ENGINE PERFORMANCE CURVE

JOHN DEERE

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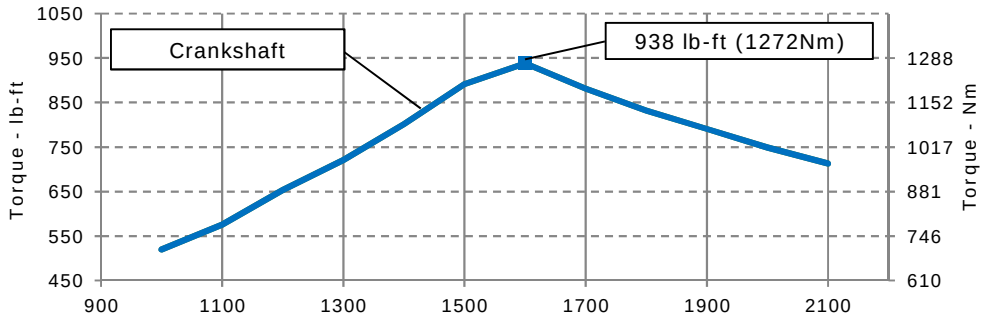
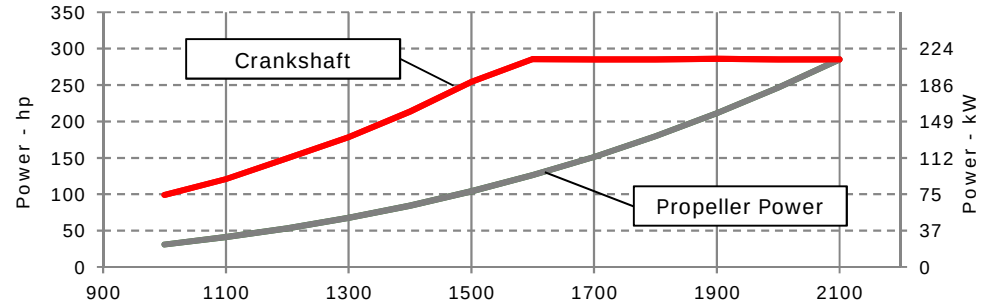
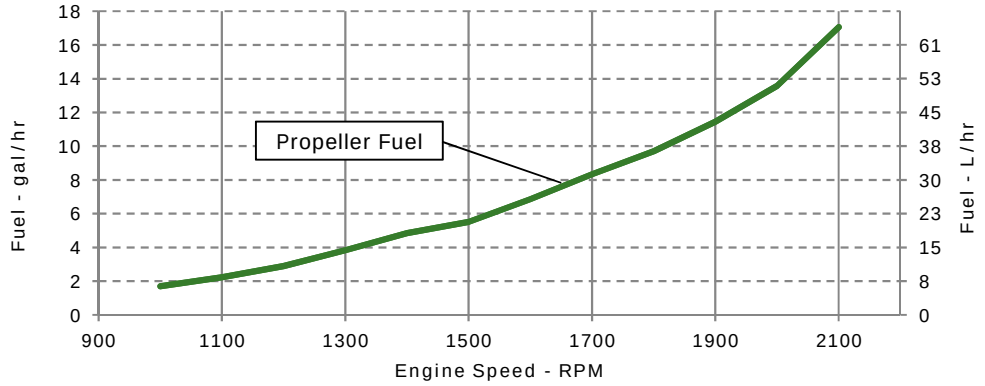
Rating: M1 - 285hp (213kW) @ 2100 RPM
Application Marine

PowerTech™ 9.0L Engine

Model: 6090AFM85







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 Tier II Compliant	
• NRMM (97/68/EC), as amended	
Ref: Engine Emission Label	7-Oct-16

Performance Curve: 6090AFM85_A

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

Engine Installation Criteria

General Data

Model	6090AFM85			
Number of Cylinders	6			
Bore	118	mm	4.65	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	Engine coolant			
Engine Crankcase Vent System	Closed			

