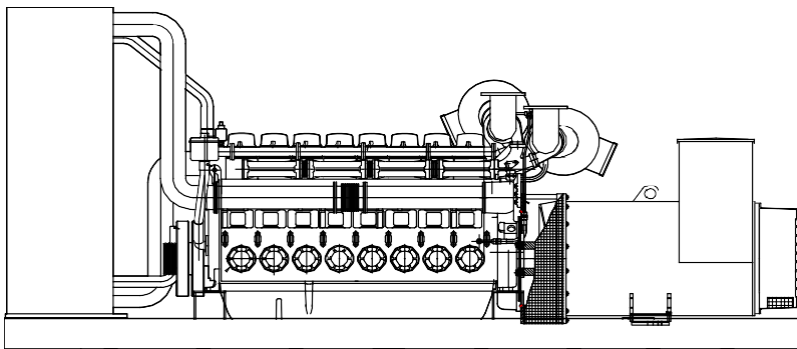


Perkins 2206A-E13TAG2 diesel engine

Leroy Somer alternator



### Standard Generator Features

- ◇ AMF, Automatic mains failure unit
- ◇ Heavy duty type, 8 cylinder, water cooled engine
- ◇ 52°C tropical type radiator
- ◇ Starter motor
- ◇ Lead acid battery
- ◇ Charging alternator
- ◇ Battery charge redressor
- ◇ Heavy duty, brushless type alternator
- ◇ Base frame with anti-vibration units
- ◇ Industrial type silencers
- ◇ Flexible exhaust compensator
- ◇ Block water heater unit
- ◇ Control panel with digital-automatic main control module
- ◇ Fan, fan drive, charging alternator drive and all rotating parts covered
- ◇ Radiator matrix covered by metal mesh against the mechanical damages
- ◇ Fabricated and welded steel base frame
- ◇ Anti-vibration mountings
- ◇ Engine and alternator manufacturer test reports
- ◇ Factory load, performance and function tests

### Optional Features

- ◇ Automatic load transfer panel
- ◇ Automatic synchronization and power sharing systems
- ◇ Soundproof canopy
- ◇ Container type enclosures
- ◇ Road trailer
- ◇ Job-site trailer
- ◇ Protection circuit breaker
- ◇ Air start
- ◇ Remote type radiator
- ◇ Base fuel tank
- ◇ External type fuel tank
- ◇ Automatic fuel transfer system
- ◇ Residential silencer

| Model          | Standby    |            | Prime      |            |
|----------------|------------|------------|------------|------------|
|                | kVA        | kW         | kVA        | kW         |
| <b>CJ400PL</b> | <b>400</b> | <b>320</b> | <b>360</b> | <b>288</b> |

## APPLICATION DATA

### Perkins 2206A-E13TAG2 Engine

#### Standard Features

##### 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 temperatures are controlled by an advanced gallery jet cooling sys.
- ◊ All engines are tolerant of a wide range of temperatures without derate
- ◊ Service is provided by the extensive Perkins network of over 4.000 distributors and dealers worldwide

##### 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 surfaces; fewer pipe joints and easier access to reduce maintenance times
- ◊ Designed to provide excellent service access for easy of maintenance
- ◊ Engines designed to comply with major international standards
- ◊ Low gaseous emissions for cleaner operation

##### Standards

- ◊ UK MOD, BS5750, ISO9001, BS5514/1-1982, ISO 3046/1, ISO 8528/1

#### Technical Specifications

|                                                     |                                        |
|-----------------------------------------------------|----------------------------------------|
| Manufacturer                                        | PERKINS                                |
| Model                                               | 2206A-E13TAG2                          |
| Type                                                | 4 cycle, water-cooled, diesel engine   |
| Number of cylinders                                 | 6                                      |
| Cylinder arrangement                                | Vertical in-line                       |
| Displacement, Liters                                | 30.561                                 |
| Bore X Stroke, mm                                   | 160 X 190                              |
| Compression Ratio                                   | 13.6:1                                 |
| Combustion System                                   | Direct injection                       |
| Aspiration                                          | Turbocharged, air-to-air charge cooled |
| Rotation                                            | Anti-clockwise viewed on flywheel      |
| Gross engine power, kWb                             | 985                                    |
| Fan Power, kWm                                      | 38                                     |
| BMEP gross, bar                                     | 25,4                                   |
| Combustion air flow, m <sup>3</sup> / min           | 80,5                                   |
| Exhaust gas temp.(after turbo), °C                  | 465                                    |
| Exhaust gas flow (after turbo),m <sup>3</sup> / min | 200                                    |
| Mean piston speed, m / s                            | 9,5                                    |

