ENGINE DATASHEET

TEKSAN

400 Series 403D-11G ElectropaK

11.4 kWm @ 1800 rpm

The Perkins® 400 Series engine family continues to set new standards in the compact engine market. Developed alongside customers to fulfill their needs in the generator set, compressor, agricultural and general industrial markets.

The 400D range of ElectropaKs has been designed to fully comply with stringent EU emissions regulations, providing an emissions compliant power solution for the future

These ElectropaKs provide compact power, from a robust family of 3 and 4 cylinder diesel engines designed to provide economic and durable operation at prime and standby duties, hitting the key power nodes required by the power generation industry.

Emissions statement

Constant Speed Engines for use in Industrial, IOPU and ElectropaK applications: Certified against the requirements of EU Stage IIIA (Directives 97/68/EC, as last amended, for mobile applications).

Specification		
Number of cylinders	3 vertical in-line	
Bore and stroke	77 x 81 mm	3 x 3.2 in
Displacement	1.131 litres	69 in^3
Aspiration	Naturally aspirated	
Cycle	4 stroke	
Combustion system	Indirect injection	
Compression ratio	23:1	
Rotation	Anti-clockwise, viewed on flywheel	
Total lubricating capacity	4.9 litres	1.3 US gal
Cooling system	Water cooled	
Total coolant capacity	5.2 litres	1.4 US gal

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Perkins®

THE HEART OF EVERY GREAT MACHINE

400 Series 403D-11G ElectropaK

11.4 kWm @ 1800 rpm

Features and benefits

Powered by your needs

- The 403D-11G ElectropaK is a powerful but quiet 1.1 litre naturally aspirated 3-cylinder compact package

Compact, clean, efficient power

- Design features on the 400D range of ElectropaKs ensures clean rapid starting in all conditions whilst delivering impressive performance with low operating costs in a small, efficient package size

Lower operating costs

- Approved for operation on biodiesel* concentrations of up to 20%
- Oil and filter changes are 500 hours, dependent on load factor
- Engine durability and reliability, the warranty offering and ease of installation combine to drive down the cost of ownership
- Warranties and Service Contracts

  We provide one-year warranties for constant speed engines and two-year warranties for variable speed models, as standard. These are supported by multilevel Extended Service Contracts that can be bought additionally
  Discover more: **www.perkins.esc**

Product support

- With highly trained Perkins distributors in thousands of communities in over 180 countries, you are never far away from expert product knowledge, genuine parts and a range of advanced diagnostic technology for keeping your engine in peak condition
- To find your local distributor: **www.perkins.com/distributor**

*Subject to conformance with ASTM D6751 and EN14214

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Technical information

Air inlet

- Mounted air filter

Fuel system

- Mechanically governed cassette type fuel injection pump
- Split element fuel filter

Lubrication system

- Wet steel sump with filler and dipstick
- Spin-on full-flow lub oil filter

Cooling system

- Thermostatically-controlled system with belt driven coolant pump and pusher fan
- Mounted radiator, piping and guards

Electrical equipment

- 12 volt starter motor and 12 volt 15 amp alternator with DC output
- Oil pressure and coolant temperature switches
- 12 volt shut-off solenoid energised to run
- Glow plug cold start aid and heater/starter switch

Flywheel and housing

- High inertia flywheel to SAE J620 Size 6½ Heavy
- Flywheel housing SAE 5 Long

Mountings

- Front and rear engine mounting brackets

Optional equipment

- Parts book

Option groups

A selection of optional items is available to enable you to prepare a specification precisely matched to your needs.

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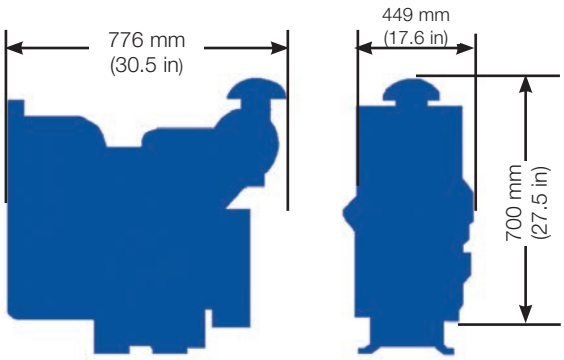
THE HEART OF EVERY GREAT MACHINE

