


## Important

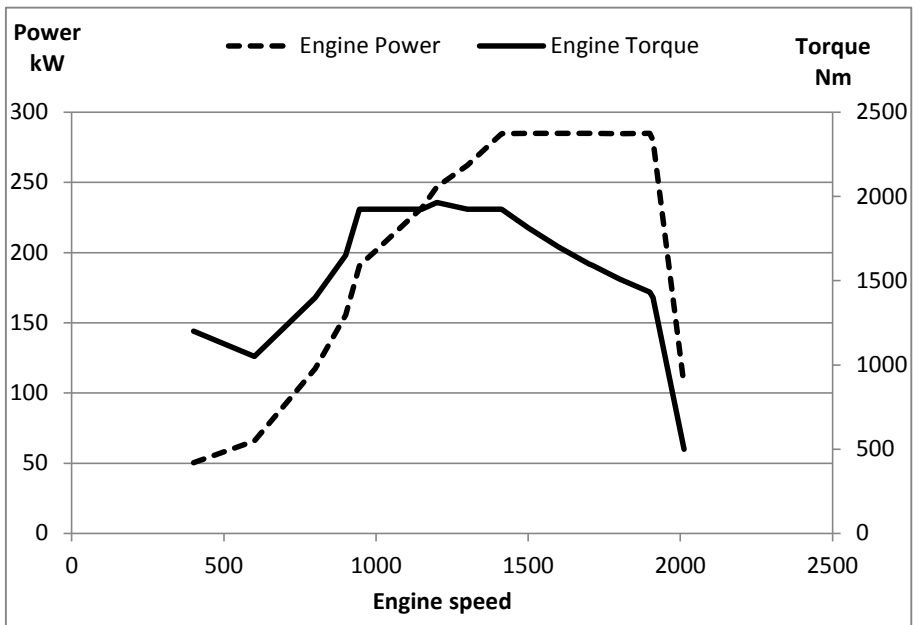
This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with  are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.

In-line four stroke diesel engine with common rail direct injection. Rotation direction counterclockwise viewed towards flywheel.

Peak Power	kW	285	
	hp	388	
	rpm	1900	
Peak Torque	Nm	1965	
	rpm	1200	
Dimensions	L	mm	1251
	W	mm	923
	H	mm	1200



## Consumption data

		rpm	1200	1500	1800	1900
Specific fuel consumption at:	25%	g/kWh	217	233	265	283
		lb/hph	0,35	0,38	0,43	0,46
	50%	g/kWh	198	205	223	231
		lb/hph	0,32	0,33	0,36	0,37
	75%	g/kWh	194	197	211	216
		lb/hph	0,31	0,32	0,34	0,35
	100%	g/kWh	192	195	206	211
		lb/hph	0,31	0,32	0,33	0,34
Specific AdBlue®/DEF consumption of diesel consumption, NRTC		Vol%	6,00			

## CO<sub>2</sub> emission declaration

Carbon dioxide (CO <sub>2</sub> ) emissions determined during the EU type approval process and recorded in EU type approval certificate, NRTC.	g/kWh	694,8
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**General**

Number of cylinders			6
Displacement, total		liters	12,78
		in <sup>3</sup>	780
Firing order			1-5-3-6-2-4
Bore		mm	131
		in	5,16
Stroke		mm	158
		in	6,22
Compression ratio			16,8:1
Wet weight	Engine only	kg	1267
		lb	2793
	<u>The weight includes:</u> The engine is weighed with components that consist of the minimum running weight including standard flywheel and excluding cooling package, hoses and air filters. For a clearer description, contact your regional application engineer.		
	Power pack	kg	N/A
		lb	N/A
<u>The weight includes:</u> N/A			

**Performance**

Rated power	kW	285
	rpm	1900
IFN Power	kW	N.A
ICFN Power	kW	285
For ICFN please see Technical data for		N/A

The engine performance corresponds to ISO 3046.

