

Technical Data

4000 Series

4012TAG1A

4012TAG2A

Diesel Engine - Electrounit

Basic technical data

Number of cylinders ... 12
 Cylinder arrangement ... 60° Vee
 Cycle ... 4 stroke, compression ignition
 Induction system ... Turbocharged
 Compression ratio ... 13,6:1 nominal
 Bore ... 160 mm
 Stroke ... 190 mm
 Cubic capacity ... 45.842 litres
 Direction of rotation ... Anti-clockwise viewed on flywheel
 Firing order ... 1^A, 6^B, 5^A, 2^B, 3^A, 4^B, 6^A, 1^B, 2^A, 5^B, 4^A, 3^B
 Cylinder 1 furthest from flywheel

Cylinders designated 'A' are on the left side of the engine when viewed from the front (opposite end to flywheel)

Total weight Electrounit (engine only)
 4012TAG1A/2A(dry) ... 4400 kg
 4012TAG1A/2A(wet) ... 4604 kg
 Overall dimensions ... Height 2118 mm
 ... Length 2731 mm
 ... Width 1723 mm
 Moment of inertia ... Engine 9.73 kgm²
 ... Flywheel 9.57 kgm²
 Cyclic irregularity for engine/flywheel (Prime power):
 4012TAG1A ... 1500 rev/min ... 1,714
 4012TAG2A ... 1500 rev/min ... 1,669

Ratings

Steady state speed stability at constant load ... ± 0,25%
 Electrical ratings are based on average alternator efficiency and are for guidance only (0,8 power factor being used).

Operating point

Engine speed ... 1500 rev/min
 Static injection timing... See engine number plate
 Cooling water exit temperature ... <98 °C

Fuel data

To conform to BS2869 class A1, A2.

Performance

Sound pressure level 1500 rev/min ... 106/112 dBA
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%
 Air inlet restriction at maximum power (nominal) ... 2,5 kPa
 Exhaust back pressure (nominal) ... 3,0 kPa

General installation 4012TAG1A

Designation	Units	50Hz 1500 rev/min			60Hz 1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Gross engine power	kWb	942	1178	1292	-	-	-
Fan power	kWm	42			-	-	-
Net engine power	kWm	900	1136	1250	-	-	-
BMEP gross	bar	16	20,5	22,5	-	-	-
Combustion air flow	m ³ /min	76	95	105	-	-	-
Exhaust gas temperature max (after turbo)	°C	435	460	470	-	-	-
Exhaust gas flow max (after turbo)	m ³ /min	257			-	-	-
Boost pressure ratio	-	2,7	3,22	3,53	-	-	-
Mechanical efficiency	%	89	91	92	-	-	-
Overall thermal efficiency	%	42	43	42	-	-	-
Friction power and pumping losses	kWm	120			-	-	-
Mean piston speed	m/s	9,5			-	-	-
Engine coolant flow (min)	l/s	17			-	-	-
Typical Genset Electrical Output 0,8 pf 25 °C (100 kPa)	kVA	1080	1363	1500	-	-	-
	kWe	864	1091	1200	-	-	-
Assumed alternator efficiency	%	96			-	-	-

General installation 4012TAG2A

Designation	Units	50Hz 1500 rev/min			60Hz 1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Gross engine power	kWb	1037	1296	1422	-	-	-
Fan power	kWm	42			-	-	-
Net engine power	kWm	995	1254	1380	-	-	-
BMEP gross	bar	18,1	22,6	24,8	-	-	-
Combustion air flow	m ³ /min	83,6	106	110	-	-	-
Exhaust gas temperature max (after turbo)	°C	442	472	483	-	-	-
Exhaust gas flow max (after turbo)	m ³ /min	285			-	-	-
Boost pressure ratio	-	2,8	3,53	3,84	-	-	-
Mechanical efficiency	%	88	92	92	-	-	-
Overall thermal efficiency	%	42	42	41	-	-	-
Friction power and pumping losses	kWm	120			-	-	-
Mean piston speed	m/s	9,5			-	-	-
Engine coolant flow	l/s	17			-	-	-
Typical Genset Electrical Output 0,8 pf 25 °C (100 kPa)	kVA	1194	1505	1656	-	-	-
	kWe	955	1204	1325	-	-	-
Assumed alternator efficiency	%	96			-	-	-

Note: Not to be used for CHP design purposes. (Indicative figures only). Consult Perkins Engines Co. Ltd. Assumes complete combustion.

