Basic technical data

Number of cylinders: 4
Cylinder arrangement: Vertical in-line
Cycle: 4 stroke
Induction system: Turbocharged, air to air charge cooled
Compression ratio: 16.7:1
Bore: 105 mm
Stroke: 127 mm
Cubic capacity: 4.399 litres
Direction of rotation: Anticlockwise when viewed from flywheel
Firing order: 1, 3, 4, 2

Estimated total weight of IOPU
Dry: 439 kg
Wet: 448 kg

Overall dimensions
Height: 967 mm
Length: 1280 mm
Width (including mounting brackets): 717 mm

Centre of gravity
Forward from rear of block: 289.0 mm
Above centre line of block: 138.0 mm
Offset to RHS of centre line: -3.0 mm

Moments of inertia
Engine rotational excluding crank pulley and flywheel: 0.124 kgm²
Flywheel: 1.2 kgm²

Performance

Note: All performance data based on operation to ISO Standard reference conditions.
Steady state speed stability at constant load: ±0.25%
Cyclic irregularity at rated power with 1.2 kgm² flywheel: TBA

Test conditions
Air temperature: 25°C
Barometric pressure: 100 kPa
Relative humidity: 30%
Air inlet restriction at rated speed: 3 kPa
Exhaust back pressure at rated speed (nominal): 15 kPa (60Hz)

Sound level
Estimated ElectropaK sound power level @ 1 metre without inlet and exhaust: 105.5 dB(amps)

Note: If the engine is to operate in ambient conditions other than those of the test conditions, suitable adjustments must be made for these changes. For full details, contact Perkins Technical Service Department.

Emissions capability
Certified against the requirements of EU (EU 97/68/EC Stage IIIa) legislation for non-road mobile machinery, powered by constant speed engines.
### General installation

<table>
<thead>
<tr>
<th>Designation</th>
<th>Units</th>
<th>Prime</th>
<th>Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross engine power</td>
<td>kWb</td>
<td>64.7</td>
<td>71.4</td>
</tr>
<tr>
<td>ElectropaK nett engine power</td>
<td>kWm</td>
<td>63.2</td>
<td>69.9</td>
</tr>
<tr>
<td>Brake mean effective pressure</td>
<td>kPa</td>
<td>981</td>
<td>1082</td>
</tr>
<tr>
<td>Combustion air flow (at rated speed)</td>
<td>m³/min</td>
<td>6.02</td>
<td>6.17</td>
</tr>
<tr>
<td>Exhaust gas flow (maximum)</td>
<td>m³/min</td>
<td>13.9</td>
<td>14.48</td>
</tr>
<tr>
<td>Exhaust gas mass flow (maximum)</td>
<td>kg/min</td>
<td>7.15</td>
<td>7.33</td>
</tr>
<tr>
<td>Exhaust gas temperature in manifold maximum</td>
<td>°C</td>
<td>616</td>
<td>644</td>
</tr>
<tr>
<td>Boost pressure ratio</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall thermal efficiency (nett)</td>
<td>%</td>
<td>35.8%</td>
<td>36.2%</td>
</tr>
<tr>
<td>Typical genset electrical output (0.8 pf 25°C)</td>
<td>KVA</td>
<td>68.2</td>
<td>75.0</td>
</tr>
<tr>
<td>Assumed alternator efficiency</td>
<td>%</td>
<td>88.5</td>
<td>88.5</td>
</tr>
</tbody>
</table>

### Energy balance

<table>
<thead>
<tr>
<th>Designation</th>
<th>Units</th>
<th>Prime</th>
<th>Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy in fuel</td>
<td>kWt</td>
<td>180.9</td>
<td>197.3</td>
</tr>
<tr>
<td>Energy to power output (gross)</td>
<td>kWt</td>
<td>64.7</td>
<td>71.4</td>
</tr>
<tr>
<td>Energy to cooling fan</td>
<td>kWm</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Energy to power (nett)</td>
<td>kWm</td>
<td>63.7</td>
<td>70.4</td>
</tr>
<tr>
<td>Energy to exhaust</td>
<td>kWt</td>
<td>62.0</td>
<td>66.9</td>
</tr>
<tr>
<td>Energy to coolant and oil</td>
<td>kWt</td>
<td>43.0</td>
<td>47.1</td>
</tr>
<tr>
<td>Energy to charge cooler</td>
<td>kWt</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Energy to radiation</td>
<td>kWt</td>
<td>11.2</td>
<td>11.9</td>
</tr>
</tbody>
</table>
**Cooling system**

**Cooling pack**

- Overall weight (wet): 71.0 kg
- Overall face area of matrix: 0.27 m²
- Width of matrix: 550 mm
- Height of matrix: 762 mm

**Radiator**

- Face area: 0.27 m²
- Number of rows and material: 2.0 rows, Aluminium
- Matrix density and material: 12.7 fins per inch, Aluminium
- Width of matrix: 526.2 mm
- Height of matrix: 524.2 mm
- Pressure cap setting (minimum): 110 kPa

**Fan**

- Diameter: 457.2 mm
- Drive ratio: 1.25:1
- Number of blades: 7
- Blade Material: Composite
- Type: Pusher

**Coolant**

- Total system capacity: 16.5 litres
- Coolant pump drive: Gear
- Coolant pump drive ratio: 2:1
- Maximum top tank temperature: 110°C
- Temperature rise across engine (rating dependent): 6.6 - 7.0°C
- Thermostat operation range: 82 - 97°C

**Recommended coolant**: 50% ethylene glycol with a corrosion inhibitor (BS 658:1992 or MOD AL39) and 50% clean fresh water.

