

4BY2

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4BY2

Please refer to the Safety section at the beginning of this manual.

Engine Specifications

Parameter	Data	
	4BY2-150	4BY2-180
Configuration	4-cycle Diesel, 15° Inclined, Dual Overhead Camshaft	
Crankshaft Rotation (Viewed from Flywheel)	Counterclockwise	
Combustion System	Direct Injection	
Aspiration	Turbocharger with Charge Air Cooler	
Number of Cylinders	In-line 4	
Bore x Stroke	84 mm x 90 mm (3.307 in. x 3.543 in.)	
Displacement	1.995 L (121.7 cu in.)	
Continuous Rating Output at Crankshaft (at 3600 rpm)	88 kW (120 hp)	102 kW (137 hp)
Maximum Output at Crankshaft (at 4000 rpm)	110 kW (150 hp)	132 kW (180 hp)
Piston Speed (Continuous Rating Output)	11 m/sec (36.1 ft/sec)	10.8 m/sec (35.4 ft/sec)
Piston Speed (Maximum Output)	12.0 m/sec (39.4 ft/sec)	
Brake Mean Effective Pressure (Maximum Output)	1.66 MPa (240.66 psi)	1.95 MPa (287.2 psi)
Maximum Torque	320 N·m (236ft·lb)	360 N·m (265 ft·lb)
High Idling Speed	4600 rpm	

Parameter	Data	
	4BY2-150	4BY2-180
Low Idling Speed (at 88°C [190°F])	750 rpm*	
Firing Order	1 - 3 - 4 - 2 - 1**	
Engine Lubrication System	Enclosed, Forced	
Engine Oil Capacity (0° incline)	8,0 L (8.45 qt)***	
Dry Weight (without Gear/Drive or Mixing Elbow)	For Stern-Drive: 273.5 kg For Marine Gear: 262.5 kgs	
Total Air Flow Requirements	1850 m ³ /h (65332 ft ³ /h)	

* 1080 rpm at startup for alternator excitation.

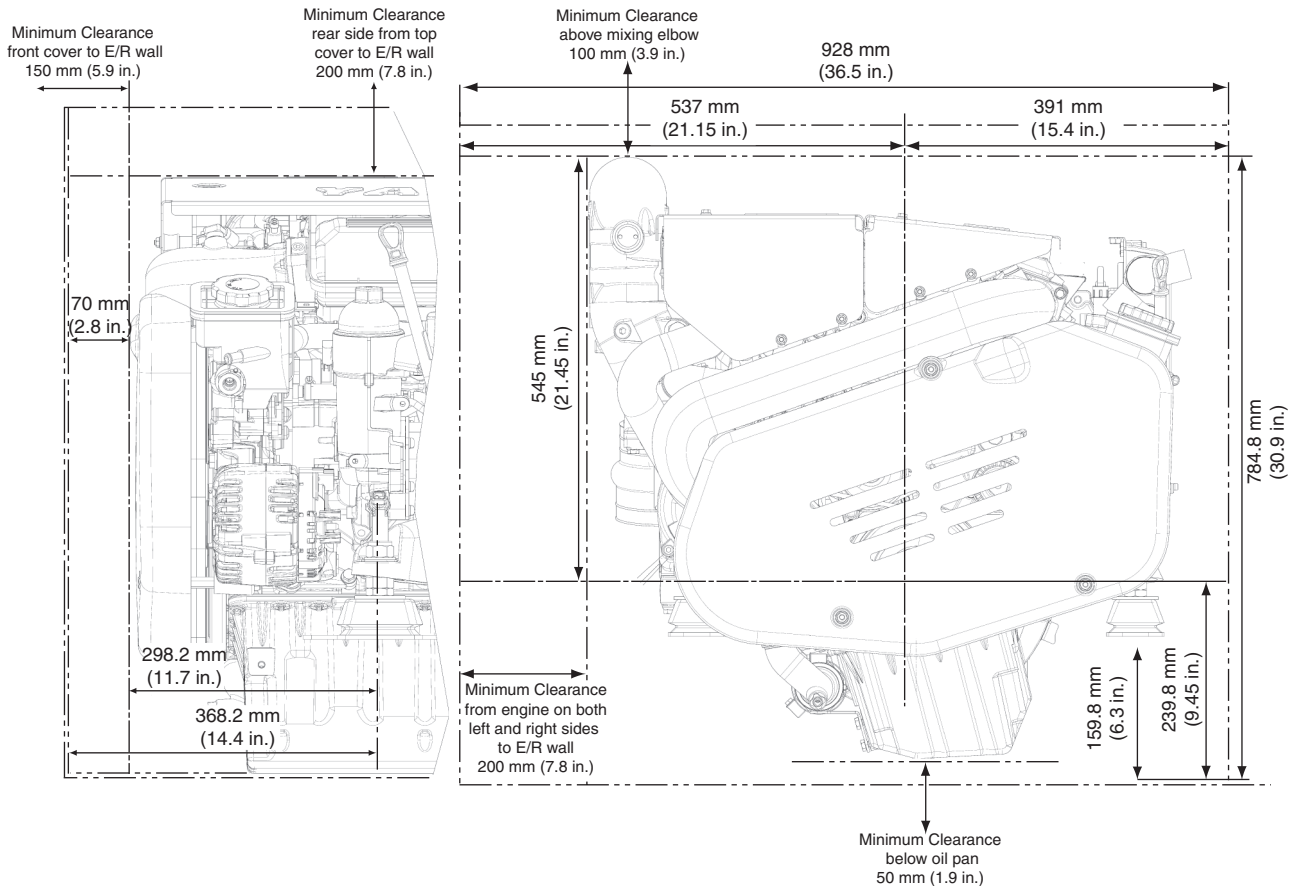
** No. 1 cylinder is at the coolant pump end of the engine.

*** The engine oil capacity includes oil in the oil pan, channels, coolers, and filter.

Note: Rating condition, ISO 8665
Fuel temperature: 40°C (104°F)

1 hp metric = 0.7355 kW

Engine Room Space for Safety, Service and Correct Operation



0006581

Figure - 1

The installer is responsible for ensuring that there is sufficient engine room space to access the engine for service and repair.

Superstructures and connected components should be installed so that the engine can be removed, fitted and serviced without time being lost to any obstructions.

The following components must be easy to access:

- Fuel filter(s)
- Fuel system components for bleeding the fuel system
- Air filter
- Engine oil filter(s)
- Oil fill port and dipstick
- Engine oil drain plug
- Marine Gear or Sail-Drive oil fill port / dipstick
- Coolant tank fill port
- Coolant drain cock(s)
- Coolant pump
- Heat exchanger
- Complete seawater pump assembly (to access impeller and filter)
- Zinc anodes
- Batteries
- Starter motor
- Alternator
- Turbocharger