Continuous Baseload rating Power available for continuous full load operation. **Prime Power rating** is available for unlimited hours per year with a variable load of which the average engine load factor is 80% of the published prime power rating, incorporation of a 10% overload for 1 hour in every 12 hours of operation which is permitted. **Standby Power rating** is for the supply of emergency power at variable load for the duration of the non-availability of the mains power supply. NO OVERLOAD capacity is available at this rating. Engines must not be allowed to have facilities for parallel operation with the mains supply. This rating should be applied only when reliable mains power is available. Should this not be the case then refer to Prime Power rating. A standby rated engine should be sized for an average load factor of 80% based on published standby rating for 500 operating hours per year. Standby ratings should never be applied except in true emergency power failure conditions.

Energy balance

Note: Not to be used for CHP design purposes. (Indicative figures only). Consult Perkins Engines Co Ltd. Assumes complete combustion.

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	Units	1500 rev/min			1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Energy in fuel	kWt	2238	2770	3117	-	-	-
Energy in power output (gross)	kWb	942	1178	1292	-	-	-
Energy to cooling fan	kWm	42	42	42	-	-	-
Energy in power output (net)	kWm	900	1136	1250	-	-	-
Energy to exhaust	kWt	680	760	924	-	-	-
Energy to coolant and oil	kWt	353	434	465	-	-	-
Energy to radiation	kWt	44	95	100	-	-	-
Energy to charge coolers	kWt	219	303	336	-	-	-

4012TAG2A

	Units	1500 rev/min			1800 rev/min		
		Continuous Baseload	Prime Power	Standby Maximum	Continuous Baseload	Prime Power	Standby Maximum
Energy in fuel	kWt	2444	3078	3477	-	-	-
Energy in power output (gross)	kWb	1037	1296	1422	-	-	-
Energy to cooling fan	kWm	42	42	42	-	-	-
Energy in power output (net)	kWm	995	1254	1380	-	-	-
Energy to exhaust	kWt	750	877	1013	-	-	-
Energy to coolant and oil	kWt	372	464	511	-	-	-
Energy to radiation	kWt	49	95	108	-	-	-
Energy to charge coolers	kWt	236	346	423	-	-	-

Cooling system

Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. For combined heat and power systems and where there is no likelihood of ambient temperatures below 10 °C then clean 'soft' water may be used, treated with 1% by volume of Perkins inhibitor in the cooling system. The inhibitor is available in bottles under Perkins Part No. 21825 735.

Nominal jacket water pressure in crankcase 1,7 bar
The following is a guide based on ambient air conditions of 52 °C on a Perkins supplied radiator.

Total coolant capacity:

Electrounit (engine only) 73 litres
ElectropaK (engine/radiator) 235 litres
Pressure cap setting 0,69 bar
Fan Incorporated in radiator
Diameter 1524 mm (pusher)
Ambient cooling clearance (open ElectropaK Prime power) based on air temperature at fan 3 °C above ambient.

4012TAG1A

Maximum additional restriction (duct allowance) to cooling airflow (Prime power) and resultant minimum airflow					
Ambient clearance 50% glycol		Duct allowance mm H ₂ O		Min airflow m ³ /min	
rev/min		rev/min		rev/min	
1500	1800	1500	1800	1500	1800
52 °C	52 °	20	-	1872	-

4012TAG2A

Maximum additional restriction (duct allowance) to cooling airflow (Prime power) and resultant minimum airflow					
Ambient clearance 50% glycol		Duct allowance mm H ₂ O		Min airflow m ³ /min	
rev/min		rev/min		rev/min	
1500	1800	1500	1800	1500	1800
52 °C	52 °	20	-	1872	-

Coolant pump speed and method of drive 1,4 x e rev/min gear
Maximum static pressure head on pump above engine crank centre line 7 m
Maximum external permissible restriction to coolant pump flow 20 kPa
Thermostat operating range 71-85 °C
Shutdown switch setting 101 °C rising
Coolant immersion heater capacity 4 kW x 2

Jacket cooling water data	Unit s	1500 rev/min	1800 rev/min
Coolant flow 4012TAG1A/2A	l/s	17,0	-
Coolant exit temperature (max)	°C	98	-
Coolant entry temperature (min)	°C	70	-
Coolant entry temperature (max) *	°C	85	-
Coolant entry temperature (max)**	°C	88	-

*4012TAG2A **4012TAG1A

Lubrication system

Recommended lubricating oil to conform with the specification of API CG4 15W/40 .

