VOLVO PENTA D13B MG RC 360	Document No 21720676	Issue Index 08

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			18.5
Dry weight	Engine only, excluding cooling system	kg lb	1500 3307
	Genset, see dimension drawing	kg lb	

Performance			**rpm** **load**	**1500** **25%**	**50%**	**75%**	**100%**	**110%**
Power setting 300 kW		without fan	kW hp	75 102	150 204	225 306	300 408	330 449
		with fan 890 mm	kW hp	64 87	139 189	214 291	289 393	319 434
Torque at:	Power setting 300 kW		Nm lbft	477 352	955 704	1432 1056	1910 1409	2101 1549
Mean piston speed			m/s ft/sec			7,9 26,0		
Effective mean pressure at:	Power setting 300 kW		MPa psi	0,5 68	0,9 136	1,4 204	1,9 272	2,1 300
Max combustion pressure at:	Power setting 300 kW		MPa psi	7 1015	9,7 1407	13,8 2002	15,4 2234	16,1 2335
Total mass moment of inertia, J (mR^2) Engine only			kgm^2 $lbft^2$			3,43 81,4		
Degree of irregularity at:	Power setting 300 kW							
Friction Power			kW hp	32 44	32 44	32 44	32 44	32 44
If applicable Derating are described in Technical Diagrams								

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Performance			**rpm** **load**	**1800** **25%**	**50%**	**75%**	**100%**	**110%**
Power setting 360 kW		without fan	kW	90	180	270	360	396
			hp	122	245	367	490	539
		with fan 890 mm	kW	71	161	251	341	377
			hp	97	219	341	464	513
Power setting IMO Tier II 360 kW		without fan	kW	90	180	270	360	396
			hp	122	245	367	490	539
		with fan 890 mm	kW	71	161	251	341	377
			hp	97	219	341	464	513
Torque at:	Power setting 360 kW		Nm	477	955	1432	1910	2101
			lbft	352	704	1056	1409	1549
Mean piston speed			m/s			9,5		
			ft/sec			31,2		
Effective mean pressure at:	Power setting 360 kW		MPa	0,5	0,9	1,4	1,9	2,1
			psi	68	136	204	272	300
Max combustion pressure at:	Power setting 360 kW		MPa	7,9	11,4	14,6	17,2	17,9
			psi	1146	1653	2118	2495	2596
Total mass moment of inertia, J (mR^2) Engine only			kgm^2 $lbft^2$			3,43 81,4		
Degree of irregularity at:	Power setting 360 kW							
Friction Power			kW	46	46	46	46	46
			hp	62,56	62,56	62,56	62,56	62,56
If applicable Derating are described in Technical Diagrams								

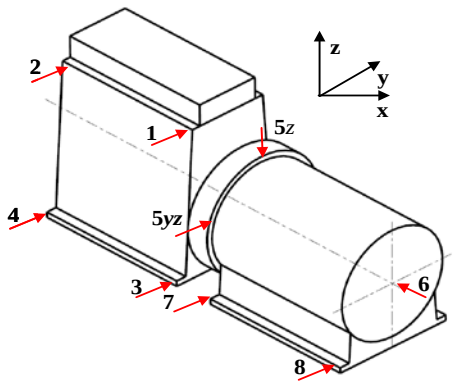
Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (with intake and without exhaust noise)
Tolerans ± 0.75 dB(A)

			rpm **load**	**1500** **25%**	**50%**	**75%**	**100%**	**110%**
Measured sound power Lw	No load		dB(A)	112,9	112,9	112,9	112,9	112,9
	Power setting 300 kW		dB(A)	114	114	113,3	113,6	113,7
			rpm			**1800**		
Measured sound power Lw	No load		dB(A)	116,9	116,9	116,9	116,9	116,9
	Power setting 360 kW		dB(A)	117,4	117,1	117,1	117,2	117,2

Vibrations (vibration velocity)

Declared vibration levels according to ISO 8528-9



rpm	**1500**		
	RMS Velocity (10 - 1000Hz) Measurement direction		
Measuring position	Axial [x] mm/s	Transverse [y] mm/s	Vertical [z] mm/s
1	11,4	13,7	16,9
2	10,9	15,2	14,4
3	9,9	12,6	10,5
4	10,4	18,5	16,2
5	10,1	6,2	14,2
6	13,6	14,8	21,4
7	10,2	12,4	18,3
8	10,2	15	18,5
rpm		**1800**	
1	10,8	16,0	18,0
2	11,5	32,7	20,5
3	10,8	21,4	28,0
4	10,3	20,7	28,3
5	9,7	9,8	17,5
6	15,4	20,0	16,5
7	9,7	18,4	24,9
8	9,9	21,3	24,2

Test conditions for load acceptance data

Warm engine. UFRO according to stamford recommendation (Start at -3Hz) Minimum dip setting	**Generator**	**Modell**	**Type of AVR**
	Stamford	HCM 534C	MX341

