

8220K-972

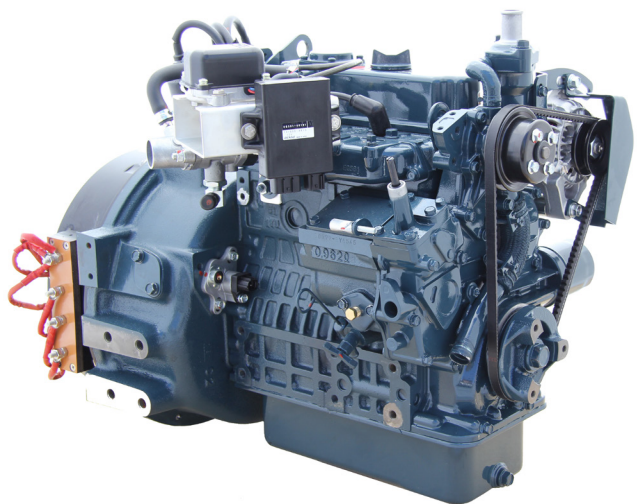
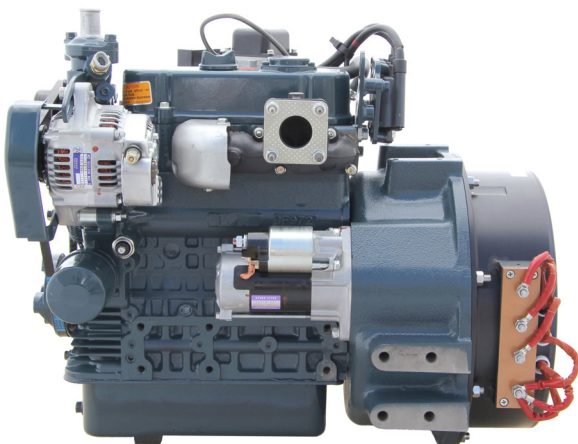
Prime Power 10kW DC Generator

The Most Efficient Means to Charge Batteries and Power Loads using Propane (LPG) or Natural Gas

Telecommunications
Conventional Hybrid Power
Solar Hybrid Power
Rapid Electric Vehicle charging
Hybrid Electric Vehicle Series Drive
Oil Field

Features

- Maximum continuous output is 10 kW at 2600 RPM
- Lower engine speed options available
- Variable speed with a typical 500 RPM span from full load to no load
- Available in all voltages from 24 to 500 Vdc
- 3 cylinder water cooled engine - quiet/low vibration
- Engine operational life is 30,000 to 40,000 hours based on selected engine RPM and load
- Temperature compensated battery charging
- Oil change at 200 hours standard with up to a 3,000 hour option
- Alternator exceeding 85% efficiency



Why choose our prime power generator over a backup generator - for higher reliability with lower maintenance and operational cost. Small backup generators require oil maintenance as frequent as an 8 hour level check and 100 oil change. You never know when the generator will be called upon to run longer than the oil maintenance period. This is particularly true for Solar Hybrid.

Description

Combining our lightweight 8220 alternator with the heavy duty Kubota 972 water cooled engine delivers a DC power solution that offers significant advantages over manufacturer's DC generators and AC generators with battery chargers.

This generator has the capacity to deliver 15 kW at 3600 RPM, but the ideal power range is between 4 to 10kW.

The 8220-972, properly configured, can reliably operate for 24 hours a day, 7 days a week. A realistic life expectancy for the Kubota 972 engine is between 30,000 to 40,000 hours depending on speed verses load selection and quality of maintenance.

The service life of the controller, wire harness, and alternator is well over 100,000 hours. At the end of engine life you replace the engine and not the whole generator (unlike AC generators)

LPG Generators from other manufactures typically have only 2,000 to 6,000 hours in life expectancy. The large difference in engine service life is attributed to:

- The 972 gas engine is derived from a diesel engine block. The injectors are removed and a gas carburetor, spark plugs and ignition are added along with reducing the compression ratio. The conversion and manufacturing is performed by Kubota. The heavy-duty diesel type engine block, bearings, crankshaft, cylinder, and pistons provide a very reliable and long life generator.
- There are 4 heavy duty bearings supporting the crankshaft in the 972 engine as opposed to 2 light duty aluminum bearings typical of our competitors' generators.

