

BAB V

KESIMPULAN & SARAN

5.1 Kesimpulan

Berdasarkan atas analisa yang telah dibuat, makadapat ditarik beberapa kesimpulan, yaitu sebagai berikut :

1. Beberapa komponen sistem bahan bakar memiliki resiko tinggi untuk menyebabkan motor induk gagal beroperasi. Komponen-komponen dengan tingkat kekritisan tertinggi tersebut antara lain :
 - a) *Transfer Pump*
 - b) *Separator*
 - c) *Duplex Filter*
 - d) *Y Strainer*
2. Hasil penilaian resiko berdasarkan FMECA (*Failure Mode Effect & Critical Analysis*) menunjukkan komponen-komponen kritis yang perlu mendapatkan prioritas utama untuk diperhatikan. Sehingga dengan demikian maka kegiatan perawatan yang akan dilakukan dapat berjalan secara efektif dan efisien.
3. Hasil dari analisa kritis sangat berguna untuk mengidentifikasi kriteria urutan prioritas untuk melakukan preventive maintenance dan corrective maintenance.
4. Penentuan resiko suatu peralatan atau komponen pada suatu system merupakan suatu yang tidak gampang untuk dilakukan, karena assessment harus dilakukan oleh orang-orang yang berpengalaman dibidangnya.

5.2 Saran

- ✦ Strategi perawatan yang dipilih harus benar-benar diperhatikan, hal ini karena beberapa komponen penting pada sistem mempunyai nilai kekritisan yang tinggi, sehingga akan beresiko mengalami kegagalan dan mempengaruhi sistem secara keseluruhan jika tidak mendapat prioritas kegiatan peralatan.

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PT. Nusantara Terminal Terpadu, Tug Boat TITAN 03



Separator



Transfer Pump



Hand Pump

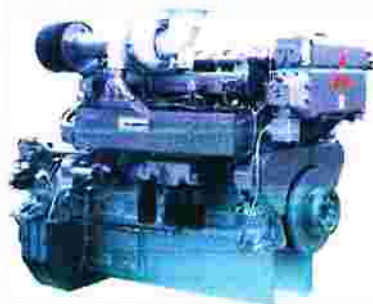


Sight Glass

MITSUBISHI MARINE ENGINE

Model		S6A3-MPTK	S6R-MPTK	S6R2-MPTK	S6R2-MTK2L	S6R2-MTK3L	S12A2-MPTK	S12A-MPTK	S16R-MPTK	
Continuous rating output B		Work boats, Tug boats and Fishing boats (Marine class and BAPP compliant) 6000 (recommended annual running hour), 8 hours out of 24 hours (period of full throttle operation)								
Flywheel end output	kW	445	520	530	691	759	776	1040	1380	
at	rpm	1900	1650	1400	1400	1406	2000	1650	1650	
Continuous rating output C		Harbor tug boats and Passenger ferry boats (Marine class and BAPP compliant) 3000 (recommended annual running hour), One hour out of 6 hours (period of full throttle operation)								
Flywheel end output	kW	490	605	610			858	1210	1610	
at	rpm	1960	1800	1500			2100	1800	1800	
Type		4 stroke cycle, Water cooled, Diesel engine Direct injection, Turbocharged with Air-cooler (Inter-cooler type)								
Cylinder arrangement		in-line					60 degree Vee			
No. of cylinder		6	6	6	6	6	12	12	16	
Piston Bore	mm	150	170	170	170	170	150	170	170	
Piston Stroke	mm	175	180	220	220	220	160	180	180	
Total Piston Displacement	liter	18.6	24.5	30.0	30.0	30.0	33.9	49.0	65.4	
Flywheel	SAE	14 inch	18 inch	18 inch	18 inch	18 inch	18 inch	21 inch	21 inch	
Flywheel housing	SAE	No. 1	No. 0	No. 0	No. 0	No. 0	No. 0	No. 00	No. 00	
Fuel oil		Diesel fuel oil (ASTM No. 2-40 or equivalent)								
Fuel injection pump		Bosch type	Original PS	Original PS	Original PS	Original PS	Bosch type	Original PS	Original PS	
Governor type		Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	
Engine starting system		Electric starting motor (DC24V earth float type)								
Capacity of starting motor	pc-kW	1-6	1-6	1-7.5	1-7.5	1-7.5	2-7.5	2-7.5	2-7.5	
Recommended battery size	AH	200	200	200	200	200	400	400	400	
Lubricating system		Forced lubrication by engine driven toothed pump								
Lubricating oil		API service grade CD or CF class								
Lube oil capacity (Oil pan)	liter	100	140	140	140	140	120	200	260	
Fresh water capacity (Engine)	liter	36	55	55	55	55	100	125	170	
Engine dimensions & dry weight										
Length	mm	2089	1864	2207	2207	2207	2400	2534	3064	
Width	mm	927	1202	1156	1156	1156	1509	1582	1582	
Height	mm	1371	1615	1695	1695	1695	1596	1728	1960	
Dry weight	kg	1850	2700	3000	3000	3000	3300	4950	6350	

