

# Technical data TAD733GE

With mounted radiator

## General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel.

Turbocharged

Number of cylinders			6
Displacement, total		litre in <sup>3</sup>	7,15 436,0
Firing order			1-5-3-6-2-4
Bore		mm in	108 4,25
Stroke		mm in	130 5,12
Compression ratio			18:1
Dry weight	Engine only	kg lb	710 1565
	Engine and cooling package	kg lb	900 1984
Wet weight	Engine only	kg lb	751 1656
	Engine and cooling package	kg lb	968 2134

## Performance

Performance		r/min	1500	1800	2000
Standby Power	without fan	kW	201	224,9	206
		hp	273	306	280
	with fan	kW	195	214	192
		hp	265	292	261
Prime Power	without fan	kW	181	202	185
		hp	246	275	252
	with fan	kW	175	192	171
		hp	238	260	232
Torque at:	Standby Power	Nm	1280	1193	984
		lbft	944	880	725
	Prime Power	Nm	1152	1072	883
		lbft	850	790	651
Mean piston speed		m/s	6,5	7,8	8,7
		ft/sec	21,4	25,7	28,5
Effective mean pressure at:	Standby Power	MPa	2,3	2,1	1,7
		psi	326	304	251
	Prime Power	MPa	2,0	1,9	1,6
		psi	294	273	225
Max combustion pressure at:	Standby Power	MPa	14,9	19,1	15,2
		psi	2161	2770	2205
	Prime Power	MPa	14	15,1	14
		psi	2031	2190	2031
Total mass moment of inertia, J (mR2)		kgm <sup>2</sup>	3,09		
		lbft <sup>2</sup>	73,3		
Degree of irregularity at:	Standby Power		1:37	1:48	
	Prime Power		1:41	1:52	
Residual speed droop at load increase from 0 to 100%		%	adjustable		
Friction Power		kW	8,5	12,3	
		hp	11,56	16,728	

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### Engine noise emission

Test Standards: ISO 3744-1981 (E)

sound power (without fan, intake and exhaust noise)

Tolerans  $\pm 0.75$  dB(A)

		r/min	1500	1800	2000
Measured sound power Lw	No load	dB(A)	103	104	
	Standby Power	dB(A)	106	109	
	Prime Power	dB(A)	106	108	
Calculated sound pressure Lp at 1 m	No load	dB(A)	90	91	
	Standby Power	dB(A)	93	95	
	Prime Power	dB(A)	92	95	

### Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

	r/min	1500	1800	2000
Standby Power	dB(A)	117	118	
Prime Power	dB(A)	116	117	

### Load acceptance

Test condition: Warm engine. Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

#### Single step load performance at 1500 rpm

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-40	6,0	6,3	1,8	2,0	40-100	11,2	13,1	4,5	9,9
0-50	7,2	8,2	2,1	2,9	50-100	8,5	9,6	3,8	7,8
0-60	8,7	10,2	3,0	4,3	60-100	6,8	7,8	3,5	5,0
0-75	13,7	17,5	3,8	4,5	75-100	4,0	4,6	3,2	3,6
0-51	7,0		2,8		0-46		7,0		2,8
0-100									
100-0									

#### Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load (%)	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby		Prime	Standby	Prime	Standby
0-40	3,8	4,1	1,2	1,4	40-100	5,4	6,7	2,1	7,0
0-50	4,5	5,1	1,6	1,7	50-100	4,8	5,8	1,9	6,8
0-60	5,6	6,2	1,8	2,2	60-100	3,6	4,4	1,8	4,1
0-75	7,3	7,5	2,1	2,5	75-100	2,4	3,5	1,7	3,6
0-73	7,0		1,9		0-66		7,0		1,9
0-100	14,3	18,3	3,5	9,1					
100-0	5,8	5,8	2,0	2,0					

### Cold start performance

1500/1800/2000

Cold start limit temperature	°C	-15
		-30*

\* With manifold heater engaged, lubrication oil 15W/40

### Derating, mechanical governor

The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For operation at higher altitudes and temperatures the power should be derated according to the following factors:

Altitude derating factor < 3000 m	% / m	4 / 500
Altitude derating factor > 3000 m	% / m	6 / 500
Ambient temperature derating factor	% / °C	2 / 5°C
Humidity	%	No derating

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### Derating, electronic governor

The engine may be operated up to 1000 m altitude and 40°C ambient air temperature without derating. For applications above 1000 m an ECU with automatic derating must be used. For operations with air ambient temperature over 40°C, see mechanical governor.

