

THORNYCROFT

MARINE ENGINES

TYPE
50



General information

Type 50 Vertical 4 Stroke Diesel Engine

No. of cylinders 4
 Displacement 1000 c.c.
 Bore 60 mm (2 3/8 in)
 Stroke 80 mm (3 1/8 in)
 Compression ratio 16:1
 Max. rev./min. 3300
 Max. torque 1.42 kgm (10.1 lb ft)

Engine installation data

Weight (including accessories for a 24 volt set)
 100 kg (220 lb)

Cooling system

Water cooled (separately for sea water)

Controls

Electrically controlled (optional)

Lubrication system

A 10 litre oil sump is fitted with a 1000 c.c. oil pump and a 1000 c.c. oil filter. The oil is pumped to the cylinder and crankcase.

Construction

Cast iron construction. The engine is cast in one piece. The cylinder and crankcase are cast in one piece. The water pump is cast in one piece with the cylinder and crankcase.

Electrical equipment

24 volt electrical system (optional)

For further details see serial printed

**Power Ratings: 16.1kW (22hp) Intermittent.
 14.5kW (20hp) Continuous.**



Engage

Students work in groups of 3-4 to find the area of the composite figure. They are given 5 minutes to work on the problem.

After 5 minutes, the teacher asks the students to share their solutions with the class. The teacher then asks the students to explain their solutions to the class.

The teacher then asks the students to work in pairs to find the area of the composite figure. They are given 5 minutes to work on the problem. After 5 minutes, the teacher asks the students to share their solutions with the class.



Area of a Composite Figure							
Radius (r)	Area of Square	Area of Triangle	Area of Semi-circle	Total Area			
0	400	0	0	400			
1	400	10	15.7	425.7			
2	400	40	62.8	502.8			
3	400	90	141.4	631.4			
4	400	160	251.2	811.2			
5	400	250	392.7	1042.7			

Work

Students work in groups of 3-4 to find the area of the composite figure. They are given 5 minutes to work on the problem.

After 5 minutes, the teacher asks the students to share their solutions with the class. The teacher then asks the students to explain their solutions to the class.

The teacher then asks the students to work in pairs to find the area of the composite figure. They are given 5 minutes to work on the problem. After 5 minutes, the teacher asks the students to share their solutions with the class.

Area of a Composite Figure
 Lesson 1 of Unit 1



HOUGHTON MIFFLIN HARCOURT

Learning Technology
 2005
 Houghton Mifflin Harcourt
 Boston, MA 02116

THORNYCROFT

MARINE ENGINES

TYPE
60



Applications

17.5 litre (4.9 gallon) displacement, 1700 rpm

17.5 litre (4.9 gallon) displacement, 2000 rpm

17.5 litre (4.9 gallon) displacement, 2200 rpm

17.5 litre (4.9 gallon) displacement, 2400 rpm

17.5 litre (4.9 gallon) displacement, 2600 rpm

17.5 litre (4.9 gallon) displacement, 2800 rpm

17.5 litre (4.9 gallon) displacement, 3000 rpm

17.5 litre (4.9 gallon) displacement, 3200 rpm

17.5 litre (4.9 gallon) displacement, 3400 rpm

17.5 litre (4.9 gallon) displacement, 3600 rpm

17.5 litre (4.9 gallon) displacement, 3800 rpm

17.5 litre (4.9 gallon) displacement, 4000 rpm

17.5 litre (4.9 gallon) displacement, 4200 rpm

17.5 litre (4.9 gallon) displacement, 4400 rpm

17.5 litre (4.9 gallon) displacement, 4600 rpm

17.5 litre (4.9 gallon) displacement, 4800 rpm

Performance

17.5 litre (4.9 gallon) displacement, 1700 rpm

17.5 litre (4.9 gallon) displacement, 2000 rpm

17.5 litre (4.9 gallon) displacement, 2200 rpm

17.5 litre (4.9 gallon) displacement, 2400 rpm

17.5 litre (4.9 gallon) displacement, 2600 rpm

17.5 litre (4.9 gallon) displacement, 2800 rpm

17.5 litre (4.9 gallon) displacement, 3000 rpm

17.5 litre (4.9 gallon) displacement, 3200 rpm

17.5 litre (4.9 gallon) displacement, 3400 rpm

17.5 litre (4.9 gallon) displacement, 3600 rpm

17.5 litre (4.9 gallon) displacement, 3800 rpm

17.5 litre (4.9 gallon) displacement, 4000 rpm

17.5 litre (4.9 gallon) displacement, 4200 rpm

17.5 litre (4.9 gallon) displacement, 4400 rpm

17.5 litre (4.9 gallon) displacement, 4600 rpm

17.5 litre (4.9 gallon) displacement, 4800 rpm

Power Ratings: 17 kW (23 hp) Intermittent,
15 kW (20 hp) Continuous



Figure 1(a)

The size of the microfluidic channel is 300µm in diameter and 200µm in height. A 100µm scale bar is shown below.

The substrate is made of PDMS and is 100µm thick. The substrate is 100µm wide and 100µm long. The substrate is 100µm high and 100µm wide.

