


**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.

**General**

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel

Number of cylinders			4
Displacement, total		liters	5,13
		in <sup>3</sup>	313
Firing order			1-3-4-2
Bore		mm	110
		in	4,33
Stroke		mm	135
		in	5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg	557
		lb	1228
	Power pac	kg	854
		lb	1883
	Power pac, compact cooling package	kg	776
		lb	1711

**Performance**

				rpm	1500	1800	2000	2200
IFN Power	160 kW	without fan	kW	141	160	160	160	
			hp	192	218	218	218	
		with fan 600 mm	kW	136	153	153	153	
			hp	185	208	208	208	
Torque at:		IFN Power 160 kW	Nm	900	849	764	695	
			lbf ft	664	626	563	513	
Max torque at engine speed	IFN Power	1450 rpm	Nm	910				
			lbf ft	671				
Power tolerance			%	±5				
Mean piston speed			m/s	6,8	8,1	9,0	9,9	
			ft/sec	22,1	26,6	29,5	32,5	
Effective mean pressure at:		IFN Power 160 kW	MPa	2,20	2,08	1,87	1,70	
			psi	319	301	271	247	
Max combustion pressure at:		IFN Power 160 kW	MPa	16	16	15,5	14,9	
			psi	2320	2320	2248	2161	
Total mass moment of inertia, J (mR <sup>2</sup> ) (not including flywheel)			kgm <sup>2</sup>	0,261				
			lbft <sup>2</sup>	6,2				
Friction Power			kW	13	18	23	29	
			hp	18	24	31	39	

**Derating see Technical Diagrams**

**Cold start performance**

*Cold start limit temperature	without starting aid	°C	-15	
		°F	5	
	with manifold heater 4 kW	°C	-25	
		°F	-13	
*Specify oil quality	Above -15°C; 15W40 Above -25°C; 10W30 Below -25°C; 5W30	°C	-35	
		°F	-31	
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	1,5		

\* See also general section in the sales guide



**Lubrication system**

Lubricating oil consumption (average)		Vol%	0,05
Oil system capacity including filters		liter	16
		US gal	4,23
Oil sump capacity:	Max	liter	14
		US gal	3,57
	Min	liter	10
		US gal	2,51
Oil change intervals/specifications	VDS3, VDS4.5	h	500
	VDS3 with oil analysis	h	1000
Engine angularity limits:	front up	°	32
	front down	°	32
	side tilt	°	32
Oil pressure at rated speed		kPa	420
		psi	61



**Lubrication system**

Lubrication oil temperature in sump:	max	°C	125
		°F	257
Oil filtration efficiency (in accordance with ISO 4548-12)	97%	μ	36
	50%	μ	14

Fuel system		rpm	1500	1800	2000	2200
Fuel to conform to			EU EN590 US D975, 1-D and 2-D (Max 3000ppm sulphur and 7% FAME) For further information, see service bulletin 18-8-8			
System supply flow at max. speed		liter/h US gal/h	165 43,6			
Fuel supply line max. restriction (Measured at fuel inlet connection)		kPa psi	9 1,3			
Fuel supply line max. pressure, during engine stand still (measured at fuel inlet connection)		kPa psi	20 2,9			
System return flow at max. speed		liter/h US gal/h	111,0 29,3			
Fuel return line max. restriction (Measured at fuel return connection)		kPa psi	10 1,5			
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	80 176			
Prefilter / Water separator filtration efficiency	99%	μ	30			
Main fuel filter filtration efficiency (in accordance with ISO 19438)	98%	μ	5			
	96%	μ	4			
Governor type/make, standard		Volvo / EMS 2.3				
Injection pump type/make		Denso HP3				

Intake and exhaust system		Inlet air temp	rpm	1500	1800	2000	2200
Charge air consumption at: (+25°C and 100kPa)	IFN Power 160 kW	25°C	m³/min	9,3	10,9	11,7	12,7
		77°F	cfm	328	385	413	449
 <b>See front page for important information</b>							
Max allowable air intake restriction including piping			kPa psi	6 0,9			
Heat rejection to exhaust at:	IFN Power 160 kW		kW	102	122	128	138
			BTU/min	5801	6938	7279	7848
Exhaust gas temperature after turbine at:	IFN Power 160 kW		°C	497	507	498	498
			°F	927	945	928	928
 <b>See front page for important information</b>							
Max allowable back pressure in exhaust line (after turbine)			kPa	9	12	13	15
Pipe dimension Ø: 127 mm			psi	1,3	1,7	1,9	2,2
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power 160 kW		m³/min	24,4	27,9	29,3	30
			cfm	862	985	1035	1059

<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:	IFN Power 160 kW	kW	9	10	9,5	9,7
		BTU/min	535	557	540	552
Heat rejection to coolant at:	IFN Power 160 kW	kW	68	79	81,7	88,7
		BTU/min	3867	4481	4646	5044
Radiator cooling system type			Closed circuit			
Standard radiator core area	IFN Power 160 kW	m <sup>2</sup>	0,6			
		foot <sup>2</sup>	6,46			
Compact cooling package radiator core area	IFN Power 160 kW	m <sup>2</sup>	0,28			
		foot <sup>2</sup>	3,01			
Fan diameter	600 mm	IFN Power 160 kW	mm	600		
			in	23,62		
Maximum fan power consumption	600 mm pull	kW	5,1	7,2	7,2	7,2
		hp	7	10	10	10
Fan drive ratio	fan Ø600		1,4:1			
Coolant capacity:	engine	liter	13			
		US gal	3,4			
	engine + standard radiator with hoses and expansion tank	liter	47			
		US gal	12,4			
engine + compact cooling package radiator with hoses and expansion tank	liter	31				
	US gal	8,2				
Coolant pump		drive/ratio	belt/1,4:1			
Coolant flow with standard system		l/s	5,4	6,5	7,2	8
		US gal/s	1,4	1,7	1,9	2,1
Minimum coolant flow		l/s				4,5
		US gal/s				1,2
Maximum outer circuit restriction incl. piping		kPa	40,0			
		psi	5,8			
Thermostat:	start to open	°C	85			
		°F	185			
	fully open	°C	95			
		°F	203			
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			
Standard pressure cap setting		kPa	100			
		psi	14,5			
Maximum top tank temperature		°C	107			
		°F	225			
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 are functioning		liter	2			
		US gal	0,5			

