INSTALLATION MANUAL Vol. 2

MARINE ENGINE

GM, YM, JH Series and Sail Drives

YANMAR

3YM30AE

Page

3YM30AE

Engine Specifications

Parameter	Data	
Configuration	4-cycle, vertical, water-cooled diesel engine	
Crankshaft rotation (viewed from stern)	Counterclockwise	
Combustion system	Swirl pre-combustion chamber	
Aspiration	Natural aspiration	
Number of cylinders	3	
Bore × stroke	80 mm × 84 mm (3.15 in. × 3.31 in.)	
Displacement	1.267 L (77.3 cu in.)	
Continuous rating output at crankshaft (at 3101 min^{-1})	19.4 kW (26.4 hp metric)	
Brake mean effective pressure (continuous rating output)	0.59 MPa, 6.04 kgf/cm^2 (86.0 psi)	
Piston speed (continuous rating output)	8.68 m/sec. (28.5 ft/sec.)	
Fuel stop power at crankshaft (at 3200 min^{-1})	21.3 kW (29.0 hp metric)	
Brake mean effective pressure (fuel stop power)	0.63 MPa 6.43 kgf/cm^2 (91.5 psi)	
Piston speed (fuel stop power)	8.96 m/sec. (29.4 ft/sec.)	
High idling speed	3485 ± 25 min^{-1}	
Low idling speed	850 ± 25 min^{-1}	
Firing order	240° 240° 240° 1 – 3 – 2 – 1	
Starter motor	DC 12 V, 1.4 kW	
Alternator	DC 12 V, 125 A	
Minimum battery capacity	650 CCA (cold cranking amps) (Reference: DC12 V, 64 Ah (5 h rate)/ DC12 V, 80 Ah (20 h rate)	
Cooling system	Coolant cooling by centrifugal coolant pump and rubber impeller seawater pump	
Coolant capacity (engine)	4.9 L (5.2 qt)	
Coolant recovery tank capacity	0.8 L (0.85 qt)	
Engine lubrication system	Forced lubrication with trochoid pump	
Engine oil capacity at 8° rake angle (effective/maximum)	1.4/2.8 L (1.48/2.96 qt)	
Engine oil capacity at 0° rake angle (effective/maximum)	1.5/2.5 L (1.59/2.64 qt)	
Marine gear model/Sail drive model	KM2P-1	SD20/SD25
Dry weight	133 kg (293 lb)	157 kg (346 lb)
Recommended installation rake angle	8°	0°
Allowable rake angle when running	15°	15°

Note • Rating condition:
Fuel temperature: 40 °C at fuel pump inlet ISO 8665
Fuel density: 0.835 to 0.845 g/cm^3 at 15 °C

• 1 (hp metric) = 0.7355 kW

Marine Gear/Sail Drive Specifications

Use the KM2P-1 or the SD20/SD25 with the 3YM30AE engine. KM2P-1 is a parallel drive with a mechanical cone clutch and SD20/SD25 has a constant mesh gear with dog clutch.

■ KM2P-1

Parameter	Data
Reduction ratio (ahead)	2.21/2.62
Reduction ratio (astern)	3.06
Marine gear oil capacity	0.3 L (0.32 qt)
Propeller rotation (viewed from stern)	Clockwise
Dry weight (without engine)	9.8 kg (21.6 lb)

■ SD20/SD25

Parameter	Data
Reduction ratio (ahead)	2.64
Reduction ratio (astern)	2.64
Sail drive oil capacity	Standard 2.2 L (2.3 qt)
	Long-reach 2.5 L (2.6 qt)
Propeller rotation (viewed from stern)	Counterclockwise
Dry weight (without engine)	30 kg (66.13 lb)

Fuel System Specifications

Parameter	Data
Maximum fuel feed pump suction head	1.0 m (39.37 in.)
Maximum fuel feed pump discharge volume (engine at 3000 min^{-1})	13.8 L/hr (3.66 gal/hr)
Maximum fuel feed pump discharge pressure (engine at 3000 min^{-1})	29.4 kPa (4.26 psi)
Fuel inlet pipe connector outer diameter	8.3 mm (0.326 in.)
Fuel return pipe connector outer diameter	8.0 mm (0.315 in.)
Fuel consumption at continuous rated output	7.14 L/hr (1.89 gal/hr)

Cooling System Specifications

Parameter	Data
Maximum seawater pump suction head	0.5 m (19.69 in.)
Seawater inlet pipe connector outer diameter	19.5 mm (0.768 in.)
Thermostat operating temperature (full open)	85 °C (185 °F)
Thermostat operating temperature (opening)	70 - 72 °C (158 - 161.6 °F)
Maximum overflow pipe length (coolant recovery tank to filler cap)	1.0 m (39.37 in.)
Maximum overflow pipe outer diameter (coolant recovery tank to filler cap)	9 mm (0.355 in.)
Water heater tank connector thread size	RC 3/8 (inlet) M16 (outlet)

Air Intake and Exhaust Specifications

Parameter	Data
Minimum engine room fresh air exchanges (ventilator capacity)	5.5 m^3/min. (194 cu ft/min.)
Maximum air inlet depression	4.0 kPa, 408 mmAq (16.1 in.Aq)
Maximum back pressure	30 kPa, 3059 mmAq (0.306 kgf/cm^2)
Maximum exhaust gas temperature (measured within 250 mm (9.8 in.) of exhaust manifold inlet)	610 °C (1130 °F)
EPA exhaust test port size	Location: Service tool G 1/4 - 19 BSPP*. Refer to **Figure 1**.
Maximum engine room ambient temperature	60 °C (140 °F)
Exhaust pipe outer diameter connection	50.8 mm (2.0 in.)

*Note: *Back pressure measured from EPA test port located on the service tool. (It needs to be obtained locally.) CAUTION! Test ports are British Standard Pipe Parallel (BSP) not National Pipe Thread (NPT). BSP and NPT threads are not compatible due to the thread pitch. Mixing can cause thread damage. Refer to Installation Manual Volume 1, Appendix C.*