Specifications/data subject to change without prior notice.



S6R2-MTK3L



S6R2-MPTK



S12A2-MPTK

GENERAL ENGINE DATA

Type	-----	4-Cycle, Water Cooled	
Aspiration	-----	Turbo-Charged, Inter Cooler (Raw water to Cooler)	
Cylinder Arrangement	-----	Inline	
No. of Cylinders	-----	6	
Bore mm(in.)	-----	170	(6.69)
Stroke mm(in.)	-----	220	(8.66)
Displacement Liter(in. ³)	-----	29.96	(1828)
Compression Ratio	-----	14.0 : 1	
Dry Weight - Engine only - kg(lb)	-----	2960	(6527)
Wet Weight - Engine only - kg(lb)	-----	3150	(6946)

PERFORMANCE DATA

Steady State Speed Stability Band at any Constant Load(Generator Use)

Hydraulic (std.) or Electric Governor - %	-----	±0.25 or better	
Idling Speed -rpm	-----	600 • 650	
Maximum Overspeed Capacity - rpm	-----	1750	
Moment of Inertia of Rotating Components J-kg • m ² (lb • ft ²)	-----	11.96	(1135)
(Includes 18 inch Flywheel)			
Cyclic Speed Variation with Flywheel at	.....	1/116	
	.....	1/76	

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Flywheel Housing	-----	1961	(1447)
- N • m(lbf • ft)			

AIR INLET SYSTEM

Maximum Intake Air Restriction (Includes piping)- kPa (in.H ₂ O)	-----	3.92	(15.7)
Maximum Allowable Intake Air Temperature- °C (°F)	-----	45	(113)

EXHAUST SYSTEM

Maximum Allowable Back Pressure - kPa (in.H ₂ O)	-----	4.41	(17.7)
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LUBRICATION SYSTEM

Oil Pressure	0.2 • 0.3 (29 • 43)	
	0.5 • 0.6 (71 • 93)	
Standard Thermostat (Modulating)Range- °C (°F)	-----	82 • 95 (180 • 203)	
Maximum Oil Temperature- °C (°F)	-----	110	(230)
Oil Capacity of Marine Pan	.....	14.0	(37.0)
	.....	11.0	(29.1)
Total System Capacity (Includes Oil Filter) - liter (U.S.gal)	-----	16.0	(42.3)
Maximum Installation Angle	.....	8 •	
	.....	8 •	
Maximum Instantaneous Operating Angle	.....	25 •	
(Engine Level)	.....	15 •	
	.....	22.5 •	

COOLING SYSTEM

Coolant Capacity - liter (US.gal)	-----	55	(14.5)
(Engine only)			
Maximum External Friction Head at Engine Outlet-MPa(psi)	-----	0.034	(5.0)
Recommended Static Head of Coolant above Crankshaft Center - m(ft)			
	MAX.	10	(32.8)
	MIN.	7	(23.0)
Standard Thermostat (Modulating)Range- °C (°F)	-----	71 • 85 (160 • 185)	
Maximum Coolant Temperature at Engine Outlet- °C (°F)	-----	95	(203)
Recommended Coolant Temperature at Engine outlet- °C (°F)	-----	80	(176)
Minimum Coolant Expansion Space-% of System Capacity	-----	10	
Maximum Coolant Temperature at Inter Cooler Inlet, TK type- °C (°F)	-----	32	(90)

The specifications are subject to change without notice.

