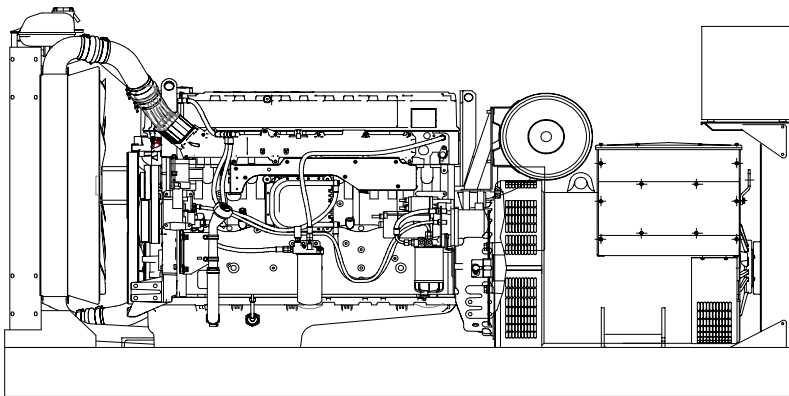


CUKUROVA GENERATOR SYSTEMS

1500 Rpm, 50Hz, 400V

Volvo TAD1345GE diesel engine

Leroy Somer LSA 47.2 S5 alternator



Standard Generator Features

- ◊ AMF, Automatic mains failure unit
- ◊ Heavy duty type, 6 cylinder, water cooled engine
- ◊ 55°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 |
| CJ500VL | 500 | 400 | 455 | 364 |

APPLICATION DATA

Volvo TAD1345GE Engine

Standard Features

The TAD1345GE is a powerful, reliable and economical Generating Set Diesel built on the dependable Volvo in-line six design.

Durability & low noise

Designed for easy, fast and most economical installation. Well-balanced to produce smooth and vibration-free operation with low noise level. To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

Low exhaust emission

The state of the art, high-tech injection and highly efficient charge air system with low internal losses contributes to excellent combustion and low fuel consumption.

The TAD1345GE is EU Stage 2 emission certified.

Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine.

Engine and Block

- ◊Cast iron cylinder block with optimum distribution of forces without the block being unnecessarily heavy.
- ◊Wet, replaceable cylinder liners
- ◊Piston cooling for low piston temperature and reduced ring temperature
- ◊Tapered connecting rods for increased piston lifetime
- ◊Crankshaft induction hardened bearing surfaces and fillets with seven bearings for moderate load on main and high-end bearings
- ◊Case hardened and Nitrocarburized transmission gears for heavy duty operation
- ◊Keystone top compression rings for long service life
- ◊Viscous type crankshaft vibration dampers to withstand single bearing alternator torsional vibrations
- ◊Replaceable valve guides and valve seats
- ◊Over head camshaft and four valves per cylinder

Technical Specifications

| | |
|---|--|
| Manufacturer | VOLVO |
| Model | TAD1345GE |
| Type | 4 cycle, water-cooled, diesel engine |
| Number of cylinders | 6 |
| Cylinder arrangement | Vertical in-line |
| Displacement, Liters | 12.78 |
| Bore X Stroke, mm | 131 X 158 |
| Compression Ratio | 18.1:1 |
| Combustion System | Direct injection |
| Aspiration | Turbocharged, air-to-air charge cooled |
| Rotation | Anti-clockwise viewed on flywheel |
| Gross engine power, kWb | 441 |
| Fan Power, kWm | 10 |
| Exhaust gas temp.(after turbo), °C | 570 |
| Exhaust gas flow (after turbo),m³ / min | 58.3 |
| Mean piston speed, m / s | 7.9 |

| Model | Standby kW | | Prime kW | |
|------------------|------------|------------|------------|------------|
| | Gross | Net | Gross | Net |
| TAD1345GE | 441 | 431 | 398 | 388 |

Cooling System

| | |
|--------------------------------------|---------------------------|
| Type | Tropical, heavy duty type |
| Ambient temperature, °C | 55 |
| Engine+Radiator coolant cap., Liters | 44 |

