ENGINE DATASHEET

TEKSAN

1100 Series 1104D-44TG1 Diesel Engine – ElectropaK

63 kWm (84 hp) gross standby power @ 1800 rpm

The Perkins® 1104D turbocharged ElectropaKs are the latest addition to the 1100 Series ElectropaK range. Perkins has developed this engine in line with our customer's needs by providing the options of either electronic common rail or mechanically controlled fuel systems.

These ultra clean engines are assembled on a new high technology production line. Frequent computerized checks during the production process ensure high build quality is maintained throughout.

Perkins has produced a world-class product for their customers, engineered to give even greater levels of reliability, yet with a lower cost of ownership.

Emissions

Certified against the requirements of U.S. EPA Tier 3 legislation for non-road mobile machinery, powered by constant speed engines (EPA 40 CFR Part 89 Tier 3).

Specification		
Number of cylinders	4 vertical in-line	
Bore and stroke	105 x 127 mm	4.1 x 5.0 in
Displacement	4.41 litres	269 in^3
Aspiration	Turbocharged	
Cycle	4 stroke	
Combustion system	Direct injection	
Compression ratio	18.2:1	
Rotation	Anti-clockwise, viewed on flywheel	
Total lubricating capacity	8.4 litres	2.2 US gal
Cooling system	Water-cooled	
Total coolant capacity	16.5 litres	4.4 US gal

www.perkins.com

Photographs are for illustrative purposes only and may not reflect final specification.
All information in this document is substantially correct at time of printing and may be altered subsequently.
Final weight and dimensions will depend on completed specification.

Publication No. PN1908/05/15 Produced in England

Perkins®

THE HEART OF EVERY GREAT MACHINE

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Features and benefits

Powered by your needs

- Hitting the key power nodes required by the market, the 1104D-44TG1 ElectropaK has been developed to provide a clean and cost effective power solution

State of the art design

- The 1104D utilises the latest diesel mechanical controlled fuel system technology. This allows the 1104D-44TG1 to deliver high power density and excellent fuel economy with low exhaust emissions and minimum heat rejection

Worldwide power solution

- The 1104D has been designed to be worldwide fuel tolerant, and 5% biofuel (RME) options are available to meet local market needs

Lower operating costs

- The 1104D maintains Tier 2 fuel economy. This will allow many customers to keep existing fuel tanks, avoiding the need for costly redesign. Service intervals are set at 500 hours as standard
- 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
- Low usage warranty package is also available

Long-term power solution

- The 1104D-44TG1 ElectropaK has been designed to fully comply with stringent EPA Tier 3 emissions regulations, providing an emissions compliant power solution for the future

Product support

- Perkins actively pursues product support excellence by ensuring our distribution network invest in their territory – strengthening relationships and providing more value to you, our customer
- Through an experienced global network of distributors and dealers, fully trained engine experts deliver total service support around the clock, 365 days a year. They have a comprehensive suite of web based tools at their fingertips covering technical information, parts identification and ordering systems, all dedicated to maximising the productivity of your engine
- Throughout the entire life of a Perkins engine, we provide access to genuine OE specification parts and service. We give 100% reassurance that you receive the very best in terms of quality for lowest possible cost .. wherever your Perkins powered machine is operating in the world
- To find your local distributor: www.perkins.com/distributor

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63 kWm (84 hp) gross standby power @ 1800 rpm

Technical information

Air inlet

- Mounted air filter and turbocharger

Fuel system

- Rotary type pump
- Fuel filter

Lubrication system

- Wet cast iron sump with filler and dipstick
- Oil filter

Cooling system

- Belt-driven pusher fan and guards
- Mounted radiator and piping
- Water pump

Electrical equipment

- 12 volt starter motor and 12 volt 65 amp alternator with DC output

Flywheel and housing

- High inertia flywheel to SAE J620 size 10/11
- SAE 3 flywheel housing

Starting aids

- Glow plugs

Literature

- User's Handbook

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THE HEART OF EVERY GREAT MACHINE

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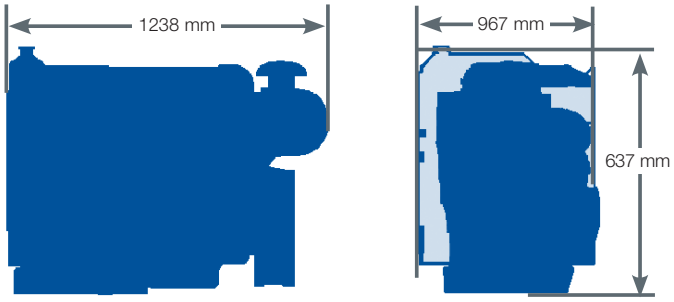

Engine package weights and dimensions		
Length	1238 mm	48.7 in
Width	967 mm	38.0 in
Height	637 mm	25.0 in
Weight (dry)	474 kg	1045 lb

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63 kWm (84 hp) gross standby power @ 1800 rpm

Speed rpm	Type of operation	Typical generator output (Net)		Engine power			
				Gross		Net	
		kVA	kWe	kWm	hp	kWm	hp
1800	Standby power	70.9	56.7	64	86	63	85

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 of 0.8. **Fuel specification**: BS 2869 Class 2 or ASTM D975 D2. **Lubricating oil**: API CH4/ACEA E5.

