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# **Marine generator sets**

Operator's manual

4 GSCH/GSACH

U\_CT4GSCH3\_EN  
Revision 2





# Introduction

## Introduction

### Presentation

Dear customer,

First of all, we would like to thank you for choosing a Solé Diesel product. We recommend that you read this manual carefully before carrying out any operation, and that you always keep it close to the generator set, as you may find it very useful in the future.

Our goal as a manufacturing company is for you to enjoy our product, no matter what you use it for. The equipment manufactured at Solé Diesel's facilities is designed to provide the best performance in the most demanding operating conditions.

### **NOTICE**

The images, text and information contained in this manual are consistent with the characteristics of the product at the time of publication. Solé Diesel reserves the right to modify this document without prior notice.

## Table of contents

<b>Table of contents</b> .....	<b>4</b>
<b>Safety precautions and instructions</b> .....	<b>6</b>
<b>Solé Diesel Warranty</b> .....	<b>9</b>
<b>Section 1 - Information about the generator set</b> .....	<b>12</b>
1.1. Identification of the generator set .....	12
1.2. Identification of the parts of the generator set .....	12
<b>Section 2 - Transport, handling and storage</b> .....	<b>14</b>
2.1. Reception.....	14
2.2. Transport and handling of the generator set while it is in its packaging.....	14
2.3. Transport and handling of the generator set once its packaging is removed .....	15
2.4. Storage of the generator set before and after its packaging is removed.....	15
<b>Section 3 - Installation</b> .....	<b>16</b>
3.1. Operation on a gradient.....	16
3.2. Installation site .....	16
3.3. Securing the on-board generator set .....	16
3.3.1. Ventilation .....	17
3.4. Cooling System .....	17
3.4.1. Seawater circuit.....	17
3.4.2. System components.....	18
3.4.3. Examples of installation .....	19
3.5. Exhaust system.....	20
3.5.1. System components.....	20
3.5.2. Examples of installation .....	21
3.6. Fuel system.....	22
3.7. Electrical system.....	23
3.7.1. Battery connection .....	23
3.7.2. Control panel connection .....	24
3.7.3. Load connection (AC).....	24
3.7.4. Switch (shore power connection/generator) .....	25
3.7.5. Emergency stop.....	26
3.7.6. Pre-Start Checklist.....	26
<b>Section 4 - Operation</b> .....	<b>28</b>
4.1. Start-up of the generator set.....	28
4.2. Stopping the generator set .....	28
4.3. Operating the generator set at low temperatures.....	29
4.4. Hibernation and prolonged storage .....	30
4.5. Restoration of operating conditions.....	30
<b>Section 5 - Systems and Scheduled Maintenance</b> .....	<b>31</b>
5.1. Description of operation .....	31
5.2. Programme for routine maintenance.....	31
5.3. Lubrication system.....	33
Oil specifications .....	33
Maintenance task. Checking oil level.....	33
Maintenance task. Filling/Replacing oil.....	33
Maintenance task. Replacing oil filter.....	34
5.4. Air intake system .....	34
Maintenance task. Cleaning and replacing the air filter .....	34
5.5. Fuel system.....	34
Maintenance task. Cleaning and replacing the fuel filter.....	34
Maintenance task. Purging the fuel circuit.....	35
5.6. Cooling System .....	35
Maintenance task. Inspecting the water pump impeller.....	35

# Table of contents



5.7. Electrical system.....	36
Maintenance task. Inspection of the AC alternator.....	36
Maintenance task. Inspection of the battery.....	36
Maintenance task. Inspection of the sacrificial anode.....	36
Maintenance task. Inspecting/Replacing the belt .....	36
<b>Section 6 - Troubleshooting.....</b>	<b>38</b>
<b>Section 7 - Technical Specifications .....</b>	<b>39</b>
<b>Section 8 - Technical Appendices.....</b>	<b>42</b>
8.1. Electrical diagrams .....	43
8.2. General dimensions.....	45
<b>Section 9 - Instructions for replacement, disposal and removal .....</b>	<b>47</b>
<b>Section 10 - Pre-delivery inspection of generator sets.....</b>	<b>48</b>
<b>Section 11 - Maintenance record .....</b>	<b>50</b>

# Safety precautions and instructions



## Safety precautions and instructions

Here at Solé Diesel, we are concerned about your safety and the condition of your machine. These safety precautions and instructions are one of the main ways in which we are able draw your attention to potential risks associated with the operation of our engine. Please follow the precautions listed in this manual, both before and during operation and maintenance procedures, in order to ensure your safety, the safety of others, and the performance of your engine.

Types of safety precautions:



Indicates the presence of a hazard that may **cause severe personal injury, death or substantial property damage.**



Indicates the presence of a hazard that **will cause or may cause minor personal injury or property damage.**



Communicates information regarding installation, operation and maintenance in relation to safety, but not in relation to hazards.



**Maintenance of the fuel system and combustible materials. A flash fire can cause serious injury or death.**



Do not smoke or allow flames or sparks anywhere near the fuel injection system, fuel line, fuel filter, feed pump, or other potential sources of fuel spillage or fuel vapours. Never add fuel to the tank while the generator set is running, as spilled fuel may ignite when it comes into contact with hot parts or sparks.

Collect fuel in a suitable container when removing the fuel line or fuel system. Ensure that fuel lines and connections remain tight and in good condition. Do not replace flexible fuel lines with rigid lines. Use flexible sections to prevent the fuel line from breaking as a result of vibrations. Keep the generator set and the room it is in clean and free of debris, in order to minimize the risk of fire.



**Maintenance of the air filter. A sudden explosion can cause serious injury or death.**



Do not operate the generator set without the air filter or muffler.



**Combustible materials. Fire can cause serious injury or death.**



The fuel for the generator set, the fuel vapours and the combustible materials are all flammable and explosive. Handle these materials with care in order to minimize the risk of fire or explosion. Make sure that there is a fully charged fire extinguisher in the room or in a nearby area. In case of fire, follow these instructions:

- Turn off the generator set(s).
- Discharge the entire contents of a portable halon or CO<sub>2</sub> fire extinguisher (or other as provided) immediately, without stopping.



**Carbon monoxide (CO) can cause severe nausea, fainting or death.**

The exhaust pipe of the generator set contains carbon monoxide. Carbon monoxide is an odourless, colourless, tasteless, non-irritating gas that can cause death even if it is inhaled for just a short time.

