

**YANMAR**

OPERATION MANUAL

# SAIL-DRIVE

**SD25**

**en** English

**California  
Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

**California  
Proposition 65 Warning**

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.

Wash hands after handling.

**Disclaimers:**

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OPERATION MANUAL	MODEL	SD25
	CODE	0ASDM-EN0030

# TABLE OF CONTENTS

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	Page
<b>Introduction</b> .....	1
<b>Safety</b> .....	3
Safety Precautions .....	4
General Information .....	4
Before You Operate.....	4
During Operation and Maintenance.....	5
<b>Product Overview</b> .....	9
Overview .....	9
Owner/Operator Responsibilities .....	9
New Sail-Drive Break-In: .....	9
Dealer/Distributor Responsibilities.....	9
Component Identification .....	10
Galvanic Corrosion.....	11
Corrosion Control .....	11
Shore Power .....	12
Underwater Drive Coating.....	13
<b>Before You Operate</b> .....	15
Propeller Selection .....	16
Recommended Propeller Size (Maximum) .....	16
Fitting a Fixed Propeller (2-Blade).....	17
Lubricating Oil .....	18
Lubricating Oil Chart.....	18
For SD25 (Except if coupled with the 1GM10C) ..	18
Filling with Lubricating Oil .....	19
Checking The Instrument Panel Alarm System .....	20

# TABLE OF CONTENTS

---

Daily Checks.....	22
Visual Checks .....	22
<b>Sail-Drive Operation</b> .....	23
Remote Control Device Check .....	24
Engine Cooling Water.....	26
<b>Periodic Maintenance</b> .....	27
Tightening Fasteners.....	28
Torque Charts.....	28
Standard Torque Values .....	28
Standard Torque Chart .....	28
Periodic Maintenance.....	29
Periodic Maintenance Table .....	30
When the Vessel is Out of the Water, Perform the Following:.....	31
Removing Deposits from the Lower Gear Case...	31
Repairing Damaged Coating.....	31
Inspecting the Anode .....	31
Inspecting the Folding Propeller.....	31
Draining Water .....	31
Periodic Maintenance Procedures.....	32
After Initial 50 Hours of Operation.....	32
Every 100 Hours of Operation.....	33
Every 250 Hours of Operation.....	34
Every Year .....	34
Every 2000 Hours of Operation.....	35
Every 5 Years.....	36
<b>Specifications</b> .....	37

# INTRODUCTION

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This Operation Manual describes Sail-Drive Model SD25. For engine handling and operation, refer to the respective operation manuals for Engine Models 1GM10C, 2YM15, 3YM20, 3YM30 and 3YM30AE.

However, instructions for the marine gear box are not necessary as they are included.

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# SAFETY

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Yanmar considers safety of great importance and recommends that anyone that comes into close contact with its products, such as those who install, operate, maintain or service Yanmar products, exercise care, common sense and comply with the safety information in this manual.



This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

## DANGER

Indicates a hazardous situation which, if not avoided, *will* result in death or serious injury.

## WARNING

Indicates a hazardous situation which, if not avoided, *could* result in death or serious injury.

## CAUTION

Indicates a hazardous situation which, if not avoided, *could* result in minor or moderate injury.

## NOTICE

Indicates a situation which can cause damage to the Sail-Drive, personal property and/or the environment or cause the equipment to operate improperly.

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## SAFETY PRECAUTIONS

### General Information

There is no substitute for common sense and careful practices. Improper practices or carelessness can cause burns, cuts, mutilation, asphyxiation, other bodily injury or death. This information contains general safety precautions and guidelines that must be followed to reduce risk to personal safety. Special safety precautions are listed in specific procedures. Read and understand all of the safety precautions before operation or performing repairs or maintenance.

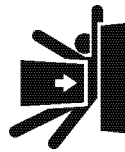
### Before You Operate

#### DANGER



- **Never permit anyone to install or operate the Sail-Drive without proper training.**
- **Read and understand this *Operation Manual* before you operate or service the Sail-Drive to ensure that you follow safe operating practices and maintenance procedures.**
- **Safety signs and labels are additional reminders for safe operating and maintenance techniques.**
- **See your authorized Yanmar marine dealer or distributor for additional training.**

#### Crush Hazard



- **Never stand under a hoisted Sail-Drive.**
- **If the hoist mechanism fails, the Sail-Drive will fall on you. When you need to transport a Sail-Drive for repair, have a helper assist you to attach it to a hoist and load it onto a truck.**
- **Never support marine gear with equipment not designed to support the weight of the marine gear such as wood blocks or by only using a jack.**
- **Never use the Sail-Drive lifting eye to lift the engine and Sail-Drive as an assembly. Use the engine lifting eyes to lift the engine and Sail-Drive. Only use the Sail-Drive lifting eye to lift the Sail-Drive as a separate component.**



## During Operation and Maintenance

### DANGER

#### Explosion Hazard



While the engine is running or the battery is charging, hydrogen gas is being produced and can be easily ignited. Keep the area around the battery well-ventilated and keep sparks, open flame and any other form of ignition out of the area.

#### Fire Hazard



Ensure that appropriate fire detection and extinguishing equipment are installed and checked periodically for proper operation.

### WARNING

#### Fire Hazard

Undersized wiring systems can cause an electrical fire.



#### Sever Hazard



- Never service the Sail-Drive while under tow or if the engine is running at idle speed. The propeller may rotate under these circumstances.
- Never wear jewelry, unbuttoned cuffs, ties or loose fitting clothing and always tie long hair back when working near moving/rotating parts. Keep hands, feet and tools away from all moving parts.
- Always remove any tools or shop rags used during maintenance from the area before operation.
- Never service the Sail-Drive while under tow or if the engine is running at idle speed. The propeller may rotate under these circumstances.
- Always stop the engine before you begin to service the Sail-Drive and secure the propeller so it will not turn.

#### Alcohol and Drug Hazard



Never operate the engine while under the influence of alcohol or drugs or when feeling ill.

## WARNING

### Exposure Hazard



Always wear personal protective equipment including appropriate clothing, gloves, work shoes, eye and hearing protection as required by the task at hand.

### Entanglement Hazard



- Never leave the key in the key switch when you are servicing the Sail-Drive. Someone may accidentally start the engine and not realize you are servicing it.
- Never operate the engine while wearing a headset to listen to music or radio because it will be difficult to hear the warning signals.