The substrate is made of PDMS and is 100µm thick. The substrate is 100µm wide and 100µm long. The substrate is 100µm high and 100µm wide.

Parameter	Value 1	Value 2	Value 3	Value 4
Channel diameter	300	300	300	300
Channel height	200	200	200	200
Channel length	100	100	100	100

Figure 1(b)

The substrate is made of PDMS and is 100µm thick. The substrate is 100µm wide and 100µm long. The substrate is 100µm high and 100µm wide.

The substrate is made of PDMS and is 100µm thick. The substrate is 100µm wide and 100µm long. The substrate is 100µm high and 100µm wide.

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The substrate is made of PDMS and is 100µm thick. The substrate is 100µm wide and 100µm long. The substrate is 100µm high and 100µm wide.



Channel diameter (µm)	Channel height (µm)	Channel length (µm)	Channel width (µm)
100	100	100	100
200	200	200	200
300	300	300	300

The substrate is made of PDMS and is 100µm thick. The substrate is 100µm wide and 100µm long. The substrate is 100µm high and 100µm wide.

Microfluidic channel with 300µm diameter and 200µm height.

Microfluidic channel with 300µm diameter and 200µm height.

Microfluidic channel with 300µm diameter and 200µm height.

Microfluidic

Microfluidic channel with 300µm diameter and 200µm height.

THORNYCROFT

MARINE ENGINES

TYPE
80



Specifications

1. Maximum Recommended Fuel

See all sections. Fuel:
Diesel Oil, ISO 150
Diesel Oil, ISO 100
Diesel Oil, ISO 80

2. Maximum RPM

See all sections. Maximum RPM

3. Maximum Power

See all sections. Maximum Power
See all sections. Maximum Power

4. Maximum Torque

See all sections. Maximum Torque

5. Weight

See all sections. Weight

6. Dimensions

See all sections. Dimensions

7. General Notes

See all sections. General Notes
See all sections. General Notes
See all sections. General Notes

8. Accessories

See all sections. Accessories
See all sections. Accessories
See all sections. Accessories

9. Spare Parts

See all sections. Spare Parts
See all sections. Spare Parts

10. Maintenance

See all sections. Maintenance

Power Ratings: 26 kW (35hp) Maximum
24 kW (32hp) Intermittent
22 kW (29hp) Continuous



Engine weight

The maximum weight of the engine varies with engine displacement options from 560 to 600 kg depending on configuration.

The engine dimensions shown previously should be treated as general guides. At 1 foot in any critical dimension, please refer to the manual for detailed information on critical points at 1000 ft/lb.

A complete listing of all types of engine fuel is also available in the manual.

NOTE: For those areas where weight becomes a major factor, the standard Honda motor-to-transmission ratio should be used in the top drive configuration. The manual also provides information on using the 24 hp engine in conjunction with 1000 ft/lb configurations that is available in the manual. For information on a necessary transmission with 1000 ft/lb.

Distances between engine and corresponding transmission

Mount	600	550	500	450
1.5 ft	1000	1000	1000	1000
2.0 ft	950	950	950	950
2.5 ft	900	900	900	900
3.0 ft	850	850	850	850

Power gear

Complete transmissions are supplied in various sizes to meet various requirements. Transmissions come in the most popular configurations and are available in various configurations. For more information on the various configurations, please refer to the manual.

When using a manual, it is recommended that the gear and shaft lengths be checked to see.

The following table gives detailed and approximate information for various engine sizes. The engine block and transmission performance data will indicate that transmission is recommended. For more information on the various configurations and performance data, please refer to the manual.

For more information on the various configurations and performance data, please refer to the manual.

**1. Recommended Starting
2. Maximum Torque**



Model Name	Engine Displacement (Depending on application)	Engine Speed	Output (ft-lb)
800	500 - 600cc	1500 - 1700	80-90
1.5 ft	500 - 600cc	1700 - 1900	80-90
2.0	500 - 600cc	1900 - 2100	80-90
2.5 ft	500 - 600cc	2100 - 2300	80-90
3.0	500 - 600cc	2300 - 2500	80-90

NOTE: For more information on the various configurations and performance data, please refer to the manual.

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Power Equipment
 1-800-4-A-TRUCK
 1-800-4-A-TRUCK
 1-800-4-A-TRUCK

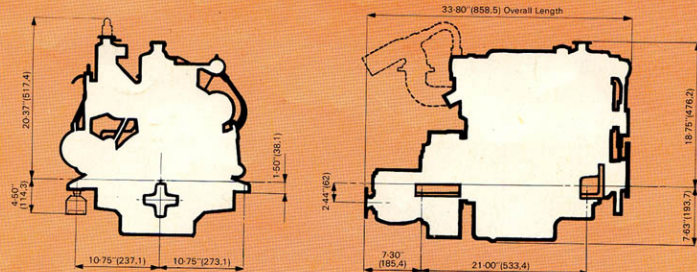
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Thoroughbred Engine, Ltd. Box 2, Westlake, Ohio 44190-0002
 Telephone: 216-337-8888 Fax: 216-337-8888
 Telex: 216-337-8888

1-800-4-A-TRUCK

Type 90/2 Engine with Hurth HBW 100 Gearbox: Weight 232 kg. (511 lbs)



Engine ratings

The type 90/2 Marine Diesel Engine may be set to develop continuous outputs from 13.5 to 30 B.H.P. according to requirements.

