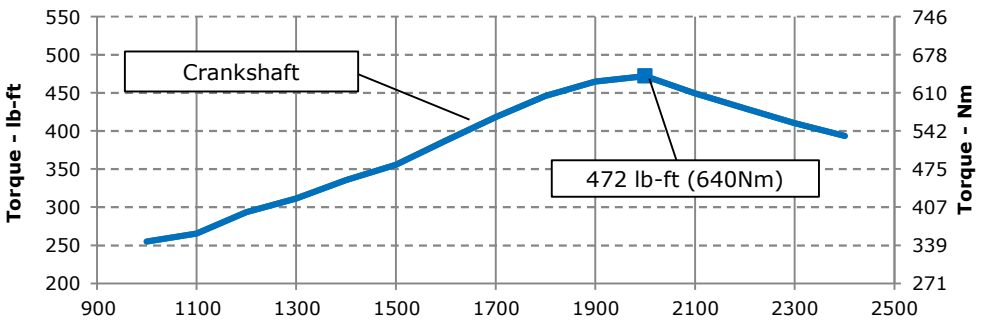
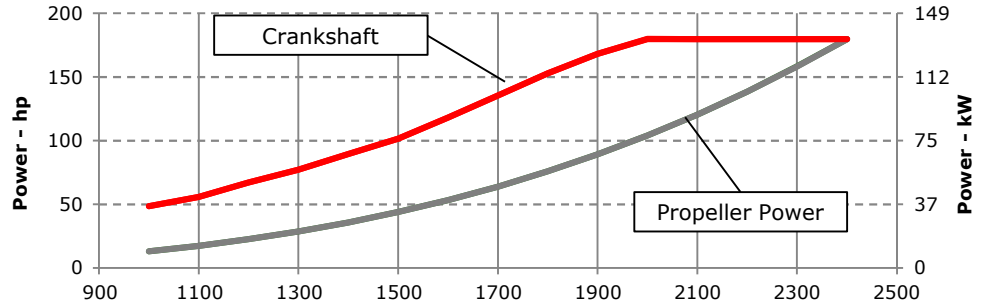
ENGINE PERFORMANCE CURVE

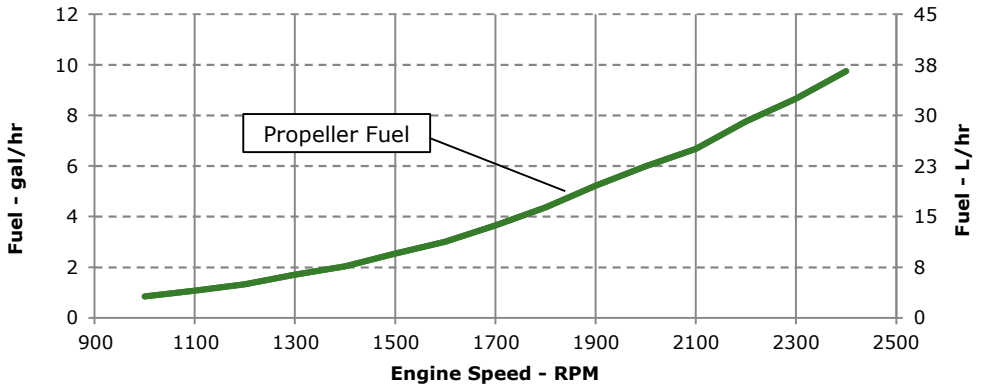
JOHN DEERE

Rating: **M2 - 180hp (134kW) @ 2400 RPM**
Application: **Marine**

PowerTech™ 4.5L Engine
Model: 4045AFM85







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 ISO 8665/SAE J1228 and ISO 3046/SAE J1995
Test 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.

All pressures shown in gague pressure

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 Marine Tier 3 Commercial (40 CFR 1042) • IMO Tier II Compliant (MARPOL Annex VI) • China Stage 2 Commercial Propulsion (GB15097-2016) • EU Stage IIIa Inland Waterways (NRMM 97/68/EC, as amended) • Recreational Craft Directive 2 (2013/53/EU)	Scott D Ochsner
Ref: Engine Emission Label	26-Jan-22

Performance Curve: 4045AFM85_B

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

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Engine Installation Criteria