400 Series 403D-11G ElectropaK

11.4 kWm @ 1800 rpm



Engine package weights and dimensions		
Length	776 mm	30.5 in
Width (including mounting brackets)	449 mm	17.6 in
Height	700 mm	27.5 in
Weight (dry)	129.2 kg	284.8 lb

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THE HEART OF EVERY GREAT MACHINE

400 Series 403D-11G ElectropaK

11.4 kWm @ 1800 rpm

Speed rpm	Type of operation	Typical generator output (Net)		Engine power			
				Gross		Net	
		kVA	kWe	kWm	hp	kWm	hp
1800	Prime power	11.2	9.0	10.7	14.3	10.3	13.9
	Standby power	12.4	9.9	11.8	15.8	11.4	15.3

The above ratings represent the engine performance capabilities to conditions specified in ISO 8528/1, ISO 3046/1:1986, BS 5514/1. **Derating may be required for conditions outside these; consult Perkins Engines Company Limited.**

Generator powers are typical and are based on typical alternator efficiencies and a power factor (cos θ) of 0.8. **Fuel specification:** BS 2869: Part 2 1998 Class A2 or ASTM D975 D2.

Rating definitions: Prime power: Power available at variable load in lieu of a main power network. Overload of 10% is permitted for 1 hour in every 12 hours operation. **Standby (maximum):** Power available at variable load in the event of a main power network failure. No overload is permitted.

Percent of prime power	Fuel consumption at 1800 rpm g/kWh	Fuel consumption at 1800 rpm l/hr
Standby power	268	3.6
Prime power	248	3.0
75%	257	2.3
50%	280	1.7

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THE HEART OF EVERY GREAT MACHINE

Technical Data

400 Series 403D-11G

ElectropaK

Basic technical data

Number of cylinders 3
Cylinder arrangement . . . . . Vertical in-line
Cycle . . . . . four stroke
Induction system . . . . . Naturally aspirated
Compression ratio 23:1
Bore . . . . . 77 mm
Stroke . . . . . 81 mm
Cubic capacity . . . . . 1·131 litres
Direction of rotation . . . . anti-clockwise when viewed from flywheel
Firing order 1, 2, 3
Estimated total weight of Electropak (dry) . . . . . 129,2 kg

Overall dimensions of Electropak

-height . . . . . 700 mm
-length . . . . . 776 mm
-width . . . . . 449 mm

Moments of inertia (GD²)

-engine rotational components . . . . . TBA kg m²
-flywheel . . . . . 1,51 kg m²

Centre of gravity (fan face to flywheel housing)

-forward from rear of block . . . . . 98 mm
-above crank centre line . . . . . 67 mm
-offset to RHS of centre line . . . . . 2 mm

Performance

Note: All data based on operation to ISO 3046-1:2002 standard reference conditions

Speed variation at constant load - G2 . . . . . ± 0,75%
Cyclic irregularity
-at 110% stand-by power . . . . . TBA

Test conditions

-air temperature . . . . . 25 °C
-barometric pressure . . . . . 100 kPa
-relative humidity 31.5%
-air inlet restriction at maximum power (nominal) . . . . . 3 kPa
-exhaust back pressure at maximum power (nominal) . . . . . 10,2 kPa
-fuel temperature (inlet pump) . . . . . 40 °C

