General / KC

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	1480 3263
	Genset, see dimension drawing	kg lb	

Performance		**rpm** **load**	**1500** **25%**	**50%**	**75%**	**100%**	**110%**
Power setting 360 kW		kW hp	90 122	180 245	270 367	360 490	396 539
Torque at:	Power setting 360 kW	Nm lbft	573 423	1146 845	1719 1268	2292 1690	2521 1859
Mean piston speed		m/s ft/sec			7,9 26,0		
Effective mean pressure at:	Power setting 360 kW	MPa psi	0,6 91	1,3 182	1,9 272	2,5 363	2,8 400
Max combustion pressure at:	Power setting 360 kW	MPa psi	8 1160	10,3 1494	13,6 1973	17,6 2553	19,3 2799
Total mass moment of inertia, J (mR^2) Engine only		kgm^2 $lbft^2$					
Degree of irregularity at:	Power setting 360 kW						
Friction Power		kW hp	32 44	32 44	32 44	32 44	32 44
If applicable Derating are described in Technical Diagrams							

Performance		**rpm** **load**	**1800** **25%**	**50%**	**75%**	**100%**	**110%**
Power setting 400 kW		kW hp	100 136	200 272	300 408	400 544	440 598
Torque at:	Power setting 400 kW	Nm lbft	531 391	1061 783	1592 1174	2122 1565	2334 1722
Mean piston speed		m/s ft/sec			9,5 31,2		
Effective mean pressure at:	Power setting 400 kW	MPa psi	0,5 76	1,0 151	1,6 227	2,1 303	2,3 333
Max combustion pressure at:	Power setting 400 kW	MPa psi	8,7 1262	11,5 1668	14,2 2060	17 2466	18,3 2654
Total mass moment of inertia, J (mR^2) Engine only		kgm^2 $lbft^2$					
Degree of irregularity at:	Power setting 400 kW						
Friction Power		kW hp	46 62,56	46 62,56	46 62,56	46 62,56	46 62,56
If applicable Derating are described in Technical Diagrams							

VOLVO PENTA 1500rpm/1800 rpm	Document No 21720675	Issue Index 09

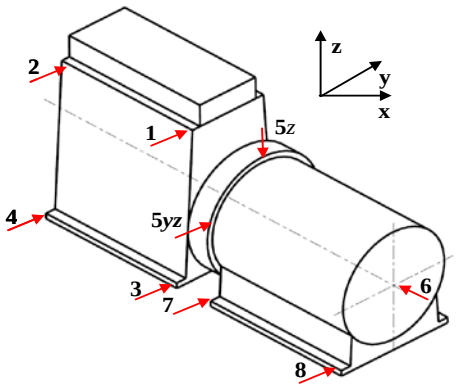
Engine noise emission

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

		rpm			1500		
		load	**25%**	**50%**	**75%**	**100%**	**110%**
Measured sound power Lw	No load	dB(A)	107,5	107,5	107,5	107,5	107,5
	Power setting 360 kW	dB(A)	110,6	111	111,8	111,9	112,1
		rpm			**1800**		
Measured sound power Lw	No load	dB(A)	109,1	109,1	109,1	109,1	109,1
	Power setting 400 kW	dB(A)	112,5	112,6	113	114,3	114,7

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	12,1	13,2	21,7
2	12,9	17,9	20
3	11,4	13	16,9
4	11,4	14,1	18,7
5	12,6	7,6	17,7
6	15,9	20	28,8
7	9,7	15,6	24,6
8	9,4	23,2	18,5
rpm		**1800**	
1	10	18	21,6
2	16	37,5	23,6
3	11	36,5	25
4	13	29,8	20,5
5	12	10,3	21,1
6	18	26,2	18,9
7	10	23,6	29,6
8	10	27,6	26,1