General Data

Model	4045AFM85			
Number of Cylinders	4			
Bore	107	mm	4.21	in
Stroke	127	mm	5.00	in
Displacement	4.5	L	275	in^3
Compression Ratio	16.7:1			
Valves per Cylinder, Intake/Exhaust	2/2			
Combustion System	Direct injection			
Firing Order	1-3-4-2			
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**	145	kW	8253	BTU/min
Max. Pressure Drop Across Keel Cooler	40	kPa	5.8	psi
Coolant Flow	208	L/min	55	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	17	L	4.4	gal
Engine Coolant Capacity, KC	20	L	5.2	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	2	kW	135	BTU/min
Engine Radiated Heat	9	kW	527	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	752	mm	29.6	in
Length to rear face of flywheel housing (SAE #3)	890	mm	35.0	in
Length maximum	1105	mm	43.5	in
Width maximum	864	mm	34.0	in
Height, crank centerline to top	654	mm	25.7	in
Height, crank centerline to bottom	310	mm	12.2	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	578	kg	1274	lb
Center of Gravity Location, X-axis From Rear Face of Block	273	mm	10.8	in
Center of Gravity Location, Y-axis Right of Crankshaft	4.78	mm	0.2	in
Center of Gravity Location, Z-axis Above Crankshaft	227	mm	8.9	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	2.2	kN	495	lbf
Thrust Bearing Load Limit, Forward Intermittent	4	kN	899	lbf
Thrust Bearing Load Limit, Rearward Continuous	1	kN	225	lbf
Thrust Bearing Load Limit, Rearward Intermittent	2	kN	450	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	625	amps		
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	500	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	0.002	ohms		
Max. Allowable Start Circuit Resistance, 24V	0.0012	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			HPCR	
Governor Type			Electronic	
Volumetric Fuel Consumption	36.9	L/hr	9.7	gal/hr
Mass Fuel Consumption	31.4	kg/hr	69	lb/hr
Total Fuel Volumetric Flow	152	L/hr	40.0	gal/hr
Total Fuel Mass Flow	129	kg/hr	284	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	6.63	mm	0.26	in
Min. Recommended Fuel Line Size			5	(-) AN
Primary Fuel Filter			10	mic
Secondary Fuel Filter			2	mic

Lubrication System

Oil Pressure at Rated Speed	436	kPa	63	psi
Oil Pressure at Low Idle (800rpm)**	213	kPa	31	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***			35	deg
Engine Angularity Limits Any Direction, Intermittent***			45	deg

Seawater Pump System

Seawater Pump Flow	235	L/min	62	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	10.95	m^3/min	386.7	ft^3/min
Intake Manifold Pressure	156.7	kPa	22.7	psi
Manifold Air Temperature	81	°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	0.067	m^2	104	in^2

Performance Data

Rated Power	134	kW	180	hp
Rated Speed		2400	RPM	
Peak Torque Speed		2000	RPM	
Low Idle Speed		600	RPM	
Rated Torque	533	Nm	393	ft-lb
Peak Torque	604	Nm	446	ft-lb
BMEP, Rated	1496	kPa	217	psi
Rated Pferdestärke (metric hp)		182	ps	
Front Drive Capacity, Intermittent	621	Nm	458	lb-ft
Front Drive Capacity, Continuous	621	Nm	458	lb-ft

Exhaust System

Exhaust Flow	24.9	m^3/min	879	ft^3/min
Exhaust Flow @ gas STP	11.26	m^3/min	398	ft^3/min
Exhaust Temperature	438	°C	820	°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	101.6	mm	4.0	in
Min. Exhaust Pipe Diameter, Wet	114.3	mm	4.5	in

* With clean filters

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

*** With 19CZ 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
2400	134	180	533	393	134	180	37	10	234
2300	134	180	556	410	118	158	33	9	236
2200	134	180	582	429	103	138	29	8	242
2100	134	180	609	449	90	120	25	7	239
2000	134	180	640	472	78	104	23	6	248
1900	125	168	630	465	66	89	20	5	252
1800	114	153	604	446	57	76	16	4	248
1700	101	135	567	418	48	64	14	4	246
1600	88	118	525	387	40	53	11	3	244
1500	76	102	482	356	33	44	10	3	250
1400	67	89	455	336	27	36	8	2	246
1300	57	77	422	311	21	29	6	2	258
1200	50	67	398	294	17	22	5	1	255
1100	41	56	360	266	13	17	4	1	268
1000	36	49	346	255	10	13	3	1	283

*** Theoretical 3.0 exponent propeller curve , measured at flywheel**

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