SPECIFICATIONS

OF

MITSUBISHI DIESEL ENGINE

MODEL : S16R-PTA

FOR DIESEL GENERATOR SET

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FOR DIESEL GENERATOR SET

MITSUBISHI HEAVY INDUSTRIES,LTD

SAGAMIHARA MACHINERY WORKS

	APPROVED BY	DRAWN BY
B	'99-5-31	OEM-A0041 Y.F
DATE	13.Feb.1998	

1. GENERAL

Object and use	:	Diesel generator
Color of painting	:	Mansel No. 7.5BG6/1.5
Applicable conditions		
Ambient temperature	:	5°C ~ 40°C
Altitude	:	1500m above sea level
Max ,humidity	:	85%
Place of installation	:	In door

Shop test

Diesel engine running tests shall be carried out by the following items.

Starting test			
Load test	:	1/4, 2/4, 3/4 Load each	5min
	:	4/4 Load	20min
Governor test	:	Governor test should be done along with respective governor controller	
Safety stop device test			

Guarantee

The guarantee shall be valided for the period of either 1year or 1000Hr (at Hr counter) after installation, whichever the shorter.

The guarantee shall cover against manufacturer defect, materials and workmanship only, and shall not be applicable to damage sustained through mishandling of the equipment.

Standard

All items, unless otherwise specified, are in accordance with JIS and manufacturer's standards.

2. PRINCIPAL PARTICULARS

Model	:	MITSUBISHI S16R-PTA
Type	:	4cycle stroke, water cooled diesel engine
Combustion chamber	:	Direct injection type
Aspiration	:	Turbocharged with after cooler
Number of cylinders	:	16-V
Bore × stroke	:	170mm × 180mm
Total displacement	:	65.37liter
Compression ratio	:	14.0 : 1
firing order	:	1 - 9 - 6 - 14 - 2 - 10 - 4 - 12 - 8 - 16 - 3 - 11 - 7 - 15 - 5 - 13
Direction of rotation	:	Counter clockwise as viewed from flywheel side
Engine dimensions (Approx.)	:	Length 3223mm
	:	width 1360mm
	:	Height 1810mm
Dry weight (Approx.)	:	6250kg (without accessories)
Fuel oil	:	ASTM D975 No. 2 - D or BS 2869 class A
Lubricating oil	:	API service CD class or CF class SAE No. 30 or No. 40

Output at ISO 3046 standard air conditions (25℃, 750mmHg, 30% Humid)

Stand-by rating	:	1475Hp/1200rpm 2131Hp/1500rpm 2279Hp/1800rpm
Prime rating	:	1340Hp/1200rpm 1944Hp/1500rpm 2064Hp/1800rpm
Fuel consumption ratio at Prime rating (allowance +5%)	:	151g/Hp-hr at 1200rpm 152g/Hp-hr at 1500rpm 159g/Hp-hr at 1800rpm
Lub, oil consumption ratio at Prime rating	:	within 0.6g/Hp-hr

3. DESIGN FEATURES

Cylinder head	:	Individual type, Iron casting, Corrosion resistant inserts for intake and exhaust valves.
Valve mechanism	:	Two intake and exhaust valves by each cylinder (with valve rotators).
Cam shaft	:	High - tensile strength steel forging.
Crank case	:	Mono - block hanger type.
(Cylinder block)		High - tensile strength iron casting.
Cylinder liners	:	Replaceable wet sleeve type.
Main bearings and Con - rod bearings	:	Steel - backed tri - metal copper special alloy with thin lead - tin overlay.
Piston	:	Aluminium alloy casting. Oiljet cooling with cooling channel. Ni - resist top ring insert. Two compression rings and one oil ring.
Piston pin	:	Full floating type. High - tensile strength steel.
Connecting rod	:	High - tensile strength steel forging. I beam section stem.
Crankshaft	:	High - tensile strength steel forging. Induction hardended bearing journals. Counter weighted web.
Gear train	:	Located at rear end of crankcase.
Turbocharger	:	Exhaust gas turbine.
Lubricating system	:	Forced lubricating by gear pump.
Cooling system	:	Forced circulation of jacket water by centrifugal pump.
Fuel injection pump	:	Bosch type multiple plunger with fuel feed pump.
Starting system	:	Electric starting.
Stopping system	:	Fuel cut type.