### Burn Hazard



Some of the engine and Sail-Drive surfaces become very hot during operation and shortly after shut-down. Keep hands and other body parts away from hot surfaces.

### Sudden Movement Hazard

Always stop the engine before beginning service.

## WARNING

### Exhaust Hazard



- Never block windows, vents, or other means of ventilation if the engine is operating in an enclosed area.
- All internal combustion engines create carbon monoxide gas during operation and special precautions are required to avoid carbon monoxide poisoning.
- To prevent accidental equipment movement, never start the engine in gear.
- Before starting the engine, always make sure that all bystanders are clear of the area. Keep children and pets away while the engine is operating.
- Avoid unexpected equipment movement. Shift the Sail-Drive into the NEUTRAL position any time the engine is at idle.

### Electrical Shock Hazard



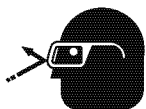
- Always turn off the battery switch (if equipped) or disconnect the negative battery cable before servicing the Sail-Drive.
- Always keep the electrical connectors and terminals clean. Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors.

**CAUTION****Poor Lighting Hazard**

Ensure that the work area is adequately illuminated. Always install wire cages on portable safety lamps.

**Tool Hazard**

Always use tools appropriate for the task at hand and use the correct size tool for loosening or tightening machine parts.

**Exposure Hazard**

Always wear eye protection when servicing the Sail-Drive or when using compressed air or high-pressure water. Dust, flying debris, compressed air, pressurized water or steam may injure your eyes.

**Slipping and Tripping Hazard**

Ensure that adequate floor space is set aside for servicing Sail-Drive. The floor space must be clean, flat and free of spilled liquids and debris to prevent slipping or tripping.

**NOTICE**

It is important to perform daily checks as listed in this *Operation Manual*.

Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor Sail-Drive performance and can help extend the life of the Sail-Drive and engine.

Always be environmentally responsible.



Follow the guidelines of the EPA or other governmental agencies for the proper disposal of hazardous materials such as lubrication oil, diesel fuel and engine coolant. Consult the local authorities or reclamation facility.

Never dispose of hazardous materials by dumping them into a sewer, on the ground or into ground water or waterways.

Never attempt to modify the Sail-Drive's design or safety features.

- Never release or modify the limiting devices such as the engine speed limit, fuel injection limit, etc.
- Modification will impair the safety and performance of the product and shorten product life.
- Modifications to the design, safety or limiting features will void the warranty.

## NOTICE

If the Sail-Drive oil temperature is too high, stop engine immediately and check the Sail-Drive oil level.

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The anode of the Sail-Drive is only calculated for the Sail-Drive. Using the different material propeller may require additional anodes to be installed on the propeller itself.

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Failure to use the correct anode material may result in inadequate protection and excessive corrosion of underwater drive system components. Use only aluminum anodes in brackish and saltwater applications. In freshwater applications, use aluminum or magnesium anodes for best results. Never use magnesium anodes in brackish or salt water, as they will deteriorate rapidly, which will lead to severe damage to the drive system.

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Always tighten components to the specified torque. Loose parts can cause equipment damage or cause it to operate improperly.

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Only use replacement parts specified. Other replacement parts may affect warranty coverage.

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Never attempt to modify the Sail-Drive's design or safety features. Failure to comply may impair the marine gear's safety and performance characteristics and shorten the Sail-Drive's life. Any alterations to this Sail-Drive may affect the warranty coverage of your Sail-Drive.

# PRODUCT OVERVIEW

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## OVERVIEW

### Owner/Operator Responsibilities

The operator must, and assumes all responsibility to:

- Read and understand the *Operation Manual* prior to operating the Sail-Drive;
- Perform all safety checks as necessary to ensure safe operation;
- Comply with and follow all lubrication and maintenance instructions and recommendations; and
- Have an authorized Yanmar dealer/distributor perform periodic checkups.

Conducting normal maintenance service and replacing consumable parts as necessary is the responsibility of the owner/operator and necessary to provide the best durability, performance and dependability of the Sail-Drive while keeping your overall operating expenses to a minimum. Individual operating habits and usage may increase the frequency of performing maintenance service condition. Monitor conditions frequently to determine if the maintenance intervals suggested in the manual are frequent enough for your Sail-Drive.

### New Sail-Drive Break-In:

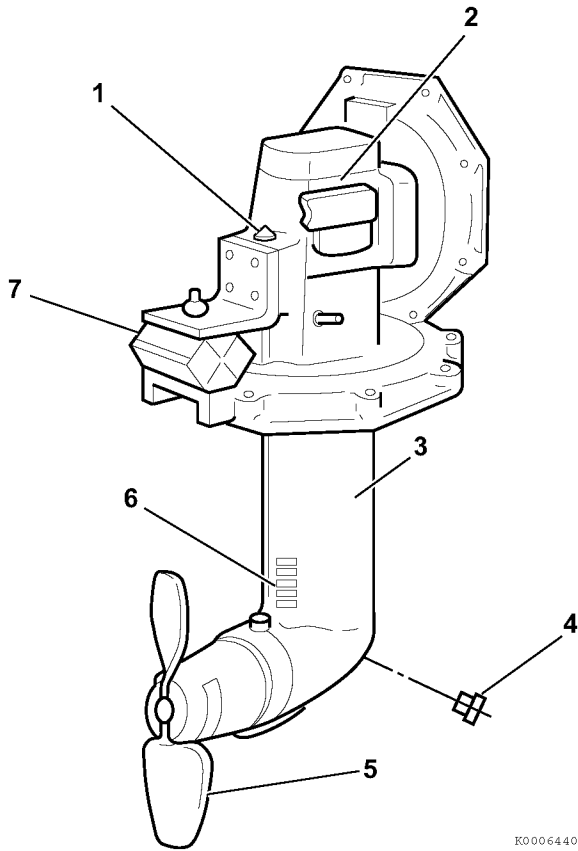
- On the initial engine start-up, allow the engine to idle for approximately 15 minutes while you check for proper Sail-Drive function and Sail-Drive oil leaks.
- During the break-in period, carefully observe Sail-Drive seal indicators for proper Sail-Drive function.
- During the break-in period, check the Sail-Drive oil levels frequently.

