## Basic technical data

- Number of cylinders: 3
- Cylinder arrangement: Vertical in-line
- Cycle: Four stroke
- Induction system: Turbocharged
- Compression ratio: 17.25:1
- Bore: 105 mm (4.13 in)
- Stroke: 127 mm (4.99 in)
- Cubic capacity: 3.3 litres
- Direction of rotation: Clockwise view from front
- Firing order: 1, 2, 3

### Weight of Genset (engine only)

- Dry: 420 kg
- Wet: 438 kg

### Overall dimensions

- Height: 951 mm (37.44 inches)
- Length: 1049 mm (41.29 inches)
- Width (including mounting brackets): 634 mm (24.96 inches)

### Moment of inertia

- Engine:
  - Longitudinal: 25 kgm²
  - Horizontal: 42 kgm²
  - Axial: 25 kgm²
- Flywheel (polar): 1.14 kgm²

### Centre of gravity (wet)

- Forward from rear of block: 215 mm (8.46 inches)
- Above centre line of block: 120 mm (4.72 inches)
- Offset of RHS of centre line: 25 mm (0.98 inches)

## Performance

**Steady state speed stability at constant load:** G2 ± 0.75%

**Note:** All data based on operation to ISO 3046/1, BS 5514 and DIN 6271 standard reference conditions.

### Test conditions

- **Air temperature:** 25°C
- **Barometric pressure:** 100 kPa
- **Relative humidity:** 30%

### Sound Level

**Overall sound pressure level (cooling pack and air cleaner fitted):**

- @1500 rpm: 89.4 dB(A)
- @1800 rpm: 92.8 dB(A)

**Note:** Sound pressure level from the mean of 4 microphones at the front, left, right and above the engine. Exhaust was piped away out of the test cell.

**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.

### Cyclic irregularity (for engine & flywheel)

#### Prime Power:

- @1500 rpm: ±0.055%
- @1800 rpm: ±0.037%
### General installation

**1103A-33TG2**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Units</th>
<th>Type of operation and application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross engine power</td>
<td>kWm</td>
<td>Prime power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 Hz</td>
</tr>
<tr>
<td>Brake mean effective pressure</td>
<td>kPa (lbf/in²)</td>
<td>1333 (193.3)</td>
</tr>
<tr>
<td>Mean piston speed</td>
<td>m/s (ft/s)</td>
<td>6.35 (20.8)</td>
</tr>
<tr>
<td>ElectropaK nett engine power</td>
<td>kWm</td>
<td>53.8</td>
</tr>
<tr>
<td>Engine coolant flow 35 kPa restriction</td>
<td>litres/min (UK gal/min)</td>
<td>125.5 (27.6)</td>
</tr>
<tr>
<td>Combustion air flow</td>
<td>m³/min (ft³/min)</td>
<td>3.8 (134.1)</td>
</tr>
<tr>
<td>Exhaust gas flow (max.)</td>
<td>m³/min (ft³/min)</td>
<td>10.1 (356.6)</td>
</tr>
<tr>
<td>Exhaust gas temperature (max.) in manifold</td>
<td>°C (°F)</td>
<td>557 (1034.6)</td>
</tr>
<tr>
<td>Cooling fan air flow</td>
<td>m³/min (ft³/min)</td>
<td>89.0 (3134.0)</td>
</tr>
<tr>
<td>Overall thermal efficiency (nett)</td>
<td>%</td>
<td>39.2</td>
</tr>
<tr>
<td>Typical Genset electrical output (0.8pf 25ºC)</td>
<td>kWe</td>
<td>48.0</td>
</tr>
<tr>
<td></td>
<td>kVA</td>
<td>60.0</td>
</tr>
</tbody>
</table>