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)	
	Nominal	110% power	Nominal	110% power	(%)	Nomi-nal	110% power	Nomi-nal	110% power
0-20	0,9	0,9	0,3	0,3	20-100	10,1	13,0	0,7	2,6
0-40	1,5	1,8	0,3	0,4	40-100	4,2	5,4	0,6	2,0
0-60	3,7	5,7	0,5	0,4	60-100	1,3	2,9	0,3	1,5
0-80	10,4	13,8	0,6	0,7	80-100	0,7	0,7	0,2	0,3
0-100	19,5	26,2	0,8	2,1					
0-68,1	**6,7 (G3)**		0,4		68,1-100	1,0		0,3	
0-61,8		**6,7 (G3)**		0,4	61,8-100		2,3		1,3
0-77,9	**9,6 (G2)**		0,6		77,9-100	0,7		0,3	
0-70,7		**9,6 (G2)**		0,6	70,7-100		1,0		0,6
0-50-100			2,7						
100-0	-2,2	-2,3	0,3	0,3					

Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Nominal	110% power	Nominal	110% power	(%)	Nomi-nal	110% power	Nomi-nal	110% power
0-20	1,0	1,0	0,1	0,2	20-100	5,5	6,5	0,4	0,9
0-40	1,5	1,7	0,2	0,1	40-100	2,3	3,3	0,1	0,6
0-60	2,3	4,2	0,3	0,3	60-100	1,0	1,6	0,1	0,1
0-80	6,3	8,0	0,3	0,3	80-100	49,0	0,7	0,1	0,1
0-100	10,1	14,8	0,4	1,1					
0-81,7	**6,9 (G3)**		0,3		81,7-100	0,4		0,1	
0-74,2		**6,8 (G3)**		0,3	74,2-100		0,9		0,1
0-99,7	**10 (G2)**		0,4		99,7-100	0,1		0,0	
0-90,5		**10 (G2)**		0,4	90,5-100		0,1		0,2
0-50-100			1,1						
100-0	-2,1	-2,6	0,3	0,2					

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

Lubrication system			rpm / load	1500 25%	50%	75%	100%	110%
Lubricating oil consumption	Power setting 300 kW		liter/h	0,005	0,010	0,015	0,020	0,023
			US gal/h	0,001	0,003	0,004	0,005	0,006
			rpm			1800		
	Power setting 360 kW		liter/h	0,006	0,012	0,018	0,025	0,027
			US gal/h	0,002	0,003	0,005	0,006	0,007
Oil system capacity including filters			liter	49				
			US gal	12,9				
Oil sump capacity:		max	liter	44				
			US gal	11,6				
		min	liter	35				
			US gal	9,2				
Oil change intervals/ specifications: (Fuel quality dependent)	VDS-3		h	600				
	VDS-2		h	400				
			h					
			h					
Engine angularity limits, static (ref. classification rules, roll and pitch simultaneously)		front up	°	36				
		front down	°	36				
		side tilt	°	36				

Lubrication system		rpm	1500	1800
Oil pressure at rated speed		kPa	360	450
		psi	52,2	65,3
Lubrication oil temperature in oil sump:	max	°C	110	
		°F	230	
Oil filter micron size		µ	40	

* See also general section in the sales guide

Fuel system		load	25%	50%	75%	100%	110%
Specific fuel consumption: US EPA Tier 3	Power setting 300 kW	g/kWh	239	209	204	203	203
		lb/hph	0,387	0,339	0,330	0,329	0,330
Specific fuel consumption IMO Tier II	Power setting IMO Tier II	g/kWh	235	203	193	194	195
		lb/hph	0,381	0,329	0,313	0,314	0,316
		rpm			1800		
Specific fuel consumption: US EPA Tier 3	Power setting 360 kW	g/kWh	250	214	212	216	214
		lb/hph	0,405	0,347	0,344	0,349	0,346
Specific fuel consumption IMO Tier II	Power setting IMO Tier II	g/kWh	244	207	200	200	203
		lb/hph	0,396	0,336	0,324	0,325	0,329
Fuel to conform to		ASTM-D975-No. 1 and 2-D, JIS KK 2204, EN 590 MDO-DMX and MDO-DMA (ISO8217)					
		rpm			1500		
System return flow	Power setting 300 kW	liter/h	53	52	52	52	51
		US gal/h	13,9	13,8	13,6	13,6	13,5
		rpm			1800		
	Power setting 360 kW	liter/h	56	56	55	55	55
		US gal/h	14,9	14,7	14,6	14,5	14,4
		rpm			1500		
System supply flow	Power setting 300 kW	liter/h	74	90	106	125	131
		US gal/h	19,6	23,7	28,1	32,9	34,7
		rpm			1800		
	Power setting 360 kW	liter/h	83	102	124	148	156
		US gal/h	22,0	26,9	32,7	39,0	41,2
		rpm			1500		
Normal fuel pressure (after filter)	Power setting 300 kW	kPa	529	519	508	495	490
		psi	76,7	75,3	73,7	71,8	71,1
		rpm			1800		
	Power setting 360 kW	kPa	576	561	548	532	527
		psi	83,5	81,4	79,5	77,2	76,4