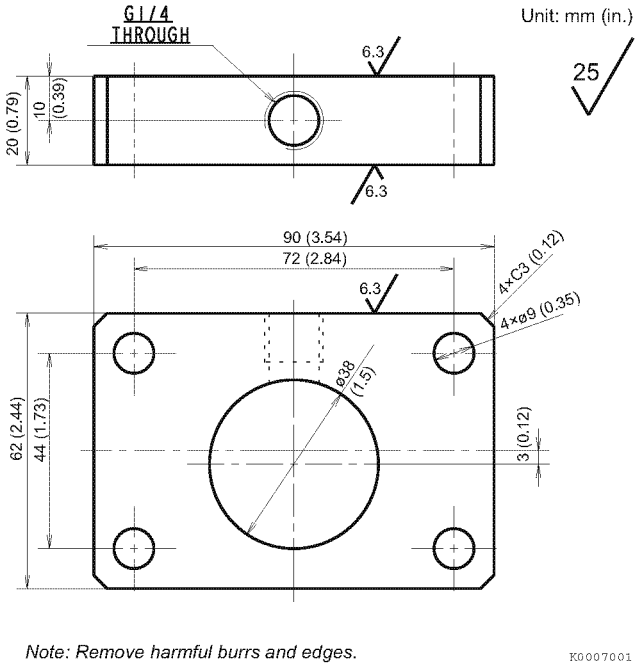
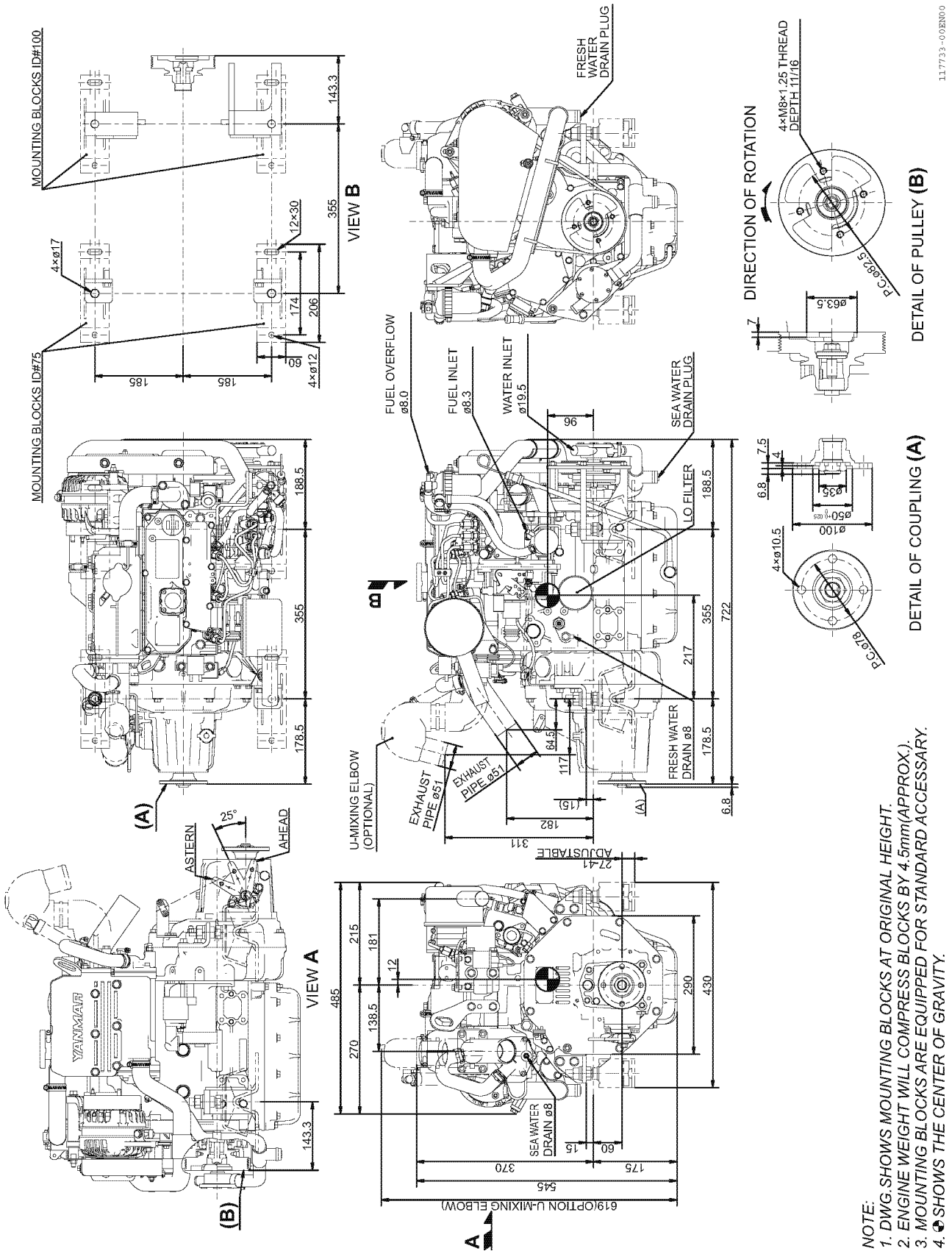


Figure 1

Alarm System Specifications

Parameter	Data
Coolant alarm switch operating temperature	ON: 106 ± 2 °C (222.8 ± 3.6 °F) Hysteresis ≤ 10 °C (≤ 18 °F)
Engine oil alarm switch - low oil pressure	49 ± 9.8 kPa (7.1 ± 1.4 psi)

Engine Outline with KM2P-1



NOTE:
1. DWG.SHOWS MOUNTING BLOCKS AT ORIGINAL HEIGHT.
2. ENGINE WEIGHT WILL COMPRESS BLOCKS BY 4.5mm(APPROX.).
3. MOUNTING BLOCKS ARE EQUIPPED FOR STANDARD ACCESSARY.
4. ◒ SHOWS THE CENTER OF GRAVITY.