### Energy balance

<table>
<thead>
<tr>
<th>Designation</th>
<th>Units</th>
<th>Prime power 50 Hz</th>
<th>Standby power 50 Hz</th>
<th>Prime power 60 Hz</th>
<th>Standby power 60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power in fuel (Fuel heat of combustion)</td>
<td>kW (Btu/min)</td>
<td>140.0 (7968.7)</td>
<td>155.0 (8822.5)</td>
<td>167.0 (9509.5)</td>
<td>177.0 (10074.7)</td>
</tr>
<tr>
<td>Power output (gross)</td>
<td>kW (Btu/min)</td>
<td>55.0 (3130.5)</td>
<td>60.5 (3443.6)</td>
<td>63.3 (3603.0)</td>
<td>66.5 (3898.9)</td>
</tr>
<tr>
<td>Power to cooling fan</td>
<td>kW (Btu/min)</td>
<td>1.2 (68.3)</td>
<td>2.1 (119.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power output (nett)</td>
<td>kW (Btu/min)</td>
<td>53.8 (3062.2)</td>
<td>59.3 (3375.3)</td>
<td>61.2 (3483.4)</td>
<td>66.4 (3779.4)</td>
</tr>
<tr>
<td>Power to coolant and lubricating oil</td>
<td>kW (Btu/min)</td>
<td>35.0 (1992.1)</td>
<td>38.0 (2162.9)</td>
<td>41.0 (2333.7)</td>
<td>43.0 (2447.5)</td>
</tr>
<tr>
<td>Power to exhaust</td>
<td>kW (Btu/min)</td>
<td>41.0 (2333.7)</td>
<td>46.0 (2618.3)</td>
<td>52.0 (2959.8)</td>
<td>54.0 (3073.6)</td>
</tr>
<tr>
<td>Power to radiation</td>
<td>kW (Btu/min)</td>
<td>10.0 (569.1)</td>
<td>11.0 (626.1)</td>
<td>11.0 (626.1)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The airflows shown in this table will provide acceptable cooling for an open power unit operating in ambient temperatures of up to 53 °C (127 °F) or 46 °C (114.8 °F) if a canopy is fitted. If the power unit is to be enclosed totally, a cooling test should be done to check that the engine cooling is acceptable. If there is insufficient cooling, contact Perkins Technical Service Department.
Cooling system

**Radiator**
- Face area: 0.276 m² (2.97 ft²)
- Rows and materials: Single row aluminium
- Matrix density and material: Aluminium, 12.5 fins/inch
- Width of matrix: 526 mm (20.7 inches)
- Height of matrix: 524 mm (20.6 inches)
- Pressure cap setting: 107 kPa

**Fan**
- Diameter: 457 mm (18 in)
- Drive ratio: 1.25:1
- Number of blades: 7
- Material: Composite
- Type: Pusher

**Coolant**
- Recommended coolant: 50% ethylene glycol with a corrosion inhibitor (BS 658:1992 or MOD AL39) and 50% clean fresh water.
- Total system capacity:
  - With radiator: 10.2 l (21.5 pt)
  - Without radiator: 4.4 l (9.2 pt)
- Maximum top tank temperature: 110 °C (230 °F)
- Thermostat operating range: 82 - 93 °C (180 - 199 °F)

Lubrication system

**Lubricating oil capacity**
- Total system: 8.3 litres (17.5 pt)
- Sump minimum: 6.2 litres (13.1 pt)
- Sump maximum: 7.8 litres (16.4 pt)
- Maximum engine operating angles:
  - Front up, front down, right side or left side: 25°

**Lubricating oil pressure**
- Relief valve opens: 415 - 470 kPa
- - at maximum no-load speed: 276 - 414 kPa
- Max continuous oil temperature (in rail): 125 °C (257 °F)
- Oil consumption at full load as a % of fuel consumption: 0.15%

Exhaust system

**Maximum back pressure**
- 1500 rpm: 10 kPa
- 1800 rpm: 15 kPa
- Exhaust outlet size: 56 mm (2.2 inches)

Fuel System

**Type of injection**
- Direct

**Fuel injection pump**
- Rotary

**Fuel atomiser**
- Multi-hole

**Nozzle opening pressure**
- 29 MPa (290 bar)

**Fuel lift pump**
- Type: Mechanical
- Flow/hour: 120 - 150 litres/h (211 - 264 pt/m)
- Pressure: 30 - 75 kPa (4.4 - 10.9 psi)
- Maximum suction head: 20 kPa