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	HCI534D1	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	2,0	2,0	1,0	1,2	20-100	18,0	22,7	3,5	10,4
0-40	3,3	3,8	1,3	1,3	40-100	7,2	8,7	1,4	6,7
0-60	8,8	11,7	2,0	2,6	60-100	3,0	4,0	1,3	4,7
0-80	18,6	25,5	3,4	4,0	80-100	1,5	1,6	1,1	1,0
0-100	42,8	65,2	6,8	11,9					
0-62.7	**10,2**		2,3		62.7-100	2,7		1,3	
0-57		**10,1**		2,3	57-100		4,8		5,3
0-54.9	**7,1**		1,8		54.9-100	3,6		1,3	
0-49.9		**7,0**		1,8	49.9-100		6,1		5,8
100-0						-4,4	-4,1	1,2	1,2

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	1,2	1,3	0,6	0,6	20-100	7,3	9,1	1,5	5,5
0-40	2,0	2,5	0,8	0,7	40-100	3,5	4,8	1,3	4,2
0-60	4,3	6,2	1,2	1,2	60-100	2,0	2,4	0,7	1,7
0-80	8,6	11,8	1,7	2,0	80-100	0,9	1,1	0,6	0,5
0-100	15,3	20,3	2,2	6,6					
0-84.5	**10,5**		1,9		84.5-100	0,6		0,4	
0-76.8		**10,3**		1,9	76.8-100		1,3		0,5
0-70.1	**7,1**		1,1		70.1-100	1,2		0,7	
0-63.7		**6,9**		1,2	63.7-100		2,1		1,3
100-0	-3,1	-3,3	1,3	1,4					

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 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
		rpm			**1800**		
	Power setting 400 kW	liter/h	0,007	0,014	0,020	0,027	0,030
		US gal/h	0,002	0,004	0,005	0,007	0,008

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 dependant)	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		rpm / load	25%	50%	1500 75%	100%	110%
Specific fuel consumption: US EPA Tier 3	Power setting 360 kW	g/kWh	225,4	203,6	202,0	201,6	198,1
		lb/hph	0,365	0,330	0,327	0,327	0,321
Specific fuel consumption IMO Tier II	Power setting 360 kW	g/kWh	220	197	190	191	192
		lb/hph	0,357	0,319	0,307	0,309	0,312
		rpm			**1800**		
Specific fuel consumption: US EPA Tier 3	Power setting 400 kW	g/kWh	244,5	211,8	212,0	209,0	210,2
		lb/hph	0,396	0,343	0,344	0,339	0,341
Specific fuel consumption IMO Tier II	Power setting 400 kW	g/kWh	236	203	197	199	200
		lb/hph	0,383	0,330	0,320	0,322	0,325
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 360 kW	liter/h	46	45	44	44	44
		US gal/h	12,2	11,9	11,6	11,6	11,6
		rpm			**1800**		
	Power setting 400 kW	liter/h	49	49	48	47	47
		US gal/h	12,9	12,9	12,7	12,4	12,4
		rpm			**1500**		
System supply flow US EPA Tier 3	Power setting 360 kW	liter/h	70	89	109	131	138
		US gal/h	18,6	23,5	28,9	34,6	36,4
System supply flow IMO Tier II	Power setting 360 kW	liter/h	70	87	105	126	135
		US gal/h	18,4	23,1	27,8	33,4	35,7
		rpm			**1800**		
System supply flow US EPA Tier 3	Power setting 400 kW	liter/h	78	100	124	147	158
		US gal/h	20,7	26,3	32,8	38,9	41,7
System supply flow IMO Tier II	Power setting 400 kW	liter/h	77	98	119	142	153
		US gal/h	20,4	25,8	31,4	37,5	40,3
		rpm			**1500**		
Normal fuel pressure (after filter)	Power setting 360 kW	kPa	528	516	500	487	484
		psi	76,6	74,8	72,5	70,6	70,2
		rpm			**1800**		
	Power setting 400 kW	kPa	574	560	542	525	520
		psi	83,3	81,2	78,6	76,1	75,4

Fuel system

Fuel supply line max restriction	kPa	30
	psi	4,4
Fuel supply max pressure head (day tank, from CL)	m	2
	feet	6,6
Fuel supply line max suction head (from CL)	m	4
	feet	11,8
Fuel return line max restriction	kPa	20
	psi	2,9
Maximum allowable inlet fuel temp	°C	50
	°F	122