Rating definitions

Prime power: Power available at variable load in lieu of a main power network. Overload of 10% permitted for 1 hour in every 12 hours operation.
Standby power: Power: available at variable load in the event of a main power network failure. Maximum use 500 hours per year. No overload is permitted.

Percent of prime power	Fuel consumption at 1800 rpm g/kWh	Fuel consumption at 1800 rpm l/hr
Standby power	243	18.7
Prime power	240	16.6
75%	248	12.8
50%	260	9
25%	300	5.2

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THE HEART OF EVERY GREAT MACHINE

1104D-44TG1

1100 Series

64.0 kWm (Gross) @ 1800 rpm

ElectropaK

Basic technical data

Number of cylinders 4
Cylinder arrangement . . . . . In-line
Cycle . . . . . 4 stroke
Induction system . . . . . Turbocharged
Combustion system . . . . . Direct injection diesel
Compression ratio 18,2:1
Bore . . . . . 105 .0mm
Stroke . . . . . 127.0 mm
Cubic capacity . . . . . 4,4 litres
Direction of rotation . . . . . Anticlockwise when viewed from flywheel
Direction of rotation . . . . . Clockwise when viewed from front
Firing order (number 1 cylinder furthest from flywheel) . . . 1, 3, 4, 2
Estimated total weight of Electropak (dry) . . . . . 474 kg

Overall dimensions

-height, including radiator support brackets . . . . . 967 mm
-length, front of radiator to rear of air cleaner . . . . . 1238 mm
-width . . . . . 637 mm

Moments of inertia (mk²)

Engine rotational inertia (excluding, pulley, flywheel) . . 0.132 kgm²
Crank pulley inertia (dependant on option code) . . . Refer to ESM
Flywheel inertia (dependant on option code) . . . . . 1.2 kgm²

Centre of gravity - Electropak

Forward from rear of block - wet . . . . . 227.2 mm
Above crankshaft centre line - wet . . . . . 160.4 mm
Offset to RHS of crankshaft centre line - wet . . . . . 8.1 mm

Performance

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

All ratings certified to within . . . . . + 5%
Speed variation at constant load . . . . . + 0,25%
Cyclic irregularity @ 110% stand-by power @ 1800 rpm . . 0.0118

Test conditions

-air temperature . . . . . 25 °C
-barometric pressure . . . . . 100 kPa
-relative humidity 31.5%
-air inlet restriction at maximum power (nominal) . . . . . 5 kPa
-exhaust back pressure at maximum power (nominal) . . . . 15 kPa
-fuel temperature (inlet pump) . . . . . 40 °C

Sound level

Average sound pressure level for ElectropaK . . . . . 106.5 dB(A)
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 EPA legislation for non-road mobile machinery, powered by constant speed engines (Tier 3).

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THE HEART OF EVERY GREAT MACHINE

