


### Important

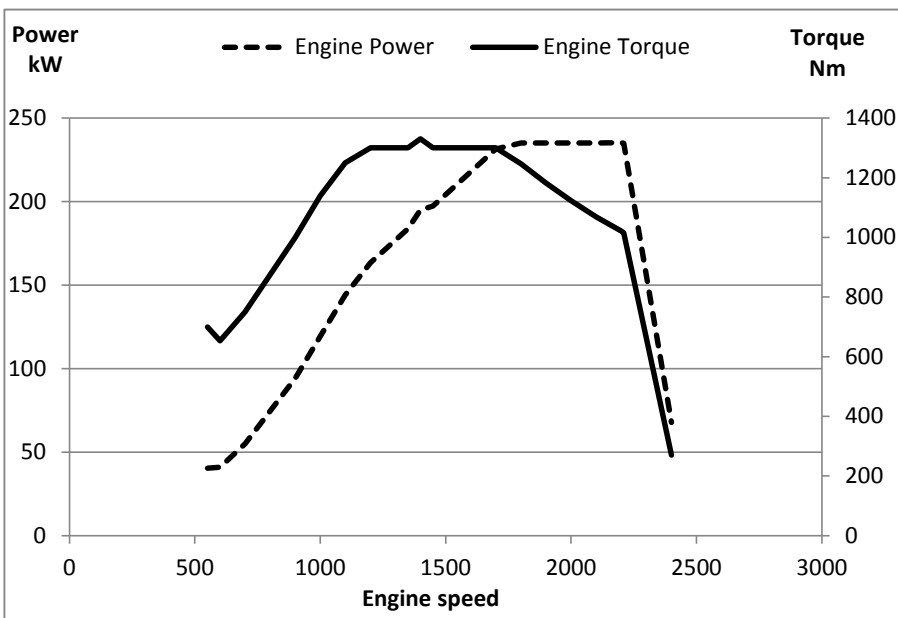
This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

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-cycle diesel with common rail direct injection. Rotation direction counterclockwise viewed towards flywheel.

Peak Power	kW	235	
	hp	320	
	rpm	2200	
Peak Torque	Nm	1330	
	rpm	1400	
Dimensions	L	mm	1229
	W	mm	876
	H	mm	1030



### Consumption data

		rpm	1500	1800	2000	2200
Specific fuel consumption at:	25%	g/kWh	260	262	272	285
		lb/hph	0,42	0,42	0,44	0,46
	50%	g/kWh	202	208	218	238
		lb/hph	0,33	0,34	0,35	0,39
	75%	g/kWh	201	204	211	222
		lb/hph	0,33	0,33	0,34	0,36
	100%	g/kWh	194	200	205	213
		lb/hph	0,32	0,32	0,33	0,35
Specific AdBlue®/DEF consumption of diesel consumption, NRTC		Vol%	7,30			

### 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	673,30
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**General**

Number of cylinders			6
Displacement, total		liters	7,70
		in <sup>3</sup>	470
Firing order			1-4-2-6-3-5
Bore		mm	110
		in	4,33
Stroke		mm	135
		in	5,31
Compression ratio			17,2:1
Wet weight	Engine only	kg	723
		lb	1594
	<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.		
	Power pack	kg	N/A
		lb	N/A
	<u>The weight includes:</u> N/A		
Exhaust aftertreatment muffler	DPF	kg	32
		lb	71
	SCR	kg	41
		lb	90

**Performance**

Rated power	kW	235
	rpm	2200
IFN Power	kW	235
ICFN Power	kW	185
For ICFN please see Technical data for		TAD881VE

The engine performance corresponds to ISO 3046.

