MULTIPHASE POWER

EP Series

WPS2000 / WPS2000S

Features:

- Excitation system: self-excited (AREP and PMG are optional)
- ATS (automatic transfer switch) receptacle
- Lockable battery isolator switch
- Stainless galvanized zinc plates with strong corrosion resistance
- Vibration isolators between the engine/alternator and base frame
- Integrated wiring design
- Base fuel tank for at least 8 hours running
- Equipped with an industrial muffler
- Engine oil pump
- 50℃ radiator
- Top lifting and steel base frame with forklift holes
- Drainage for fuel tank
- Complete protection functions and safety labels
- IP54 (soundproof sets), IP56 (control system)
- Water jacket preheater, oil heater and double air cleaner, etc. are available.

Output Ratings

Generating Set Model	Prime	Standby
WPS2000/S	2000kVA/1600kW	2200kVA/1760kW

Ratings at 0.8 power factor.

Ratings and Performance Data

Engine Make & Model:		4016TAG2A
Alternator Model:		LSA51.2M60
Alternator Brand:		Leroy Somer
Control System:		PLC-8610 / PLC-7420
Noise Level@7m:		/
Circuit Breaker Type:		/
Frequency & Phase:		50Hz & 3PH
Engine Speed: RPM		1500
Structure Type:	WPS2000	A
	WPS2000S	C
Fuel Tank Capacity: L	WPS2000	/
	WPS2000S	2000
Fuel Consumption: l/hr (100% Load)	Prime	/
	Standby	/

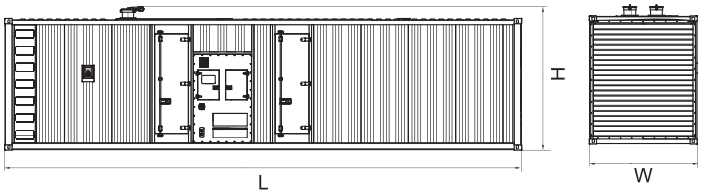
Also available in the following voltages: 415/240V-380/220V-220/127V-200/115V;
ESP: Standby Power Standby duty, operation under variable load, without over load;
PRP: Prime Power-Continuous duty operation, under variable load 24/24h-10% over load permissible 1 hour/12 hours;
The data is only for your reference but not for use of sales.

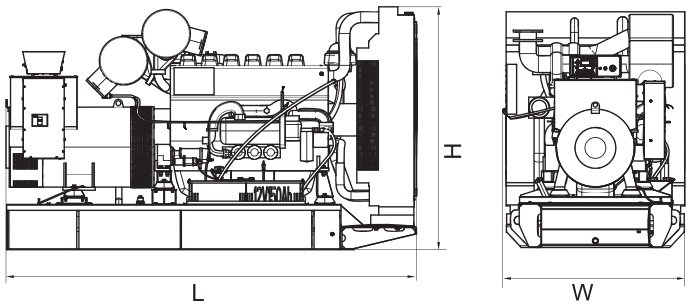
M: Mechanical speed governor, E/ECU: Electronic speed governor;
NA: Naturally aspirated, TC: Turbocharged, TCA: Turbocharged and air-air aftercooled. TCW: Water-cooled Turbocharged;
The weights are approximate and without fuel.

Dimensions and Weights

Generating Set Model	Length (L) mm (in)	Width (W) mm (in)	Height (H) mm (in)	Dry kg (lb)	Wet kg (lb)
WPS2000	5000	2192	3246	10530	/
WPS2000S	12192	2438	3150	20480	/

Dry = With Lube Oil Wet = With Lube Oil and Coolant





MULTIPHASE POWER

EP Series

WPS2000 / WPS2000S

Engine model: 4016TAG2A

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.