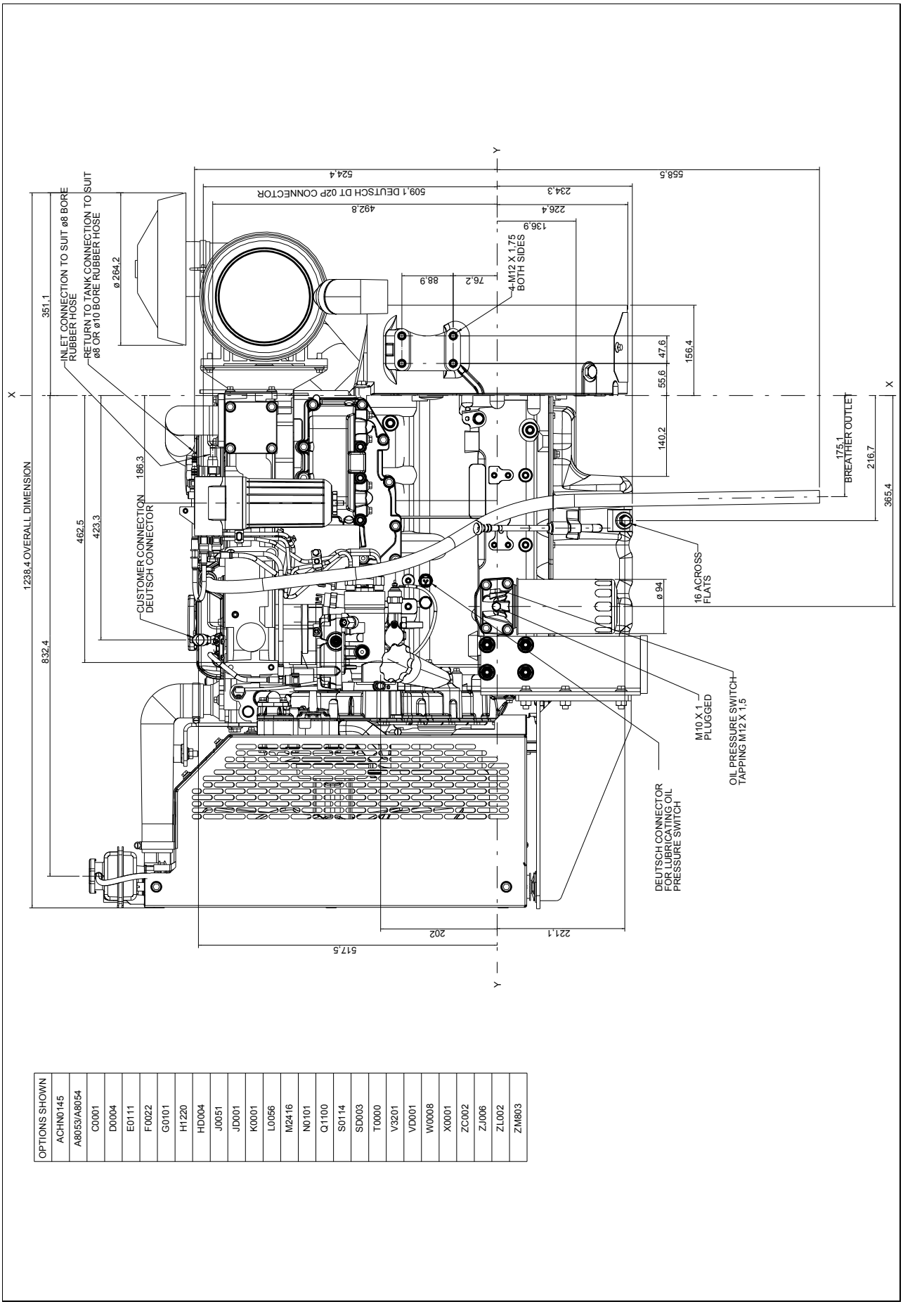
General installation

Designation	Units	1800 rpm
		Standby
Gross engine power (sales power)	kWm	64.0
Fan and battery charging alternator power	kW	TBA
Radiator core resistance	kPa	35
Fan power absorption	kWm	1
Net engine power	kWm	63
Brake mean effective pressure	kPa	971
Inlet air flow volume - wet	m³/min	
Exhaust gas flow - wet	m³/min	13.7
Exhaust gas temperature (ex. Manifold / turbo outlet)	°C	571
Overall thermal efficiency (net)	%	33
Assumed alternator efficiency	%	90.0
Regenerative power estimated	kW	TBA
Engine coolant flow - minimum against 35 kPa restriction	l/min	151
Typical GenSet electrical output (0.8pf)	kVA	70.9
	kWe	56.7