If someone shows signs of carbon monoxide poisoning, they should get some fresh air. They must not sit, lie down, or fall asleep. Some of the signs are:

# Safety precautions and instructions



- Dizziness, vertigo.
- Physical tiredness, weakness in joints and muscles.
- Drowsiness, mental fatigue, inability to concentrate or speak clearly, blurred vision.
- Upset stomach, vomiting and nausea.

## **⚠ WARNING**

Ensure that the area around the battery is well ventilated. Hydrogen gas is produced when the generator set is running or the battery is being charged, and it can easily be ignited.



Do not allow battery fluid (which contains sulphuric acid) to come into contact with clothing, skin, or eyes. Always wear safety gloves and protective clothing when performing maintenance on the battery. If battery fluid comes into contact with the eyes and/or skin, immediately wash the affected area with plenty of clean water and seek medical treatment.

## **⚠ CAUTION**

Before working on the connected generator set, first follow these steps to disable it:



Put the control panel in OFF mode.

- (1) Disconnect the battery's power supply.
- (2) Disconnect the battery cables. Remove the negative (-) cable first when disconnecting the battery. Reconnect the negative (-) cable last when reconnecting the battery.

Follow these precautions to prevent the generator set from being turned on remotely from the panel while you are working on it.

## **⚠ CAUTION**



Never remove the cover from the cooling unit if the generator set is hot. Vapour and jets of hot coolant will come out of the engine and could cause serious burns. Allow the engine to cool down before attempting to remove the cover from the cooling unit.

## **⚠ NOTICE**

Read and understand the *Operator's Manual for Generator Sets* before operating the generator set or performing maintenance on it. This will allow you to ensure that safe operating practices and maintenance procedures are followed.

**Hearing protection.** Use protection to prevent hearing loss when operating the generator set.

## **⚠ NOTICE**

1. The person installing/operating the generator set must wear suitable CLOTHING for the workplace and the situation. In particular, avoid wearing loose clothing, chains, bracelets, rings and any type of accessory that may get caught in moving parts.
2. The person installing/operating the generator set must wear personal protective equipment such as gloves, work shoes and eye and ear protection, as required for the task.
3. The area where the operator works must be kept clean and free from oil or other spillages, as well as solid waste (metal shavings, etc.).

# Safety precautions and instructions



## Labels on the generator set

**⚠ CAUTION - AVISO ⚠**

Over cranking can cause engine water ingestion.

*Excesivos intentos de arranque pueden provocar entrada de agua en el motor.*

If, after several attempts, the generator set has not started up, this may have caused water to enter the generator set. In this situation, it is recommended that you:

- 1) Turn off the water intake valve.
- 2) Completely drain the water from the exhaust system into the waterlock.
- 3) Do not attempt to restart the generator set until the cause of the ignition failure has been identified.

**⚠ AVISO ⚠**

*El motor y/o el inversor se suministran sin ningún fluido en su interior. Consulte el manual para seguir el procedimiento de instalación y puesta en marcha.*

The generator set is supplied without any type of fluid inside. Refer to the manual for the installation and commissioning procedure, as well as the fluid capacity for each system (coolant, oil and gearbox oil).



**Moving parts. Keep hands, feet, hair, clothing and test cables away from belts and pulleys when the generator set is running.** Put guards, screens and covers back in place before operating the generator set.

**⚠ WARNING ⚠**

**ROTATING PARTS**  
Can cause severe injury

Do not operate generator set without all guards, screens or covers in place.

**⚠ CAUTION - AVISO - ATTENTION ⚠**  
**ATTENZIONE - ACHTUNG**

**Read and understand the *Operator's Manual for Generator Sets* before operating the generator set or performing maintenance on it.** This will allow you to ensure that safe operating practices and maintenance procedures are followed

**Dangerous voltage.** Only operate the generator set when all the protections and electrical panels are in place.

**Hot parts, coolant and vapour.** Stop the generator set and allow it to cool down before touching or removing any of its parts.

**Moving parts.** Stay a safe distance away from the belts and pulleys while the generator set is running. Put guards, screens and covers back in place before using the generator set.

**Heavy equipment.** The generator set is a heavy unit, so the appropriate tools must be used to transport and handle it.

**⚠ WARNING ⚠**

**THIS GENERATOR CAN BE STARTED REMOTELY**

OBLIGATIONS			
PROHIBITIONS			
DANGERS			

**Do not stand on the generator set.** Standing on the generator set can cause damage, and is also detrimental to its operation.

**CONNECT THE POSITIVE CABLE HERE**  
**CONECTE AQUÍ EL CABLE POSITIVO**

Point where the red positive battery cable and the black negative battery cable are connected to the engine.

**CONNECT THE NEGATIVE CABLE HERE**  
**CONECTE AQUÍ EL CABLE NEGATIVO**

## **⚠ NOTICE**

**Installation label for the generator set exhaust line, above and below the waterline.** See subsection 5.7. Intake and exhaust system.

# Solé Diesel Warranty



## Solé Diesel Warranty

Read the manuals and documentation supplied with each engine before performing any operation or consultation. The engine is supplied without fluids. Ensure that fluids are used in accordance with the specifications set out in Solé Diesel's manuals.

The application of the conditions set out in this document will only be effective for engines or generator sets that were registered after 4 November 2011.

## Solé Diesel Limited Warranty

Solé Diesel warrants that, at the time of shipment, all engines and generator sets meet the anticipated specifications, and are free from manufacturing defects.

For the Solé Diesel limited warranty, the term is effective from the date of sale to the first end purchaser or user of the engine or generator set. If the product is not immediately delivered to the end customer, the warranty comes into effect 6 months after the date of sale. Any limited warranty period that has not expired can be transferred to the next purchaser(s).

Unless otherwise authorised by Solé Diesel, the warranty periods apply according to the time frame in months from the date of purchase, or the limit of operating hours (whichever occurs first), as listed in the table below:

Limited Warranty Periods of Coverage				
Product	Rest		Work	
	Months	Hours	Months	Hours
Propulsion Engines	36	1000	12	2000
Generator sets	36	1000	12	1000

## Solé Diesel Extended Warranty

Solé Diesel provides an extended period of coverage for the following components: engine block, cylinder head, crankshaft, camshaft, flywheel housing, timing gear housing, timing gears and conrod.