- ◊Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- ◊Belt driven coolant pump with high degree of efficiency
- ◊Electronically controlled viscous fan drive provides lower noise and fuel consumption
- ◊Coolant filter as standard

Fuel System

| | |
|--------------------------|--------------------------|
| Type of injection system | Direct injection |
| Fuel injector | Electronic unit injector |
| Governor type | Electronic/EMS2 |

- ◊Fuel prefilter with water separator and water-in-fuel indicator / alarm
- ◊Gear driven low-pressure fuel pump
- ◊Fine fuel filter with manual feed pump and fuel pressure switch
- ◊Electronic high pressure unit injectors

Fuel Consumption

| | | |
|---------------|-----------|-----------|
| grams per kWh | %100 Load | 196 g/kWh |
| | %75 Load | 197 g/kWh |
| | %50 Load | 198 g/kWh |
| | %25 Load | 211 g/kWh |

Lubricating System

| | |
|---|-------------|
| Type | Pressurized |
| Capacity, Liters | 36 |
| Lub oil pressure , bar | 3,7-5.2 |
| ◊Full flow oil cooler | |
| ◊Full flow disposable spin-on oil filter, for extra high filtration | |
| ◊The lubricating oil level can be measured during operation | |
| ◊Gear type lubricating oil pump, gear driven by the transmission | |

Electrical System

| | |
|---|----------------|
| Alternator | Bosch 80 A |
| Starter motor (DC) | Melco, 24 Volt |
| Starter motor power | 7 kW |
| ◊EngineManagementSystem(EMS2), an electronically controlled processing system which optimizes engine performance.It also includes advanced facilities for diagnostics and fault tracing | |
| ◊Possibility to perform a start battery test according to the NCPA requirements via CAN bus signals. | |
| ◊Sensors for oil pressure, oil temp, boost pressure, boost temp, coolant temp, fuel temp, water in fuel, fuel pressure and two speed sensors. | |

Leroy Somer LSA 47.2 S5 Alternator

Standard Features

Top of the Range Electrical Performance

Class H insulation
 Standard 12-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 47.2 is IP23

Reinforced Mechanical Structure Using Finite Element Modelling

Compact and rigid assembly to better withstand generator-set vibrations
 Steel frame
 Cast iron flanges and shields
 Two-bearing and single bearing versions designed to be suitable for engines on the market
 Half-key balancing
 Greased for life bearings (regreasable bearings optional)

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
 8-way terminal block for voltage reconnection

Compliant with International Standards

The LSA 47.2 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 47.2 is designed, manufactured and marketed in an ISO 9001 environment

| Model | Standby | | Prime | |
|--------------------|------------|------------|------------|------------|
| | kVA | kW | kVA | kW |
| LSA 47.2 S5 | 500 | 400 | 455 | 364 |

Technical Specifications

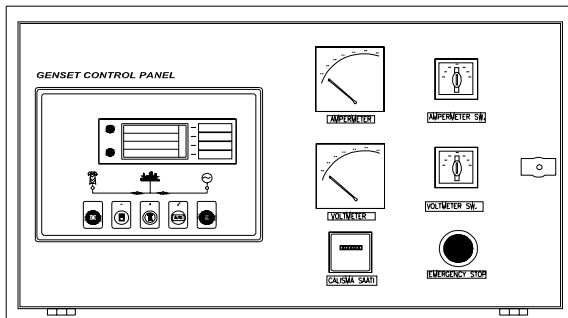
| | |
|-------------------------------------|------------------------------------|
| Manufacturer | LEROY SOMER |
| Model | LSA 47.2 S5 |
| Type | 4-Poles, Rotating Field, Brushless |
| Standby power at rated voltage, kVA | 500 |
| Efficiency, % | 93,6 |
| Power factor | 0.8 |
| Phase | 3 |
| Frequency, Hz | 50 |
| Speed, Rpm | 1500 |
| Voltage, V | 400 |
| Excitation | SHUNT(12 wire) |
| Stator windings | 2/3 Pitch factor |
| Regulation | AVR, Automatic Voltage Regulator |
| Voltage Regulator | R 230 |
| Voltage Regulation, % | ± 0.5 |
| Total HarmonicTGH / THC | at no load<1.5% - on load<2% |
| Waveform: NEMA = TIF | < 50 |
| Waveform: I.E.C = THF, | < 2% |
| Insulation class | H |
| Overspeed, Rpm | 2250 |
| Construction | Single bearing, direct coupled |
| Coupling | Flexible |
| Amortisseur Windings | Full |
| Connection | WYE |
| Rotor | Dynamic balanced |
| Protection class | IP23 |
| Air flow, m ³ / min | 0,9 |

