

4012-46TWG2A

4000

Series

1216 kWm Standby @ 1500 rpm
1216 kWm Standby @ 1800 rpm

Diesel Engine Switchable 50/60 Hz Electrounit

Basic technical data

Number of cylinders	12
Cylinder arrangement	60° Vee
Cycle	4 stroke
Induction system	Turbocharged
Combustion system	Direct injection
Compression ratio	13:1
Bore	160 mm
Stroke	190 mm
Cubic capacity	45.842 litres
Direction of rotation	Anticlockwise viewed on flywheel
Firing order	1A, 6B, 5A, 2B, 3A, 4B, 6A, 1B, 2A, 5B, 4A, 3B
Cylinder 1	Furthest from flywheel

Note: Cylinders designated 'A' are on the right hand side of the engine when viewed from the flywheel end.

Total weight (engine only)

Dry	4400 kg
Wet	4604 kg

Overall dimensions of Electrounit

Height	2255 mm
Length	3750 mm
Width	1479 mm

Moments of inertia (mk²)

Flywheel	9.57 kgm ²
Engine @ 1800 rpm	9.73 kgm ²

Cyclic irregularity for engine/flywheel maximum

1500 rpm	1:752
1800 rpm	1:1147

Ratings

Steady state speed stability at constant speed $\pm 0.25\%$
Electrical ratings are based on average alternator efficiency and are for guidance only (0.8 power factor being used).

Operating point

Static injection timing 20° btdc
Cooling water exit temperature < 98°C

Fuel data

To conform to BS2869 class A2; BS EN590

Performance

All data based on operation to ISO 3046/1, BS5514 and DIN 6271 standard reference conditions.

Noise

Estimated sound pressure levels at 1 metre

1500 rpm	112 dB(A)
1800 rpm	113 dB(A)

Note: Noise level represents highest recorded at 1500/1800 rpm.

Test conditions

Air temperature	25°C
Barometric pressure	100 kPa
Relative humidity	30%
Air inlet restriction at maximum power (nominal)	2.5 kPa
Exhaust back pressure at maximum power (nominal)	3 kPa
Fuel temperature (inlet pump)	58°C maximum

Note: For test conditions relevant to data on load acceptance, refer to page 4 of this document.

General installation

4012-46TWG2A

Designation	Units	Type of operation and application					
		Base load Power	Prime Power	Standby Power	Base load Power	Prime Power	Standby Power
		50 Hz @ 1500 rpm			60 Hz @ 1800 rpm		
Gross engine power	kWm	891	1113	1224	891	1113	1224
Fan and battery charging alternator power Typical (trop.)	kWm	58			58		
Nett engine power	kWm	833	1055	1166	833	1055	1166
Brake mean effective pressure - Gross	kPa	1555	1942	2136	1296	1619	1780
Combustion air flow at ISO conditions	m ³ /min	90	103	109	96	111	116
Exhaust gas temperature (after turbo) - maximum	°C	422			435		
Exhaust gas flow - maximum at atmospheric pressure	m ³ /min	232			238		
Boost pressure ratio	:1	2.39	2.87	3.1	2.41	2.81	3
Mechanical efficiency	%	88.1	90.3	91.1	88	90	91
Overall thermal efficiency (nett)	%	39.51	39.82	39.61	37.5	37	38
Friction and pumping power losses	kWm	120			121		
Mean piston speed	m/s	9.5			11.4		
Engine coolant flow	litres/min	948			1066		

Note: All quoted gross engine powers include an allowance of 1.5% for installation variances.

Note: Not to be used for CHP design purposes (indicative figures only). Consult Perkins Engines Stafford Limited. Assumes complete combustion.

Rating definitions

Baseload power

Unlimited hours usage with an average load factor of 100% of the published Baseload power rating.

Prime power

Variable load. Unlimited hours usage with an average load factor of 80% of the published Prime Power over each 24 hour period. A 10% overload is available for 1 hour in every 12 hours.

Standby power

Limited to 500 hours annual usage with an average load factor of 80% of the published Standby Power rating over each 24 hour period. Up to 300 hours of annual usage may be run continuously. No overload is permitted on Standby Power.

