

VOLVO PENTA D11B2 (R5-725 IPS)	Document No	Issue Index
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General

4-stroke direct injected, turbocharged and aftercooled diesel engine

Number of cylinders		6
No of valves		24
Displacement, total	litres in ³	10,84 661,3
Firing order		1-5-3-6-2-4
Rotational direction, viewed from the front		Clockwise
Bore	mm in	123 4,84
Stroke	mm in	152 5,98
Compression ratio		16,5:1
Max. static forward inclination:	°	0
Max. static backward inclination:	°	7
Max. intermittent forward inclination while running:	°	10
Max. intermittent backward inclination while running:	°	17
Max. intermittent side inclination while running:	°	30
Idling speed	rpm	600 (+50)
Rated speed R5	rpm	2500
Propeller selection range R5	rpm	2500-2550
Dry weight engine BT	kg lb	1195 2635

Performance		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Crankshaft power 1), 5)	5	kW	106	181	249	329	411	482	519	533	533	533	
		hp	144	246	339	447	559	656	706	725	725	725	
Propeller shaft power 1) (At full load) With drive IPS	5	kW	100	171	235	311	388	455	490	504	504	504	
		hp	136	233	320	423	528	619	667	685	685	685	
Propellershaft power at prop. load x ^{2,5} With drive IPS	5	kW	21	39	65	98	165	254	326	409	455	504	
		hp	28	53	88	134	224	345	443	556	619	685	
Propellershaft power at prop. load x ³ With drive IPS	5	kW	11	23	43	71	132	221	299	392	446	504	
		hp	15	32	58	96	180	301	406	533	606	685	
Torque at crankshaft 2)	5	Nm	1446	1920	2162	2417	2453	2423	2360	2213	2121	2036	
		lbf ft	1067	1416	1594	1782	1809	1787	1741	1632	1564	1502	
Mean piston speed		m/s	3,5	4,6	5,6	6,6	8,1	9,6	10,6	11,7	12,2	12,7	
		ft/s	11,6	15,0	18,3	21,6	26,6	31,6	34,9	38,2	39,9	41,6	
Effective mean pressure 2)	5	MPa	1,68	2,23	2,51	2,80	2,84	2,81	2,74	2,57	2,46	2,36	
		psi	243,2	323,0	363,6	406,5	412,6	407,4	396,9	372,2	356,7	342,4	
Max combustion pressure 2)	5	MPa	18,5	19,3	20,2	20,3	19,8	19,9	20,3	20,3	19,9	20	
		psi	2683	2799	2930	2944	2872	2886	2944	2944	2886	2901	

Lubricating system

Specific lubricating oil consumption.	g/kWh	0,1
Max. oil volume including filters for all allowed installation inclinations:	litres	38
	US gal	10,04
Max. oil volume excluding filters for all allowed installation inclinations:	litres	33
	US gal	8,72
Min. oil volume excluding filters for all allowed installation inclinations:	litres	29
	US gal	7,66

1) ISO 3046, fuel temp 40°C.

ISO 8665 (=SAE J 1228=ICOMIA 28-83)

2) At power according to 1).

3) If reverse gear is used, 4% in heat rejection will be added for its oil cooler.

4) Acc. to ISO 3744

5) At installed back pressure

Fuel system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Specific fuel consumption 2)	5	g/kWh lb/hph	217 0,352	216 0,35	227 0,368	218 0,353	200 0,324	206 0,334	211 0,342	217 0,352	222 0,36	224 0,363
Fuel consumption, Test cycle E5	5	g/kWh lb/hph	223 0,36									
Fuel consumption at prop. load x ^{2,5}	5	l/h US gal/h	6,6 1,7	11,6 3,1	18,4 4,9	27,2 7,2	44,6 11,8	67,5 17,8	87,4 23,1	113,0 29,9	126,5 33,4	139,5 36,9
Fuel consumption at full load	5	l/h US gal/h	27,5 7,3	46,8 12,4	67,6 17,9	85,8 22,7	98,4 26,0	118,8 31,4	131,0 34,6	138,4 36,6	141,6 37,4	142,9 37,7

Intake and exhaust system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500	
Specific exhaust heating effect in percent of crankshaft power	5	%	68	70	78	78	69	75	79	82	85	86	
Exhaust temperature at the exhaust pipe connecting flange after the turbo charger.	5	°C °F	422 792	529 984	623 1153	639 1182	512 954	519 966	524 975	526 979	526 979	522 972	
Permitted back pressure in the exhaust line at rated speed. (Installed back pressure)		kPa psi								Max	15 2,2		
		kPa psi								Min			

Intake and exhaust system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Engine air consumption at 25°C / 77°F atmospheric pressure 100kPa and relative humidity 30%.	5	m³/min cu.ft./min	7,5 264,9	10,2 360,2	13 459,1	16,5 582,7	24,1 851,1	30,2 1067	33,9 1197	36,5 1289	37,6 1328	38,3 1353
Charge air pressure Inlet manifold	5	kPa psi	110 16,0	131 19,0	147 21,3	167 24,2	213 30,9	233 33,8	239 34,7	237 34,4	235 34,1	232 33,6
Exhaust gas flow	5	m³/min cu.ft./min	19 671	30 1059	43 1519	55 1942	66 2331	80 2825	87 3072	93 3284	95 3355	96 3390

