

GOLDEN MAJD Co.



Rating @ 0.8 PF		Prime rating	Stand-by rating
Voltage ^{*1}	Freq. ^{*2}	PT 2000 ^{*3}	PT 2200S ^{*4}
400 V	50 Hz	2000 KVA	2200 KVA
480 V	60 Hz	-	-

The above ratings represent the generating set capability guaranteed within $\pm 3\%$ at the references conditions equivalent to those specified in ISO 8528/1, ISO 3046/1 and BS 5514/1

NOTES

- 1 - The applicable voltage range is 380V to 415V for 50Hz applications and 380V to 480V for 60Hz applications.
- 2 - This generating set is of fixed speed of 1500rpm.
- 3 - **PT2000** is the prime power rating of the generating set, where a variable load and unlimited hours usage are applied on the generating set with an average load factor of 80% of the prime rating over each 24 hour period. Noting that a 10% overload is available for 1 hour in every 12 hours operation.
- 4 - **PT2200S** is the standby power rating of the generating set, where a variable load limited to an annual usage up to 500 hours is applied, with 300 hours of which may be continuous running. Noting that no overload is permitted.

Engine Technical Data		
Model	Perkins 4016-61TRG2	
Cylinders	12;60° Vee Form	
Aspiration	Turbocharged & A/A charge cooled	
Combustion	Direct injection	
Cooling System	Water cooled	
Displacement	61.123 L	
Oil consumption	0.52 g/KW hr	
Lube oil capacity	237 L	
Coolant capacity	316 L	
Governor	Electronic	
Emissions regulations	TA-Luft(1986)	
Speed	1500 rpm	1800 rpm
Fuel Consumption PT2000	436.0 L/H	-
Fuel Consumption PT2200S	490.0 L/H	-
Radiator Cooling Air Flow	2058 m ³ /min	-
Max Exhaust Gas Flow	395 m ³ /min	-

The above performance data are valid as per the following specs:

- Diesel Fuel is according to BS2869 Class A2 or equivalent.
- Lubricating oil is according to API CG 4 (15W/40).
- The coolant should be 50% antifreeze and 50% fresh water.

Alternator Technical Data		
Model	Leroy Somer LSA 50.1 M60	
Regulation	$\pm 0.5\%$	
International protection	IP21	
Insulation class	H	
Terminals	6	
Frequency	50 Hz	60 Hz
Coolant Air Flow	2.5 m ³ /s	-

Shipping Data			
Length	Width	Height	Weight
5700 mm	2780 mm	3540 mm	15100 kg

All information given in this leaflet is correct at the time of printing but it may be changed subsequently by the company



2000 - 2200S

62nd St. - Baghdad - Iraq
العراق - بغداد - شارع ٦٢

Mobile : 07901150364
07901109589
07801970163
07801970166

www.goldenmajd.com
Email : info@goldenmajd.com
golden_majd@yahoo.com

4000 Series 4016-61TRG1, TRG2 Diesel Engine – ElectropaK

4016-61TRG1 – 1684 kWm 1500 rpm
4016-61TRG2 – 1895 kWm 1500 rpm

The Perkins 4000 Series family of 6, 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 4016-61TRG ElectropaK is a newly developed turbocharged, air-to-water charge cooled, 16 cylinder diesel engine.

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.



Economic power

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

Reliable power

- Developed and tested using latest engineering techniques
- Piston temperature 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
- New designed radiator assemblies with corrosion inhibiting powder coated finish; fewer pipe joints and easier access to reduce maintenance times
- Designed to provide excellent service access for ease of maintenance

- Engines designed to comply with major international standards
- Low gaseous emissions

Product support excellence

- 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 Model (1500 rev/min)	Type of Operation	Typical Generator Output (Net)		Engine Power			
				Gross		Net	
		kVA	kWe	kWm	hp	kWm	hp
4016-61TRG1	Baseload Power	1400	1120	1269	1700	1179	1579
	Prime Power	1850	1480	1648	2208	1558	2088
	Standby (maximum)	2000	1600	1774	2377	1684	2257
4016-61TRG2	Baseload Power	1600	1280	1437	1926	1347	1805
	Prime Power	2000	1600	1774	2377	1684	2257
	Standby (maximum)	2250	1800	1985	2659	1895	2538

The above ratings represent the engine performance capabilities 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

Continuous Baseload: 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.

