

# 4008TAG2

# 4000

## Series

985 kWm Standby @ 1500 rpm  
980 kWm Standby @ 1800 rpm

## Diesel Engine Switchable 50/60 Hz Electrounit

### Basic technical data

Number of cylinders	8
Cylinder arrangement	In-line
Cycle	4 stroke
Induction system	Turbocharged
Combustion system	Direct injection
Compression ratio	13:1
Bore	160 mm
Stroke	190 mm
Cubic capacity	30.561 litres
Direction of rotation	Anticlockwise viewed on flywheel
Firing order	1, 4, 7, 6, 8, 5, 2, 3
Cylinder 1	Furthest from flywheel

### Total weight (engine only)

Dry	3250 kg
Wet	3428 kg

### Overall dimensions of Electrounit

Height	1760 mm
Length	2879 mm
Width	1571 mm

### Moments of inertia (mk<sup>2</sup>)

Flywheel	9.6 kgm <sup>2</sup>
Engine @ 1800 rpm	6.02 kgm <sup>2</sup>

### Cyclic irregularity for engine/flywheel maximum

1500 rpm	1.67
1800 rpm	1.105

### 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  $20^\circ$  btdc  
Cooling water exit temperature  $< 98^\circ\text{C}$

### 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	109 dB(A)
1800 rpm	110 dB(A)

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

### Test conditions

Air temperature	$25^\circ\text{C}$
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)	$58^\circ\text{C}$ maximum

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

## General installation

### 4008TAG2

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	719	899	985	715	894	980
Fan and battery charging alternator power Typical (trop.)	kWm	38			51		
Nett engine power	kWm	681	861	947	664	843	929
Brake mean effective pressure - Gross	kPa	1850	2320	2540	1530	1920	2110
Combustion air flow at ISO conditions	m <sup>3</sup> /min	64	75	80.5	59	72	75
Exhaust gas temperature (after turbo) - maximum	°C	465			505		
Exhaust gas flow - maximum at atmospheric pressure	m <sup>3</sup> /min	200			202		
Boost pressure ratio	:1	3.18	3.7	4	2.8	3.15	3.4
Mechanical efficiency	%	90.0	92.0	92.0	88	90	91
Overall thermal efficiency (nett)	%	44.20	43.80	43.40	41	40	39
Friction and pumping power losses	kWm	72			96		
Mean piston speed	m/s	9.5			11.4		
Engine coolant flow	litres/s	600			720		

**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. No overload is permitted on Baseload power.

### Prime power

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 operation.

### 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.

### Emissions capability

All 4008TAG2 ratings are optimised for the best fuel consumption and do not comply to Harmonised International Regulation Emission Limits. More information may be obtained by contacting the Applications Department at Perkins Engine Company Limited.

## 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	1733	2209	2498	1738	2250	2516
Energy in power output (gross)	kW	719	899	985	715	894	980
Energy to cooling fan - typical	kW	38			51		
Energy in power output (nett)	kW	861	861	947	664	843	929
Energy to exhaust	kW	548	698	807	550	725	811
Energy to coolant and oil	kW	273	332	349	255	336	366
Energy to radiation	kW	40	80	100	59	85	100
Energy to charge cooler	kW	153	200	257	160	210	259

**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) . . . . . 48 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	600	720
Coolant exit temperature (max)	°C	98	98
Coolant inlet temperature (min)	°C	70	70
Coolant inlet temperature (max)	°C	86	86

### Coolant pump - 1 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 . . . . . 153 litres  
 Minimum sump capacity . . . . . 127 litres  
 Oil temperature at normal operating conditions . . . . . 95°C  
 Oil temperature (in rail) - Maximum continuous operation . . . . . 105°C

### Lubricating oil pressure

At rated speed . . . . . 340 kPa  
 Minimum . . . . . 240 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	0.5	0.53
Oil flow rate from pump	litres/sec	3.7	4.4

## Electrical

Alternator type . . . . . Insulated return  
 Alternator voltage . . . . . 24 volts  
 Alternator output . . . . . 55 amps  
 Starter type . . . . . Electric  
 Starter motor voltage . . . . . 24 volts  
 Starter motor power . . . . . 8.2 kW  
 Number of teeth on flywheel . . . . . 190  
 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	660	810
Heat retained in fuel to tank	kWt	4	4.5

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 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	209	216	240	249
Primepower	206	213	215	224
Base load power	206	206	172	173
At 75% of prime power	207	206	162	162
At 50% of prime power	213	205	111	108

**Note:** All based on assumed density of 0.862

## Induction system

### Maximum air intake restriction of engine: 1500/1800 rpm

Clean filter..... 1.3 kPa  
 Dirty filter..... 3.8 kPa  
 Air filter type ..... Paper element

## Exhaust system

Exhaust outlet size (internal) TAG2..... 2\*152.4 mm  
 Exhaust outlet flange size TAG2..... BS10 table D  
 Back pressure for total system TAG2 1500 RPM..... 6.8 kPa  
 Back pressure for total system TAG2 1800 RPM..... 6.8 kPa

## Mountings

Maximum static bending moment at rear face of block ..... 1456 Nm  
 Maximum additional load applied to flywheel due to all rotating components..... 650 kg

## Centre of gravity (Bare engine - Wet)

Forward of rear face of cylinder block ..... 900 mm  
 Above crankshaft centre line..... 140 mm

## Cold start recommendations

### Temperature range down to 0°C

Oil SAE grade ..... API CG 15w/40  
 Starter type ..... 1 x 24 volts  
 Battery ..... 2 x 12 volts x 178 Ah  
 Maximum breakaway current..... 1400 amps  
 Cranking current..... 750 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	%	33	35

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 kgm<sup>2</sup> 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.

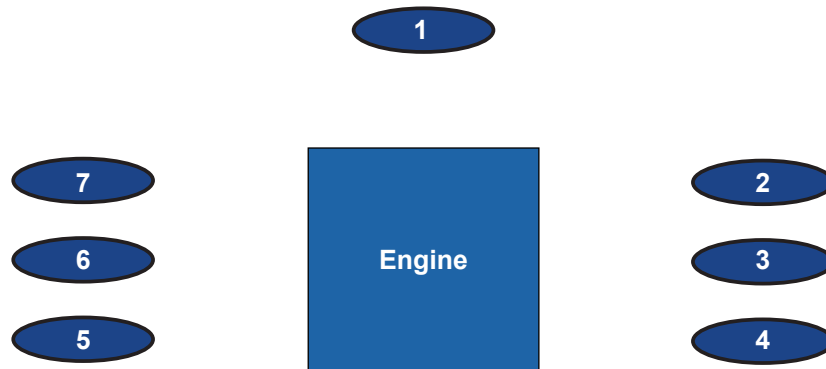
For ratings other than those shown, contact Perkins Engines Limited Stafford.

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 1-7 at Standby power

1500 rpm	
Position	SPL
	Noise, dB(A)
1	105
2	109
3	110
4	108
5	109
6	110
7	110

1800 rpm	
Position	SPL
	Noise, dB(A)
1	105
2	108
3	111
4	109
5	109
6	110
7	107

### Frequency analysis at point 7 at Standby power

1500 rpm	
Freq. (Hz)	Noise, dB(A)
31.5	88
63	97
125	100
250	101.5
500	101
1K	103
2K	102
4K	100
8K	97
16k	80

1800 rpm	
Freq. (Hz)	Noise, dB(A)
31.5	87
63	91
125	103
250	107
500	104
1K	104.5
2K	103.5
4K	102
8K	107
16k	104

**Note:** Please contact Application team for drawing information