	0.191
X'' <sub>d</sub> DIRECT AXIS SUB-TRANSIENT	0.151	0.144	0.134	0.112	0.161	0.152	0.146	0.140
X <sub>q</sub> QUADRATURE AXIS REACTANCE	1.96	1.86	1.73	1.44	2.08	1.97	1.88	1.80
X'' <sub>q</sub> QUAD. AXIS SUB-TRANSIENT	0.284	0.270	0.251	0.210	0.302	0.286	0.273	0.262
X <sub>L</sub> LEAKAGE REACTANCE	0.088	0.084	0.078	0.065	0.093	0.088	0.085	0.081
X <sub>2</sub> NEGATIVE PHASE SEQUENCE	0.219	0.208	0.193	0.162	0.233	0.221	0.211	0.202
X <sub>0</sub> ZERO PHASE SEQUENCE	0.029	0.028	0.026	0.022	0.031	0.029	0.028	0.027
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED TO IEC60034 TOLERANCES							
T <sub>d</sub> TRANSIENT TIME CONSTANT	0.208							
T'' <sub>d</sub> SUB-TRANSIENT TIME CONSTANT	0.016							
T' <sub>do</sub> O.C. FIELD TIME CONSTANT	5.000							
T <sub>a</sub> ARMATURE TIME CONSTANT	0.083							
SHORT CIRCUIT RATIO	1/X <sub>d</sub>							

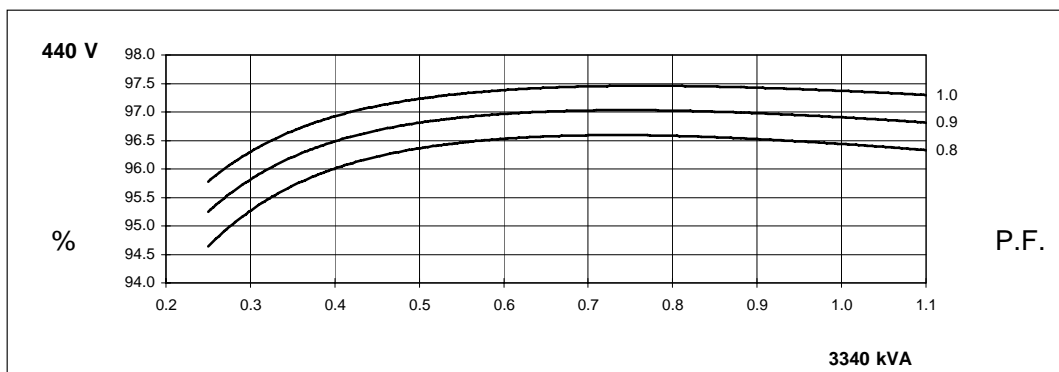
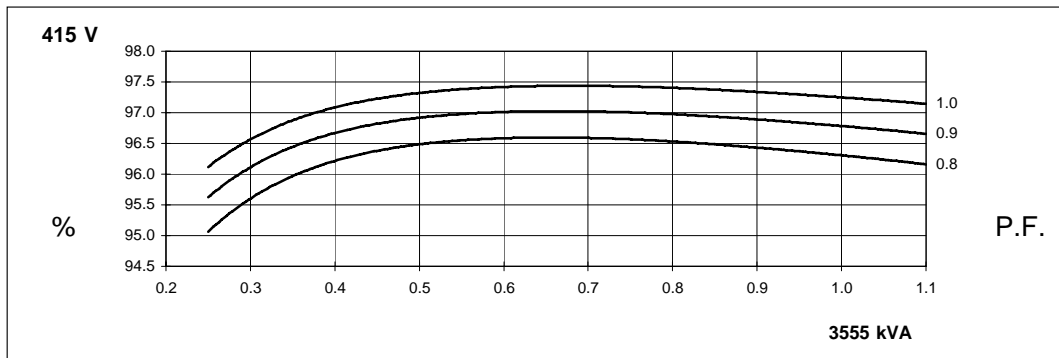
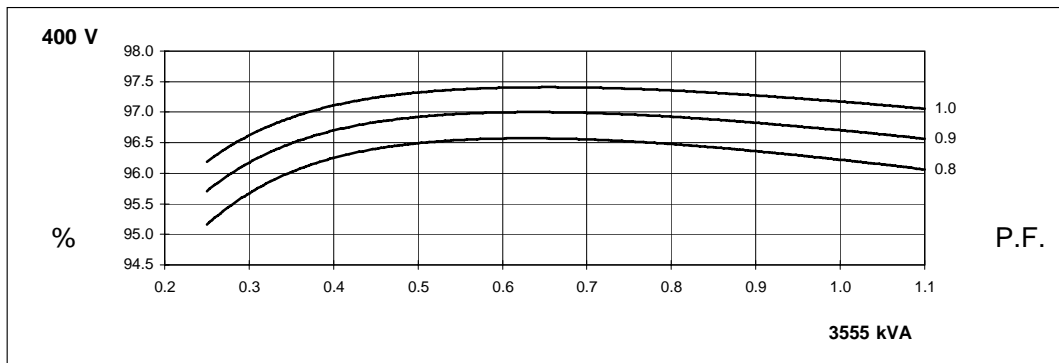
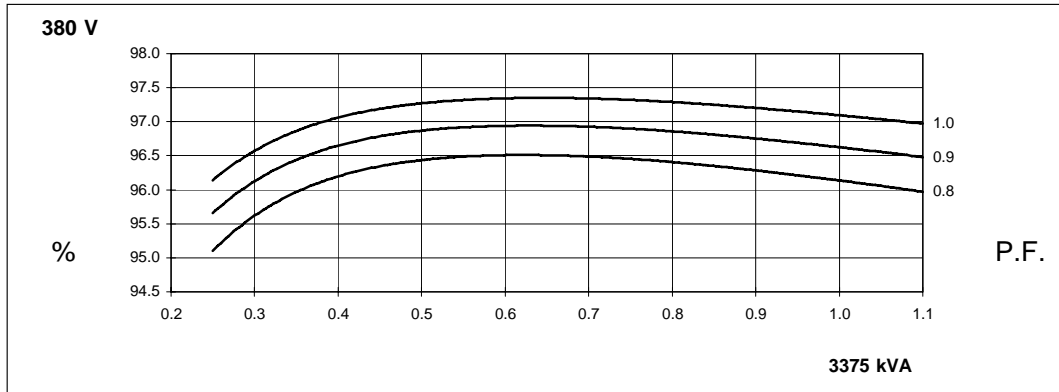
STATOR WINDING RESISTANCE (L-N)	0.000330
ROTOR WINDING RESISTANCE	1.470
EXCITER STATOR FIELD RESISTANCE	17.00
EXCITER ROTOR RESISTANCE (L-L)	0.092
PMG STATOR RESISTANCE (L-L)	3.800
RESISTANCE VALUES ARE IN OHMS AT 20° C	