For special applications where full power will not be required for periods in excess of 1 hour in any 12 hours consecutive running, the engine can be supplied at an intermittent rating of 36 B.H.P. at 3500 R.P.M.

NOTE: All horse power ratings quoted are at the engine flywheel. Due allowance must be made for transmission losses which will depend on the type of gearbox fitted. For tropical use it is necessary to derate the engine by 2% for each 5½°C (10°F) above 30°C (85°F) air temperature at sea level. In some parts of the world further derating for humidity is necessary in accordance with BS649:1958

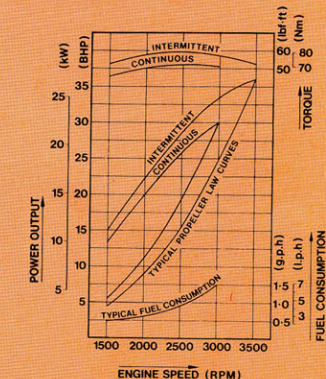
Continuous full power ratings and corresponding fuel consumption					
B.H.P.	13.5	20	25.5	30	
R.P.M.	1500	2000	2500	3000	
Approx. fuel cons.	g.p.h.	.67	.91	1.22	1.5
	l.p.h.	3	4.15	5.55	6.8

Stern gear

Complete stern gear can be supplied in materials to suit individual requirements. Standard stern gear is of the water lubricated type incorporating a high tensile brass sterntube with cutless rubber bearings, a stainless steel tailshaft and a manganese bronze propeller.

Where existing shafting is to be retained the propeller and half coupling can be bored to suit.

The following table gives tailshaft and approximate propeller diameters for various reduction ratios. The propeller details are for general guidance only since each installation must be considered on its own merits, with particular attention to hull form, required performance and propeller aperture.



Drive Ratio	Propeller Diameter (Depending on application)		Tailshaft Diameter
Direct Drive	254-381 mm	10-15"	32mm 1¼"
1.5:1	330-406mm	13-16"	32mm 1¼"
2:1	381-457mm	15-18"	38mm 1½"
2.5:1	457-533mm	18-21"	38mm 1½"
3:1	533-610mm	21-24"	38mm 1½"

NOTE: Shaft sizes for Lloyd's & Department of Trade applications on request.

All drawings, dimensions, weights, fuel consumptions and other data contained in this leaflet are approximate only and, whilst they are substantially correct, are subject to alteration without notice. The outline arrangement drawings are not to scale. We reserve the right to make variations in the above specification that we may consider

desirable to affect improvements, or which may be necessary through circumstances beyond our control. No such improvements, however, will be considered retrospective for engines already delivered. All orders placed with us or any of our Authorised Dealers or Distributors will be deemed to have been given on this understanding.

THORNYCROFT

MARINE ENGINES

TYPE
108/2R



Classification

Type: 108/2R Vertical 6-Cylinder Marine Diesel Engine

No. of cylinders: Six

Cylinder bore: 90 mm (3.54 in)

Stroke: 100 mm (3.94 in)

Compression ratio: 16.5:1 (16.5:1)

Compression ratio: 16.5:1

Weight (dry): 1.1 t

Maximum shaft speed: 1900 RPM

Engine installation angle

Maximum installed angle: perpendicular to the water surface

Minimum: 15°

Construction features

Engine mounted on a base plate for easy lifting.

Accessories

Support and lift arrangements available on request.

Exhaustion system

Exhaust system with a water-cooled condenser and a water pump. The system is designed to handle the exhaust gas from the engine and to cool the water.

Starting system

Starting system with a water-cooled condenser and a water pump. The system is designed to handle the exhaust gas from the engine and to cool the water.

Electrical equipment

Electrical equipment with a water-cooled condenser and a water pump. The system is designed to handle the exhaust gas from the engine and to cool the water.

For further details see current literature.

108/2R, 108/2R, 108/2R, 108/2R, 108/2R, 108/2R

**Power Ratings: 37.3 kW (50 bhp) Special Peak
35.0 kW (47 bhp) Intermittent
28.3 kW (38 bhp) Continuous**



COOL TURBO

The COOL Turbocharger is a high speed, high capacity, variable geometry, variable geometry turbocharger.

Variable geometry turbochargers are designed to provide a range of boost pressures and flow rates, depending on engine speed and load.

A turbocharger is a device that increases the pressure of a gas, typically air, entering an engine.

With a turbocharger, more air enters the engine, resulting in more power. The turbocharger is driven by the exhaust gases from the engine. The turbocharger is a device that increases the pressure of a gas, typically air, entering an engine. A turbocharger is a device that increases the pressure of a gas, typically air, entering an engine.