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	-

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

Lubrication system

Recommended lubricating oil to conform with the specification of API CG4.
Lubricating oil capacity:
Sump maximum . ... 213 litres
Sump minimum .. .. 157 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%

Induction system

Maximum air intake restriction of engine:
Clean filter.. ... ... 127 mm H_20
Dirty filter ... ... 380 mm H_20
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_20	949	-
4016TAG2A	mm H_20	673	-

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

MULTIPHASE POWER

EP Series

WPS2000 / WPS2000S

Alternator model: LSA51.2M60

SPECIALLY ADAPTED FOR GENSET APPLICATIONS

The LSA 51.2 alternator is designed to be suitable for typical generator set applications, such as: backup, base production, cogeneration, 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 1.22, ISO 8528/3, CSA, UL 1446, UL 1004B 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 and ISO 14001 environment. ≤

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.
- Voltage range 60 Hz : 380V - 416V - 440V - 480V.
  Ability to reconnect : 50 Hz : 220V - 230V - 240V / 60 Hz : 220 V - 240 V : consult factory.
- 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).
- High efficiency and motor starting capacity.
- Total harmonic content < 3,5 %.
- R 791 interference suppression conforming to standard EN 55011 group 1 class B standard for the 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**	**PMG**	**C.T.** Current transformer for paralleling	**R 726** Mains paralleling	**R 731** 3 Phase sensing	**R 734** 3 Phase sensing for unbalanced mains paralleling	**P** Remote voltage potentiometer
R 449	**Std**	**Option**	√	√	√	√	√
D 510	**Option**	**Option**	√	**included**	**included**	**consult factory**	√

Voltage regulator accuracy ± 0.5%. - √ : adaptation possible

PROTECTION SYSTEM SUITED TO THE ENVIRONMENT

- The LSA 51.2 is IP 23.
- Standard winding protection for clean environments with relative humidity ≤ 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 RTD protection for winding.

REINFORCED MECHANICAL STRUCTURE USING FINITE ELEMENT MODELLING

- Compact and rigid assembly to better withstand genset or engine vibrations.
- Steel frame.
- Cast iron flanges and shields.
- Twin-bearing and single-bearing versions designed to be suitable for most 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 incorporation of accessories for paralleling, protection and measurement.

MULTIPHASE POWER

EP Series

WPS2000 / WPS2000S

Control System

PLC-7420

PLC-7420 is an advanced control module based on micro-processor, containing all necessary functions for protection of the genset and the breaker control. It can monitor the mains supply, breaker control. and automatically start the engine when the mains is abnormal. Accurately measure various operational parameters and display all values and alarms information on the LCD. In addition, the control module can automaticallyshut down the engine and indicate the engine failure.

FEATURES

- Microprocessor control, with high stability and credibility
- Monitoring and measuring operational parameters of the mains supply and genset
- Indicating operation status, fault conditions, all parameters and alarms
- Multiple protections; multiple parameters display, like pressure, temp. etc.
- Manual, automatic and remote work mode selectable
- Real time clock for time and date display, overall runtime display, 250 log entries
- Overall power output display
- Integral speed/frequency detecting, telling status of start, rated operation, overspeed etc.
- Communication with PC via RS485 OR RS232 interface, using MODBUS protocol

a Button (next page)

b Button (increase value / previous item)

c Button (accept)

d Button (previous page)

e Button (decrease value / next item)

f Button (transfer the load to the mains supply, when in Manual mode only)

g Mains supply available LED

h Stop / Reset button

i Manual button (Manual control mode)

j Mains supply on load LED

k Test button (Test mode) l Auto button (Auto mode)

m Genset on load LED n Mute/Lamp test button

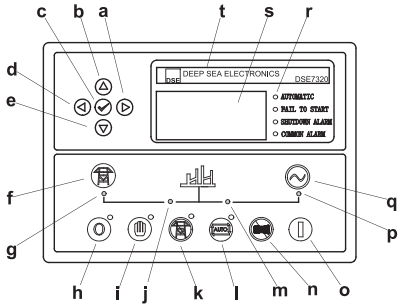
o Start button (Manual) p Genset available LED

q Button (transfer the load to the genset, when in Manual mode only)

r Alarm LED (4 alarm items)

