YANMAR

0000A0A1015-9112

SERVICE MANUAL

MARINE DIESEL ENGINE

3JH2 Series

2000. 3. 10

FOREWORD

This service manual has been compiled for engineers engaged in sales, service, inspection and maintenance. Accordingly, descriptions of the construction and functions of the engine are emphasized in this manual while items which should already be common knowledge are omitted.
One characteristic of a marine diesel engine is that its performance in a vessel is governed by its applicability to the vessel's hull construction and its steering system.
Engine installation, fitting out and propeller selection have a substantial effect on the performance of the engine and the vessel. Moreover, when the engine runs unevenly or when trouble occurs, it is essential to check a wide range of operating condi tions—such as installation on the hull and suitability of the ship's piping and propeller – and not just the engine itself. To get maximum performance from this engine, you should completely understand its functions, construction and capabilities, as well as proper use and servicing.
Use this manual as a handy reference in daily inspection and maintenance, and as a text for engineering guidance.

Printed in Japan
A0A1015-9110SP

APERÇU — Engine Manual — fichier complet disponible après achat

CONTENTS

CHAPTER 1 GENERAL
1. Exterior Views ····· 1-1
2. Specifications ····· 1-3
3. Engine Outline ····· 1-5
4. Performance Curves ····· 1-10
5. Piping Diagrams ····· 1-12

CHAPTER 2 BASIC ENGINE PARTS
1. Cylinder Block ····· 2-1
2. Cylinder Head ····· 2-4
3. Piston and Piston Pins ····· 2-11
4. Connecting Rod ····· 2-15
5. Crankshaft and Main Bearing ····· 2-18
6. Camshaft and Tappets ····· 2-21
7. Timing Gear ····· 2-24
8. Flywheel and Housing ····· 2-26

CHAPTER 3 FUEL INJECTION EQUIPMENT
1. Fuel Injection Pump Service Data ····· 3-1
2. Governor ····· 3-2
3. Disassembly, Reassembly and Inspection of Fuel Injection Pump ····· 3-11
4. Adjustment of Fuel Injection Pump and Governor ····· 3-21
5. Fuel Feed Pump ····· 3-27
6. Fuel Injection Nozzle ····· 3-29
7. Troubleshooting ····· 3-33
8. Tools ····· 3-35
9. Fuel Filter ····· 3-37
10. Fuel Tank(Optional) ····· 3-38

CHAPTER 4 INTAKE AND EXHAUST SYSTEM
1. Intake and Exhaust System ····· 4-1
2. Turbocharger ····· 4-3
3. Mixing Elbow ····· 4-17

CHAPTER 5 LUBRICATION SYSTEM
1. Lubrication System ····· 5-1
2. Lube Oil Pump ····· 5-3
3. Lube Oil Filter ····· 5-6
4. Oil Pressure Control Valve ····· 5-8
5. Lube Oil Cooler ····· 5-9
6. Piston Cooling Nozzle ····· 5-10
7. Rotary Waste Oil Pump(Optional) ····· 5-11

CHAPTER 6 COOLING WATER SYSTEM
1. Cooling Water System ····· 6-1
2. Sea Water Pump ····· 6-4
3. Fresh Water Pump ····· 6-7
4. Heat Exchanger ····· 6-10
5. Pressure Cap and Sub Tank ····· 6-12
6. Thermostat ····· 6-14
7. Kingston Cock(Optional) ····· 6-16
8. Sea Water Filter(Optional) ····· 6-17
9. Bilge Pump and Bilge Strainer(Optional) ····· 6-18

CHAPTER 7 REDUCTION AND REVERSING GEAR
1. Construction ····· 7-1
2. Shifting Device ····· 7-7
3. Inspection And Servicing ····· 7-12
4. Disassembly ····· 7-20
5. Reassembly ····· 7-25

CHAPTER 8 REMOTE CONTROL
1. Remote Control System ····· 8-1
2. Remote Control Installation ····· 8-2
3. Remote Control Inspection ····· 8-5
4. Remote Control ADJUSTMENT ····· 8-6
5. Disassembly ····· 8-13