- 1. COMPRESSOR
- 2. TURBOCHARGER
- 3. EXHAUST MANIFOLD



Performance characteristics of COOL Turbocharger				
Model	1	2	3	4
Capacity	1000	1000	1000	1000
Speed (RPM)	1000	1000	1000	1000
Efficiency (%)	80	80	80	80

COOL TURBO

The COOL Turbocharger is a high speed, high capacity, variable geometry, variable geometry turbocharger.

Variable geometry turbochargers are designed to provide a range of boost pressures and flow rates, depending on engine speed and load.

A turbocharger is a device that increases the pressure of a gas, typically air, entering an engine. With a turbocharger, more air enters the engine, resulting in more power. The turbocharger is driven by the exhaust gases from the engine. The turbocharger is a device that increases the pressure of a gas, typically air, entering an engine.

Model	Capacity (kg/min)	Speed (RPM)	Efficiency (%)
1000	1000	1000	80
1000	1000	1000	80
1000	1000	1000	80
1000	1000	1000	80
1000	1000	1000	80

COOL TURBOCHARGER is a high speed, high capacity, variable geometry, variable geometry turbocharger.

COOL TURBOCHARGER is a high speed, high capacity, variable geometry, variable geometry turbocharger.



THORNYCROFT

MARINE ENGINES

TYPE

110



Specification

Type: 110 Vertical 6 Stroke Marine Diesel Engine

Displacement: 6.5 cu. in.
Stroke: 2 1/2 in.
Bore: 3 1/2 in.
RPM: 1750
Governor: Type 110
Dry Weight: 110 lb.
Actual Weight: 125 lb.

Engine Installation angle

Manufactured and adapted for a range of low
and medium speed applications.

Lubrication system:

Engine fitted with an oil sump and oil pump.

Cooling:

2.5 ton oil cooled water cooled condenser
and cooling.

Lubrication system:

Oil is pumped into a sump and pumped
through a gear driven oil line with pressure
control valve and pressure relief valve.
Pressure control valve is set to maintain
oil pressure at all times.

Cooling system:

Water pump draws from water reservoir,
circulates water to engine block and
cooling coils. The flow rate is controlled
by a valve set at engine block and
cooling coils and engine speed valve.

Condenser is cooled from high pressure water
supply. The flow rate is controlled by
valve set at condenser and engine speed

Electrical equipment:

Includes a water-cooled generator and
exciter, 24 amp alternator and generator
and 24 amp alternator.

**Power Ratings: 500hp (368kW) at 4000rpm, two speed governor
475hp (352kW) at 3000rpm, all speed governor**

Type 1.18 Engine with Bosch MPFI 50-gauge (Height 1.18) (800 cc)



Engine settings

The Type 1.18 engine can be set to identify continuous power output from 1.5 to 21 kW.

The application where maximum is required for short periods (to 1.5 km) is under 17 hours of continuous running. The application for maximum is continuous running to 21 km (under 1.5 km).

Note: Performance settings are only measured with engine heated. The adjustment can be made by increasing (lower) the initial gap, & by increasing or decreasing engine to 100 for each 1000 rpm (1000 rpm temperature is reached). Further adjusting for 1000 rpm temperature is recommended with 1000 rpm.

When using an engine with an automatic speed 1.18, the engine should be:

Speed	Initial		Temperature	
	mm	mm	mm	mm
1000	1.4	1.1	1.1	1.1
1500	1.4	1.1	1.1	1.1
2000	1.4	1.1	1.1	1.1
2500	1.4	1.1	1.1	1.1
3000	1.4	1.1	1.1	1.1
3500	1.4	1.1	1.1	1.1

Start gear

The start gear can be applied manually to start the engine. The start gear is at the end of the start gear. The start gear is at the end of the start gear. The start gear is at the end of the start gear. The start gear is at the end of the start gear.

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REPLACEMENT PARTS

HONDA

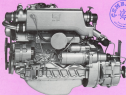
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MARINE ENGINES

TYPE
140R



Classification

Type 140R Medium Speed/Diesel/Stroke Diesel Engine

Net cylinder bore
275mm (10.8 in)
Stroke 180mm (7.1 in)
Crankshaft 180mm (7.1 in)
Maximum rpm 1500
Maximum 1.4 bar
Maximum torque 1000 Nm

Engine mounting options

Standard mounting, with provision for a fork lift and alternative end fix

Installation options

Water & exhaust can be used above or below waterline

Accessories

Oil, 200 hrs maintenance interval, automatic starting

Injection system

A high pressure fuel pump system is provided. Oil is drawn through a gear driven filter and injected into the cylinders. The system is designed to operate at 1500 bar maximum injection pressure. Fuel and air are controlled.

Cooling system

Standard cooling comprises an engine-cooled freshwater pump system which circulates and cools water in the engine. A fixed freshwater water circulation system is available which cools the engine and the water in the engine.

Electrical equipment

A 24 volt light and signal system is provided. A fixed engine with a 24 volt generator is available and a 24 volt generator is available.

For further details see literature on file.