#### Cooling System

|                                                                                                                                                                 |                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Type                                                                                                                                                            | Tropical, heavy duty type |
| Ambient temperature, °C                                                                                                                                         | 52                        |
| Engine coolant capacity, Liters                                                                                                                                 | 48                        |
| Engine+Radiator coolant cap., Liters                                                                                                                            | 149                       |
| Jacket coolant flow, Liters / sec                                                                                                                               | 10                        |
| Cooling min airflow, m <sup>3</sup> / min                                                                                                                       | 1350 (at 50°C)            |
| ◊ Gear driven circulating pump                                                                                                                                  |                           |
| ◊ Twin thermostats                                                                                                                                              |                           |
| ◊ Crankshaft pulley for fan drive                                                                                                                               |                           |
| ◊ Powder coated radiator assemblies comprising:water radiator; air charge cooled radiator; all pipes, hoses and clips; fan; pulley; fan belts and safety guards |                           |

#### Lubricating System

|                                               |             |
|-----------------------------------------------|-------------|
| Type                                          | Pressurized |
| Capacity, Liters                              | 165.6       |
| Lub oil temp. Max to bearings, °C             | 105         |
| Lub oil pressure (at 80°C,min), MPa           | 0.34        |
| ◊ Wet sump with filler and dipstick           |             |
| ◊ Engine block lub oil temperature stabilizer |             |
| ◊ Full-flow spin-on oil filters               |             |

#### Fuel System

|                                                            |                                                         |
|------------------------------------------------------------|---------------------------------------------------------|
| Type of injection system                                   | Direct injection                                        |
| Fuel injection pump                                        | Combined unit injector                                  |
| Fuel injector opening pressure, bar                        | 234                                                     |
| Delivery/hour at 1500rev/min, Liters                       | 660                                                     |
| Fuel lift pump                                             | Tuthill TCH 1-054                                       |
| Governor type                                              | Digital electronic governor to ISO 3046 Part 4 class A1 |
| ◊ Unit fuel injectors with lift pump and hand stop control |                                                         |
| ◊ Full flow spin-on fuel filters                           |                                                         |

#### Electrical System

|                                                               |                                 |
|---------------------------------------------------------------|---------------------------------|
| Alternator                                                    | 24 Volt with integral regulator |
| Starter motor (DC)                                            | 24 Volt                         |
| Starter motor power                                           | 8.2 kW                          |
| ◊ Combined high coolant temperature / low oil pressure switch |                                 |
| ◊ Overspeed switch and magnetic pick up                       |                                 |
| ◊ Turbo inlet temperature shutdown switch                     |                                 |

#### Fuel Consumption

|                 |           |           |
|-----------------|-----------|-----------|
| liters per hour | %110 Load | 77 L      |
|                 | %100 Load | 71 L      |
|                 | %75 Load  | 54 L      |
|                 | %50 Load  | 35 L      |
| grams per kWh   | %110 Load | 214 g/kWh |
|                 | %100 Load | 204 g/kWh |
|                 | %75 Load  | 202 g/kWh |
|                 | %50 Load  | 205 g/kWh |

#### Optional Equipments

- ◊ Fuel oil cooling radiator available integral to radiator assemblies
- ◊ Twin heavy duty air cleaner - paper element with pre-cleaner
- ◊ Changeover lubricating oil filter
- ◊ Changeover fuel oil filter
- ◊ Immersion heater with thermostat
- ◊ Air starters