CHAPTER 9 ELECTRICAL SYSTEM
1. Electrical System ····· 9-1
2. Battery ····· 9-5
3. Starter Motor ····· 9-8
4. Alternator ····· 9-24
5. Instrument Panel ····· 9-34
6. Warning Devices ····· 9-36
7. Air Heater(Optional) ····· 9-39
8. Electric Type Engine Stop Device(Optional) ····· 9-40
9. Tachometer ····· 9-42
10. Alternator 12V/80A(Optional) ····· 9-45

CHAPTER 10 DISASSEMBLY AND REASSEMBLY
1. Disassembly and Reassembly Precautions ····· 10-1
2. Disassembly and Reassembly Tools ····· 10-2
3. Disassembly and Reassembly ····· 10-9
4. Bolt/nut Tightening Torque ····· 10-32
5. Test Running ····· 10-33

Printed in Japan
A0A1015-9110SP

CHAPTER 1

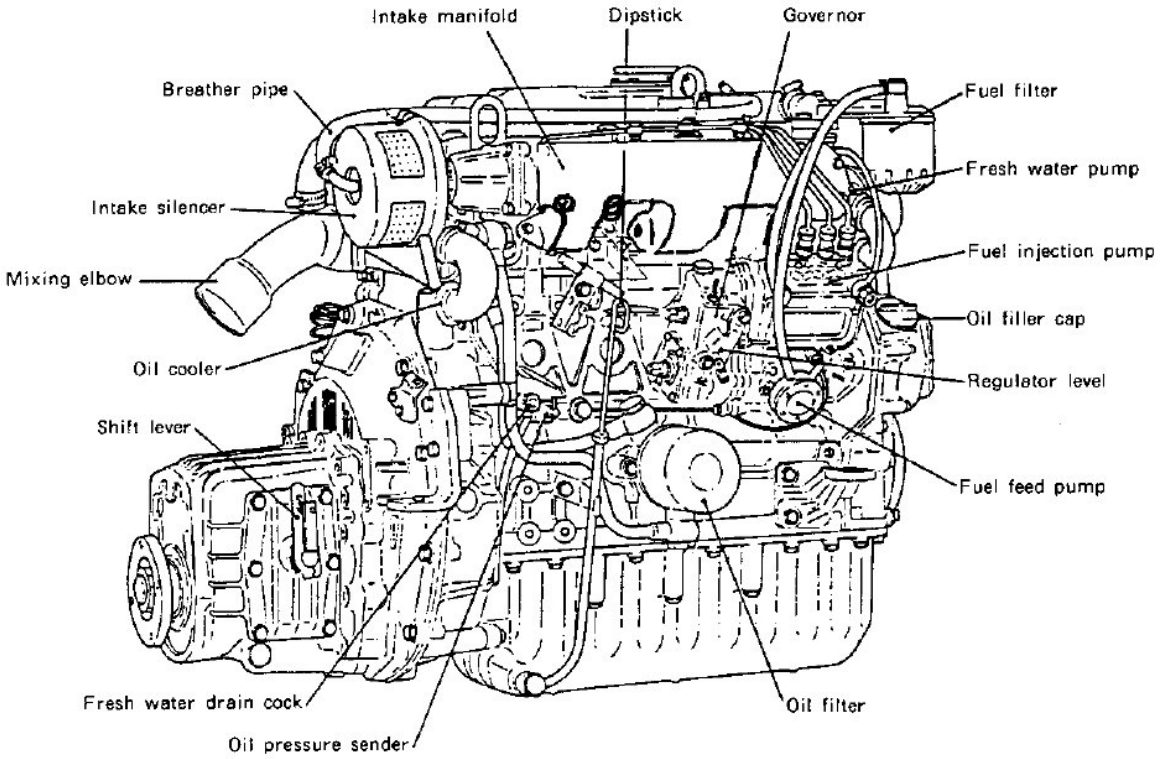
GENERAL

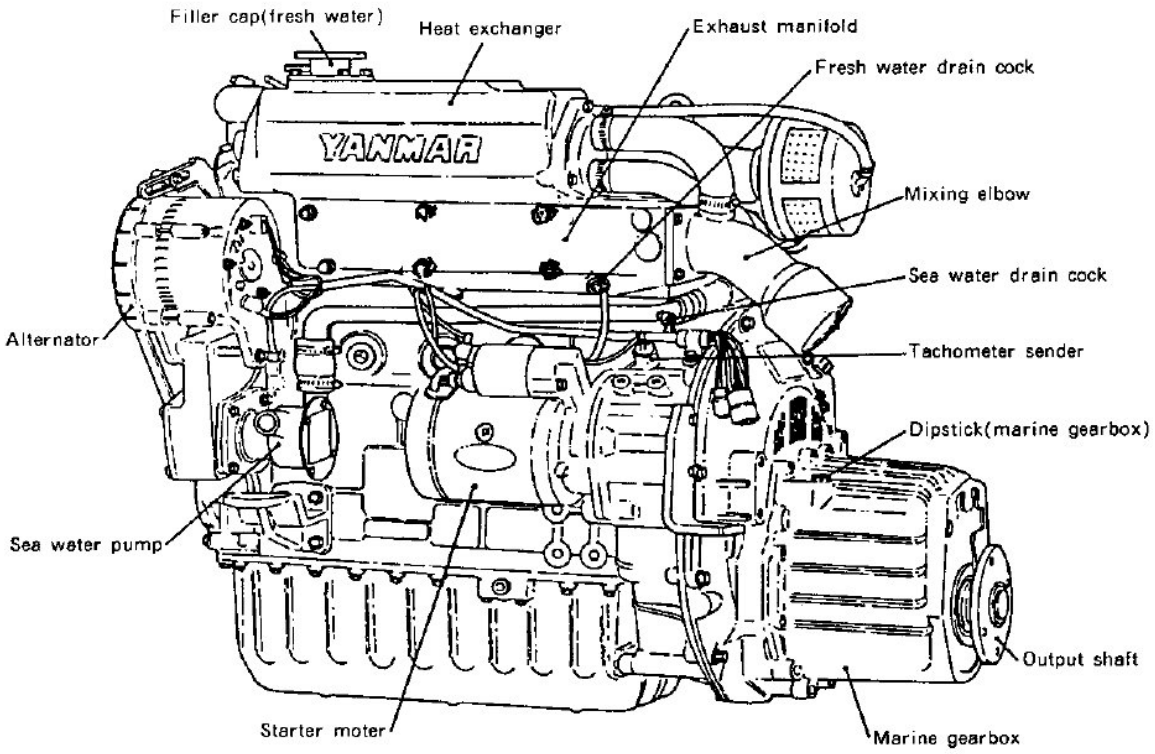
1. Exterior Views 1-1
2. Specifications 1-3
3. Engine Outline 1-5
4. Performance Curves 1-10
5. Piping Diagrams 1-12