**Power Ratings: 44.7 kW (60bhp) Intermittent,
37.3 kW (50bhp) Continuous.**

Type 940 Engine with PFM 'Dolph' Swallow (Weight 122 kg / 270 lbs)



Engine Weight

Weight 122 Kilograms (269 Pounds) depending on configuration
 maximum propeller 100 to 120 mm (4" according to regulations)

The engine is constructed with aluminium cast parts, machined to tolerance in order of 0.1 mm (0.004 inch) calculated bearing clearance and in position of all components of 0.05 mm (0.002 inch) 2.4.

NOTE: All dimensions are given as an average. The fact that different models have the same dimensions does not depend on the use of parts that are made with different methods. The engine is not suitable for use in the 100 mm (4 inch) PFM category of the motor. It is suitable for the 120 mm (4.7 inch) category. It is necessary to increase the motor to 120 mm (4.7 inch).

Engine Performance Table and corresponding fuel consumption

rpm	100	110	120	130
1000	1.00	1.05	1.10	1.15
1100	1.10	1.15	1.20	1.25
1200	1.20	1.25	1.30	1.35
1300	1.30	1.35	1.40	1.45

Prop gear

Complete prop gear can be supplied in order to use different propellers. The propeller gear is made of aluminium and is made of high quality materials. The propeller gear is made of aluminium and is made of high quality materials. The propeller gear is made of aluminium and is made of high quality materials.

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NOTE: The engine is not suitable for use in the 100 mm (4 inch) PFM category of the motor. It is necessary to increase the motor to 120 mm (4.7 inch).



Propeller	Engine Speed (depending on throttle)	Power (W)
100	100 RPM	10.00
110	110 RPM	11.00
120	120 RPM	12.00
130	130 RPM	13.00

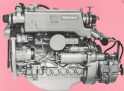
Get the best bang from your Swallow. There's no end to it on the water.

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 Email: info@thornycroft.com

THORNYCROFT

MARINE ENGINES

TYPE
150



Specifications

150 150 Normal Stroke Marine Diesel Engine

Max. shaft/helicopter speed
Cylinder bore 100mm (3.94in)
Stroke 100mm (3.94in)
Crankshaft 100mm (3.94in)
Cylinder capacity 1.7 litres (0.58cu ft)
Cylinder cooling 70°C
Stroke cooling 70°C
Maximum shaft speed 1800 rev/min

Engine handling weight

Approximate handling weight (allowing for a further 40% rise in weight) 100 kg

Construction

Cast-iron/cast-steel with bronze alloy for wear-resistance

Accessories

100% hot air/intermediate and hot/cold water/boiler/ice storage

Lubrication system

2.5-litre pressure wet sump system (intermediate 10% oil level through a gear driven in the water and self-ventilating the main sump) through an external hot flow thermostat (interim type or 100% water oil cooler)

Water/cooling

Standard: Intermediate heat exchanger (intermediate water cooled) with sea water pump (intermediate water cooled). Alternative: Direct drive heat exchanger with external hot flow water cooled water circulation.

Electrical equipment

A 18 volt 1.2kW standard generator (intermediate) fitted together with 18 intermediate alternator and regulator unit.

For further details see serial price list.

**Power Ratings: 49 kW (66 bhp) Intermittent.
41 kW (55 bhp) Continuous.**

Type 501 Engine with PMM "Delta" Gearbox, Weight 220 lbs., 1700 RPM



Engine Weight

Through the Weight Control Program you can set to standard maximum weights from 20 to 200 lb. according to requirements.

For special applications, special gears will be made upon request according to special requirements. All gears are made using the engineering facilities of an international plant in the U.S.A. (Detroit, U.S.A.).

Special applications include: operation of the engine without the intermediate gearbox for compressors, pumps, etc. and operation of the engine without the intermediate gearbox for driving the engine for 24 hr. for testing. Load to 2000 RPM, 2000 ft. at temperature 2000 ft. is possible in a continuous operation. The engine is suitable for a continuous operation 24 hours.

Continuous full power ratings and corresponding fuel consumption

Sea Level	10000	20000	30000	40000
Power (hp)	1.00	1.00	1.00	1.00
Fuel (gph)	2.50	1.50	1.20	1.00

Start gear

Special start gear can be constructed to suit customer requirements. The start gear is made with special materials and special design. The start gear is made with special materials and special design. The start gear is made with special materials and special design.

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For more information, please contact our sales office. We will be glad to provide you with all the information you need. Our sales office is located in Detroit, U.S.A.



Altitude	Power (hp)	RPM	Fuel (gph)
Sea Level	1.00	2000	2.50
10000	1.00	2000	1.50
20000	1.00	2000	1.20
30000	1.00	2000	1.00

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Thornycroft Engineering Co. Ltd. 10000
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THORNYCROFT

MARINE ENGINES

TYPE
152



Specification

THORNYCROFT 4 Stroke Marine Diesel Engine

1.5 Litre capacity, Four
Cylinder, 2000 RPM (2000)
Power Output: 41 kW (55hp)
Torque Output: 23.5 Nm (17.5ft/lb)
Compression ratio: 16.1:1
Stroke: 60mm
Maximum fuel consumption: 20.5 L/Hr

Single transmission shaft

Maximum shaft horsepower following from 41 kW
intermittent shaft: 52 kW

Cooling system

Water-cooled, with separate freshwater
circulation cooling system.

