



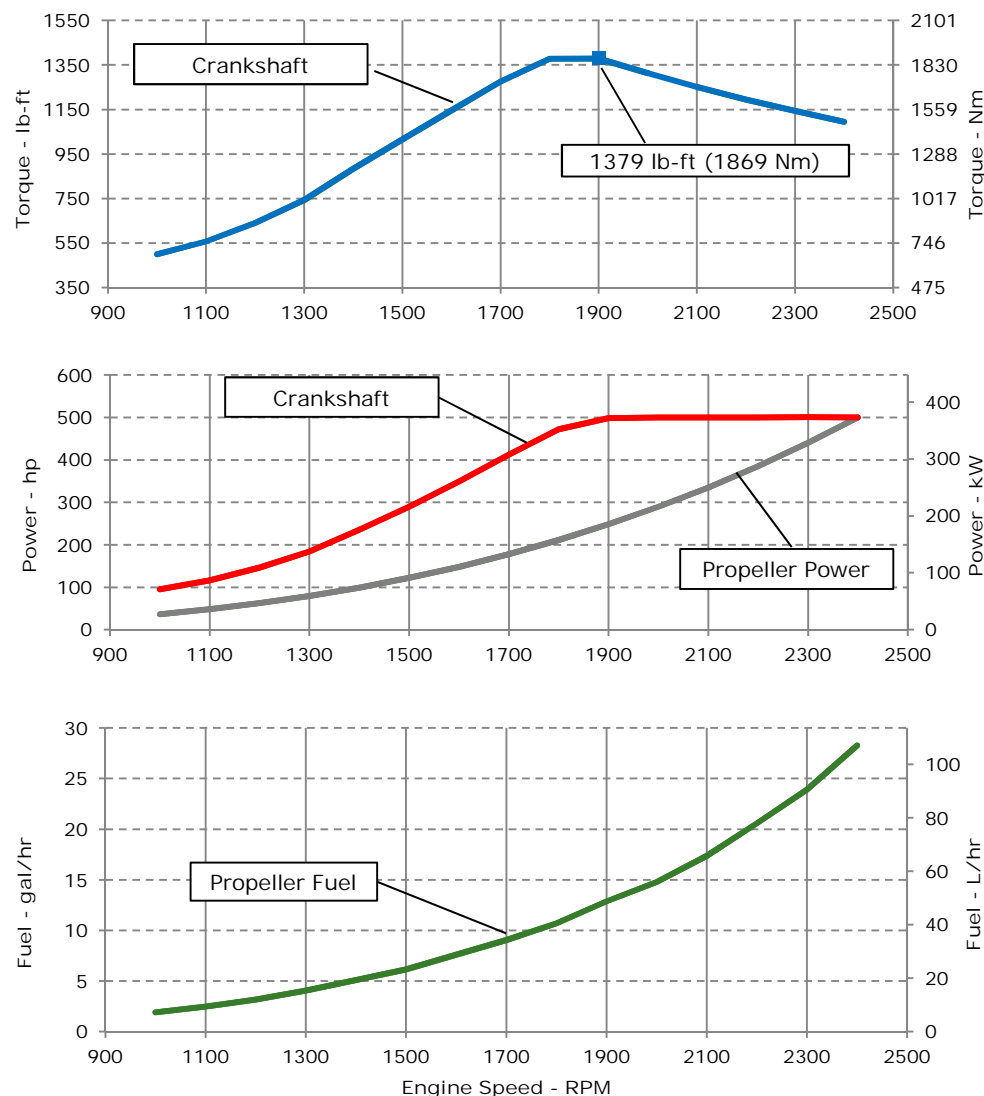
JOHN DEERE

## ENGINE PERFORMANCE CURVE

Rating: M4 - 500hp (373kW) @ 2400 RPM  
Application: Marine

PowerTech™ 9.0L Engine

Model: 6090SFM85



### REFERENCE CONDITIONS

Air Intake Restriction..... 12 in. H<sub>2</sub>O (3 kPa)  
Exhaust Back Pressure..... 30 in. H<sub>2</sub>O (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:

**M4:** The M4 rating is for marine propulsion applications that typically operate between 1,000-3,000 hours per year and have load factors below 40 percent. This rating is for applications that use full power no more than 1 hour out of each 12 hours of operation. The remaining time of operation is at or below cruising speed.