s LCD display

t Control module name



Control Panel

Control System function list

		MODEL	PLC-8610	PLC-7420
General accessory		AVR	●	●
		Electronic Governing	●	×
		Glow plug control	●	●
		Cycle Cranking	●	●
		(MODBUS) Networking	●	●
		Fault History	●	●
Operator Interface		manual start/stop	●	●
		Auto/remote start	●	●
		Regular Test	●	●
		Auto operation LED	●	●
		Manual operation LED	●	●
		Common Shutdown LED	●	●
		Common warning LED	●	●
		Fail to start LED	●	●
		Emergency stop(local)	●	●
		Alphanumeric screen	●	●
		Remote start input active LED	●	●
		Alarm reset	●	●
Measurement and Instrumentation	Engine	Oil pressure	●	●
		Water Temperture	●	●
		Engine Speed	●	●
		Hours Run	●	●
		Number of Starts	●	●
		Battery Voltage	●	●
		Coolant Temperature	●	●
	Alternator	3Phase-L Voltage&Frequency	●	●
		3phase Current	●	●
		Frequency	●	●
		kWh	●	●
		Apparent Power	●	●
		Active Power and Reactive Power	●	●
		Power Factor	●	●
		Per PhasekW, kWr	●	●
		Per Phase kVA	●	●
		Phase Voltage	●	●
		Output Power	●	●
	Mains Expression	Grid Line Voltage	●	●
		Grid Phase Voltage	●	●
		Grid Frequency	●	●
Shutdown Protection and Indication	Engine	Low Fuel Level	●	●
		High Fuel Level	○	○
		Low Oil Pressure	●	●
		High Water Temperature	●	●
		Failure to Stop	●	●
		Failure to Start	●	●
		Controlable start circles/times	●	●
		Overspeed	●	●
	Alternator	Under&Over Voltage	●	●
		Under&Over Frequency	●	●
		Overcurrent	●	●
		Earth Leakage	○	○
		Reverse Power	●	×
		Reverse kWr	●	×
Threshold Warning&Indication		Low Oil Pressure	●	●
		Low Water Temperature	○	○
		High Water Temperature	●	●
		Low Water Level	●	●
		Low/High Battery Voltage	●	●
		Failure to Charge	●	●
		Overcurrent	●	●
		Overload	●	●
		Genset Under/Over Voltage	●	●
		Genset Under/Over Frequency	●	●
		under/over Speed	●	●
		High Engine Temperature	●	●
		Earth Leakage	●	●
Paralleling Capability		Synchroscope(Independent Bus)	●	×
		Active and Reactive Power Control	●	×
		Synchroscope(Shared Bus)	●	×
		Synchronization Dector	●	×
		Peak Lopping	○	×
Power Transfer Function		Automatic Transfer	●	●
		Hard Closed Transition	●	●
		Soft Closed Transtion	●	×
		Gen/Mains Breaker	×	●
		Gen/Mains Breaker Status Protection	×	●
		Speed/Voltage Control	●	×
		Power Indication	●	●
		Fuel&solenoid Valve Control	●	●
		Startor Control	●	●
		Preheating	○	○
		Mains Transfer Switch (Standard)	●	●
		Mains Transfer Switch (Emergency)	●	●
Environment		Operating Temperature (-40℃-70℃)	●	●
		Ambient Temperature (-25℃-45℃)	●	●
		Humidity≤80%	●	●
Monitoring Function		Grid Over/Under Voltage Control	●	●
		Grid Over/Under Frequency Control	●	●
		Remote Start Output(Load/No-load)	●	●
		Optional Relay Output	●	●
		Remote Telecom Control with All Functions	●	●
		Engine Instrument Monitoring	●	●
		Altemator Output Instrument Monitoring	●	●
		Connection Point with All-around Setting For 6 Users	●	●
		3 Users Input Connection Point	●	●
		LCD Light Control of Low Light Operation Environment	●	●
		Safe PIN Code	●	●
		RS232/485 Interface	●	●
		Language Selection	●	●
		Multi-Language Function	●	

● Standard ○ Optional × Impossible

MULTIPHASE POWER

EP Series

WPS2000 / WPS2000S

Control System

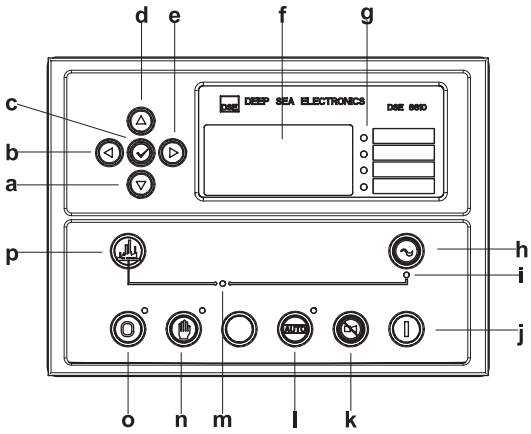
Digital, intelligent control system allows easier operation.