Fuel system

Fuel supply line max restriction	kPa psi	30 4,4
Fuel supply max pressure head (day tank, from CL)	m feet	2,0 6,6
Fuel supply line max suction head (from CL)	kPa psi	3,6 11,7
Fuel return line max restriction	kPa psi	20,0 2,9
Maximum allowable inlet fuel temp	°C °F	50 122
Prefilter / Water separator micron size	µ	
Fuel filter micron size	µ	2

Intake system		**rpm** **load**	**25%**	**50%**	**1500** **75%**	**100%**	**110%**
Air consumption at: (+25°C and 100kPa)	Power setting 300 kW	m^3/min cfm	-	-	-	23 812	24 848
		rpm			**1800**		
	Power setting 360 kW	m^3/min cfm	-	-	-	27 954	28 989
Max allowable air intake restriction including piping		kPa psi	3 0,4				
Air filter type			Paper Cartridge				
Air filter cleaning efficiency		%	98,5				

Exhaust system		**rpm** **load**	**25%**	**50%**	**1500** **75%**	**100%**	**110%**
Heat rejection to exhaust at:	Power setting 300 kW	kW BTU/min	-	-	-	183 10407	202 11488
		rpm			**1800**		
	Power setting 360 kW	kW BTU/min	-	-	-	231 13137	258 14672
		rpm			**1500**		
Exhaust gas temperature after turbine at:	Power setting 300 kW	°C °F	-	-	-	386 727	401 754
		rpm			**1800**		
	Power setting 360 kW	°C °F	-	-	-	403 757	435 815
Max allowable back pressure in exhaust line		kPa psi	10 1,5				

Exhaust system		**rpm** **load**	**25%**	**50%**	**1500** **75%**	**100%**	**110%**
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Power setting 300 kW	m^3/min cfm	-	-	-	50,0 1766	53,0 1872
		rpm			**1800**		
	Power setting 360 kW	m^3/min cfm	-	-	-	61 2154	65 2295

Cooling system		**rpm** **load**	**25%**	**50%**	**1500** **75%**	**100%**	**110%**
Heat rejection radiation from engine to surrounding at:	Power setting 300 kW	kW BTU/min	3,0 171	3,5 199	4,0 227	4,5 256	4,7 267
		rpm			**1800**		
	Power setting 360 kW	kW BTU/min	3,5 199	4,0 227	4,5 256	5,0 284	5,2 296

Cooling system

		rpm			**1500**		
Heat rejection to coolant at:	Power setting 300 kW	kW	-	-	-	149	162
		BTU/min				8473	9213
		rpm			**1800**		
	Power setting 360 kW	kW	-	-	-	187	203
		BTU/min				10635	11544

Coolant (40% coolant / 60% water)	See Operators Manual
Radiator cooling system type	Closed circuit

		rpm	**1500**	
Standard radiator core area	Power setting 300 kW	m²	0,8	
		foot²	8,61	
		rpm	**1800**	
	Power setting 360 kW	m²	0,8	
		foot²	8,61	
		rpm	**1500**	
Fan diameter	Power setting 300 kW	mm	890	
		in	35,0	
		rpm	**1800**	
	Power setting 360 kW	mm	890	
		in	35,0	

		rpm	**1500**	
Fan power consumption			fan Ø 890	fan Ø 890
		kW	11	11
		hp	15	15
		rpm	**1800**	
			fan Ø 890	fan Ø 890
		kW	19	19
		hp	26	26

Cooling system

		rpm	**1500**	
Fan drive ratio	fan ø 890		0,99	
		rpm	**1800**	
	fan ø 890		0,99	
Coolant capacity:	engine	liter	20	
		US gal	5,28	
		rpm	**1500**	
	std radiator with hoses		Power setting 300 kW	Power setting IMO Tier II 300
		liter	24	
		US gal	6,34	
		rpm	**1800**	
			Power setting 360 kW	Power setting IMO Tier II 360
		liter	24	
		US gal	6,34	

Coolant pump	drive/ratio		Belt / 1,43:1	
		rpm	**1500**	**1800**
Coolant flow with standard system		l/s	5,22	6,23
		US gal/s	1,38	1,65
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	
Standard pressure cap setting		kPa	75	
		psi	10,9	
Maximum temperature entering engine		°C	98	
		°F	208	

Charge air cooler system		rpm / load	25%	50%	1500 / 75%	100%	110%
Cooling power	Power setting 300 kW	kW	-	-	-	63	71
		BTU/min				3583	4038
		rpm			**1800**		
	Power setting 360 kW	kW	-	-	-	89	97
		BTU/min				5061	5516
		rpm			**1500**		
Charge air mass flow	Power setting 300 kW	kg/s	-	-	-	0,453	0,474
		rpm			**1800**		
	Power setting 360 kW	kg/s	-	-	-	0,541	0,553