Figure 2

Engine Outline with SD20/SD25

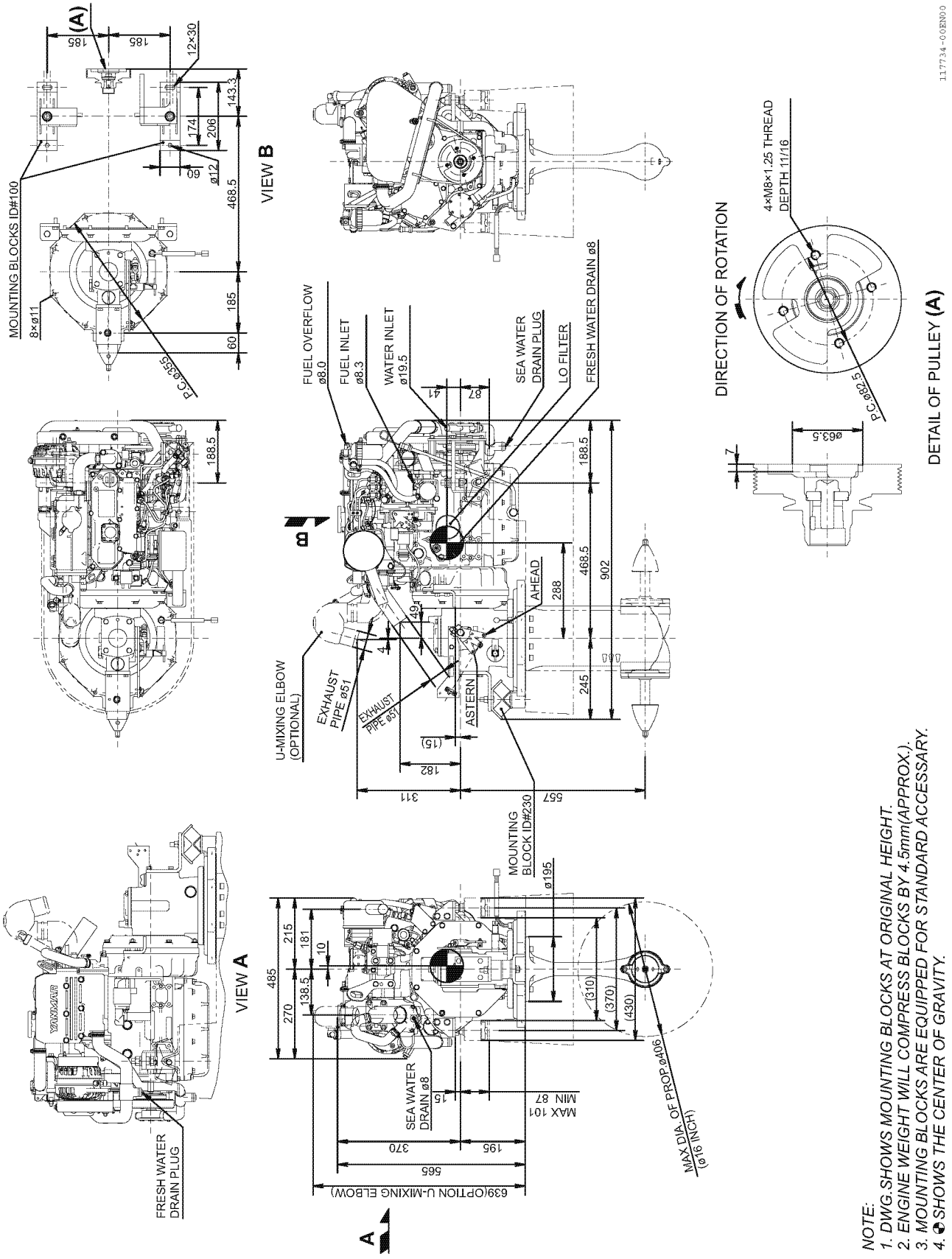


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Figure 3

Flywheel/Flywheel Housing Dimensions

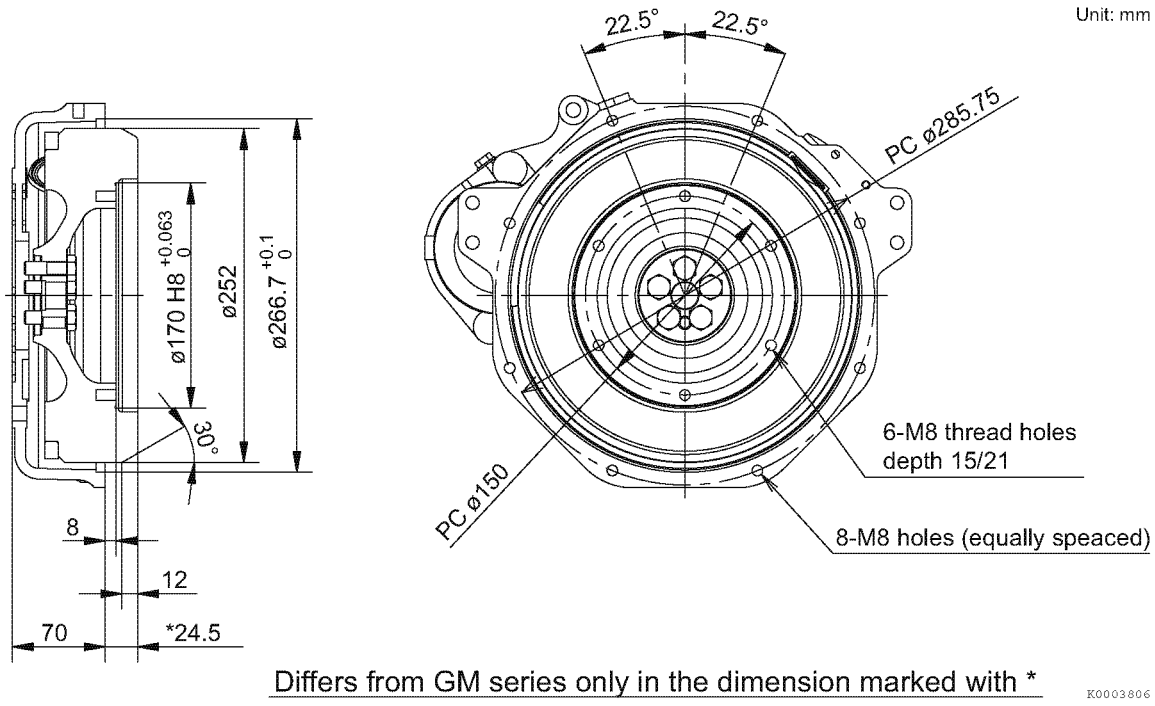


Figure 4

Piping Diagram

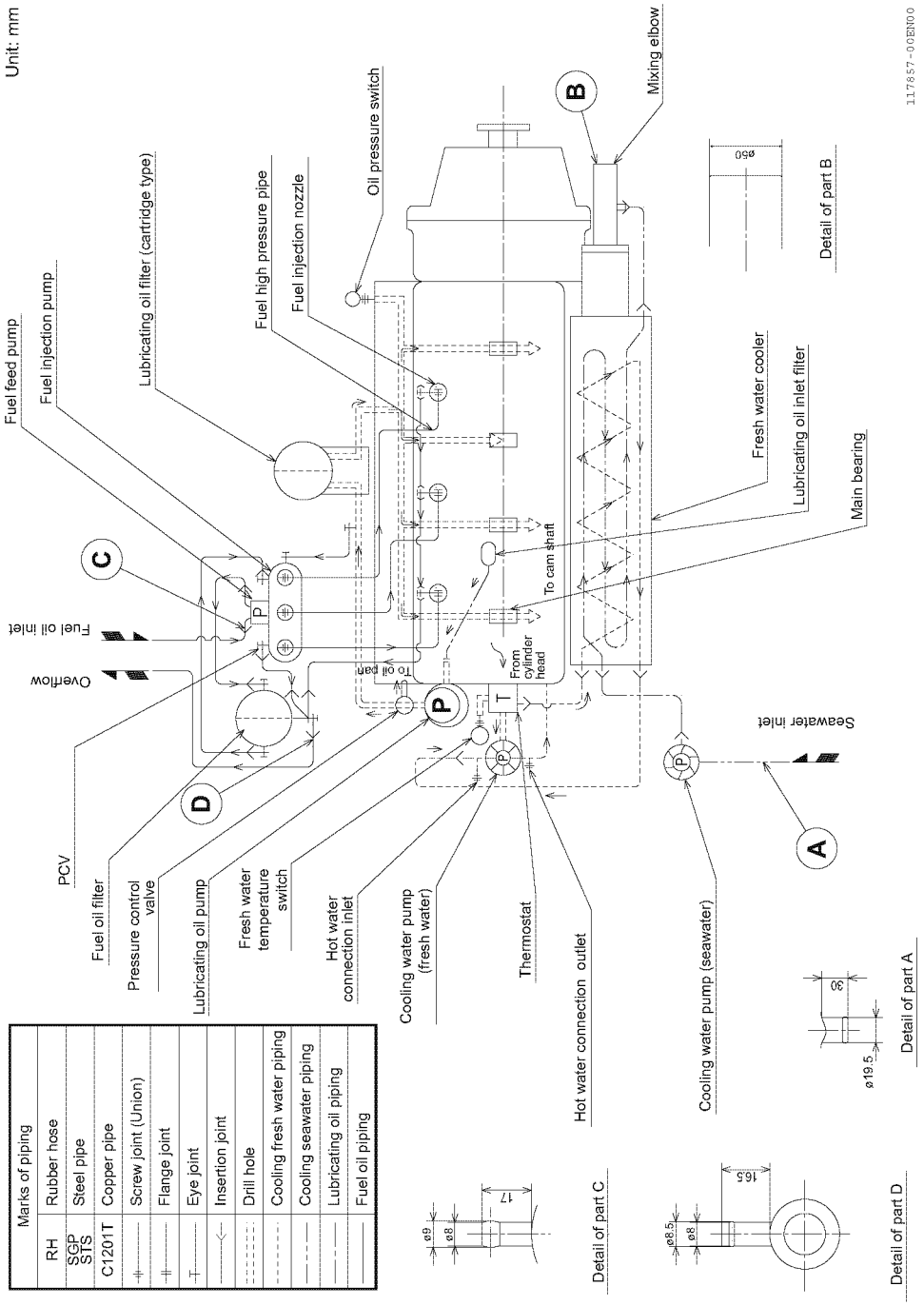


Figure 5

Electrical System

■ Starter specifications

Parameter	Data
Yanmar code	129608-77010
Starter model	S114-817A (Hitachi)
Voltage	12 V
Output	1.4 kW
Direction of rotation (viewed from pinion side)	Clockwise
Weight	3.0 kg (6.6 lb)
Rating	30 seconds
Number of pinion teeth	11

Parameter	Data
No-load terminal voltage	11 V
No-load maximum current	90A (maximum)
No-load rpm	2700 (minimum)
Loaded terminal voltage	8.4 V
Loaded maximum current	250 A
Loaded torque	8.3 N·m, 0.85 kgf-m (6.12 lbf-ft) minimum
Loaded rpm	1000 (minimum)

Performance curve for starter

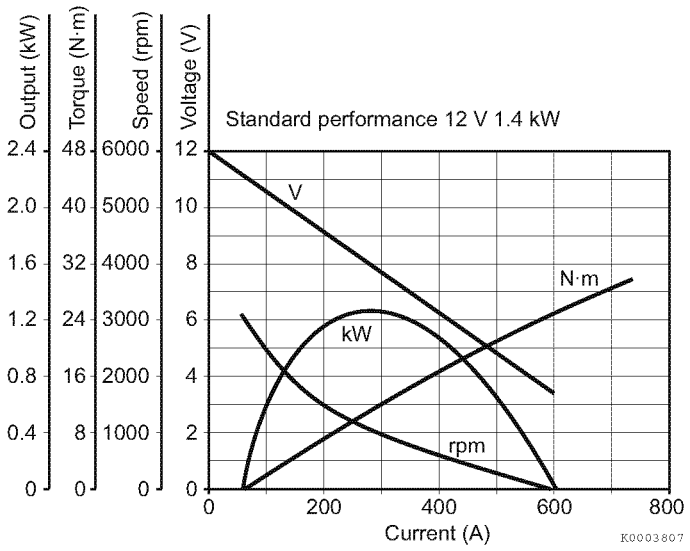