Charge air cooler system		rpm	1500	1800	2000	2200
Heat rejection to charge air cooler	IFN Power 160 kW	kW	24,8	28,6	30,4	33,5
		BTU/min	1410	1626	1729	1905
Charge air mass flow	IFN Power 160 kW	kg/s	0,186	0,216	0,232	0,253
Charge air inlet temp. (Charge air temp after turbo compressor)	IFN Power 160 kW	°C	176	178	178	182
		°F	349	352	352	360
 <b>See front page for important information</b> Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	44	46	48	50
		°F	111	115	118	122
 <b>See front page for important information</b> Maximum pressure drop over charge air cooler incl. piping		kPa	7	8	10	12
		psi	1,0	1,2	1,5	1,7
Charge air pressure (After charge air cooler)		kPa	195	201	194	193
		psi	28,28	29,15	28,14	27,99
Standard charge air cooler core area		m <sup>2</sup>	0,5			
		foot <sup>2</sup>	5,38			
Compact charge air cooler core area		m <sup>2</sup>	0,22			
		foot <sup>2</sup>	2,37			

### Cooling performance: 0,6 m<sup>2</sup> radiator and 600mm fan, pull

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed		Air on temp		Air flow		External restriction	
rpm	Engine power kW hp	°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
2200	160	75,3	168	7,3	257,8	0	
	218	74,7	166	7,2	254,3	100	0,015
		74	165	7	247,2	200	0,029
		72,4	162	6,6	233,1	300	0,044

### Cooling performance: 0,28 m<sup>2</sup> radiator and 600mm fan, pull

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

Engine speed		Air on temp		Air flow		External restriction	
rpm	Engine power kW hp	°C	°F	m <sup>3</sup> /s	ft <sup>3</sup> /s	Pa	psi
2200	160	53,3	128	4,6	162,4	0	
	218	48,7	120	4,3	151,9	150	0,022
		43,9	111	4	141,3	300	0,044
		39,8	104	3,7	130,7	450	0,065

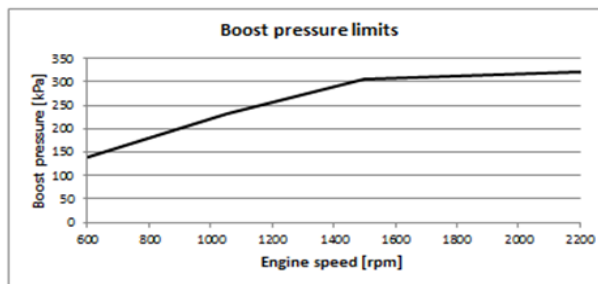
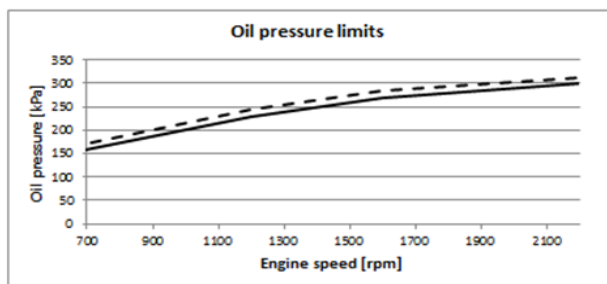
### Engine management system

Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	125	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	900	rpm	700
Stop function				Replaced by "Ignition of stop engine"
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Lamp test				No lamp test, not used any longer
Ignition of stop engine	Yes	No		No

Engine sensors and switch settings		Alarm level	Default setting	Engine protection	
Parameter	Unit	Setting range	Default setting	Level	Action. Default/Alternative
Oil temp	°C		125	125	Derate
Oil pressure	Low idle	kPa	150,0	150	Shut down
	Rated speed	kPa	300	300	Shut down
Coolant temp	°C		107	107	Derate
Coolant level			On	Low level	Derate
Water in fuel		On if closed circuit			
Air filter pressure drop			5kPa		
Altitude, above sea	m				Automatic derating, see section derating
Charge air temp	°C		80	80	Derate
Charge air pressure	kPa		See map		Derate
Engine speed	rpm				Shut down. ON/OFF*

\* Off means no shut down, alarm only

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after 0 sec	Forced shut down after 0 sec
Coolant temp	103°C	107°C	107°C	110°C		
Oil temp	122°C	125°C	125°C	130°C		
Low oil pressure	Warning map value	Alarm map value		Alarm map value		
High charge air temp	77°C	80°C	80°C	100°C		
High charge air pressure		Alarm map value	Alarm map value			



### Electrical system

Voltage and type			24V
Alternator:	make		MELCO
	output	A	110/130
	tacho output	Hz/alternator rev.	
	drive ratio		
Starter motor:	make		MELCO
	type		85P50 / 90P55
	output	kW	5 / 5.5
		hp	6.8 / 7.5
Number of teeth on:	flywheel		137
	starter motor		10 / 12 teeth
Inlet manifold heater (at 20 V)		kW	4
Power relay for the manifold heater		A	200