Lubricating oil capacity:

Sump maximum 159 litres
Sump minimum 136 litres
Lubricating oil temperature maximum to bearings 105 °C
Lubricating oil pressure:
at 80 °C temperature to bearing gallery (minimum) 0,34 MPa

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Oil consumption Prime Power	Units	1500 rev/min	1800 rev/min
After running-in*	g/kWhr	0,50	-
Oil flow rate from pump	l/s	6,0	-

4012TAG2A

Oil consumption Prime Power	Units	1500 rev/min	1800 rev/min
After running-in*	g/kWhr	0,51	-
Oil flow rate from pump	l/s	6,0	-

*Typical after 250 hours

Sump drain plug tapping size G1
Oil pump speed and method of drive 1,4 x e rev/min, gear driven
Oil pump flow 1500 rev/min 6,0 litres/sec
Shutdown switch setting 1,93 bar falling
Normal operating angles
Fore and aft 5°
Side tilt 10°

Fuel system

Recommended fuel... To conform to BS2869 1998 Class A1, A2
 Type of injection system ... Direct injection
 Fuel injection pump ... Combined unit injector
 Fuel injector... Combined unit injector
 Fuel injector opening pressure... 234 bar
 Fuel lift pump... Tuthill TCH 1-089
 Delivery/hour at 1500 rev/min ... 1020 litres
 Heat retained in fuel to tank ... 9,5 kW
 Temperature of fuel at lift pump to be less than ... 58 °C
 Fuel lift pump pressure... 3,0 bar
 Fuel lift pump maximum suction head... 2,5 m
 Fuel lift pump maximum pressure head (see Installation Manual)
 Fuel filter spacing... 10 microns
 Governor type ... Electronic
 Torque at the governor output shaft... 1,631 kgm
 Static injection timing ... See engine number plate
 Tolerance on fuel consumption... To ISO 8528-1 1993

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Fuel consumption (gross)				
Designation	g/kWh		Litres/hr	
	1500	1800	1500	1800
rev/min				
At Standby Max power rating	203	-	309	-
At Prime Power rating	199	-	276	-
At Continuous Baseload rating	197	-	218	-
At 75% of Prime Power rating	195	-	203	-
At 50% of Prime Power rating	194	-	134	-
At 25% of Prime power rating	207	-	72	-

4012TAG2A

Fuel consumption (gross)				
Designation	g/kWh		Litres/hr	
	1500	1800	1500	1800
rev/min				
At Standby Max power rating	206	-	345	-
At Prime Power rating	201	-	306	-
At Continuous Baseload rating	197	-	240	-
At 75% of Prime Power rating	197	-	225	-
At 50% of Prime Power rating	195	-	149	-
At 25% of Prime power rating	207	-	79	-

Induction system

Maximum air intake restriction of engine:
 Clean filter ... 127 mm H₂O
 Dirty filter ... 380 mm H₂O
 Air filter type ... 4998-00-00 MF&T

Exhaust system

Maximum back pressure for total system.

Designation	Units	1500 rev/min	1800 rev/min
4012TAG1A	mmH ₂ O	949	-
4012TAG2A	mmH ₂ O	612	-

Exhaust outlet flange size ... 2 x 254 mm (table 'D')
 For recommended pipe sizes, refer to the Installation Manual.

Electrical system

Type ... Insulated return
 Alternator ... 24 volts with integral regulator
 Alternator output ... 40 amps at a stabilised output 28 volts at 20 °C ambient
 Starter motor ... 24 volts
 Starter motor power ... 16,4 kW
 Number of teeth on flywheel... 156
 Number of teeth on starter motor ... 12
 Minimum cranking speed at (0 °C) ... 120 rev/min
 Pull-in current of each starter motor solenoid ... 30 amps at 24 volts
 Hold-in current of each starter motor solenoid ... 9 amps at 24 volts
 Engine stop solenoid... 24 volts
 Pull-in current of stop solenoid... 60 amps at 24 volts
 Hold-in current of stop solenoid... 1,1 amps at 24 volts

Engine mounting

Position of centre of gravity (wet engine) forward from rear face of crankcase 771 mm
 Engine vertical centre line above crankshaft centre line 38 mm
 Maximum additional load applied to flywheel due to all rotating components 850 kg