Fuel system

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 360 kW	m^3/min	12,42	17,68	23,03	26,91	27,77
		cfm	439	624	813	950	981
		rpm			1800		
	Power setting 400 kW	m^3/min	16,35	22,6	28,09	30,26	30,24
		cfm	577	798	992	1069	1068
Max allowable air intake restriction including piping		kPa	3				
		psi	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 360 kW	kW	68	117	166	220	246
		BTU/min	3867	6654	9440	12511	13990
		rpm			1800		
	Power setting 400 kW	kW	79	129	192	264	300
		BTU/min	4493	7336	10919	15013	17061

Exhaust system		rpm / load	25%	50%	1500 / 75%	100%	110%
Exhaust gas temperature after turbine at:	Power setting 360 kW	°C	279	326	351	389	418
		°F	534	619	664	732	784
		rpm			1800		
	Power setting 400 kW	°C	254	293	339	416	464
		°F	489	559	642	781	867
Max allowable back pressure in exhaust line		kPa	10				
		psi	1,5				
		rpm			1500		
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	Power setting 360 kW	m^3/min	22,5	36,1	47,8	58,0	67,3
		cfm	794	1273	1687	2048	2375
		rpm			1800		
	Power setting 400 kW	m^3/min	29	43	57	68	73
		cfm	1038	1513	1996	2399	2565

Cooling system, HT circuit, heat rejection		rpm / load	25%	50%	1500 / 75%	100%	110%
Heat rejection radiation from engine to surrounding at:	Power setting 360 kW	kW	3,5	4,0	4,5	5,0	5,2
		BTU/min	199	227	256	284	296
		rpm			1800		
	Power setting 400 kW	kW	3,8	4,3	4,8	5,3	5,5
		BTU/min	216	245	273	301	313

Cooling system, HT circuit, heat rejection		rpm			1500		
Heat rejection to coolant at: (HT)	Power setting 360 kW	kW	67	100	134	175	186
		BTU/min	3810	5687	7620	9952	10578
		rpm			1800		
	Power setting 400 kW	kW	80	110	152	204	226
		BTU/min	4550	6256	8644	11601	12852

Cooling system, HT circuit, other data

Coolant volume in engine with std. expansion tank		liter US gal	38 10,04		Note! Expansion tank size to be calculated. Recomended. 15% of total coolant volume
Max. additional coolant in HT system with std. expansion tank		liter US gal			
Coolant pump	drive/ratio		1/1,5		
		rpm	**1500**	**1800**	
Coolant flow with fully open thermostat		l/s US gal/s	1,53 0,40	3,6 0,95	
Nominal coolant pressure with standard system		kPa psi	183,0 26,5	225,0 32,6	
Maximum external coolant system restriction, including piping		kPa psi	85 12,3	85 12,3	
Thermostat	start to open	°C °F	82 180		
	fully open	°C °F	92 198		
Design point for box cooler, engine outlet temperature		°C °F	90 194	89 192	
Coolant flow at design point		l/s US gal/s	1,5 0,40	2,7 0,71	
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa psi	85 12,3		
Standard pressure cap setting		kPa psi	75 10,9		
Maximum temperature entering engine		°C °F	60 140	70 158	
Coolant (40% coolant / 60% water)	See Operators Manual				

Cooling system, LT circuit, heat rejection		**rpm** **load**	**25%**	**50%**	**1500** **75%**	**100%**	**110%**
Heat rejection to coolant at: (LT)	Power setting 360 kW	kW BTU/min	13 739	33 1877	59 3355	84 4777	87 4948
		rpm			**1800**		
	Power setting 400 kW	kW BTU/min	23 1308	49 2787	80 4550	105 5971	105 5971