Energy balance

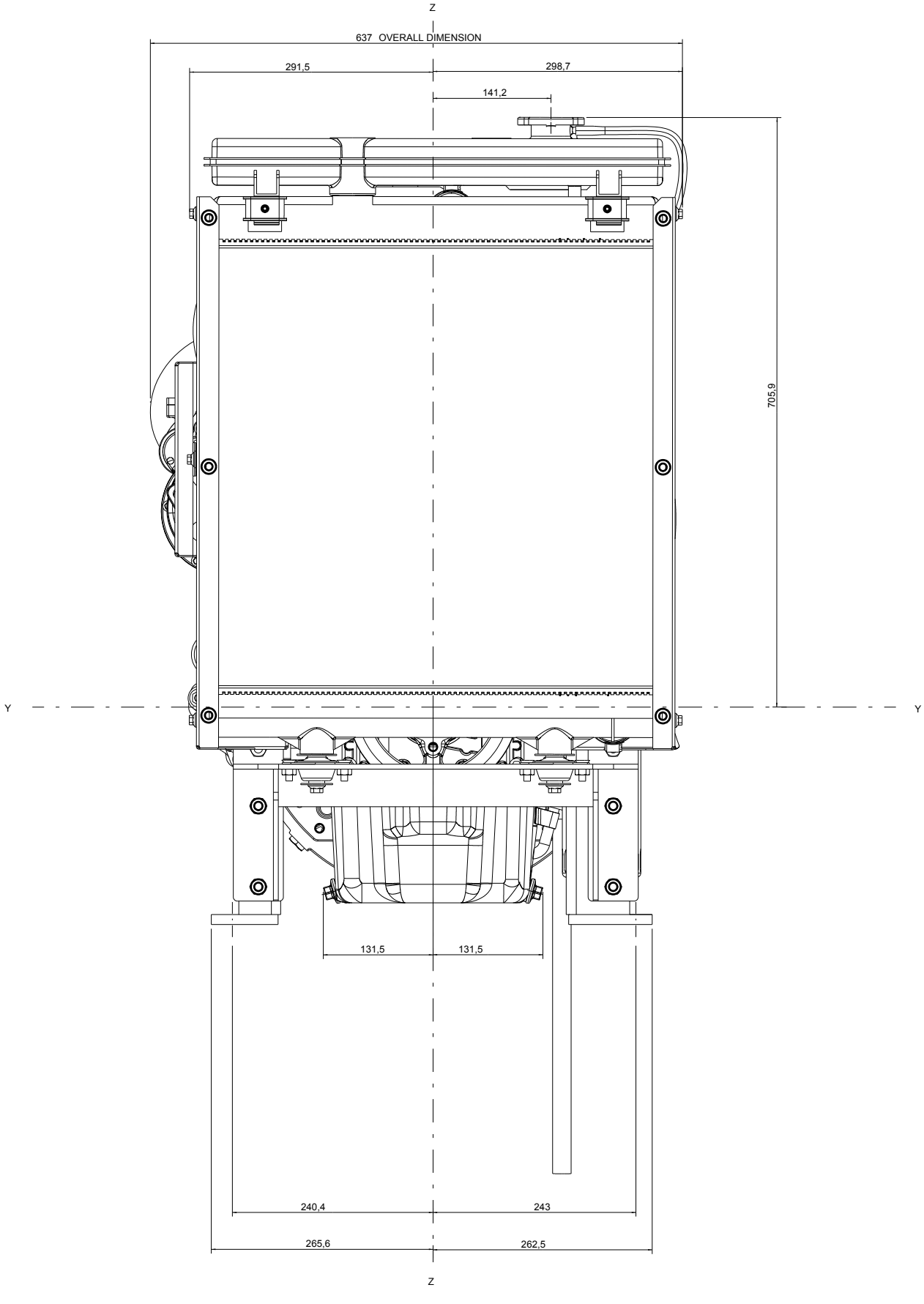
Designation	Units	1800 rpm
		Standby
Energy in fuel (fuel heat of combustion)	kWt	190.1
Energy to power (gross)	kWt	64.0
Energy to cooling fan pusher and battery charging alternator power	kWm	1
Energy to power (nett)	kWm	63
Heat rejection to radiator	kWt	46.1
Energy to exhaust	kWt	66.9
Energy to radiation	kWt	13.1