The 972 engine has much lower maintenance, higher reliability, and lower fuel consumption due to its water/fluid cooling system:

- In cold climates the water cooled engine can use its thermostat to regulate combustion temperatures improving fuel efficiency and reducing engine maintenance. Typical air cooled generator engines do not have the ability to regulate combustion temperatures.
- In hot and cold weather extremes the water cooled engine provides lower oil maintenance than the air cooled.
- In hot weather the water cooled engine's oil temperature is typically under 125°C whereas air cooled engines typically operate at temperatures above 150°C reducing the service life of the oil. In cold weather the oil temperatures can be too low to remove the absorbed water from the combustion process, this also reduces oil service life.
- The 972 has a larger oil capacity in the oil pan than conventional air cooled engines, reducing oil checks and changes.
- The 972 can make use of Polar's Electric Radiator option saving 10% to 15% in fuel.

Polar's water cooled generator is significantly quieter than other AC or DC generators using air cooled engines:

- For low noise requirements the water cooled engine can take advantage of its fluid lined cylinders for noise reduction at the source
- Sound traps inside the enclosure are more effective with water cooled engines than air cooled.
- Polar offers an electric radiator option that incorporates electrically driven fans that produce lower noise than belt or direct driven engine fans. The electric radiator can be mounted external to the sound attenuating enclosure allowing a more efficient means of sound attenuation.

For integration into a shelter or enclosure the Model 8220K-972 offers numerous advantages:

- The air cooled engine disperses the heat all over the shelter or enclosure, additional fans are typically required to scavenge the hot air and remove it from the enclosure. The fluid cooled generator can make use of the radiator and fan to direct the heat away from the enclosure. Enclosures for the 8220K-972 typically operates at 4-7°C over the ambient air temperature. Typical air cooled generators operate at 16-33°C over ambient, which greatly lowers the reliability of the batteries and control electronics.
- For sites with very cold weather conditions the problem with air cooled generators is that the air flow volume is not easily controllable and too much cold air is brought into the shelter. The 8220K-972 can have its radiator installed exterior to the shelter, so only a minimum volume of air needs to enter the shelter.
- Too much air flow into the shelter can be a maintenance problem in dusty and sandy environments, another advantage to installing the radiator outside the shelter.
- In hot weather if the electric radiator is installed inside the shelter the fans can cool the shelter without requiring additional fans. This is an advantage in removing the heat from the engine after it cycled off (thermal lag).

Additional Information

The Kubota 972 engine service is readily available for throughout the world. Propane fueled generator sets are supplied with vapor withdraw carburetion. Liquid withdraw is available at an additional cost. Fuel tanks are not supplied and can be obtained from your local propane supplier.

To configure a DC Generator system we start with the DC generator then add the accessories as the application requires including: engine monitoring, load battery monitoring, communication options, enclosure or frame, cooling system, extended lubrication system, etc.

Accessories

Electric Solenoid Valve

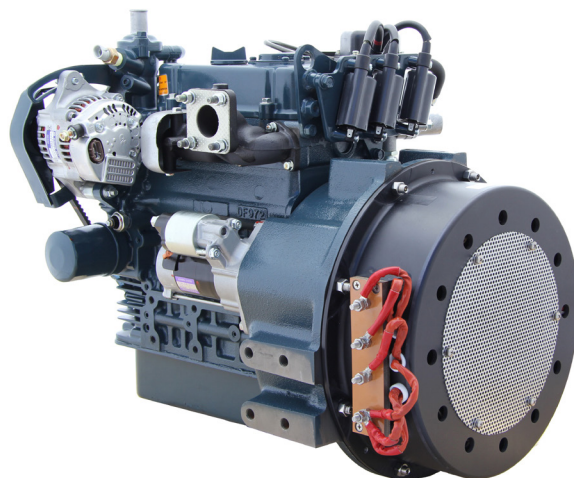
To shut down the generator we first turn off the fuel then the ignition; this helps to prevent backfire (unburned gas entering the hot muffler and exploding). We use one valve in the system and choose between a high pressure valve placed before the high to low pressure regulator or a low pressure valve placed after the high to low pressure regulator.

Oil Refining Pack Filter (option)

This is a bypass filter that processes a partial flow of oil to remove particles in the sub-micron level. This filter is also effective in removing moisture that the oil absorbs from the combustion process and marine air. This option can extend the standard oil sump maintenance interval from 200 hours to 400 hours using synthetic lubricants

Extended Oil Sump (option)

Polar manufactures a 16 liter Oil sump conversion extending the oil maintenance period to once a year or 3,000 hours whichever occurs first. With 16 L of oil the use of an automatic oil adder is not required and the lubrication system is simplified. The oil refining pack is recommended with the 16L sump to remove moisture from the oil due to the possibility of the oil operating at lower temperatures and retaining moisture.



Fluid Cooled Alternator

This option allows the alternator to run more efficiently when installed inside compartments with poor air circulation. We recommend air cooling over fluid cooling because it makes a simpler system.