**Duct allowance with 50% glycol @ 1800°C**

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>kPa</th>
<th>m³/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>0</td>
<td>120.0</td>
</tr>
<tr>
<td>50</td>
<td>120</td>
<td>112.5</td>
</tr>
<tr>
<td>46</td>
<td>200</td>
<td>108.0</td>
</tr>
</tbody>
</table>

**Cold start recommendation**

<table>
<thead>
<tr>
<th>Minimum required cranking speed over TDC 60 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to -10°C</td>
</tr>
<tr>
<td>Oil</td>
</tr>
<tr>
<td>10W40</td>
</tr>
<tr>
<td>Starter</td>
</tr>
<tr>
<td>Battery</td>
</tr>
<tr>
<td>Cranking current</td>
</tr>
<tr>
<td>Aids</td>
</tr>
<tr>
<td>Minimum mean cranking speed</td>
</tr>
</tbody>
</table>

**Note**: Battery capacity is defined by the 20 hour rate.

**Fuel system**

- Type of injection: Direct
- Fuel injection pump: Common rail
- Fuel atomiser: Unit injector / multi-hole
- Nozzle opening pressure: 160 MPa
- Maximum allowable fuel temperature: 80°C
- Fuel lift pump delivery: 200 l/h

**Fuel lift pump**

- Maximum flow through customer filter: 130 litres/hour
- Maximum fuel supply restriction at lift pump: 40 kPa
- Maximum fuel return restriction @ low idle: 50 kPa
- Maximum fuel return flow: 6.6 m³/min
- Maximum suction head: 17 kPa (1.7 m)
- Maximum static pressure head: 10 kPa (1.0 m)
- Governor type: Control by ECM
- Speed control to: ISO 8528, G3

**Fuel specification**

- USA Fed Off Highway EPA2D 89.330-96
- Density (kg/l @ 15°C): 0.8373
- Viscosity (mm²/s @ 40°C): 0.8373
- Sulphur Content: 0.02
- Cetane Number: 53.8

**Fuel consumption litres/hour**

<table>
<thead>
<tr>
<th>Power Rating</th>
<th>110%</th>
<th>100%</th>
<th>75%</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.66</td>
<td>18.02</td>
<td>15.71</td>
<td>11.36</td>
<td></td>
</tr>
</tbody>
</table>
Electrical system

- Alternator type: 8SI
- Alternator voltage: 12 volts
- Alternator output: 65 amps
- Starter motor type: AZE
- Pull-in and hold-in current of starter motor solenoid @ 20°C maximum: 68 amps at 12 volts
- Hold-in current of starter motor solenoid @ 20°C maximum: 20 amps at 12 volts
- Engine stop method: Hardware input to engine ECM

Exhaust system

- Maximum back pressure: 15 kPa
- Exhaust outlet size: 64 mm
- Crankcase breathing system type: Open circuit

Induction system

- Maximum air intake restriction:
  - Clean filter: 3 kPa
  - Dirty filter: 5 kPa
  - Air filter type: 2 stage cyclonic/paper element

Load acceptance

<table>
<thead>
<tr>
<th>Prime power %</th>
<th>Transient frequency deviation %</th>
<th>Frequency recovery time seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>6.2</td>
<td>1.1</td>
</tr>
</tbody>
</table>

- The above complies with the requirements of classifications 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5
- The above figures were obtained under test conditions as follows:
  - Minimum engine block temperature: 45°C
  - Alternator efficiency: 90%
  - Ambient temperature: 15°C
  - Governing mode: Isochronous
  - Mechanical governing: 4% ±1%
  - Alternator inertia: 8 kgm²
  - Flywheel inertia: 14 kgm²
  - Under frequency roll off point (UFRO) set to: 0 Hz below rated UFRO rate set to: 2% voltage / 1% frequency
  - LAM on/off: Off

All tests were conducted using an engine which was installed and serviced to Perkins Engines Company Limited recommendations.

Mountings

- Maximum static bending moment at rear face of block: 791 N
- Flywheel housing: SAE3

Lubrication system

- Lubricating oil capacity total system: 8.4 litres
- Maximum sump capacity: 6.9 litres
- Minimum sump capacity: 5.6 litres
- Maximum engine operating angles:
  - Front up, front down, right side or left side: 24°

Lubricating oil pressure

- Relief valve opens pressure: 0.415 kPa
- Pressure at maximum no-load speed: 0.470 kPa
- Oil temperature (continuous operation): 125°C
- Oil temperature (maximum intermittent operation): 135°C
- Oil consumption at full load as a % of fuel consumption: 0.10%

Recommended SAE viscosity

- A single or multigrade oil must be used which conforms to API-CC/SE or CCMC-D1, see illustration below:
- Recommended oil specification: CH4
1104D-E44TG1 ElectropaK - rear view