NO LOAD EXCITATION VOLTAGE	15.0
FULL LOAD EXCITATION VOLTAGE	67.0

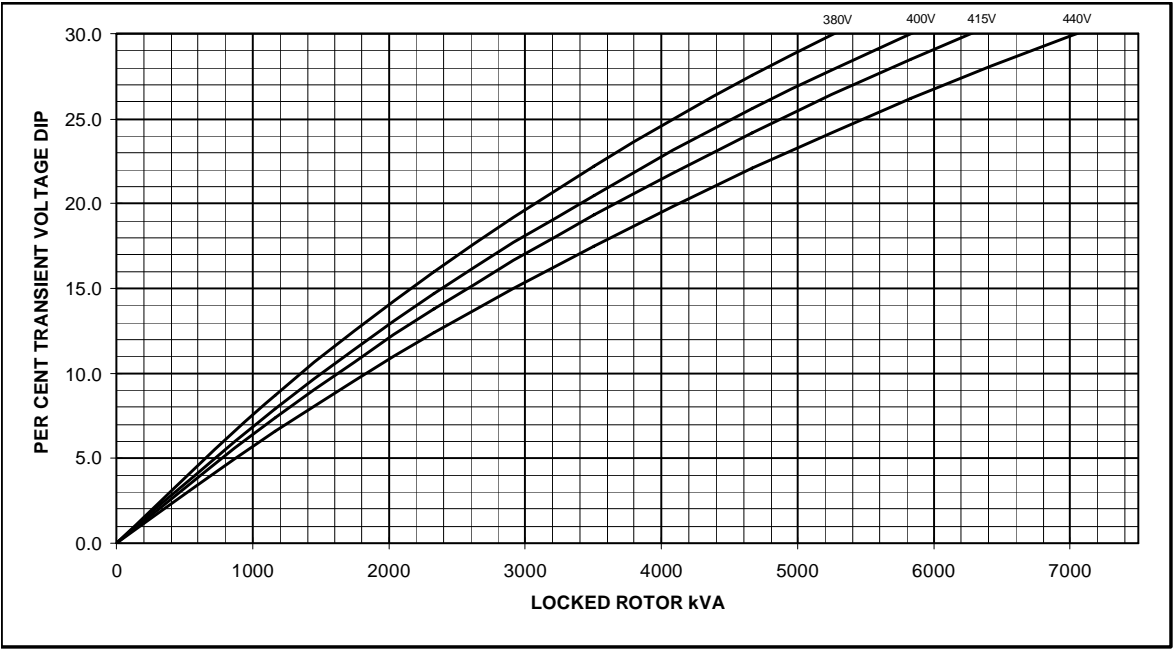
Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.