Printed in Japan
A0A1015-9110SP

1. Exterior Views

1-1. 3JH2E

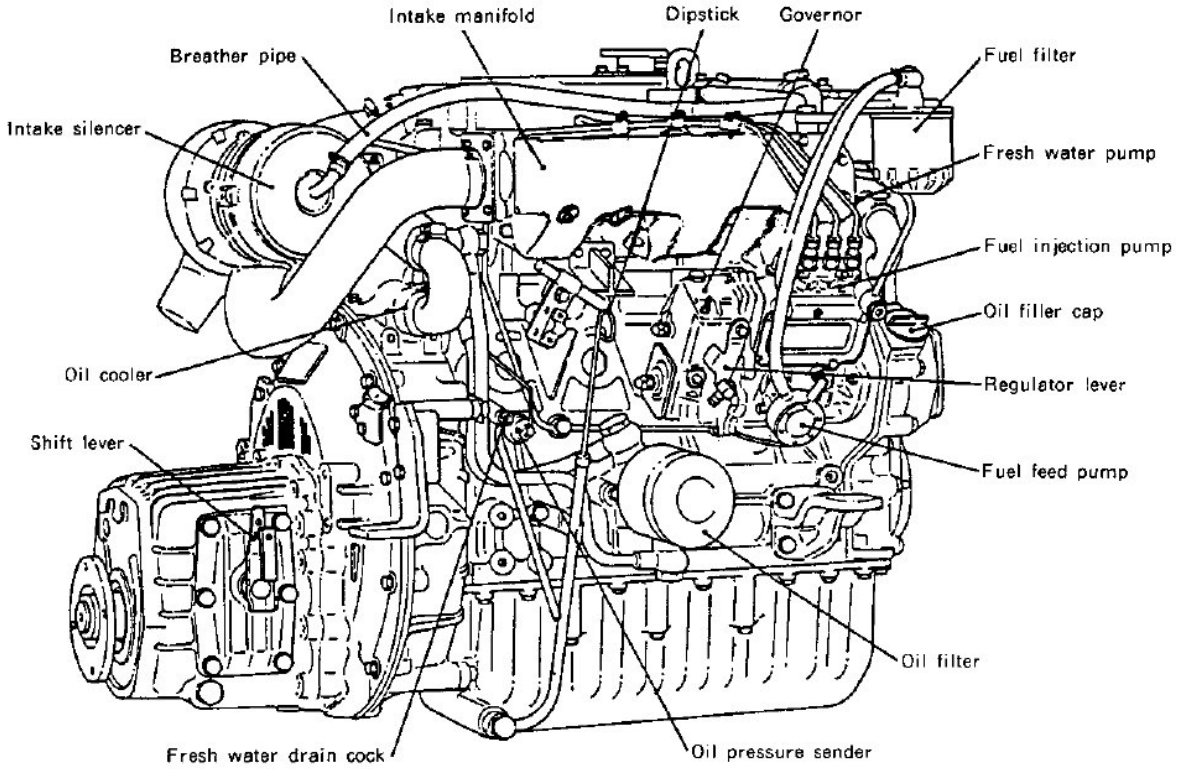


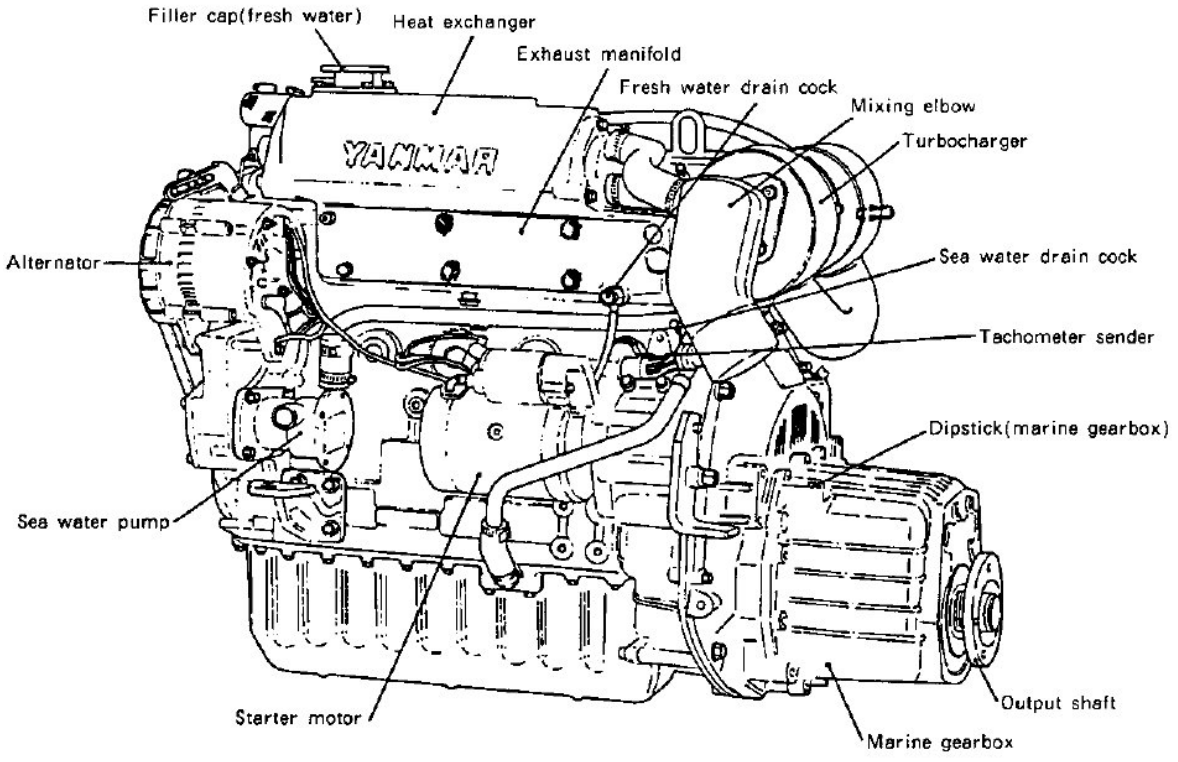


Printed in Japan
A0A1015-9110SP

APERÇU — Engine Manual — fichier complet disponible après achat

1-2. 3JH2-TE





Printed in Japan
A0A1015-9110SP

APERÇU — Engine Manual — fichier complet disponible après achat

2. Specifications

2-1. Engine

Model			3JH2-(B)E	3JH2-T(B)E
Type			Vertical 4-cycle water cooled diesel engine	
Combustion system			Direct injection	
Aspiration			Normal aspiration	Exhaust gas turbocharger
Number of cylinders			3	
Bore × stroke		mm (in.)	82 × 86 (3.23 × 3.39)	
Displacement		ℓ (cu.in.)	1.363 (83.17)	
One hour rating output (DIN6270B) flywheel output	Output/crankshaft speed	kW/rpm (HP/rpm)	28.5/3600 (38.7/3600)	35.0/3600 (47.6/3600)
	Brake mean effective pressure	kgf/cm² (lb./in²)	6.97 (99.113)	8.62 (122.576)
	Piston speed	m/sec. (ft./sec.)	10.3	
Continuous rating output (DIN6270A) flywheel output	Output/crankshaft speed	kW/rpm (HP/rpm)	25.7/3400 (34.9/3400)	31.6/3400 (43.0/3400)
	Brake mean effective pressure	kgf/cm² (lb./in²)	6.80 (96.696)	8.35 (118.737)
	Piston speed	m/sec. (ft./sec.)	9.75	
Compression ratio			18.1	18.0
Fire order			1 — 240° — 3 — 240° — 2 — 240° — 1	
Fuel injection pump			YPES-CL	
Fuel injection timing (b.T.D.C.)		degree	14°	17°
Fuel injection pressure		kgf/cm²(lb./in².)	200±5 (19.6±0.5)	
Fuel injection nozzle			Hole type	
Direction of rotaion	(Crankshaft)		Counter-clock wise viewed from stern	