Cooling system	Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Radiated heat in percent of crankshaft power.	5	%	2,4	2,3	2,7	2,2	1,3	1,1	1,1	1,2	1,2	1,1
Heat rejection to charge air cooler in percent of crankshaft power.	5	%	16	14	15	13	17	19	20	21	22	23
Coolant heat rejection to HE, incl. engine oil cooler and excl. charge air cooler, in percent of crankshaft power.	5	%	48	65	85	79	49	49	51	56	60	61
Coolant flow with fully open thermostat and std cooling system		l/min cu.ft./min	249 8,8	342 12,1	400 14,1	477 16,8	591 20,9	693 24,5	742 26,2	750 26,5	738 26,1	733 25,9
Max. permissible temperature on coolant in engine outlet		°C °F	98 208									
Coolant volume engine, including heat exchanger and charge air cooler		litres US gal.	46 12,15									
Max. additional coolant for cabin heater etc. with std. Expansion tank		litres US gal.	40 10,57									
Maximum coolant flow to cabin heater etc.		l/min cu.ft./min	76 2,68									
Thermostat, start open at		°C °F	76 169									
Thermostat, fully open at		°C °F	86 187									

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Raw water circuit		rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Nominal raw water design flow	l/min		76	99	121	141	174	204	227	249	255	261
	cu.ft/min		2,7	3,5	4,3	5,0	6,1	7,2	8,0	8,8	9,0	9,2
Maximum raw water pump suction head	kPa		30									
	psi		4,4									
Maximum raw water temperature entering heat exchanger	°C		32									
	°F		90									

Emissions		Rating	rpm	700	900	1100	1300	1600	1900	2100	2300	2400	2500
Smoke at prop. load x ^{2,5}	5	*BSU		0,0	0,2	0,3	0,7	0,5	0,2	0,2	0,4	0,4	0,4
Noise at prop. load x ^{2,5} . 4)	5	dBA		103,1	106,3	109	110,3	111,1	113,8	115,3	116,9	117,8	118,2

***NB.!** BSU are calculated values. Measured values are acc. to ISO 10054 in FSN units

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Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	Signal	Unit	Range	Warning Initial Delay / Warning Delay	Warning Level	Derating Level	Shutdown Initial Delay / Shutdown Delay	Shutdown Level (Tolerance)
Charge air pressure	0,5-4,5 V	kPa	50 - 400 ± 4,2kPa	30 sec from start / 2 sec	270 kPa (relative)	280 kPa*	NA	NA
Charge air temperaure	50-0 kΩ	°C	-40 - 130 ± 4%	30 sec from start / 2 sec	75°C	80°C (soft 3)	NA	NA
Coolant level switch	Digital		ON/OFF	30 sec from start / 100 sec	Low level / Lost signal	NA	NA	NA
Coolant temperature	50-0 kΩ	°C	-40 - 140 ± 1.5°C	30 sec from start / 2 sec	98°C	101°C (soft 1)	NA	NA
Engine speed cam	Frequency	rpm		Instant	Lost signal	Lost signal**	NA	NA
Engine speed crank	Frequency	rpm		Instant	Lost signal	Lost signal**	NA	NA
Exhaust gas dry temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 5 sec	Fault Limit table 1	655°C (soft 4)	NA	NA
Exhaust gas wet temperature	PT200	°C	-40 - 750 ± 2.5%	30 sec from start / 5 sec	200°C	NA	NA	NA
Oil level sensor	Digital		ON/OFF	30 sec from start / 5 sec	Low level / Lost signal	NA	NA	NA
Oil temperature	50-0 kΩ	°C	-40 - 140 ± 3.5%	30 sec from start / 2 sec	120°C	122°C (soft 2)	NA	NA
Water in fuel switch	Digital		ON / OFF	All the time	Water in fuel	NA	NA	NA
Reversing gear oil pressure (EVC)	0.5-4.5 V	kPa	0-3000 ± 3%	60 sec from start / 7 sec	700 kPa	NA	NA	NA
Reversing gear temperature (EVC)	50-0 kΩ	°C	-40 - 140 ± 2.5%	NA (IB) 2s (IPS)	95°C Lost signal during slip	NA	NA	NA

