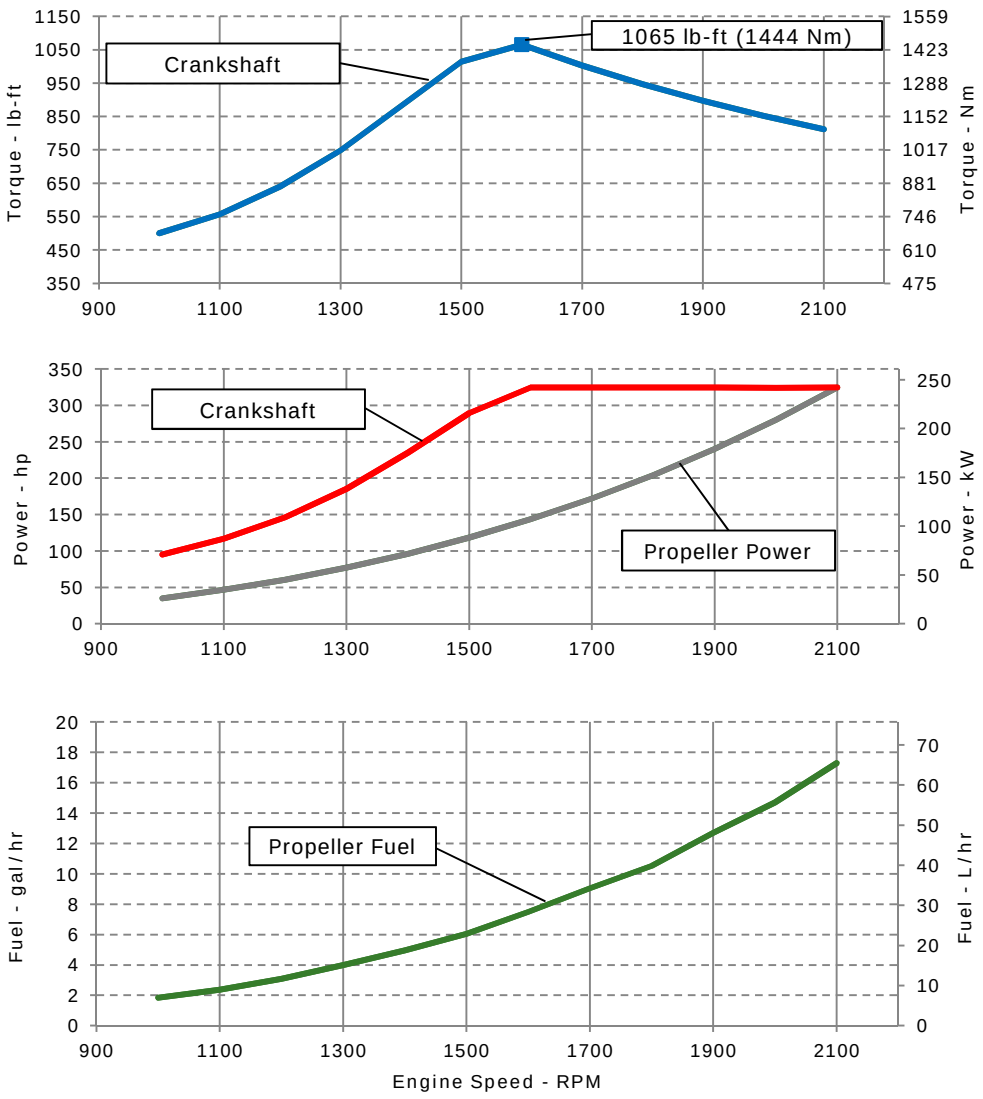
ENGINE PERFORMANCE CURVE

JOHN DEERE

Rating: M1 - 325hp (242kW) @ 2100 RPM
Application: Marine

PowerTech™ 9.0L Engine
Model: 6090SFM85



REFERENCE CONDITIONS

Air Intake Restriction.....12 in.H_2O (3 kPa)
Exhaust Back Pressure..... 30 in.H_2O (7.5 kPa)

Rated speed and power
Gross power guaranteed within ±5% at SAE J1995 and ISO 3046
J1995 and ISO 3046 conditions:

- 77 °F (25 °C) air inlet temperature
- 29.31 in.Hg (99 kPa) barometric pressure
- 104 °F (40 °C) fuel inlet temperature
- 0.853 fuel specific gravity @ 60 °F (15.5 °C)

Ambient air temperature is defined to be the temperature of ambient air close to operating vessel that is not influenced in any manner by operating characteristics of the vessel (free field temp).