4. STANDARD EQUIPMENTS

(1) power line system

Flywheel	:	DWG.NO.37896-21001
		SAE J620C 21in, except screw size
Flywheel housing	:	DWG.NO.37896-21001
		SAE J617b No.00, except screw size
Engine mounting	:	DWG.NO.37896-14001
		6 points mounting, C = 250mm
Torsional vibration damper	:	Viscous type × 2pcs

(2) Air intake system

Air cleaner	:	Not supply
Turbocharger	:	MITSUBISHI TD Type
		Model : TD13L-48QRC(40) for1200rpm
		TD10L-36F(28) for 1500rpm
		TD13M-36F(29) for 1800rpm
Air cooler	:	Jacket water cooled type
		Plated element type
Air heater	:	Not supply

(3) Exhaust system

Exhaust manifold	:	Air cooled type with heat insulator
Muffler	:	Not supply
Flexible pipe	:	Not supply
Companion flange	:	Not supply
Breather	:	Up side direction type
		For blow – off to outside of engine room

(4) Lubricating system

Oil pump	:	Gear pump type
Capacity of oil pump	:	1200rpm : 380 liter/min.
		1500rpm : 480 liter/min.
		1800rpm : 580 liter/min.
Lub. oil pressure	:	4.0 ～ 6.5kg/cm2
Quantity of oil (Approx.)	:	Oil pan full level : 200 liter
		low level : 140 liter
		Others (filter etc.) : 30 liter
		Total : 230 liter
Lub. oil filter (Full flow)	:	DWG.NO.37896-40001
		Paper element cartridge type × 4pcs
		filter mesh : 20 μ
		with by - pass alarm switch
Lub. oil filter (By - pass flow)	:	DWG.NO.37896-40001
		Paper element cartridge type × 1pc
		filter mesh : 2 μ
Lub. oil cooler	:	Water cooled corrugated type with by - pass valve

(5) Cooling system

Water pump	:	Gear drive centrifugal type
Capacity of water pump	:	1200rpm : 1300 liter/min.
		1500rpm : 1650 liter/min.
		1800rpm : 1850 liter/min.
Thermostat	:	Wax pellet type × 4pcs
		Open at 71°C ～ 85°C
Fan	:	Pusher type steel fan 1530 diameter, Gear drive
		Fan speed ratio i = 0.568 for 1200rpm and 1500rpm
		i = 0.475 for 1800rpm
Radiator piping	:	Not supply

(6) Fuel system

Fuel inlet pipings	:	DWG.NO.37896-62101
		With flexible hose (PT 3/4 joint)
Fuel return pipings	:	DWG.NO.37896-61305
		With flexible hose (PT 3/4 joint)
Fuel overflow of Inj. Pump and fuel leak –		off of Nozzle have to return to fuel tank
Injection pump	:	Bosch type "PS8" without timer
Feed pump	:	Piston type with priming pump
Injection Nozzle	:	Hole type 0.325mm × 10 holes for 1200rpm and 1500rpm
		0.350mm × 10 holes for 1800rpm
Fuel filter	:	DWG, No.37896-62002
	:	Paper element cartridge type filter mesh : 5 μ

(7) Control system

Governor	:	DWG.NO.37896-63004
		Electronic speed governor
		Speed droop : 0 ～ 5% adjustable
Actuator	:	DWG.NO.S13-1010
		Supply voltage : DC24V± 20%
		Current consumption
		At starting : 13A
		Normal operation : 1～ 5A
		Min. Supply voltage : DC16V50%ED
Controller	:	DWG.NO.S13-1041 loose supply
		Supply voltage : DC24V± 20%
		Current consumption : 100mA
Connector	:	DWG.NO.S13-1020 loose supply
		From actuator to controller
		5000mm length
Magnetic pick up	:	DWG.NO.S13-1400
		With 2P-connector
Cable	:	DWG.NO.S13-1410 loose supply
		From magnetic pick up to controller
		4000mm length

(8) Starting system

Starter switch	:	Not supply
Starting motor	:	DWG.NO.37896-66001 DC24V, 7.5KW × 2pcs Reduction type with safety relay with 2 poles connector (DWG.NO.S14-0320)
Safety relay	:	DWG.NO.S10-0150 loose supply For Parallel running of starting motor
Current of starter	:	Rush 1250A Cranking 400A (Ambient temp : 5℃, Lub. oil : SAE No. 30)
Alternator	:	DWG.NO.S10-0540 DC24V, 30A, with voltage regulator with 2 poles connector (DWG.NO.S10-0550)
Recommended battery capacity	:	DC24V, 400AH
		Not supply
Battery switch	:	Not supply

(9) Stopping system	:	DWG.NO.37896-87502
Automatic stop		Automatically shut - down by stop solenoid and electronic governor power off simultaneously
Stop solenoid	:	DWG.NO.S13-0280 Energized to run type DC24V, 31.2A(pull), 0.57A(hold)
Manual stop	:	By stop lever

(10) Safety device

Alarm switches	:	DWG.NO.37896-9020*
Alarm and trip		
Low oil press. switch	:	DWG.NO.S11-0794 (04442-25201) Diaphragm type : 1.5kg/cm2 switch on
High water temp. switch	:	DWG.NO.S11-0551 (04442-34400) Wax type : 95℃ switch on
Alarm		
Oil filter alarm switch	:	DWG.NO.S11-1350 Piston type : 1.5kg/cm2 switch on
Oil filter alarm lamp	:	Not supply
Air filter alarm indicator	:	Not supply

(11) Others

Turning device	:	DWG.NO. 37896-71001 Gear type, for maintenance
Service meter	:	Not supply
Tools	:	DWG.NO. 37896-91001 loose supply
Spare parts	:	DWG.NO. 37896-94003 loose supply (for 1200rpm and 1500rpm) 37896-94004 loose supply (for 1800rpm)