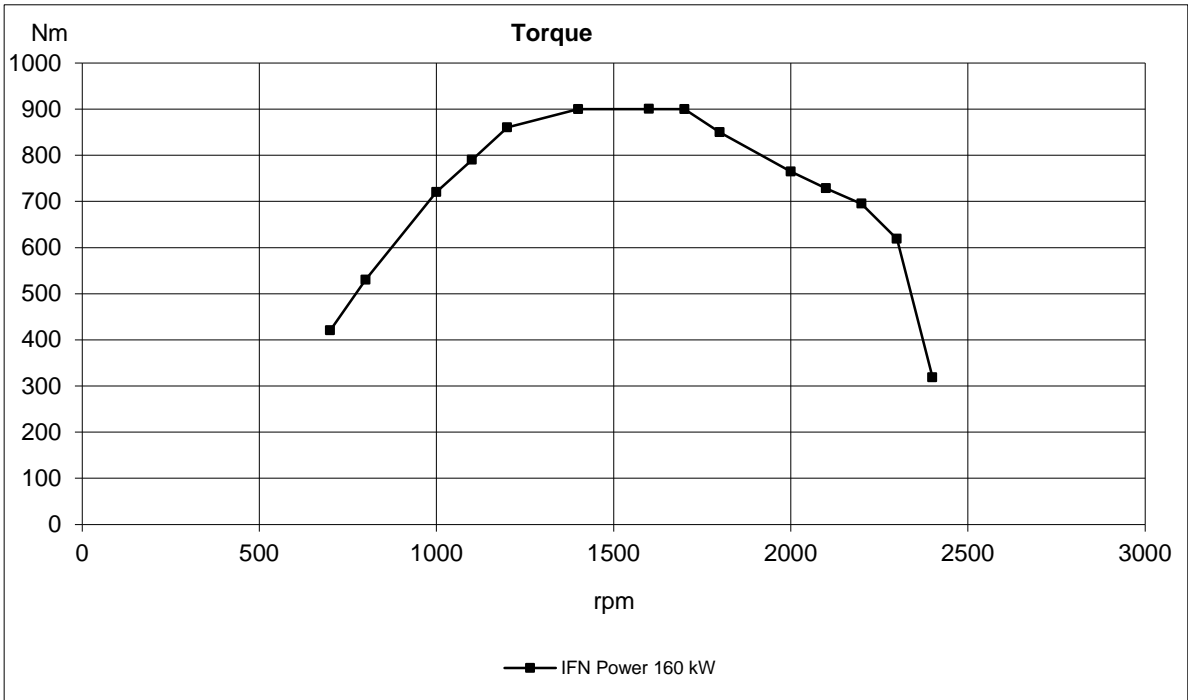
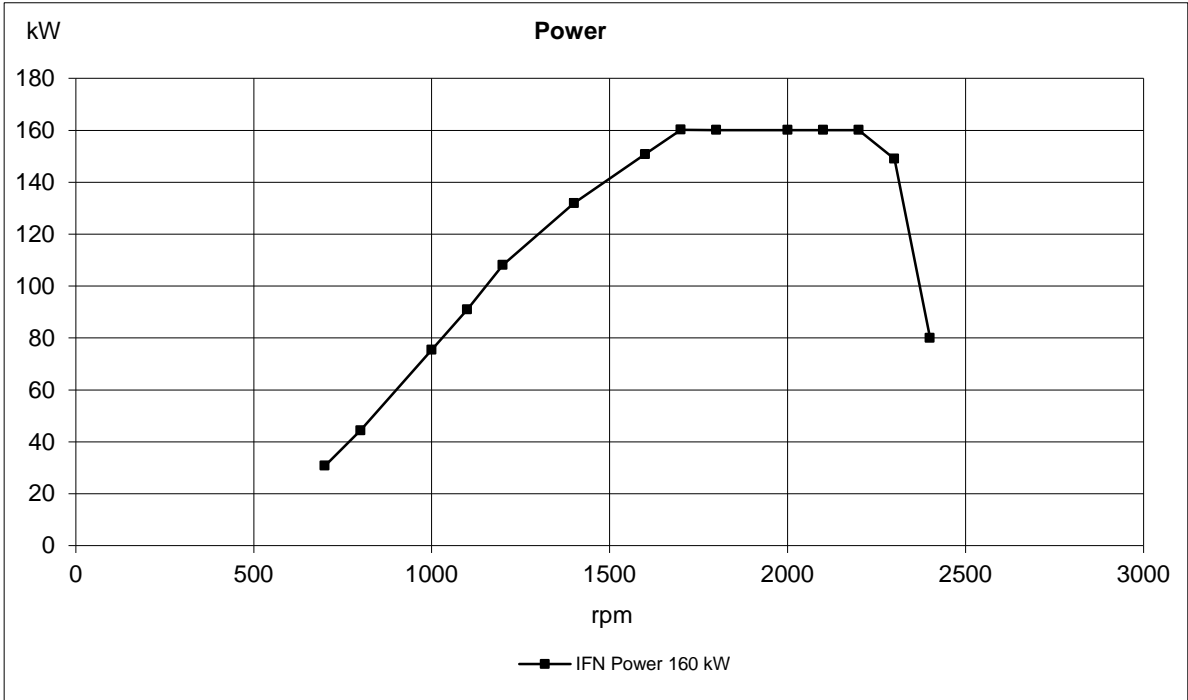
Conditions: (5 mΩ main circuit resistance@)	Temperature	°C	25	0	-15
	Battery	Ah / CCA	100/700	100/700	100/700
Crank speed		rpm	197	150	123
Crank current		A	173	265	320
Starter input power during crank		kW	3,90	4,70	5,20
Battery power during crank		kW	4,00	5,10	5,70
Min battery @ 0°C		Ah / CCA			