APPLICATION : MARINE

Model 1000FG*

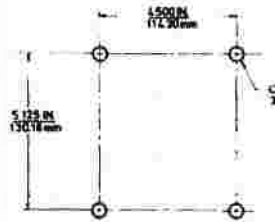
Maximum Rated Flow 12 l/Min. (3.16 GPM)
 Port Size: 7/8" x 14 UNF Str Thd
 w/O-ring

Parts Diagram

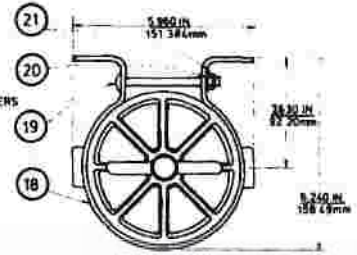
Parts List

Item	Part No.	Qty	Description
1	11780	1	Drain Valve
2	11041	1	Bowl Drain Gasket
3	11031A	1	Clear Bowl
4	11026C	1	Turbine Centrifuge
5	11027	1	3/4" Check Ball
6	11025C	1	Conical Baffle
7	11028B	1	Check Ball Gasket
8	11007	3	Gasket
9	11023B	1	Base
10	2020SM	1	Element
11	11008	1	Return Tube
12	11005B	1	Lid
13	11350	1	O-Ring
14	11888	1	T-Handle
15	11542	4	Bowl Retaining Screw
16	11037A	1	Bowl Ring
17	11021	1	Outer Cylinder
18	11815	2	Bracket Clamp
19	11838	4	5/16" Carriage Bolt
20	12049	4	5/16" Flat Washer
21	11841	4	5/16" Lock Nut

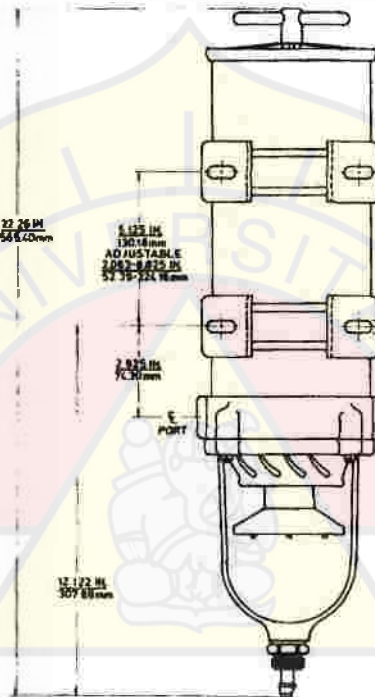
*For (U) listed applications,
 order model 1000MA



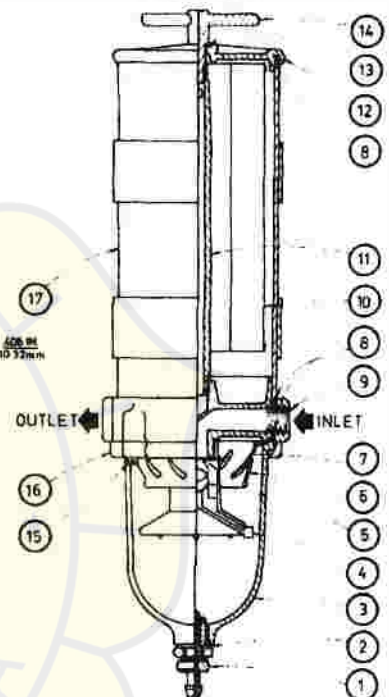
Mounting Hole Pattern



Top View



Back View



Cutaway View

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Diesel-Fuel filter/water separators

Installation and Service Instructions

Installation

1. Remove vacuum side filters in fuel line between fuel tank and fuel pump. Cast-in-head or non-removeable housing should be adapted with primary spin-on adaptor (Racor Part No. 11548) where applicable. Otherwise, service and leave in-place.