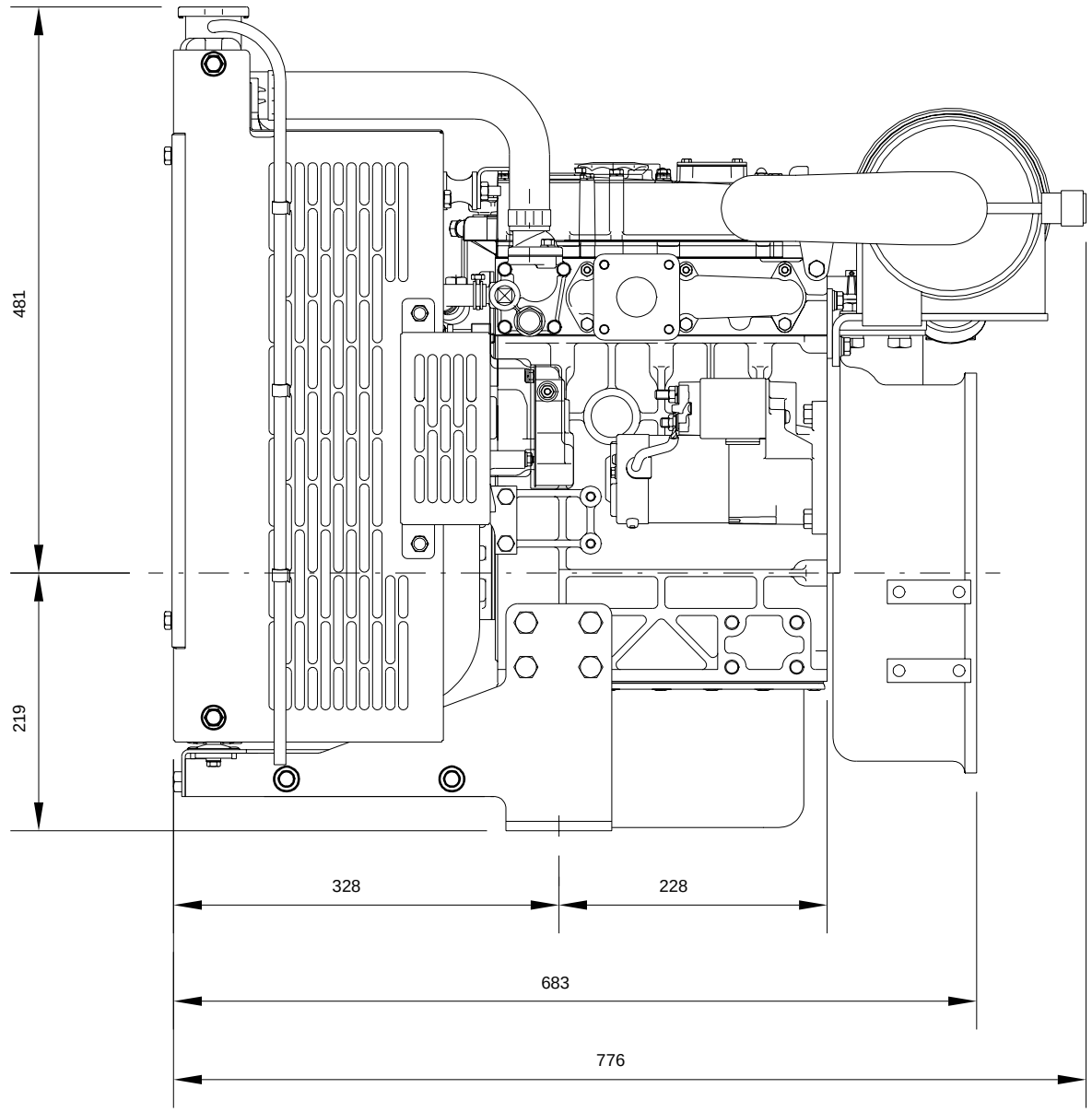
Sound level

Average sound pressure level for bare engine (without inlet and exhaust) at 1 metre . . . . . 78,5 dB(A)
-all ratings certified to within . . . . . ± 5%
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 Statement: Certified against the requirements of EU2007 (EU 97/68/EC Stage II) and EPA Tier 4 (EPA 40 CFR Part 1039 Tier 4 legislation for non-road mobile machinery, powered by constant speed engines