### Power take off

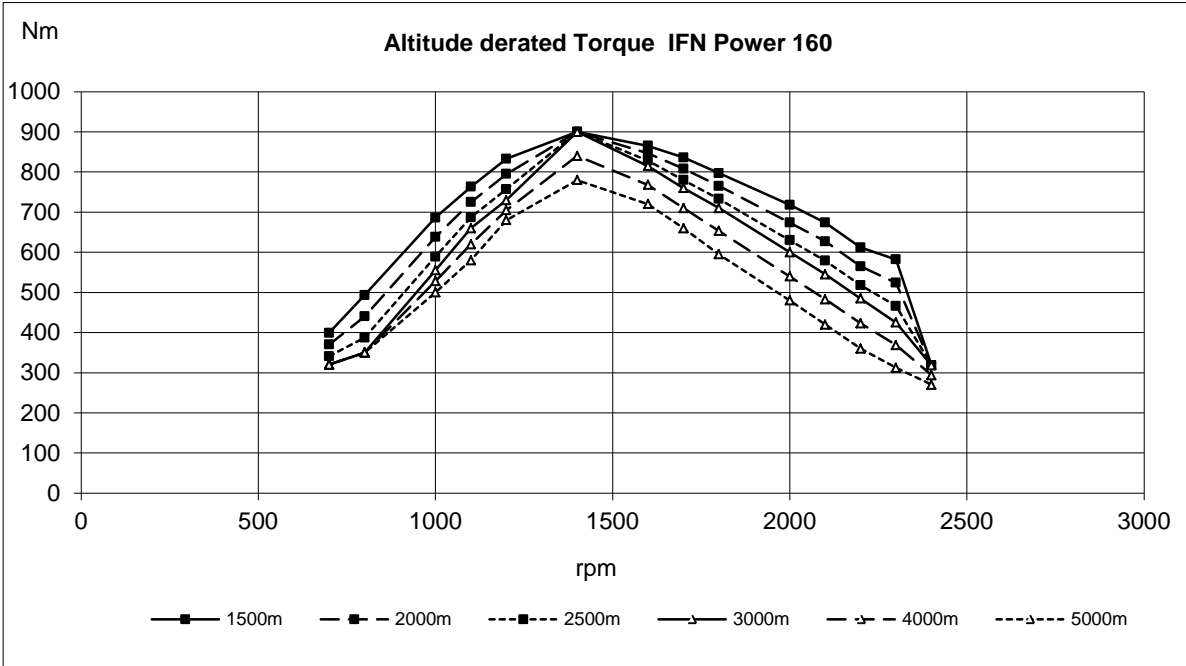
		rpm	1500	1800	2000	2200
Front end in line with crank shaft max:*	0.02 kgm <sup>2</sup>	Nm	866	817	750	610
		lbf ft	639	611	546	451
<b>Flywheel</b> SAE 2, STD 10" & 11,5 ", 1.303 kgm <sup>2</sup>	0.03 kgm <sup>2</sup>	Nm	866	748	711	457
		lbf ft	639	611	500	387
	0.04 kgm <sup>2</sup>	Nm	866	695	645	399
		lbf ft	639	572	461	320
Front end belt pulley load.	Max up (above or equal to horizontal line)	kW	3,4	4,1	4,5	5,0
		hp	4,6	5,6	6,1	6,8
	Max down (below horizontal line)	kW	28,4	34,0	37,8	41,6
		hp	38,6	46,2	51,4	56,6
Maximum power on Rear PTO on top of flywheel housing (REPTO):*		kW	75			
		hp	102			
Speed ratio direction of rotation viewed from flywheel side			1:1 Counter clockwise			
Maximum torque on PTO at compressor position:*		Nm	200			
		lbf ft	148			
Speed ratio direction of rotation viewed from flywheel side			1.026:1 Counter clockwise			
Timing gear at hydraulic pump PTO max:*		Nm	80			
		lbf ft	59			
Speed ratio direction of rotation viewed from flywheel side			1.3:1 Clockwise			
Max allowed bending moment in flywheel housing SAE2		Nm	7100			
		lbf ft	5236			
Max. rear main bearing load		N				
		lbf				