		rpm	1200	1500	1800	1900
Power	without fan	kW	247	285	285	285
		hp	336	387	387	387
For performance with fan see options technical data for the desired module.						
Torque (IFN)	without fan	Nm	1965	1814	1511	1432
		lbf ft	1449	1338	1114	1056
Max torque at engine speed	1200 rpm	Nm	1965			
		lbf ft	1449			
Power tolerance		%	±3%			
Total mass moment of inertia, J (mR <sup>2</sup> ) for two mass calculations (not including flywheel)		kgm <sup>2</sup>	1,075			
		lbft <sup>2</sup>	25,5			
Total mass moment of inertia, J (mR <sup>2</sup> ) for transient load response calculations (not including flywheel)		kgm <sup>2</sup>	1,075			
		lbft <sup>2</sup>	25,5			
Friction Power warm engine		kW	20	30	43	48
		hp	27	40	58	65

**Engine brake performance option**

		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	149	183	244	297
		hp	203	249	332	403
Brake torque:	without fan	Nm	1190	1168	1229	1288
		lbf ft	877	861	906	950
Engine speed range for engine brake activation:		rpm	890			
Engine brake automatically deactivates at:		rpm	≤880			
Min oil temperature for engine brake activation:		°C	55			

**Cold start performance**

Cold start limit temperature	Preheater required @	°C	-15
	Preheater 4 kW	°F	5
	Preheater + block heater req @	°C	-30
	Blockheater: Volvo 21694291 1500W/230V	°F	-22
Cold start oil specification	T>-20°C VDS4.5 10W/30 T<-20°C VDS4.5 5W/30		
Cold start fuel specification	EN590 98/70/EC (For details see Volvo Penta Industrial fuel bulletin)		

**Lubrication system**


Lubricating oil consumption of diesel consumption (average)		Vol %	0,014
Oil change intervals/specifications	VDS 4.5	h	1000
		h	
Oil pressure at rated speed	Max	kPa	560
		psi	81
Oil pressure at rated speed	Min	kPa	260
		psi	38
Lubrication oil temperature in oil pan:	Max	°C	128
		°F	262
Oil filter filtration efficiency (in accordance with ISO 4548-12)	90%	μ	38
	50%	μ	14






*For oil system capacity and angularity limits see technical data per options*

**Fuel system**



Suction line fuel flow at maximum output (Measured at fuel inlet connection)		liter/h	180
		US gal/h	47,55
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa	10,0
		psi	1,45
Fuel supply line max. pressure, during engine running (measured at fuel inlet connection @ engine)		kPa	16,5
		psi	2,39
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection @ engine)		kPa	16,5
		psi	2,39
Fuel supply line min. pressure, during engine stand still (measured at fuel inlet connection @ engine)		kPa	-12,5
		psi	-1,81
Maximum system return flow		liter/h	60
		US gal/h	15,85
Fuel return line max. restriction (measured at fuel return connection)		kPa	20,0
		psi	2,90
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C	60
		°F	140
Prefilter / Water separator filtration efficiency	99%	μ	30
	0%	μ	N/A
Fuel filter filtration efficiency	98%	μ	5
	96%	μ	4
Injector type	F2		
Fuel to conform to	EN590 98/70/EC (For details see Volvo Penta Industrial fuel bulletin)		

**Intake system**

	rpm	1200	1500	1800	1900
Air consumption at: (+25°C and 100kPa)	m³/min	16,6	22,5	25,8	26,6
	cfm	585	794	913	940
					
<b>See front page for important information</b>					
Max allowable air intake restriction including piping, with clean air filters	kPa		6		
	psi		0,9		