### Dealer/Distributor Responsibilities

In general, a dealer's responsibilities to the customer include predelivery inspection and preparation such as:

- Ensure that the vessel is properly equipped.
- Prior to delivery, make certain that the Yanmar Sail-Drive and other equipment are in proper operating condition.
- Make all necessary adjustments for maximum efficiency.
- Familiarize the customer with the on-board equipment.
- Explain and demonstrate the operation of the Sail-Drive and vessel.

COMPONENT IDENTIFICATION



K0006440

- |                                |                    |
|--------------------------------|--------------------|
| 1 – Dipstick                   | 5 – Propeller      |
| 2 – Upper gear case            | 6 – Seawater inlet |
| 3 – Lower gear case            | 7 – Flexible mount |
| 4 – Lubricating oil drain plug |                    |

*Figure 1*

## GALVANIC CORROSION

Galvanic corrosion results whenever two or more dissimilar metals (like those found on the sail-drive) are submerged in a conductive solution, such as saltwater, polluted water or water with a high mineral content because a chemical reaction takes place causing electrical current to flow between the metals. The electrical current flow causes the metal that is most chemically active, or anodic, to erode. If not controlled, galvanic corrosion may corrode Sail-Drive components.

## CORROSION CONTROL

It is the boat designer's responsibility and/or the re-powering engineer's responsibility to design the proper systems and equipment to control and reduce the possibility of galvanic corrosion.

However, it is essential that the owner/operator frequently monitor the anodes for wear, inspect the sail-drive for corrosion and replace the anodes often enough to provide a sacrificial surface for the electrical current to attack. Galvanic isolators and isolation transformers are also available from the aftermarket (not supplied by Yanmar). The Galvanic isolator is a device that is installed in series with the (AC) grounding (GREEN) conductor of the shore-power cable to effectively block low-voltage DC galvanic current flow but permit the passage of alternating current (AC)\*.

The rate of corrosion depends on numerous factors, such as:

- the number, size and location of sacrificial anodes on the sail-drive and vessel;
- the marina environment, such as stray current in the water, fresh or salt water and use and isolation of shore power;
- improper application of marine paint or antifouling paint;
- failure to repaint damaged areas; and
- how the vessel is bonded.

Please check with the boat builder, dealer or other professional to determine if your vessel and/or Sail-Drive is adequately protected from galvanic corrosion.

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\* "The Boatowner's Guide to Corrosion", by Everett Collier.

### **NOTICE**

The anode of the Sail-Drive is only calculated for the Sail-Drive. Changing the material of the propeller may require additional anodes to be installed on the Sail-Drive.

### **NOTICE**

Failure to use the correct anode material may result in inadequate protection and excessive corrosion of underwater drive system components. Use only aluminum anodes in brackish and saltwater applications. In freshwater applications, use aluminum or magnesium anodes for best results. Never use magnesium anodes in brackish or salt water, as they will deteriorate rapidly, which will lead to severe damage to the drive system.

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If sacrificial anodes erode quickly or if signs of corrosion are evident, the owner should take immediate corrective action. Yanmar recommends consulting an engineer specializing in marine electricity and corrosion control to determine the best way to correct the rapid erosion of the anodes.

## SHORE POWER

Vessels that are connected to shore power require additional protection to prevent destructive low voltage galvanic currents from passing through the shore power ground wire. Galvanic isolators are available from the aftermarket (not supplied by Yanmar) to block these currents while still providing a path to ground for dangerous shock currents.

### **NOTICE**

If the AC shore power ground is not isolated from the boat ground, sacrificial anodes may be unable to neutralize the increased galvanic potential. Corrosion damage that results from the improper system design or application is not covered by the Yanmar Limited Warranty.

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## UNDERWATER DRIVE COATING

The lower gear case coating may be damaged when hit by objects in the water, or when having deposits removed from it. The underwater coating must be inspected at least once per year and when it is believed that an object was hit that may have caused damage. Repair and repaint damaged areas immediately.

Observe the following precautions when applying antifouling or marine paint to the bottom of the boat hull:

- Always follow the paint/coating manufacturer's directions for surface preparation and application.
- Always use a high quality primer and topcoat paint specifically designed for aluminum outboards, Sail-Drives or Stern-Drives.
- Never paint the sacrificial anodes installed on the Sail-Drive.
- Never paint the Sail-Drive with a material that contains copper or tin.
- Never paint over drain holes, sacrificial anodes, or other items specified by the sacrificial anode Manufacturer.

Contact your authorized Yanmar Marine dealer or distributor for assistance.

### **NOTICE**

Galvanic corrosion damage, normal maintenance and consumable parts are not covered by the Yanmar Limited Warranty.

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# BEFORE YOU OPERATE

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This section of the *Operation Manual* describes propeller selection, propeller fitting, lubricating oil specifications and how to replenish them. It also describes the daily instrument panel and remote-control device checks.

Before you operate the Sail-Drive, review the *Safety* section on page 3.

## BEFORE YOU OPERATE

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### PROPELLER SELECTION

#### Recommended Propeller Size (Maximum)

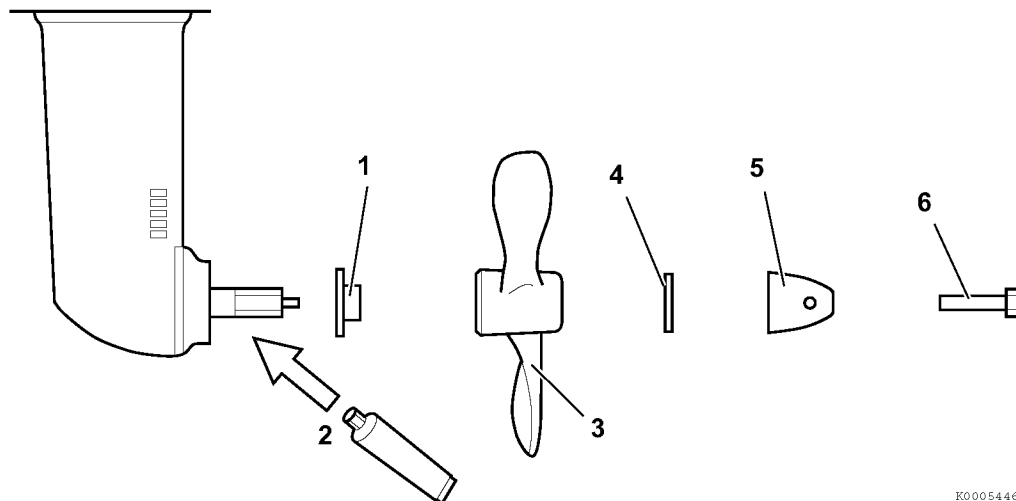
Engine model	Folding type diameter	2-Blade fixed type diameter
1GM10C	14 in.	14 in.
2YM15	14.5 in.	15 in.
3YM20	15 in.	16 in.
3YM30	16 in.	16.5 in.
3YM30AE	16 in.	16.5 in.