		rpm	1500	1800	2000	2200
Power	without fan	kW	204	235	235	235
		hp	278	320	320	320
For performance with fan see options technical data for the desired module.						
Torque (IFN)	without fan	Nm	1300	1247	1123	1021
		lbf ft	959	920	828	753
Max torque at engine speed	1400 rpm	Nm	1330			
		lbf ft	981			
Power tolerance		%	+/-2			
Total mass moment of inertia, J (mR <sup>2</sup> ) for two mass calculations (not including flywheel)		kgm <sup>2</sup>	0,398			
		lbf ft <sup>2</sup>	9,4			
Total mass moment of inertia, J (mR <sup>2</sup> ) for transient load response calculations (not including flywheel)		kgm <sup>2</sup>	0,398			
		lbf ft <sup>2</sup>	9,4			
Friction Power warm engine		kW	17	23	28	34
		hp	23	31	38	46

**Engine brake performance option**

		rpm	1500	2200	2500	2800
Brake power:	without fan	kW	66	132	160	183
		hp	90	180	218	249
Brake torque:	without fan	Nm	420	574	613	625
		lbf ft	309	423	452	461
Engine speed range for engine brake activation:		rpm	900-2800			
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: TYP UI 701 1500W / ~230V or ~115V	°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 %	0,020
Oil change intervals/specifications	VDS 4.5		h	1000
			h	
Oil pressure at rated speed	Max		kPa	475
			psi	69
Oil pressure at rated speed	Min		kPa	275
			psi	40
Lubrication oil temperature in oil pan:	Max		°C	130
			°F	266
Oil filter filtration efficiency (in accordance with ISO 4548-12)	75%		μ	22
	90%		μ	26






*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	130
		US gal/h	34,4
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa	20,0
		psi	2,90
Fuel supply line max. pressure, during engine running (measured at fuel inlet connection @ engine)		kPa	20,0
		psi	2,90
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection @ engine)		kPa	20,0
		psi	2,90
Fuel supply line min. pressure, during engine stand still (measured at fuel inlet connection @ engine)		kPa	-55
		psi	-8
Maximum system return flow		liter/h	67
		US gal/h	17,8
Fuel return line max. restriction (measured at fuel return connection)		kPa	40
		psi	6
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C	80
		°F	176
Prefilter / Water separator filtration efficiency	98%	μ	30
	50%	μ	10
Fuel filter filtration efficiency	90%	μ	5
	75%	μ	4
Injector type	Denso G4S		
Fuel to conform to	EN590 98/70/EC (For details see Volvo Penta Industrial fuel bulletin.)		



**Intake system**

	rpm	1500	1800	2000	2200
Air consumption at: (+25°C and 100kPa)	m <sup>3</sup> /min	13,1	16,3	17,4	18,5
	cfm	463	576	614	653
					
<b>See front page for important information</b>	kPa			6	
Max allowable air intake restriction including piping	psi			0,9	

Exhaust system	rpm	1500	1800	2000	2200
Heat rejection to exhaust:	kW	143	173	182	190
	BTU/min	8137	9815	10348	10826
Exhaust gas temperature after turbine at:	°C	496	497	489	482
	°F	925	926	913	899
 <b>See front page for important information</b>					
Max allowable back pressure in exhaust line at full load (after turbine)	kPa	27	32	34	36
	psi	3,8	4,7	4,9	5,2
 <b>See front page for important information</b>					
Max allowable temperature drop between turbine and muffler 1 inlet at exhaust temperature 495° C and exhaust gas flow 0.40 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 495° C and exhaust gas flow 0.40 kg/s.	Δ°C	5	5	5	5
	Δ°F	9	9	9	9
Muffler 1 pressure drop (at exhaust gas flow and exhaust temp specified in this table)	kPa	8	11	12	12
	psi	1,2	1,6	1,7	1,7
Muffler 2 pressure drop (at exhaust gas flow and exhaust temp specified in this table)	kPa	19	15	16	17
	psi	2,8	2,2	2,3	2,5
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	m³/min	29,9	34,7	35,9	37,5
	cfm	1056	1225	1268	1324
 <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	540			
	lb ft	398			