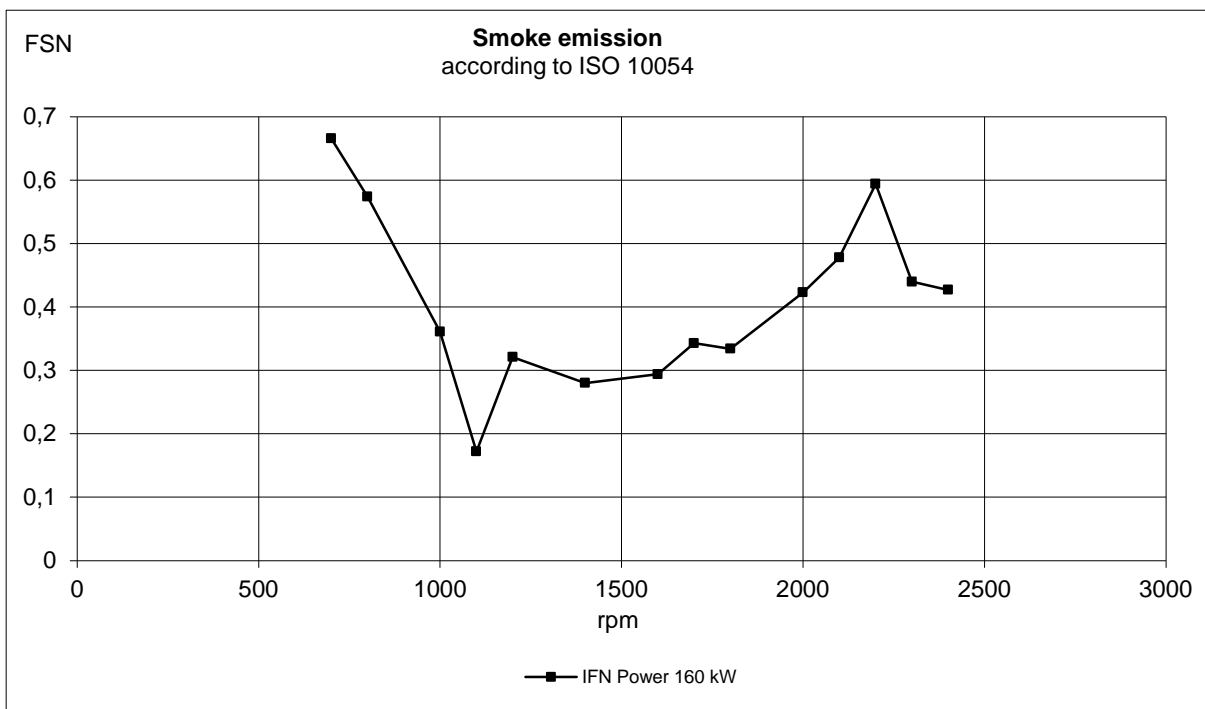
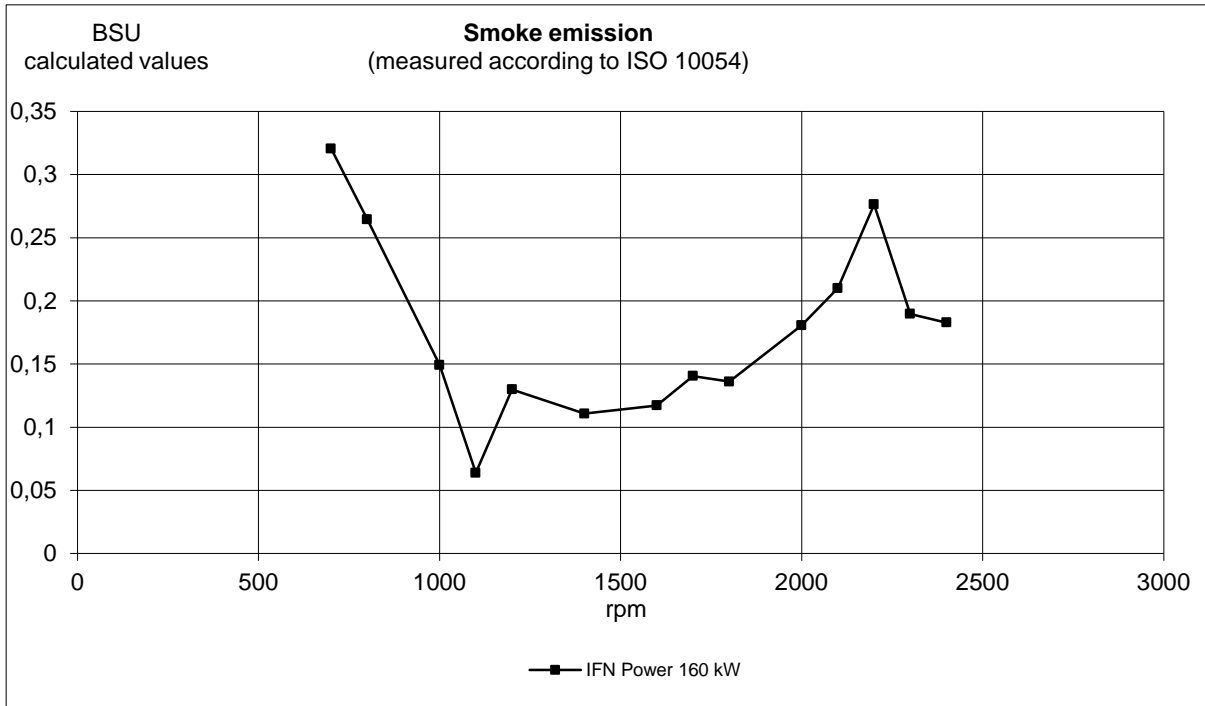
\* Maximum allowed torque at individual PTO's.