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
- ◊PMG system

Control Panel

Standard Equipments



- ◊Deeapse 5220 digital automatic control module
- ◊Hourmeter
- ◊Voltmeter
- ◊Voltmeter commutator
- ◊Ammeter
- ◊Ammeter commutator
- ◊Emergency stop button

Deepsea 5220 Control Module

Description

- ◊The model 5220 is an Automatic Mains Failure Control module.
- ◊The module 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 graphical 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

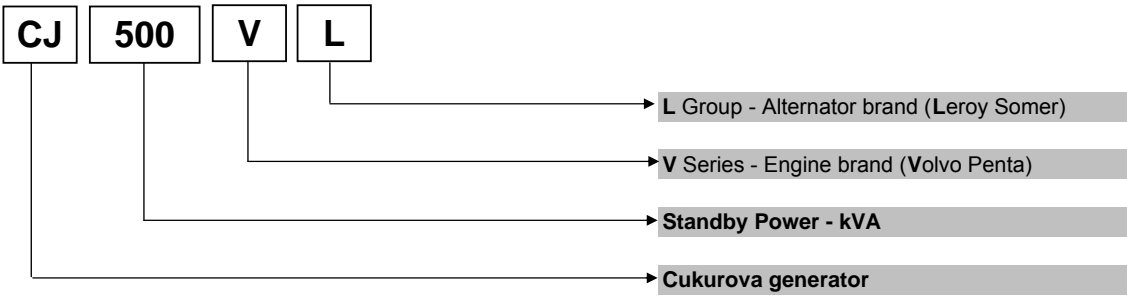
BS EN 6068-2-27 Three half sine shocks in each of the three major axes 15gn amplitude. 11ms duration.

Electrical Safety

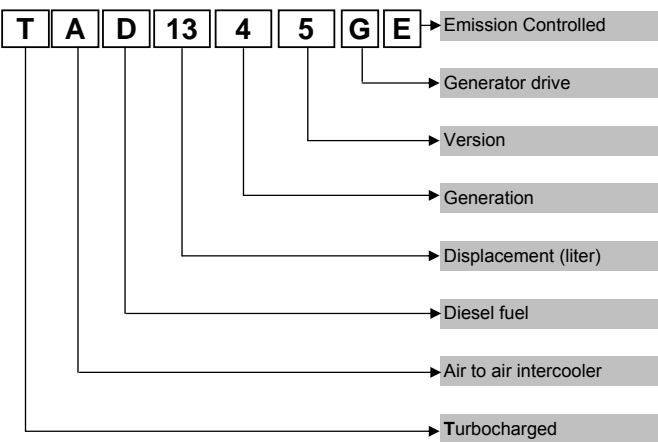
BS EN 60950 Low Voltage Directive/Safety of information technology equipments, including electrical business equipment