1104D-44TG1 - Left side view GAA0760

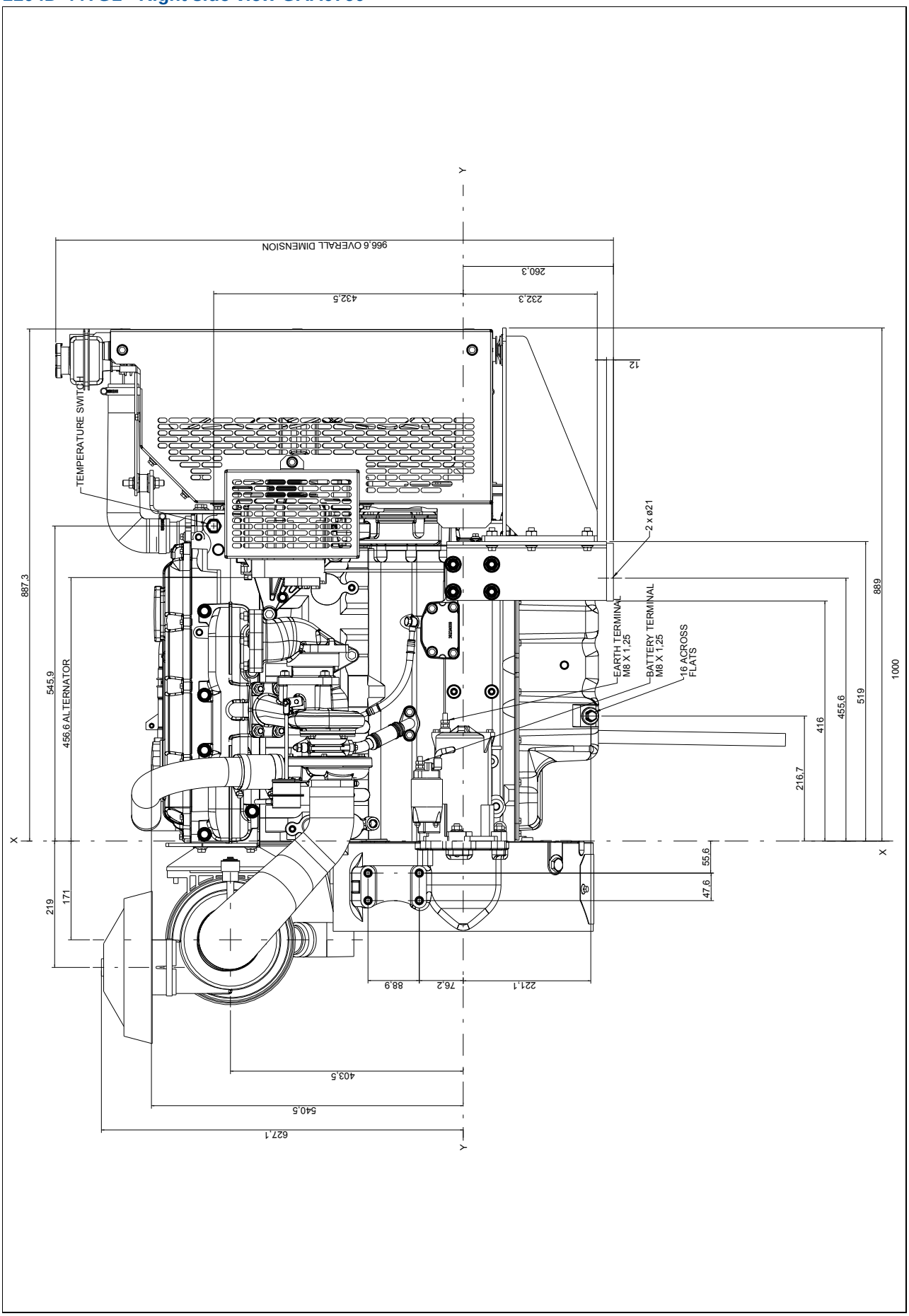


OPTIONS SHOWN
ACHN0145
A8053/A8054
C0001
D0004
E0111
F0022
G0101
H1220
HD004
J0051
JD001
K0001
L0056
M2416
N0101
Q1100
S0114
SD003
T0000
V3201
VD001
W0008
X0001
ZC002
ZJ006
ZL002
ZM803