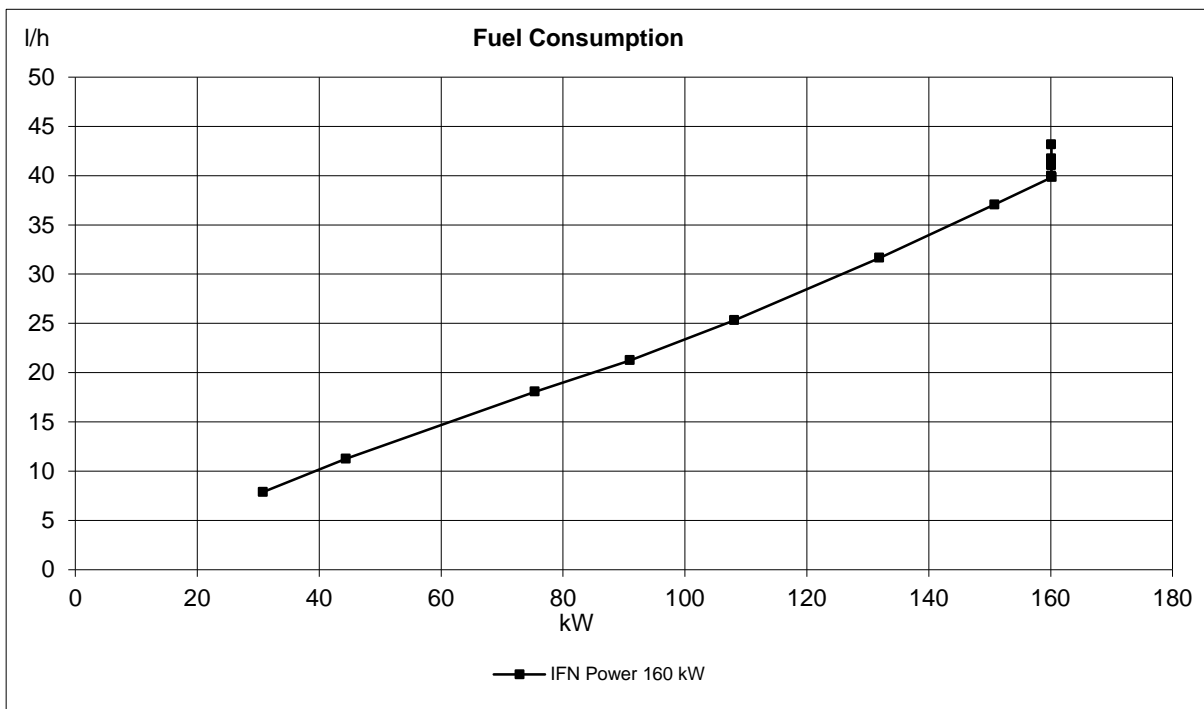
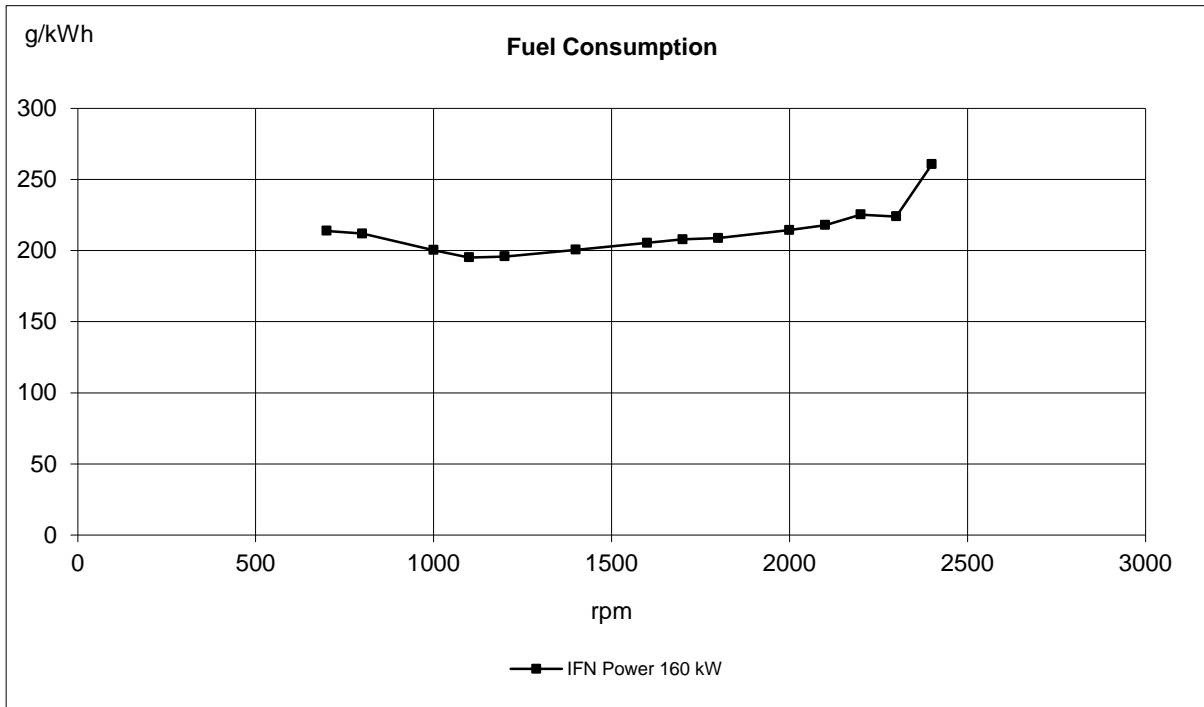
If more than one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