#### **NOTICE**

Make sure the propeller (fixed or folding) has a rubber bushing. If a propeller is used without a rubber bushing, the shaft, bearing and gears of the Sail-Drive will be damaged.

---

## Fitting a Fixed Propeller (2-Blade)



- 1 – Spacer
- 2 – Grease
- 3 – Propeller

- 4 – Washer
- 5 – Nut \*
- 6 – Bolt \*\*

R0005446

**Figure 1**

	Size	Tightening torque
*	M16	60 to 70 N·m (44 to 52 lb-ft)
**	M8 × 75 mm	11 to 15 N·m (8 to 11 lb-ft)

### ■ Locking procedure for fixed propeller nut (optional)

When tightening the nut to 60 to 70 N·m (44 to 52 lb-ft) torque for the SD25, move the shift lever to ahead and hold the crankshaft V-pulley clamp nut with a wrench to stop the propeller rotating.

## BEFORE YOU OPERATE

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### LUBRICATING OIL

The choice of lubricating oil is very important. If an unsuitable oil is used, or an oil change is neglected, it may result in damage and reduce the life of the Sail-Drive. When selecting a lubricating oil, use one of the following:

#### Lubricating Oil Chart

<b>Engine model</b>	1GM10C	2YM15, 3YM20, 3YM30, 3YM30AE
<b>Lubricating oil for the Sail-Drive</b>	API CC or greater and SAE 10W-30	API GL4 or GL5 and SAE 80W-90 or 90

Use only oil of quality GL-4 or GL-5 in the API service, and SAE No. 90 or 80W-90. (Except model SD25 × 1GM10C).

Use only oil of quality CC or greater in the API service, and SAE No. 10W-30. (Applicable model: SD25 × 1GM10C).

#### For SD25 (Except if coupled with the 1GM10C)

<b>Supplier</b>	<b>Brand name</b>	<b>API service</b>	<b>SAE No.</b>
SHELL	Shell Spilax oil EP 90	GL-4	90
SHELL	Shell Spilax oil HD 90	GL-5	90
CALTEX	Multipurpose thuban EP	GL-4/GL-59	90
MOBIL	Mobilub HD 80W-90	GL-5	80W-90
ESSO	Esso gear oil GP 90	GL-4	90
ESSO	Esso gear oil GX 90	GL-5	90

## FILLING WITH LUBRICATING OIL

Sail-Drive model	SD25
Standard unit	2.2 L (2.3 qt)
Long-reach unit	2.5 L (2.6 qt)

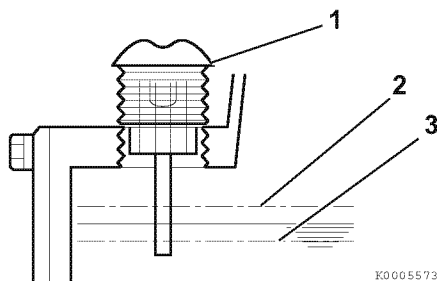
### NOTICE

The lubricating oil capacity of the standard unit is different from that of the long-reach unit. Confirm the capacity by means of the oil capacity nameplate.

1. Remove the dipstick (yellow cap). Fill with approved lubricating oil.
2. Check the amount of lubricating oil by inserting the dipstick as far as possible. Do not screw the dipstick in (1, **Figure 2**). The oil level should reach the upper mark on the dipstick (2, **Figure 2**).

### NOTICE

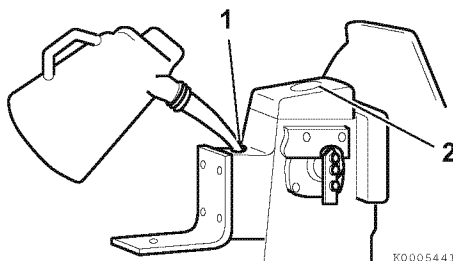
It takes about 10 minutes to fill up the Sail-Drive with lubricating oil. Check the oil level 15 minutes after adding the specified quantity of oil.



K0005573

- 1 – Dipstick
- 2 – Upper limit
- 3 – Lower limit

**Figure 2**



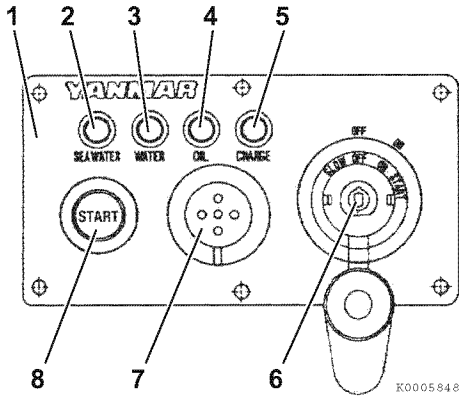
K0005441

- 1 – Oil supply port
- 2 – Oil capacity nameplate

**Figure 3**

**CHECKING THE INSTRUMENT PANEL ALARM SYSTEM**

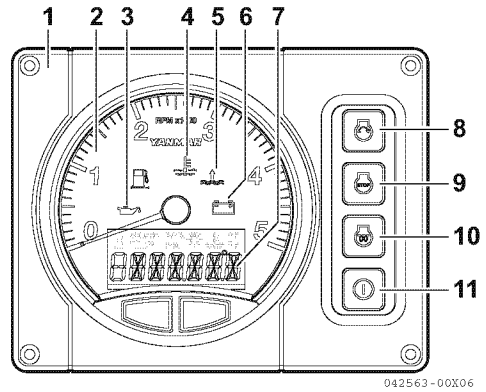
**A-type**



- 1 – “A” instrument panel
- 2 – Seawater in sail drive alarm lamp (Optional)
- 3 – Cooling water temperature alarm lamp
- 4 – Engine oil low pressure alarm lamp
- 5 – Battery low charge alarm lamp
- 6 – Key switch
- 7 – Alarm buzzer
- 8 – Start switch (Push button)