Photographs are for illustrative purposes only and may not reflect final specification.

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Perkins®

THE HEART OF EVERY GREAT MACHINE

4000 Series 4016-61TRG1, TRG2 Diesel Engine – Electropak

4016-61TRG1 – 1684 kWm 1500 rpm

4016-61TRG2 – 1895 kWm 1500 rpm



Standard Electropak specification

Air inlet

- Mounted air filters and turbochargers

Fuel system

- Direct fuel injection system with fuel lift pump
- Digital governing to ISO 8528-5 class G2 with isochronous capability
- Full-flow spin-on fuel oil filters

Lubrication system

- Wet sump with filler and dipstick
- Full-flow spin-on oil filters

Cooling system

- Two triple thermostats
- System designed for ambients up to 50°C
- Powder coated radiator comprising: water radiator, air charge-cooled radiator, fuel oil cooling (optional), all pipes, hoses and clips, fan, pulleys, fan belts and safety guards.

Electrical equipment

- 24 volt starter motor and 24 volt alternator with integral regulator and DC output
- Turbine inlet temperature shutdown switch
- Twin high coolant temperate shutdown switches
- Twin low oil pressure shutdown switches
- Air shut off valve wiring harness - fully wired

Flywheel and housing

- Flywheel to SAE J620 size 18, 533.4 mm (21in)
- SAE 00 flywheel housing

Optional equipment

- Choice of either damper guard or radiator drive pulley arrangement
- Immersion heater with thermostat

Note: This list is not exhaustive, further options are available. Please ask your Perkins representative for more details.

General data

Number of cylinders	16
Cylinder arrangement	60° Vee form
Cycle	4 stroke
Induction system	Quad turbocharged Air to water charge cooled
Combustion system	Direct injection
Cooling system	Water-cooled
Displacement	61.123 litres (3730 cubic in)
Bore and stroke	160 x 190 mm (6.3 x 7.5 in)
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 (62.7 US gals)

4016-61TRG1	Temperate		Tropical	
	litres	US gals	litres	US gals
Coolant capacity	210	55.5	215	56.8
Dimensions	mm	inches	mm	inches
Length	3302	130.0	3302	130.0
Width	1723	67.8	1723	67.8
Height	2128	83.8	2128	83.8

4016-61TRG2	Temperate		Tropical	
	litres	US gals	litres	US gals
Coolant capacity	215	56.8	252	66.6
Dimensions	mm	inches	mm	inches
Length	4542	178.8	4542	178.8
Width	2185	86.0	2185	86.0
Height	2366	93.1	3175	125.0

Total weight (dry)..... 5570 kg (12279.7 lbs)

Final weight and dimensions will depend on completed specification

Fuel Consumption	4016-61TRG1		4016-61TRG2	
	g/kWh	litres/hr	g/kWh	litres/hr
Standby	201	414	207	477
Prime	201	384	205	422
Baseload	206	303	205	342
75% prime	209	300	206	318
50% prime	207	198	210	216
25% prime	230	110	225	116

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Perkins Engines Company Limited