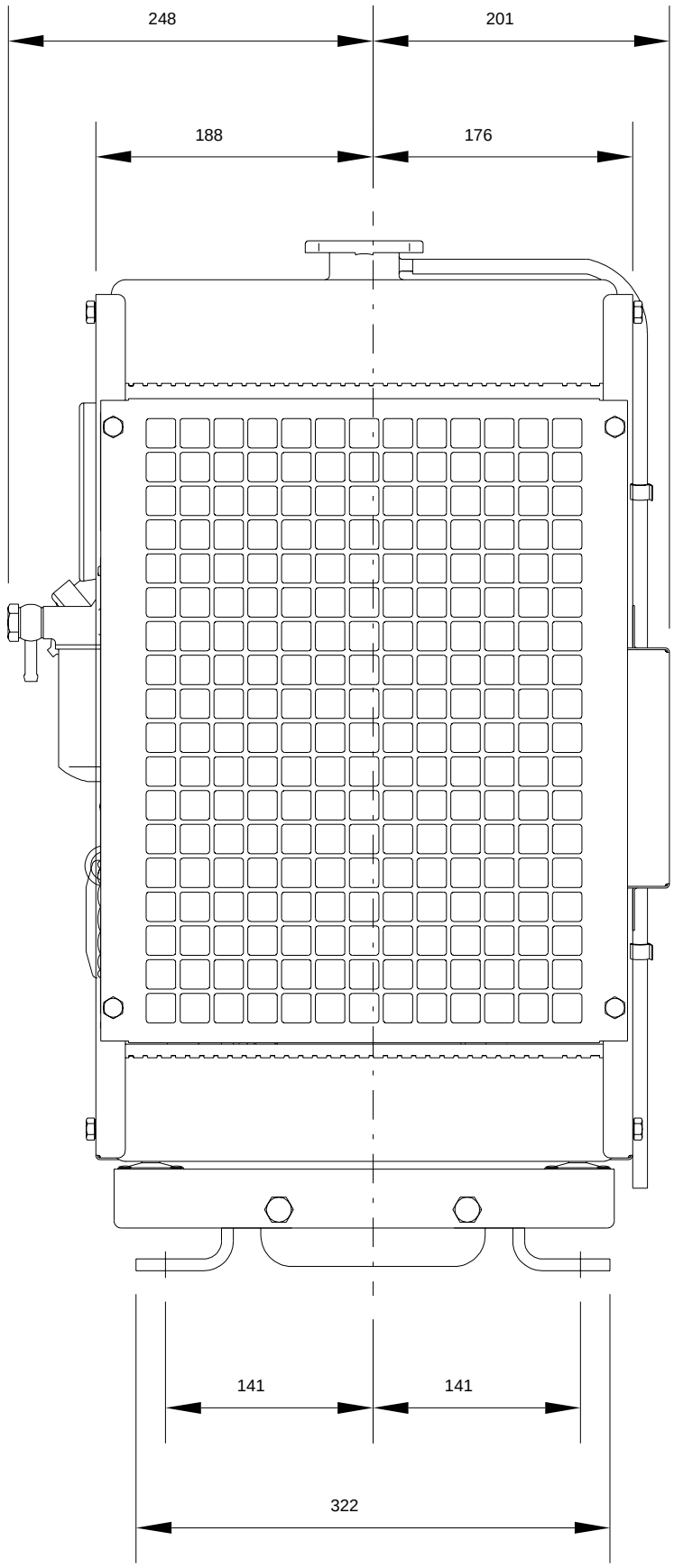
General installation

Designation	Units	Type of operation and application	
		Prime	Stand-by
Gross engine power	kWb	10,7	11,8
ElectropaK net engine power	kWm	10,3	11,4
Brake mean effective pressure	kPa	TBA	TBA
Engine coolant flow (Water Pump Ratio 1.285:1)	l/min	32,5	
Combustion air flow	m³/min	0,9	
Exhaust gas flow (max.)	m³/min	2·21	2,4
Exhaust gas temperature (max.)	°C	437	515
Overall thermal effeciency (nett)	%	32	31
Typical genset electrical output (0.8 pf 25 °C)	kWe	9,0	9,9
	kVA	11,2	12,4
Assumed alternator efficiency	%	87	
Energy balance			
Energy in fuel	kWt	31,8	37,8
Energy in power output (gross)	kWb	10,7	11,8
Energy to cooling fan	kWm	0,4	0,4
Energy in power output (nett)	kWt	10,3	11,4
Energy to coolant and lubricating oil	kWt	10,2	12,1
Energy to exhaust	kWt	8,9	10,8
Energy to radiation	kWt	2,6	3,1