Extended Periods of Coverage				
Product	Rest		Work	
	Months	Hours	Months	Hours
Propulsion Engines	24	1500	-	-
Generator sets	24	1000	-	-

## Limitations

### Coverage:

- a) In order to authenticate the warranty, the inspection and pre-delivery sheet must be filled in for the propulsion engine or generator set, and sent to Solé Diesel via an official installer. See SECTION 10.
- b) The warranty covers any failure of the product under normal use conditions, as a result of a manufacturing defect.
- c) The warranty covers the cost of any labour required to replace and/or repair any defective original components, in accordance with the standards established by Solé Diesel. The time covered for completion of such operations is limited to 4 hours.
- d) The warranty covers reasonable travel costs involved in carrying out the required operations. Trip limited to 300 kilometres or a maximum of 3 hours.

### Exclusions of the coverage:

- a) The warranty will only be extended to Solé Diesel products. It will be invalidated if products from other manufacturers end up being unsuitable, or causing the failure or malfunction of our products.
- b) The warranty will not be in effect if the inspection and pre-delivery sheet has not been correctly filled in for the propulsion engines or generators, and sent to Solé Diesel via an official installer. See SECTION 11.
- c) The warranty will be void if the maintenance checks and services indicated in the use and maintenance manuals have not been carried out correctly. If the warranty is applied, proof of maintenance checks and services that exceed the requirements indicated in these manuals must be shown.
- d) Deterioration caused by a storage period of more than 6 months, and/or storage that does not comply with the procedures set out in the use and maintenance manuals. In addition to deterioration caused by not complying with the hibernation procedures specified in the use and maintenance manuals.
- e) Failure due to negligence, lack of servicing, accidents or abnormal use, and improper service or installation.
- f) Failures due to the use of components not manufactured or sold by Solé Diesel.
- g) Failures due to electrical installations that do not meet the design specifications, or that have not been explicitly approved by Solé Diesel.
- h) Failures due to application and operation using fuels, oils or lubricants that are not authorized by Solé Diesel.
- i) Failure due to water ingress in the cylinder(s) via the exhaust system.
- j) Failure of propulsion engines due to the use of a propeller(s) that is not suitable for the load or application. It is recommended that you contact Solé Diesel for guidance in choosing the correct propeller(s).
- k) Failure due to a general oversight related to the procedures set out in the use and maintenance manuals.
- l) Components subject to normal operating wear.
- m) Costs related to telephone communications, loss of time or money, inconvenience, launching, grounding, removal or replacement of the boat's parts or equipment as required by the boat's design in order to gain access to the engine, and any damage and/or accidents resulting from a failure.

# Solé Diesel Warranty



## Responsibilities

### Manufacturer's responsibilities:

Solé Diesel's obligations are limited to the repair of defective parts or, AT THE DISCRETION OF Solé Diesel, returning the purchase money or replacing the parts in order to avoid any malfunction resulting from defective materials or manufacturing faults covered by the warranty.

Solé Diesel reserves the right to modify the design of any product without assuming any obligation to modify a previously manufactured product.

This manual, in addition to any technical documents, manuals or sales brochures, may be subject to change without notice.

### Purchaser's responsibilities:

The care, operation and maintenance of the product, in accordance with the specifications in the use and maintenance manuals, is the responsibility of the purchaser. The purchaser must provide evidence of all maintenance services performed. The costs of such services, as well as the components and fluids replaced as part of these services, are to be borne by the purchaser.

The maintenance operations described in this manual must be carried out during the Contractual Warranty Periods (Limited and Extended Coverage) by a Solé Diesel AUTHORIZED SERVICE. Failure to comply with this condition will completely invalidate the warranty. The purchaser is responsible for all materials (oils, filters, etc.) and labour. You should keep the invoice for any work carried out, as proof of completion.

If the service is not covered by the warranty, the purchaser must pay for all labour, related material and any other expenses associated with the service.

Any product or component sent by the purchaser for inspection and repair will be sent at the purchaser's expense.

## Contact with after-sales service

Any claims must be made during the warranty period, by notifying the nearest authorized Solé Diesel agent. They will then arrange for repair and inspection, providing the service that is covered by the warranty.

The purchaser must provide proof of purchase, and evidence of the date of purchase by presenting the purchase invoice for the product supplied, or a copy thereof, to the authorized agent. The agent will not deal with warranty claims until the date of purchase has been verified.

The following additional information should also be provided:

- a) Owner's name, address, and phone number.
- b) Model number and serial number of the product.
- c) Number of hours the product has been in operation.
- d) Detailed description of the problem.
- e) Report any repairs or installations carried out by an external service to the Solé Diesel distribution network, detailing the operations carried out.
- f) For an updated list of our distribution network, please visit the Distributors section of our website [www.solediesel.com](http://www.solediesel.com)

Or request the information by contacting Solé Diesel:

**e-mail:** [info@solediesel.com](mailto:info@solediesel.com)  
**Tel:** +34 93 775 14 00

# Information about the generator set

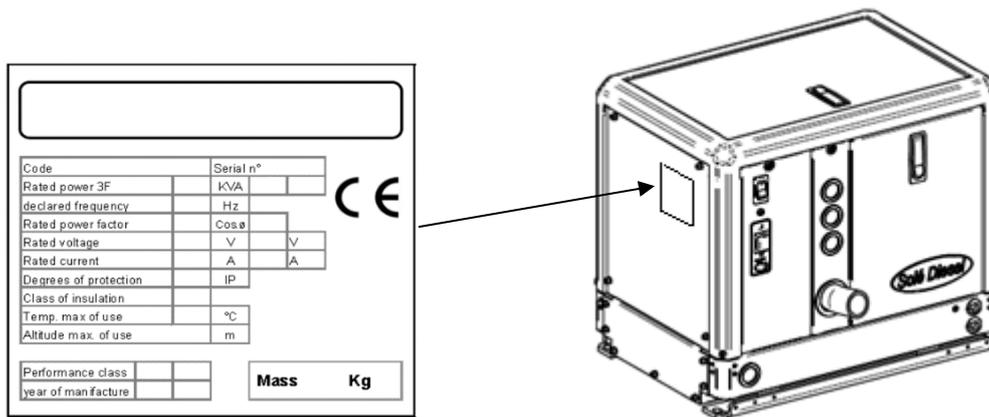


## Section 1 - Information about the generator set

### 1.1. Identification of the generator set

Identification label:

The engine identification plate is located on one of the enclosure's protective covers, as shown in the below picture.