Peterborough PE1 5FQ

United Kingdom

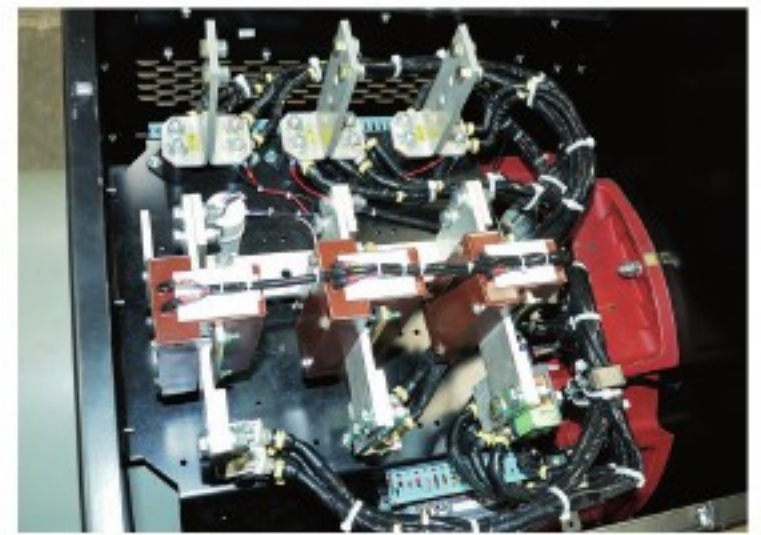
Telephone +44 (0)1733 583000

Fax +44 (0)1733 582240

www.perkins.com



THE HEART OF EVERY GREAT MACHINE



Low Voltage alternators - 4 pole LSA 51.2

1860 to 2500 kVA - 50 Hz / 2235 to 3000 kVA - 60 Hz

Electrical and mechanical data

Low Voltage alternators 4 pole 3-phase

LSA 51.2

1860 to 2500 kVA - 50 Hz / 2235 to 3000 kVA - 60 Hz

SPECIALLY ADAPTED TO APPLICATIONS

The LSA 51.2 alternator is designed to be suitable for typical generator applications, such as: backup, marine applications, rental, telecommunications, etc.

COMPLIANT WITH INTERNATIONAL STANDARDS

The LSA 51.2 alternator conforms to the main international standards and regulations:

- IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA / UL 1446 (UL 1004 on request), marine regulations, etc.

It can be integrated into a CE marked generator.

The LSA 51.2 is designed, manufactured and marketed in an ISO 9001 environment and ISO 14001.

TOP OF THE RANGE ELECTRICAL PERFORMANCE

- Class H insulation.
- Standard 6-wire winding, 2/3 pitch, type no. 6S.
- Voltage range 50 Hz: 380V - 400V - 415V - 440 V and 220V - 230V - 240V.
- Voltage range 60 Hz: 380V - 416V - 440V - 480V and 220 V - 240 V.
- High efficiency and motor starting capacity.
- Other voltages are possible with optional adapted windings:
 - 50 Hz : 440 V (no. 7S), 500 V (no. 9S), 600 V (no. 22S or 23S), 690 V (no. 10S or 52S).
 - 60 Hz : 380 V and 416 V (no. 8S), 600 V (no. 9S).
- R 791 interference suppression conforming to standard EN 55011 group 1 class B standard for European zone (CE marking).

EXCITATION AND REGULATION SYSTEM SUITED TO THE APPLICATION

The LSA 51.2 can be supplied with AREP or PMG excitation system, according to the alternator specification.

Standard excitation system is AREP with R 449 A.V.R.

Excitation system			Regulation options				
Volage regulator	AREP + PMI	PMG	Current transformer for paralleling	Mains paralleling	3-phase sensing	3-phase sensing for mains paralleling unbalanced	Remote voltage potentiometer
R449	Std	Option	C.T.	R726	R731	R734	√
D510C	Option	Option	C.T.	included	included	contact factory	√

Voltage regulator accuracy $\pm 0.5\%$ - √ : possible mounting

PROTECTION SYSTEM SUITED TO THE ENVIRONMENT

- The LSA 51.2 is IP 23.
 - Standard winding protection for clean environments with relative humidity $\leq 95\%$, including indoor marine environments.
- Options :
- Filters on air inlet : derating 5%.
 - Filters on air inlet and air outlet (IP 44) : derating 8%.
 - Winding protections for harsh environments and relative humidity greater than 95%.
 - Space heaters.
 - Thermal protection for winding.