Oil Cooler

This option is used for generators installed in poorly ventilated compartments and provides additional cooling to the engine through oil.

24 Vdc Generator Electrical System

This option upgrades the starter to 24 Vdc.

24 Vdc Starting Battery Alternator

Standard alternator voltage is 12 Vdc. In special applications it may be desirable to upgrade the engine alternator to 24 Vdc for charging the starter battery. In most applications the starter battery charging is accomplished through a DC to DC power supply and the belt driven alternator is eliminated or serves as an idler pulley.

Super Capacitor to replace Starting Battery.

The starting battery is the number one failure point on generator starting. We see three problems with starting batteries:

- They are popular targets for theft.
- Upon replacement many operators choose an unreliable (but convenient) battery.
- Reliability is compromised at low and high temperatures

The super capacitor performs well at temperatures ranging from -40°C to 65°C. The super capacitor should provide a minimum of 10 years of service or a 500,000 start cycles. The super capacitor charged from the load battery using a DC-DC converter.

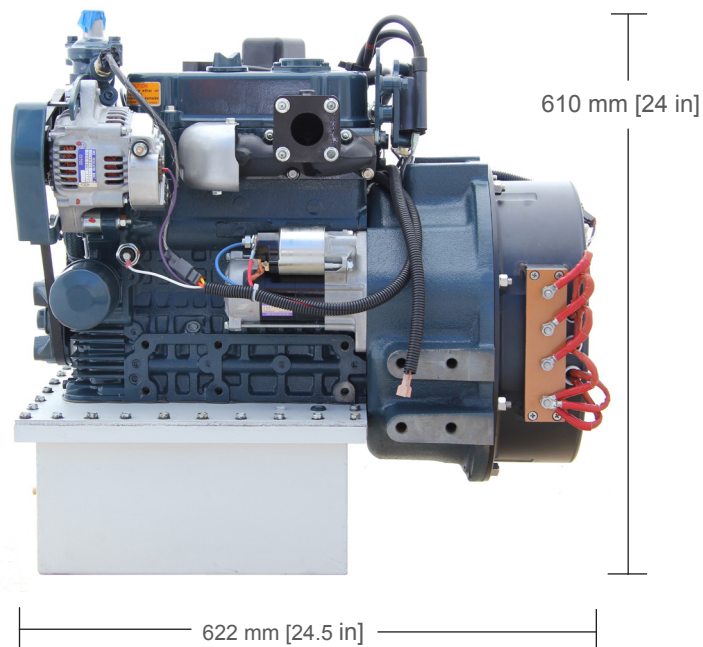
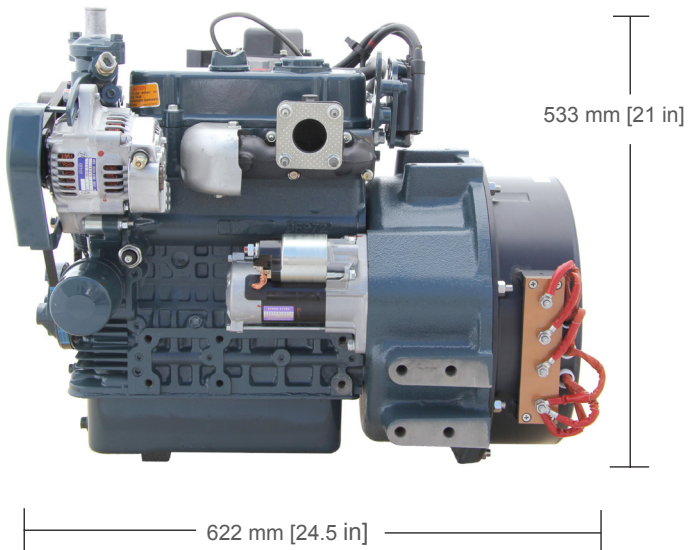
Additional Information

For details regarding engine, alternator, and battery monitoring and control options please see Polar Power's data sheets on the Supra Control System.

There are also specific data sheets on Output Power Filters, Electric Radiator, Frames and Enclosures, Lubrication, and Starting Accessories.

For engine speeds verses electrical loads please see Polar Power's Alternator data sheets.