Marine Gear / Stern-Drive Specifications

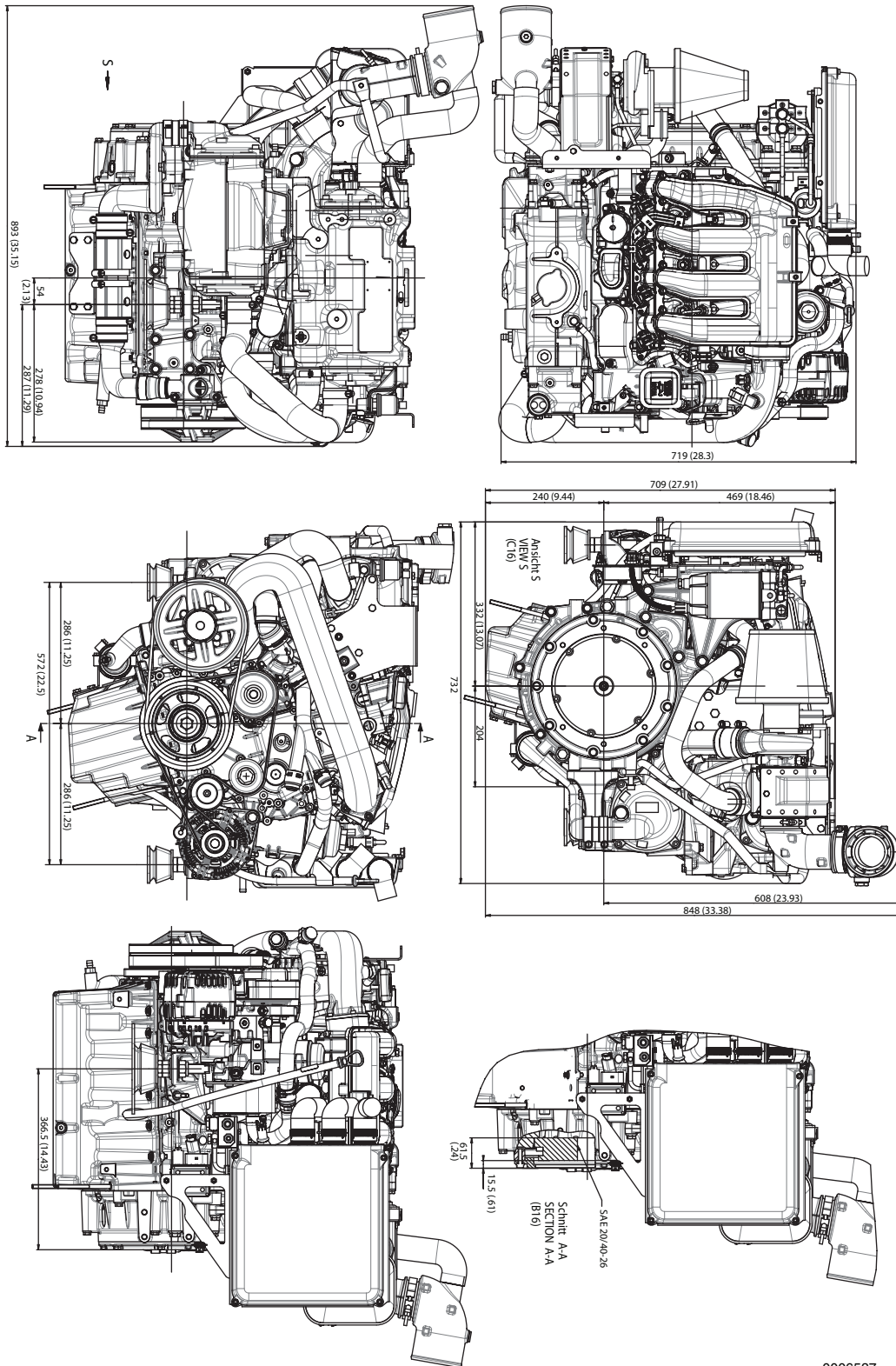
Use the KMH40 or KMH50 marine gear or ZT350 or Mercruiser Bravo 1, 2 or 3 stern-drive with the 4BY2 series engine.

WARNING! Fire Hazards.

- *ZT350 and Bravo stern-drive power steering hoses must be routed away from hot engine components.*
- *Ensure the heat insulator is installed on the turbocharger.*

Note: See the marine gear / stern-drive manufacturer's literature for additional information.

4BY2 (Inboard)

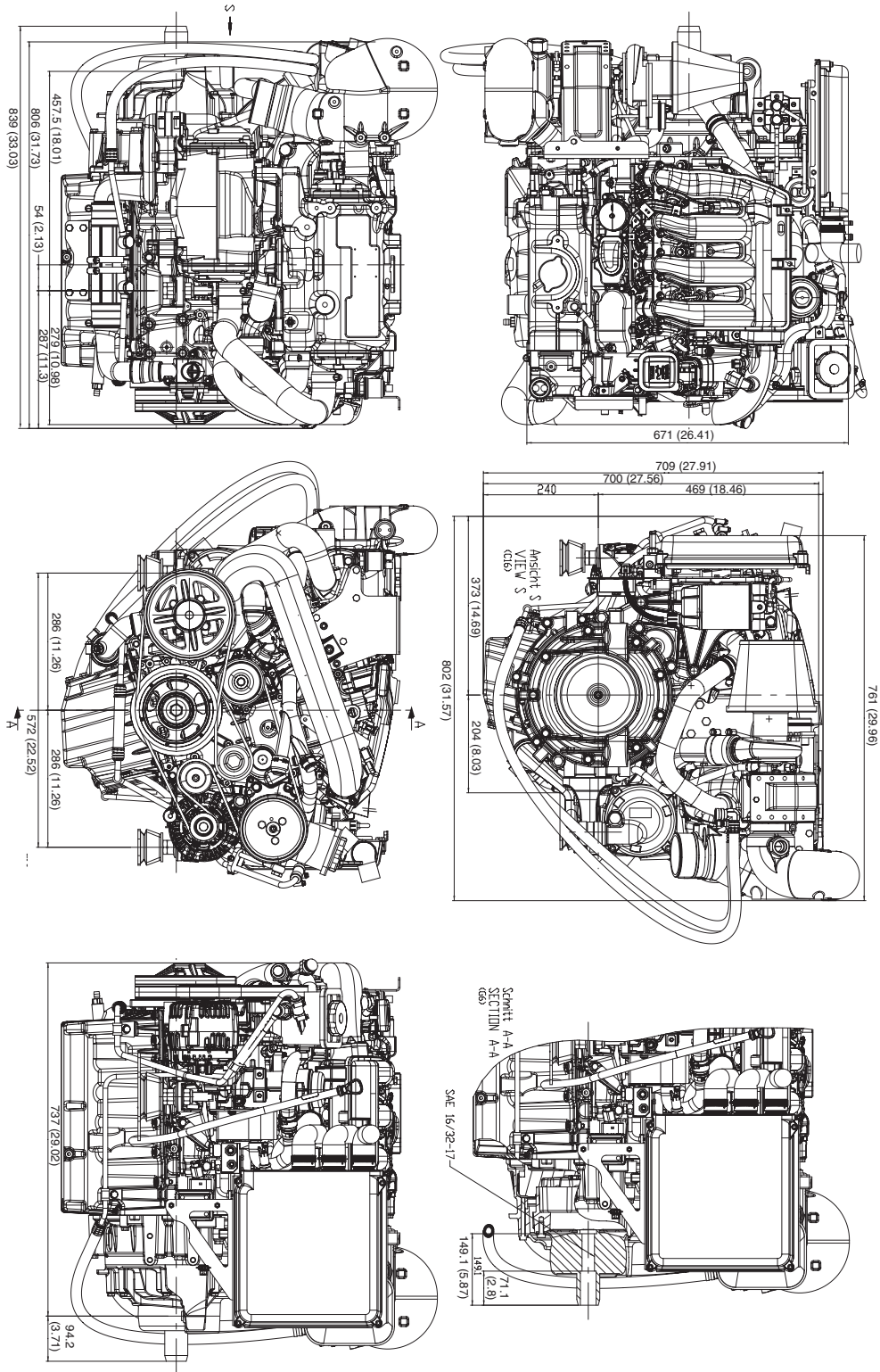


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Unit: mm (in.)

Figure - 2

4BY2 (Stern-Drive)

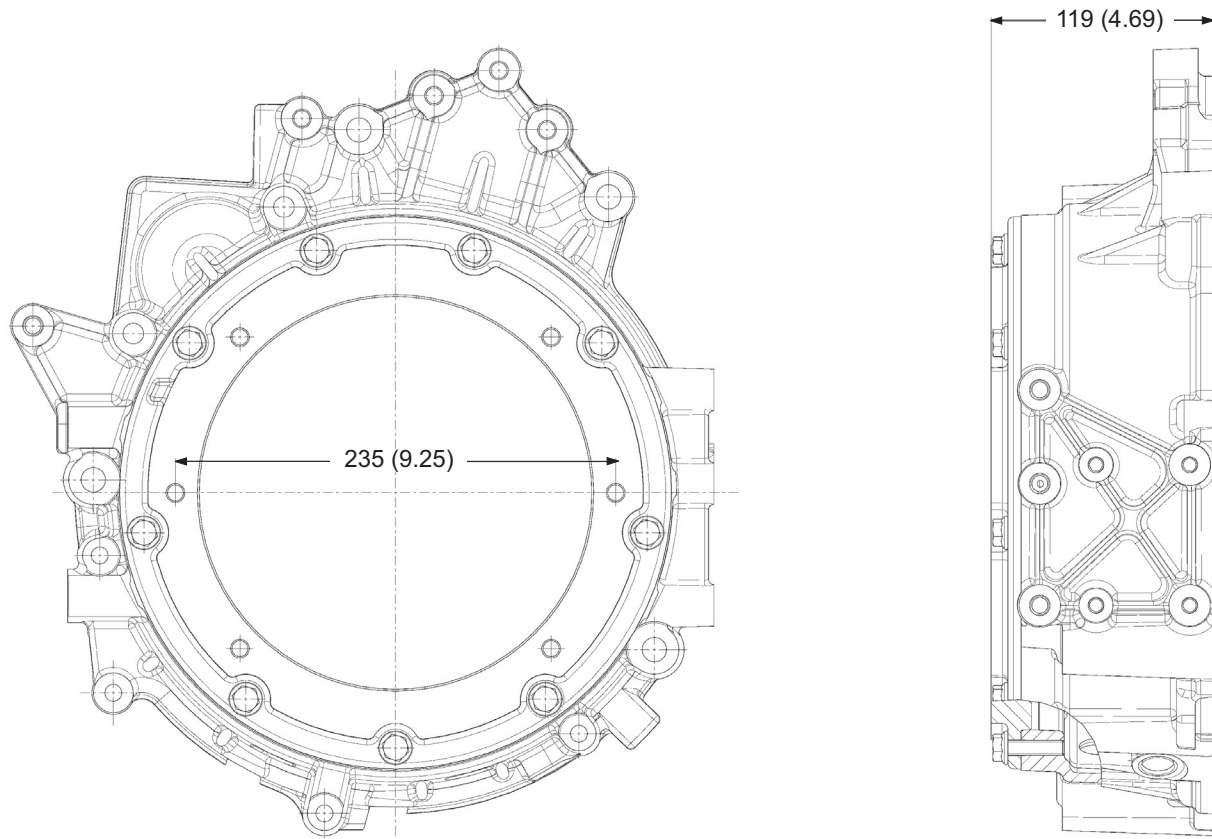


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Unit: mm (in.)