### THREE PHASE EFFICIENCY CURVES



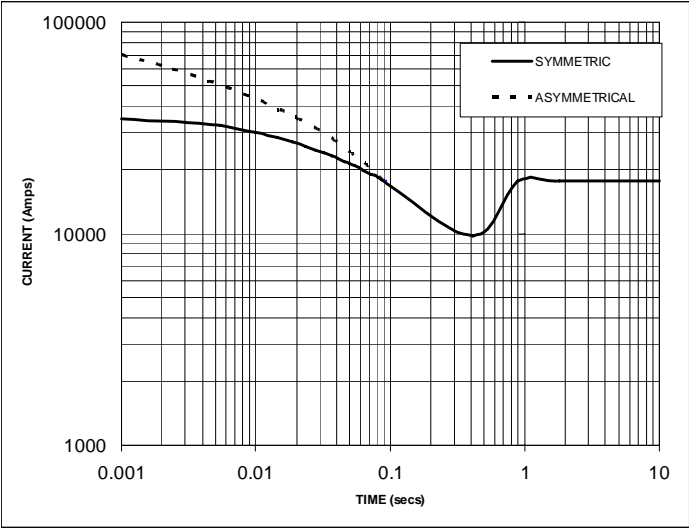
FULL WAVE RECTIFIED AVR  
LOCKED ROTOR MOTOR STARTING CURVE



FRAME LV 804 W WDG 12 50Hz

Three Phase Short Circuit Decrement Curve  
No- Load Excitation at Rated Speed

Based on series star (wye) connection



NOTE 1  
THE FOLLOWING MULTIPLICATION FACTORS SHOULD BE USED TO ADJUST THE VALUES FROM CURVES BETWEEN THE 0.001 SECONDS AND THE MINIMUM CURRENT POINT IN RESPECT OF NOMINAL OPERATING VOLTAGE

VOLTAGE	FACTOR
380V	X 0.95
400V	X 1.00
415V	X 1.04
440V	X 1.10

THE SUSTAINED CURRENT VALUE IS CONSTANT IRRESPECTIVE OF VOLTAGE LEVEL

NOTE 2  
THE FOLLOWING MULTIPLICATION FACTORS 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 1.0	X 0.87	X 1.30
MINIMUM	X 1.0	X 1.80	X 3.20
SUSTAINED	X 1.0	X 1.50	X 2.50
MAX SUSTAINED DURATION	10 SEC	5 SEC	2 SEC

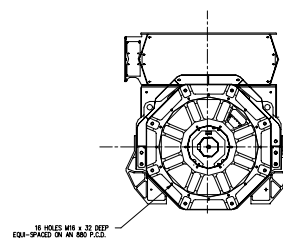
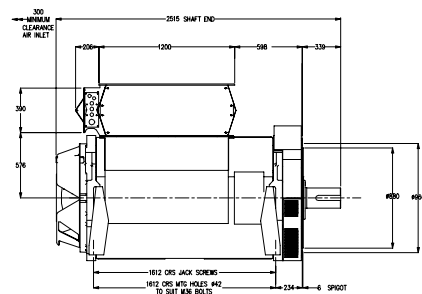
ALL OTHER TIMES ARE UNCHANGED