REINFORCED MECHANICAL STRUCTURE USING FINITE ELEMENT MODELLING

- Compact and rigid assembly to better withstand generator vibrations.
- Steel frame.
- Cast iron flanges and shields.
- Twin-bearing and single-bearing versions designed to be suitable for engines on the market.
- Half-key balancing.
- Regreasable bearings.

ACCESSIBLE TERMINAL BOX PROPORTIONED FOR OPTIONAL EQUIPMENT

- Easy access to the voltage regulator and to the connections.
- Possible inclusion of accessories for paralleling, protection and measurement.

Low Voltage alternators 4 pole 3-phase

LSA 51.2

1860 to 2500 kVA - 50 Hz / 2235 to 3000 kVA - 60 Hz

General characteristics

Insulation class	H	Excitation system	AREP + PMI or PMG
Winding pitch	2/3 (n° 6S)	AVR type	R 449
Number of wires	6	Voltage regulation (*)	± 0.5 %
Protection	IP 23	Short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Totale Harmonic distortion THD (**)	< 4 %
Overspeed	2250 min ⁻¹	Waveform: NEMA = TIF (**)	< 50
Air flow	2.5 m³/s (50 Hz) - 2.8 m³/s (60 Hz)		

(*) Steady state. (**) Total harmonic distortion between phases, no-load or on-load (non-distorting)

Ratings 50 Hz - 1500 R.P.M.

kVA / kW - P.F. = 0.8																	
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
Δ*		220V	230V	240V		220V	230V	240V		220V	230V	240V		220V	230V	240V	
LSA 51.2 S55	kVA	1860			1690	1700			1540	1955			1792	2045			1860
	kW	1488			1352	1360			1232	1564			1433	1636			1488
LSA 51.2 M60	kVA	2050			1864	1870			1700	2155			1975	2255			2050
	kW	1640			1491	1496			1360	1724			1580	1804			1640
LSA 51.2 L70	kVA	2200			2000	2005			1825	2330			2120	2420			2200
	kW	1760			1600	1604			1460	1864			1696	1936			1760
LSA 51.2 VL90	kVA	2360			2145	2150			1955	2500			2275	2595			2360
	kW	1888			1716	1720			1564	2000			1820	2076			1888
LSA 51.2 VL95	kVA	2500			2250	2280			2052	2650			2385	2750			2475
	kW	2000			1800	1824			1642	2120			1908	2200			1980

Δ* : Consult factory

Ratings 60 Hz - 1800 R.P.M.

kVA / kW - P.F. = 0.8																	
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V
Δ*		220V	240V			220V	240V			220V	240V			220V	240V		
LSA 51.2 S55	kVA	1860	2030	2150	2235	1695	1850	1960	2035	1955	2150	2280	2365	2045	2235	2365	2455
	kW	1488	1624	1720	1788	1356	1480	1568	1628	1564	1720	1824	1892	1636	1788	1892	1964
LSA 51.2 M60	kVA	2050	2240	2375	2460	1870	2045	2165	2250	2155	2375	2520	2608	2255	2465	2615	2705
	kW	1640	1792	1900	1968	1496	1636	1732	1800	1724	1900	2016	2086	1804	1972	2092	2164
LSA 51.2 L70	kVA	2200	2400	2545	2640	2005	2190	2320	2410	2330	2545	2700	2800	2420	2640	2800	2905
	kW	1760	1920	2036	2112	1604	1752	1856	1928	1864	2036	2160	2240	1936	2112	2240	2324
LSA 51.2 VL90	kVA	2360	2575	2730	2835	2150	2350	2490	2583	2500	2730	2895	3000	2595	2835	3005	3115
	kW	1888	2060	2184	2268	1720	1880	1992	2066	2000	2184	2316	2400	2076	2268	2404	2492
LSA 51.2 VL95	kVA	2500	2713	2870	3000	2280	2474	2617	2736	2650	2876	3042	3180	2750	2984	3157	3300
	kW	2000	2170	2296	2400	1824	1979	2093	2189	2120	2300	2433	2544	2200	2387	2525	2640

Δ* : Consult factory