Figure - 3

Flywheel Housing Dimensions (For Inboard)

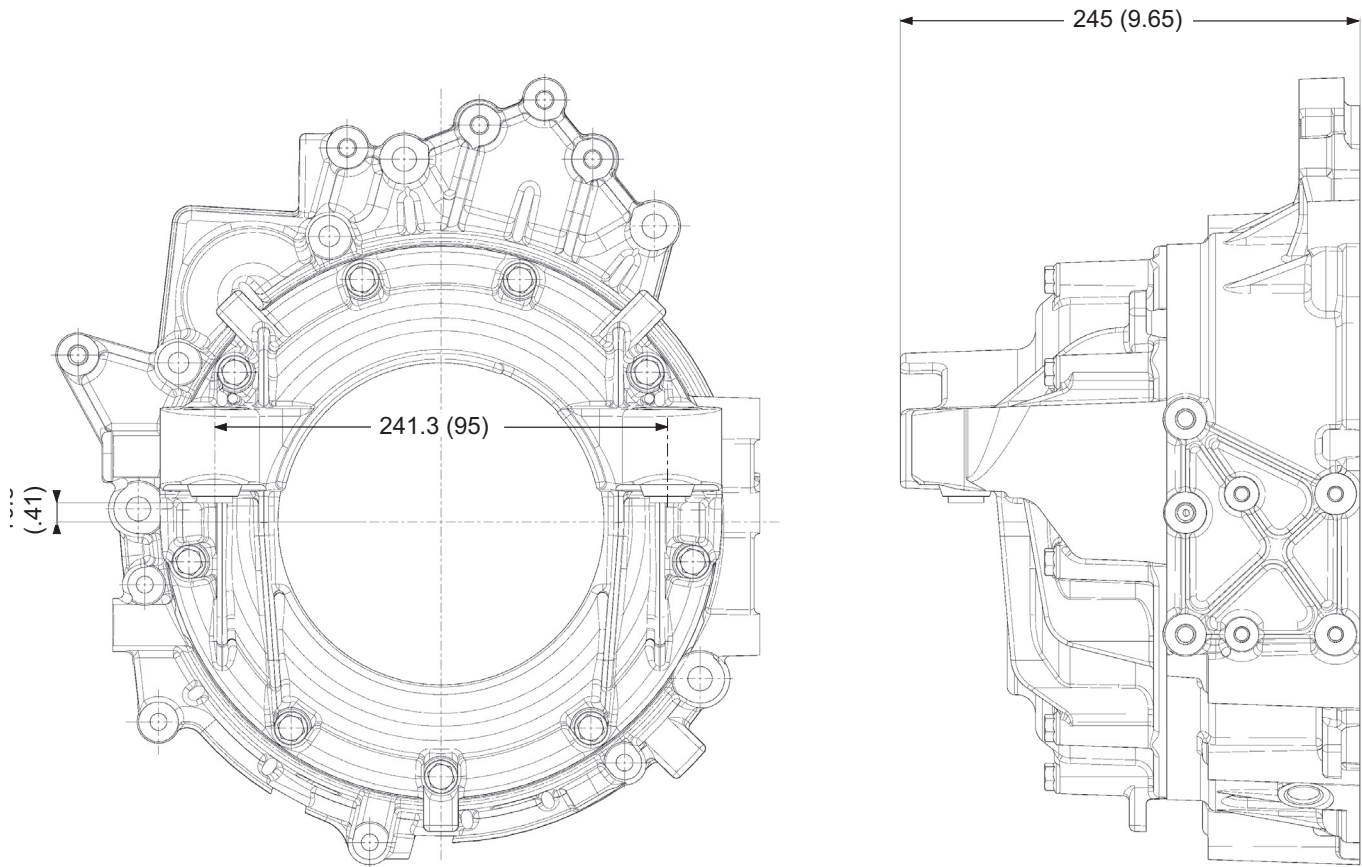


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Figure - 4

Unit: mm (in.)

Flywheel Housing Dimensions (For Stern-Drive)



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Figure - 5

Unit: mm (in.)

Fuel System Specifications

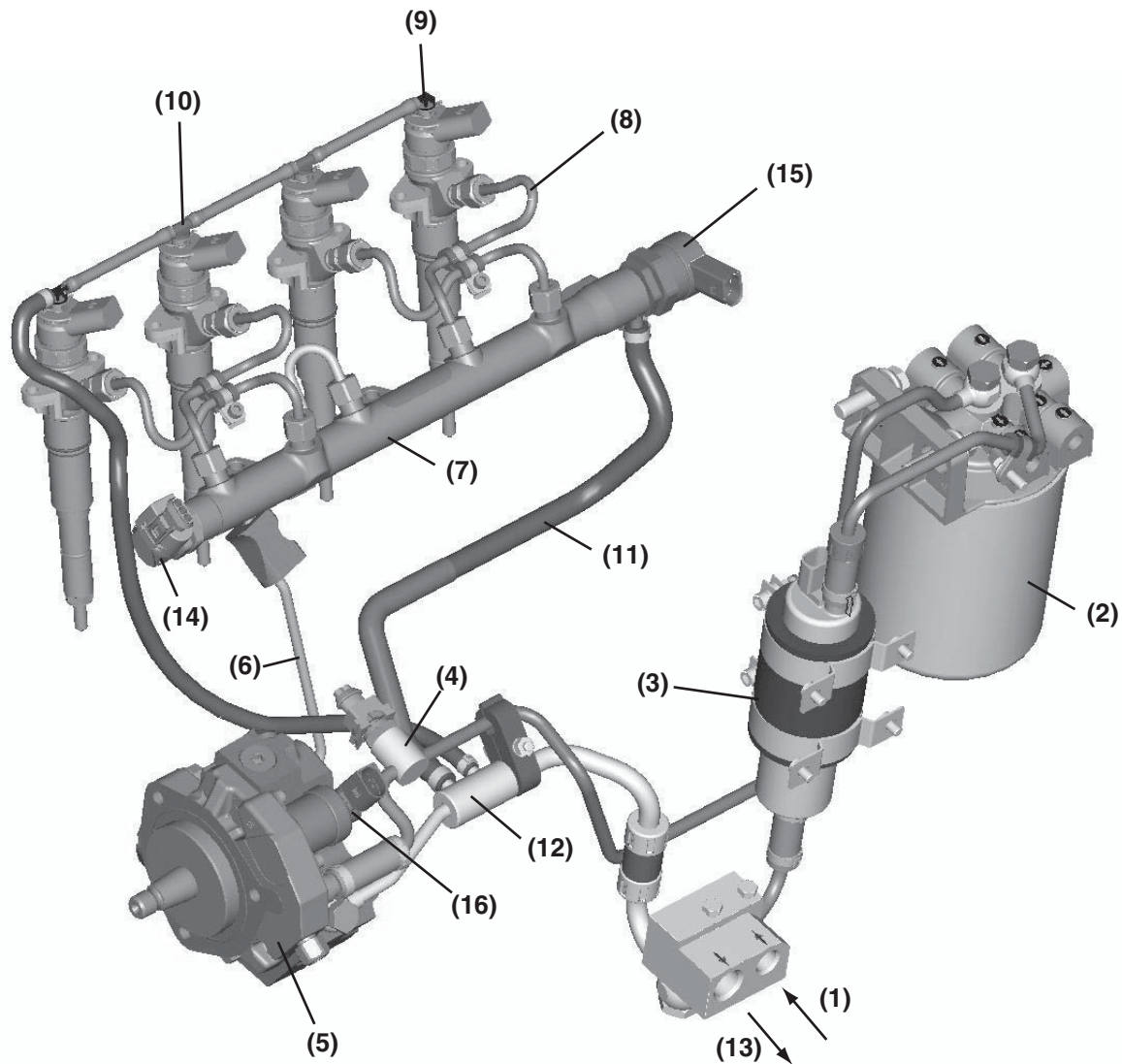
Parameter	Data	
	4BY2-150	4BY2-180
Maximum Fuel Feed Pump Suction Head	1.0 m (39.37 in.)	
Maximum Fuel Feed Pump Discharge Volume	160.0 L/hr minimum (42.3 gal/hr minimum)	
Maximum Fuel Feed Pump Discharge Pressure	5 bar (72.5 psi)	
Fuel Inlet Pipe Connector Thread	3/8 NPT	
Maximum Fuel Inlet Temperature	70°C (158°F)	
Fuel Consumption at Rated Output	30.0 L/hr (7.9 gal/hr)	36.2 L/hr (9.6 gal/hr)
Fuel Line (minimum size)	Hose acc. DIN ISO 7840 A1 (fire resistance hose) is requested. Max length of hose between prefilter and engine depends on suction height of complete suction line.	
Inner diameter for inlet	8 mm (0.32 in.)	
Inner diameter for outlet	12 mm (0.47 in.)	