Conversion factors:

- Power: kW = hp x 0.746
- Fuel: 1 gal = 7.1 lb, 1 L = 0.85 kg
- Torque: N·m = lb-ft x 1.356

All values from currently available data. Subject to manufacturing and measurement variations and to change without notice.
Actual performance is subject to application and operation conditions outside of John Deere control.

Notes:

M1: The M1 rating is for marine propulsion applications that may operate up to 24 hours per day at uninterrupted full power and have load factors greater than 65 percent.

Possible applications: Line hauls tugs and towboats, fish and shrimp trawlers/draggers, and displacement hull fishing boats.

Designed/Calibrated to meet:	Certified by:
• EPA Commercial Marine Tier 3 • IMO MARPOL Annex VI Compliant • NRMM (97/68/EC), as amended Ref: Engine Emission Label	9-Mar-14

Performance Curve: 6090SFM85_A

All values at rated speed, power, and standard conditions, per SAE J1995 unless otherwise noted.

Engine Installation Criteria

General Data

Model	6090SFM85			
Number of Cylinders	6			
Bore	118.4	mm	4.66	in
Stroke	136	mm	5.35	in
Displacement	9.0	L	549	in^3
Compression Ratio	16.3:1			
Valves per Cylinder, Intake/Exhaust	2/2			
Combustion System	Direct injection			
Firing Order	1-5-3-6-2-4			
Engine Type	In line, 4 Cycle			
Aspiration	Turbocharged and Aftercooled			
Aftercooling System	Seawater cooled			
Engine Crankcase Vent System	Closed			

Cooling System*

Total Engine to Seawater Heat Rejection**	186	kW	10587	BTU/min
Aftercooler Heat Rejection	50.24	kW	2860	BTU/min
Coolant Flow	280	L/min	74	gal/min
Thermostat Start to Open	82	°C	180	°F
Thermostat Fully Open	94	°C	202	°F
Min. Coolant Fill Rate	12	L/min	3.2	gal/min
Min. Pressure Cap	110.3	kPa	16	psi
Max. External Coolant Restriction	40	kPa	5.8	psi
Normal Operation Max Top Tank Temperature	100	°C	212	°F
≤ 5% of Total Operating Time Top Tank Temperature	100-110	°C	212-230	°F
Absolute Max Top Tank Temperature	110	°C	230	°F
Recommended Fuel Cooler	14	kW	786	BTU/min
Engine Radiated Heat	33	kW	1869	BTU/min

Physical Data

Length to rear face of block	1293	mm	50.9	in
Length maximum	1714	mm	67.5	in
Width maximum	975	mm	38.4	in
Height, crank centerline to top	662	mm	26.1	in
Height, crank centerline to bottom	320	mm	320	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1056	kg	2327	lb
Center of Gravity Location, X-axis From Rear Face of Block	408	mm	16.1	in
Center of Gravity Location, Y-axis Right of Crankshaft	38	mm	1.5	in
Center of Gravity Location, Z-axis Above Crankshaft	200	mm	7.9	in
Max. Allowable Static Bending Moment At Rear Face of Flywheel Housing with 5-G Load	814	Nm	600	lb-ft
Thrust Bearing Load Limit, Forward Continuous	8.6	kN	1933	lbf
Thrust Bearing Load Limit, Forward Intermittent	13	kN	2923	lbf
Thrust Bearing Load Limit, Rearward Continuous	4	kN	899	lbf
Thrust Bearing Load Limit, Rearward Intermittent	6	kN	1349	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1100	amps
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	750	amps
Starter Rolling Current, 12V @32 °F (0 °C)	500	amps
Starter Rolling Current, 24V @32 °F (0 °C)	300	amps
Min. Voltage at ECU during Cranking, 12V	6	volts
Min. Voltage at ECU during Cranking, 24V	10	volts
Max. Allowable Start Circuit Resistance, 12V	0.002	ohms
Max. Allowable Start Circuit Resistance, 24V	0.0012	ohms
Recommended Starter Cable, 12V 100"	#00	
Recommended Starter Cable, 24V 100"	#2	
Recommended Starter Cable, 12V 200"	#0000 or 2#00	
Recommended Starter Cable, 24V 200"	#0	
Electrical Component Maximum Temperature Limit	125 °C	257 °F

* The cooling system should be capable of typical at ambient up to the maximum conditions in which the vessel will operate.
Typical operation is defined as the average load sustainable in the vessel over 10 min.
** Reference 32 ˚C Sea Water Temperature

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Engine Installation Criteria