Charge air cooler system		rpm			1500		
Charge air inlet temp. (Charge air temp after turbo compressor) (Approx 30°C air temp before compressor)	Power setting 300 kW	°C	-	-	-	184	197
		°F				363	387
		rpm			**1800**		
	Power setting 360 kW	°C	-	-	-	214	229
		°F				417	444
		rpm			**1500**		
Charge air outlet temp. (Charge air temp after charge air cooler) (46°C air before cooler at 1800rpm) (39°C air before cooler at 1500rpm)	Power setting 300 kW	°C	-	-	-	46	49
		°F				115	120
		rpm			**1800**		
	Power setting 360 kW	°C	-	-	-	53	56
		°F				127	133

Maximum pressure drop over charge air cooler, incl. piping		kPa	10
		psi	1,45
		rpm	**1500**
Charge air pressure	Power setting 300 kW	kPa	220
		psi	31,91
		rpm	**1800**
	Power setting 360 kW	kPa	241
		psi	34,95
		rpm	**1500**
Standard charge air cooler core area	Power setting 300 kW	m²	0,82
		foot²	8,82
		rpm	**1800**
	Power setting 360 kW	m²	0,82
		foot²	8,82

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 40% coolant. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

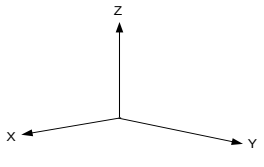
Engine speed rpm	Air on temp °C	Nominal POWER		110% power POWER	
		Air flow m^3/s	External restriction Pa	Air flow m^3/s	External restriction
1500	57,4	5,0	500		
	52,7			5,0	500
	61,2	5,6	300		
	56,8			5,6	300
	64,1	6,3	100		
	60,1			6,3	100
	65,4	6,6	0		
	61,5			6,6	0
1800	54,1	6,5	500		
	49,9			6,6	500
	57,0	7,1	300		
	53,1			7,2	300
	59,5	7,7	100		
	55,8			7,7	100
	60,7	8,0	0		
	57,1			8,0	0