Lubrication system		r/min	1500	1800	2000
Lubricating oil consumption	Standby Power	liter/h	0,09	0,11	0,10
		US gal/h	0,024	0,029	0,026
	Prime Power	liter/h	0,08	0,09	0,09
		US gal/h	0,021	0,024	0,024
Oil system capacity including filters		liter	34		
		US gal	9,0		
Oil sump capacity:	max	liter	31		
		US gal	8,2		
	min	liter	24		
		US gal	6,3		
Oil change intervals/specifications:					
Closed crankcase ventilation	ACEA: E4. API: CH-4, CI-4* full synthetic		h	500	
Open crankcase ventilation	VDS-2. ACEA: E3, E5. API: CG-4, CH-4*		h	500	
Open crankcase ventilation	VDS. ACEA: E2. API: CF, CF-4*		h	250	
Engine angularity limits:		front up	°	10	
		front down	°	10	
		side tilt	°	10	
Oil pressure at rated speed		kPa	480	520	550
		psi	70	75	80
Oil pressure shut down switch setting		kPa	200		
		psi	29		
Lubrication oil temperature:	normal	°C	110		
		°F	230		
	max	°C	125		
		°F	257		
Oil filter micron size		mm	0,012		

\* See also general section in the sales guide

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### Fuel system

<b>Standby Power</b> Specific fuel consumption at:		25%	g/kWh lb/hph	228 0,37	238 0,39	249 0,40
		50%	g/kWh lb/hph	216 0,35	221 0,36	223 0,36
		75%	g/kWh lb/hph	215 0,35	220 0,36	221 0,36
		100%	g/kWh lb/hph	219 0,35	228 0,37	226 0,37
<b>Prime Power</b> Specific fuel consumption at:		25%	g/kWh lb/hph	228 0,37	245 0,40	265 0,43
		50%	g/kWh lb/hph	217 0,35	222 0,36	227 0,37
		75%	g/kWh lb/hph	214 0,35	220 0,36	221 0,36
		100%	g/kWh lb/hph	216 0,35	222 0,36	223 0,36
Recommended fuel to conform to			ASTM-D975-No1 and 2-D JIS KK 2204, EN 590			
Total fuel flow			liter/h US gal/h	360 95	450 119	480 127
Max allowed inlet fuel temperature		continuous	°C °F	70 158		
		temporarily	°C °F	90 194		
Feed pump pressure			kPa psi	500 73		
Fuel supply line max. restriction (before fuel feed pump)			kPa psi	35 5,1		
Fuel supply line max. restriction (before fuel prefilter and manuel feed pump)			kPa psi	15 2,2		
Fuel supply line max. pressure, (before fuel feed pump)			kPa psi	20 2,9		
Fuel filter micron size			mm	0,005		
Prefilter / Water separator			mm	0,063		
Governor type/make, standard			Heinzman / EDC4			
Injection pump type/make			PFM 1 P100 S 2005 / Bosch			
Injection timing std.			°B.T.D.C	2,5		

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### Intake and exhaust system

Intake and exhaust system			r/min	1500	1800	2000
Air consumption at:	Standby Power	27°C	m <sup>3</sup> /min	12,4	15,8	14,4
		81°F	cfm	439	557	509
	Prime Power	27°C	m <sup>3</sup> /min	11,5	14,2	13,1
		81°F	cfm	406	501	463
Air intake restriction, clean filter(s)			kPa	1,5		
			in wc	6,0		
Max allowable air intake restriction			kPa	3,5		
			in wc	14,1		
Air filter type			Two stage paper cartridge			
Air filter cleaning efficiency			%	99,9		
Heat rejection to exhaust at:	Standby Power	kW	165	202		
		BTU/min	9383	11488		
	Prime Power	kW	142	168		
		BTU/min	8075	9554		
Exhaust gas temperature after turbine at:	Standby Power	°C	530	530	501	
		°F	986	986	934	
	Prime Power	°C	510	509	479	
		°F	950	948	894	
Max allowable back pressure in exhaust line	Standby Power	kPa	3	5	5	
		In wc	12,0	20,1	20,1	
	Prime Power	kPa	5	7,5	7,5	
		In wc	20,1	30,1	30,1	
Exhaust gas flow at:	Standby Power	m <sup>3</sup> /min	37,2	44,4	48,0	
		cfm	1314	1568	1695	
	Prime Power	m <sup>3</sup> /min	31,8	40,4	43,0	
		cfm	1123	1427	1519	
Heat rejection to CAC	Standby Power	kW	42	51	43	
		BTU/min	2388	2895	2462	
	Prime Power	kW	38	46	39	
		BTU/min	2150	2605	2235	