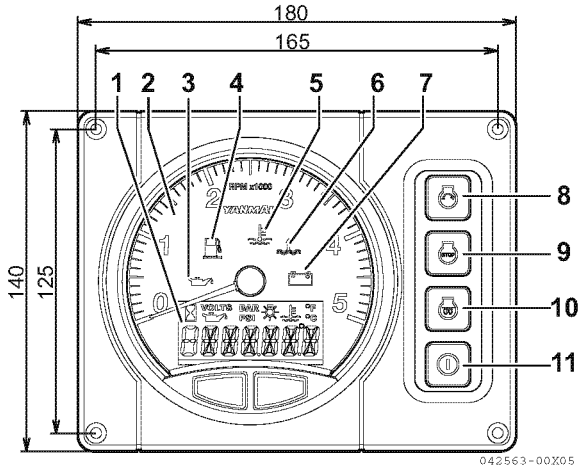


Figure 6

■ Panel

The 3YM30AE uses the B20 type panel.

B20 type



1 – LCD
2 – Tachometer
3 – Engine oil low pressure indicator and alarm
4 – This feature is not available on this engine
5 – Coolant high temperature indicator and alarm
6 – Water in sail drive seal indicator and alarm
7 – Battery low charge indicator
8 – Start switch
9 – Stop switch
10 – Glow switch
11 – Power switch

Figure 7

■ Alternator data

Parameter	Data
Yanmar code	128990-77250
Alternator model	SG10S078
Battery voltage	12 V
Nominal output	125 A (at 6000 min^{-1}, 13.5 V)
Earth polarity	Negative earth
Direction of rotation	Clockwise
Operating speed	1500 - 18000 min^{-1}
Voltage regulation at 20 °C	14.55 ± 0.15 V
Pulley diameter, Crank/Alternator	140 mm/64.8 mm

Performance curve for 125 A alternator

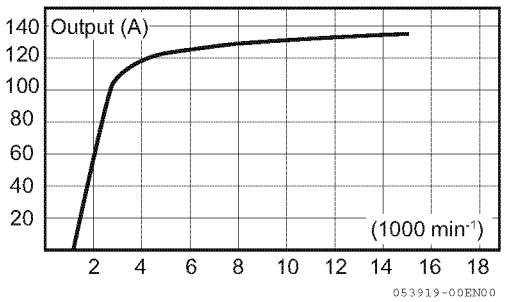


Figure 8

■ Wiring Diagrams

Panel: B20 type (Medallion)