Cooling system, LT, other data

Coolant volume in engine charge air cooler circuit		liter US gal	7 1,85		Note! Expansion tank size to be calculated. Recomended. 15% of total coolant volume
Max. additional coolant in LT system with std. expansion tank		liter US gal			
Maximum static pressure head (expansion tank height + pressure cap setting)		kPa psi	85 12,3		
Standard pressure cap setting		kPa psi	75 10,9		
LT circuit pump	drive/ratio		1/1.5		
		rpm	**1500**	**1800**	
Nominal LT water design flow		l/s US gal/s	1,40 0,37	1,60 0,42	
Nominal LT water pump pressure head at design flow		kPa psi	86 12,5	88 12,8	
Maximum LT waterpump suction head		kPa psi	-14 -2,0	-19 -2,7	
Maximum additional pressure drop LT water circuit		kPa psi	105 15,2	107 15,4	
Maximum allowed LT water circuit pressure before Heat Exchanger (External pump system)		kPa psi	72 10,4	65 9,4	
Maximum temperature entering charge air cooler		°C °F	38 100		
Coolant (40% coolant / 60%water)	Volvo Penta coolant together with clean fresh water				

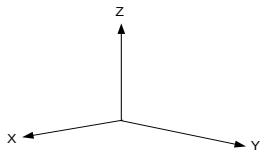
Charge air cooler system		**rpm** **load**	**1500** **25%**	**50%**	**75%**	**100%**	**110%**
Cooling power	Power setting 360 kW	kW	13	33	59	84	87
		BTU/min	739	1877	3355	4777	4948
		rpm			**1800**		
	Power setting 400 kW	kW	23	49	80	105	105
		BTU/min	1308	2787	4550	5971	5971
		rpm			**1500**		
Charge air mass flow	Power setting 360 kW	kg/s	0,246	0,351	0,457	0,534	0,550
		rpm			**1800**		
	Power setting 400 kW	kg/s	0,320	0,441	0,548	0,591	0,591
		rpm			**1500**		
Charge air inlet temp. Charge air temp after turbo compressor)	Power setting 360 kW	°C	76	120	161	195	197
		°F	169	248	322	383	387
		rpm			**1800**		
	Power setting 400 kW	°C	92	138	182	211	217
		°F	198	280	360	412	423

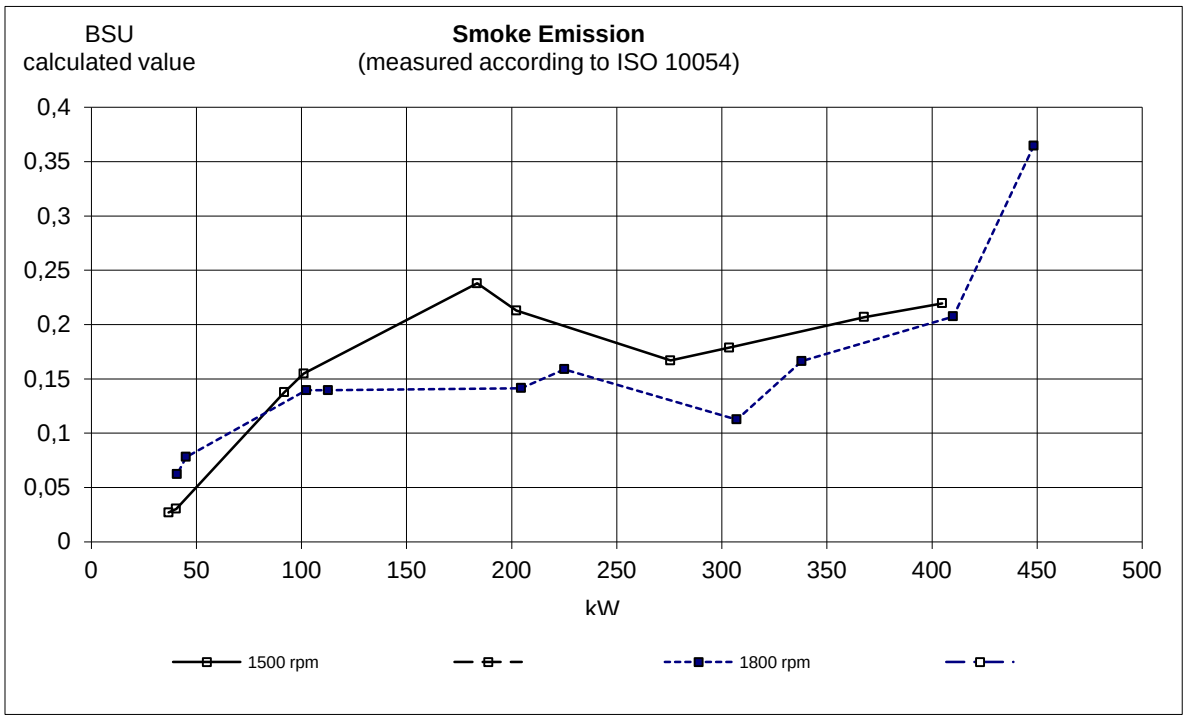
Charge air cooler system		**rpm** **load**	**1500** **25%**	**50%**	**75%**	**100%**	**110%**
Charge air outlet temp. (Charge air temp after charge air cooler)	Power setting 360 kW	°C	22	26	32	38	40
		°F	72	79	90	100	104
		rpm			**1800**		
	Power setting 400 kW	°C	25	30	34	39	40
		°F	77	86	93	102	104
		rpm	**1500**				
Charge air pressure	Power setting 360 kW	kPa	260				
		psi	37,71				
		rpm	**1800**				
	Power setting 400 kW	kPa	241,00				
		psi	34,95				