**Figure 4**

**B20 - type**



- 1 – “B20” instrument panel
- 2 – Tachometer
- 3 – Engine oil low pressure alarm lamp
- 4 – Cooling water temperature alarm lamp
- 5 – Seawater in sail drive alarm lamp (Optional)
- 6 – Battery low charge alarm lamp
- 7 – LCD (Hour meter)
- 8 – Start switch
- 9 – Stop switch
- 10 – Glow switch
- 11 – Power switch

**Figure 5**



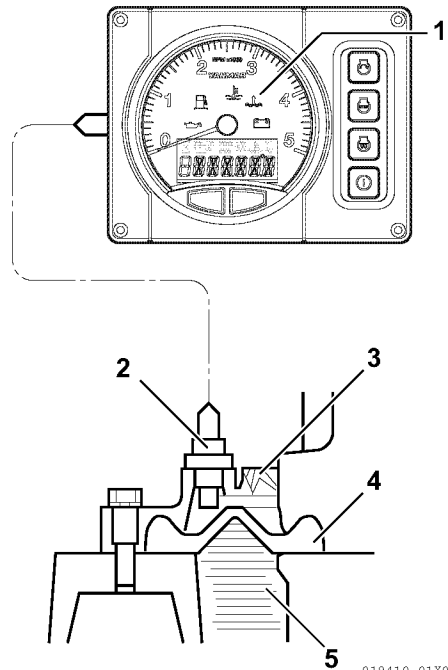
Turn the battery switch on. Turn the key (6, **Figure 4**) or power switch (11, **Figure 5**) to the ON position and check the lamps on the panel (**Figure 4**, **Figure 5**) with the engine off:

1. The lubricating oil warning lamp should be illuminated.  
(4, **Figure 4**) (3, **Figure 5**)
2. The cooling water temperature warning lamp should be out.  
(3, **Figure 4**) (4, **Figure 5**)
3. The charge warning lamp should be illuminated.  
(5, **Figure 4**) (6, **Figure 5**)
4. The rubber seal warning lamp should be out.  
(2, **Figure 4**) (5, **Figure 5**)
5. The warning buzzer should sound.

*Note: All the above alarm signals will continue until you push the starting button or turn the key (power switch) to the OFF position.*

### **WARNING**

The rubber seal alarm lamp warns of seawater entering the vessel. The watertight structure of the Sail-Drive is dual type. Even if the rubber diaphragm A (4, **Figure 6**) is damaged and seawater enters, the rubber diaphragm B (3, **Figure 6**) prevents it from entering the vessel. The rubber seal switch between the rubber diaphragms (3, **Figure 6**) and (4, **Figure 6**) sounds the warning buzzer and lights the rubber seal lamp on the instrument panel. If this happens, stop the engine and under sail, quickly return to the nearest port for repairs.



- 019410-01X01
- 1 – ON (Rubber seal lamp)
  - 2 – Rubber seal switch
  - 3 – Diaphragm (B)
  - 4 – Diaphragm (A)
  - 5 – Seawater

**Figure 6**

### DAILY CHECKS

Before starting the Sail-Drive, make sure it is in good operating condition. Make sure you check the following items:

#### Visual Checks

1. Check for damaged or missing parts.
2. Check for loose, missing or damaged fasteners.
3. Check oil level. *See Filling with Lubricating Oil on page 19.*
4. Open cooling water cock before operation. Drain cooling water and close cooling water cock after operation. *See Engine Cooling Water on page 26.*

#### NOTICE

If any problem is noted during the visual check, the necessary corrective action should be taken before you operate the engine.

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# **SAIL-DRIVE OPERATION**

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Before you operate the Sail-Drive, read the following safety information and review the *Safety* section on page 3.

### REMOTE CONTROL DEVICE CHECK

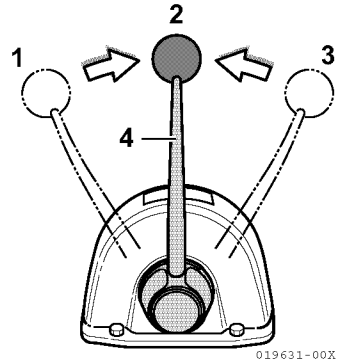
#### NOTICE

Before operating the engine, check Sail-Drive oil level.

While cranking the engine slowly, shift the control handle of the remote-control head (single lever control) rapidly through NEUTRAL - AHEAD - NEUTRAL - ASTERN. If a shift operation is done slowly, the tip of the clutch dog is worn away by being hammered, and, consequently, the clutch fails to engage. Confirm that the operation lever of the Sail-Drive moves smoothly to AHEAD, ASTERN and NEUTRAL. Because the Sail-Drive SD25 uses a dog clutch, the clutch is not engaged unless the operation lever is moved to the NEUTRAL position.

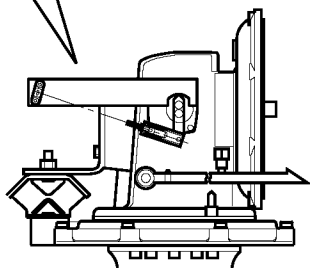
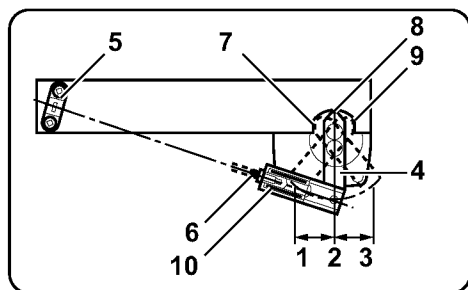
#### NOTICE

When sailing, set the remote control lever in neutral. Not doing so WILL introduce slippage and void your warranty (2, **Figure 1**).