Engine models: 2YM15/3YM20/3YM30AE

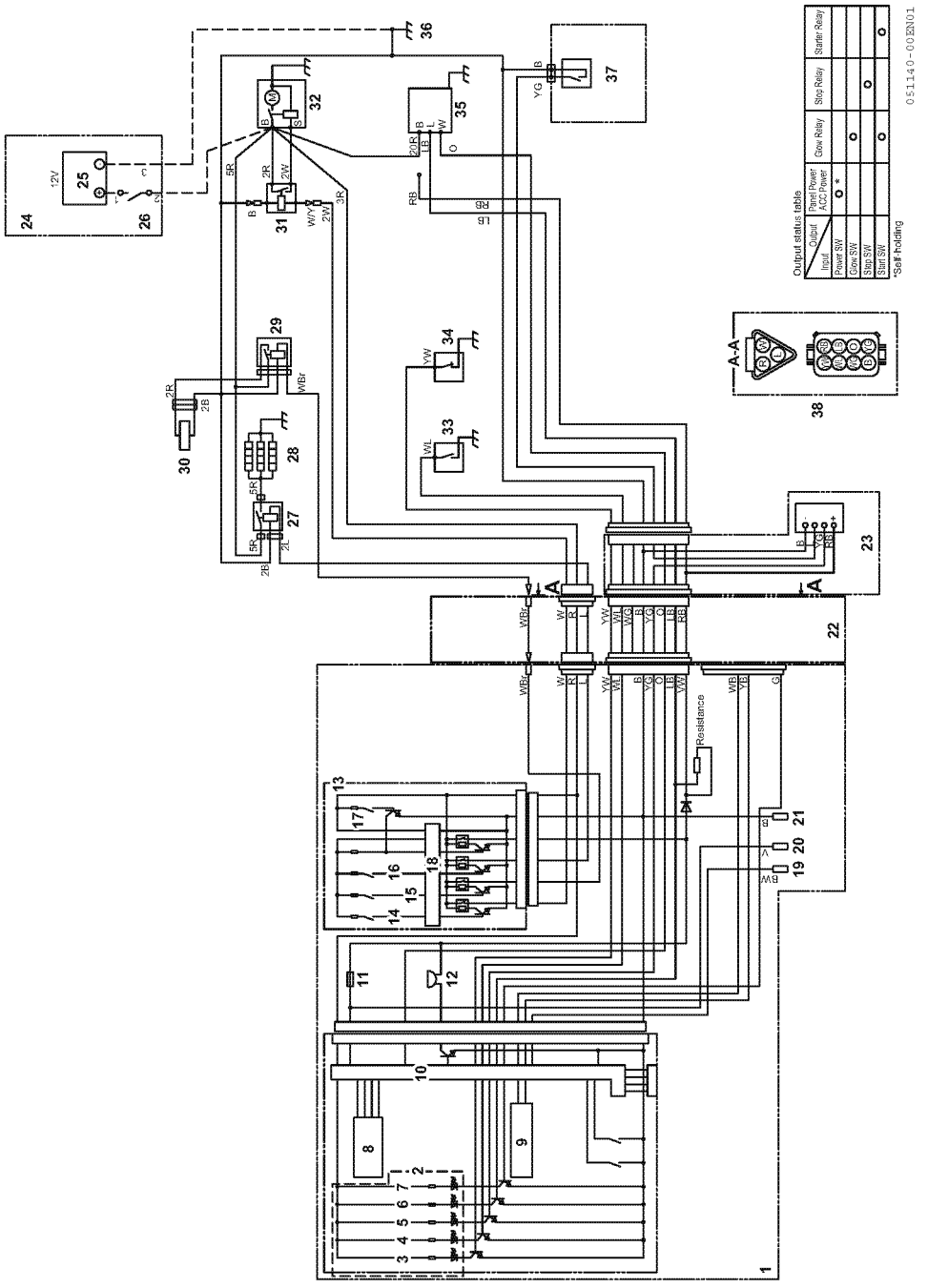


Figure 9

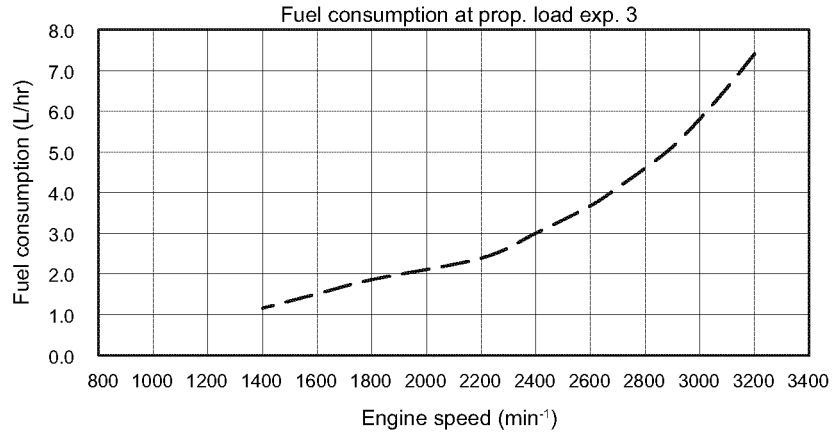
Color coding	
R	Red
B	Black
W	White
L	Blue
RB	Red/Black
LB	Blue/Black
YW	Yellow/White
YG	Yellow/Green
WL	White/Blue
V	Purple
BW	Blue/White
O	Orange
WBr	White/Brown

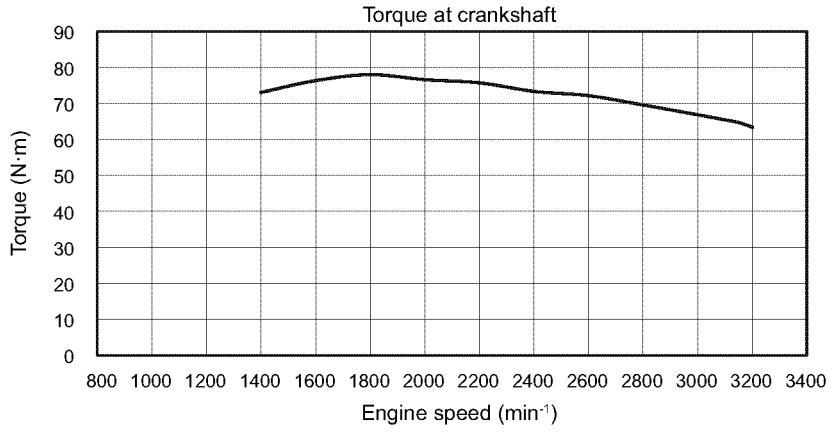
Allowable length by cross sectional area of battery cable	
Section of cable mm^2 ($in.^2$)	**Allowable length L = 1 + 2 + 3 m (ft)**
15 (0.023)	< 0.86 (0.26)
20 (0.031)	< 1.3 (0.40)
30 (0.046)	< 2.3 (0.70)
40 (0.062)	< 2.8 (0.85)
50 (0.077)	< 3.5 (1.07)
60 (0.093)	< 4.1 (1.25)