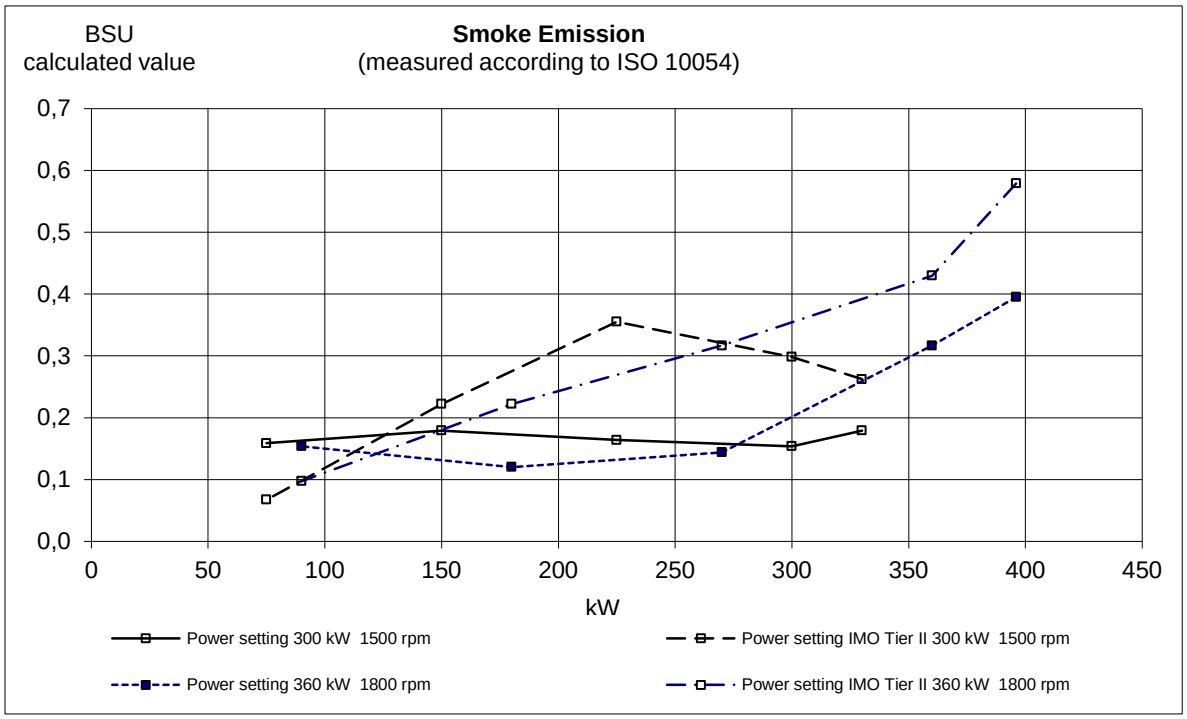
Note! Calculated values >0 Pa

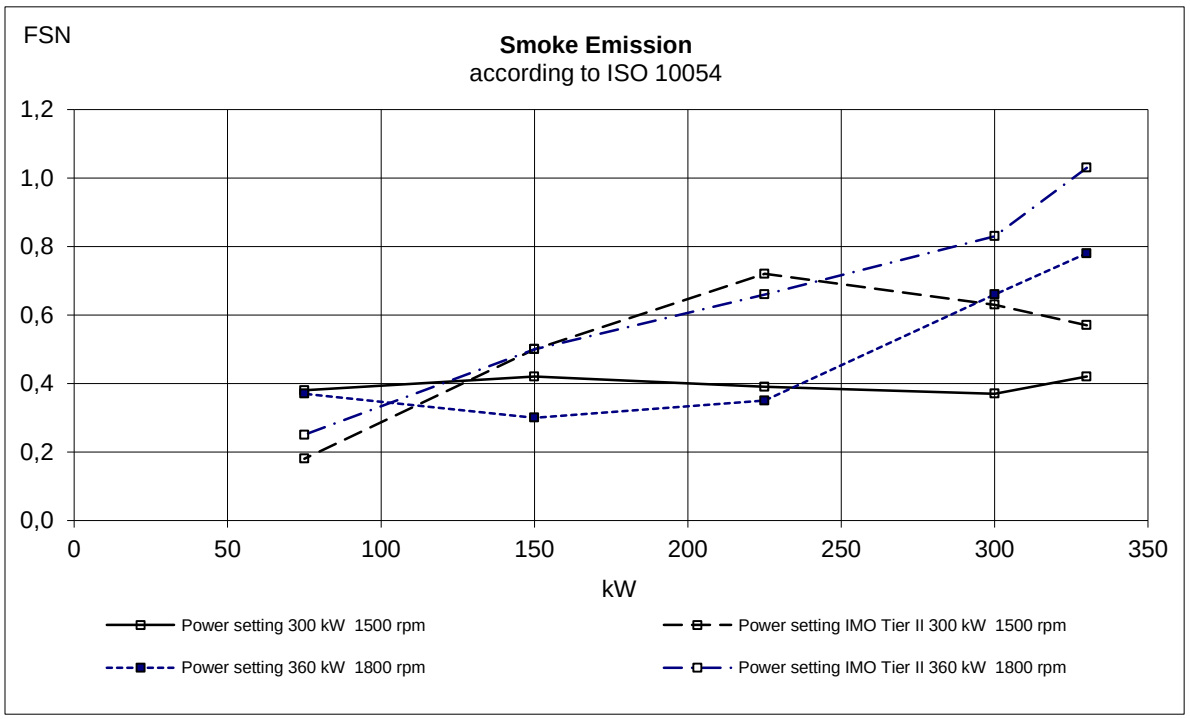
Engine management system

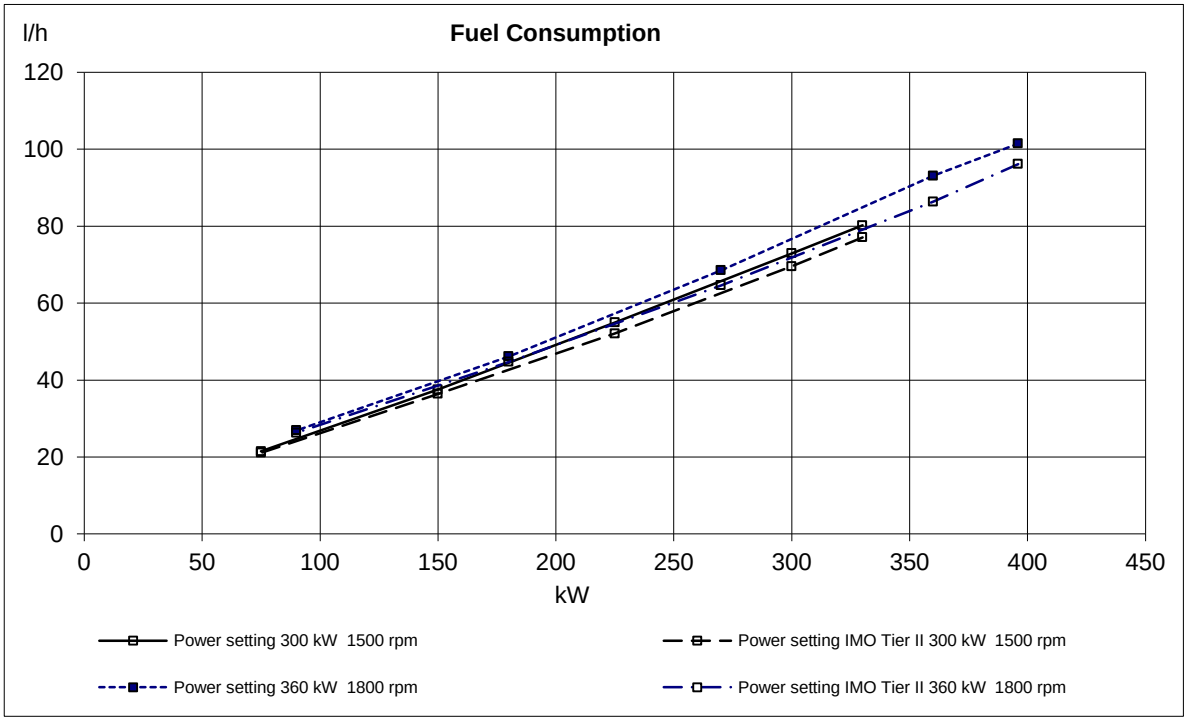
Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Droop
Governor droop	0 / 0.1-5%	4%
Governor response	Adjustable PID (service tool)	0/0/0
Dual speed	YES	1500 or 1800 rpm
Idle speed	600-1200	900
Fine speed adjustment	± 90	0
Stop function	Normaly Closed / Normaly Opend	Depends on order