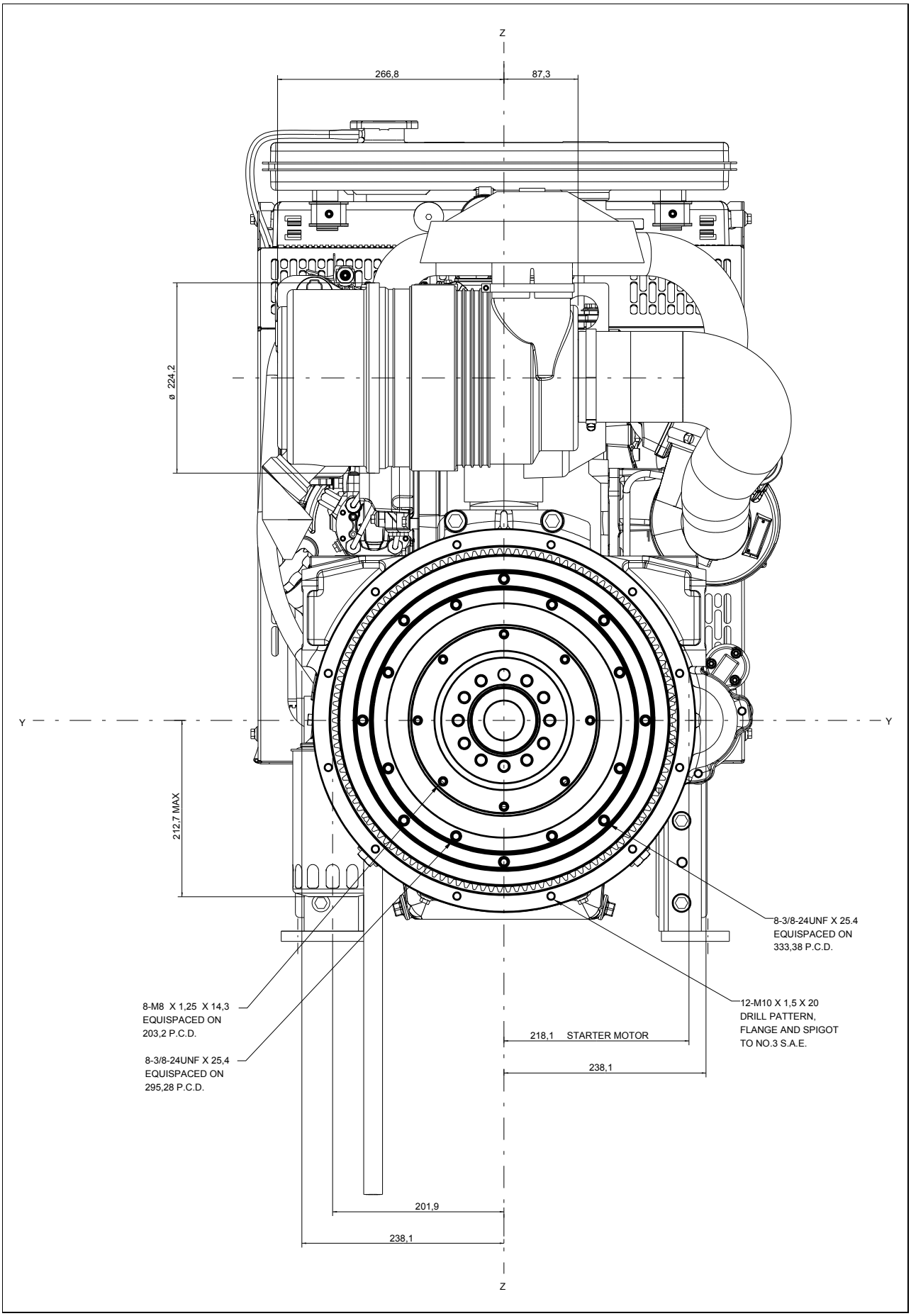
1104D-44TG1 - Front view GAA0760



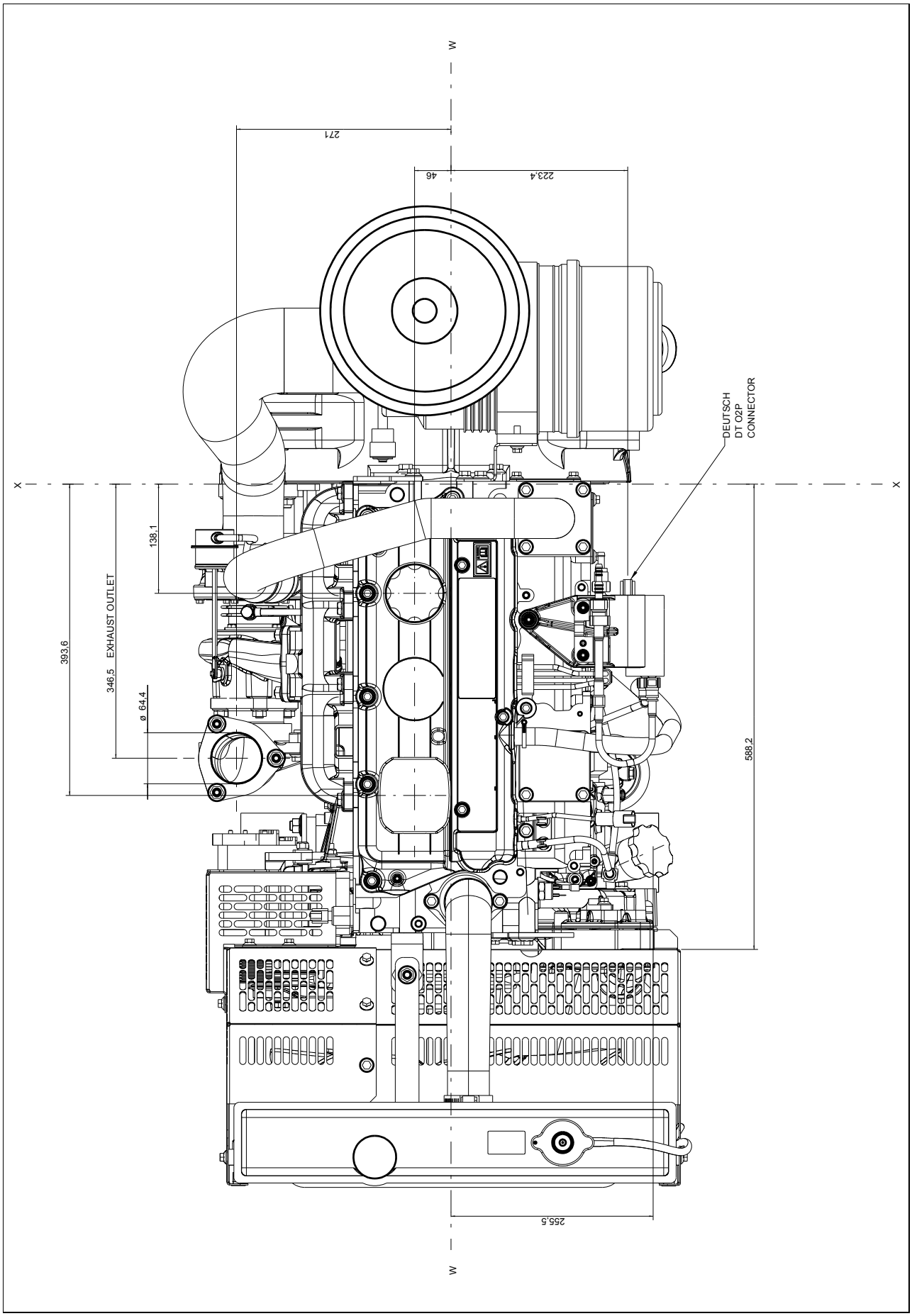
1104D-44TG1 - Right side view GAA0760



1104D-44TG1 - Rear view GAA0760



1104D-44TG1 - Plan view GAA0760



Cooling system

Cooling pack

Overall weight (wet) ... 71 kg
Overall face area ... 275834 mm²
Width ... 550 mm
Height ... 762 mm

Radiator

Face area ... 275834 mm²
Number of rows ... 2 rows, aluminium
Matrix density and material ... 12.7 fins/inch, Aluminium
Width of matrix ... 526.2 mm
Height of matrix ... 524.2 mm
Pressure cap setting ... 100.0 kPa

Fan

Type ... Pusher
Diameter ... 457,2 mm
Drive ratio ... 1.25:1
Number of blades ... 7
Material ... composite
Type ... pusher
Cooling fan air flow @ 1800 rev/min ... 98,2 m³/min

Coolant

Total system capacity ... 16.5 litres
Bare engine capacity ... 7.0 litres
Maximum top tank temperature ... 112°C
Shutdown switch setting ... 118°C
Thermostat operation range ... 85 - 95°C
Temperature rise across engine (maximum) ... 6.6 - 7.0°C
Max. permissible external system resistance ... 35 kPa
Coolant pump drive ... Gear driven
Coolant immersion heater rating (minimum) ... 0.75 kW

Recommended coolant

BS6580 - 1992, and ELC coolants to 1E1966
50% anti freeze / 50% water. For complete details of recommended coolant specifications, refer to the Operation and Maintenance Manual for this engine model.