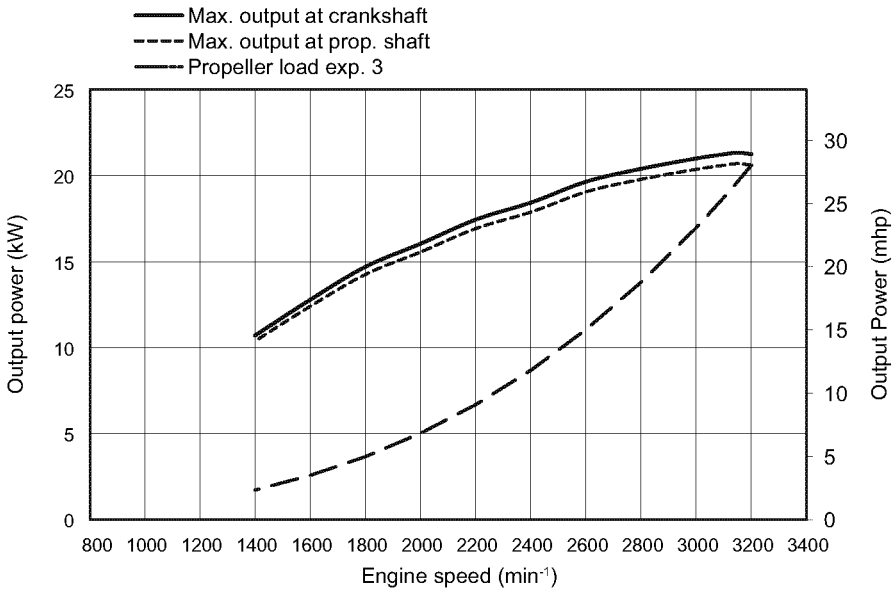
1 – Instrument panel B20
2 – Alarm lamps (3 to 7)
3 – Engine oil low pressure indicator
4 – Coolant high temperature Indicator
5 – Water in sail drive seal indicator
6 – Battery low charge indicator
7 – Water in fuel filter indicator
8 – Tachometer
9 – Segmented display
10 – Control unit (tacho gauge)
11 – Fuse 3 A
12 – Buzzer
13 – Switch module (14 to 18)
14 – Start switch
15 – Stop switch
16 – Glow switch
17 – Power switch
18 – Control unit (switch module)
19 – Fuel tank level sensor input
20 – ACC power
21 – ACC GND
22 – Wire harness
23 – Water in sail drive seal sensor amplifier (sail drive only)
24 – Procured by customer
25 – Battery
26 – Battery switch
27 – Relay (glow plug)
28 – Glow plug
29 – Stop relay
30 – Engine stop solenoid
31 – Starter relay
32 – Starter
33 – Coolant temperature switch
34 – Engine oil pressure switch
35 – Alternator
36 – Ground
37 – Water in sail drive seal sensor (sail drive only)
38 – Details of coupler (wire harness, view from A-A)

Performance Curves

■ 3YM30AE







Note: • Rating Condition: ISO 8665
• Fuel condition: Density at 15 °C = 0.835 to 0.845 g/cm³
• Fuel oil temperature : 40 °C at fuel injection pump inlet

060728-00EN00

Figure 10

Controls

The 3YM30AE uses a mechanical linkage to control engine speed and marine gear shifting. Electric stop solenoid is applied for engine stop.

■ Engine speed control (YPES-ML fuel injection pump

Recommended remote control cable

Parameter	Data
Cable stroke	76.2 mm (3.0 in.)
Cable connector thread size	M5 × P0.8

■ Mechanical controls (KM2P-1)

Recommended remote control cable

Parameter	Data
Shift cable stroke	76.2 mm (3.0 in.)
Cable connector thread size	10-32 UNF (See **Figure 11**)

Shifting lever force (reference value)		
Shifting direction	**Shift lever position at 56 mm (2.2 in.)**	**Remote control handle position at 170 mm (cable length - 4 m (157.5 in.))**
Engaging force at engine 1000 min^{-1}	29.4 - 39.2 N, 3 - 4 kgf (6.6 - 8.8 lbf)	39.2 - 49.0 N, 4 - 5 kgf (8.8 - 11.0 lbf)
Disengaging force at engine 1000 min^{-1}	34.3 - 49.0 N, 3.5 - 5 kgf (7.7 - 11.0 lbf)	39.2 - 58.8 N, 4 - 6 kgf (11.0 - 13.2 lbf)
Disengaging force at engine 1000 min^{-1} (KM2P-1 only)	39.2 - 49.0 N, 4 - 5 kgf (8.8 - 11.0 lbf)	49.0 - 58.8 N, 5 - 6 kgf (11 - 13.2 lbf)

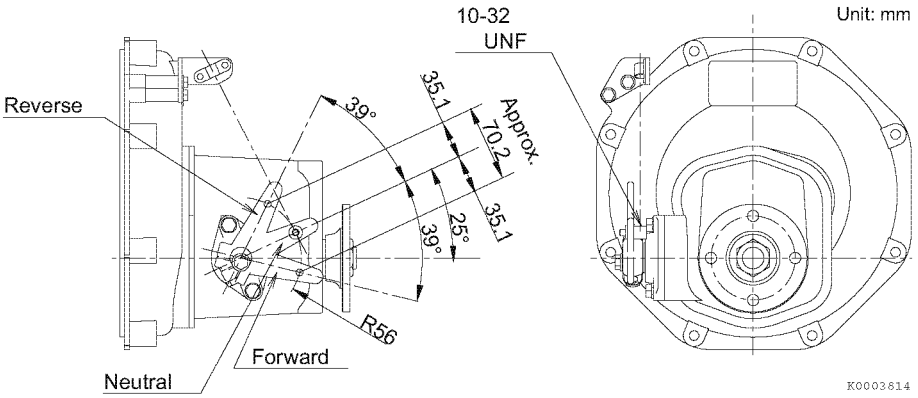


Figure 11

■ Mechanical controls (SD20/SD25)

Parameter	Data
Shift cable stroke	76.2 mm (3.0 in.)
Cable connector thread size	10-32 UNF

Shifting lever force (reference value)	
Shifting direction	**Shift lever length 70 mm (2.75 in.)**
Engaging force at engine 850 min^{-1}	19.6 - 29.4 N, 2 - 3 kgf (4.4 - 6.6 lbf)
Disengaging force at engine 850 min^{-1}	29.4 - 39.2 N, 3 - 4 kgf (6.6 - 8.8 lbf)