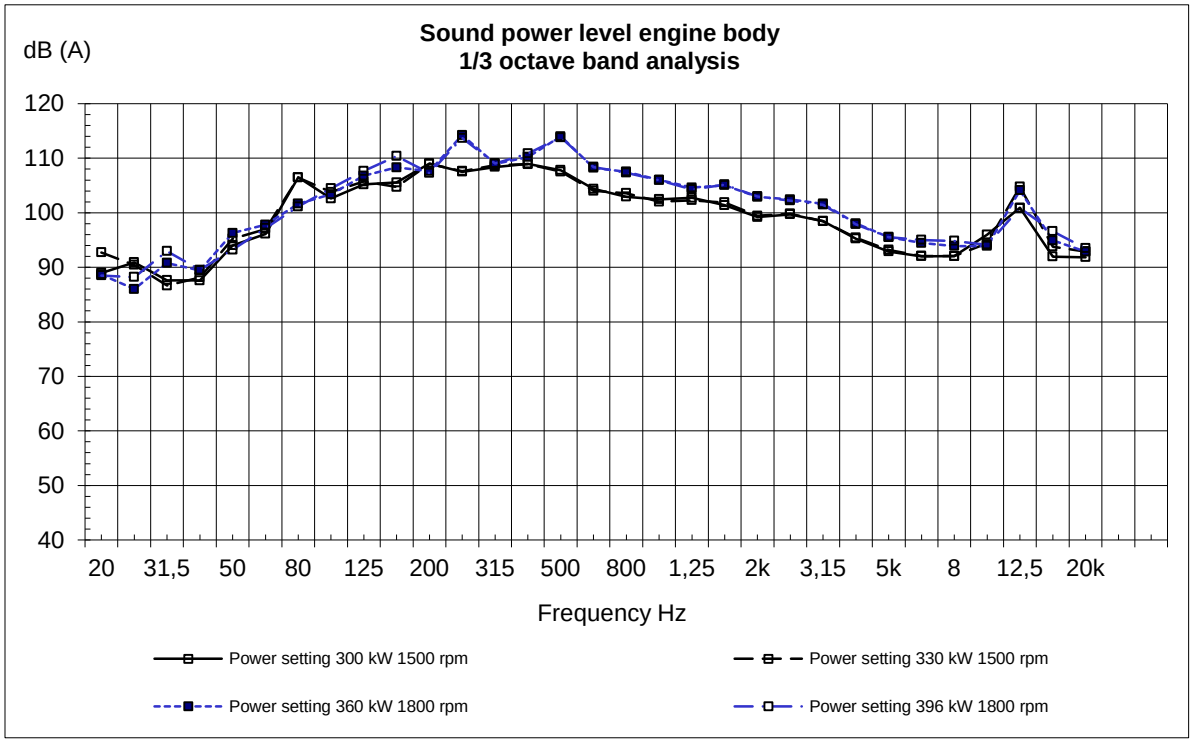
Electrical system		**rpm**	**1500 and 1800**
Voltage and type		24V / insulated from earth	
Alternator:	make/output	Amp	Bosch /110A
	tacho output	Hz/alt. Rev	6
	drive ratio		3,7:1
Starter motor		make	Melco
		type	105P70
		kW	7.0
Starter motor solenoid,	pull current	Amp	280
	hold current	Amp	-
Number of teeth on:	flywheel		153
	starter motor		12
Inrush current at +20°C \ +5°C		Amp	1020 \ 1560
Cranking current at +20°C \ +5°C		Amp	400 \ 530
Crank engine speed at 20°C \ +5°C		rpm	150 \ 130
Starter motor battery capacity:	max	Ah	2x220
	min at +5°C	Ah	2x180