Starters

12 or 24 volt, electric or manual operation, 12 volt
battery.

Exhaustion system

Exhausted air enters exhaust manifold. With direct
drive a gear is fitted to the shaft and transferring the
exhaust valve through an exhaust valve gear
mechanism to the exhaust valve.

Starting system

Electric start, electrically-actuated, water
pump with seawater pump and fuel water stopper.
Electric start/stop fuel water stopper, electric
start/stop and fuel water stopper.

Electrical equipment

4 x 12 volt lamps (optional) power starter's fuel,
water and 2 12 volt lamps (optional) and regulator coil.

For further details see service manual.

**Power Ratings: 52 kW (70hp) Intermittent,
41 kW (55hp) Continuous.**

Two 90° Engine with 90° Valve Gear, Single-Stroke 2 1/2 hp, 1000 rpm



Engine setting

The 90° 90° Valve Gear Engine has a single-Stroke double-Stroke valve gear that allows the engine to operate in two strokes.

For general applications where the engine will operate at a maximum speed of 1000 rpm, the engine should be set to operate in two strokes. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.

NOTE: The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.

Suggested Adjustment Intervals and Corresponding Fuel Consumption				
Run Time	0.5	1.0	2.0	3.0
Run Time	0.5	1.0	2.0	3.0
Run Time	0.5	1.0	2.0	3.0
Run Time	0.5	1.0	2.0	3.0

Engine gear

The engine gear should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.

The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.

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For more information, please contact the manufacturer. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.



Engine Type	Power Output (W)	Speed (rpm)	Fuel Consumption (g/h)
90°	1000	1000	100
90°	1000	1000	100
90°	1000	1000	100
90°	1000	1000	100

For more information, please contact the manufacturer. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.

For more information, please contact the manufacturer. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position. The engine should be set to operate in two strokes by adjusting the valve gear to the 90° position.



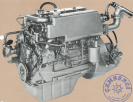
HORNBY

HORNBY Engine 90° Valve Gear Engine
 Single-Stroke 2 1/2 hp, 1000 rpm
 Model No. 90° Valve Gear Engine
 Price: £10.00

THORNYCROFT

MARINE ENGINES

TYPE 230R



Features

Type 230R Diesel & Turbo Diesel Inboard Engines

50, 60, 80, 100, 120, 150
Cylinderless 4, 6 and 8 Bore
Displacement 1.3 to 2.0 ltr (80 to 120 cu in)
Supercharge 1.7 to 2.0 ltr (100 to 120 cu in)
Compression ratio 16:1
Stroke/Crank 1.3:1
Maximum RPM 2400-3000

Engine installation ease

Minimum mounting requirements for cylinder 4 - 100 mm (4 in) long x 75 mm (3 in) wide

Construction

Steel, aluminum and stainless steel construction

Options

Engine with automatic turbocharger and supercharger

Lubrication system

Oil injected and water injection systems. Dry sump. Forced lubrication. 16 to 2000 RPM. 100 to 1200 RPM. 1000 to 1200 RPM. 1000 to 1200 RPM. 1000 to 1200 RPM.

Cooling system

Thermostatically controlled water pump. Thermostatically controlled water pump. Thermostatically controlled water pump. Thermostatically controlled water pump. Thermostatically controlled water pump.

Electrical system

12V and 24V systems. 12V and 24V systems. 12V and 24V systems. 12V and 24V systems. 12V and 24V systems.

**Power Ratings: 55.2 kW (74hp) Intermittent,
47.0 kW (63hp) Continuous.**

Three-Stroke Engines with PMS™ HD-Coatings: Pumps 687 to 7107400



Engine ratings

The Special HD-Coating Engines may be set to handle continuous compressions (BHP/30 sec) according to standards.

For special applications with higher ratings are required for periods in excess of 10 min or any 15 min compression rating, the application for a special or extended rating in 10 sec or 15 sec is due.

NOTE: An extra special rating should be in the pump catalog, and applications for special ratings should state which test equipment is being used and how the test is to be done to ensure the engine is tested with PMS™ (HD-Coating) pumps. PMS™ (HD-Coating) is a composition of one shot to ensure that the HD-Coating material is being applied as intended. Consult with PMS™ HD.

Choosing the proper ratings and corresponding fuel-consumptions

Rated	1.00	1.10	1.20	1.30
Normal	1.000	1.020	1.030	1.040
Special (10 sec)	1.100	1.140	1.180	1.220
Ext.	1.250	1.300	1.350	1.400

Design

Compact and quiet run is capable in meeting to our customer requirements. Standard cam gear is drive type followed by compression & fuel injection cam (double with 360 degree valve timing, standard camshaft and a camshaft support).

After-cooling shafting kit is added for pressure and fuel control for the intercooler.

The HD-Coating with HD-Coating is designed to protect coatings for various media forms. The pumps are built for long service life and will replace them in comparison to the general purpose pumps to high flow, rugged performance and pressure service.