SUSTAINED SHORT CIRCUIT = 17703 Amps

**STAMFORD | AvK**

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
<b>50Hz</b>	Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	kVA	3155	3322	3322	3122	3375	3555	3555	3340	3610	3800	3800	3570	3715	3910	3910	3675
	kW	2524	2658	2658	2498	2700	2844	2844	2672	2888	3040	3040	2856	2972	3128	3128	2940
	Efficiency (%)	96.2	96.3	96.4	96.5	96.1	96.2	96.3	96.4	96.0	96.1	96.2	96.4	96.0	96.1	96.2	96.3
	kW Input	2624	2760	2758	2589	2809	2956	2953	2771	3008	3163	3160	2964	3097	3256	3252	3052

**TYPICAL DIMENSIONS - Further arrangements available - please refer to factory**



TD LV804.12.GB 03.09 09 GB

# DSECONTROL<sup>®</sup> MONITORING WITH INTELLIGENCE.



## DSE7310 & DSE7320

AUTO START & AUTO MAINS (UTILITY) FAILURE CONTROL MODULES (COMMUNICATIONS & EXPANSION)



The DSE7310 and DSE7320 are new control modules for single gen-set applications. The modules have been developed from the successful DSE5310 and DSE5320 Series and incorporate a number of advanced features to meet the most demanding on-site applications.

The DSE7310 is an Automatic Start Control Module and the DSE7320 is an Auto Mains (Utility) Failure Control Module. Both modules have been designed to start and stop diesel and gas generating sets that include electronic and non-electronic engines. The DSE7320 includes the additional capability of being able to monitor a mains (utility) supply.

Both modules include USB, RS232 and RS485 ports as well as dedicated DSENet<sup>®</sup> terminals for expansion device connectivity.

The modules are simple to operate and feature a newly designed menu layout for improved clarity. Enhanced features include a real time clock for enhanced event and performance monitoring, ethernet communications for low cost monitoring, mutual standby to reduce engine wear and tear, trend analysis to assist in the detection of patterns in engine status and preventative maintenance designed to detect if engine parts have developed fault conditions so they can be replaced before a major problem occurs.

### FEATURES

- Backed up real time clock
- 132 x 64 pixel LCD display
- Configurable display languages
- USB connectivity
- Robust module enclosure
- Five-key menu navigation
- Durable soft touch membrane buttons
- Fully configurable via PC software
- LED and LCD alarm indication
- Engine exercise mode
- Configurable start & fuel outputs
- kWh monitoring
- Automatic load transfer
- Eight configurable digital inputs
- Six configurable outputs
- Configurable timers and alarms
- Modbus RTU
- Magnetic pick-up
- Front panel programming
- Multiple date and time exercise scheduler
- SMS messaging
- Power save mode
- PIN protected programming
- User selectable RS232 & RS485 communications
- DSENet<sup>®</sup> compatible
- Ethernet communications via DSE860/865
- Customer logo display capability
- Multiple date and time maintenance scheduler
- Configurable display pages
- Programmable load shedding/acceptance
- Trend analysis
- Preventative maintenance
- kW overload protection
- Unbalanced load protection
- PDA compatible PC software

- Flexible sender input
- Configurable SCADA output page

### NEW FEATURES

- True dual mutual standby with load balancing timer
- Fan control for additional cooling
- 'Protections Disabled' facility
- Fuel usage monitoring and low fuel alarm
- Support for up to three remote display units
- Automatic sleep mode
- Easy access, configurable diagnostics page shows summary of output states
- Improved programmable event log (250) showing date and time
- Manual fuel pump control
- Alternative configuration
- Multiple date and time scheduler
- 3 Programmable Maintenance alarms with comms alert
- Customisable status screens
- Low fuel level alarm delay
- Charge alternator fail warning and shutdown alarms with user programmable delay
- Independent Earth fault trip
- Sleep mode
- Load switching (Load shedding and dummy load outputs)
- Manual speed trim (on CAN engines that support this feature)
- Additional display screens to help with modern diagnostics
- Security levels – PC software has password system to control access to PC software features
- Operator configurable virtual LEDs visible in SCADA

### SPECIFICATION

#### DC SUPPLY

**CONTINUOUS VOLTAGE RATING**  
8V to 35V Continuous

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

**CHARGE FAIL/ EXCITATION**  
0V to 35V fixed power source 2.5W

**MAXIMUM STANDBY CURRENT**  
160mA at 12V 80mA at 24V

**MAXIMUM OPERATING CURRENT**  
340mA at 12V 160mA at 24V

#### ALTERNATOR INPUT

**RANGE**  
15V - 333V (L-N) 50Hz - 60Hz  
(Minimum 15V AC Ph-N)

**ACCURACY**  
1% of full scale true RMS sensing

**SUPPORTED TOPOLOGIES**  
3 phase 4 wire  
3 phase 3 wire  
Single phase 2 wire  
2 phase 3 wire L1 & L2  
2 phase 3 wire L1 & L3