Leroy Somer Alternator

Standard Features

Top of the Range Electrical Performance

Class H insulation  
Standard 6-wire re-connectable winding, 2/3 pitch  
High efficiency and motor starting capacity  
R 791 interference suppression conforming to standard EN 55011 group 1  
class B standard for European zone (CE marking)

Protection System Suited to the Environment

The LSA 49.1 is IP23

Reinforced Mechanical Structure Using Finite Element Modelling

Standard direction of rotation: clockwise when looking at the drive end view  
Compact and rigid assembly to better withstand generator-set 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  
Greased for life bearing

Accessible Terminal Box Proportioned for Optional Equipment

Easy access to the voltage regulator and to the connections  
Possible clusion of accessories for parallelling, protection and measurement  
Connection bar for reconnecting voltage

Compliant with International Standards

The LSA 49.1 alternator conforms to the main international standards and regulations:  
**IEC 60034, NEMA MG 1.22, ISO 8528, CSA, CSA/UL**  
It can be integrated into a **CE** marked generator set  
The LSA 49.1 is designed, manufactured and marketed in an ISO 9001 environment

| Marka       | Standby |     | Prime |     |
|-------------|---------|-----|-------|-----|
|             | kVA     | kW  | kVA   | kW  |
| LEROY SOMER | 400     | 320 | 360   | 288 |

Technical Specifications

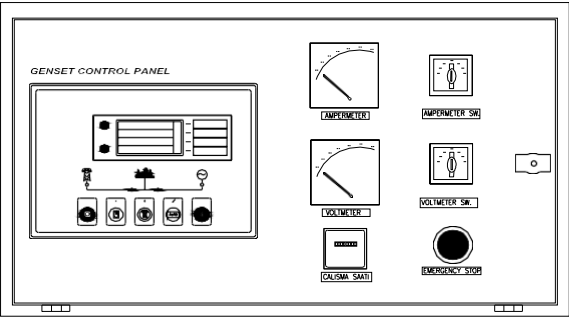
|                                     |                                    |
|-------------------------------------|------------------------------------|
| Manufacturer                        | LEROY SOMER                        |
| Model                               | LSA                                |
| Type                                | 4-Poles, Rotating Field, Brushless |
| Standby power at rated voltage, kVA | 1100                               |
| Efficiency, %                       | 94.3                               |
| Power factor                        | 0.8                                |
| Phase                               | 3                                  |
| Frequency, Hz                       | 50                                 |
| Speed, Rpm                          | 1500                               |
| Voltage, V                          | 400                                |
| Excitation                          | AREP+PMI or PMG                    |
| Stator windings                     | 2/3 Pitch factor                   |
| Regulation                          | AVR, Automatic Voltage Regulator   |
| Voltage Regulator                   | R 449                              |
| Voltage Regulation, %               | ± 0.5                              |
| Total HarmonicTGH / THC             | < 4%                               |
| Waveform: NEMA = TIF                | < 50                               |
| Waveform: I.E.C = THF,              | < 2%                               |
| Insultion class                     | H                                  |
| Overspeed, Rpm                      | 2250                               |
| Sustained short-circuit current     | 300%(3IN) : 10s                    |
| Construction                        | Single bearing, direct coupled     |
| Coupling                            | Flexible                           |
| Amortisseur Windings                | Full                               |
| Connection                          | WYE                                |
| Rotor                               | Dynamic balanced                   |
| Protection class                    | IP23                               |
| Air flow, m³ / min                  | 1.6                                |

Optional Equipment

- ♦Filters on air inlet and air outlet (IP44)
- ♦Windign protection for clean environmetns with relative humidity greater than 95%
- ♦Space heaters
- ♦Thermal protection for winding
- ♦Digital voltage regulator

Control Panel

Standard Equipments



- ◊ digital automatic control module Hourmeter
- ◊ Voltmeter
- ◊ Voltmeter commutator
- ◊ Ampermeter
- ◊ Ampermeter commutator
- ◊ Emergency stop button