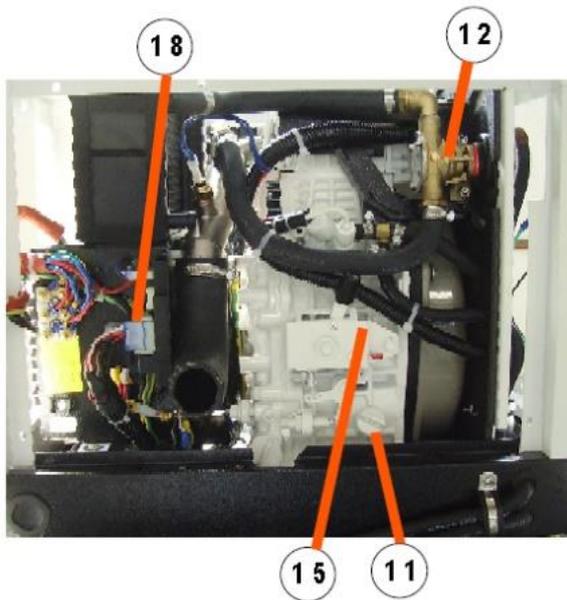


### 1.2. Identification of the parts of the generator set

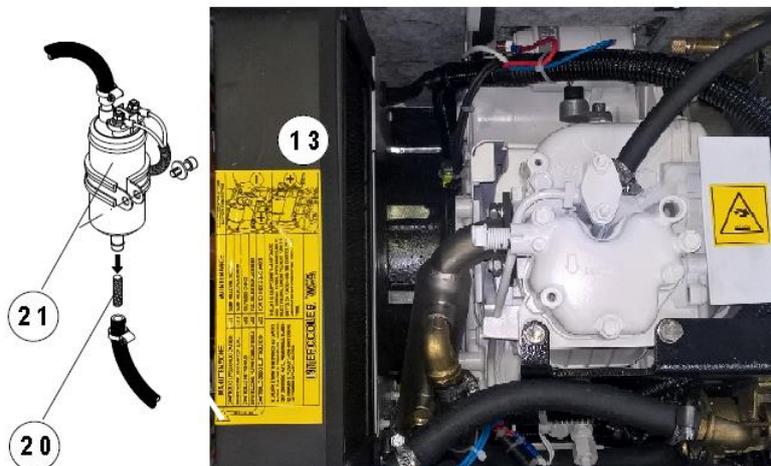
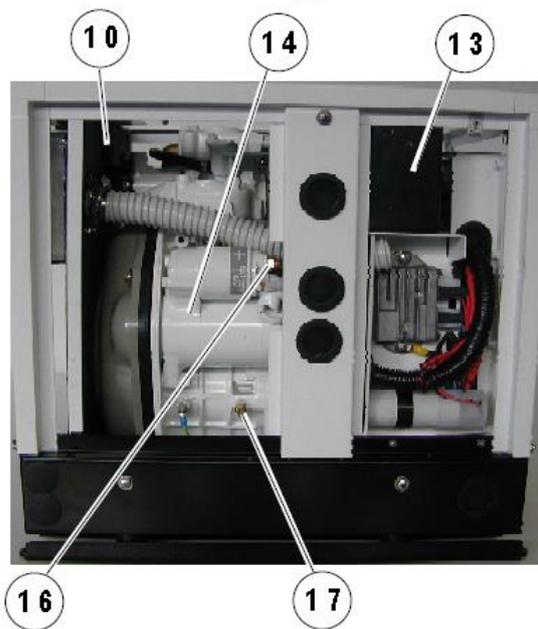


NUMBER	PART
1	Soundproofing enclosure
2	Upper access door
3	Side access door
4	Power line connection door
5	Anchoring brackets
6	Emergency stop
7	Exhaust and sea water outlet
8	Sea water inlet
9	Fuel connection

# Information about the generator set



NUMBER	PART
10	Air filter
11	Oil filler cap
12	Sea water pump
13	Water exchanger
14	Starter motor
15	Speed adjustment screw for the engine
16	Battery connection terminal (+)
17	Battery connection terminal (-)
18	Control panel connection
19	Zinc anodes
20	Fuel filters
21	Fuel pump



## Section 2 - Transport, handling and storage

### 2.1. Reception

Once the generator set has been delivered, make sure that the packaging was not damaged during transport, and that no components have been tampered with or removed from the packaging (see information marked on covers, bases and cartons).

Move the generator set as close as possible to the installation site, while it is still in its packaging. Then, remove the packaging material, checking that the goods supplied correspond to the order specifications.

#### **▲ NOTICE**

If you notice any damage or missing parts, inform the Solé Diesel S.A. after-sales department and the carrier immediately. Send photographic evidence of the damage.

After inspecting the goods, if you notice any damage, write a reservation on the delivery note. Ask the carrier to endorse the note and inform Solé Diesel S.A., preferably by e-mail (info@solediesel.com).

### 2.2. Transport and handling of the generator set while it is in its packaging

The generator set should ONLY be lifted or transported using a forklift or overhead crane that has the appropriate load capacity, with chains that are equipped with suitable safety hooks for lifting the load.

The use of any other system automatically invalidates the insurance guarantee that covers possible damage to the generator set.

In order to unpack the generator set, follow these steps:

1. Remove the cardboard box.
2. Attach suitable chains to the eyebolts on the generator set and lift it using a forklift truck.
3. Move the generator set to the intended installation location.
4. Remove the wooden support.
5. Begin installation operations.

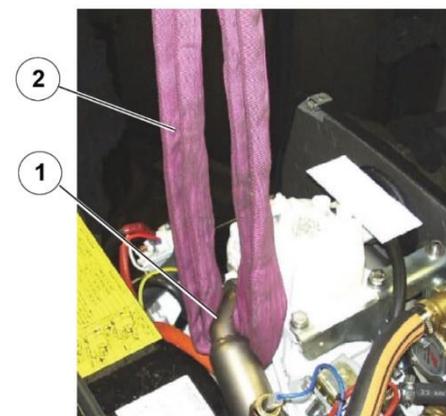


# Transport, handling and storage



## 2.3. Transport and handling of the generator set once its packaging is removed

Once the packaging has been removed from the generator set and it is ready for transport, only use the attachment point shown below:



NUMBER	PART
1	Exhaust elbow
2	Attachment sling

The exhaust elbow is designed and dimensioned to allow it to carry the load of the assembly. This allows the generator set to be handled and transported safely.

## 2.4. Storage of the generator set before and after its packaging is removed

If the generator set is to be left inactive for long periods of time, the customer must check the possible storage conditions at the location where it will be stored.

If the generator set is not going to be used for long periods of time, and is to be kept in storage, all relevant technical specifications must be adhered to.

The treatment of the generator set for storage is guaranteed for a period of 6 months after the delivery date.

