

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 ³	12,78 779,7
Firing order			1-5-3-6-2-4
Bore		mm in	131 5,16
Stroke		mm in	158 6,22
Compression ratio			18,1:1
Wet weight	Engine only	kg lb	1325 2921
	Engine incl. cooling system, air filtration system, and frame	kg lb	1790 3946

Performance

			rpm	1500	1800
Prime Power	without fan	kW		335	371
		hp		456	505
	with fan	kW		325	353
		hp		442	480
Standby Power	without fan	kW		366	406
		hp		498	552
	with fan	kW		356	388
		hp		484	528
Torque at:	Prime Power	Nm lbft		2133 1573	1968 1452
	Standby Power	Nm lbft		2330 1718	2154 1588
Mean piston speed		m/s		7,9	9,5
		ft/sec		26,0	31,2
Effective mean pressure at:	Prime Power	MPa psi		2,1 304	1,9 281
		Standby Power	MPa psi		2,3 332
Max combustion pressure at:	Prime Power		MPa psi		17,5 2538
		Standby Power	MPa psi		18,3 2654
Total mass moment of inertia, J (mR ²)			kgm ² lbft ²		3,43 81,4
Friction Power		kW		30	44
		hp		40,8	59,84

Derating see Technical Diagrams

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power

Tolerance ± 0.75 dB(A)

		rpm	1500	1800
Measured sound power Lw	No load	dB(A)	114,8	118
	Prime Power	dB(A)	115,8	118,2
	Standby Power	dB(A)	116	118,5
Calculated sound pressure Lp at 1 m	No load	dB(A)	97,8	100,9
	Prime Power	dB(A)	98,8	101,2
	Standby Power	dB(A)	98,9	101,4

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m

	rpm	1500	1800
Prime Power	dB(A)	114	118
Standby Power	dB(A)	115	118

Test conditions for load acceptance data

Warm engine.	Generator	Model	Type of AVR
	Stamford	HCI 444 F1	SX 440

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
0-20	1,5	1,6	1,2	1,2	20-100	12,5	16,0	2,8	3,1
0-40	3,0	3,3	1,5	1,4	40-100	4,9	5,4	1,6	2,5
0-60	6,1	8,1	2,6	2,8	60-100	2,6	2,8	1,6	1,6
0-80	15,8	19,4	2,9	3,2	80-100	1,2	1,4	1,2	1,2
0-63	7,0		2,6		63-100				
0-69	10,0		1,7		69-100				
0-58		7,0			58-100				
0-64		10,0			64-100				
100-0	6,4	7,0	2,0	2,0					

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
0-20	1,3	1,4	1,3	1,3	20-100	5,1	5,9	1,9	2,1
0-40	2,6	2,9	1,5	1,6	40-100	3,2	3,3	1,8	1,3
0-60	4,2	4,6	1,5	1,5	60-100	2,0	2,2	1,6	1,6
0-80	6,3	7,7	1,1	1,5	80-100	1,0	1,0	1,3	1,4
0-84	7,0		1,8		84-100	0,7		1,2	
0-100	10,0		2,8						
0-75		7,0		1,1	75-100		1,3		1,5
0-90		10,0		2,5	90-100		0,6		0,8
100-0	5,8	6,3	2,6	2,6					

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		°C	rpm	1500	1800
Time from start to stay within 0.5% of no load speed at ambient temperature:	20	s	4,8	4,6	
	5	s	5,7	5,2	
	-15*	s	6,6	6,0	

* With manifold heater - kW engaged, lubrication oil 15W/40 and block heater.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	2	12	10°C 50°F

Lubrication system

		rpm	1500	1800
Lubricating oil consumption	Prime Power	litre/h US gal/h	0,04 0,011	0,05 0,013
	Standby Power	litre/h US gal/h	0,04 0,011	0,05 0,013
Oil system capacity including filters		litre US gal	36 9,5	
Oil sump capacity:	max	litre US gal	30 7,9	
	min	litre US gal	19 5,0	
Oil change intervals/specifications:	VSD3	h	600	
	VSD2	h	400	
		h	200	
Engine angularity limits:	front up	°	11	
	front down	°	11	
	side tilt	°	11	
Oil pressure at rated speed		kPa psi	370 - 520 54 - 75	
Lubrication oil temperature in oil sump:	max	°C	130	
		°F	266	
Oil filter micron size		µ	40	