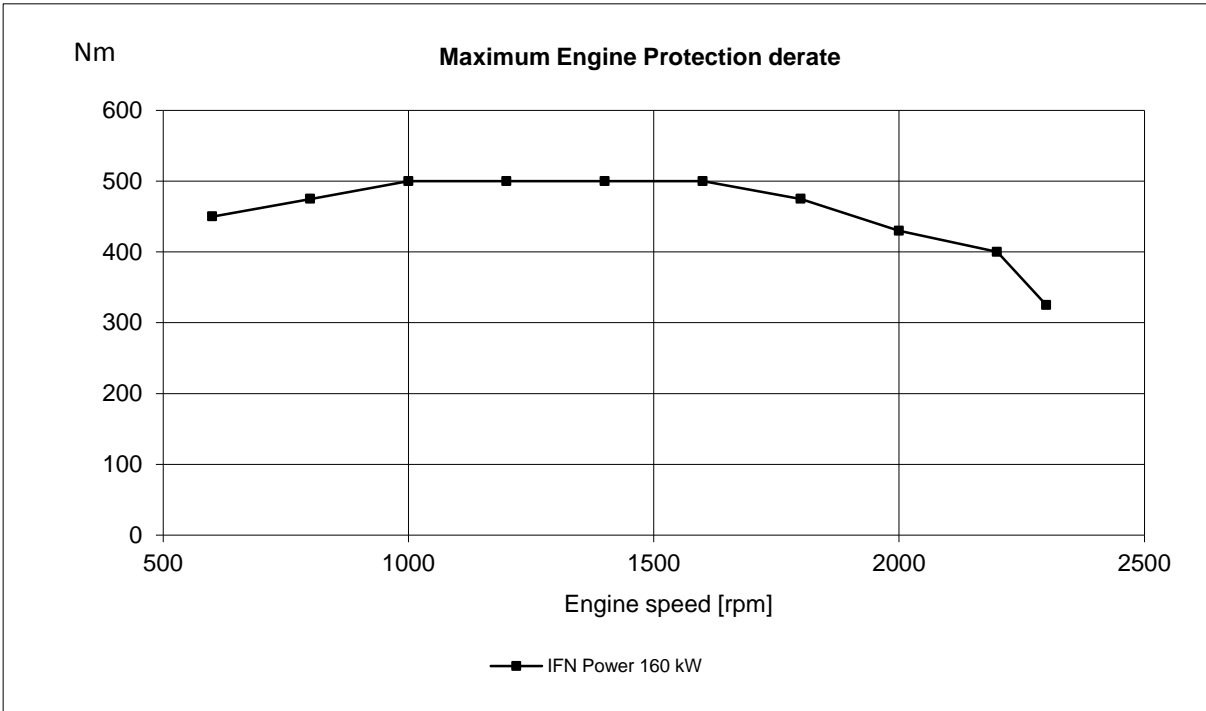


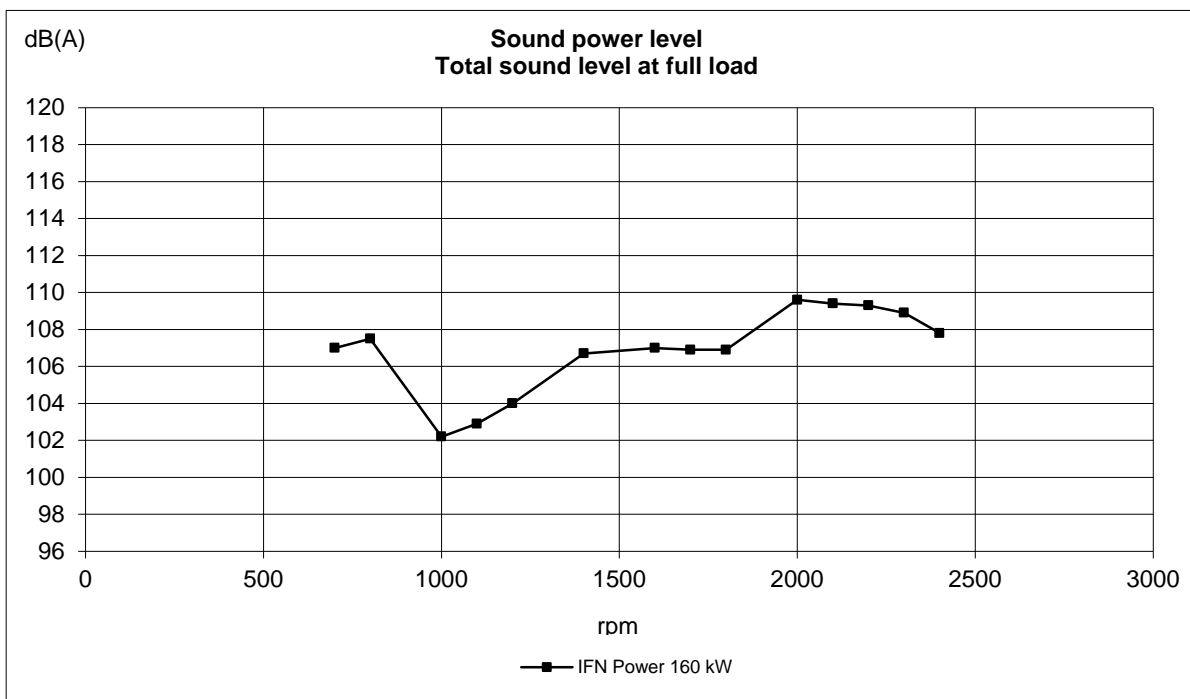
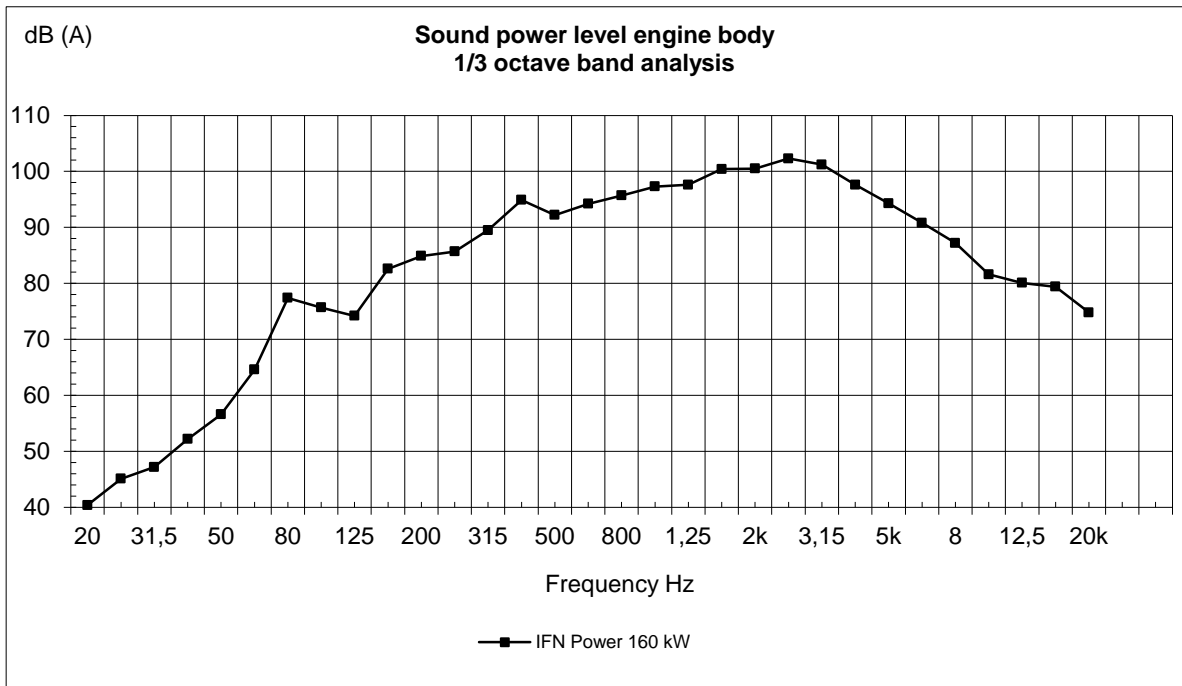