### **⚠ NOTICE**

If the user decides to switch the generator on after a long period of time, they must do so in the presence of an authorized technician.

# Installation

## Section 3 - Installation

### 3.1. Operation on a gradient

Ensure that the generator set is installed on a level surface. If not, operation is permitted at a maximum gradient of 30°

### 3.2. Installation site

You must leave sufficient space around the unit to allow the following operations to be carried out:

- The generator must be installed in a room that is sufficiently well-ventilated, and that is able to provide the air capacity that is necessary for correct engine combustion.
- The room must be separated from living areas and soundproofed.
- The generator must be positioned in such a way as to facilitate normal maintenance operations.
- It is advisable to install the generator set in the engine room, as long as the above conditions are met.
- The surrounding air must be free from particles and impurities.
- The ambient air temperature at the installation site should be between -5 °C and +40 °C. The relative humidity should not exceed 50%. A relative humidity of 90% at +20 °C and 100% at +25 °C is permissible.

### 3.3. Securing the on-board generator set

To ensure that your generator operates correctly, it is very important to have a solid, level mounting platform. Select a location that has sufficient space for ventilation and maintenance on all sides.

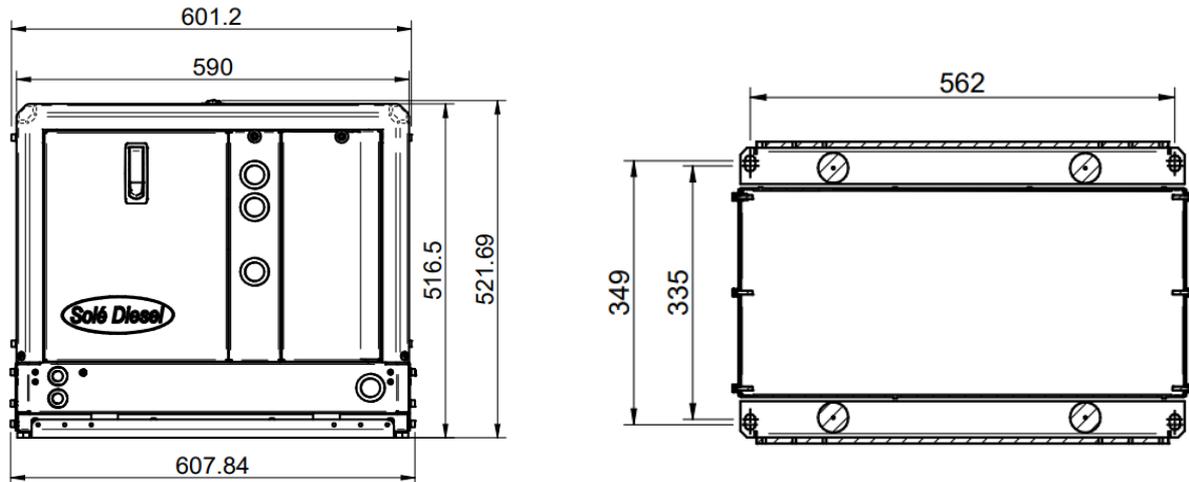
Place the generator far away from any cabins, and from splashes and vapours.

The mounting platform can be made of wood, metal or fibreglass. It should be installed horizontally, and it should be as small as possible in order to minimize vibrations. A low platform is preferable, as it will be stable and easy to build. If a higher mounting platform is used, it must be very solid in order to prevent it from resonating and vibrating (see illustrations).

If an installation has a mounting surface that is not ideal, and the vibration damping supports provided with the generator are not suitable for damping its vibration or resonance, the solution may be to place a plate between the generator and the boat's mounting platform. This will also improve the sound insulation. This plate should consist of a 3 cm thick wooden board, weighing between 10 kg and 15 kg, and some soft rectangular supports. Place these supports so that they sit diagonally in relation to the supports of the generator, not in line with them (see illustration).

# Installation

The generator supports can face any direction. Mount the plate on the boat's platform and then mount the generator onto the plate.



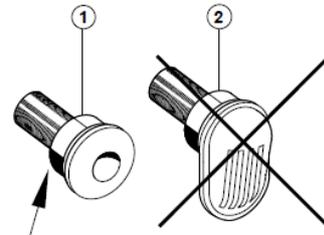
## 3.4. Cooling System

The engine is cooled by an open circuit system that seawater circulates through. The flow rate of this seawater circuit is 1,200 litres/hour. After installation, it is necessary to provide a seawater supply circuit for cooling, as well as an exhaust system for the combustion gas/water mixture.

### 3.4.1. Seawater circuit

There are two systems that are normally used on boats for the introduction of water:

- 1 - Direct drive system
- 2 - System with deflector



The direct drive system is recommended, as it prevents pressurised water from getting into the suction pipes, creating a vacuum that is easily overcome by the prevalence of the generator set water pump.

The deflector system may cause the following problems:

a - If it is mounted with the slots facing the bow. In this case, when sailing, and when the generator is off, pressure is generated in the water inlet pipe. This can cause the system to fill up, allowing water to possibly get into the engine cylinders.

b - If it is mounted with the slots facing the stern. In this case, when sailing, a depression may be created in the water inlet pipe, causing the water pump to malfunction or limiting the water flow, which in turn may cause the generator set to overheat.

# Installation

## 3.4.2. System components

### 1 - Water intake valve 1/2"

#### **▲ NOTICE**

If the unit is installed at a height of more than 1 metre above the waterline, a non-return valve must be fitted in order to prevent the water circuit from draining when the engine is switched off. If it drains, the water pump impeller may be damaged during start-up. Similarly, when the unit is started up for the first time, it is necessary to manually fill the suction pipe, from the valve all the way to the pump.

### 2 - Ball valve (General system) 1/2".

### 3 - Ball valve (system purge) 1/2".

This is used to empty the cooling system of the generator set for the purposes of general maintenance, or in advance of long periods of inactivity.

### 4 - Water filter.

This must effectively protect the cooling system from possible ingress of mud, sand or algae.

#### **▲ NOTICE**

The water filter must be a fine one. A filter of 2 - 470 microns is recommended.

### 5 - Anti-siphon valve

The generator set can be installed below sea level. If this is the case, the safety vacuum breaker valve must be mounted on a wall to one side of the generator, at least 50 cm above the outer waterline. Two additional holes are provided in the covers which should be used for anti-siphon pipes.