Control Module

Description

- ◊ The model is an Automatic Mains Failure Control module.
- ◊ The modul is used to monitor a mains supply and automatically start a standby generator set.
- ◊ The module also provides indication of operational status and fault conditions automatically shutting down the genset and indicating failures by means of an LCD display, and appropriate flashing LED on the front panel.
- ◊ Selected timers and alarms can be altered by the user from the front panel.
- ◊ Alterations to the system are made using the 810 interface and a PC. This interface also provides real time diagnostic facilities

Specifications

- ◊ 240mm x 172mm dimensions
- ◊ 70mm x 40mm dimensions, 4 segment grafical LCD monitor
- ◊ Developed 16-bit Microprocessor design
- ◊ Easy comprehended display (Hid-Til-Lit SMD LED technology)
- ◊ LED mimic diagram
- ◊ SMS messaging capability with suitable GSM Modem
- ◊ PC software is MS Windows based and allows the operator to control the module from a remote location (P810 Software Kit necessary)
- ◊ Easy pushbutton controls
- ◊ System parameters can be adjusted manually from the front panel
- ◊ kVA, kW ve Cosφ measurements
- ◊ Communication with MODEM

Pushbutton Controls

STOP / START  
AUTO, TEST, MANUAL  
LCD PAGE

Input Functions display on LCD

|                        |                           |
|------------------------|---------------------------|
| Generator Volts        | Volts L1-N, L2-N, L3-N    |
| Generator Volts        | Volts L1-L2, L2-L3, L3-L1 |
| Generator Amps         | Amps L1, L2, L3           |
| Generator Frequency    | Hz                        |
| Mains Volts            | Volts L1-N, L2-N, L3-N    |
| Mains Volts            | Volts L1-L2, L2-L3, L3-L1 |
| Mains Frequency        | Hz                        |
| Engine Speed           | RPM                       |
| Plant Battery Volts    | Volts                     |
| Engine Hours Run       | Hour                      |
| Generator total power  | kVA L1, L2, L3,total      |
| Generator total power  | kW L1, L2, L3,total       |
| Generator power factor | Cosφ L1, L2, L3,total     |

Optional Input Functions

|                     |     |
|---------------------|-----|
| Engine Oil pressure | kPa |
| Fuel level          | %   |
| Engine Temperature  | °C  |

Alarm Channels

Under/over generator voltage  
Over-current  
Under/over generator frequency  
Under/over speed  
Charge fail  
Emergency stop  
Low oil pressure  
High engine temperature  
Fail to start  
Low/high DC battery voltage  
Reverse power  
Generator phase rotation error  
Generator short-circuit protection  
Loss of speed sensing signal  
Mains out of limits

Environmental Testing Standards

Electromagnetic Compatibility

BS EN 50081-2:1992 and EN 61000-6-4:2000 EMC, Emission Standards for the Industrial Environment  
EN 61000-6-2:1999 EMC, Immunity Standards for the Industrial Environment

Vibration

BS EN 60068-2-6 Ten sweeps (up and back down) at 1 octave/minute in each of the three major axes.  
5Hz to @ +/-7.5mm constant displacement.  
8Hz to 500Hz 2gn constant acceleration.

Temperature

Cold : BS EN 60068-2-1 to -30°C  
Hot : BS EN 60068-2-2 to 70°C

Humidity

BS EN 2011 part 2.1 93% RH @ 40° for 48 hours

Shock

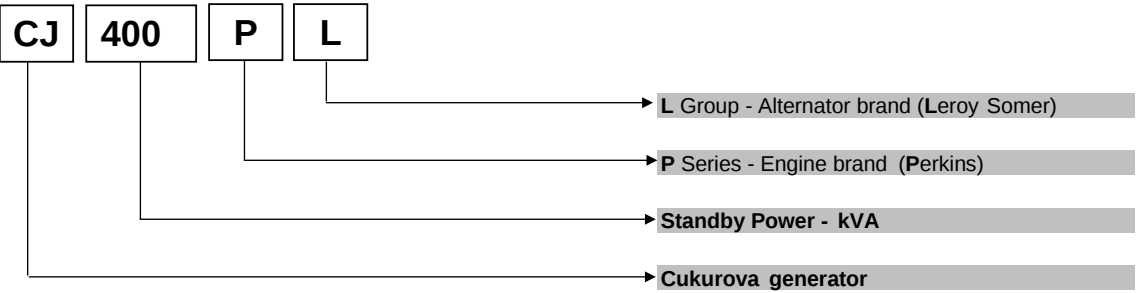
BS EN 6068-2-27 Three half sine shocks in each of the three major axes 15gn amplitude.11mS duration.