Exhaust system	rpm	1200	1500	1800	1900
Heat rejection to exhaust:	kW	170	183	224	230
	BTU/min	9680	10435	12759	13062
Exhaust gas temperature after turbine at:	°C	462	412	400	398
	°F	864	774	753	749
 <b>See front page for important information</b>					
Max allowable back pressure in exhaust line at full load (after turbine)	kPa	45	45	45	45
	psi	6,5	6,5	6,5	6,5
 <b>See front page for important information</b>					
Max allowable temperature drop between turbine and muffler 1 inlet at exhaust temperature 480° C and exhaust gas flow 0.58 kg/s.	Δ°C	10	10	10	10
	Δ°F	18	18	18	18
 <b>See front page for important information</b>					
Max allowable temperature drop between muffler 1 and muffler 2 at exhaust temperature 480° C and exhaust gas flow 0.58 kg/s.	Δ°C	N/A	N/A	N/A	N/A
	Δ°F	N/A	N/A	N/A	N/A
Muffler 1 pressure drop (at exhaust gas flow and exhaust temp specified in this table)	kPa	13	17	20	21
	psi	1,9	2,5	2,9	3,1
Muffler 2 pressure drop (at exhaust gas flow and exhaust temp specified in this table)	kPa	N/A	N/A	N/A	N/A
	psi	N/A	N/A	N/A	N/A
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	m³/min	41,6	53,2	58,6	61,0
	cfm	1469	1878	2069	2153
 <b>See front page for important information</b>					
Engine speed during stand still regeneration	rpm	1400 ± 100			
 <b>See front page for important information</b>					
Max allowed load during stand still regeneration	Nm	1000			
	lb ft	738			

Cooling system		rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:	kW	8,9	7,9	7,7	9,5	
	BTU/min	507	452	440	538	
Heat rejection to coolant at:	kW	119	136	150	154	
	BTU/min	6751	7721	8527	8775	
Coolant	Volvo Penta Coolant VCS (Yellow) Ready Mix 40/60 or Mix 40% Volvo Penta Coolant VCS (Yellow) + 60% tap Water*. * Tap water must fulfill Volvo quality standard VOLVO STD: 1285, 1					
Coolant capacity: Engine only <i>For coolant capacity for engine and cooling packages see Technical data for the specific option.</i>	liter	20				
	US gal	5,3				
Coolant pump (Engine is reference =1)	drive/ratio	belt/1,41:1 cw				
Coolant pump curve see graphs at end						
Nominal engine coolant pressure before engine circuit coolant pump	kPa	37	40	41	40	
	psi	5,4	5,8	5,9	5,8	
Coolant pressure drop over complete engine circuit (at coolant flow below)	kPa	19	32	45	50	
	psi	2,7	4,6	6,5	7,2	
Coolant flow	l/s	4,17	5,25	6,32	6,67	
	US gal/s	1,102	1,388	1,669	1,762	
Minimum coolant flow At fully opened thermostat	l/s	3,20	4,20	5,50	5,50	
	US gal/s	0,845	1,110	1,453	1,453	
Maximum outer circuit restriction incl. piping	kPa	65				
	psi	9,4				
Thermostat:	start to open	°C	82			
		°F	180			
	fully open	°C	92			
		°F	197,6			
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				
Maximum top tank temperature	°C	107				
	°F	224,6				
Recommended Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still functioning	liter	2,0				
	US gal	0,528				

<b>Charge air cooler system</b>	<b>rpm</b>	<b>1200</b>	<b>1500</b>	<b>1800</b>	<b>1900</b>
Heat rejection to charge air cooler	kW	35	54	62	65
	BTU/min	2008	3048	3523	3669
Charge air mass flow	kg/s	0,32	0,44	0,50	0,52
Charge air inlet temp @ 25 °C (Charge air temp after turbo compressor)	°C	142	158	160	163
	°F	287	316	321	325
 <b>See front page for important information</b> Max allowable Charge air outlet temp @ 25 °C ambient temperature (Charge air temp after charge air cooler)	°C	50	50	50	50
	°F	122	122	122	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping	kPa	5	8	11	11
	psi	0,7	1,1	1,5	1,7
Charge air pressure - relative pressure at sea level (After charge air cooler)	kPa	150	180	171	169
	psi	21,7	26,1	24,9	24,5

**Electrical system**

Engine Management System		EMS2.4			
Voltage and type		24V DC			
Battery and cable resistance	Temperature	°C	25	0	-15
	Recommendations:	°F	77	32	5
	Maximum main circuit resistance @ 20°C	mΩ	5	4	3
	Minimum battery size	Ah (20h) / CCA (EN)	120/700	140/800	145/1050

**Power take off**

Maximum allowed torque at individual PTO's. If more than one PTO output is used simultaneously, calculations need to be performed to determine available maximum. Available torque depends on application inertia.