Power take off			At Flywheel side	
Cooling system			Constant high temperature fresh water cooling Fresh water : Centrifugal pump See water : Rubber impeller pump	
Lubrication system			Forced lubrication with trochoid pump	
Starting system	Starting motor		DC 12V 1.4kW	
	AC generator		12V 55A (12V 80A : Option)	
Turbocharger	Type		—	RHB52 (I.H.I.)
	Model		—	—
	Cooling system		—	Water cooling
Air cooler system	Type		—	—
	Radiation area	m² (in²)	—	—
Dimensions (with KMA)	Overall length	mm (in.)	760.2 (3JH2BE) / 782.3(3JH2E)	760.2 (29.93) / 782.3 (30.84)
	Overall width	mm (in.)	511.5	511.5 (20.65)
	Overall height	mm (in.)	587.5	587.5 (23.13)
Engine weight without marine gear (dry)		kg (lb.)	165	174
Lubricating oil capacity Effect/max.		ℓ (cu.in.)	2.1 / 4.9	
Cooling water capacity (Fresh water)	Fresh water tank	ℓ (cu.in.)	4.7	
	Sub tank	ℓ (cu.in.)	0.8 (48.82)	

Printed in Japan
A0A1015-9301SP

APERÇU — Engine Manual — fichier complet disponible après achat 7/10

2-2. Marine Gear

Marine gear system	Model		KBW-10E		KM3A		
	Type		Multiple friction disc cluth (Parallel drive)		Cone clutch (Angle drive)		
	Reduction ratio (Forward/Reverse)		2.14/2.50	2.45/2.50	2.33/3.04	2.64/3.04	3.21/3.04
	Direction of rotation (Forward) viewed from stern		Clock wise		Clock wise		
	Lubricating oil capacity Effect/max.	ℓ (cu.in.)	0.2/0.7 (12.204/42.714)		0.05/0.35 (3.051/21.357)		
	Lubricating oil						
	weight	kg (lb.)	17.5 (38.588)		13 (28.665)		