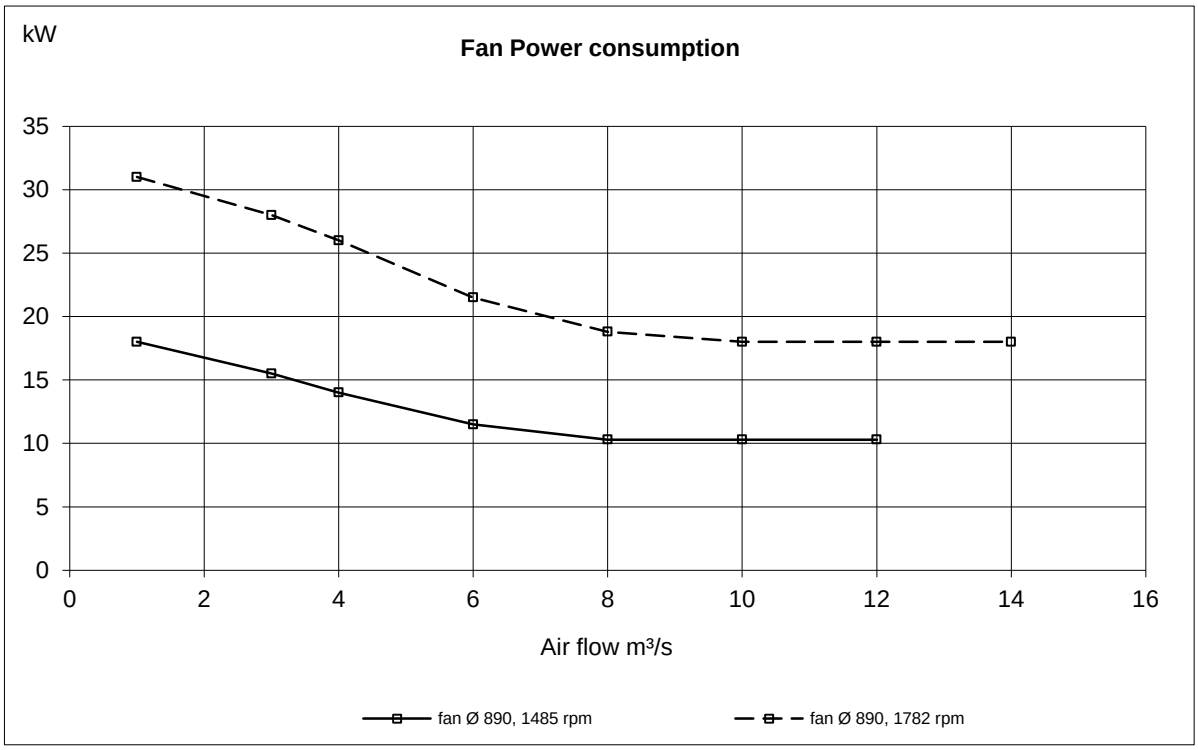
Max. g-force			
	x	m/s²	2
	y	m/s²	2
	z	m/s²	6

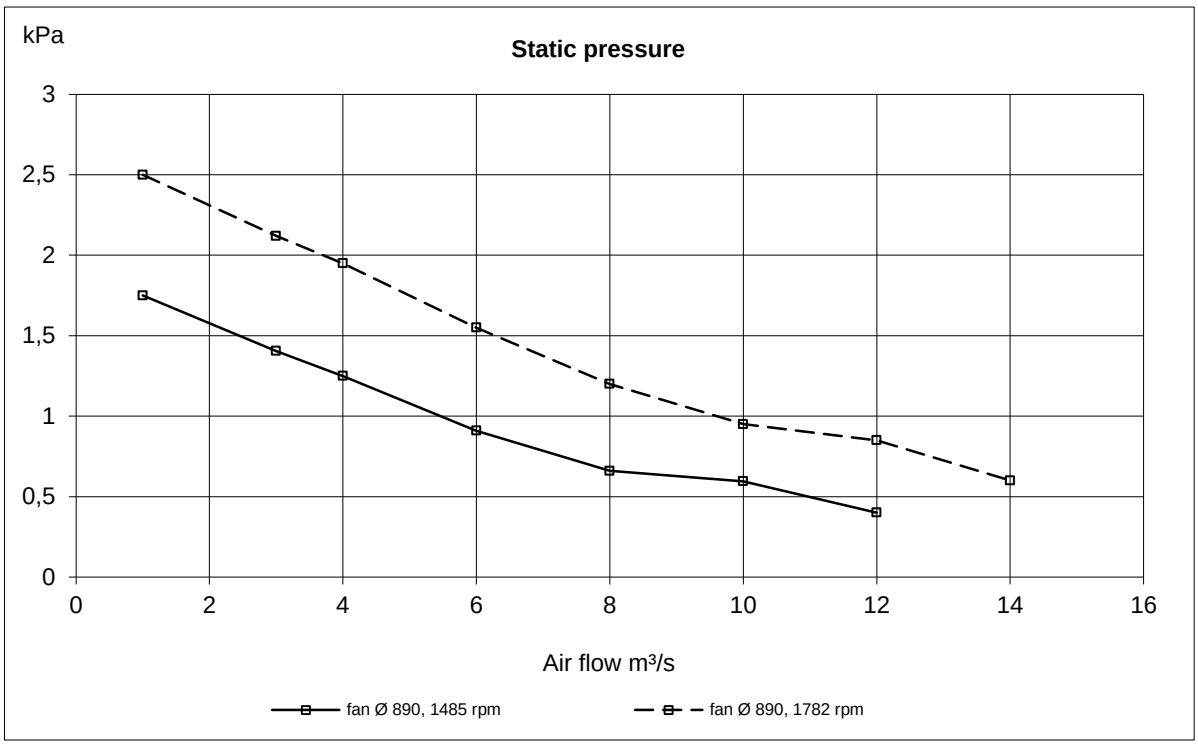

BSU
calculated value
Smoke Emission
(measured according to ISO 10054)
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0,0
0
50
100
150
200
250
300
350
400
450
kW
Power setting 300 kW 1500 rpm
Power setting IMO Tier II 300 kW 1500 rpm
Power setting 360 kW 1800 rpm
Power setting IMO Tier II 360 kW 1800 rpm


