



Shanghai Cummins Trade Co., Ltd.
Shanghai, China, 200030
Marine Performance Curves

Basic Engine Model

L8.9CMII223

Curve Number:

M-FR96908

Engine Configuration

D563033MX03

CPL Code:

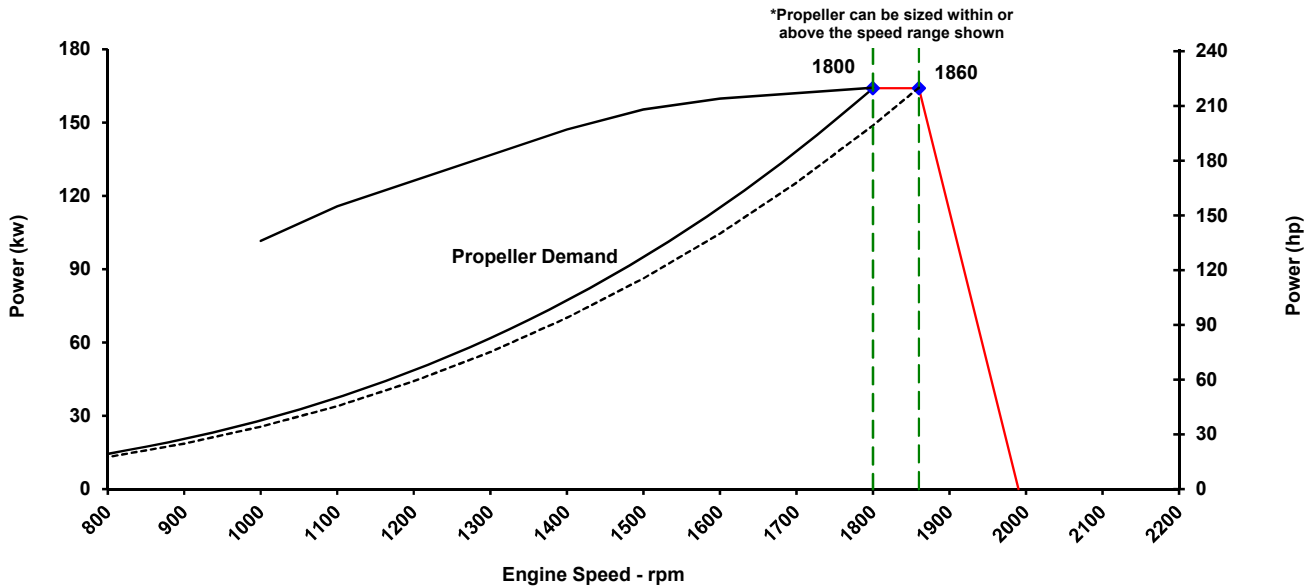
5570

Date:

15-Apr-19

Displacement:	8.9 liter	[542 in³]	Rated Power:	164 kw	[220 bhp]
Bore:	114 mm	[4.49 in]	Rated Speed:	1800 rpm	
Stroke:	145 mm	[5.71 in]	Rating Type:	Continuous Duty	
Cylinders:	6		Aspiration:	Turbocharged	
Fuel System:	HPCR		110% Power:	180 kw	[242 bhp]

CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:
IMO Tier II (Two) NOx requirements of International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13
China Marine Emission Regulation Stage II GB15097-2016



Speed	100% Throttle				Propeller Demand					
	Power		Torque		Power		Torque		Fuel Consumption	
	kw	(hp)	N·m	(ft·lb)	kw	(hp)	N·m	(ft·lb)	L/hr	(gal/hr)
1860	164	(220)	842	(642)						
1800	164	(220)	870	(642)	164	(220.0)	870	(642)	44.4	(11.7)
1700	162	(217)	910	(671)	138	(185.3)	777	(573)	36.3	(9.6)
1600	160	(214)	950	(701)	115	(154.5)	687	(507)	29.4	(7.8)
1500	155	(208)	990	(730)	95	(127.3)	605	(446)	23.2	(6.1)
1400	147	(197)	1000	(738)	77	(103.5)	526	(388)	18.9	(5)
1300	136	(183)	1000	(738)	62	(82.9)	454	(335)	15.1	(4)
1200	126	(169)	1000	(738)	49	(65.2)	386	(285)	12.0	(3.2)
1100	116	(155)	1000	(738)	37	(50.2)	325	(240)	9.4	(2.5)
1000	101	(136)	970	(716)	28	(37.7)	268	(198)	7.4	(2)
900					21	(27.5)	217	(160)		
800					14	(19.3)	172	(127)		

*** Cummins Full Throttle Requirements:**

- Engine achieves or exceeds rated rpm at full throttle under any steady operating condition
- Engines in variable displacement boats (such as pushboats, tugboats, net druggers, etc.) achieve no less than 100 rpm below rated speed at full throttle during a dead push or bollard pull
- Engine achieves or exceeds rated rpm when accelerating from idle to full throttle

Rated Conditions: Ratings are based upon ISO 15550 reference conditions; air pressure of 100 kPa [29.612 in Hg], air temperature 25deg. C [77 deg. F] and 30% relative humidity. Member NMMA. Unless otherwise specified, tolerance on all values is +/-5%. Values from engine control modules and displayed on instrument panels are not absolute. Tolerance varies, but is generally less than +/-5% when operating within 30% of rated power.