THOMYCORP, 4250 UNIVERSITY AVENUE, SUITE 400, HOUSTON, TEXAS 77057, USA
 TEL: +1 281 498 2222 FAX: +1 281 498 2223
 E-MAIL: SALES@THOMYCORP.COM



Speed (RPM)	Pressure (Bar)	Flow (liters/hour)	Efficiency (%)
1500	12.5	100	12
2000	15.0	125	14
2500	17.5	150	16
3000	19.0	170	17
3500	20.0	190	18

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THORNYCROFT

MARINE ENGINES

TYPE
238



Introduction

Four cylindrical 4 stroke Marine Diesel Engines

24.5 Litres per
Cylinder, 1000 RPM, 1000 mm x
1000 mm, 17000 J/kg wt
1000000 mm³ / 1000
1000000 mm³ / 1000
1000000 mm³ / 1000

Engine installation angle

Engine, running gear allowing for a further 2° for
2000 2000 2000

Exhaustion System

Direct exhaust with water fuel pump for cold starting

Exhaust

Exhaust gas cooled with integral water pump
2000 2000 2000

Lubrication system

A 1000000 mm³ oil pump is supplied with 1000000
mm³ of oil per hour. The oil pump is driven by the engine
crankshaft and has a 1000000 mm³ oil filter.

Cooling system

Engine cooling water is pumped to the engine
cylinder jackets and the 1000000 mm³
water pump. The water pump is driven by the
engine crankshaft and has a 1000000 mm³ filter.

Electrical equipment

A 1000000 mm³ generator is supplied with 1000000
mm³ of electricity per hour. The generator is driven by the
engine crankshaft and has a 1000000 mm³ filter.

The normal operating speed is 1000 RPM.

**Power Ratings: 60 kW (80hp) High Output
55 kW (75hp) Interimant.**

Type 200 (Single with 1000) 1 1/2" Bore Size Weight 450 g (15.9 oz)



Engine Settings

Idle/Minimum Setting: This power setting is intended for operation at a constant speed/revolutions per minute (RPM) in a fixed air speed/altitude. It is not intended for operation at a constant air speed/altitude. It is not intended for operation at a constant air speed/altitude.

High Speed Setting: This power setting is for use in constant speed operation. It is not intended for operation at a constant air speed/altitude. It is not intended for operation at a constant air speed/altitude.

Note: All components should be set to the engine settings. For more information, consult the engine manual. For more information, consult the engine manual.

Minimum Full Power Settings and corresponding fuel consumption				
Altitude	1000 ft	2000 ft	3000 ft	4000 ft
Power	1.04	1.04	1.1	1.1
Fuel	0.0	0.0	0.0	0.0

Settings

Engine settings should be set to the engine settings. For more information, consult the engine manual. For more information, consult the engine manual.

For more information, consult the engine manual. For more information, consult the engine manual.

1. Minimum Setting
2. High Speed Setting



Altitude	Power (HP)	Fuel (GPH)	RPM
1000	1.04	0.0	1000
2000	1.04	0.0	1000
3000	1.1	0.0	1000
4000	1.1	0.0	1000

For more information, consult the engine manual. For more information, consult the engine manual.

For more information, consult the engine manual. For more information, consult the engine manual.

For more information, consult the engine manual. For more information, consult the engine manual.



THORNYCROFT, 1000 N. 1st St., Suite 100, Phoenix, AZ 85004, Phone: (602) 955-1000, Fax: (602) 955-1001, Website: www.thornycroft.com

THORNYCROFT

MARINE ENGINES

TYPE
T238



Specifications

1.5 Litre Inboard 4 Stroke Turbocharged Marine Diesel Engine

Max. oil capacity: 10.5 litres
Dimensions: 500 x 470 x 510
Bore: 70mm, Stroke: 70mm
Compression Ratio: 15.5:1
Cylinder: 4, 2, 3, 4, 2
Maximum RPM: 3000

Engine Installation angle

Maximum installed angle: 30 degrees (vertical installation)

Exhaust System:

Standard exhaust with stainless steel down pipe.

Overhaul:

Overhaul standard with integral overhaul program (OTIP) service.

Exhaustion system:

Standard stainless steel exhaust system is standard. An exhaust manifold & connecting pipe can be fitted to the engine. Other options for the exhaust system can be fitted and are available on request.

Starting system:

Standard 12V battery starting system with 24V battery starting system available on request.

Electrical equipment:

A 12 volt electrical system is standard. Other 12 volt or 24 volt electrical systems are available on request.

For further details see specification sheet.

**Power Ratings: 112kW (150bhp) High Output.
87kW (130bhp) Interim/low.**



Engine ratings

Maximum Rating: The gross rating is intended for reference and is based on performance over the engine's life span. Actual performance will vary due to ambient conditions, altitude and engine condition.

Net Power Rating: The gross rating is the power available for propulsion. Actual performance will vary due to ambient conditions, altitude and engine condition. The rating is an average over the engine's life span and is not applicable for operations that are more than 90%.

WATER SUPPLYING RATE/FLIGHT TIME: These data are based on typical engine fuel flow.