Electrical Safety

BS EN 60950 Low Voltage Dircrive/Safety of information technology equipments, including electrical business equipment

Model Codes and General Information

Cukurova Diesel Generator



Information

Power Ratings

**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. 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.

**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 power rating, incorporation of a 10% overload for 1 hour in every 12 hours of operation which permitted

**Continuous power rating** is available for continuous full load operation. No overload is permitted.

Acc. to ISO 3046/1, BS 5514, DIN6271

Electric Formulas

| Values    | Formula                                           |                                       |
|-----------|---------------------------------------------------|---------------------------------------|
| kWe       | $kW_m \times E$                                   |                                       |
| kWe       | $(U \times I \times 1.73 \times pf) / 1000$       | $kVA \times pf$                       |
| kVA       | $(U \times I \times 1.73) / 1000$                 | $kWe / pf$                            |
| I (Amp)   | $(kWe \times 1000) / (U \times 1.73 \times pf)$   | $(kVA \times 1000) / (U \times 1.73)$ |
| Frequency | $(Rpm \times N^{\circ} Pole) / (2 \times 60)$     |                                       |
| Rpm       | $(2 \times 60 \times Frequency) / N^{\circ} Pole$ |                                       |

**kW<sub>m</sub>**: Mechanical Power

**kWe** : Electrical Power

**pf** : Power factor

**E** : Alternator efficiency

**I** : Current (A)

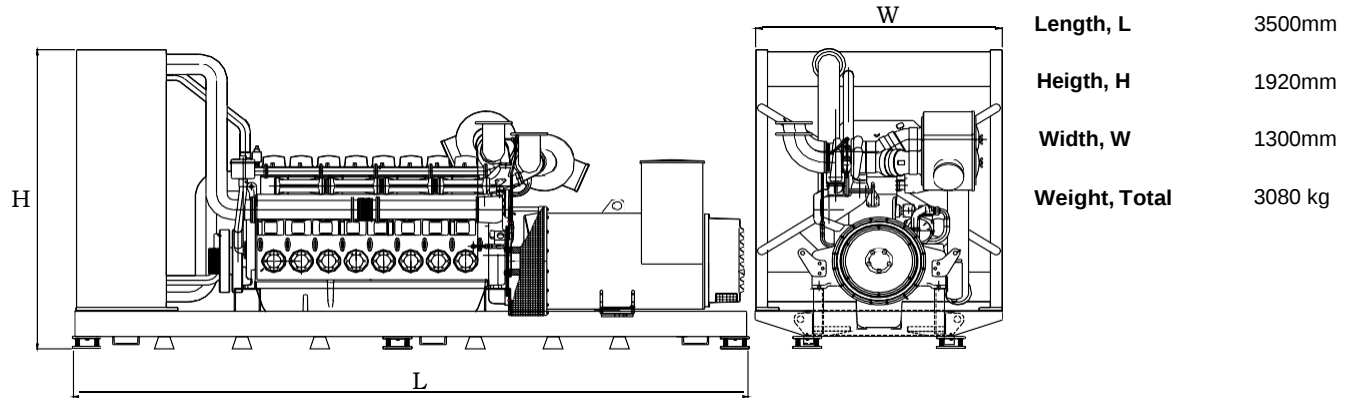
**U** : Voltage (V)