Model Codes and General Information

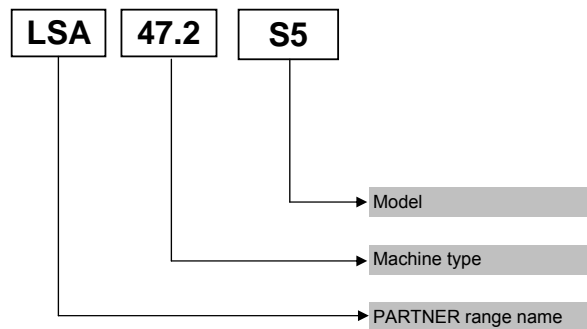
Cukurova Diesel Generator



Volvo Penta Diesel Engine



Leroy Somer Alternator



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

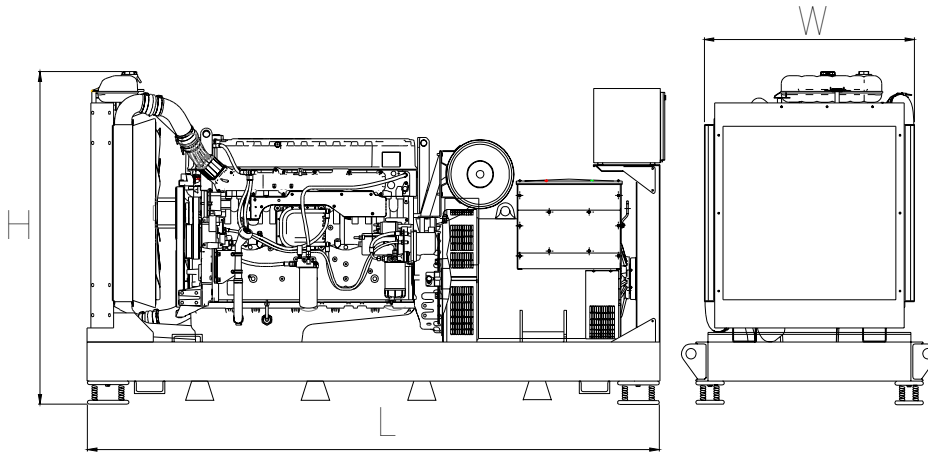
Electric Formulas

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

- kWm: Mechanical Power
- kWe : Electrical Power
- pf : Power factor
- E : Alternator efficiency
- I : Current (A)
- U : Voltage (V)
- kVA : Power
- Rpm: Revolutions per minute