- 1 – Astern
- 2 – Neutral
- 3 – Ahead
- 4 – Control handle

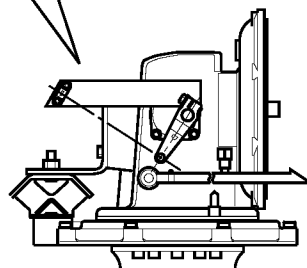
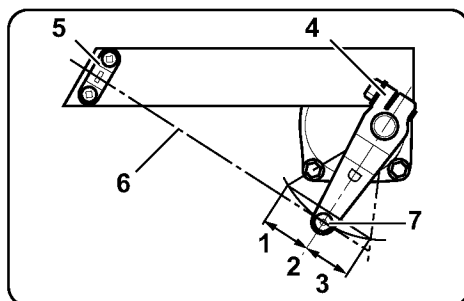
**Figure 1**



019719-00X

- 1 – Astern
- 2 – Neutral
- 3 – Ahead
- 4 – Operation handle
- 5 – Cable clamp
- 6 – Remote control cable
- 7 – Ahead stop
- 8 – Neutral position
- 9 – Astern stop
- 10 – Spring joint

**Figure 2**



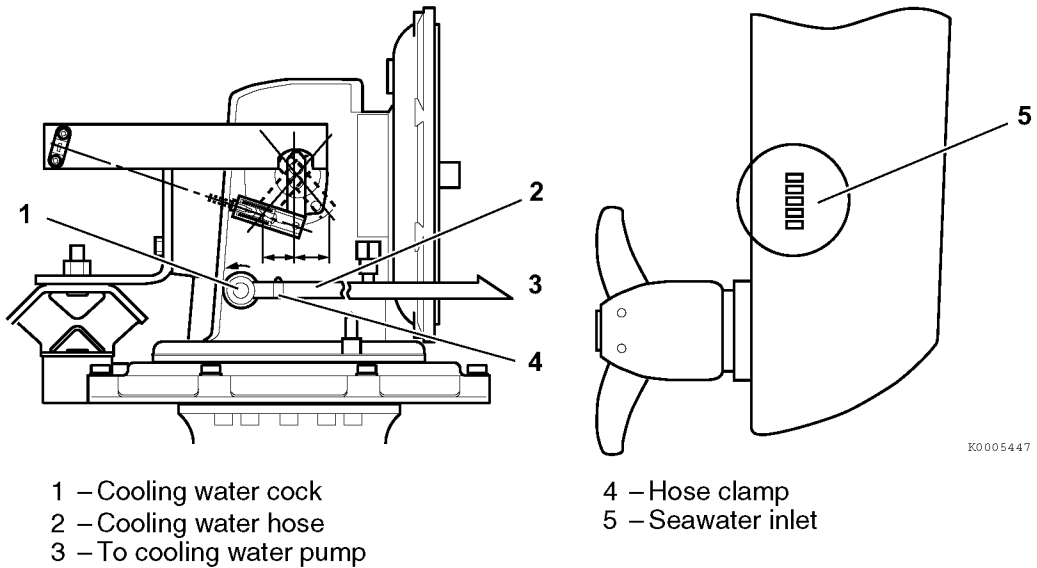
019720-00X

- 1 – Astern
- 2 – Neutral
- 3 – Ahead
- 4 – Operation lever
- 5 – Cable clamp
- 6 – Remote control cable
- 7 – Pivot

**Figure 3**

## ENGINE COOLING WATER

Opening or closing the cooling water system of the engine driving the Sail-Drive is done by the cooling water cock fixed on the upper case of the Sail-Drive. Be sure to open the cock (1, **Figure 4**) and confirm that the cooling water has suction by cranking the engine before starting the vessel. The cooling water passes through the Sail-Drive case, cools the engine by the cooling water pump, and is then discharged.



**Figure 4**

# PERIODIC MAINTENANCE

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Before you perform maintenance on the Sail-Drive, read the following safety information and review the *Safety* section on page 3.

This section of the *Operation Manual* describes the procedures for proper care and maintenance of the Sail-Drive.

## PERIODIC MAINTENANCE

### TIGHTENING FASTENERS

Use the correct amount of torque when tightening fasteners. Applying excessive torque may damage the fastener or component and too little torque may cause a leak or component failure.

#### NOTICE



The tightening torque in the Standard Torque Chart should be applied only to the bolts with a “7” head. (JIS strength classification: 7T).

- Apply 60 % torque to bolts that are not listed.
- Apply 80 % torque when tightened to aluminum alloy.

### TORQUE CHARTS

#### Standard Torque Values

		M6 × 1.0	M8 × 1.25	M10 × 1.25 or 1.5	M12 × 1.25 or 1.75	M14 × 1.5	M16 × 1.5
Cast Iron or Steel	N·m	10.8 ± 1.0	25.5 ± 2.0	49.1 ± 4.9	88.3 ± 10.0	137.2 ± 4.9	225.4 ± 10.0
	lb-ft	8.0 ± 0.8	18.8 ± 1.5	36.2 ± 3.6	65.1 ± 7.4	101.2 ± 3.6	166.2 ± 7.4
Aluminum	N·m	8.8 ± 1.0	20.6 ± 2.0	39.2 ± 2.0	70.6 ± 4.9	109.8 ± 4.9	180.3 ± 10.0
	lb-ft	6.5 ± 0.8	15.2 ± 1.5	28.9 ± 1.5	52.1 ± 3.6	81.0 ± 3.6	133.0 ± 7.4

#### Standard Torque Chart

Thread size × Pitch mm		M6 × 1.0	M8 × 1.25	M10 × 1.5	M12 × 1.75	M14 × 1.5	M16 × 1.5
Tightening torque	lb-in.	96.0 ± 9.0	–	–	–	–	–
	lb-ft	–	19.0 ± 2.0	36.0 ± 4.0	65.0 ± 7.0	101.0 ± 7.0	167.0 ± 7.0
	N·m	10.8 ± 1.0	25.5 ± 2.9	49.0 ± 4.9	88.3 ± 9.8	137.0 ± 9.8	226.0 ± 9.8
	kgf-m	1.1 ± 0.1	2.6 ± 0.3	5.0 ± 0.5	9.0 ± 1.0	14.0 ± 1.5	23.0 ± 2.0



## Periodic Maintenance

### CAUTION

Establish a periodic maintenance plan according to the Sail-Drive application and make sure you perform the required periodic maintenance at intervals indicated. Failure to follow these guidelines will impair the Sail-Drive's safety and performance characteristics, shorten the Sail-Drive's life and may affect the warranty coverage on your Sail-Drive.