* See also general section in the sales guide

Fuel system

		rpm	1500	1800
Prime Power Specific fuel consumption at:	25%	g/kWh lb/hph	222 0,360	236 0,383
	50%	g/kWh lb/hph	200 0,324	206 0,334
	75%	g/kWh lb/hph	193 0,313	200 0,324
	100%	g/kWh lb/hph	192 0,311	200 0,324
Standby Power Specific fuel consumption at:	25%	g/kWh lb/hph	218 0,353	230 0,373
	50%	g/kWh lb/hph	198 0,321	204 0,331
	75%	g/kWh lb/hph	192 0,311	200 0,324
	100%	g/kWh lb/hph	194 0,314	201 0,326

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Fuel system	rpm 1500 1800		
Fuel to conform to	ASTM-D975-No1 and 2D JIS KK 2204, EN 590		
System supply flow at:	litre/h	120	130
	US gal/h	31,7	34,3
Fuel supply line max restriction (Measured at fuel inlet connection)	kPa	30,0	30,0
	psi	4,4	4,4
Fuel supply line max pressure, engine stopped	kPa	20,0	20,0
	psi	2,9	2,9
System return flow	litre/h	18,0	18,0
	US gal/h	4,8	4,8
Fuel return line max restriction (Measured at fuel return connection)	kPa	20,0	20,0
	psi	2,9	2,9
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)	°C	50	50
	°F	122	122
Prefilter / Water separator micron size	µ	10	
Fuel filter micron size	µ	5	
Governor type/make, standard	Volvo / EMS 2.2		
Injection pump type/make	Delphi E3		

Intake and exhaust system		rpm 1500 1800		
Air consumption at: (+25°C and 100kPa)	Prime Power	m ³ /min	26	28
		cfm	918	989
	Standby Power	m ³ /min	27	28
		cfm	954	989
Max allowable air intake restriction including piping		kPa	5	5
		psi	0,7	0,7
Air filter restriction clean Volvo Penta filter		kPa	0,9	1,0
		psi	0,1	0,1
Heat rejection to exhaust at:	Prime Power	kW	209	263
		BTU/min	11886	14957
	Standby Power	kW	236	299
		BTU/min	13421	17004
Exhaust gas temperature after turbine at:	Prime Power	°C	400	446
		°F	752	835
	Standby Power	°C	420	498
		°F	788	928
Max allowable back pressure in exhaust line	Prime Power	kPa	9	9
		psi	1,3	1,3
	Standby Power	kPa	10	10
		psi	1,5	1,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Prime Power	m ³ /min	56,0	66,0
		cfm	1978	2331
	Standby Power	m ³ /min	60,0	71,0
		cfm	2119	2507

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03**Cooling system**

			rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power	kW	12	22	
		BTU/min	682	1251	
	Standby Power	kW	13	23	
		BTU/min	739	1308	
Heat rejection to coolant at:	Prime Power	kW	141	163	
		BTU/min	8019	9270	
	Standby Power	kW	152	177	
		BTU/min	8644	10066	
Coolant	Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60				
Radiator cooling system type	Closed circuit				
Standard radiator core area	m ²		0,8		
	foot ²		8,61		
Fan diameter	mm		890		
	in		35,04		
Fan power consumption - LOW fan ratio	kW		6	11	
	hp		8	15	
Fan power consumption - STD fan ratio	kW		10	18	
	hp		14	24	
Fan drive ratio - LOW	0,84 : 1				
Fan drive ratio - STD	0,99 : 1				
Coolant capacity,	engine	litre	20		
		US gal	5,28		
	std radiator and hoses	litre	24		
		US gal	6,34		
Coolant pump	drive/ratio		Belt / 1,43 :1		
Coolant flow with standard system	l/s		5	5,5	
	US gal/s		1,32	1,45	
Minimum coolant flow	l/s		4,5	5,2	
	US gal/s		1,19	1,37	
Maximum outer circuit restriction, including piping	kPa		30	50	
	psi		4,4	7,3	
Thermostat	start to open	°C	82		
		°F	180		
	fully open	°C	92		
		°F	198		
Maximum static pressure head (expansion tank height + pressure cap setting)	kPa		100		
	psi		14,5		
Minimum static pressure head (expansion tank height + pressure cap setting)	kPa		70		
	psi		10,2		
Standard pressure cap setting	kPa		70		
	psi		10,2		
Maximum top tank temperature	°C		107		
	°F		225		
Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still are functioning	litre		1,8		
	US gal		0,48		