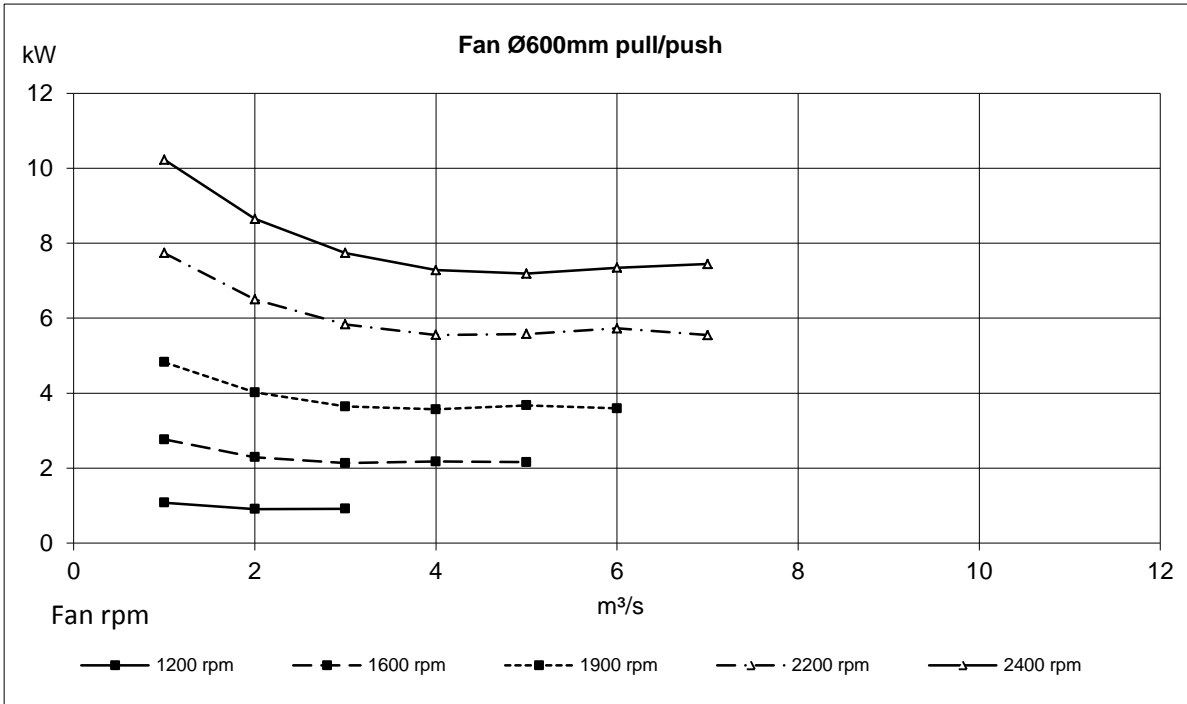




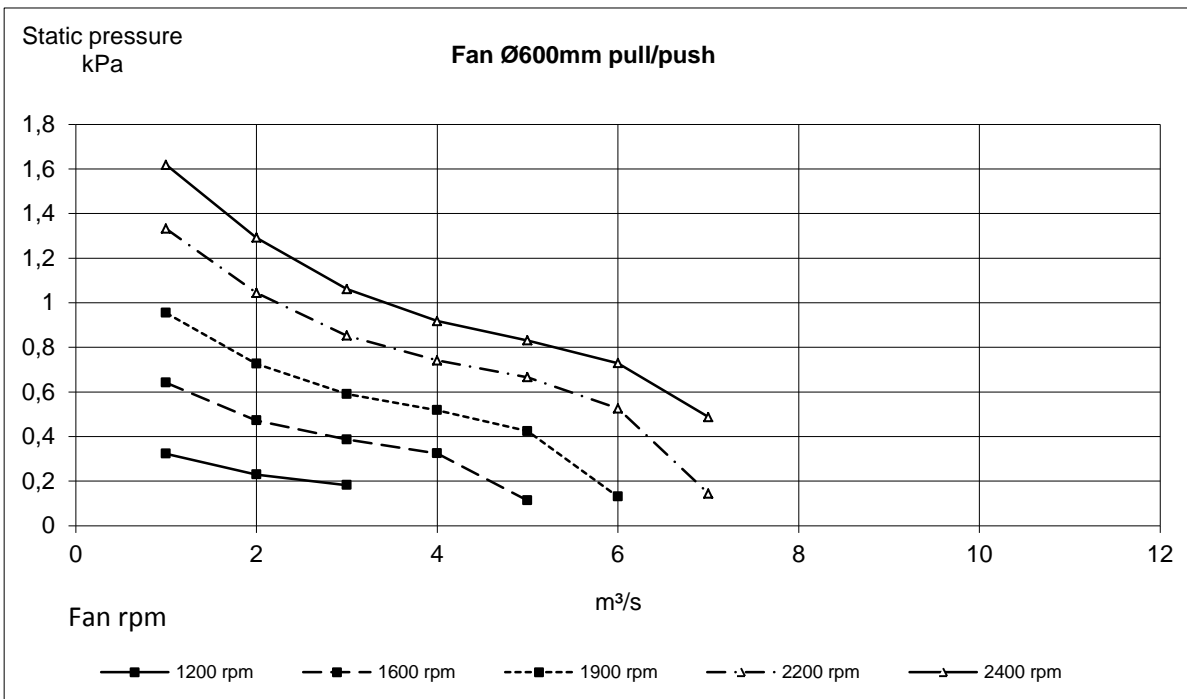








Maximum fan speed with visco clutch: 2400rpm



Maximum fan speed with visco clutch: 2400rpm