<b>Cooling system</b>		<b>rpm</b>	<b>1500</b>	<b>1800</b>	<b>2000</b>	<b>2200</b>
Heat rejection radiation from engine at:		kW	6,7	7,8	7,8	8,7
		BTU/min	383	442	443	496
Heat rejection to coolant at:		kW	97	111	117	124
		BTU/min	5499	6313	6681	7041
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	liter	17			
<i>For coolant capacity for engine and cooling packages see Technical data for the specific option.</i>		US gal	4,5			
Coolant pump	(Engine is reference =1)	drive/ratio	belt/1,40:1 cw			
Coolant pump curve see graphs at end						
Nominal engine coolant pressure before engine circuit coolant pump		kPa	54	55	55	57
		psi	7,8	8,0	8,0	8,3
Coolant pressure drop over complete engine circuit (at coolant flow below)		kPa	6	10	13	16
		psi	0,9	1,5	1,9	2,3
Coolant flow		l/s	3,60	4,30	4,80	5,30
		US gal/s	0,951	1,136	1,268	1,400
Minimum coolant flow		l/s	3,50	4,20	4,60	5,10
At fully opened thermostat		US gal/s	0,925	1,110	1,215	1,347
Maximum outer circuit restriction incl. piping		kPa	40			
		psi	5,8			
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	110			
		psi	16,0			
Minimum static pressure head (expansion tank height + pressure cap setting)		kPa	85			
		psi	12,3			
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	2,00			
		US gal	0,528			

**Charge air cooler system**

	rpm	1500	1800	2000	2200
Heat rejection to charge air cooler	kW	32	44	45	46
	BTU/min	1820	2474	2559	2588
Charge air mass flow	kg/s	0,25	0,31	0,33	0,36
Charge air inlet temp @ 25 °C (Charge air temp after turbo compressor)	°C	160	167	164	161
	°F	319	332	328	322
 <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	42	48	50	50
	°F	108	118	122	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping	kPa	7	9	11	12
	psi	1,0	1,3	1,5	1,7
Charge air pressure - relative pressure at sea level (After charge air cooler)	kPa	166	182	175	169
	psi	24,1	26,4	25,5	24,6

**Electrical system**

Engine Management System		EMS 2.4			
Voltage and type		24V			
Battery and cable resistance Recommendations:	Temperature	°C	25	0	-15
		°F	77	32	5
	Maximum main circuit resistance @ 20°C	mΩ	5	5	4
	Minimum battery size	Ah (20h) / CCA (EN)	100 / 680	100 / 680	140 / 800

**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.

**Front end in line with crankshaft**

	rpm	1500	1800	2000	2200
With a total added mass moment of inertia	J (mR2)	0.02 kgm2			
Max torque at continuous load:	Nm	1064	743	740	833
	lbt ft	785	548	546	614
<b>PTO at flywheel</b>					
Max allowed bending moment in flywheel housing	Nm	4600			
	lbf ft	3393			
Max load on rear main bearing	N	4250			
	lbf	955			