**kVA** : Power

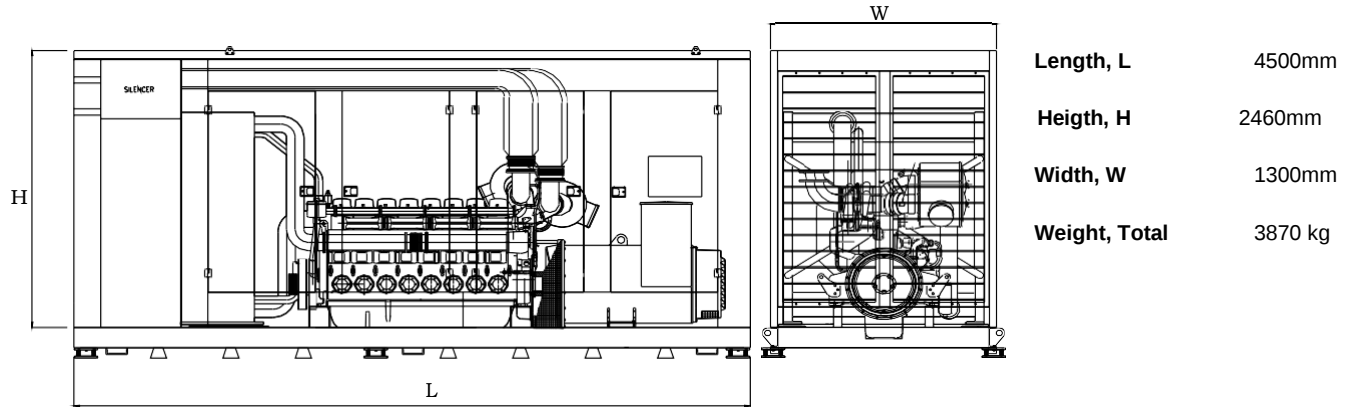
**Rpm**: Revolutions per minute

## General Dimensions

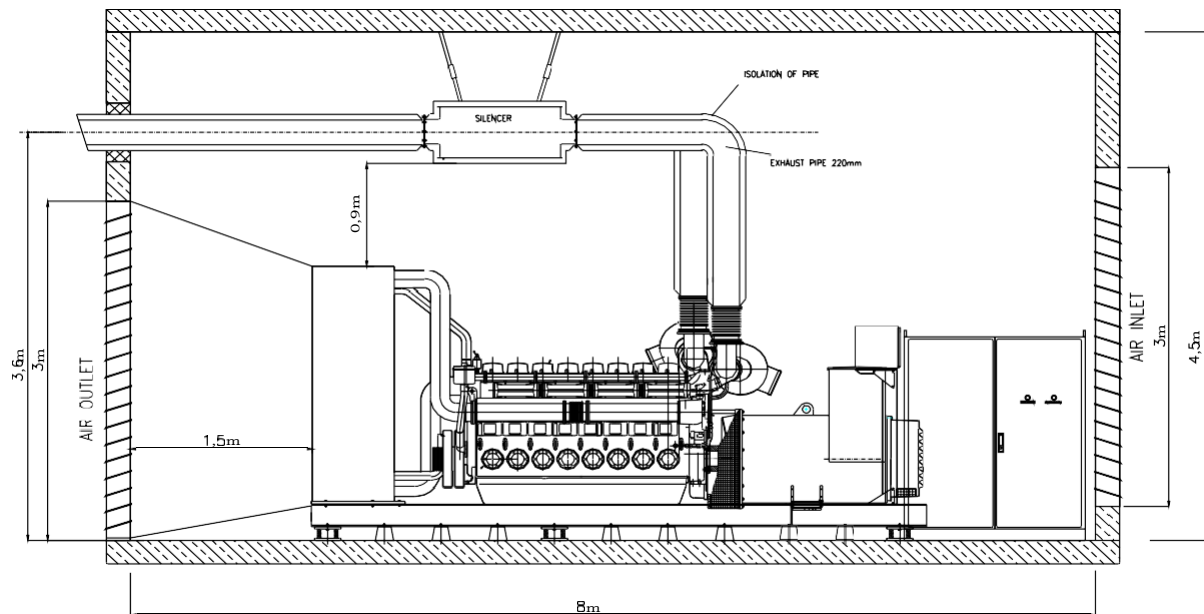
Standard Generator



Generator with Soundproof Canopy



## Generator Room Layout



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