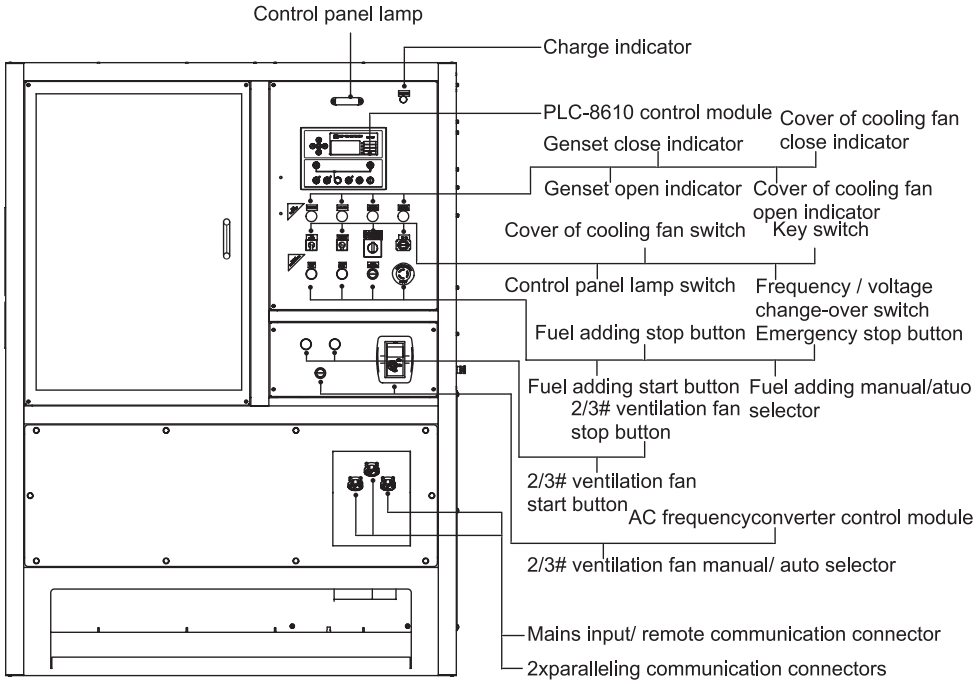
FEATURES

- Microprocessor control, with high stability and credibility
- Monitoring and measuring operational parameters of the genset
- Indicating operation status, fault conditions, all parameters and alarms
- Multiple protections; multiple parameters display, like pressure, temp. etc.
- Manual, automatic and remote work mode selectable
- RS232 & RS485 can be used at the same time
- Real time clock for time and date display, overall runtime display, 250 log entries

PLC-8610 (Optional)

PLC-8610 is a microprocessor based control unit containing all necessary functions for protection of the genset and the breaker control. Furthermore, it contains all necessary three-phase measuring circuits and presents all values and alarms on the LCD display. The module has the function of load sharing which enables the module to share the active load (kW) equally when operating in parallel with other gensets. The load sharing is performed so each genset takes a portion of the load that is calculated in percent according to the nominal power.





a Decrease value next item
b Previous page
c Accept
d Increase value previous item
e Next page
f LCD display
g Four alarm LEDs
h Close genset
i Genset available LED
j Manual start
k Mute alarm / lamp test
l Auto mode (with LED)
m Genset breaker on LED
n Manual mode (with LED)
o Stop / reset (with LED)
p Open genset

Optional

Engine	Alternator	Generator Set	Fuel System	Canopy
• Water Jacket Preheater • Oil Preheater	• Winding Temperature Measuring Instrument • Alternator Preheater • PMG • Anti-damp and anti-corrosion treatment • Anti-condensation heater	• Tools with the machine	• Low fuel level alarm • Automatic fuel feeding system • Fuel T-valves	

Lubricating System	Exhaust System	Cooling System	Control Panel	Voltages
• Oil with the machine	• Protection board from hotness	• Front heat protection • Coolant (-30°C)	• Remote control panel • PLC-8610 • PLC-7420 • ATS	• 415/240V • 400/230V • 380/220V • 220/127V • 200-115V

EP Series / May.2017