**Possible applications:** Inshore crew boats, charter fishing boats, pilot boats, dive boats, and planning hull commercial fishing boats.

Designed/Calibrated to meet:

- EPA Commercial Marine Tier 3
- IMO MARPOL Annex VI Compliant
- NRMM (97/68/EC), as amended

Ref: Engine Emission Label

Certified by:

9-Mar-14

Performance Curve: 6090SFM85\_D

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 <sup>3</sup>
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**	271	kW	15425	BTU/min
Aftercooler Heat Rejection	109.56	kW	6236	BTU/min
Coolant Flow	398	L/min	105	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	11	kW	609	BTU/min
Engine Radiated Heat	54	kW	3058	BTU/min

\* 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

## 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

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# Engine Installation Criteria

## Fuel System

ECU Description	L14			
Fuel Injection Pump	HPCR			
Governor Type	Electronic			
Volumetric Fuel Consumption	107	L/hr	28.3	gal/hr
Mass Fuel Consumption	91	kg/hr	201	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.H <sub>2</sub> O
Max. Fuel Inlet Pressure	20	kPa	80	in.H <sub>2</sub> O
Max Fuel Return Pressure	20	kPa	80	in.H <sub>2</sub> O
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.H <sub>2</sub> O
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	375	L/min	99	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	32.6	m <sup>3</sup> /min	1151	ft <sup>3</sup> /min
Intake Manifold Pressure	262	kPa	38.0	psi
Manifold Air Temperature	45	°C	113	°F
Maximum Manifold Air Temperature	67	°C	153	°F
Max. Allowable Temperature Rise, Ambient	17	°C	30	°F
Air to Engine Inlet				
Max. Air Intake Restriction, Clean Air Cleaner	3	kPa	12	in.H <sub>2</sub> O
Max. Air Intake Restriction, Dirty Air Cleaner	6.25	kPa	25	in.H <sub>2</sub> O
Min. Ventilation Area	0.201	m <sup>2</sup>	311	in <sup>2</sup>

## Performance Data

Rated Power	373	kW	500	hp
Rated Speed	2400	RPM		
Peak Torque Speed	1900	RPM		
Low Idle Speed	650	RPM		
Rated Torque	1484	Nm	1095	ft-lb
Peak Torque	1869	Nm	1379	ft-lb
BMEP, Rated	2072	kPa	300	psi
Rated Pferdestärke (metric hp)	507	ps		
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

## Exhaust System

Exhaust Flow	71.7	m <sup>3</sup> /min	2532	ft <sup>3</sup> /min
Exhaust Flow @ gas STP	31.2	m <sup>3</sup> /min	1102	ft <sup>3</sup> /min
Exhaust Temperature	414	°C	777	°F
Max. Allowable Exhaust Restriction	7.5	kPa	30	in.H <sub>2</sub> O
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	139.7	mm	5.5	in
Min. Exhaust Pipe Diameter, Wet	152.4	mm	6.0	in

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## Engine Installation Criteria

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
2400	373	500	1484	1095	373	500	107	28	244
2300	373	501	1550	1143	328	440	90	24	234
2200	373	500	1619	1194	287	385	78	21	231
2100	373	500	1696	1251	250	335	66	17	224
2000	373	500	1780	1313	216	289	56	15	220
1900	372	499	1869	1379	185	248	49	13	224
1800	352	472	1867	1377	157	211	41	11	219
1700	308	413	1730	1276	133	178	34	9	220
1600	260	349	1553	1145	111	148	29	8	221
1500	216	290	1376	1015	91	122	23	6	217
1400	176	235	1197	883	74	99	19	5	222
1300	137	184	1007	743	59	79	15	4	219
1200	109	146	868	640	47	63	12	3	218
1100	87	117	755	557	36	48	9	2	221
1000	71	95	678	500	27	36	7	2	227

\* Theoretical 3.0 exponent propeller curve , measured at flywheel

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