Engine Dimensions



Engine Specifications

| 8220K-972 | |
|--|---|
| Ratings kW (continuous) | 10 kW @ 2600 rpm |
| Output DC voltage | 24 - 500 |
| Engine | Kubota 972 |
| Cylinders | 3 in-line |
| Cylinder Volume | .972 Liter |
| Weight - 3.7 Liter Oil (dry) | 126 kg [277 lb] |
| Weight - 16 Liter Oil (dry) | 137 kg [302 lb] |
| Coolant Capacity | 1.8 Liter |
| Oil Capacity | 3.7 Liter (optional 16 Liter) |
| Operating Temperature (Ambient/Compartment) | -40C° to 72°C |
| Fuel Consumption, (apprx) | 396g/kWhr |
| Dimensions - 3.7 Liter Oil | Length: 622 mm [24.5 in] Width: 457 mm [18 in] Height: 533 mm [21 in] |
| Dimensions - 16 Liter Oil | Length: 622 mm [24.5 in] Width: 457 mm [18 in] Height: 610 mm [24 in] |

Engine Specifications (cont.)

- Fuel - Propane (LPG) or Natural Gas
- Engine Type - 4 cycle, 3 cylinder, in-line, liquid cooled
- Cylinder Head - Single piece casting, aluminum
- Cylinder Block and Camshaft - Mono-block, three cylinder, cast iron
- Camshaft - Carbon steel
- Connecting Rod - Carbon steel
- Piston Pin Bearing - Machined, piston pin, press fit
- Crankpin Bearing - Replaceable insert, aluminum
- Piston - Heat resistant aluminum alloy
- Compression ring - Two, chrome plated
- Oil Ring - One, combination type, chrome plated
- Lubricating Method - Pressure lube
- Oil Pump - Trochoid, gear drive
- Alternator - 40 Amp DC output, internally regulated
- Starter - 12 Volt, solenoid activated bendix drive
- Ignition - 12 Volt, transistorized

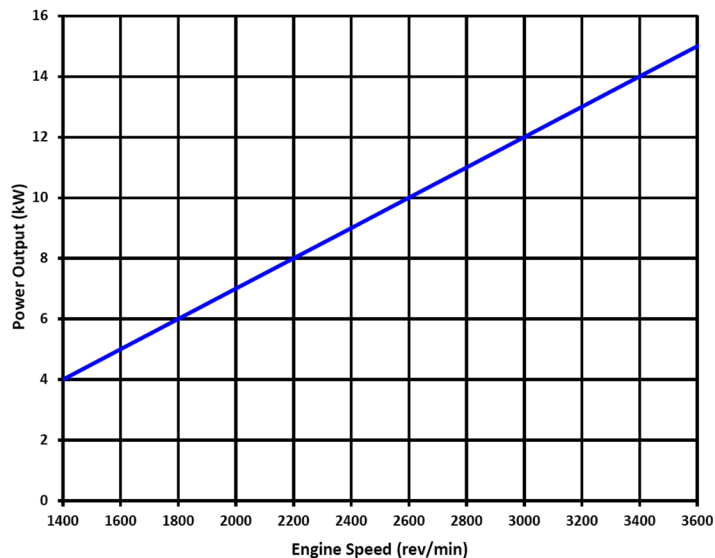
Limited Warranty

Polar Power Inc. (hereinafter "Polar"), hereby warrants goods manufactured and sold by it to be free from defects in material and workmanship for 24 months after the date of shipment.

The warranty is limited to repair or replacement at 249 E. Gardena Blvd, Carson, CA 90248 or other point designated by Polar of such parts as they appear to Polar, upon inspection, to be defective in material or workmanship. This warranty is extended to the first user only and no warranty is made or authorized to be made assignable on resale by the first end user.

The above warranty includes a pass-through warranty from the engine and controller manufacturers for whatever period and warranty is in effect by the manufacturer at that time. The above warranty only extends to applications and installations which are approved by mutual agreement between Polar and the first end users.

To obtain performance of any obligation under this warranty, contact must be made with Polar in writing at 249 E. Gardena Blvd, Carson, CA 90248. Submission of a claim does not obligate Polar to accept such claim in full or in part.



Generator must be derated for Fuel, Altitude and Temperature.

3% Derate for every 300 m (1000 ft) above 91 m (300 ft)
1% Derate for every 5.6 C (10 F) above 25 C (77 F).

No bills for service, labor or other expenses that have not been previously approved and authorized by Polar will be allowed.

No goods or materials may be returned until authorized in writing by Polar and, where the return of the material is authorized, it shall be F.O.B. to whatever point Polar designated within the U.S.A.

Repairs or alterations made to the goods without Polar written concurrence or the operation of the goods in excess of rated capacity will invalidate this warranty.

There is no implied warranty or condition of merchantability. There is no other warranty or condition expressed or implied, statutory or otherwise, except such as is expressly set forth herein. Neither Polar nor manufacturers will be liable for any general, consequential or incidental damages, including without limitation any damages for loss of use or loss of profits, for any breach of warranty or condition or for negligence; Polar's and manufacturer's liability and the buyer's exclusive remedy being expressly limited to the repair or replacement of the goods sold by polar as provided herein.