#### ■ The importance of periodic maintenance

Sail-Drive deterioration and wear occur in proportion to the length of time the Sail-Drive has been in service and the conditions it is subjected to during operation. Periodic maintenance prevents unexpected downtime, reduces the number of accidents due to poor Sail-Drive performance and helps extend the life of the Sail-Drive.

#### ■ The importance of daily checks

The Periodic Maintenance Table assumes that the daily checks are performed on a regular basis. Make a habit of performing daily checks before the start of each operating day. See *Filling with Lubricating Oil* on page 19, *Checking The Instrument Panel Alarm System* on page 20 and *Engine Cooling Water* on page 26, and refer to the Operation Manual for your engine.

#### ■ Keep a log of Sail-Drive hours and daily checks

Keep a log of the number of hours the Sail-Drive is run each day and a log of the daily checks performed. Also note the date, type of repair (e.g., replaced bearings), and parts used for any service needed between the periodic maintenance intervals. Failure to perform periodic maintenance will shorten the life of the Sail-Drive.

#### ■ Yanmar replacement parts

Yanmar recommends that you use genuine Yanmar parts when replacement parts are needed. Genuine replacement parts help ensure long Sail-Drive life.

#### ■ Tools required

Before you start any periodic maintenance procedure, make sure you have the tools you need to perform all of the required tasks.

#### ■ Ask your authorized Yanmar marine dealer or distributor for help

Our professional service technicians have the expertise and skills to help you with any maintenance or service related procedures.

Daily and periodic maintenance is important to keep the Sail-Drive in good operating condition. The following is a summary of maintenance items by periodic maintenance intervals. Periodic maintenance intervals vary depending on Sail-Drive application and are hard to establish definitively. The following should be treated only as a general guideline.

*Note: These procedures are considered normal maintenance and are performed at the owner's expense.*

# PERIODIC MAINTENANCE

## PERIODIC MAINTENANCE TABLE

○: Check or Clean ◇: Replace ●: Contact your authorized Yanmar Marine dealer or distributor

System	Item	Periodic maintenance interval						
		Daily (See Daily Checks on page 22)	50 hours or after 1 month	Every 100 hours	Every 250 hours	Every year	Every 2000 hours	Every 5 years
Lubricating oil	Check oil level, fill if necessary	Before operation ○						
	Change lubricating oil		First ◇	◇				
Cooling water	Open/close cooling water cock	Before/after operation ○						
	Clean cooling water suction hole					○		
	Drain cooling water	After operation ○						
Remote control system	Inspect remote control device					○		
Anode	Inspect and replace anode			◇				
Lower case	Repair case coating					●		
Boat hull water- tightness	Inspect rubber diaphragm					○		◇
	Inspect seal sensor					○		
Flexible mount	Inspect and/or replace the flexible mount, mounting height					●		
	Replace the flexible mount						●	

**WHEN THE VESSEL IS OUT OF THE WATER, PERFORM THE FOLLOWING:**

**Removing Deposits from the Lower Gear Case**

Remove seaweed, seashells and other marine growth from the lower gear case. Completely remove deposits around the cooling water intake (2, **Figure 1**) since the engine may overheat if the cooling water intake amount is insufficient.

**Repairing Damaged Coating**

The lower gear case coating may be damaged when hit by objects in the water, or when having deposits removed from it. Never use paint containing copper or tin. This will damage the drive and void the warranty. Use a high quality primer and topcoat paint specifically designed for aluminum outboards or stern-drives. Follow the manufacturer's directions for surface preparation and application. Contact your authorized Yanmar Marine dealer or distributor for assistance.

**Inspecting the Anode**

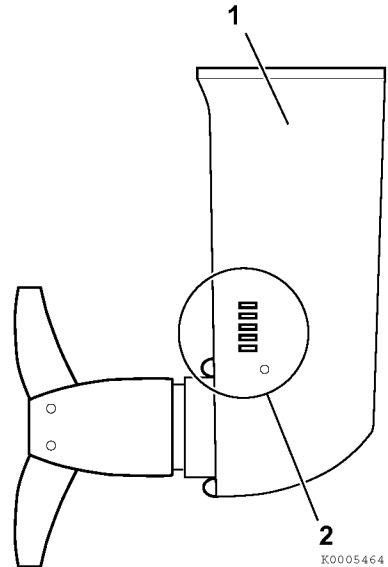
*See Inspecting and replacing the anode on page 33.*

**Inspecting the Folding Propeller**

Confirm that the blade of the folding propeller opens smoothly. Inspect for wear on the blade-fixing pins, replacing them when wear is excessive. Apply seawaterproof grease to the pins in the blade gear and propeller shaft.

**Draining Water**

Drain the engine cooling water, together with the water in the Sail-Drive case. If this water is not drained, freezing may cause the engine block and/or the Sail-Drive case to crack.



1 – Lower gear case  
2 – Seawater inlet

**Figure 1**

# PERIODIC MAINTENANCE PROCEDURES

### After Initial 50 Hours of Operation

Perform the following procedures after the first 50 hours of operation.

- Draining and replacing lubricating oil
- Inspecting and replacing the clutch shifter
- Draining and replacing lubricating oil

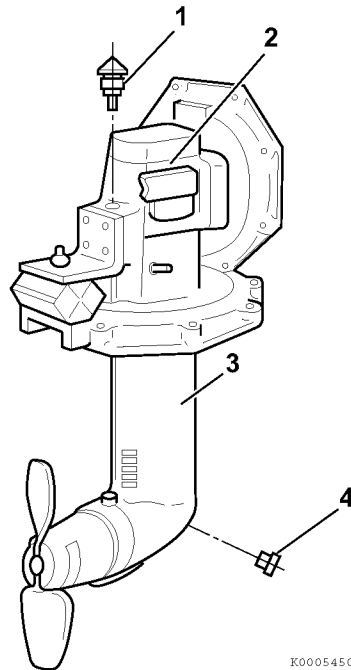
When the vessel is out of the water, drain the oil by removing the lower gear case drain plug, and the upper gear case oil dipstick.

### **CAUTION**

Let the drive unit cool at least 5 minutes after operation before removing the oil drain plug. Hot oil could spurt out forcefully if the drain plug is removed from the drive unit immediately after operation.

#### **Replacing oil**

Refer to *Filling with Lubricating Oil* on page 19.



- 1 – Dipstick
- 2 – Upper gear case
- 3 – Lower gear case
- 4 – Lubricating oil drain plug

**Figure 2**

- Inspecting and replacing the clutch shifter

See your authorized Yanmar dealer or distributor for procedure.