Maximum additional restriction (Duct allowance) to cooling airflow and resultant minimum airflow.

Pusher

	Ambient clearance	Duct allowance	Cooling fan airflow	Radiator core resistance
Engine speed rpm	°C	Pa	m³/sec	Pa
1800	43	200	281	
1800	50	125	314	

Electrical system

Alternator	Unit	N0101
Alternator voltage	Volts	12
Alternator output	Amps	100

Starter	Unit	E0111
Starter motor voltage	Volts	12
Starter motor power	kW	4.0
Number of teeth on flywheel	(D0004)	126
Number of teeth on starter pinion		10
Minimum cranking speed	rpm	100 with glow plugs, 130 without glow plugs
Starter solenoid - Max. pull-in current @ -20°C	Amps	62
Starter solenoid - Max. hold-in current @ -20°C	Amps	14

Engine stop method ... Electronic

Cold start recommendations

Minimum battery cold cranking amps

Cold start recommendation	Minimum battery Cold Cranking Amps	Minimum battery Cold Cranking Amps
	With glow plugs 12v	Without glow plugs 12v
-5 - 15W40	750	750
-10 - 15W40	850	950
-15 - 15W40	1125	Glow plugs must be used
-20 - 10W40	1125	
-25 - 5W30	1500	
Max. battery CCA.	2400	

Notes:

- Glow plugs needed below -10°C
- For cable sizes see Applications and Installation manual.

The table above shows the recommended battery sizes against starter model, temperature and oil viscosity and is based on the test results from starting a ‘bare’ engine with batteries at a 75% state of charge and with a cable resistance of 0,0017 Ohms.