**Governor type**
- Mechanical speed control to ISO 8528, G2

**Fuel specification**

<table>
<thead>
<tr>
<th>Fuel Specification</th>
<th>European RF75-T-96 / DIN EN590 / BS2869 class A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (kg/l @ 15 °C)</td>
<td>0.835 - 0.845</td>
</tr>
<tr>
<td>Viscosity (mm²/s @ 40 °C)</td>
<td>2.5 - 3.5</td>
</tr>
<tr>
<td>Sulphur content (%)</td>
<td>0.1 - 0.2</td>
</tr>
<tr>
<td>Cetane number</td>
<td>45 - 50</td>
</tr>
</tbody>
</table>

**Fuel consumption litres/hour (UK gals/hr)**

<table>
<thead>
<tr>
<th>Speed</th>
<th>110%</th>
<th>100%</th>
<th>75%</th>
<th>50%</th>
<th>25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Litres</td>
<td>15.9</td>
<td>14.6</td>
<td>10.8</td>
<td>7.56</td>
<td>4.2</td>
</tr>
<tr>
<td>SFC</td>
<td>216.8</td>
<td>217.7</td>
<td>215.4</td>
<td>224</td>
<td>252</td>
</tr>
</tbody>
</table>

Induction system

**Maximum air intake restriction**
- Clean filter: 5 kPa
- Dirty filter: 8 kPa
- Air filter type: Dry

**Perkins Engines Company Limited**
Peterborough, PE1 5FQ, United Kingdom
Tel: +44 (0)1733 583000
Fax: +44 (0)1733 582240
www.perkins.com
Electrical system

Type: Negative ground
Alternator voltage: 12 volts
Alternator output: 65 amps
Starter motor voltage: 12 volts
Starter motor power: 3 kW
Number of teeth on flywheel: 126
Pull in current of starter motor solenoid: 60 amps
Hold in current of starter motor solenoid: 15 amps
Engine stop solenoid: 12 volts
Stop solenoid (minimum):
  Pull in current: 10 amps
  Hold in current: 10 amps

Cold start recommendations
Minimum cranking speed: 105 rpm

Starter specification

<table>
<thead>
<tr>
<th>Starter motor type</th>
<th>Min. starting temp. °C (°F)</th>
<th>Lubricating oil viscosity SAE / battery type - values in CCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 volt 3.0 kW</td>
<td>-10 (14)</td>
<td>1 x 660</td>
</tr>
<tr>
<td></td>
<td>-15 (5)*</td>
<td>1 x 660</td>
</tr>
<tr>
<td></td>
<td>-20 (-4)*</td>
<td>1 x 660</td>
</tr>
<tr>
<td></td>
<td>-25 (-13)*</td>
<td>2 x 570</td>
</tr>
</tbody>
</table>

* Start aid required

Note: CCA - Cold Cracking Amps to SAEJ537.
Note: Battery capacity is defined by the 20 hour rate.
Note: If a change to a low viscosity oil is made, the cranking torque necessary at lower ambient temperatures is much reduced. The starting equipment has been selected to take advantage of this. It is important to change the appropriate multigrade oil in anticipation of operating in low ambient temperatures.

Cold start recommendations
Minimum cranking speed: 105 rpm

Recommended SAE viscosity

A single or multigrade oil must be used which conforms to API-CG4 / CH4, see illustration below.

Mountings
Maximum static bending moment at rear face of block...791 Nm (583 lb/ft)

Load acceptance

Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Units</th>
<th>1500 rpm</th>
<th>1800 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime power</td>
<td>%</td>
<td>85</td>
<td>95</td>
</tr>
<tr>
<td>Load</td>
<td>kWm (kWe)</td>
<td>46.8 (40.7)</td>
<td>60.1 (51.7)</td>
</tr>
<tr>
<td>Frequency deviation</td>
<td>%</td>
<td>&lt; -10</td>
<td>&lt; -10</td>
</tr>
<tr>
<td>Frequency recovery</td>
<td>Seconds</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
</tbody>
</table>

The above complies with requirements of Classification 3 & 4 of ISO 8528 - 12 and G2 operating limits stated in ISO 8528 - 5.

The above figures were obtained under the test conditions as follows:

- Engine block temperature: 15 °C
- Alternator efficiency: 89%
- Minimum ambient temperature: 15 °C
- Isochronous governing

Typical alternator inertia: 0.496 kgm²

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

The information given in this document is for guidance only.
1103A-33TG2 - Rear side view