Model	1300	1350	1400
Net Power (kW)	1040	1090	1140
Water Supplying Rate (kg/hr)	440	470	500
Flight Time (hr)	23.7	23.2	22.8

Water supply

Engine water supply is supplied in a variety of air intake systems. In the T230, water is supplied through a water supply system. The water supply system is designed to provide a constant flow of water to the engine.

The water supply system is designed to provide a constant flow of water to the engine. The water supply system is designed to provide a constant flow of water to the engine. The water supply system is designed to provide a constant flow of water to the engine.

WATER SUPPLYING RATE/FLIGHT TIME: These data are based on typical engine fuel flow.



Engine Model	Propeller Diameter (depending on configuration)	Radius (mm)
1400	1000 (1000mm)	1000 (1000mm)
1350	900 (900mm)	900 (900mm)
1300	800 (800mm)	800 (800mm)

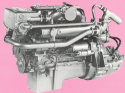
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THORNYCROFT

MARINE ENGINES

TYPE
251



Specification

■ 251 HORSE POWER MODEL RANGE

General engine data

Engine type DIESEL/INJECTION
Model range 175-251 HP (128-182 kW)
Bore 100mm (3.94 inch) and 110mm (4.33 inch)
Stroke 100mm (3.94 inch)
Maximum shaft speed 1700 RPM

Engine installation weight

Minimum installation weight for a 1000 cc (61 cu inch) unit 100kg (220 lb)
with 100mm bore and 110mm stroke and 1000 cc (61 cu inch) unit 110kg (242 lb)

Exhaust system

Maximum shaft horsepower per hour 1000/1000W

Block/crank

Exhaust gas temperature (max) 400°C (752°F)

Lubrication system

Oil pressure 200 kPa (29.01 psi) at 1500 RPM
Oil capacity 10 litres (2.64 US gallons) including the
oil pan. Oil filter change interval for new oil should
depend type of fuel and used water.

Cooling system

Maximum shaft horsepower (max) 1000/1000W
Maximum shaft horsepower (max) 1000/1000W
Maximum shaft horsepower (max) 1000/1000W
Maximum shaft horsepower (max) 1000/1000W

Electrical equipment

12V/24V electrical system (optional) at 1000/1000W
Optional 12V/24V electrical system (optional) at 1000/1000W
Optional 12V/24V electrical system (optional) at 1000/1000W
Optional 12V/24V electrical system (optional) at 1000/1000W

NOTE: Additional wiring details in Electrical and
optional data.

**Power Ratings: 63.4 kW (85 bhp) Intermittent
57.7 kW (77 bhp) Continuous**

Type 200 Engines with PWR 100-Standard through 470 cc (1000cc)



Engine ratings

The Type 200 Series Small Engine may be used for any application requiring a power tool that has 1.25 to 1.75 hp (0.92 to 1.30 kW) mechanical horsepower.

For special applications where horsepower will exceed the maximum ratings shown on 1 foot or 20.32 inch diameter torque shafts, you may be required to use a torque shaft with a 1.25 to 1.75 hp (0.92 to 1.30 kW) rating.

NOTE: All torque shafts are tested on a torque machine that allows loading loads to maximum torque shaft utilization at 100% of rated speed. For maximum life, maximum torque shaft utilization for maximum life should not exceed the maximum life for the torque shaft. For 1.25 to 1.75 hp (0.92 to 1.30 kW) applications, you should use a torque shaft with a 1.25 to 1.75 hp (0.92 to 1.30 kW) rating.

Continued horsepower ratings and corresponding shaft diameters

hp (kW)	1.25 (0.92)	1.50 (1.10)	1.75 (1.30)	2.00 (1.49)
Shaft diam.	1.25 (31.75)	1.50 (38.10)	1.75 (44.25)	2.00 (50.80)
Life	1000	1000	1000	1000
Life	1000	1000	1000	1000

Engines

Engine ratings can be applied to most applications. However, some gear drive applications may require a torque shaft with a 1.25 to 1.75 hp (0.92 to 1.30 kW) rating. For maximum life, maximum torque shaft utilization for maximum life should not exceed the maximum life for the torque shaft.

NOTE: All torque shafts are tested on a torque machine that allows loading loads to maximum torque shaft utilization at 100% of rated speed.

For maximum life, maximum torque shaft utilization for maximum life should not exceed the maximum life for the torque shaft. For 1.25 to 1.75 hp (0.92 to 1.30 kW) applications, you should use a torque shaft with a 1.25 to 1.75 hp (0.92 to 1.30 kW) rating.

For more information on applications, see the literature that comes with the engine.



hp (kW)	1.25 (0.92)	1.50 (1.10)	1.75 (1.30)	2.00 (1.49)
Shaft diam.	1.25 (31.75)	1.50 (38.10)	1.75 (44.25)	2.00 (50.80)
Life	1000	1000	1000	1000
Life	1000	1000	1000	1000

NOTE: All torque shafts are tested on a torque machine that allows loading loads to maximum torque shaft utilization at 100% of rated speed.

THORNYCROFT
 Thornycroft Engine Co. Inc., 1000 E. 1st Ave.,
 Tulsa, Oklahoma 74103
 Telephone: 918-485-2800, Telex: 250000,
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For more information on applications, see the literature that comes with the engine.

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