FSN
Smoke Emission
according to ISO 10054
1,2
1,0
0,8
0,6
0,4
0,2
0,0
0
50
100
150
200
250
300
350
kW
Power setting 300 kW 1500 rpm
Power setting IMO Tier II 300 kW 1500 rpm
Power setting 360 kW 1800 rpm
Power setting IMO Tier II 360 kW 1800 rpm


l/h
Fuel Consumption
120
100
80
60
40
20
0
0
50
100
150
200
250
300
350
400
450
kW
Power setting 300 kW 1500 rpm
Power setting IMO Tier II 300 kW 1500 rpm
Power setting 360 kW 1800 rpm
Power setting IMO Tier II 360 kW 1800 rpm


Sound power level engine body
1/3 octave band analysis
dB (A)
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
Power setting 300 kW 1500 rpm
Power setting 330 kW 1500 rpm
Power setting 360 kW 1800 rpm
Power setting 396 kW 1800 rpm


kW
Fan Power consumption
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
Air flow m³/s
fan Ø 890, 1485 rpm
fan Ø 890, 1782 rpm


kPa
Static pressure
3
2,5
2
1,5
1
0,5
0
0
2
4
6
8
10
12
14
16
Air flow m³/s
fan Ø 890, 1485 rpm
fan Ø 890, 1782 rpm

Performance	Power (kW)	Rpm
Power setting	300	1500
Power setting	300	1500
Power setting	360	1800
Power setting	360	1800

Sensors Control and Monitoring System							Switches Engine Shutdown System	
Sensors	**Signal**	**Unit**	**Range**	**Initial Delay / Warning Delay**	**Warning Level**	**Derating Level**	**Shutdown Initial Delay / Shutdown Delay**	**Shutdown Level (Tolerance)**
Coolant level switch	Digital		ON/OFF	7,5 sec from start / 7,5 sec	Low(OFF / Open contact)	NA	NA	NA
Coolant temperature	50-0 kΩ	°C	- 40 - 140 ±1.5°C	30 sec from start / 2 sec	98° C	NA	NA	NA
Coolant temperature (SDU)	Digital	°C	ON/OFF	NA	NA	NA	1 sec. from start / 1 sec	105 (±2°C) SDU Ch. S1 (NA for EME. Valid for AUX and HBR modes)*
Engine speed cam	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Engine speed crank	Frequency	rpm		Instant	Lost signal	NA	NA	NA
Eng. overspeed SDU 1500 rpm+15%	Frequency	rpm / Hz	153 puls./rev.	Instant	Lost signal	NA	Instant	1725 rpm / 4399 Hz (-1 to 0%)
Eng. overspeed SDU 1800 rpm+15%	Frequency	rpm / Hz	153 puls./rev.	Instant	Lost signal	NA	Instant	2070 rpm / 5278 Hz (-1 to 0%)
Exhaust gas temperature	PT200	°C	- 40 - 750 ± 2.5%	30 sec from start / 22 sec	575° C	NA	NA	NA
Crankcase pressure	0,5-4,5 V	kPa	0-15 kPa	20 sec from start / Instant	Rapid Pressure Increase	NA	NA	NA
Oil temperature	50-0 kΩ	°C	-40 - 140 °C	30 sec from start / 22 sec	130° C	NA	NA	NA

NA = Not applicable

* Emergency genset modes= EME
Auxiliary genset modes= AUX
Combined genset modes= EME, HBR

Sensors Alarm	Signal	Unit	Range	Initial Delay / Delay	Warning Level / Derating Level / Shutdown Level rpm Map (relative pressure)				Notes
Charge air pressure	0,5-4,5 V	kPa	50 - 600 ± 4 kPa				**1500 rpm**	**1800 rpm**	
Warning Level		kPa		30 sec from start / 2 sec			319	269	
Charge air Temperature	50 - 0 kΩ	°C	-40 - 130°C ±4%				**1500 rpm**	**1800 rpm**	
Warning Level		°C		90 sec from start / 22 sec			80° C	75° C	
Coolant pressure	0,5-4,5 V	kPa	0-300 kPa ±3%				**1500 rpm**	**1800 rpm**	
Warning Level		kPa		30 sec from start / 4 sec			55	81	
Fuel pressure	0,5-4,5 V	kPa	0-700 kPa ±1,5%				**1500 rpm**	**1800 rpm**	
Warning Level		kPa		30 sec from start / 30 sec			270	270	
Oil pressure	0,5-4,5 V	kPa	0-700 kPa ±1,5%				**1500 rpm**	**1800 rpm**	
Warning Level		kPa		30 sec from start / 3 sec			265	265	
Shutdown Level (SDU)	Digital	kPa	ON/OFF	11 s ±20% from start / 1 s			120 ±20	120 ±20	Shutdown Unit Activated S2,S3: 510 rpm ±2% 1300 Hz ±2% 153 pulses / revolution (NA for EME. Valid for AUX and HBR modes)*