Fuel System

ECU Description			L14	
Fuel Injection Pump			HPCR	
Governor Type			Electronic	
Volumetric Fuel Consumption	65.4	L/hr	17.3	gal/hr
Mass Fuel Consumption	55.6	kg/hr	123	lb/hr
Total Fuel Volumetric Flow	251	L/hr	66.3	gal/hr
Total Fuel Mass Flow	213	kg/hr	470	lb/hr
Max. Fuel Inlet Restriction*	20	kPa	80	in.H2O
Max. Fuel Inlet Pressure	20	kPa	80	in.H2O
Max Fuel Return Pressure	20	kPa	80	in.H2O
Max. Fuel Height Above Transfer Pump	2.4	m	7.9	ft
Max. Leak-off Return Height	2.4	m	7.9	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	2.4	m	7.9	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	100	°C	212	°F
Min. Recommended Fuel Line Inside Diameter	8.53	mm	0.34	in
Min. Recommended Fuel Line Size			6 (-) AN	
Primary Fuel Filter			10 mic	
Secondary Fuel Filter			2 mic	

Lubrication System

Oil Pressure at Rated Speed	270	kPa	39	psi
Oil Pressure at Low Idle (650rpm)**	145	kPa	21	psi
Max. Crankcase Pressure	2	kPa	8	in.H2O
Maximum Installed Angle, Front Down			0 deg	
Maximum Installed Angle, Front Up			12 deg	
Engine Angularity Limits Any Direction, Continuous***			20 deg	
Engine Angularity Limits Any Direction, Intermittent***			30 deg	

Seawater Pump System

Seawater Pump Flow	363	L/min	96	gal/min
Max. Suction Lift	3	m	9.8	ft
Max. Outlet Pressure	140	kPa	20	psi
Max. Inlet Restriction	30	kPa	4	psi

* With clean filters

** With John Deere Plus-50 II™ 15w-40, not applicable with break in oil.

*** With 1932 option

Air Intake System

Engine Air Flow	21	m^3/min	741.6	ft^3/min
Intake Manifold Pressure	157	kPa	22.8	psi
Manifold Air Temperature	35	°C	95	°F
Maximum Manifold Air Temperature	67	°C	153	°F
Max. Allowable Temperature Rise, Ambient Air to Engine Inlet	17	°C	30	°F
Max. Air Intake Restriction, Clean Air Cleaner	3	kPa	12	in.H_2O
Max. Air Intake Restriction, Dirty Air Cleaner	6.25	kPa	25	in.H_2O
Min. Ventilation Area	0.129	m^2	200	in^2

Performance Data

Rated Power	242	kW	325	hp
Rated Speed		2100	RPM	
Peak Torque Speed		1600	RPM	
Low Idle Speed		650	RPM	
Rated Torque	1100	Nm	812	ft-lb
Peak Torque	1444	Nm	1065	ft-lb
BMEP, Rated	1537	kPa	223	psi
Rated Pferdestärke (metric hp)		329	ps	
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

Exhaust System

Exhaust Flow	44.34	m^3/min	1566	ft^3/min
Exhaust Flow @ gas STP	20.2	m^3/min	713	ft^3/min
Exhaust Temperature	384	°C	723	°F
Max. Allowable Exhaust Restriction	7.5	kPa	30	in.H_2O
Max. Shear on Turbocharger Exhaust Outlet	11	kg	24.3	lb
Max. Bending Moment on Turbocharger Exhaust Outlet	7	Nm	15.4	lb-ft
Min. Exhaust Pipe Diameter, Dry	114.3	mm	4.5	in
Min. Exhaust Pipe Diameter, Wet	127	mm	5.0	in

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Engine Performance Data Table

Engine Speed	Crank Power		Crank Torque		* Prop Power		* Prop Fuel		* Prop BSFC
RPM	kW	hp	Nm	lb-ft	kW	hp	L/hr	gal/hr	g/kW-hr
2100	242	324	1100	811	242	324	65.4	17.3	230
2000	242	324	1155	852	209	280	55.6	14.7	226
1900	242	324	1216	897	179	240	48.0	12.7	228
1800	242	325	1284	947	152	204	39.8	10.5	222
1700	242	324	1359	1002	128	172	34.2	9.0	227
1600	242	324	1444	1065	107	144	28.3	7.5	225
1500	216	290	1375	1014	88	118	22.9	6.0	221
1400	175	235	1195	881	72	96	18.7	5.0	222
1300	138	185	1015	748	57	77	15.1	4.0	224
1200	109	146	868	640	45	61	11.7	3.1	220
1100	87	117	755	557	35	47	9.0	2.4	219
1000	71	95	678	500	26	35	6.9	1.8	226

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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