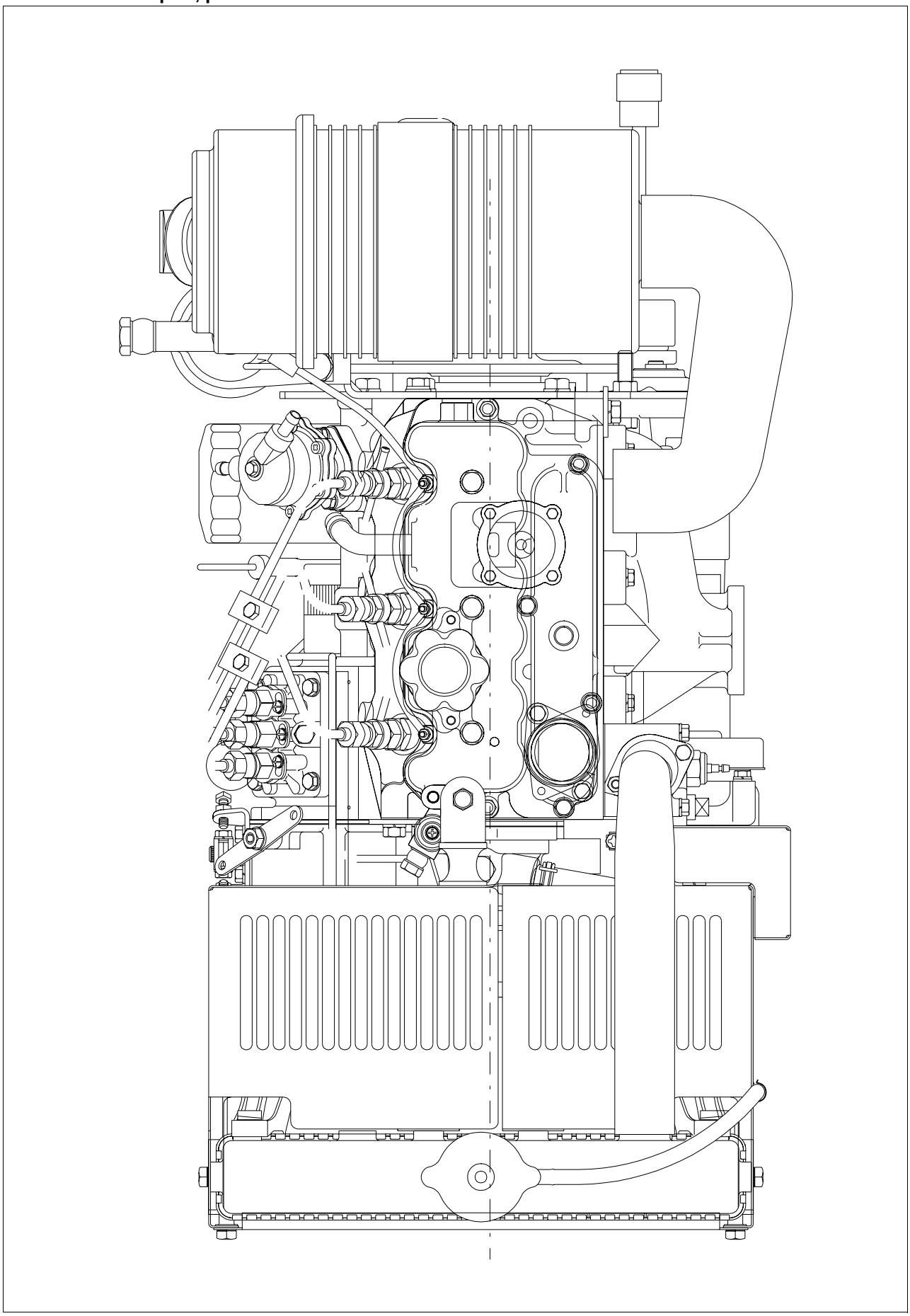
403D-11G ElectropaK, left side view



403D-11G ElectropaK, front view



403D-11G ElectropaK, plan view



Cooling system

Radiator

-face area ... ... .0,147 m²
-rows and materials . ... 2 rows, Aluminium
-matrix density and material ... ... 14,5 FPI, Aluminium
-width of matrix ... ...334 mm
-height of matrix... ... ...440 mm
-pressure cap setting ... ... 90 kPa
Estimated cooling air flow reserve... ... ...0,125 kPa

Fan

-diameter . ... 320 mm
-drive ratio 1,285:1
-number of blades 7
-material... ... ... Plastic
-type. ... ... Pusher

Coolant

Total system capacity
-with radiator ... ... 5,2 litres
-without radiator... ... ... 1,9 litres
Maximum top tank temperature... ... ... 112 °C
Temperature rise across engine.. ... ...TBA °C
Max permissible external system resistance ... ... .TBA kPa
Thermostat operation range ... ... 75 - 87°C
Recommended coolant: 50% anti freeze / 50% water. For complete details of recommended coolant specifications, refer to the Operation and Maintenance Manual for this engine model