2-3. Applicability of Marine gear & Reduction ratio

●: Standard combination
○: Optional combination
×: Inapplicable

Marine gear / Engine model			3JH2F	3JH2-TE
Model	Reduction ratio	I.D Mark		
KBW10E	2.14	S	●	●
	2.45	G	●	●
	2.63	GG	●	×
KM3A	2.33	S	●	●
	2.64	G	●	●
	3.21	GG	●	×

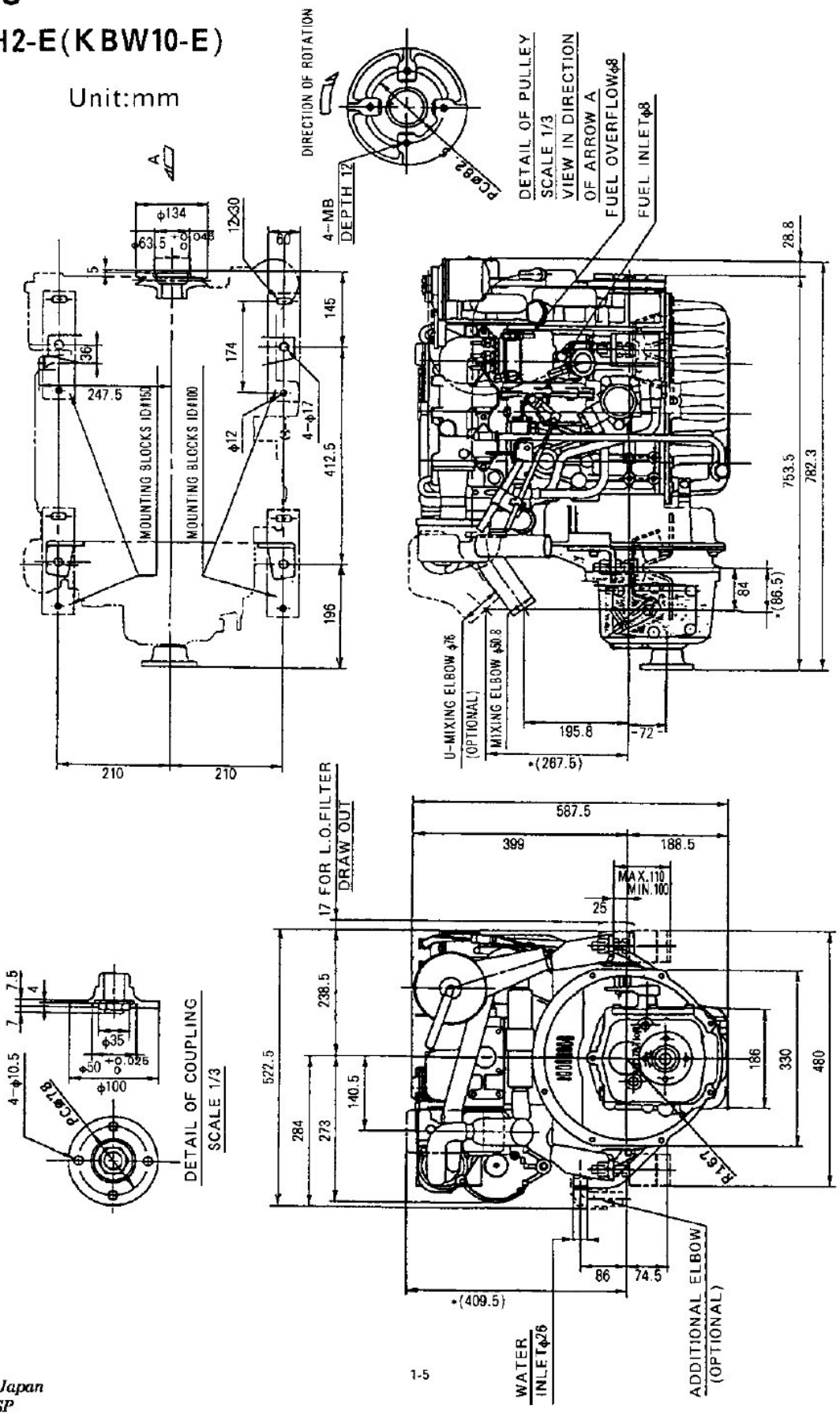
Printed in Japan
A0A1015-9110SP

APERÇU — Engine Manual — fichier complet disponible après achat

3. Engine Outline

3-1. 3JH2-E(KBW10-E)