<b>Front end in line with crankshaft</b>	<b>rpm</b>	<b>1200</b>	<b>1500</b>	<b>1800</b>	<b>1900</b>
With a total added mass moment of inertia	J (mR2)	≤ 0.05kgm2			
Max torque at continuous load:	Nm	1960	1810	1510	1430
	lbt ft	1446	1335	1114	1055
<b>PTO at flywheel</b>					
Max allowed bending moment in flywheel housing	Nm	15000			
	lbf ft	11063			
Max load on rear main bearing	N	4000			
	lbf	899			

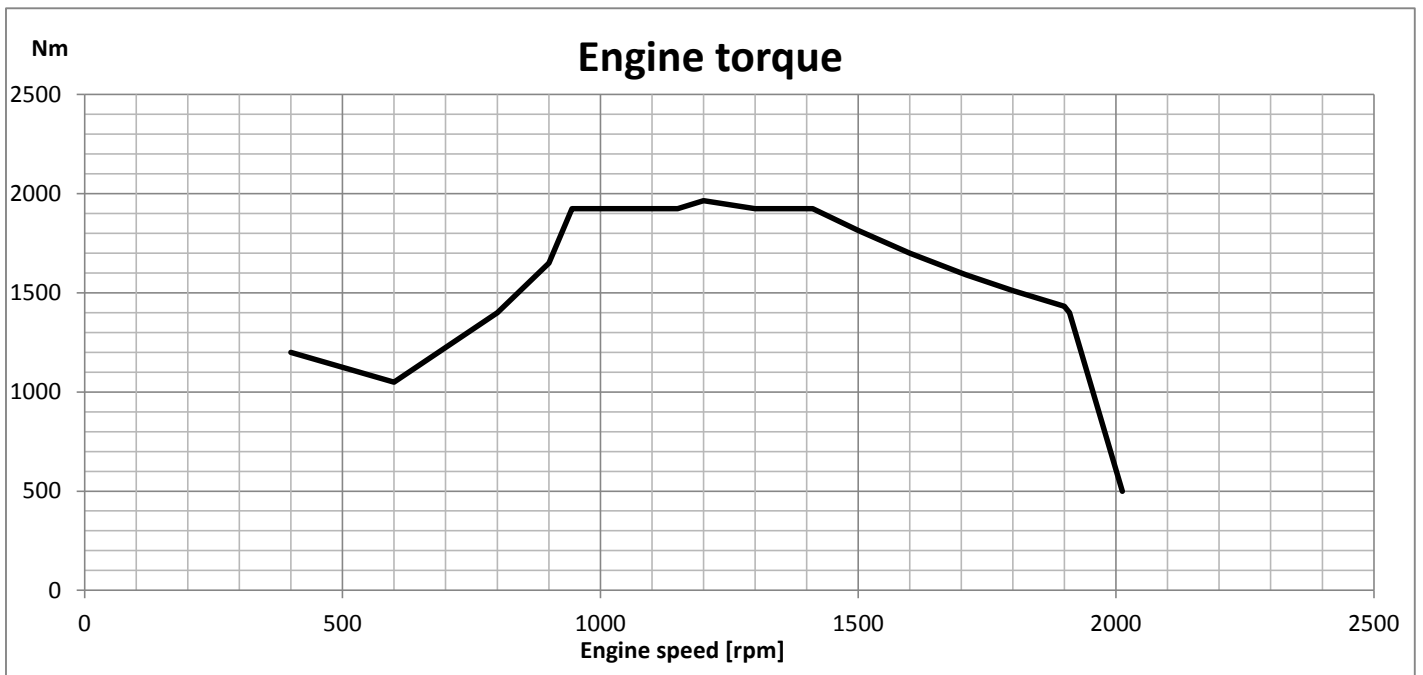
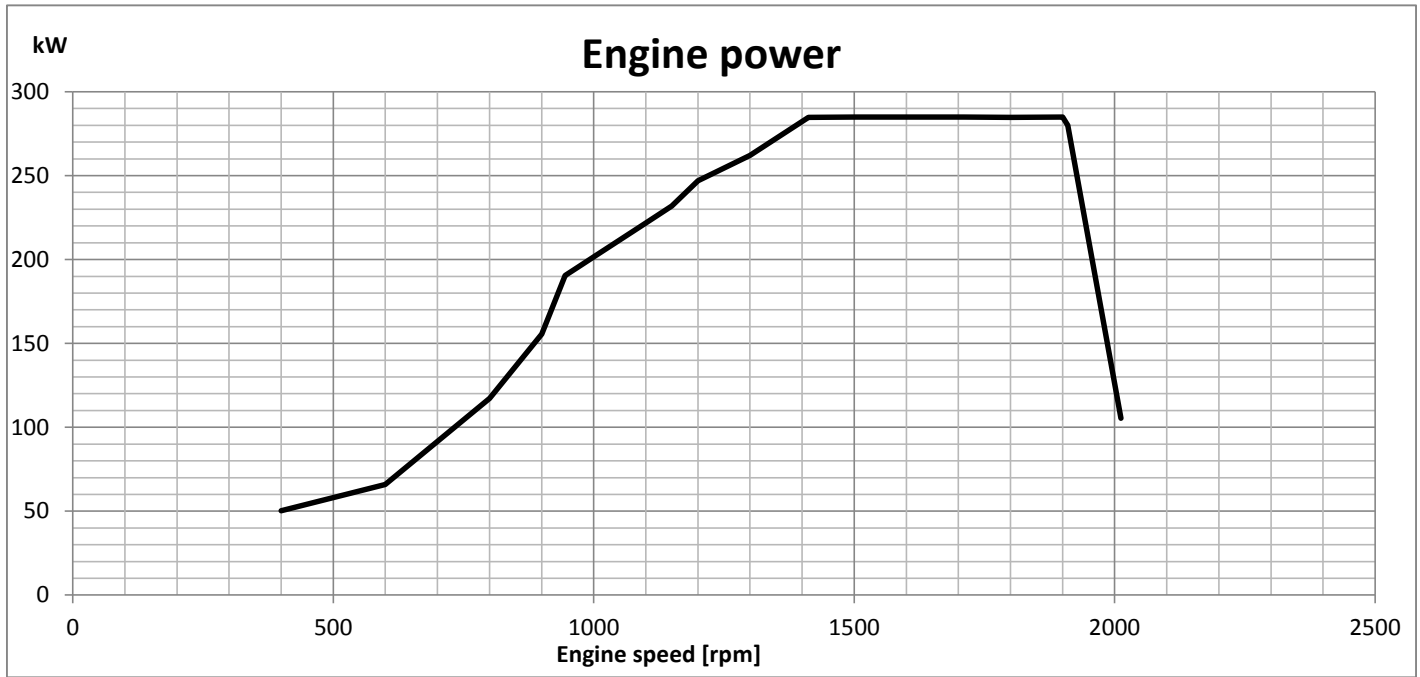
**Engine Protection**