Cooling System*

Engine Coolant Heat Rejection**	237	kW	13479	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	315	L/min	83	gal/min
Min. Coolant Pump Inlet Pressure	30.3	kPa	4.4	psi
Thermostat Start to Open	71	°C	160	°F
Thermostat Fully Open	83	°C	182	°F
Engine Coolant Capacity, HE	42	L	11.1	gal
Engine Coolant Capacity, KC	40	L	10.6	gal
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	4	kW	206	BTU/min
Engine Radiated Heat	32	kW	1845	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	1297	mm	51.1	in
Length to rear face of flywheel housing (SAE #2)	1415	mm	55.7	in
Length maximum	1712	mm	67.4	in
Width maximum	1027	mm	40.4	in
Height, crank centerline to top	665	mm	26.2	in
Height, crank centerline to bottom	319	mm	12.6	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1055	kg	2325	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 (for installations up to 5-G)	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)	920	amps		
Starter Rolling Current, 24V @32 °F (0 °C)	600	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	0.0012	ohms		
Max. Allowable Start Circuit Resistance, 24V	0.002	ohms		
Electrical Component Maximum Temperature Limit	125	°C	257	°F
Maximum ECU Temperature	105	°C	221	°F

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Engine Installation Criteria

Fuel System

ECU Description	L14			
Fuel Injection Pump	Denso HP4			
Governor Type	Electronic			
Volumetric Fuel Consumption	64.6	L/hr	17.1	gal/hr
Mass Fuel Consumption	54.9	kg/hr	121	lb/hr
Total Fuel Volumetric Flow	240	L/hr	63.4	gal/hr
Total Fuel Mass Flow	204	kg/hr	450	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
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	100	°C	212	°F
Min. Recommended Fuel Line Inside Diameter	8.34	mm	0.33	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	300	kPa	44	psi
Oil Pressure at Low Idle (650rpm)**	141	kPa	20	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	397	L/min	105	gal/min
Max. Suction Lift	3	m	9.8	ft
Max. Outlet Pressure	140	kPa	20	psi
Max. Inlet Restriction	30	kPa	4	psi

Air Intake System

Engine Air Flow	20.8	m^3/min	735	ft^3/min
Intake Manifold Pressure	176.4	kPa	25.6	psi
Manifold Air Temperature	83	°C	181	°F
Maximum Manifold Air Temperature	130	°C	266	°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	0.128	m^2	198	in^2

Performance Data

Rated Power	213	kW	285	hp
Rated Speed	2100	RPM		
Peak Torque Speed	1600	RPM		
Low Idle Speed	650	RPM		
Rated Torque	967	Nm	713	ft-lb
Peak Torque	1272	Nm	938	ft-lb
BMEP, Rated	1350	kPa	196	psi
Rated Pferdestärke (metric hp)	289	ps		
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

Exhaust System

Exhaust Flow	49	m^3/min	1730	ft^3/min
Exhaust Flow @ gas STP	20.3	m^3/min	717	ft^3/min
Exhaust Temperature	448	°C	838	°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

* With clean filters

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

*** With 1932 option

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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
2100	213	285	967	713	213	285	64.6	17.1	258
2000	213	285	1015	749	184	246	51.4	13.6	238
1900	213	286	1072	791	158	211	43.3	11.4	234
1800	213	285	1128	832	134	180	36.7	9.7	233
1700	213	285	1195	881	113	151	31.6	8.3	238
1600	213	286	1272	938	94	126	25.9	6.9	234
1500	190	255	1208	891	78	104	20.9	5.5	229
1400	159	214	1087	802	63	84	18.4	4.9	248
1300	133	179	978	721	50	68	14.5	3.8	244
1200	111	149	886	653	40	53	11.0	2.9	235
1100	90	121	781	576	31	41	8.4	2.2	235
1000	74	99	705	520	23	31	6.4	1.7	238

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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