Full Throttle curve represents power at the crankshaft for mature gross engine performance corrected in accordance with ISO 15550. Propeller Curve represents approximate power demand from a typical propeller. Propeller Shaft Power is approximately 3% less than rated crankshaft power after typical reverse/reduction gear losses and may vary depending on the type of gear or propulsion system used.

Fuel Consumption is based on fuel of 35 deg. API gravity at 16 deg C [60 deg. F] having LHV of 42,780 kJ/kg [18390 Btu/lb] and weighing 838.9 g/liter [7.001 lb/U.S. gal].

Continuous Rating (CON): Intended for continuous use in applications requiring uninterrupted service at full power. This rating is an ISO 15550 standard power rating.



APPLICATION ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-FR96908

CPL : 5570
DATE: 15-Apr-19

General Engine Data

Engine Model		L8.9CMI1223
Rating Type		Continuous Duty
Rated Engine Power	kW [hp]	164 [220]
Rated Engine Speed	rpm	1800
Rated Power Production Tolerance	±%	3
Rated Engine Torque	N·m [lb·ft]	870 [642]
Peak Engine Torque @ 1400 rpm.....	N·m [lb·ft]	1001 [738]
Brake Mean Effective Pressure	kPa [psi]	1232 [179]
Indicated Mean Effective Pressure.....	kPa [psi]	1360 [197]
Maximum Allowable Engine Speed	rpm	2440
Maximum Continuous Torque Capacity from Front of Crank Specifications		
Maximum Torque Capacity from Front of Crank ²	N·m [lb·ft]	[N.A.]
Compression Ratio		16.6:1
Piston Speed	m/sec [ft/min]	8.7 [1713]
Firing Order		1-5-3-6-2-4
Weight - Engine Only - Average	kg [lb]	877 [1933]
Weight - Engine With Heat Exchanger System - Average.....	kg [lb]	1001 [2207]

Governor Settings

Default Droop Value.....	Refer to MAB 2.04.00-03/23/2006 for Droop explanation	7%
Maximum Droop Allowed.....		16%
High Speed Governor Break Point.....	rpm	1860
Minimum Idle Speed Setting	rpm	750
Normal Idle Speed Variation	±rpm	50
High Idle Speed Range Minimum	rpm	1860
Maximum	rpm	2000

Noise and Vibration

1 m sound pressure level - GB/T1859		< 93 dB
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Lubrication System¹

Max. Allowable Oil Temperature (Sump)	°C [°F]	124 [255]
Oil Pan Capacity (OP9337)		
Low/High.....	l/l	18.9 22.7
Min. Oil Pressure at idle speed.....	kPa [psi]	69 [10]
Maximum Operational Angularity of Oil Pan	degree	35

Fuel System¹

Fuel Consumption at Rated Speed	l/hr [gal/hr]	44.4 [11.7]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	153 [40.3]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	70 [158]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	108 [28.6]
Maximum Allowable Restriction to Fuel Pump		
Clean Filter	kPa [psi]	16 [2.3]
Dirty Filter	kPa [psi]	30 [4.4]

TBD= To Be Determined

N/A = Not Applicable

N.A. = Not Available

- ¹ Unless otherwise specified, all data is at rated power conditions and can vary ± 5%.
- ² No rear loads can be applied when the FPTO is fully loaded. Max PTO torque is contingent on torsional analysis results for the specific drive system. Consult Installation Direction Booklet for Limitations.
- ³ Heat rejection to coolant values are based on 50% water/50% ethylene glycol mix and do NOT include fouling factors. If sourcing your own cooler, a service fouling factor should be applied according to the cooler manufacturer's recommendation.
- ⁴ Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.
- ⁵ May not be at rated load and speed. Maximum heat rejection may occur at other than rated conditions.

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Propulsion Marine Engine Performance Data

Curve No. M-FR96908

CPL : 5570
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Air System¹

Intake Manifold Pressure	kPa [in Hg]	193 [57]
Intake Air Flow	l/sec [cfm]	261 [553]
Heat Rejection to Ambient ⁵	kW [Btu/min]	23 [1309]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	632 [1,339]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	449 [840]
Max. Exhaust Pressure	kPa [in Hg]	10 [3]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw-hr [g/hp-hr]	4.83 [3.60]
HC (Hydrocarbons)	g/kw-hr [g/hp-hr]	0.27 [0.20]
CO (Carbon Monoxide)	g/kw-hr [g/hp-hr]	1.50 [1.12]
PM (Particulate Matter)	g/kw-hr [g/hp-hr]	0.10 [0.07]

Cooling System¹

Sea Water Pump flow ⁴ (Discharge Restriction Pressure 40 kPa).....	m3/hr	8.8
Pressure Cap Rating (With Heat Exchanger Option)	kPa [psi]	48 [7]
Max. Pressure Drop Across Any External Cooling System Circuit	kPa [psi]	34 [5]

Jacket Water Aftercooled Engine (JWAC)

Coolant Flow to Engine Heat Exchanger	l/min [gal/min]	262 [69.2]
Standard Thermostat Operating Range (Start to Open)	°C [°F]	71 [160]
Standard Thermostat Operating Range (Full Open)	°C [°F]	83 [182]
Heat Rejection to Engine Coolant ³	kW [Btu/min]	119 [6791]
Coolant Capacity		
Engine Only.....	l [gal]	11 [3]

Electrical and Start System

Voltage.....	V	24
Cold Soak at -18°C (0°F) -Cold Cranking Amperes Rating	CCA	750
Maximum Allowable Resistance of Starting Circuit	Ohms	2
Min. start temperature without cold starting aid	°C [°F]	-12 [-10]

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