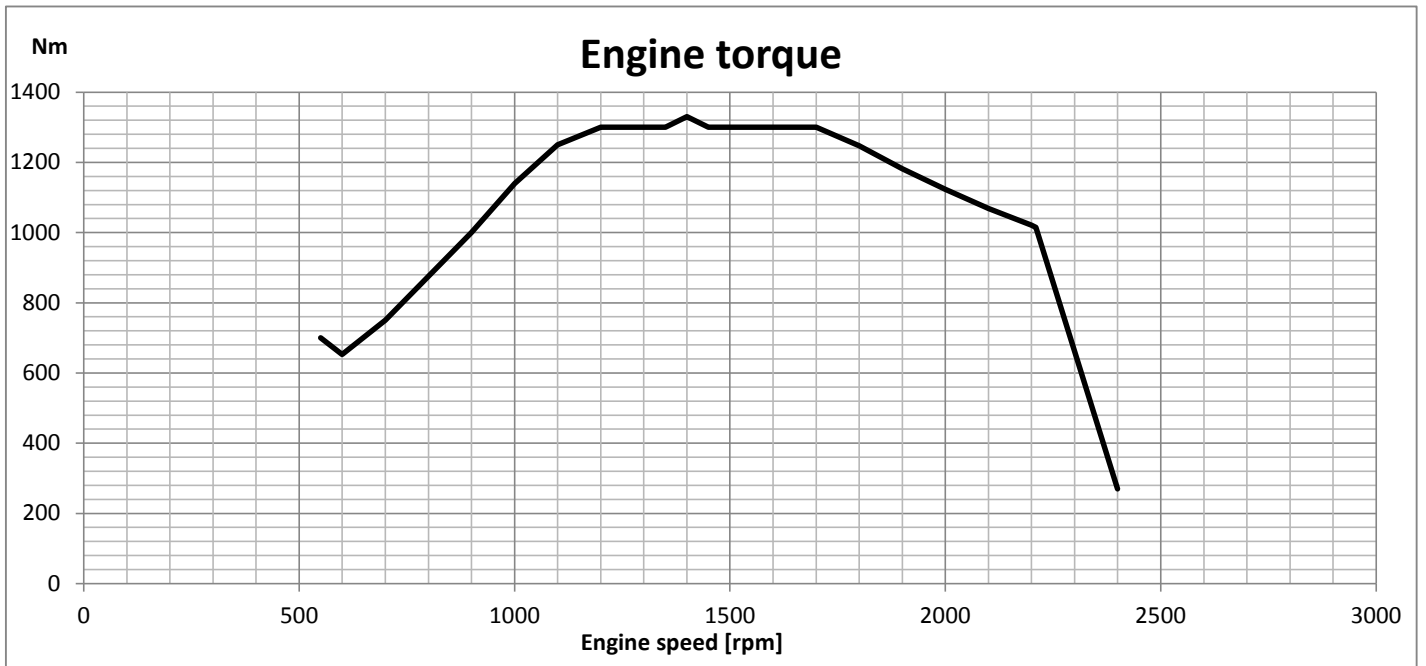
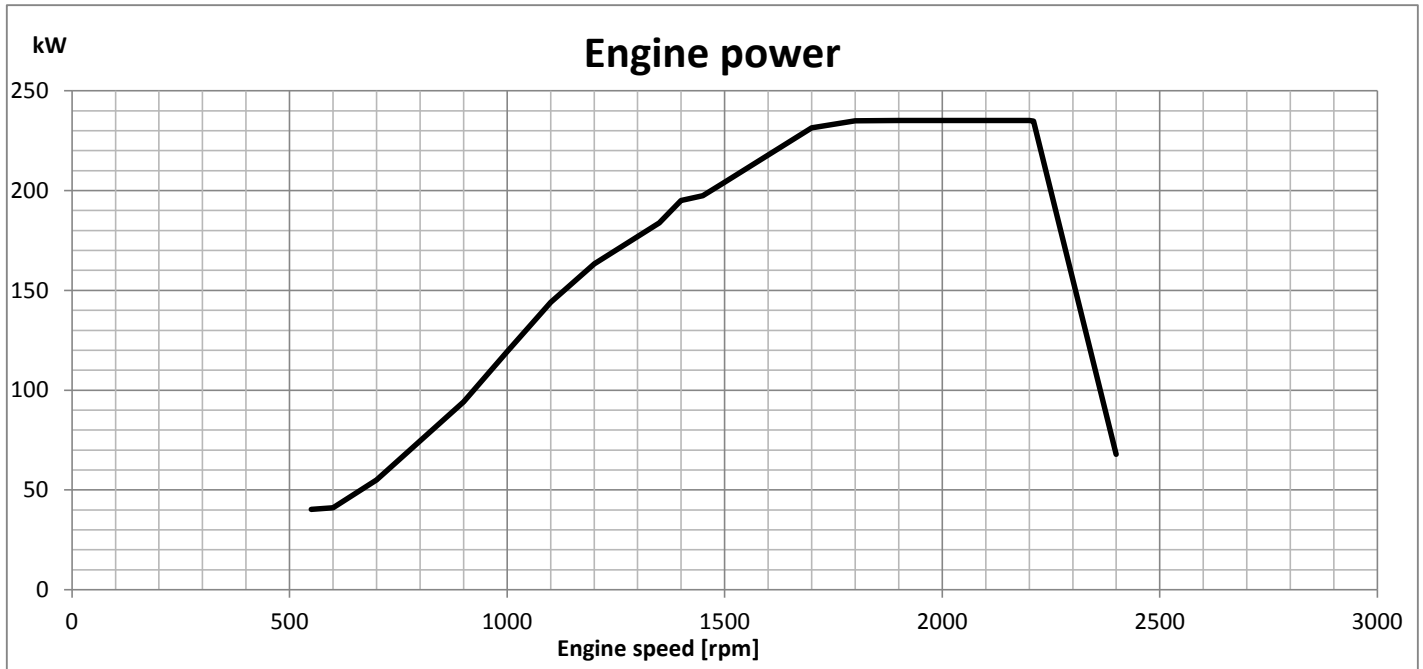
**Engine Protection**