**Every 100 Hours of Operation**

Perform the following maintenance every 100 hours of operation.

- **Changing the lubricating oil**
- **Inspecting and replacing the anode**

■ **Changing the lubricating oil**

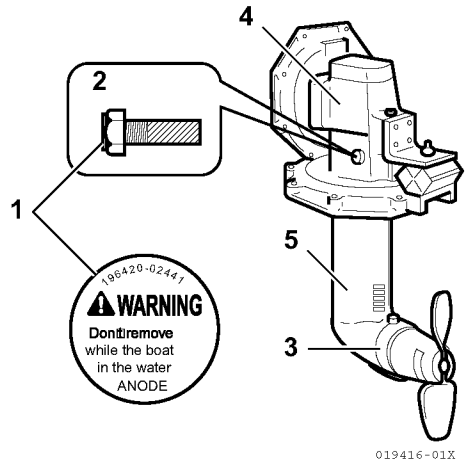
See *Draining and replacing lubricating oil* on page 32.

■ **Inspecting and replacing the anode**

To prevent corrosion of the Sail-Drive body by sea or lake water, replace the anode every 100 hours of operation, once every six months or when it has reduced to half of the original volume (size).

**NOTICE**

The anode of the Sail-Drive is only calculated for the Sail-Drive. Changing the material of the propeller may require additional anodes to be installed on the Sail-Drive.



- 1 – Safety label
- 2 – Anode
- 3 – Anode
- 4 – Upper gear case
- 5 – Lower gear case

**Figure 3**

An anode is provided on the lower gear case. To inspect and replace the anode on the lower gear case, the vessel must be removed from the water.

### Every 250 Hours of Operation

Perform the following maintenance every 250 hours of operation.

- **Inspecting and replacing the clutch shifter**
- **Inspecting and replacing the clutch shifter**

See your authorized Yanmar dealer or distributor for procedure.

### Every Year

Perform the following maintenance every year of operation.

- **Cleaning cooling water suction hole**
- **Inspecting remote control device**
- **Repairing case coating**
- **Inspecting rubber diaphragm seal ring**
- **Inspecting seal sensor**
- **Inspecting and/or replacing the flexible mount**
- **Cleaning cooling water suction hole**

*See Removing Deposits from the Lower Gear Case on page 31.*

- **Inspecting remote control device**

*See Remote Control Device Check on page 24.*

- **Repairing case coating**

*See Repairing Damaged Coating on page 31.*

- **Inspecting rubber diaphragm seal ring**

#### ***Rubber diaphragms (A) and (B)***

The rubber diaphragms (A) and (B) of the Sail-Drive are important parts for the hull and crew safety. Since rubber degenerates during use, be sure to inspect them every two years. The vessel must be lifted onto a block for this procedure. To replace, consult your Yanmar Marine dealer.

■ Inspecting seal sensor

See (Figure 6) on page 21. See your authorized Yanmar Marine dealer or distributor for inspection procedure.

■ Inspecting and/or replacing the flexible mount

Replace if clearance is less than 1 mm (1, Figure 4). See your authorized Yanmar Marine dealer or distributor for procedure.

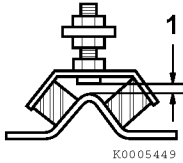


Figure 4

**Every 2000 Hours of Operation**

Perform the following maintenance every 2000 hours of operation.

- Replacing the flexible mount

■ Replacing the flexible mount

See your authorized Yanmar dealer or distributor for procedure. Flexible Mount must be replaced every 2000 hours.

### Every 5 Years

Perform the following maintenance every 5 years of operation.

- **Replacing rubber diaphragm seal ring**
- **Replacing rubber diaphragm seal ring**

To replace, consult your Yanmar Marine dealer.



# SPECIFICATIONS

Model		SD25	
Reduction gear system		Constant mesh gear with dog clutch	
Direction of rotation	Input shaft	Counter-clockwise viewed from stern	
	Propeller shaft	Counter-clockwise viewed from stern	
Reduction ratio	Ahead	2.64	
	Astern	2.64	
Propeller speed		1364 min <sup>-1</sup>	1212 min <sup>-1</sup>
Lubrication system		Oil bath type	
Lubrication oil capacity	Standard unit	2.2 L (2.3 qt)	
	Long-reach unit	2.5 L (2.4 qt)	
Dry weight		30 kg (66 lb)	
Remote-control device	Control head	Single control lever	
	Cable	MORSE 33C (equivalent)	
Applicable engine model (Maximum rated output power at crankshaft)		1GM10C 6.7 kW (9.1 hp)/3600 min <sup>-1</sup>	—
		2YM15 10 kW (13.6 hp)/3600 min <sup>-1</sup>	—
		3YM20 15.3 kW (20.8 hp)/3600 min <sup>-1</sup>	—
		3YM30 21.3 kW (29 hp)/3600 min <sup>-1</sup>	3YM30AE 21.3 kW (29 hp)/3200 min <sup>-1</sup>

**Note:**

- A propeller with rubber bushing must be used in all SD series Sail-Drives.
- 1 hp metric = 0.7355 kW

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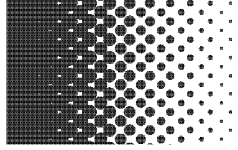
## OPERATION MANUAL

SD25

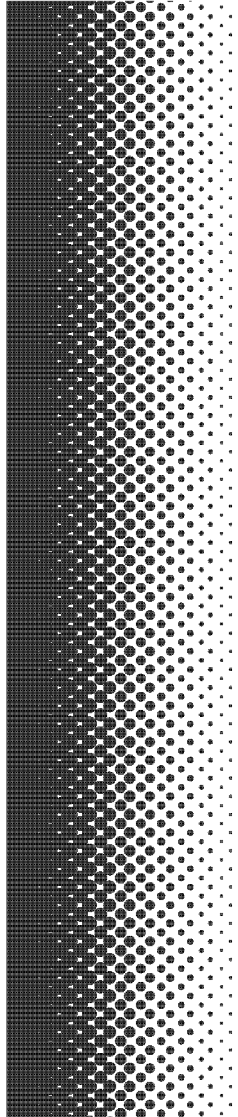
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**SAIL-DRIVE**



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