For serial number 2128 and before

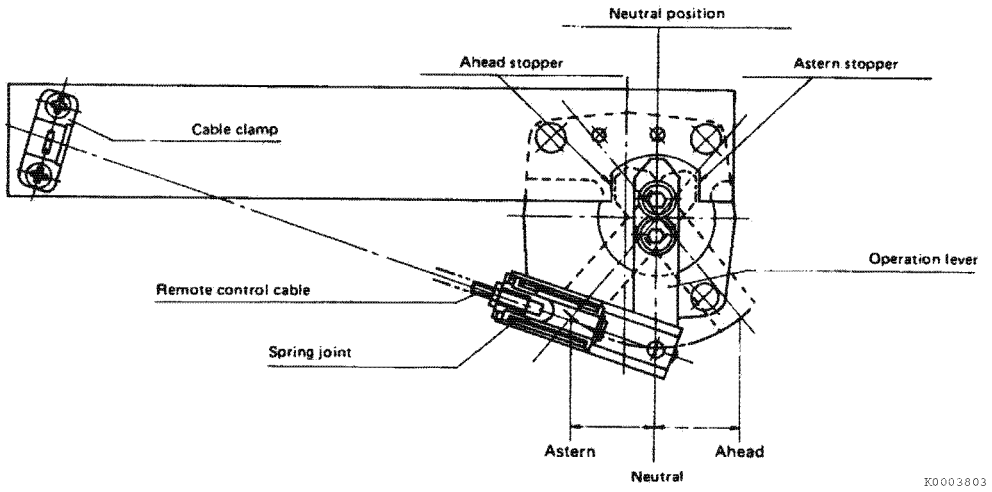


Figure 12

For serial number 2129 and after

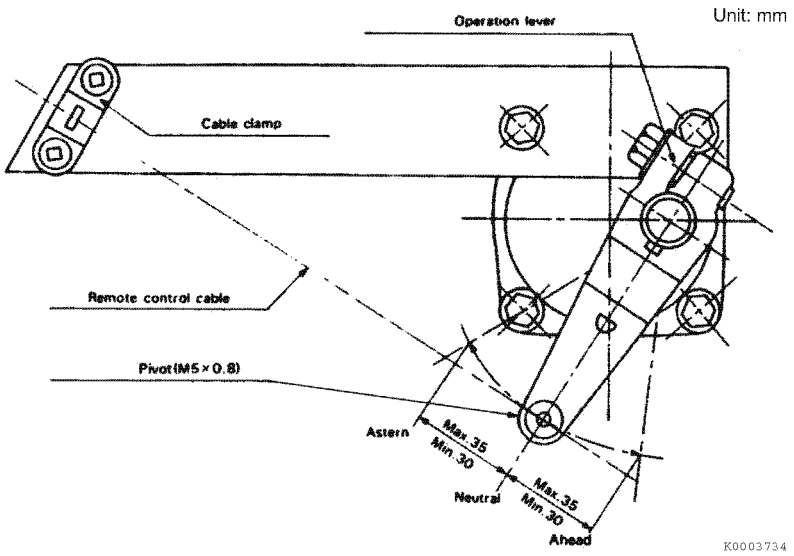


Figure 13

Power Take-Off

The 3YM30AE engine has front power take-off (PTO) capabilities.

Operating Condition:

1. A type shows an example with an overhang distance (L) of 30 mm (1.182 in.). When the overhang distance differs in value, calculate the capacity with the following formula. (Limit of distance is 50 mm (1.97 in.))

$$\text{Allowable take-off output} = \frac{140\ \text{mm}}{L + 110\ \text{mm}} \times \text{kW}$$

L: Overhang distance (mm)
kW: Permissible output

■ PTO Permissible Output Curve

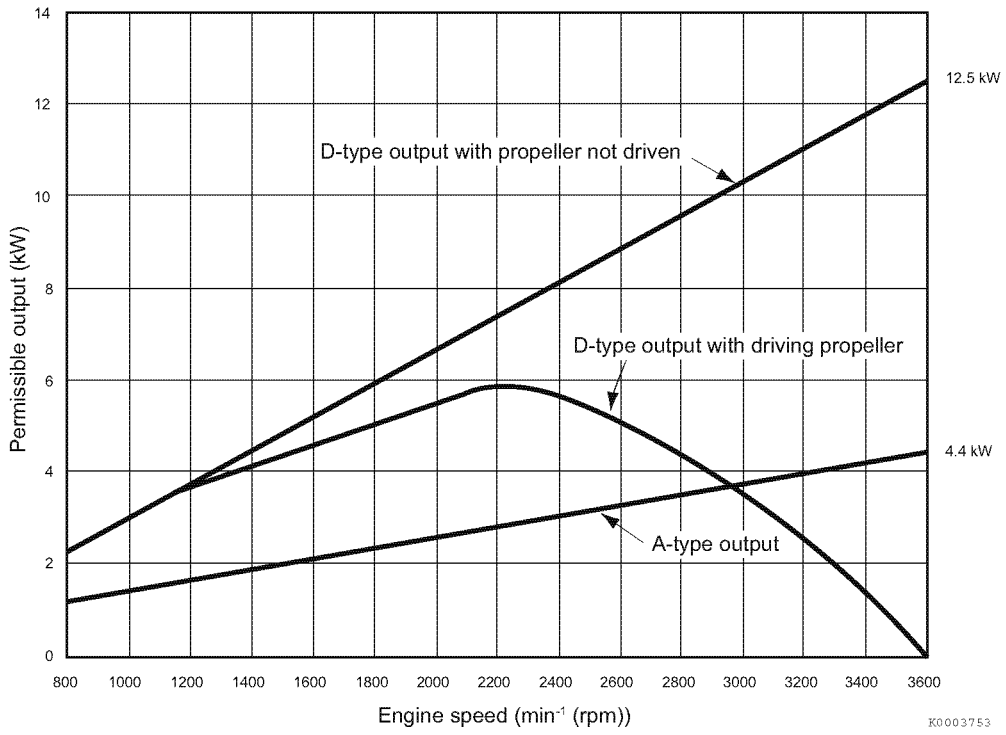


Figure 14

Engine Mount Specifications

■ Engine mounts (with KM2P-1)

Parameter	Data
Position of mount ( ) flexible mount ID	(A), (B), (C), (D) 100, 100, 75, 75 (See **Figure 15**)
Type of flexible mount	Fixed-1
Flexible mount ID and quantity	ID 75 × 2 ID 100 × 2 (See **Figure 16**)

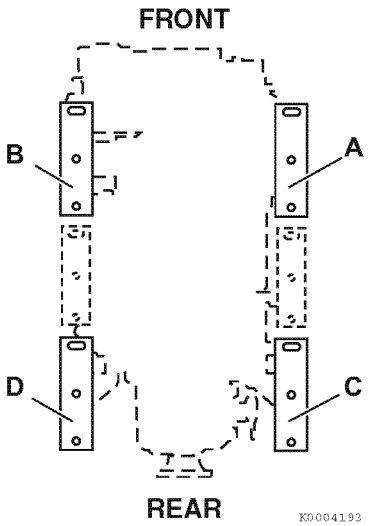
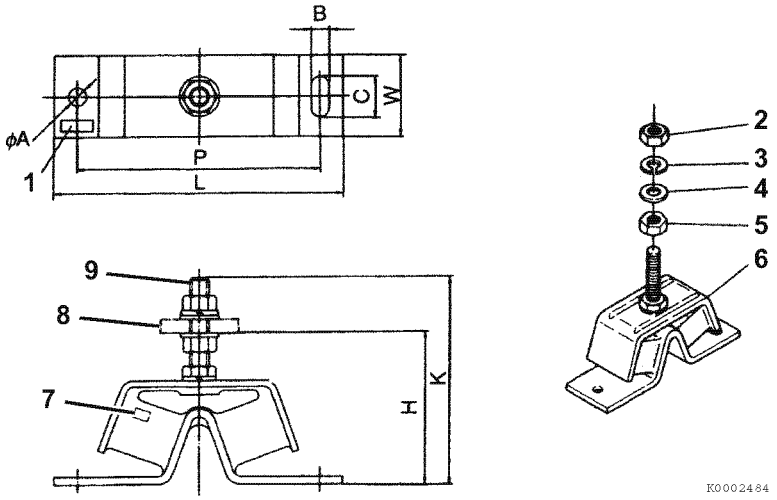