Note: Yanmar supplies a water separating pre-filter for mounting by the installer. The engine is also equipped with an on-engine fine filter.

WARNING! Fire Hazard. Always route fuel lines away from hot engine components, such as the exhaust manifold, turbocharger and exhaust hoses. Fuel lines must be secured to the hull with approved clamps every 100 cm (4.3 in.).

Piping Diagram

Fuel Flow



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- | | |
|-----------------------------------|---|
| 1. Fuel Inlet from Tank | 10. Fuel Injector Return Hose |
| 2. Fuel Filter (10 micron) | 11. Common Rail Return Line |
| 3. Fuel Feed Pump | 12. Return Fuel Tee with Back Pressure Valve |
| 4. Inlet Fuel Temperature Sensor | 13. Return Fuel to Fuel Tank with Over Pressure Valve |
| 5. High-Pressure Fuel Pump | 14. Fuel Pressure Sensor |
| 6. High-Pressure Fuel Supply Line | 15. Fuel Pressure Regulator (ECU-Controlled) |
| 7. High-Pressure Fuel Common Rail | 16. Fuel Measuring Unit (ECU-Controlled) |
| 8. Fuel Injection Line | |
| 9. Fuel Injector | |

Figure - 6

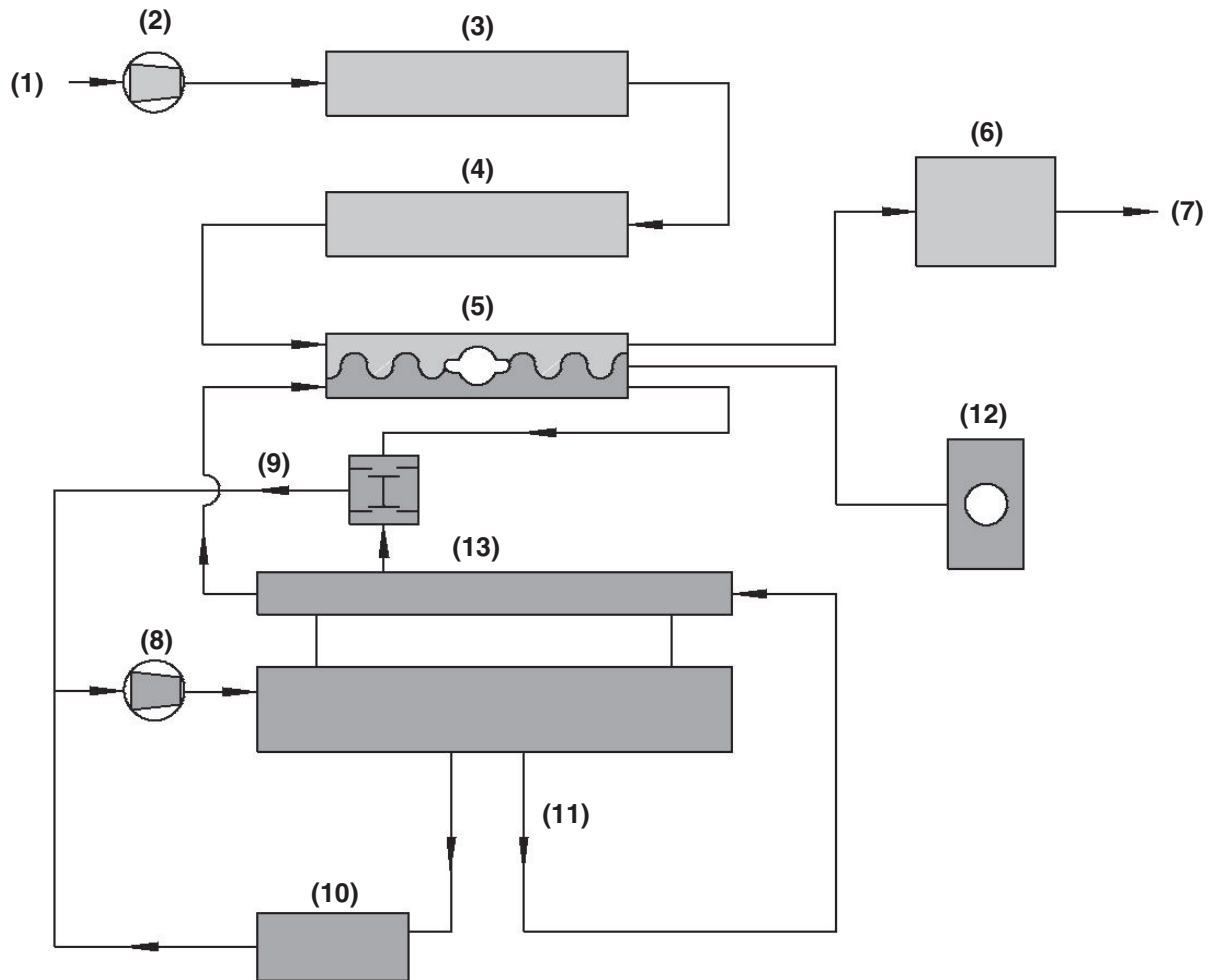
Cooling System Specifications

Parameter	Data	
	4BY2-150	4BY2-180
Cooling System	Closed Cooling with Heat Exchanger	
Coolant Capacity (Approximately)	10.0 L (10.6 qt)	
Coolant Capacity (Recovery Tank)	1.0 L (1.0 qt)	
Maximum Seawater Pump Flow Rate at Maximum Rating	165 L/min (174 qt/min)	
Maximum Seawater Pump Suction Head	0.5 m (19.69 in.)	
Seawater Inlet Pipe Connector Outer Diameter	38.1 mm (1.5 in.)	
Thermostat Operating Temperature (Full Open)	96°C (205°F)	
Thermostat Operating Temperature (Opening)	88°C (190.4°F)	
Maximum Overflow Pipe Length (Coolant Recovery Tank to Filler Cap)	1.0 m (39.37 in.)	
Overflow Pipe Inner Diameter (Coolant Recovery Tank to Filler Cap)	6 mm (0.250 in.)	
Water Heater Tank / Cabin Heater Pipe Inside Diameter	10 mm (0.394 in.)*	

* Must have a minimum pressure rating of 1.5 bar (22 psi).

NOTICE: The coolant hose from the heat exchanger to the sub-tank must be routed away from hot engine components. NEVER route coolant hoses over the flywheel side of the engine.