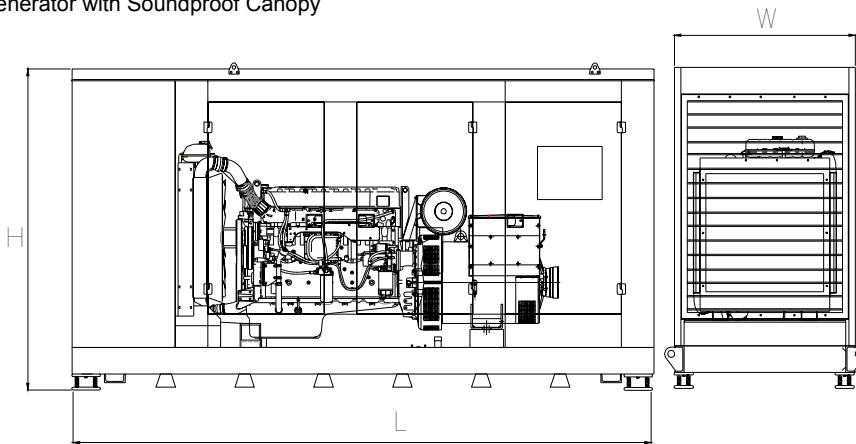
General Dimensions

Standard Generator



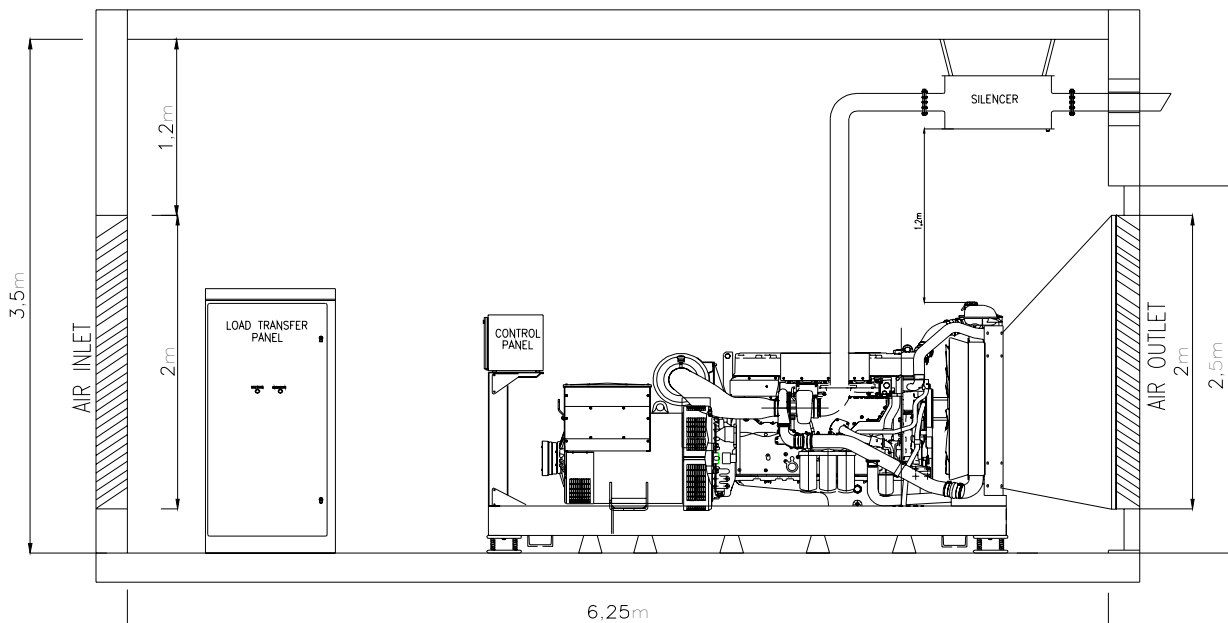
| | |
|----------------------|----------|
| Length, L | 3 m |
| Height, H | 1,7 m |
| Width, W | 1,1 m |
| Weight, Total | 3.600 kg |

Generator with Soundproof Canopy



| | |
|----------------------|----------|
| Length, L | 4,5 m |
| Height, H | 2,5 m |
| Width, W | 1,4 m |
| Weight, Total | 5.000 kg |

Generator Room Layout



Above drawings dimensions and weights are only for guidance. For installation design of your specific application, necessary certified drawings, at site consultancy service as well as maintenance and installations manuals will be provided by Cukurova without any charge.

Specifications may change without notice

| | | |
|---|--|---|
| | <p>CUKUROVA JENERATOR SANAYII TICARET A.S.</p> | |
| | <table border="0"> <tr> <td> <p>Izmir Factory Aegean Free Zone Boss Sokak No:11, Gaziemir Izmir, Turkey Tel : +90 232 252 20 26 Fax : +90 232 252 20 27</p> </td> <td> <p>Istanbul Export Sales Office Ebulula Mardin Caddesi Maya Meridyen İş Merkezi Kat:4 No: 14 Akatlar Istanbul, Turkey Tel : +90 212 352 70 90 Fax : +90 212 352 12 77 E-mail : info@cukurovapower.com</p> </td> </tr> </table> | <p>Izmir Factory Aegean Free Zone Boss Sokak No:11, Gaziemir Izmir, Turkey Tel : +90 232 252 20 26 Fax : +90 232 252 20 27</p> |
| <p>Izmir Factory Aegean Free Zone Boss Sokak No:11, Gaziemir Izmir, Turkey Tel : +90 232 252 20 26 Fax : +90 232 252 20 27</p> | <p>Istanbul Export Sales Office Ebulula Mardin Caddesi Maya Meridyen İş Merkezi Kat:4 No: 14 Akatlar Istanbul, Turkey Tel : +90 212 352 70 90 Fax : +90 212 352 12 77 E-mail : info@cukurovapower.com</p> | |