Energy balance

Designation	Units	1500 rpm			1800 rpm		
		Base load Power	Prime Power	Standby Power	Base load Power	Prime Power	Standby Power
Energy in fuel	kW	2123	2650	2960	2172	2712	3084
Energy in power output (gross)	kW	891	1113	1224	891	1113	1224
Energy to cooling fan - typical	kW	58			58		
Energy in power output (nett)	kW	833	1055	1166	833	1055	1166
Energy to exhaust	kW	689	886	1009	717	921	1055
Energy to coolant and oil	kW	345	374	403	359	389	457
Energy to radiation	kW	65	81	89	67	84	96
Energy to charge cooler	kW	133	197	234	138	205	252

Note: Not to be used for combined heat and power (CHP) purposes (indicative figures only). If necessary, consult Perkins Engines company Ltd.

Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water.

Maximum pressure in crankcase water jacket. 170 kPa
 Maximum top tank temperature (Standby) 98°C
 Maximum static pressure on pump 70 kPa

Total coolant capacity

Electrounit (engine only) 73 litres
 Maximum permissible restriction to coolant pump flow 20 kPa
 Thermostat operating range 71 - 85°C
 Temperature rise across the engine (standby power) with inhibited coolant @ 1500 rpm & 1800 rpm 8 - 12°C depending on rating

Water jacket cooling

Water jacket cooling data	Units	1500 rpm	1800 rpm
Coolant flow	litres/min	948	1100
Coolant exit temperature (max)	°C	98	98
Coolant inlet temperature (min)	°C	70	70
Coolant inlet temperature (max)	°C	85	85

Coolant pump - 2 off

Speed. 1.4 x e rpm
 Method of drive Engine driven

Lubrication system

Recommended SAE viscosity: Multigrade oil conforming to the following must be used API CG 15W/40.

Note: For additional notes on lubricating oil specifications, refer to the OMM manual.

Total system capacity

Maximum sump capacity 159 litres
 Minimum sump capacity 136 litres
 Oil temperature at normal operating conditions. 95°C
 Oil temperature (in rail) - Maximum continuous operation 105°C

Lubricating oil pressure

At rated speed 450 kPa
 Minimum 340 kPa
 Oil filter screen spacing 40 microns
 Sump drain plug tapping size. G1
 Oil pump speed and method of drive. 1.4 x e rpm, gear driven
 Shutdown switch - pressure setting (where fitted) 193 kPa (falling)

Oil consumption

Prime power	Units	1500 rpm	1800 rpm
After running in (typically after 250 hours)	g/kWhr	0.52	0.7
Oil flow rate from pump	litres/sec	6	7

Electrical

Alternator type. Insulated return
 Alternator voltage. 24 volts
 Alternator output 40 amps
 Starter type Electric
 Starter motor voltage. 24 volts
 Starter motor power. 16.4 kW
 Number of teeth on flywheel 156
 Number of teeth on starter pinion. 12
 Minimum cranking speed (0°C). 120 rpm
 Starter solenoid pull-in current @ -25°C Max. 30 amps
 Starter solenoid hold-in current @ -25°C Max. 9 amps
 Stop solenoid hold-in current. 1.1 amps
 Engine stop solenoid voltage. 24 volts

Fuel system

Recommended fuel to conform to BS2869 1998 Class A2 or BS EN590.
 Type of injection system Direct injection
 Fuel injection pump Delphi
 Injector type Unit injector
 Injector pressure 23.4 Mpa
 Lift pump type Gerotor

Delivery

	Unit	1500 rpm	1800 rpm
Fuel delivery	litres/hr	1020	1220
Heat retained in fuel to tank	kWt	8.5	8.6

Fuel inlet temperature to be less than..... 58°C
 Delivery pressure..... 300 kPa
 Maximum suction head at pump inlet..... 2.5 m
 Maximum static pressure head See manual
 Fuel filter spacing..... 10 microns
 Governor type..... Electronic
 Governing To ISO 8528-5 2005
 Torque at the governor output shaft..... 1.631 kgm
 Tolerance on fuel consumption..... To ISO 8528-1 1993