NA = Not applicable

* 50% remaining torque from 1500 rpm

** 80% remaining torque

Run detection S4 should be set to same value as S2, S3

Sensors (rpm dependent)	Signal	Unit	Range	Initial Delay /	Warning Level / Derating Level / Shutdown Level					Switches
Fuel pressure	0,5-4,5 V	kPa	0-700 ± 1.5%		0 rpm	600 rpm	1000 rpm	1500 rpm	2500 rpm	
Warning Level		kPa		30 sec from start / 2 sec	NA	125	200	260	270	
Derating Level		kPa		NA	NA	NA	NA	NA	NA	
Oil pressure	0,5-4,5 V	kPa	0-700 ± 1.5%		0 rpm	600 rpm	1000 rpm	1500 rpm	2500 rpm	
Warning Level		kPa		30 sec from start / 1 sec	NA	136	280	320	330	
Derating Level		kPa		Instant after warning	NA	80	260	300	310	30% remain torque > 1500 rpm
Shutdown Level	NA	kPa	NA	NA	NA	NA	NA	NA	NA	
Piston cooling pressure	0.5-4.5 V	kPa	0-700 ± 1.5%		0 rpm	600 rpm	1000 rpm	1500 rpm	2500 rpm	
Warning Level		kPa		30 sec from start / 4 sec	NA	NA	75	230	250	
Derating Level		kPa		Instant after warning	NA	NA	65	220	240	30% remain torque > 1500 rpm

Warning = Yellow Lamp active

Derating = Red Lamp active

Remarks

	Speed / °C	101°C	103°C	106°C
Soft 1) Soft derate Coolant temp				
Remaining torque in %	600	100%*	100%*	100%*
	1000	100%*	100%*	100%*
	1500 ->	100%*	75%	50%

	Speed / °C	122°C	124°C	126°C
Soft 2) Soft derate Oil temp				
Remaining torque in %	600	100%*	100%*	100%*
	1000	100%*	100%*	100%*
	1500 ->	100%*	50%	30%

	Speed / °C	80°C	85°C	90°C
Soft 3) Soft derate Charge Air Temp				
Remaining torque in %	600	100%*	100%*	100%*
	1000	100%*	100%*	100%*
	1500 ->	100%*	50%	30%

	Speed / °C	655°C	665°C	670°C	675°C
Soft 4) Soft derate Exhaust Temp					
Remaining torque in %	600	100%*	100%*	100%*	100%*
	1000	100%*	100%*	100%*	100%*
	1500 ->	100%*	60%	20%	10%

* = Alarm but no derate

Fault Limit table Exhaust Dry Temp.

Nm \ rpm	1000 rpm	1200 rpm	1300 rpm	1400 rpm	1500 rpm	1600 rpm	2000 rpm	2500 rpm
600	575	620	650	620	580	560	560	560
1000	575	620	650	620	580	560	560	560
1400	575	620	650	620	580	560	560	560
1600	575	620	650	620	580	560	560	560
2000	575	620	650	620	580	560	560	560
2200	575	620	650	620	580	560	560	560
2400	575	620	650	620	580	560	560	560
2600	575	620	650	620	580	560	560	560

Technical data - Drive unit

Drive line		IPS950
Transmission type		IPS2-C
Gear ratio (total)		1,70:1
Steering angle, max.		+/- 27°
Total weight of drive unit (1)	kg	586
Oil capacity, approx.	litres	26
Oil volume difference MIN-MAX	litres	0,5
Oil type		Volvo Penta API GL5 75W/90
Propeller range		IPS950: P1-P7 (eg. not PS4 & PS5)

(1) Including oil, exhaust pipe and elbow, clamping ring and various installation components. Propellers are not included in total weight

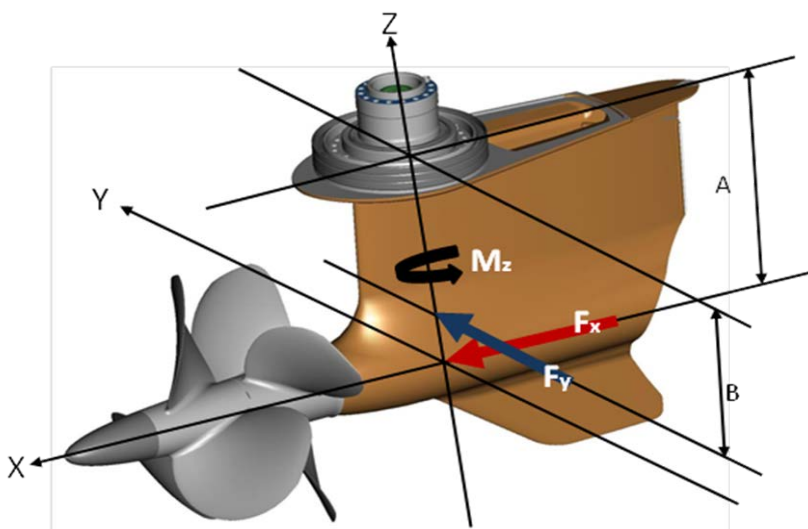
"Generalized maximum load document"for IPS2

Valid products	Drive Unit	Gear Ratio
IPS950	IPS2	1,70:1

Loads provided in chart are single maximum loads i.e. not to be used for fatigue calculations

Speed range (top speed)	Load vektor	Maximum load
20-28 kn	F _x	37 kN
	F _y (+/-)	24 kN
	M _z (+/-)	12 kNm
28-42 kn	F _x	26 kN
	F _y (+/-)	52 kN
	M _z (+/-)	12 kNm

A	450 mm
B	382 mm



Important Note!

The above forces and torque are to be used as the base for maximum load in normal operations. Volvo Penta requires however that the detailed guidelines for the structure around the IPS unit are followed in order to ensure structural strength in case of grounding.