#### MAINS/UTILITY INPUT (DSE7320 ONLY)

**RANGE**  
15V - 333V (L-N) 50Hz - 60Hz  
(Minimum 15V AC Ph-N)

**ACCURACY**  
1% of full scale true RMS sensing

**SUPPORTED TOPOLOGIES**  
3 phase 4 wire  
3 phase 3 wire  
Single phase 2 wire  
2 phase 3 wire L1 & L2  
2 phase 3 wire L1 & L3

#### CT'S

**BURDEN**  
0.5VA

**PRIMARY RATING**  
1A - 8000A (user selectable)

**SECONDARY RATING**  
1A or 5A secondary (user selectable)

**ACCURACY OF MEASUREMENT**  
1% of full load rating

**RECOMMENDATIONS**  
Class 1 required for instrumentation  
Protection class required if using for protection

Continued on page 2

SPECIFICATION
MAGNETIC PICKUP
<b>VOLTAGE RANGE</b> +/- 0.5V minimum (during cranking) to 70V peak
<b>FREQUENCY RANGE</b> 10,000 Hz (max)
RELAY OUTPUTS
<b>OUTPUT A (FUEL)</b> 15 Amp DC at supply voltage
<b>OUTPUT B (START)</b> 15 Amp DC at supply voltage
<b>OUTPUTS C &amp; D</b> 8 Amp 250V (Volt free)
<b>AUXILIARY OUTPUTS E,F,G,H</b> 2 Amp DC at supply voltage
DIMENSIONS
<b>OVERALL</b> 240mm x 181.1mm x 41.7mm 9.4" x 7.1" x 1.6"
<b>PANEL CUT-OUT</b> 220mm x 160mm 8.7" x 6.3" Max panel thickness 8mm (0.3")
TESTING STANDARDS
ELECTRICAL SAFETY/ ELECTROMAGNETIC COMPATIBILITY
<b>BS EN 60950</b> Safety of Information Technology Equipment, including Electrical Business Equipment
<b>BS EN 61000-6-2</b> EMC Generic Immunity Standard (Industrial)
<b>BS EN 61000-6-4</b> EMC Generic Emission Standard (Industrial)
ENVIRONMENTAL
<b>BS EN 60068-2-1</b> Cold Temperature -30°C
<b>BS EN 60068-2-2</b> Hot Temperature +70°C
<b>BS EN60068-2-30 HUMIDITY</b> Test Db cyclic 93% RH @ 40°C for 48 hours
<b>BS EN 60068-2-6 VIBRATION</b> 10 sweeps at 1 octave/minute in each of 3 major axes 5Hz to 8Hz @ +/-7.5mm constant displacement 8Hz to 500Hz @ 2gn constant acceleration
<b>BS EN 60068-2-27 SHOCK</b> 3 half sine shocks in each of 3 major axes 15gn amplitude, 11ms duration
<b>BS EN 60529 DEGREES OF PROTECTION PROVIDED BY ENCLOSURES</b> • <b>IP65</b> (Front of module when installed into the control panel with the supplied sealing gasket)
<b>NEMA RATING (APPROXIMATE)</b> • <b>12</b> (Front of module when installed into the control panel with the supplied sealing gasket)

## BENEFITS

- 132 x 64 pixel ratio makes information easy to read
- Real time clock provides accurate event logging
- PC software is license free
- Set maintenance periods can be configured to maintain optimum engine performance
- Ethernet communications provides advanced remote monitoring at low cost
- Modules can be integrated into building management systems
- Preventative maintenance avoids expensive engine down time
- Advanced PCB layout ensures high reliability
- Robust design
- Extensive performance monitoring

## OPERATION

The modules are operated via the START, STOP, AUTO and MANUAL soft touch membrane buttons on the front panel. The DSE7320 also has a TEST button. Both modules include load switch buttons. The main menu system is accessed using the five navigation buttons to the left of the LCD display.