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

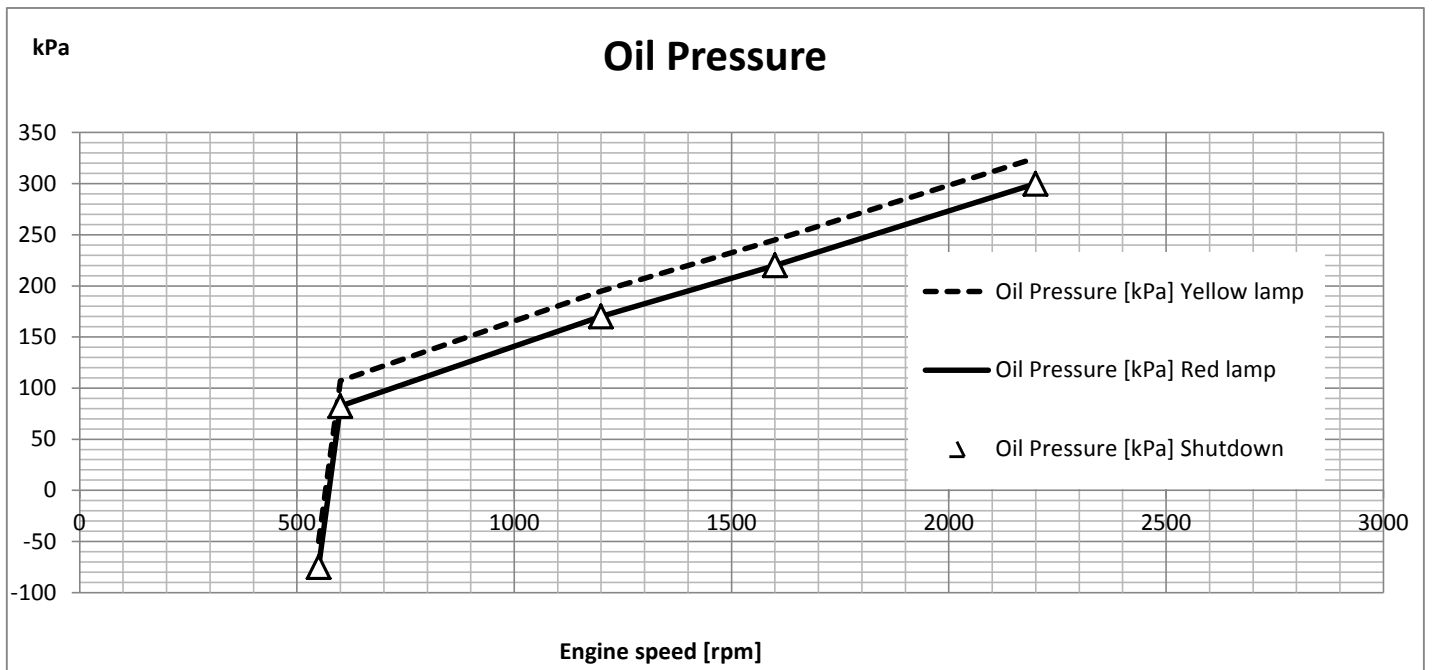
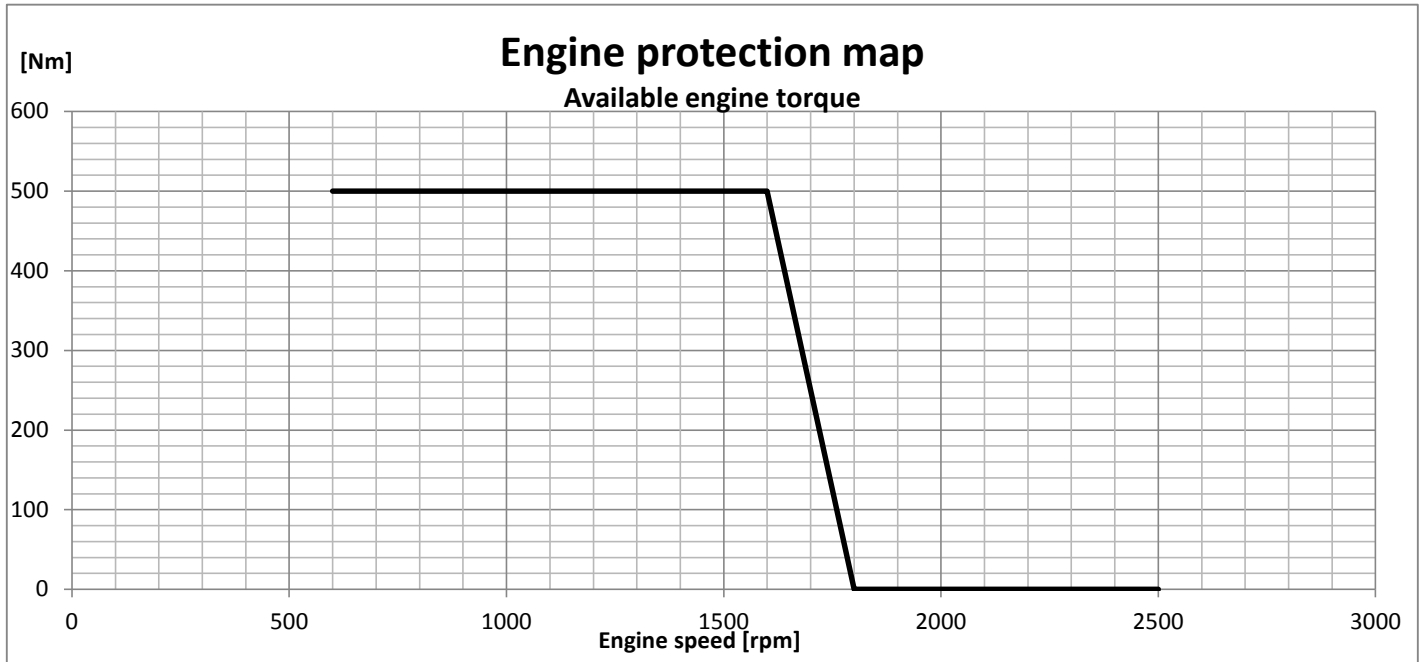
Engine sensors				Engine protection action		
	Unit	Warning level (Yellow)	Alarm level (Red)	Default	Max derate, acc engine protection map	Optional (Module or conversion kit)
Fuel temperature <sup>1</sup>	°C	Not installed	Not installed	Not installed	Not installed	Not installed
Oil temperature	°C	125	130	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 <sup>1</sup>	kPa	Not installed	Not installed	Not installed	Not installed	Not installed
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.