Unit:mm

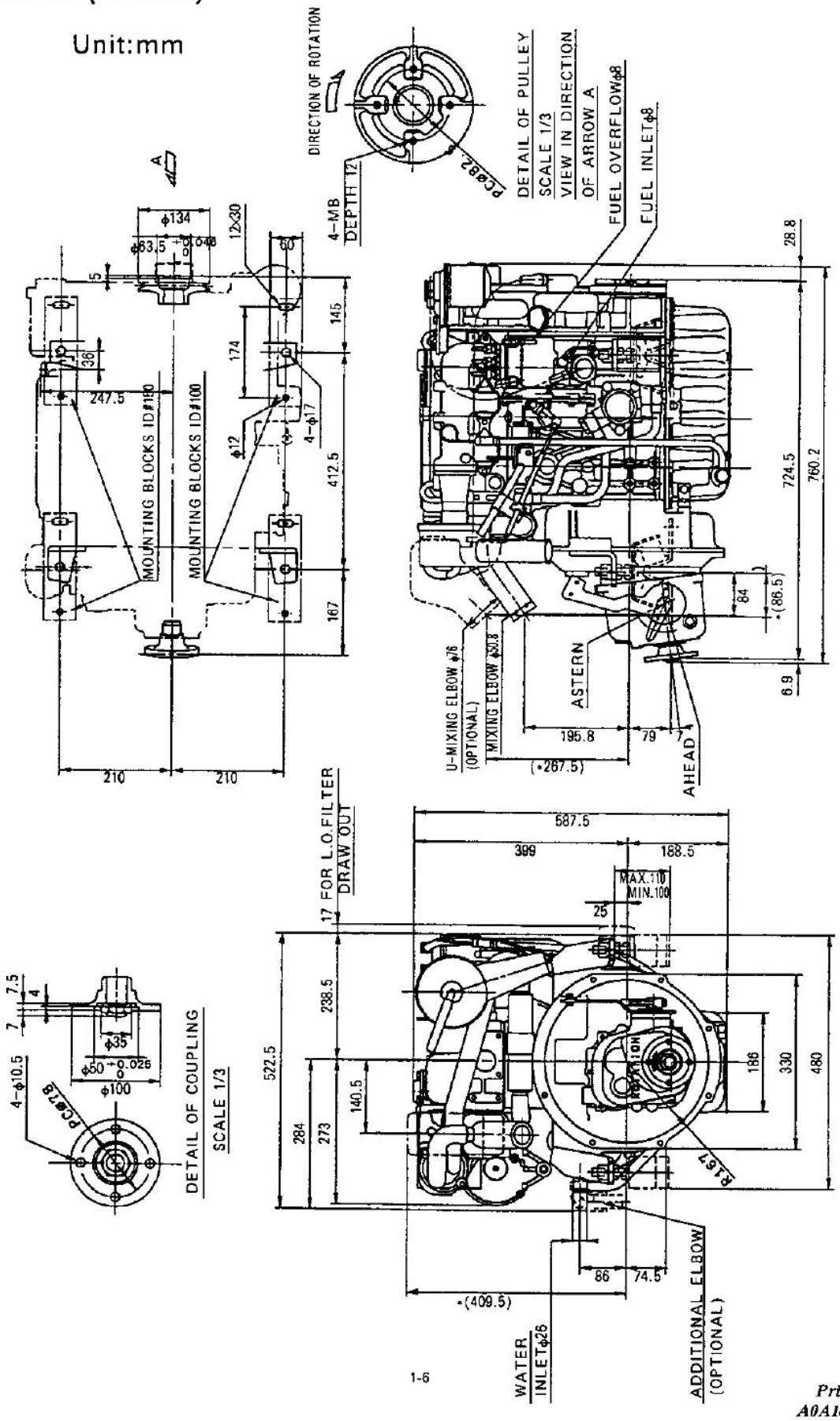


Printed in Japan
A0A1015-9110SP

APERÇU — Engine Manual — fichier complet disponible après achat

3-2. 3JH2-BE(KM3A)

Unit:mm



Printed in Japan
A0A1015-9110SP

APERÇU — Engine Manual — fichier complet disponible après achat