### Intercooler system

	r/min	1500	1800	2000
Boost pressure	kPa	183	205	186
	in wc	733	823	747
Charge air temp after turbo compressor	°C	196	201	194
	°F	385	394	381
Max allowable comb. air temp after CAC	°C	50		
	°F	122		
Max pressure droop over intercooler, incl. Piping	kPa	15		
	In wc	60		

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### Cooling system

Cooling system		r/min	1500	1800	2000
Heat rejection radiation from engine at:	Standby Power	kW	20	23	21
		BTU/min	1137	1308	1194
	Prime Power	kW	19	22	20
		BTU/min	1081	1251	1137
Heat rejection to coolant at:	Standby Power	kW	96	110	101
		BTU/min	5465	6244	5738
	Prime Power	kW	87	99	92
		BTU/min	4919	5607	5215
Recommended coolant		Volvo coolant or Volvo anticorrosion additive together with clean fresh water			
Radiator cooling system type		Closed circuit			
Radiator core area		m²	0,65		
		foot²	7,00		
Radiator core thickness		mm	55		
		in	2,17		
Intercooler core area		m²	0,41		
		foot²	4,46		
Intercooler core thickness		mm	50		
		in	1,97		
Fan diameter		mm	870		
		in	34,25		
Fan power consumption		kW	6,1	10,5	14,3
		hp	8	14	19
Fan drive ratio			1:0,8		
Coolant capacity,	engine	liter	9,8		
		US gal	2,59		
	radiator with hoses	liter	28,6		
		US gal	7,56		
Coolant pump		drive/ratio	1,73:1		1,36:1
Coolant flow with standard cooling system		l/s	3,0	3,6	3,2
		US gal/s	0,79	0,95	0,85
Maximum external coolant system restriction		kPa	25	35	28
		in wc	100	141	112
Thermostat,	start to open	°C	87		
		°F	189		
	fully open	°C	102		
		°F	216		
Maximum static pressure head		kPa	100		
		in wc	402		
Pressure cap setting on standard cooling system		kPa	90		
		in wc	361		
Maximum top tank temperature		°C	105		
		°F	221		
Max. permissible cooling down of engine coolant by radiator		°C	8		
		°F	46		
Shutdown switch setting		°C	113		
		°F	235		
Recommended draw down capacity		10% of total cooling system capacity			

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### Cooling performance

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 105°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m <sup>3</sup> /s	External restriction Pa	Air flow m <sup>3</sup> /s	External restriction Pa
1500	61	3,9	0		
	55	3,3	150		
	53	3,1	200		
	48	2,7	300		
	41	2,4	400		
	64			3,9	0
	59			3,3	150
	57			3,1	200
	52			2,7	300
	46			2,4	400
1800	63	4,9	0		
	59	4,3	150		
	58	4,1	200		
	54	3,7	300		
	51	3,4	400		
	66			4,9	0
	62			4,3	150
	61			4,1	200
	58			3,7	300
	55			3,4	400
2000	69	5,7	0		
	67	5,1	150		
	66	5,0	200		
	65	4,6	300		
	62	4,3	400		
	71			5,7	0
	70			5,1	150
	69			5,0	200
	68			4,6	300
	65			4,3	400

### Cooling performance

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 105°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m <sup>3</sup> /s	External restriction Pa	Air flow m <sup>3</sup> /s	External restriction Pa
2000	49	2,7	0		
	42	2,3	150		
	41	2,2	200		
	32	1,8	300		
	15	1,5	400		
	./.			2,7	0
	./.			2,3	150
	./.			2,2	200
	./.			1,8	300
	./.			1,5	400

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Electrical system		r/min	1500	1800	2000
Voltage and type		24V / 1 pole system			
Alternator:	make/output	Amp	Iskra/35		
	tacho output	Hz/alt. Rev	6		
	drive ratio		4,07:1		
Starter motor		make	Melco		
		type	M008T62471		
		kW	5,0		
Starter motor solenoid,	pull current	Amp	2		
	hold current	Amp	2		
Number of teeth on:	flywheel		129		
	cam wheel		96		
	starter motor		10		
Inrush current at +20°C		Amp	1200		
Cranking current at +20°C		Amp	400		
Crank engine speed at 20°C		rpm	200		
Starter motor battery capacity:	max	Ah	135		
	min at +5°C	Ah	110		
Inlet manifold heater (at 12V/24V)		kW	2 / 3,6		
Power relay for the manifold heater (at 12V/24V)		Amp	150 / 120		