Induction system

Maximum air intake restriction

Clean filter ... ...5.0 kPa
Dirty filter . ...8.0 kPa
Induction indicator setting ... ...5.0 kPa
Air filter type. ... ... Paper element

Exhaust system

Maximum back pressure

-1800 rpm ... ... .15.0 kPa
Exhaust outlet, internal diameter . ... 90 mm

Fuel injection system

Injection components

Type of injection .. .. Direct
Fuel injection pump DP210EG
Fuel atomiser... ... ... Unit injector / multi-hole
Nozzle opening pressure. ... ... 18,5 MPa
Fuel filter particle size (maximum)... ... ... 2 microns

Fuel lift pump

-max flow through customer filter ... ... 2,2 litres/min
-max fuel supply restriction at lift pump ... ... 40 kPa
-max fuel return restriction @ low idle . ... 50 kPa
-max fuel return flow ... ...0,8 m³/min
Maximum suction head ... ... 17 kPa (1.7 m)
Maximum static pressure head ... ... 10 kPa (1.0 m)

Governor type

LCS electronic - speed control conforms to. ... ... .ISO 8528, G3
Mechanical - speed control conforms to.. ... ... .ISO 8528, G2

Fuel specification

Perkins recommend the use of the following fuel specifications:

- DIN E 590 DERV Grade A, B, C, E, F, Class 0, 1, 2, 3 & 4
- BS2869 Class A2 Off-highway Gas Oil Red Diesel
- ASTM D975, Class 1D and Class 2D
- JIS K2204 Grades 1, 2 & 3 & Special Grade 3.

Note: For further information on fuel specifications and restrictions, refer to the OMM Fuels section for this engine model.

Fuel consumption (SFC)

Load	1800 rpm	
	g/kW.hr	litres/hr
25%	243	18.7
50%	240	16.6
75%	248	12.8
100% (Prime)	260	9.0
110% (Standby)	300	5.2

Note: Based on gross rated power.

Lubrication system

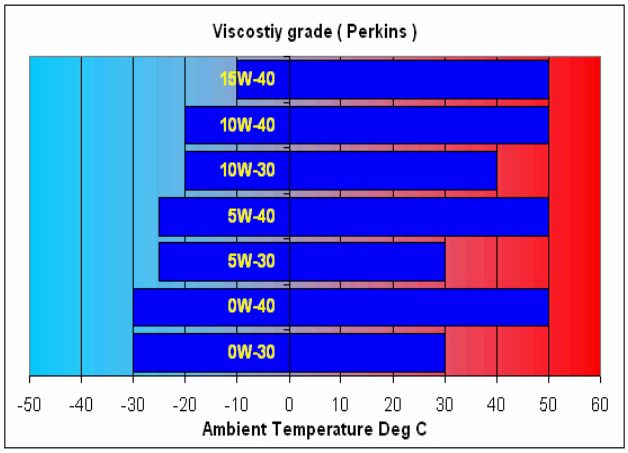
Maximum system capacity ... ...8.4 Litres
Maximum capacity in sump... ... ...5.6 Litres
Minimum capacity in sump ... ...6.9 Litres
Sump drain plug tapping size ... ... .3/4 - 16 UNF
Shutdown switch setting (where fitted) . ... .ECM controlled
Maximum oil temperature continuos operation . ... 125°C
Maximum oil temperature intermittent operation... ... ... 135°C

Lubricating oil pressure

At rated speed... ... ... 430 kPa
Relief valve opens.. ... ... 450 kPa
At maximum no-load speed .. ..280 - 340 kPa
Oil temperature
Continuous operation ... ... 125 °C
Oil consumption at full load as a % of fuel consumption 0.15%
Sump drain plug tapping size
or hose connection size ... ...3/4 UNF STOR port

Recommended SAE viscosity

A multigrade oil conforming to API-CH4 must be used.



Normal operating angles

Front and rear ... ... 24°
Side... ... ... 24°

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	1800 rpm (60 Hz)
% of Prime Power	%	80
Load (nett)	kWm (kWe)	45.6 (41.0)
Transient frequency deviation	%	≤ 3.8
Frequency recovery	seconds	0.6

The above figures were obtained under the following test conditions:
Minimum engine block temperature ... ...45°C
Ambient temperature... ... ...15°C
Governing mode.. ... ... Isochronous
Alternator inertia .. .. 8 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.

Mountings

Flywheel housing SAE3 156,4mm
Maximum static bending moment at rear face of block. ...1130 Nm

Note: Refer to “Applications and Installation Manual” for “Bending Moment approval requirements”.