5. ACCESSORIES (Loose supply parts for standard)

No.	PARTS NO.	PARTS NAME	Q' TY		DWG. NO.
1	04410-33100	CONTROLLER	1	S13-1041	37896-63004
2	04410-32900	CONNECTOR, ACTUATOR	1	S13-1020	
3	04410-38500	CABLE, PICK UP	1	S13-1410	
4	04322-40100	RELAY, SAFETY	1	S10-0150	
5	F8665-02100	CONNECTOR	2	S14-0320	for starter
6	32B90-00300	CONNECTOR	1	S10-0550	for alternator

6. TOOLS (Standard)

No.	PARTS NO.	PARTS NAME	Q' TY	DWG. NO.
	37896-91001	S.T.D. TOOL KIT	1set	consists of NO.1～26
	(32591-00012)	(TOOL ASSY.)	(1set)	consists of NO.1～23
1	MC420-083	BOX. TOOL	1	
2	F9614-17000	SOCKET	1	
3	F9614-22000	SOCKET	1	
4	F9614-24000	SOCKET	1	
5	F9614-27000	SOCKET	1	
6	F9614-30000	SOCKET	1	
7	F9614-32000	SOCKET	1	
8	F9615-25000	BAR, EXTENTION	1	
9	F9617-10000	JOINT, UNIVERSAL	1	
10	F9618-30000	HANDLE, SLIDE	1	
11	F9600-07008	SPANNER, OPEN ENDED	1	
12	F9600-10012	SPANNER, OPEN ENDED	1	
13	F9600-14017	SPANNER, OPEN ENDED	1	
14	F9600-19022	SPANNER, OPEN ENDED	1	
15	F9600-24027	SPANNER, OPEN ENDED	1	
16	F9600-30032	SPANNER, OPEN ENDED	1	
17	F9600-36041	SPANNER, OPEN ENDED	1	
18	F9630-15000	PLIER	1	
19	91267-00201	SCREW DRIVER	1	
20	64309-15300	GUN, GREASE	1	
21	30091-06501	GAGE, THICKNESS	1	
22	33491-03600	ADAPTER	1	
23	33491-13500	SOCKET	1	
24	37191-03300	HANDLE, TURING	1	
25	33591-10101	REMOVER, NOZZLE	1	
26	32591-22100	WRENCH, FILTER	1	for cartridge filter

7. SPARE PARTS (Standard)

No.	PARTS NO.	PARTS NAME	Q' TY	NOTE.
	37896-94003	SPARE PARTS KIT	1set	consists of NO.1, 3～8, for 1200rpm and 1500rpm
	37896-94004	SPARE PARTS KIT	1set	consists of NO.2～8, for 1800rpm
1	37561-17500	NOZZLE TIP ASSY.	8	ϕ0.325
2	37561-17100	NOZZLE TIP ASSY.	8	ϕ0.350
3	37561-16800	GASKET	16	
4	37504-56200	PACKING, ROCKER COVER	4	
5	32562-60300	ELEMENT, FUEL	4	
6	37540-01101	ELEMENT, L/O FULL-FLOW	4	
7	37540-02100	ELEMENT, L/O BY-PASS	1	
8	37768-04200	V-BELT	1	for dynamo drive

8. DRAWINGS (Standard & Optional)

NO.	DWG. NO.	DWG. NAME	REMARK
1	37896-00212	ENGINE OUTLINE	for 1500rpm and 1800rpm
2	37896-00216	ENGINE OUTLINE	for 1200rpm
3	37896-01001	JOINT DETAIL	
4	37896-04012	WIRING DIAGRAM	for reference
5	37896-14001	MOUNTING DETAIL	
6	37896-21001	FLYWHEEL & HOUSING DETAIL	
7	37896-40001	OIL FILTER	
8	37896-61305	FUEL RETURN PIPING	
9	37896-62002	FUEL FILTER	
10	37896-62101	FUEL INLET PIPING	
11	37896-63004	GOVERNOR	
12	37896-66001	STARTING MOTOR	
13	37896-71001	TURNING GEAR	
14	37896-87502	STOP SYSTEM	
15	37896-9020*	ALARM SWITCH	
16	37896-91001	TOOLS	
17	37896-94003	SPARE PARTS	
18	37896-94004	SPARE PARTS	
19	S10-0150	SAFETY RELAY	
20	S10-0540	ALTERNATOR	
21	S10-0550	CONNECTOR	
22	S11-0551	THERMO SWITCH	
23	S11-0794	PRESSURE SWITCH	
24	S11-1350	FILTER ALARM SWITCH	
25	S13-0280	SOLENOID	
26	S13-1010	ACTUATOR	
27	S13-1020	CONNECTOR	
28	S13-1041	CONTROLLER	
29	S13-1400	MAGNETIC PICK UP	
30	S13-1410	CABLE, PICK UP	
31	S14-0320	CONNECTOR	