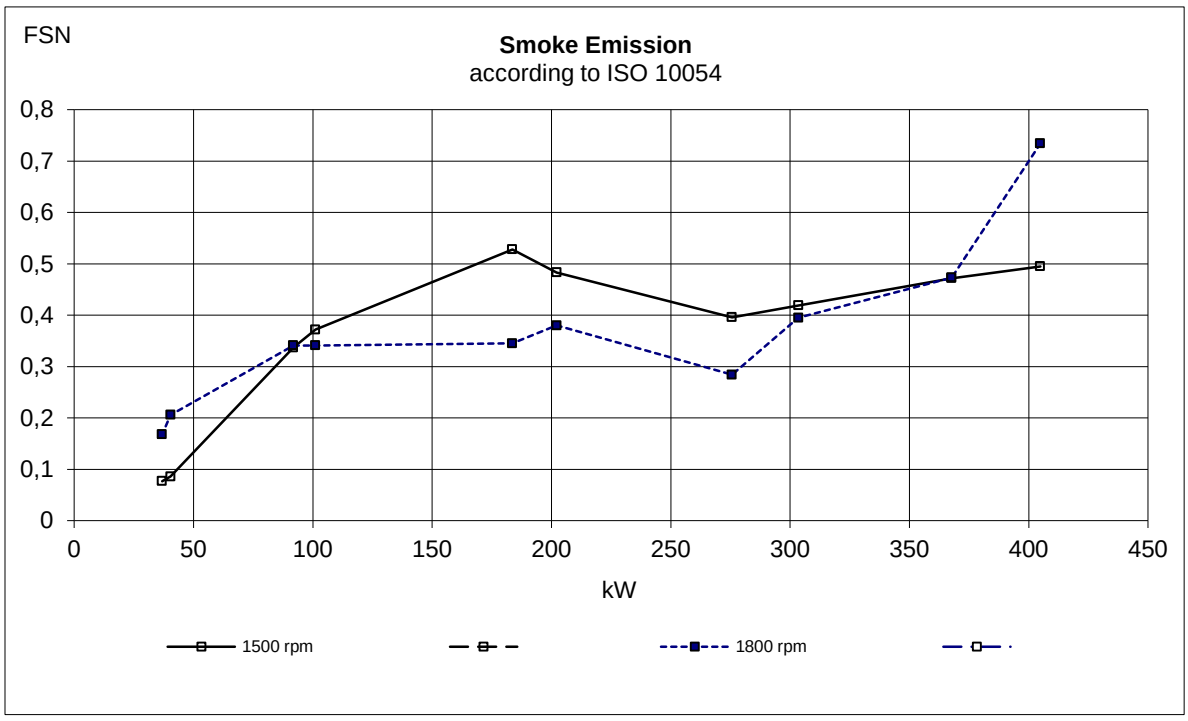
Engine management system

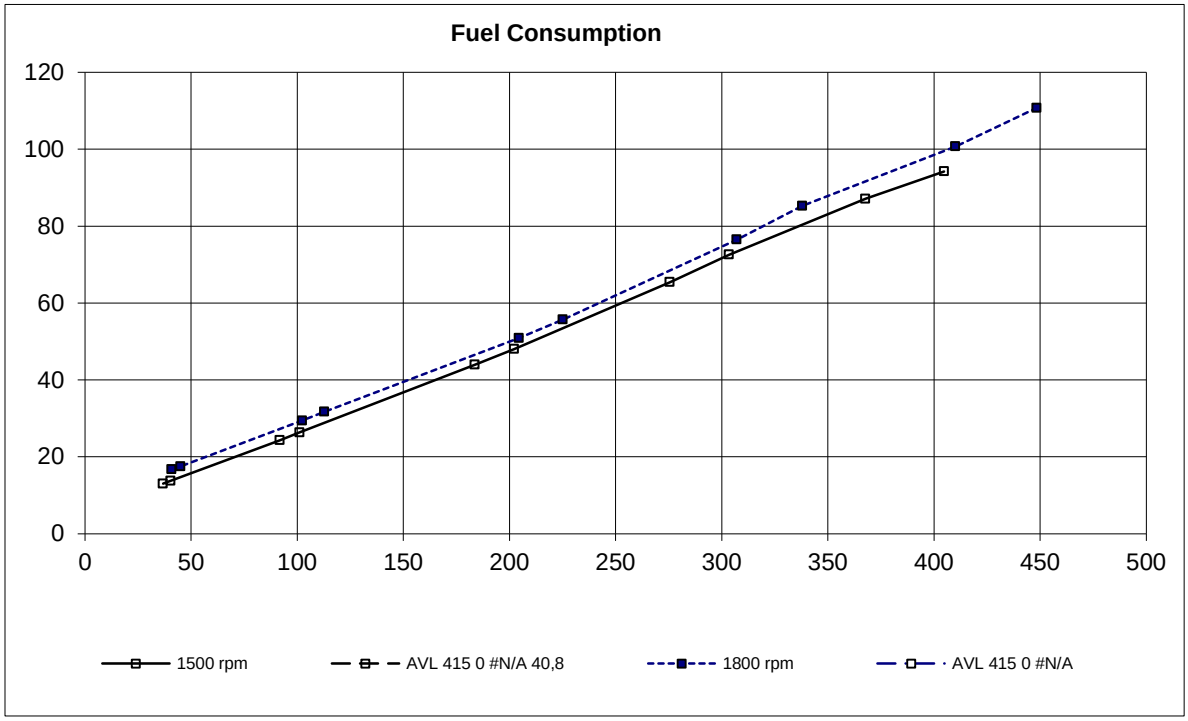
Functionality	Alternatives	Default setting
Governor mode	Isochronus / Droop	Droop
Governor droop	0 / 0,1-5%	4%
Governor response	Adjustable PID (service tool)	0/0/0
Dual speed	YES	1500 or 1800 rpm
Idle speed	600-1200	900
Fine speed adjustment	± 90	0
Stop function	Normaly Closed / Normaly Opend	Depends on order