All secondary or pressure side filters located between pump and engine should be serviced and left in place.

2. Mount Racor filter/separator vertically on the vacuum side of the fuel pump or transfer pump, whichever comes first, in a convenient location for servicing and monitoring contaminants on units with the clear see-through bowl.

Maintain vertical clearance above filter housing for removal of element or elements. (See Specifications Chart, page 15.) Position unit between the horizontal planes of the bottom of the fuel tank and pump inlet for minimum restriction to the pump. Use maximum fuel line sizes

available in order to reduce restriction.

When installing a unit in conjunction with an overhead storage fuel tank, which places head pressure on the unit, a valve must be installed on the *inlet side* of the filter system. This valve is necessary when changing elements.

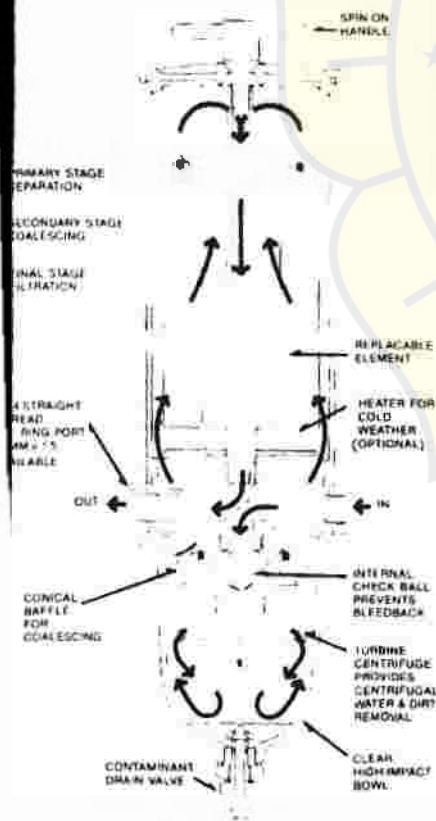
If Racor filter separator in its non-heated version is used in cold weather applications, the unit should be installed behind the engine, in engine compartment or near a manifold, or wherever heat flow is available to strike unit. A Racor heater is available for cold starts, (see page 11). A Racor in-line fuel heater is available for sub-zero conditions, (see page 13).

3. Install fuel line from tank to inlet side of the Racor filter/separator using appropriate fittings. Any fuel by-pass or return lines returning to suction side of filter which are removed must be routed into inlet side of the Racor unit using appropriate fittings. (See FIG. 1, page 3 for suggested mounting location.) These fittings are available from your dealer or Racor Industries, Inc. (See Fittings & Accessories Chart, page 14.)

4. Install fuel line from the outlet of Racor filter/separator to the inlet of the transfer or fuel pump, again using appropriate fittings as shown with each unit.

5. Remove lid and prime the system by pouring clean fuel into filter cylinder until full. Replace lid and hand tighten T-handle.

6. Start engine and test system. (See Troubleshooting Section, page 3.)



Note:

1. For Racor's complete line of Recycle/Filtering & Recycle/Blending Systems, see "800 Series — Installation & Operating Instructions", Racor Part No. 7095.

2. For Racor's complete line of U.L. Listed Marine Units, see "Marine Diesel-Fuel Filter/Water Separators", Racor Part No. 7096.

8 features to save you time and money

1. Single Unit Tri-functional Design
2. Internal Check Valve System
3. Turbine Centrifuge
4. See-Through Bowl
5. Coalescing
6. Long Life Replaceable Element
7. High Quality Construction
8. Spin-on Handle and Easily Removable Cartridge