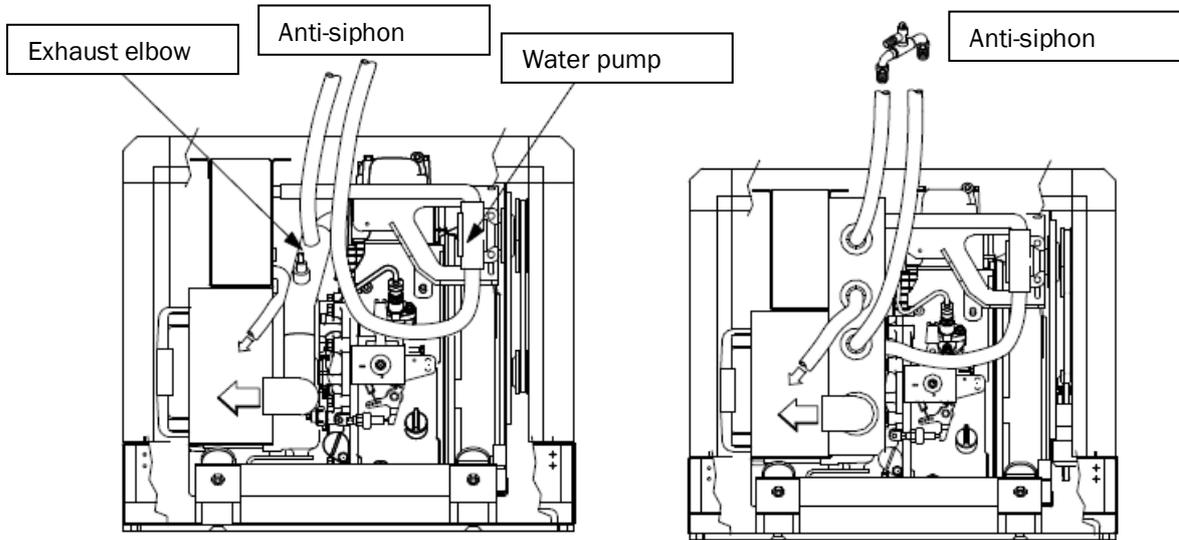
The salt water inlet is usually designed to be asymmetric, so that, depending on the direction in which it is mounted, it can generate pressure or a vacuum in the water circuit when the boat is sailing. In a generator, the water inlet must be mounted in whichever direction will create a vacuum. Otherwise, when the boat is sailing and the generator is not running, it will lead to water ingress, flooding the exhaust line with water, which will eventually reach the engine oil sump and cause serious damage to it.

If a hole cannot be made in the hull for the water inlet, the water line can be connected in parallel with the water inlet for the main engine. In this case, two shut-off valves are required, due to the fact that a failure in the main engine pump could affect the cooling of the generator set, and vice versa.

#### **▲ NOTICE**

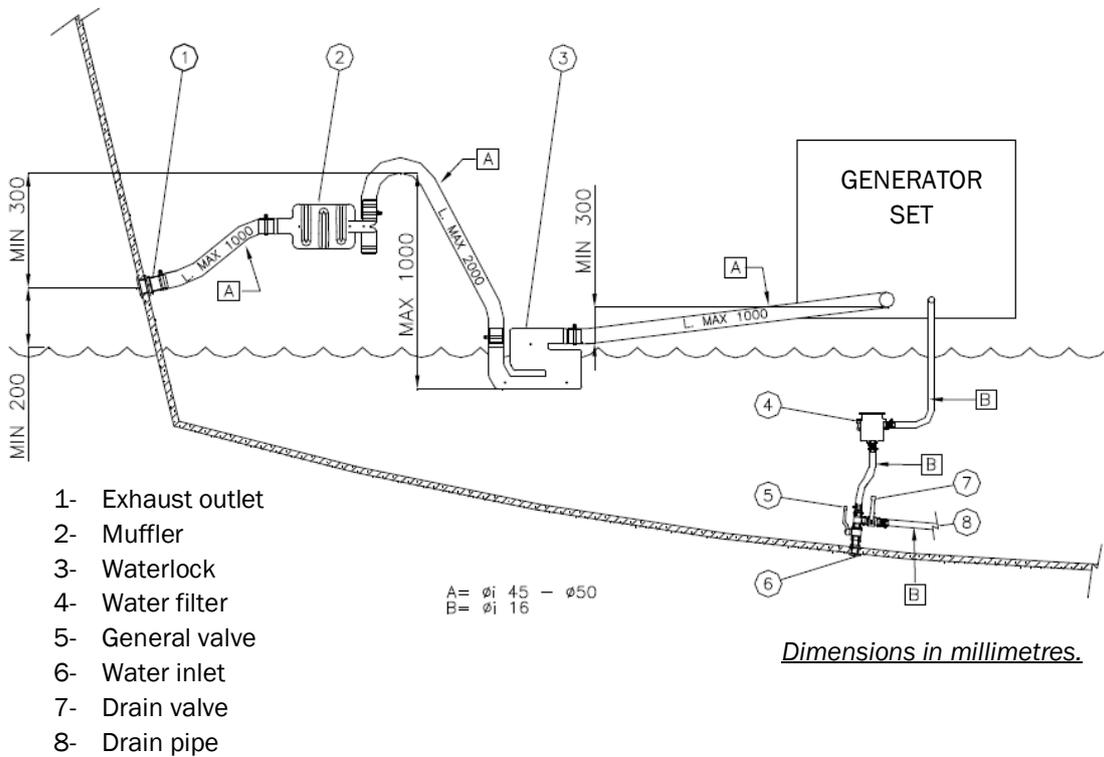
Poor installation can result in engine damage.