Cooling Flow



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- | | |
|------------------------------------|-----------------------------------|
| 1. Seawater Supply | 8. Engine Coolant Pump |
| 2. Seawater Pump | 9. Thermostat |
| 3. Hydraulic Oil Cooler | 10. Engine Oil Cooler |
| 4. Charge Oil Cooler | 11. Engine Coolant Passages |
| 5. Engine Heat Exchanger | 12. Coolant Recovery Tank |
| 6. Exhaust / Seawater Mixing Elbow | 13. Water Cooled Exhaust Manifold |
| 7. Exhaust / Seawater Exit | |

Figure - 7

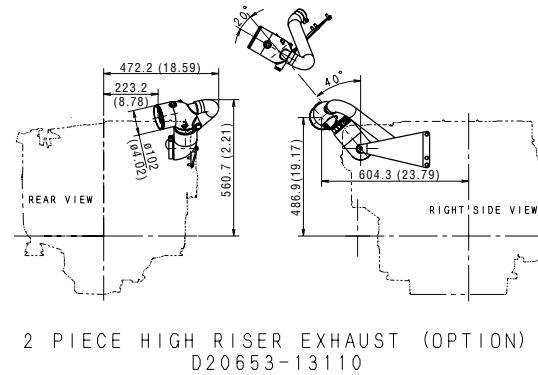
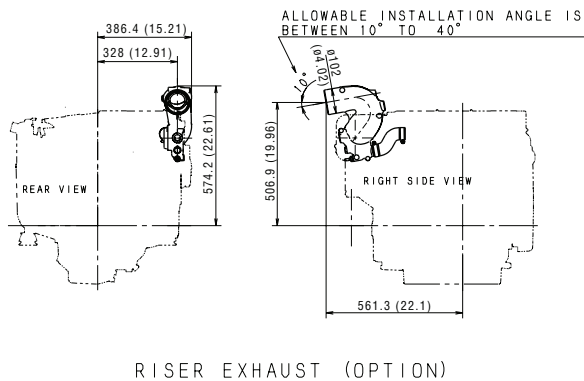
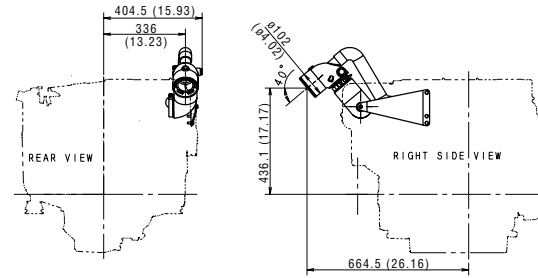
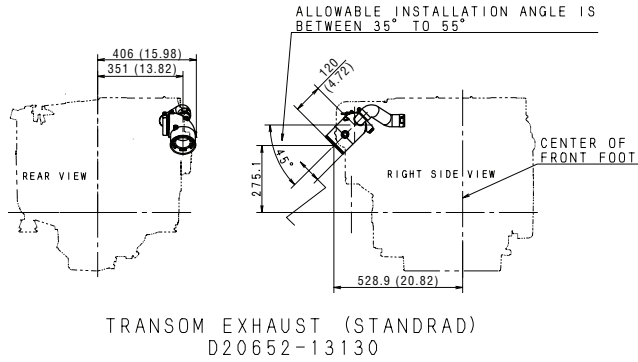
Air Intake and Exhaust Specifications

Check for leaks at initial start.

Parameter	Data	
	4BY2-150	4BY2-180
Exhaust Pipe Outer Diameter Connection	102 mm (4.0 in.)	
Air Volume Necessary for Combustion at WOT	650 m ³ /h (22955 ft ³ /h)	
Maximum Air Inlet Depression	4.0 kPa 408 mmAq (16.06 in.Aq)	
Maximum Back Pressure	45 kPa 4589 mmAq (180.67 in.Aq)	
Maximum Output Exhaust Temperature Before Turbocharger	620°C (1148°F) at rated speed 660°C (1200°F) at full load 2000 rpm	700°C (1292°F) at rated speed 660°C (1200°F) at full load 2000 rpm
EPA Exhaust Test Port Sizes	Location: Mixing Elbow G 1/4 - 19 BSPP* or G 3/8 - 19 BSPP*	
Maximum Turbocharger Boost Pressure (min/max)	1600 / 1750 mbar (23.2 / 25.4 psi)	1650 / 1800 mbar (23.9 / 26.1 psi)
Maximum Engine Room Ambient Temperature	60°C (140°F)	

* *NOTE: Back pressure measured from EPA test port located on the mixing elbow. NOTICE: Test ports are British Standard Pipe Parallel (BSPP) not National Pipe Thread (NPT). BSPP and NPT threads are not compatible due to the thread pitch. Mixing can cause thread damage.*

Mixing Elbow



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Unit = mm (in.)

To install mixing elbow:

1. Torque V-clamp to 4.0 N·m (35.4 lb-in.).
2. Lightly tap on mixing elbow with plastic hammer to center elbow.
3. Tighten V-clamp to final torque of 5.5 ± 0.5 N·m (48.6 ± 4.4 lb-in.).

Alarm System Specifications

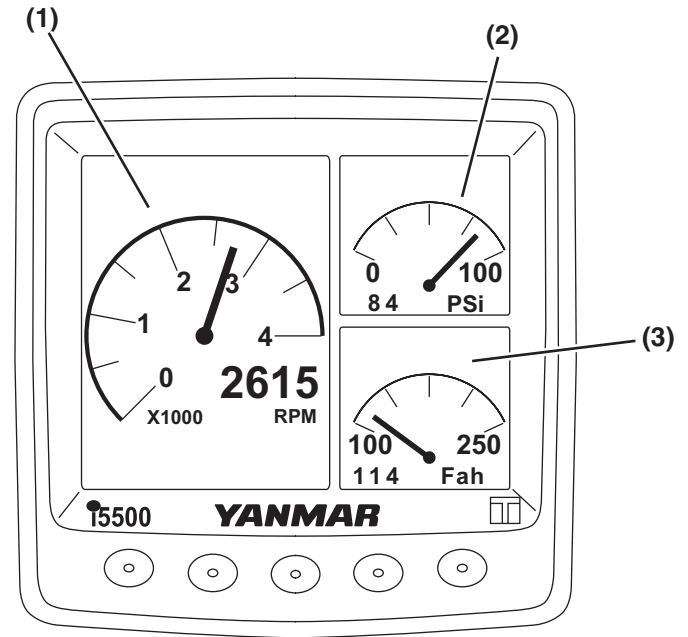
Parameter	Data	
	4BY2-150	4BY2-180
Coolant Overheat Alarm Operating Temperature	108°C (226°F)	
Lube Oil Low Pressure Alarm (Alarm not available on Classic controls)	Below 1500 rpm: < 0.5 bar (7.25 psi) for more than one second	
	Above 1500 rpm: < 2.0 bar (29 psi) for more than one second	
Overspeed Protection (fuel cutoff)	4600 rpm	

Remote Control System

Panel

The 4BY2 series utilizes Yanmar Marine Electronic control technology, incorporating an LCD multi-function display panel. Refer to the appropriate Yanmar Electronic Control System Installation Manual for detailed component specifications and options.

Yanmar Digital Display



1. Tachometer
2. Engine Oil Pressure Meter
3. Multi-function Meter

Figure - 8

Electrical System

Check all electrical connections per the wiring diagrams and ensure the bolts are tightened to the correct torque specifications.

Battery Specifications

Parameter	Data	
	4BY2-150	4BY2-180
Battery Size (Minimum)*	12 V, 85Ah, 680 CCA (cold cranking amps)	
Battery Voltage	12 V	
Nominal Output	12 V / 150 A	
Earth Polarity	Negative Ground	

* Note: No other device can be connected to the starting battery.

Battery Cable Requirements

Battery Cable Length	Battery Cable Area	AWG
1.0-2.5 m (3.3-8.2 ft)	50 mm ² (0.08 in. ²)	1
2.0-4.0 m (6.6-13.1 ft)	70 mm ² (0.11 in. ²)	2/0
2.5-5.0 m (8.2-16.4 ft)	95 mm ² (0.15 in. ²)	3/0
3.25-6.5 m (10.7-21.3 ft)	120 mm ² (0.19 in. ²)	4/0

WARNING! Fire Hazard. Always route battery cables away from hot engine components, such as the exhaust manifold, turbocharger and exhaust hoses. Install rubber protective caps on each battery terminal.

Starter Specifications

Parameter	Data	
	4BY2-150	4BY2-180
Yanmar Code	165000-70090	
Starter Model	BOSCH	
Voltage	12 V	
Output	2.0 kW (2.7 hp)	
Direction of Rotation (Viewed from Pinion Side)	Clockwise	
Weight	3.5 kg (7.7 lb)	
Number of Pinion Teeth	9	
No-load Terminal Voltage	12 V	
Loaded Terminal Voltage	5.3 V	
Loaded Maximum Current	1282 A	
Loaded Torque	32.3 N·m (23.8 lbf-ft)	