Figure 15

■ Fixed-1 Type Engine Mount



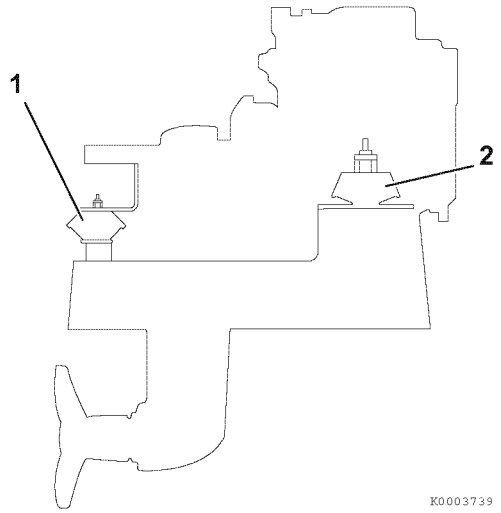
1 – ID mark (only ID 300)
2 – Lock nut
3 – Spring washer
4 – Flat washer
5 – Jack nut
6 – Rubber mount
7 – ID mark
8 – Engine foot
9 – T (Thread diameter)

Figure 16

ID	H		K	L	P	W	Diameter A	B	C	T Thread diameter
	Min	Max								
75	100 mm 3.94 in.	110 mm 4.33 in.	145 mm 5.71 in.	206 mm 8.12 in.	174 mm 6.86 in.	60 mm 2.27 in.	12 mm 0.48 in.	12 mm 0.48 in.	30 mm 1.19 in.	M16 × P1.5
100	100 mm 3.94 in.	110 mm 4.33 in.	145 mm 5.71 in.	206 mm 8.12 in.	174 mm 6.86 in.	60 mm 2.27 in.	12 mm 0.48 in.	12 mm 0.48 in.	30 mm 1.19 in.	M16 × P1.5

■ Engine mounts (with SD20/SD25)

Parameter	Data
Position of Mount ( ) Flexible Mount ID	(A) (B) 230, 100 (See **Figure 17**)
Flexible mount ID and quantity	ID 230 × 1 ID 100 × 2 (See **Figure 17**)



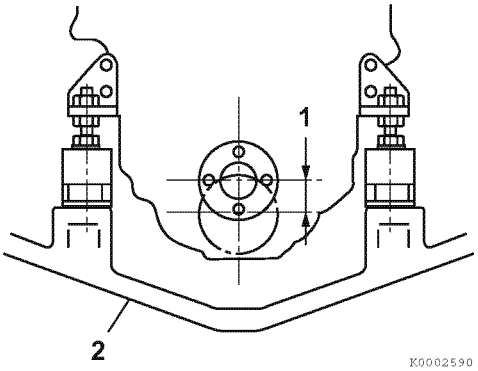
1 – Sail drive side flexible mount (A)
2 – Engine side flexible mount (B)

Figure 17

Note: The shape of flexible mount (A) is different than (B). Flexible mount (A) is packed with SD20/SD25.

Flexible Mount Distortion

Parameter	Data
Static distortion	4.5 mm (0.177 in.) approximate



1 – Static distortion
2 – Viewed from stern

Figure 18

Note •Engine weight will compress mounting blocks by the static distortion value.

•Engine outline drawing shows mounting blocks at original height.

Cold Starting Aids

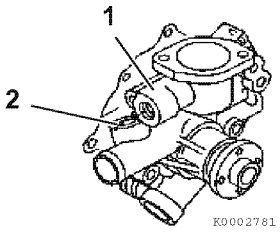
The YM series engine is available with an glow plug.

Air Venting

The 3YM30AE uses either a KM2P-1 marine gear or a SD20/SD25 sail drive, no venting device is needed.

Water Heater Tank Connection

The 3YM30AE engine supports water heating tank connections for onboard head and galley operation.



1 – Water to tank
2 – Water from tank

Figure 19

Optional Accessories

The following is a list of the 3YM30AE optional accessories.

Optional accessories equipped on engine at shipping.

- L type, water mixing elbow
- U type, water mixing elbow
- Hot water connector kit with cocks

Optional accessories packed with engine at shipping.

- B20 type panel
- Extension wire harness (4, 6 m)
- Second station harness
- Propeller cone nut kit for SD20/SD25

Parts should be ordered from the service parts dept.

- Extension wire harness (10 m)
- Battery switch (BS500)
- Side-mount single control head (MORSE: MN)
- Top-mount single control head (MORSE: MT3)
- Push-pull control cable (MORSE: 33C) (RC4, RC7)

Estimated Propeller Size (Reference Only)

Engine model: 3YM30AE with KM2P-1
Propeller matching point: Crankshaft power 21.3 kW/3200 min^{-1}

Engine model	Reduction ratio			i = 2.21	i = 2.62
	Boat speed (knots)		Unit	Dia. × Pitch	Dia. × Pitch
3YM30AE 21.3 kW/3200 min^{-1}	Two blade A.R.: 0.23	7	mm	460 × 250	500 × 300
			inch	18.1 × 9.8	19.7 × 11.8
		8	mm	450 × 270	500 × 310
			inch	17.7 × 10.6	19.7 × 12.2
		9	mm	440 × 290	490 × 330
			inch	17.3 × 11.4	19.3 × 13.0
		10	mm	440 × 300	480 × 350
			inch	17.3 × 11.8	18.9 × 13.8
		11	mm	430 × 320	470 × 370
			inch	16.9 × 12.6	18.5 × 14.6
		12	mm	430 × 330	470 × 380
			inch	16.9 × 13.0	18.5 × 15.0
Moment of inertia: GD^2			kg-m^2	≤ 0.19	≤ 0.24
Max. dia. at A.R. = 0.23			inch	≤ 20	≤ 21
3YM30AE 21.3 kW/3200 min^{-1}	Three blade A.R.: 0.36 - 0.41	7	mm	440 × 240	–
			inch	17.3 × 9.4	
		8	mm	430 × 260	470 × 300
			inch	16.9 × 10.2	18.5 × 11.8
		9	mm	420 × 280	460 × 320
			inch	16.5 × 11	18.1 × 12.6
		10	mm	420 × 290	460 × 340
			inch	16.5 × 11.4	18.1 × 13.4
		11	mm	410 × 310	450 × 360
			inch	16.1 × 12.2	17.7 × 14.2
		12	mm	410 × 330	450 × 370
			inch	16.1 × 13.0	17.7 × 14.6
Moment of inertia: GD^2			kg-m^2	≤ 0.19	≤ 0.24
Max. dia. at A.R. = 0.43			inch	≤ 18	≤ 18.5
Max. dia. at A.R. = 0.52			inch	≤ 17	≤ 17.5
Recommended prop. shaft dia. (JIS SUS304)			mm	≥ 25	≥ 28
Recommended prop. shaft dia. (JIS SUS630)			mm	≥ 20	≥ 22

Note: A.R. = Expanded Area Ratio.

1. *Propellers should not exceed the moment of inertia (DG^2) described above.*
2. *Maximum diameter is calculated based on each propeller's A.R. and is shown as a reference value.*
3. *This table is for reference only. It is not a guarantee.*
4. *Recommended propeller shaft diameter is calculated at 3200 min^{-1}.*

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