# Installation



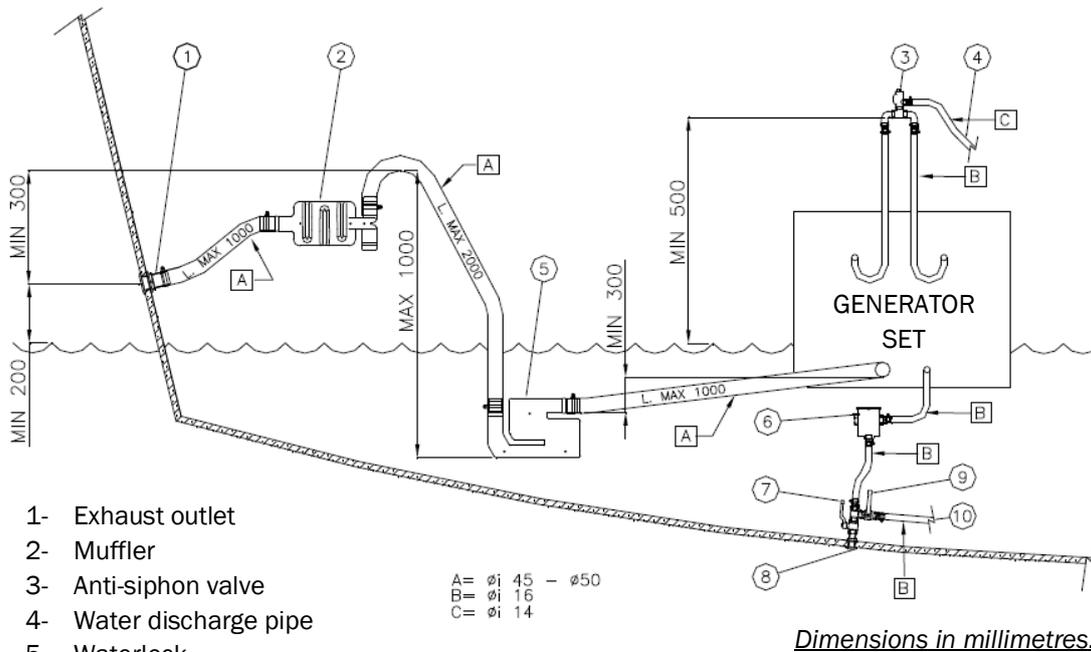
### 3.4.3. Examples of installation

Example of generator set installed above the waterline:



# Installation

Example of generator set installed below the waterline:



- 1- Exhaust outlet
- 2- Muffler
- 3- Anti-siphon valve
- 4- Water discharge pipe
- 5- Waterlock
- 6- Water filter
- 7- General valve
- 8- Water inlet
- 9- Drain valve
- 10- Drain pipe

A= øi 45 - ø50  
 B= øi 16  
 C= øi 14

*Dimensions in millimetres.*

## **▲ NOTICE**

Poor installation can result in engine damage.

### 3.5. Exhaust system

The exhaust system for the generator set must be independent of the exhaust system for the main engines.

## **▲ NOTICE**

The length of the exhaust pipe, from the muffler to its highest point, must not exceed 2 metres. This prevents any water that is left inside the pipe after the generator set has been switched off from returning to the engine after having filled the muffler and exhaust manifold.

#### 3.5.1. System components

**1 - Exhaust manifold** (3.5 litre capacity). This attenuates the exhaust noise and prevents the flow of water from returning to the engine. It is recommended that the muffler be installed at a distance of no more than 1 m from the generator, and that it be placed at a height that is equal to or less than the base of the generator.

# Installation

**2 - Muffler.** This reduces the noise even further. It is recommended that it be installed at a distance of no more than 1 m from the exhaust outlet.

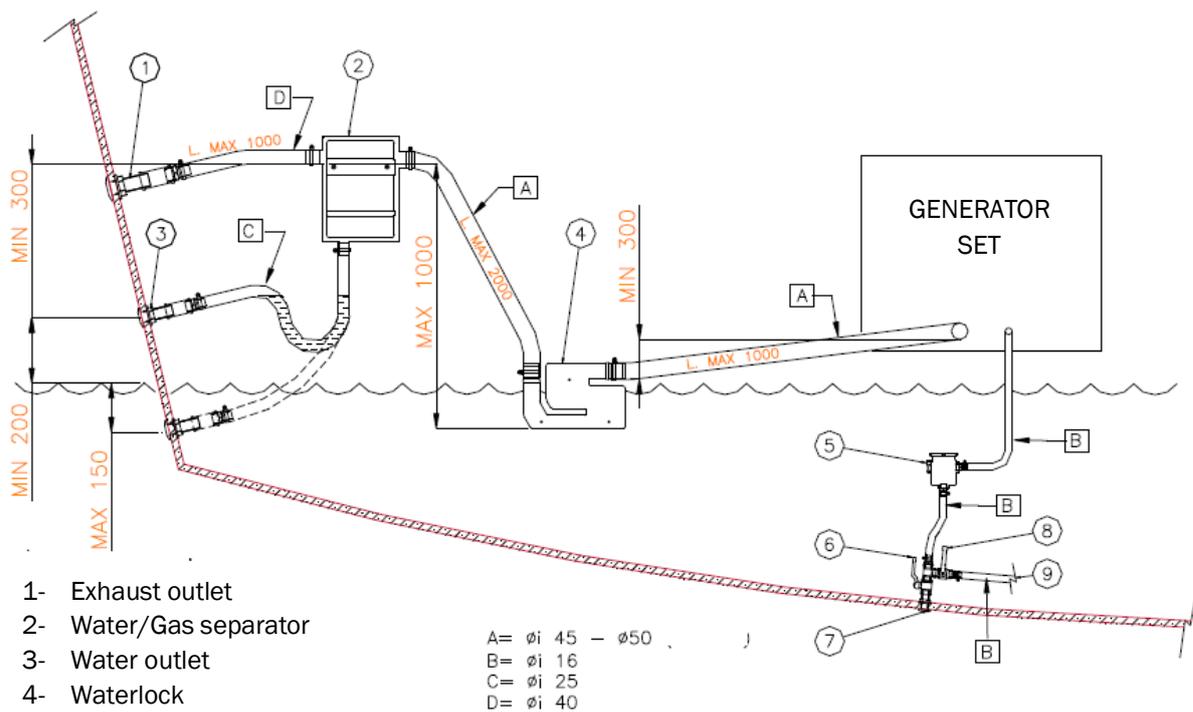
**3 - Exhaust outlet.** This must be installed above the sea line.

## 3.5.2. Examples of installation

**STANDARD SYSTEM:** for soundproofing, the best result is obtained by fitting the 3 usual exhaust silencers: waterlock (reduces noise by 50%), muffler (reduces noise by a further 20%) and gooseneck (reduces noise by a further 10% and avoids the risk of inlet caused by waves).

**IMPROVED SYSTEM:** to obtain improved sound damping, a water separator is mounted instead of the third muffler. The cooling water is then discharged separately from a different hole, flowing smoothly and avoiding the noise produced by the water distributed from the exhaust pipe.