Starter Performance Curve

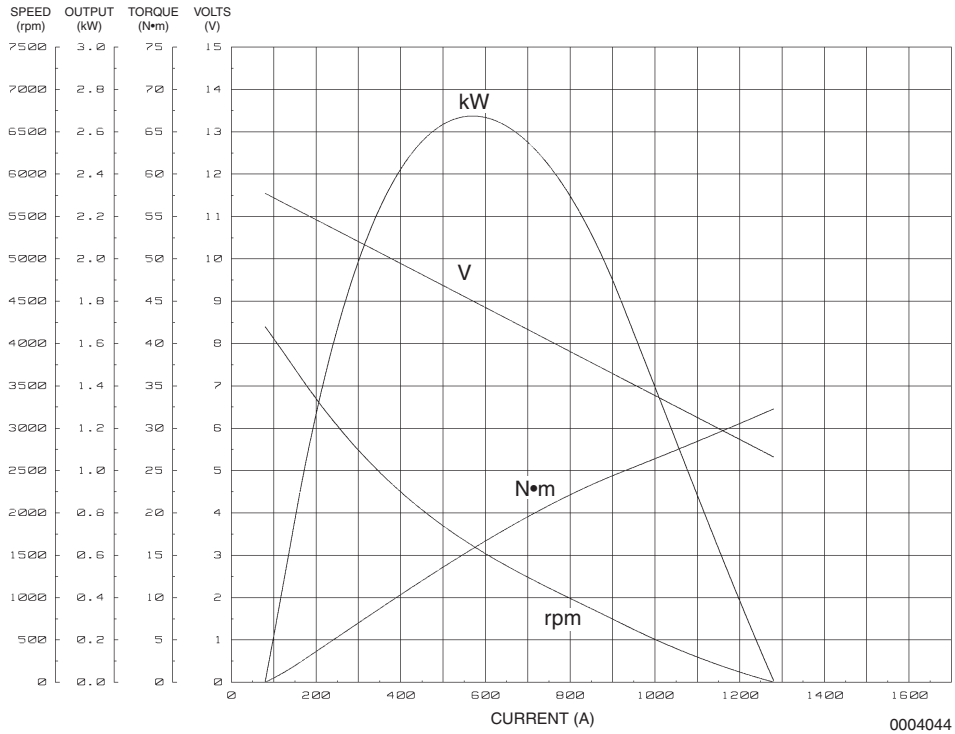


Figure - 9

Standard Alternator Data

Parameter	Data	
	4BY2-150	4BY2-180
Yanmar Code	165000-70090	
Alternator Model	Valeo	
Alternator	12 V, 150 A	
IC Regulator Model	7 788 823.1	
Rotation (Viewed from Pulley End)	Clockwise	
Weight	6.9 kg (15.2 lb)	

Wiring Diagram

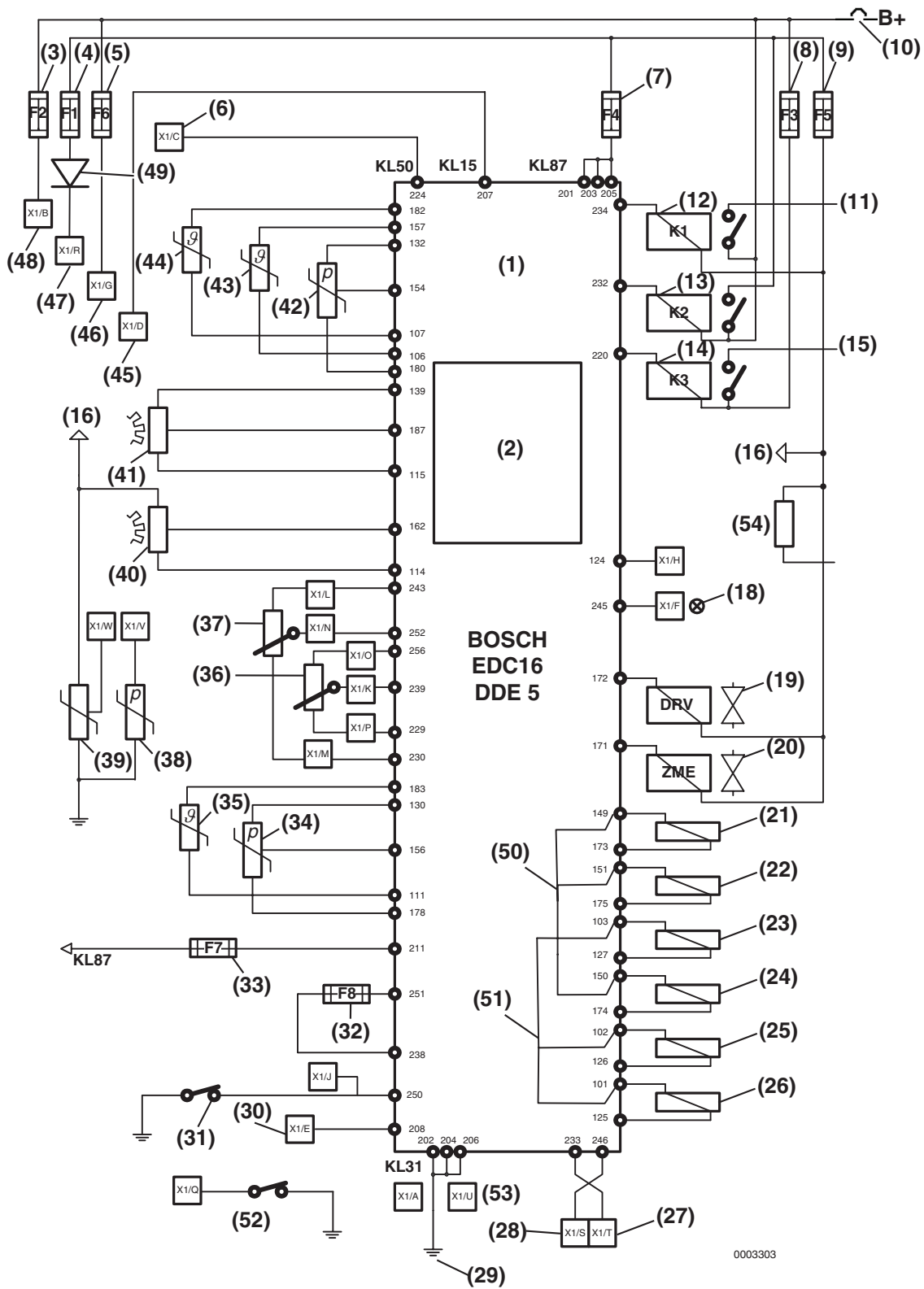


Figure - 10

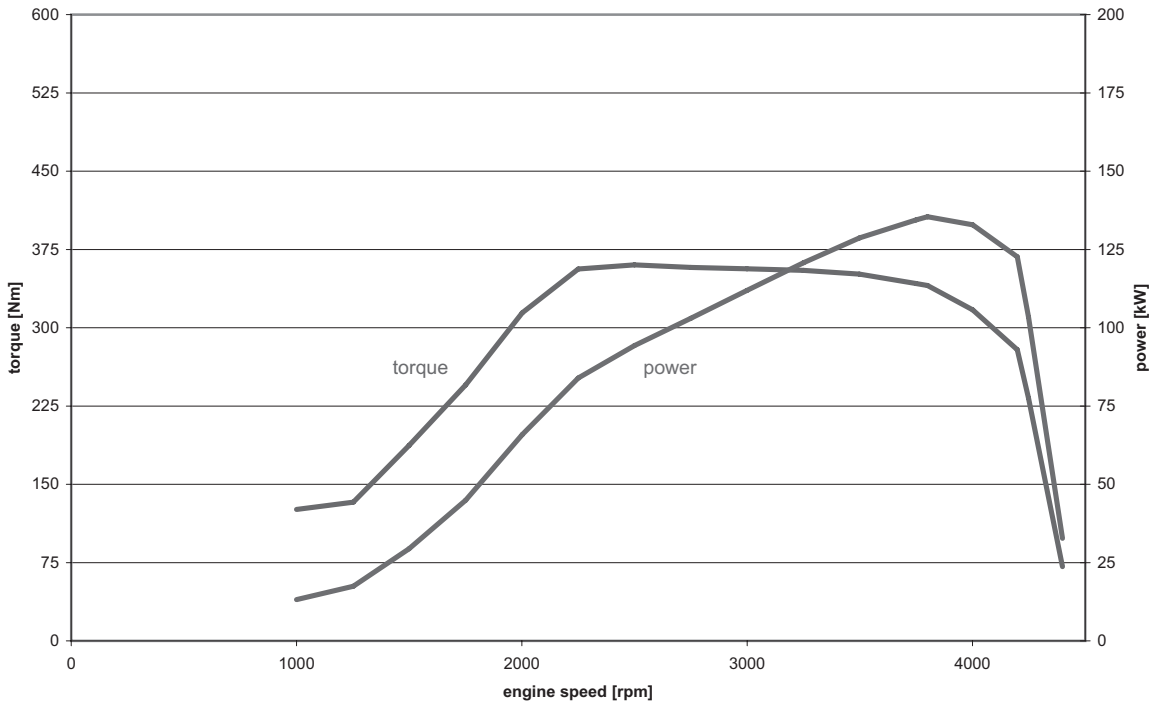
1. Engine Control Unit (ECU)
2. Internal ECU Sensors (operating voltage and ambient air pressure)
3. Fuse (F2) 10 A1 - Ignition
4. Fuse (F1) 3 A - CAN Switched Power
5. Fuse (F6) 10 A - Auxiliary Power
6. Start Signal from Key Switch
7. Fuse (F4) 30 A - ECU Switched Power
8. Fuse (F3) 15 A - Fuel Supply Pump
9. Fuse (F5) 20 A - Fuel Pressure Regulator, Water-in-Fuel, Camshaft Sensor, and Fuel Volume Regulator
10. Circuit Breaker (Boatbuilder Installed)
11. Power to Starter Solenoid Primary Terminal
12. Starter Relay K1
13. Main Power Relay K2
14. Fuel Supply Pump Relay K3
15. Power to Fuel Supply Pump
16. B+ to Water-in-Fuel Sensor
17. Not Used
18. Check Engine Indicator Output
19. Fuel Rail Pressure Control Valve
20. Fuel Volume Control (high-pressure pump)
21. Fuel Injector No. 4 (4BY2) or No. 6 (6BY2)
22. Fuel Injector No. 2 (4BY2) or No. 2 (6BY2)
23. Fuel Injector No. 3 (4BY2) or No. 5 (6BY2)
24. Fuel Injector No. 1 (4BY2) or No. 3 (6BY2)
25. Fuel Injector No. 1 (6BY2)
26. Fuel Injector No. 4 (6BY2)
27. CAN Signal - Low
28. CAN Signal - High
29. Panel, ECU, and CAN Ground
30. K-Line
31. Neutral Start Switch (NC in neutral)
32. Jumper Fuse (F8) 3 A - CAN / Analog Throttle Selection, default is analog (fuse out). Insert 3 A fuse to configure for CAN.
33. Jumper Fuse (F7) 3 A - Single / Port Selection, default is single / port (fuse in). Remove fuse for starboard configuration.
34. Fuel Rail Pressure Sensor
35. Fuel Temperature Sensor
36. Subthrottle Sensor 2
37. Subthrottle Sensor 1
38. Oil Pressure Sensor
39. Water-in-Fuel Sensor
40. Camshaft Speed Sensor
41. Crankshaft Speed Sensor
42. Charge Air Pressure Sensor
43. Charge Air Temperature Sensor
44. Engine Coolant Temperature Sensor
45. Ignition Power Input from Key Switch (terminal X1-D)
46. Auxiliary Power Output (terminal X1-G)
47. NMEA + Power Supply (X7-R)
48. Battery Power to Key Switch (terminal X1-B)
49. CAN Signal Blocking Diode
50. High Bench 1
51. High Bench 2
52. Oil Pressure Switch (X1-Q)
53. NMEA Ground Supply
54. Power Resistor for the Generator

