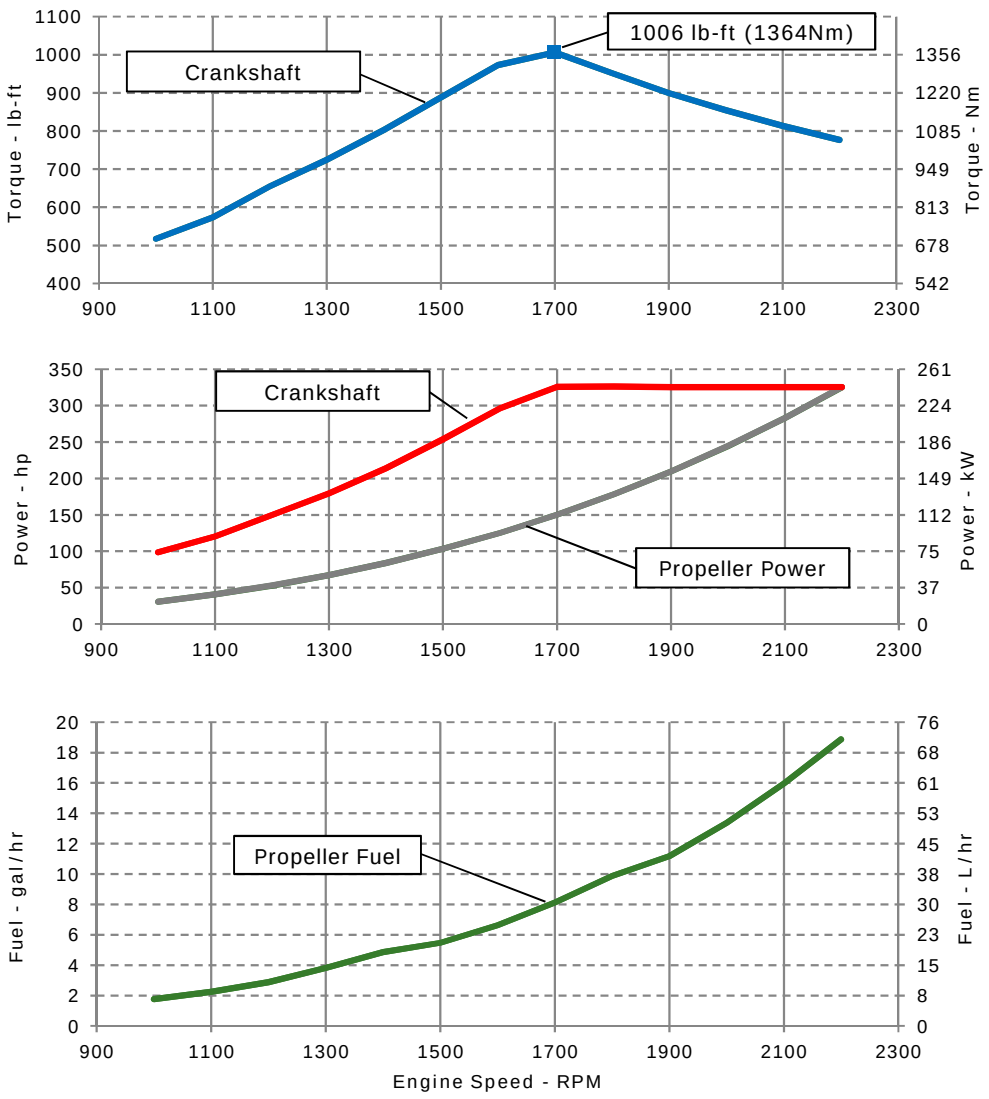
ENGINE PERFORMANCE CURVE

Rating: M2 - 325hp (242kW) @ 2200 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:

M2: The M2 rating is for marine propulsion applications that typically operate between 3,000-5,000 hours per year and have load factors up to 65 percent. This rating is for applications that are in continuous use and use full power for no more than 16 hours of each 24 hours of operation. The remaining time of operation is at or below cruising speed.

Possible applications: Short-range tugs and towboats long-range ferryboats, large passenger vessels and offshore 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_B

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**	259	kW	14742	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	329	L/min	87	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	3	kW	198	BTU/min
Engine Radiated Heat	36	kW	2042	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	71.5	L/hr	18.9	gal/hr
Mass Fuel Consumption	60.7	kg/hr	134	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	413	L/min	109	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	24.0	m^3/min	848	ft^3/min
Intake Manifold Pressure	202	kPa	29.3	psi
Manifold Air Temperature	83	°C	189	°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	0.148	m^2	229	in^2

Performance Data

Rated Power	243	kW	325	hp
Rated Speed		2200	RPM	
Peak Torque Speed		1700	RPM	
Low Idle Speed		650	RPM	
Rated Torque	1053	Nm	777	ft-lb
Peak Torque	1364	Nm	1006	ft-lb
BMEP, Rated	1470	kPa	213	psi
Rated Pferdestärke (metric hp)		330	ps	
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

Exhaust System

Exhaust Flow	52.7	m^3/min	1861	ft^3/min
Exhaust Flow @ gas STP	22.4	m^3/min	791	ft^3/min
Exhaust Temperature	430	°C	806	°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 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
2200	243	325	1053	777	243	325	71	19	250
2100	243	325	1103	814	211	283	60	16	244
2000	243	325	1158	854	182	244	51	13	236
1900	243	325	1219	899	156	210	42	11	230
1800	243	326	1290	952	133	178	37	10	239
1700	243	326	1364	1006	112	150	31	8	234
1600	221	296	1319	973	93	125	25	7	228
1500	189	254	1204	888	77	103	21	5	229
1400	159	214	1088	802	63	84	18	5	250
1300	134	179	983	725	50	67	14	4	244
1200	112	150	888	655	39	53	11	3	236
1100	90	120	778	574	30	41	9	2	239
1000	73	99	702	517	23	31	7	2	249

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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