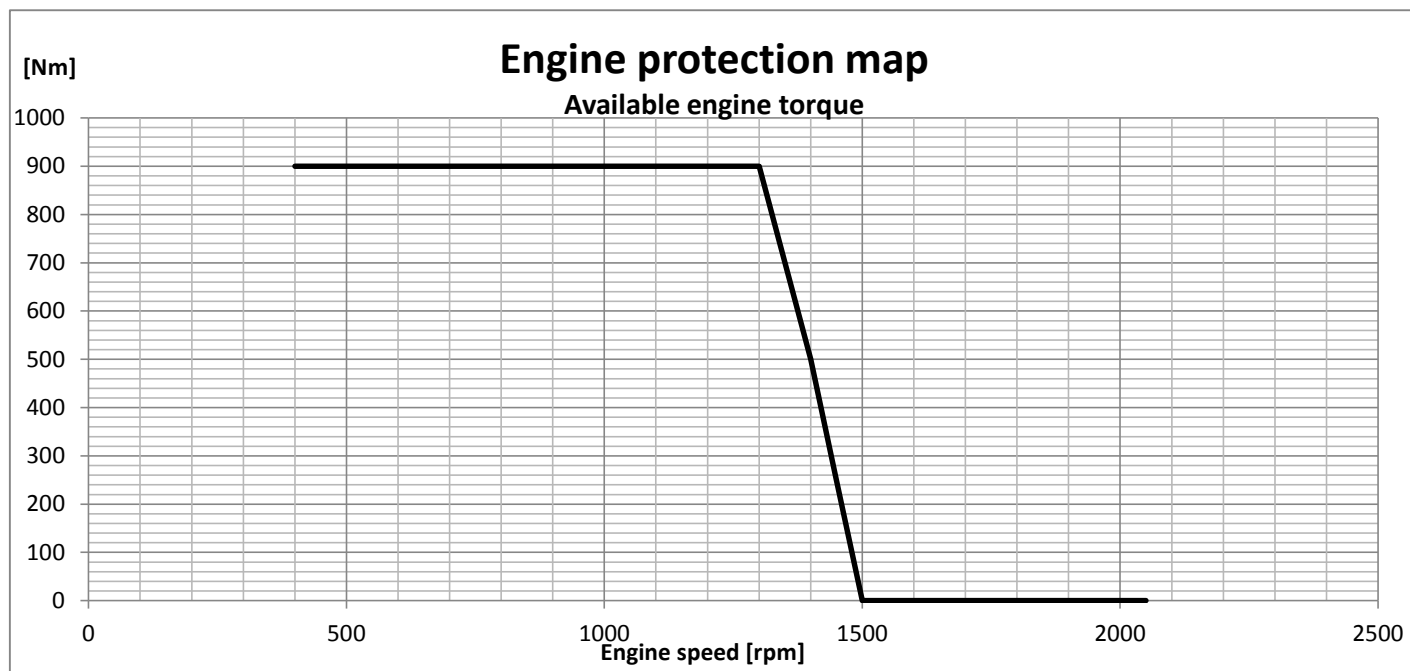
Warning implies that a Indication message is sent. Derate means an engine power derate.