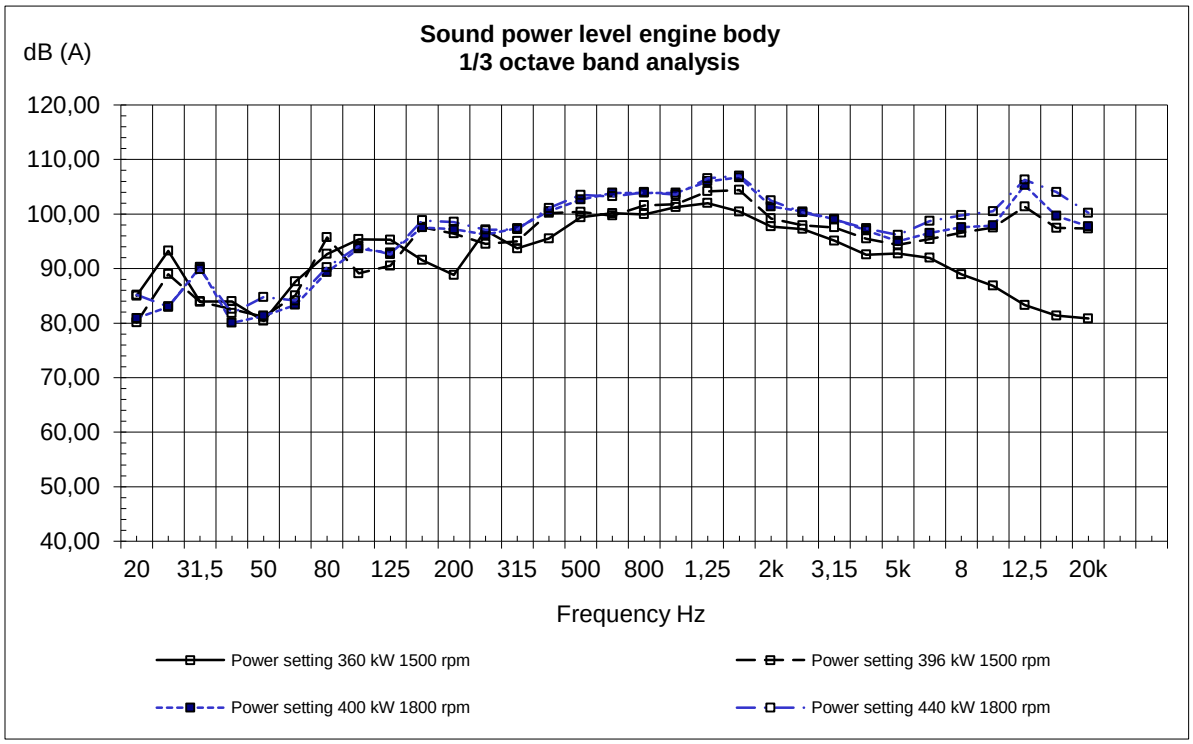
Electrical system		**rpm**	**1500 and 1800**		
Voltage and type		24V / insulated from earth			
Alternator:	make/output	Amp	Bosch /110A		
	tacho output	Hz/alt. Rev	6		
	drive ratio		3,7:1		
Starter motor		make	Melco		
		type	105P70		
		kW	7,0		
Starter motor solenoid,	pull current	Amp	280		
	hold current	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)
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
0
50
100
150
200
250
300
350
400
450
500
kW
1500 rpm
1800 rpm


FSN
Smoke Emission
according to ISO 10054
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
50
100
150
200
250
300
350
400
450
kW
1500 rpm
1800 rpm


Fuel Consumption
120
100
80
60
40
20
0
0
50
100
150
200
250
300
350
400
450
500
1500 rpm
AVL 415 0 #N/A 40,8
1800 rpm
AVL 415 0 #N/A


Sound power level engine body
1/3 octave band analysis
dB (A)
120,00
110,00
100,00
90,00
80,00
70,00
60,00
50,00
40,00
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
Power setting 360 kW 1500 rpm
Power setting 396 kW 1500 rpm
Power setting 400 kW 1800 rpm
Power setting 440 kW 1800 rpm

Performance	Power (kW)	Rpm
Power setting HE	360	1500
Power setting HE	360	1500
Power setting HE	400	1800
Power setting HE	400	1800
Power setting KC	360	1500
Power setting KC	360	1500
Power setting KC	400	1800
Power setting KC	400	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 (ON / Closed)	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	80° 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			50	70	
Seawater pressure	0,5-4,5 V	kPa	0-300 kPa ±3%				**1500 rpm**	**1800 rpm**	
Warning Level		kPa		30 sec from start / 7.5 sec			35	35	
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)*