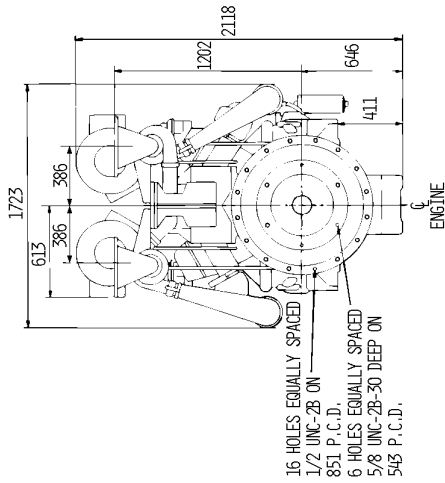
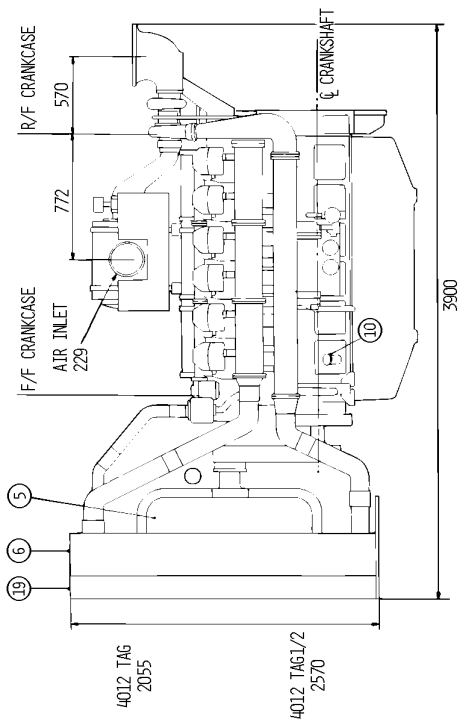
Starting requirements

Temperature range	
Range Down to 0 °C (32 °F)	Oil: API CG4 15W/40 Starter: 2 x 24V Battery: 4 x 12 volts x 286 Ah Max breakaway current: 1600 amps Cranking current: 810 amps Aids: Not necessary Starter cable size: 120 mm ² Maximum length: 6m

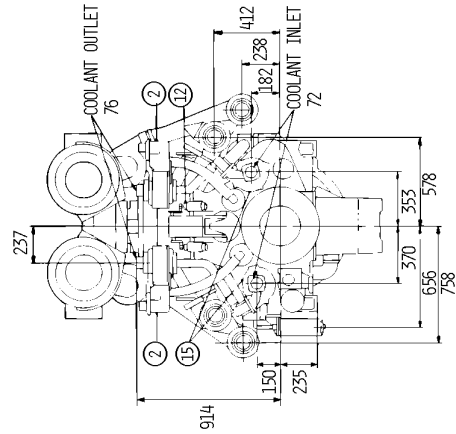
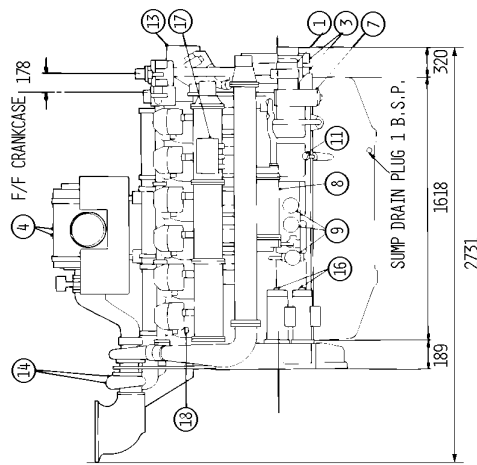
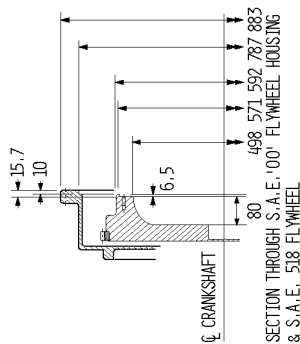
Notes:

- Battery capacity is defined by the 20 hour rate at 0 °C.
- The oil specification should be for the minimum ambient temperature as the oil will not be warmed by the immersion heater.
- Breakaway current is dependent on battery capacity available. Cables should be capable of handling the transient current which may be up to double the steady cranking current.