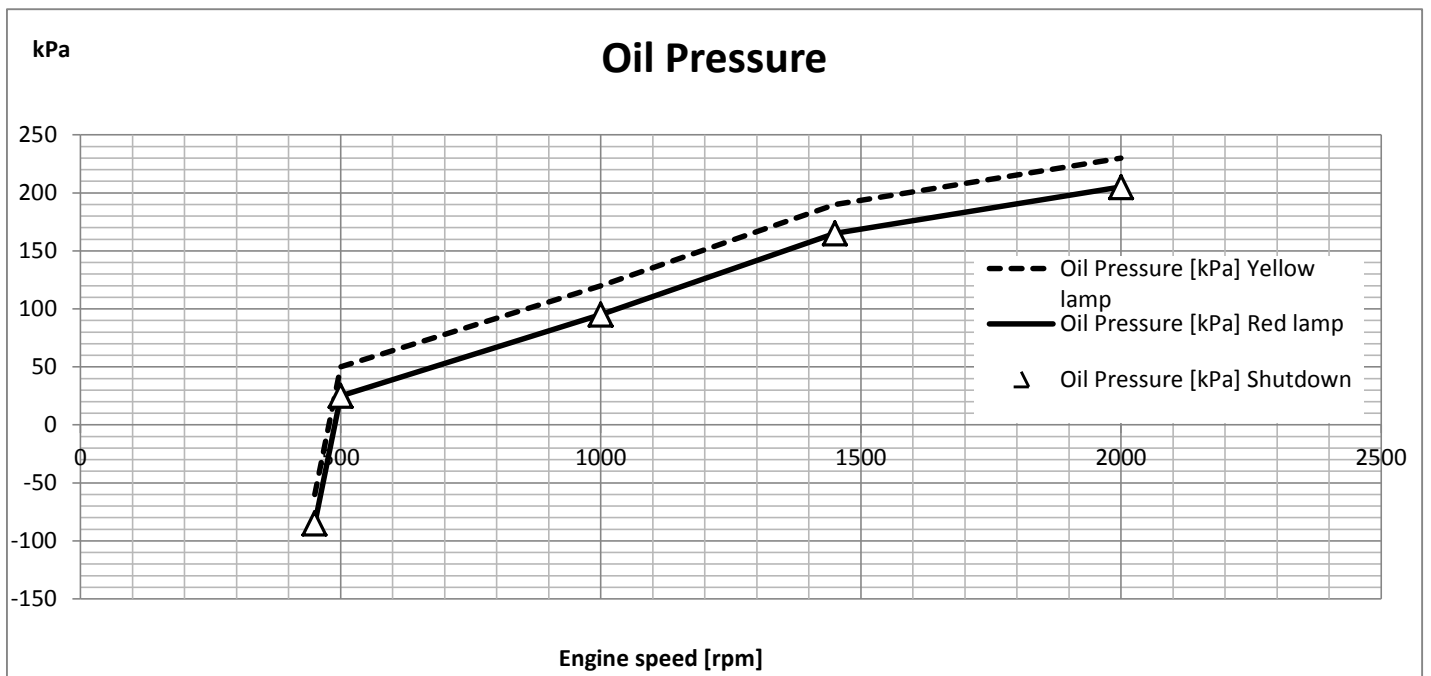
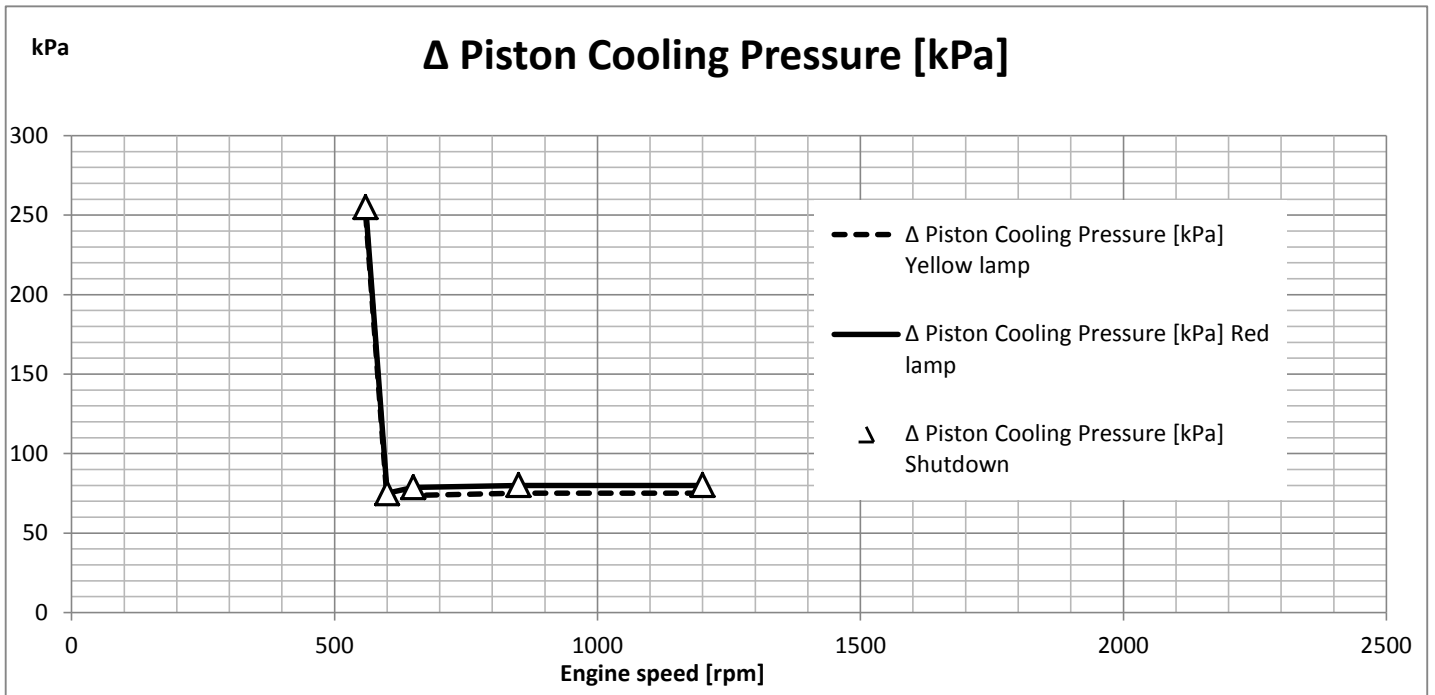
Engine sensors				Engine protection action		
	Unit	Warning level (Yellow)	Alarm level (Red)	Default	Max derate, acc engine protection map	Optional (Module or conversion kit)
Fuel temperature <sup>1</sup>	°C	Not installed	Not installed	Not installed	Not installed	Not installed
Oil temperature	°C	125	130	Derate	132	Shut down
Coolant temperature	°C	105	107	Derate	108	Shut down
Charge Air Temperature (Boost temp)	°C	120	125	Derate	126	Shut down
Air filter temperature <sup>1</sup>	°C	Not installed	Not installed	Not installed	Not installed	Not installed
Exhaust gas temperature	°C	535	550	Shut down	550	Shut down
EGR temperature <sup>1</sup>	°C	Not installed	Not installed	Not installed	Not installed	Not installed
ECU temperature	°C	90	N/A	N/A	N/A	N/A
Fuel feed pressure <sup>1</sup>	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
Fuel rail pressure <sup>1</sup>	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
Oil Pressure	kPa	See below	See below	Shut down	See below	Shut down
Δ Piston Cooling Pressure	kPa	See below	See below	Shut down	See below	Shut down
Δ Charge Air Press (Δ Boost pres)	kPa	See below	See below	Derate	See below	Shut down
Air filter pressure <sup>1</sup>	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
EGR pressure <sup>1</sup>	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
Crankcase pressure increase <sup>1</sup>	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
DPF Differential Pressure	kPa	31	33	Derate	34	Shut down
Oil level <sup>1</sup>	Digital Switch	Not installed	Not installed	Not installed	Not installed	Not installed
Coolant level	Digital Switch	N/A	Low Level	Derate	Low Level	Shut down
DEF Injector Status	Digital Switch	N/A	Error Flag	Derate	Error Flag	Shut down
EATS System - Soot Regen Status	Status Flag	Warning	Stop Request	Derate	Stop Request	Shut down
Water in fuel <sup>1</sup>	Digital Switch	Not installed	Not installed	Not installed	Not installed	Not installed

<sup>1</sup> Sensor not installed for this engine type

**Graphs**



**Warning and derate maps**



Engine protection for charge air pressure is complex and the trigger levels varies depending on engine mode, altitude and charge air temperature, ambient temperature.

Below is an example of engine protection limits for charge air pressure for normal operation engine mode, on the sea level with charge air temperature 50 degrees (normal charge cooler CAC efficiency) , and ambient temperature 25 degrees.

When engine speed increases above 1900 rpm (maximum power) charge pressure demand drops significantly but the actual charge pressure has a physical delay to decrease therefore the fault limit is higher to avoid false alarm.