## CONFIGURATION

The modules can be configured using the front panel buttons or by using the PC software and a USB lead.

## COMMUNICATIONS

The DSE7310 & DSE7320 have a number of different communication capabilities.

## SMS Messaging

When the module detects an alarm condition, it has the ability to send an SMS message to a dedicated mobile number (s), notifying an engineer of the exact time, date and reason why the engine failed (GSM Modem and SIM Card required).

## Remote Communications

When the module detects an alarm state, it dials out to a PC notifying the user of the condition (Modem required).

## Remote Control

The module can be controlled remotely using either a GSM Modem, Ethernet via DSE860/865 or via RS485. Using a modem allows the module to be controlled from any distance. Using RS485 limits the distance to 1km (0.6 miles).

## Building Management

The module has been designed to be integrated into new and existing building management systems, using RS485.

## PC Software

The module has the ability to be configured and monitored from a remote PC, using the PC software and a USB lead.

## INPUTS & OUTPUTS

Analogue inputs are provided for oil pressure, coolant temperature and fuel level. These connect to conventional engine mounted resistive sender units to provide accurate monitoring and protection facilities. They can also be configured to interface with digital switch type inputs for low oil pressure and high coolant temperature shutdowns. Eight user configurable digital inputs are also included, plus one flexible sender.

Relays are provided for fuel solenoid output, start output and six additional configurable outputs. On these configurable outputs a range of different functions, conditions or alarms can be selected.

7310	7320
<b>Generator Instruments</b> Volts, Hz, Amps, kW, kVA, Pf, kWh, kVAh, kVAh, kVAh	<b>Generator Instruments</b> Volts, Hz, Amps, kW, kVA, Pf, kWh, kVAh, kVAh, kVAh
<b>Engine Instruments</b> RPM, Oil Pressure, Coolant Temperature, Hours Run, Charging Voltage, Battery Volts.	<b>Engine Instruments</b> RPM, Oil Pressure, Coolant Temperature, Hours Run, Charging Voltage, Battery Volts.
<b>Electronic Engines</b> Enhanced Instrumentation and Engine ECU diagnostics via electronic engine interface.	<b>Electronic Engines</b> Enhanced instrumentation and Engine ECU diagnostics via electronic engine interface.
	<b>Mains/Utility Instruments</b> Volts, Frequency, Amps (optional when CT's are fitted load side of the line)

## INSTRUMENTATION

The modules provide advanced metering facilities, displaying the information on the LCD display. The information can be accessed using the five-key menu navigation to the left of the display.

## RELATED MATERIALS

TITLE	PART NO'S
DSE7xxx Manual	057-074
DSE72xx/73xx PC Software Manual	057-077
DSE2130 Data Sheet	053-060
DSE2157 Data Sheet	053-061
DSE2548 Data Sheet	053-062
DSE860/865 Data Sheet	055-071

## DSENet®

DSENet® is a collection of expansion modules that have been created to work with DSENet® compatible control modules. DSENet® allows up to 20 different expansion devices to be used at a time. 10 of these devices can be of the same type (excluding DSE2130). The expansion modules available are:

## Available Now

DSE2157 Relay Output Expansion Module  
 DSE2130 Input Expansion Module  
 DSE2548 Annunciator Module  
 Remote Display Module

## Coming Soon

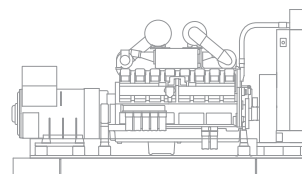
FET Output Expansion Module  
 NFPA 110 Interface Module  
 Identification Dongle

## EVENT LOG

The module includes a comprehensive event log that shows the most recent 250 alarm conditions and the date and time that they occurred. This function assists the user when fault finding and maintaining a generating set.