TYPICAL ENGINE



Electromount Support and Pad Dimensions



ITEM	DESCRIPTION
1	ALTERNATOR
2	BREATHERS
3	DAMPERS
4	AIR CLEANERS
5	FAN
6	RADIATOR (CONRAD)
7	FUEL FILTER & SEPARATOR
8	OIL COOLER
9	LUBRICATING OIL FILTERS
10	DIPSTICK
11	STOP SOLENOID
12	GOVERNOR ACTUATOR
13	TURBOCHARGERS
14	COOLANT PUMPS
15	24V STARTER
16	GOVERNOR CONTROL BOX
17	FUEL LEAK OFF
18	CHARGE COOLER

THIS DRAWING SHOWS APPROX. DIMENSIONS ONLY. FOR INSTALLATION DETAILS, G.A. DRAWINGS MUST BE OBTAINED FROM PERKINS ENGINES COMPANY STAFFORD LTD. A 52°C AIR AMBIENT RADIATOR CAN BE SUPPLIED AS AN OPTION.

DIM 023

4012TAG1A/4012TAG2A DIESEL ENGINES

Load acceptance (cold)

4012TAG1A
1500 rev/min

Initial load application when engine reaches rated speed (15 seconds max after engine starts to crank)				2 nd Load application Immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Prime power %	Load kWm/kWe Nett	Transient frequency deviation %	Frequency recovery time seconds	Prime power %	Load kWm/kWe Nett	Transient frequency deviation %	Frequency recovery time seconds
63	715/686	≤ -10	5	37	422/405	≤ -10	5

4012TAG2A
1500 rev/min

Initial load application when engine reaches rated speed (15 seconds max after engine starts to crank)				2 nd Load application Immediately after engine has recovered to rated speed (5 seconds after initial load application)			
Prime power %	Load kWm/kWe Nett	Transient frequency deviation %	Frequency recovery time seconds	Prime power %	Load kWm/kWe Nett	Transient frequency deviation %	Frequency recovery time seconds
57	715/686	≤ -10	5	43	539/518	≤ -10	5

Above complies with requirements of Classifications 3 & 4 of ISO 8528-12 and G2 operating limits stated in ISO 8528-5.

The above figures were obtained under test conditions as follows:

Engine block temperature .. 45 °C

Alternator efficiency ... 96%

Minimum ambient temperature ... 10 °C

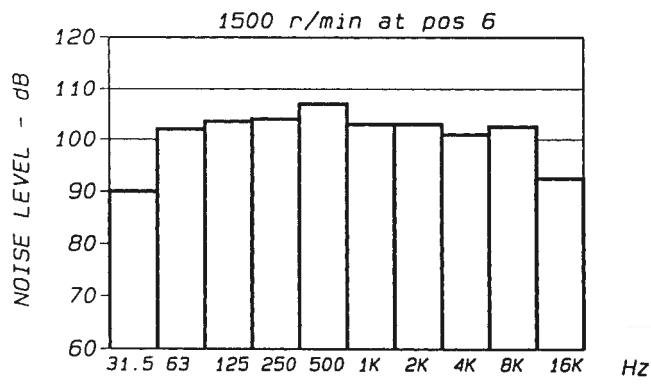
Isochronous Governing

Under Frequency Roll Off (UFRO) set to 1 Hz below rated frequency

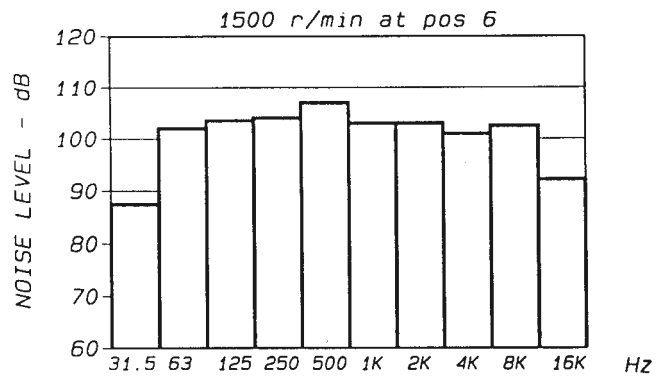
Typical alternator inertia. ... 50 Kg^m²

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

4012TAG1A



4012TAG2A



The information given on technical data sheets are for standard ratings only. For ratings other than shown contact Perkins Engines Company Limited, Stafford.

Notes



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