¹ NEVER connect any additional devices to F2. F6 may be used however, it is not switched.

Performance Curves

Power and Torque

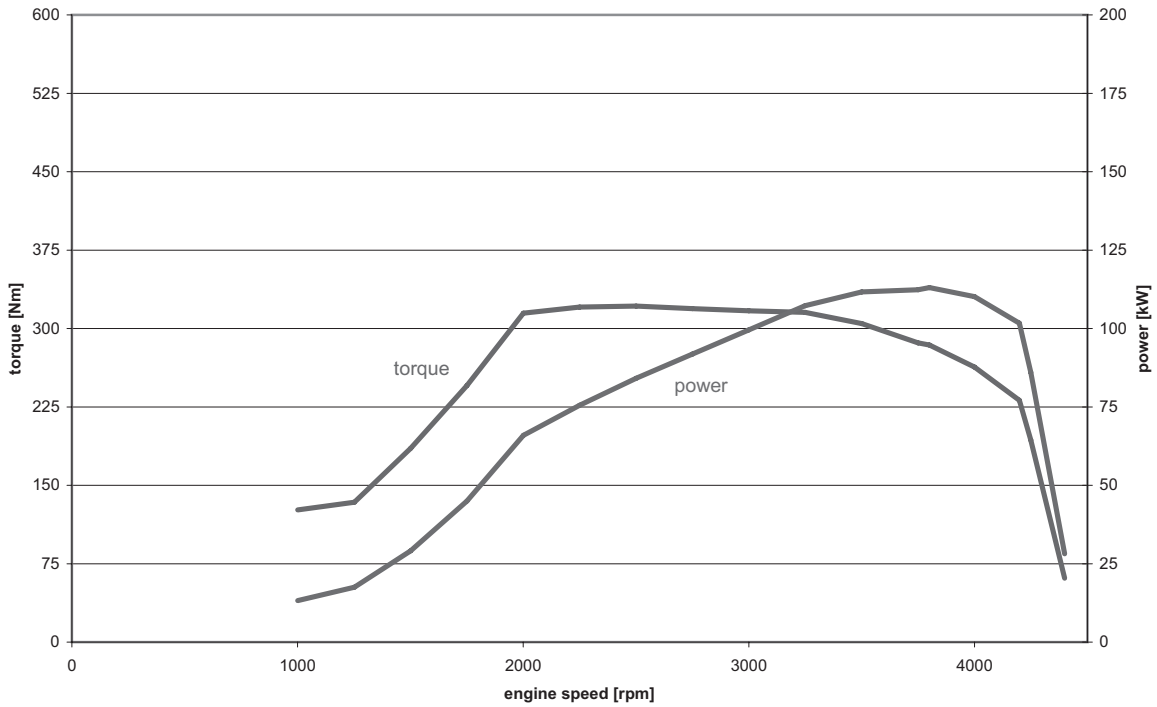
4BY2-150



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Figure - 11

4BY2-180

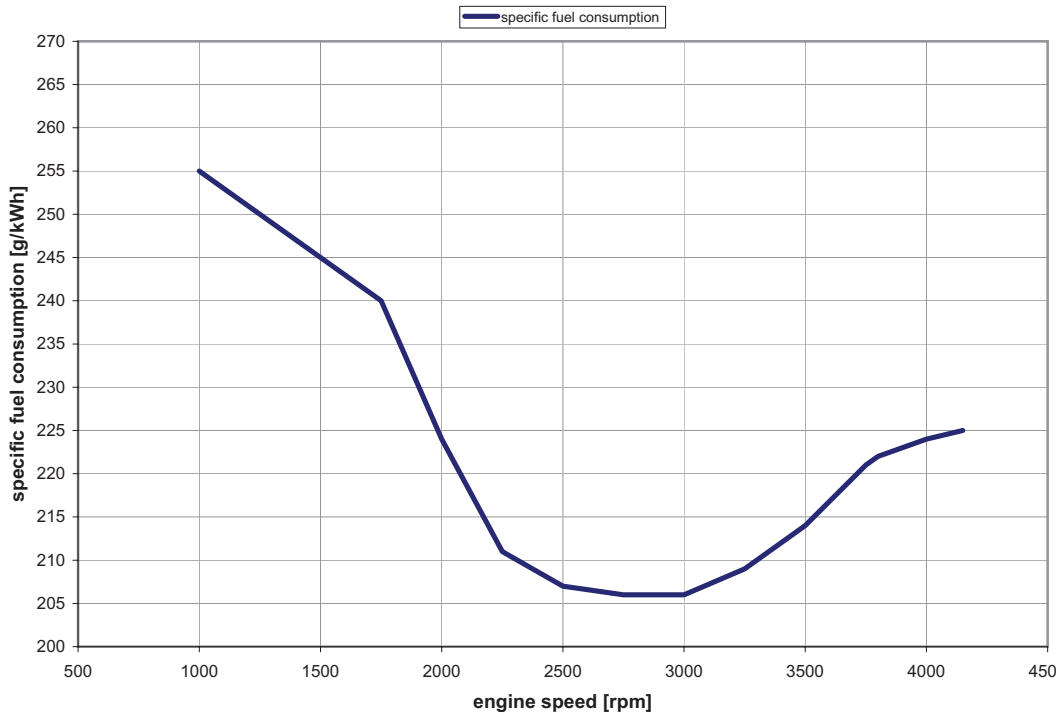


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Figure - 12

Fuel Consumption

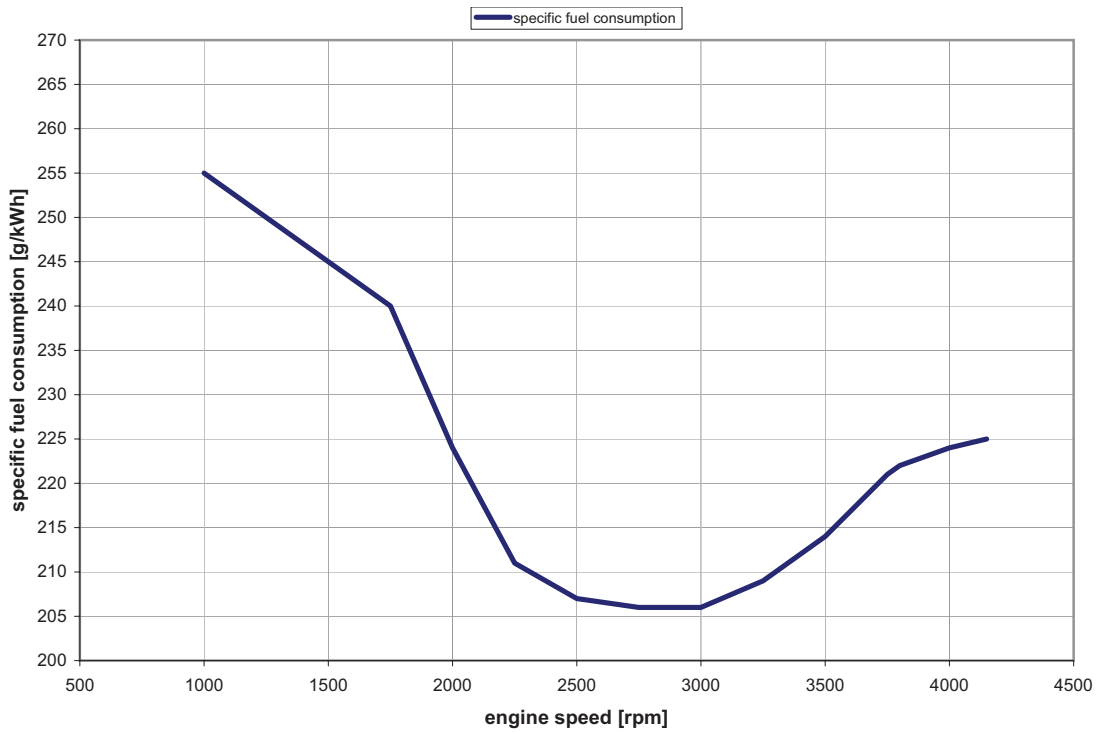
4BY2-150



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Figure - 13

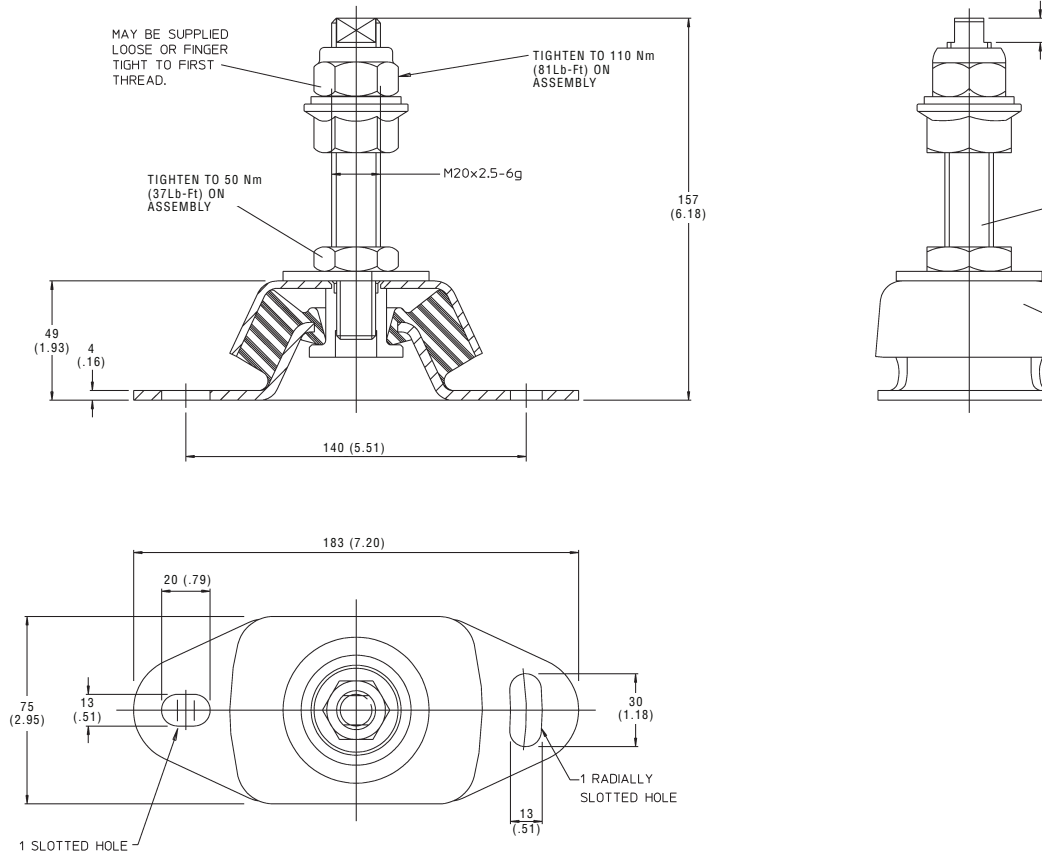
4BY2-180



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Figure - 14

Engine Mount



Unit: mm (in.)

**Marine Gear Side Mounts for
KMH40A / 50A (41A / 51A)**

Type of Mount:	Flexible
Part Number	120650-08410
Mount ID	Trelleborg Movex Number 10-03964-01 Compound 16 x 45
Quantity	2

Standard Front Engine Mounts

Type of Mount:	Flexible
Part Number	120650-08401
Mount ID	Trelleborg Movex Number 10-04418-01 Compound 16 x 55
Quantity	2

Installation Specifications

Inclination Angle Specifications

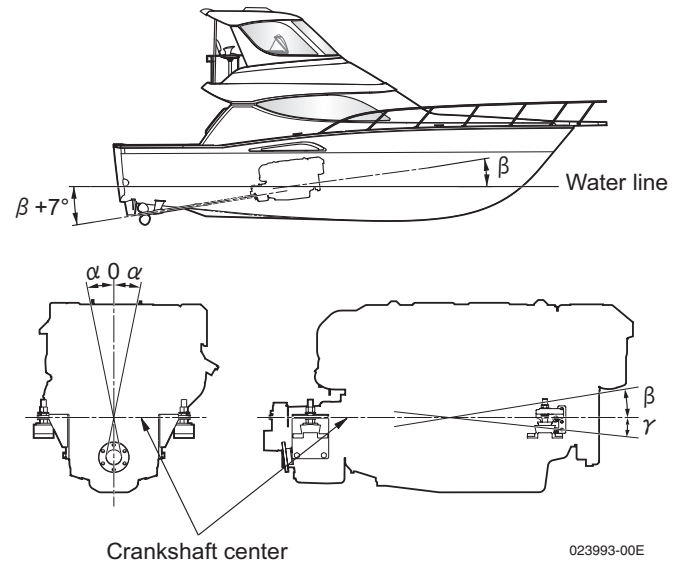


Figure - 15

Inclination Angle			
	Static	Running	Peak
	Unit = degree		
β	0-8 max	20	25
λ	0	-5	-10
α	0	20	25

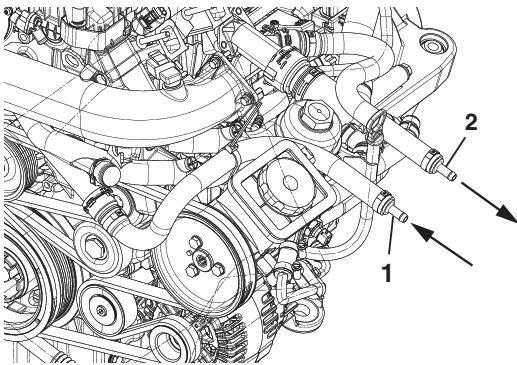
Cold Starting Aids

The 4BY2 series engine is equipped with a glow plug cold starting aid.

Water Heater Tank Connection

The 4BY2 series engine supports water heating tank connections for onboard head and galley operation.

NOTICE: Always route coolant hoses away from hot engine components. NEVER route coolant hoses over the flywheel side of the engine. To prevent damage from excess vibration, secure coolant hoses with approved clamps.



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1. Water from Tank
2. Water to Tank

Figure - 16

Heat Insulation Requirements

Temperature proof from -30 to +150°C.

Must fulfill the requirements of ISO 4589 for noise and temperature.

WARNING! Fire Hazard. *The insulation material used over the turbocharger must be made of fire-resistanant material.*

Optional Accessories

The following is a list of the 4BY2 series optional accessories.

- Yanmar digital display
- Yanmar rocker switch panel (1st station)
- Yanmar interface module, HARNESS
- Yanmar control head
- Yanmar NMEA, terminal and T-connector, CABLE)

WARNING! Fire Hazard. *Always route electrical connectors and harnesses away from hot engine components. To prevent damage from excess vibration, secure electrical connectors and harnesses with approved clamps.*