Duct allowance

Maximum additional retsriction (duct allowance) to cooling airflow and resultant minimum airflow		
Ambient clearance 50% Glycol	**Duct allowance Pa**	**m³/sec**
53°C	0	0,75
46°C	125	0,59

Electrical System

-alternator ... ... 15 amps, 12 V
-starter motor... ... ... 1,1 kW, 12 V

Cold start recommendations

Minimum cranking speed. ... ...TBA rev/min

Minimum starting temperature	Grade of engine lubricating oil	Battery specifications			
°C		BS3911 Cold start amps	SAEJ537 Cold cranking amps	Number of batteries needed	Commercial ref number
0	20W	340	540	1	069
-15	10W	340	540	1	069
-20	5W	420	590	1	072

Exhaust system

Maximum back pressure... ... ... 10,2 kPa
Exhaust outlet size
-horizontal . ... 34 mm
-vertical . ... 40 mm

Fuel system

Type of injection ... ... Indirect injection
Fuel injection pump... ... ... Cassette type
Fuel injector .. .. Pintle nozzle
Nozzle opening pressure .. ..14·7 MPa

Fuel lift pump

-flow/hour .. .. .63 litres/hr
-pressure... ... ... 10 kPa
Maximum suction head . ... 0,8 m
Maximum static pressure head . ... 3,0 m
Governor type ... ... Mechanical

Fuel specification

USA Fed Off Highway - EPA2D 89.330-96
Europe Off Highway - CEC RF-06-99
Note: For further information on fuel specifications and restrictions, refer to the OMM Fuels section for this engine model

Fuel consumption

Power rating			
g/kWh			
110%	**100%**	**75%**	**50%**
268	248	257	280

Induction system

Maximum air intake restriction

-clean filter ... ...3,0 kPa
-dirty filter . ...6,4 kPa
-air filter type ... ...Dry element type

Lubrication system

Lubricating oil capacity

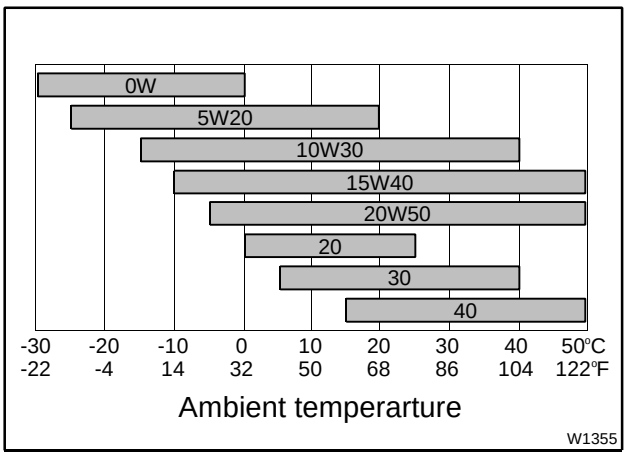
Total system. ... ... .4,9 litres
Minimum... ... ... .3,4 litres
Maximum engine operating angles
-front up, front down, right side or left side... ... . 35° continuous

Lubricating oil pressure

-relief valve opens ... ... 304 - 500 kPa
-at maximum no-load speed. ... ... TBA
Normal oil temperature. ... ... 125 °C
-oil consumption at full load (as a % of fuel consumption)... ... .

Recommended SAE viscosity

A single or multigrade oil must be used which conforms API-CH-4 or ACEA E5.



Maximum static bending moment

at rear face of block.. ... ...500 Nm

Load acceptance

The below complies with the requirements of classification 3 and 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5

Initial load application: When engine reaches rated speed (15 seconds maximum after engine starts to crank)		
Descriptor	**Units**	**60 Hz**
% of prime power	%	tba
Load	kWm (kWe)	tba
Transient frequency deviation	%	
Frequency recovery	Seconds	tba

The above figures were obtained under the following test conditions:
-minimum engine block temperature. ... ... tba °C
-ambient temperature ... ...tba °C
-governing mode ... ... isochronous
-alternator inertia ... ... tba kgm²
-under frequency roll off (UFRO) point set to ... ..1 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.
Note: The general arrangement drawings shown in this data sheet are for guidance only. For installation purposes, latest versions should be requested from the Applications Dept., Perkins Engines Stafford, ST16 3UB United Kingdom.

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