## ELECTRONIC ENGINE COMPATIBILITY

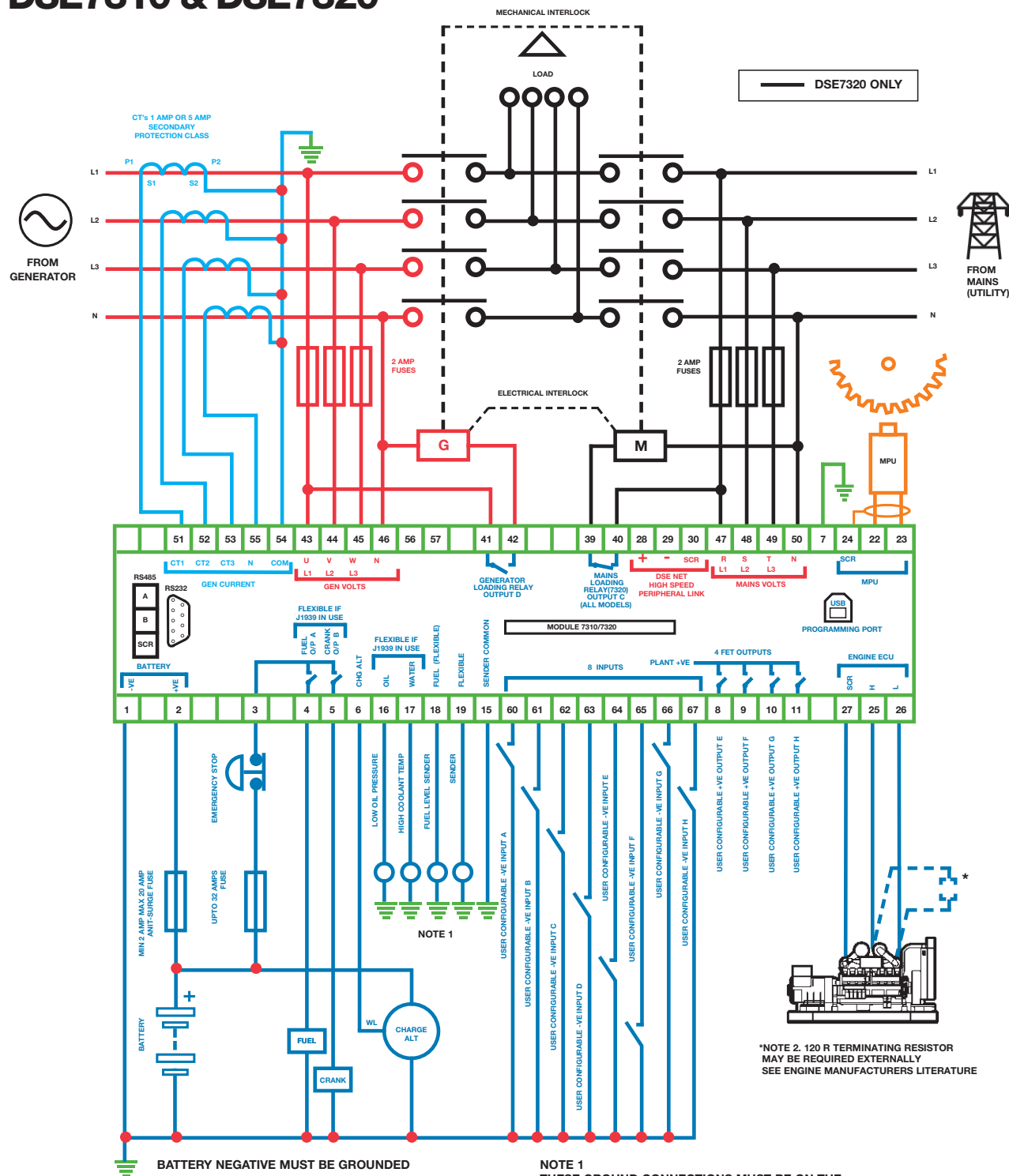
- CAT
- Cummins
- Deutz
- John Deere
- MTU
- Perkins
- Scania
- Volvo
- IVECO
- Generic
- Plus additional manufacturers



ELECTRONIC ENGINE CAPABILITY



# DSE7310 & DSE7320



BATTERY NEGATIVE MUST BE GROUND

TERMINALS SUITABLE FOR 22-16 AWG (0.6mm - 1.3mm )  
FIELD WIRING

TIGHTENING TORQUE = 0.8Nm (7lb-in)

NOTE 1

THESE GROUND CONNECTIONS MUST BE ON THE ENGINE BLOCK, AND MUST BE TO THE SENDER BODIES. THE GROUND WIRE TO TERMINAL 15 MUST NOT BE USED TO PROVIDE A GROUND CONNECTION TO ANY OTHER DEVICE

\*NOTE 2. 120 R TERMINATING RESISTOR MAY BE REQUIRED EXTERNALLY SEE ENGINE MANUFACTURERS LITERATURE

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