Charge air cooler system

		rpm		1500	1800
Heat rejection to charge air cooler	Prime Power	kW	72	80	
		BTU/min	4095	4550	
	Standby Power	kW	83	80	
		BTU/min	4720	4550	
Charge air mass flow	Prime Power	kg/s	0,49	0,54	
	Standby Power	kg/s	0,52	0,55	
Charge air inlet temp. (Charge air temp after turbo compressor)	Prime Power	°C	192	196	
		°F	378	385	
	Standby Power	°C	207	196	
		°F	405	385	
Charge air outlet temp. (Charge air temp after intercooler)	Prime Power	°C	44	44	
		°F	111	111	
	Standby Power	°C	45	45	
		°F	113	113	
Maximum pressure drop over charge air cooler incl. piping		kPa	8		
		psi	1,16		
Charge air pressure (After charge air cooler)		kPa	220		
		psi	31,91		
Standard charge air cooler core area		m ²	0,89		
		foot ²	9,58		

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m ³ /s	External restriction Pa	Air flow m ³ /s	External restriction Pa
1500 (STD 0,99)	55			5,7	304
	58			6,2	156
	61	5,9	235	6,8	0
	63	6,3	125		
	65	6,8	0		
1800 STD (0,99)	58			7,0	455
	60			7,4	290
	63	7,5	275	8,2	0
	65	8,0	100		
	66	8,3	0		
1500 (LOW 0,84)	45			4,6	246
	50	4,4	292	5,2	78
	52	4,7	224	5,5	0
	55	5,2	78		
	58	5,5	0		
1800 (LOW 0,84)	51			6,1	240
	53	5,9	285	6,5	115
	55	6,3	172	6,8	0
	58	6,8	0		

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Isochronus
Governor droop	0-8 %	0,0
Governor response	Adjustable PID-constants (VODIA)	Standard
Dual speed	YES	1500 or 1800
Idle speed	600-1200	900
Fine speed adjustment	± 120	0
Stop function	Energized to Run / Stop	Energized to Stop
Preheating function	On / Off	On
Lamp test	On / Off	On

Engine sensor and switch settings

Parameter	Unit	Alarm level		Engine protection		
		Setting range	Default setting	Level	Action. Default/Alternative	
Oil temp	°C	120 - 130	125	Setting +5	Shut down.	
Oil pressure	Low idle	kPa	-	190,0	-30,0	Shut down.
	1500 rpm	kPa	-	250,0	-30,0	Shut down.
	1800 rpm	kPa	-	300,0	-30,0	Shut down.
Oil level		-	Min level	-	-	
Piston cooling pressure >1000 rpm	kPa	-	150	150,0	Shut down.	
Coolant temp	°C	95 - 103	102	Setting +5	Shut down.	
Coolant level		See cooling system	On	Low level		
Fuel feed pressure	Low idle	kPa	-	100	-	-
	>1400 rpm		-	200	-	-
Water in fuel		-	High level	-	-	
Crank case pressure	kPa	-	Increased pressure	Increased pressure	Shut down.	
Air filter pressure droop	kPa	-	5	-	-	
	0,0		Alarm level		Engine protection	
Altitude, above sea	m	-	-	-	Automatic derating, see section derating	
Charge air temp	°C	-	80	85	Shut down.	
Charge air pressure	1500 rpm	kPa	-	360	370	Shut down.
	1800 rpm	kPa	-	350	360	Shut down.
Engine speed	rpm	100 - 120% of rated speed	120% of rated speed	Alarm level	Shut down.	

Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy

Electrical system

Voltage and type		24V / insulated from earth	
Alternator:	make/output	A	Bosch 80 A
	tacho output	Hz/alt. Rev	6
	drive ratio		5,3:1
Starter motor	make	Melco	
	type	105P70	
	kW	7,0	
Number of teeth on:	flywheel	153	
	starter motor	12	
Max wiring resistance main circuit		mΩ	2
Cranking current at +20°C		A	180
Crank engine speed at 20°C		rpm	155
Starter motor battery capacity:	max	Ah/A	2x225
	min at +5°C	Ah/A	-
Inlet manifold heater (at 20 V)		kW	4,0
Power relay for the manifold heater		A	1

Power take off**lb 2921 0**

Front end in line with crank shaft max:		Nm	-	
		lbft		
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	-	-
		hp		
	max down	kW	-	-
		hp		
Timing gear at compressor PTO max:		lbft	118	
Speed ratio direction of rotation viewed from flywheel side		0,91:1/clockwise		
Timing gear at servo pump PTO max:		Nm	100	
		lbft	74	
Speed ratio direction of rotation viewed from flywheel side		1,58:1/clockwise		
Timing gear at hydraulic pump PTO max:		Nm		
		lbft		
Speed ratio direction of rotation viewed from flywheel side				
Max allowed bending moment in flywheel housing		Nm	15000	
		lbft	11063	
Max. rear main bearing load		N	4000	
		lbf	899,2	