Fuel consumption

Designation	Fuel consumption calculated on gross rated powers			
	g/kWh		litres/hr	
	1500 rpm	1800 rpm	1500 rpm	1800 rpm
Standby	203	210	288	298
Primepower	201	196	259	266
Base load power	200	204	207	209
At 75% of prime power	203	205	196	199
At 50% of prime power	208	209	143	145

Note: All based on assumed density of 0.862

Induction system

Maximum air intake restriction of engine:

Clean filter..... 2 kPa
 Dirty filter..... 4 kPa
 Air filter type PowerCore

Exhaust system

Exhaust outlet size (internal) TWG2A..... 2*254 mm
 Exhaust outlet flange size TWG2A 10" table D
 Back pressure for total system TWG2A 1500 RPM..... 5 kPa
 Back pressure for total system TWG2A 1800 RPM..... 5 kPa

Mountings

Maximum static bending moment at rear face of block 1456 Nm

Centre of gravity (Bare engine - Wet)

Forward of rear face of cylinder block 658 mm
 Above crankshaft centre line..... 32 mm

Cold start recommendations

Temperature range down to 0°C

Oil SAE grade API CG 15w/40
 Starter type 2 x 24 volts
 Battery 4 x 12 volts x 286 Ah
 Maximum breakaway current..... 1600 amps
 Cranking current..... 810 amps
 Minimum mean cranking speed 120 rpm

Note: The battery capacity is defined by the 20 hour rate.

Note: The oil specification should be for the minimum ambient temperature as the oil will not be warned by the immersion heater.

Note: The breakaway current is dependant on the battery capacity available. Cables should be capable of handling the transient currents which may be up to double the steady cranking current.

Typical load acceptance (cold)

	Unit	1500 rpm	1800 rpm
Prime	%	72	72

The figures shown in the tables above were obtained under the following test conditions:

Engine block temperature (Cold)..... 45°C
 Ambient temperature..... 25°C
 Governing mode..... Isochronous
 Alternator inertia 50 kgm² typical
 Under frequency roll off (UFRO) point set to @ 1500 rpm 49 Hz
 Under frequency roll off (UFRO) point set to @ 1800 rpm 59 Hz
 UFRO rate set to..... 16 V/Hz approx.
 LAM on /off On

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

Applied load is a percentage of generator electrical output efficiencies as published in the general installation section of this data sheet.

The information given on this technical data sheet is for standard ratings only.

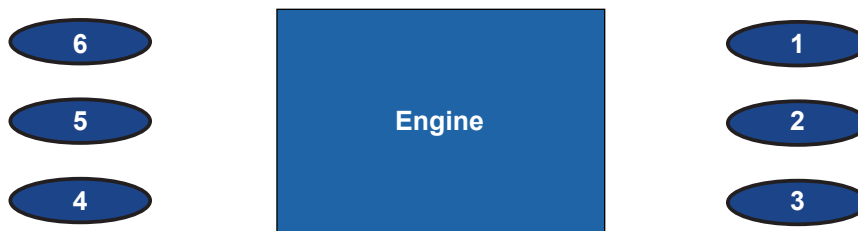
For ratings other than those shown, contact Perkins Engines Limited Stafford.

The information given in this document is for guidance only.

Noise Data

Noise levels

Noise measured in semi reverberant environment and measured at a distance of 1m from the periphery of the engine.



Noise measured at points 1-6 at Standby power

1500 rpm	
Position	SPL
	Noise, dB(A)
1	112
2	112.9
3	113
4	111.7
5	113
6	112

1800 rpm	
Position	SPL
	Noise, dB(A)
1	112.5
2	113
3	114
4	112
5	113
6	113

Frequency analysis at point 6 at Standby power

1500 rpm	
Freq. (Hz)	Noise, dB(A)
31.5	91
63	96.2
125	96
250	104
500	106.8
1K	104
2K	101.8
4K	95.6
8K	91.4
16k	86.1

1800 rpm	
Freq. (Hz)	Noise, dB(A)
31.5	91
63	97
125	96
250	105.5
500	107
1K	104.5
2K	102
4K	96
8K	92
16k	86

Note: Please contact Application team for drawing information