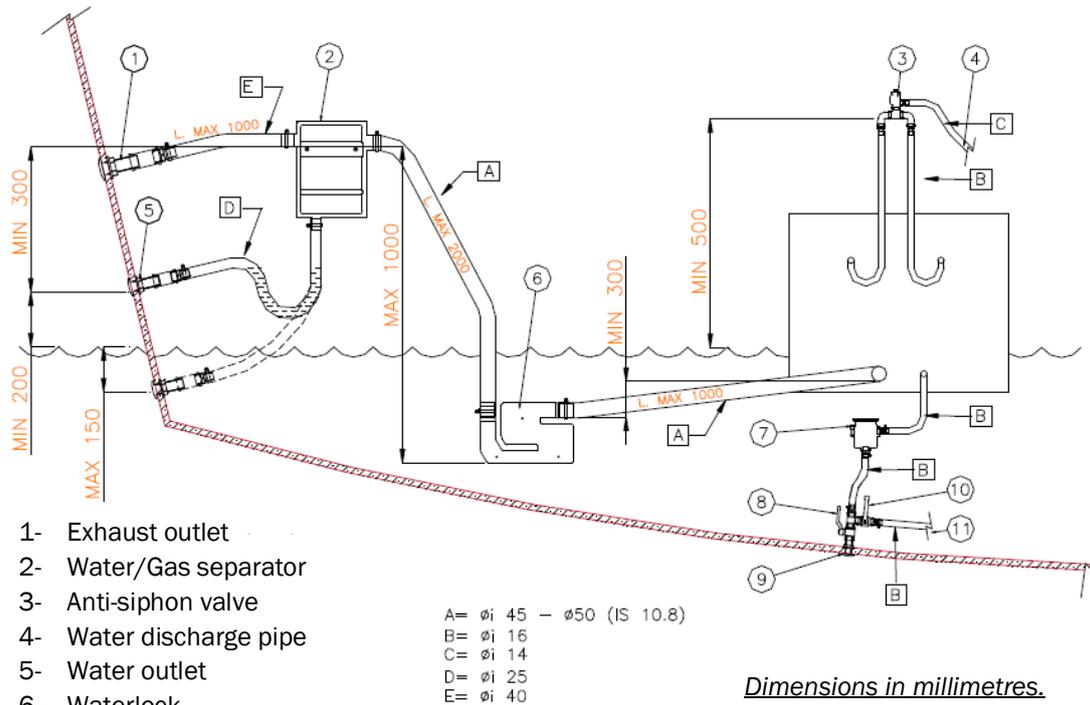
Example of generator set installed above the waterline:



*Dimensions in millimetres.*

# Installation

Example of generator set installed below the waterline:



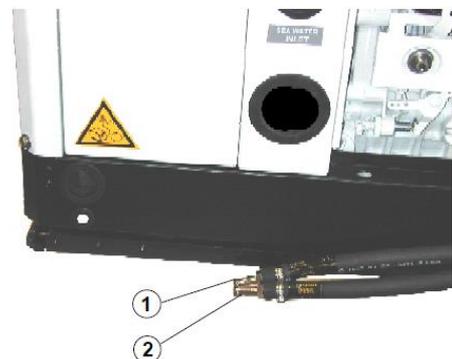
## **NOTICE**

Poor installation can result in engine damage.

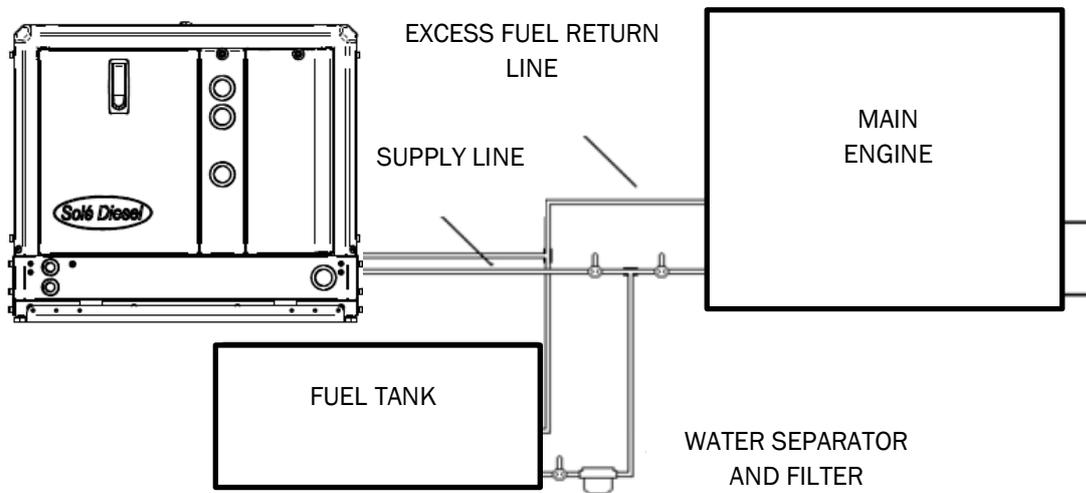
### 3.6. Fuel system

The generator set is powered by DIESEL. The fuel inlet (2) and the fuel return (1) must be connected as shown in the picture below.

Normally the main fuel tank of the boat is used. The feed pump, which is driven by the engine, can provide suction from a maximum height of 1 m., with no limit on length. A separate line coming from the tank avoids problems with air bubbles. However, in some cases, fuel can be obtained from the main engine pipe. In this instance, two shut-off valves are required, because a failure in the main engine feed pump non-return valve could affect the generator set.



# Installation



When it is connected to the fuel tank, a fuel filter must be installed. It is also good practice to install a tap in the supply line downstream of the tank, and a one-way valve (a non-return one only if the height difference is greater than 50 cm) to prevent the fuel system from being drained for any reason. Use a valve with an opening of 50 millibars. The fuel pipes must be made of hydrocarbon-resistant rubber, with an internal diameter of 6 mm.

The fuel filter must be a cartridge-type filter, with a filtering grade of 5 to 10 microns.

## **NOTICE**

The unit is equipped with automatic naphtha purging. If manual purging is required, press the "ON" button on the control panel and wait 30 seconds before switching the unit on.

## 3.7. Electrical system

### 3.7.1. Battery connection

A separate 12V battery, with a minimum capacity of 45 Ah, must be used to start the unit. It must be connected to the generator terminal as shown in the below picture, using cables that have a section of 25 mm<sup>2</sup>, that are up to 5 meters long, or cables that have a section of 35 mm<sup>2</sup> for greater distances. The following sequence of operations must be followed:

- First, connect the positive (+) terminal of the battery to the terminal marked with the (+) symbol on the generator. (STARTER MOTOR) - Then connect the negative (-) pole of the battery to the terminal marked with the (-) symbol on the generator.

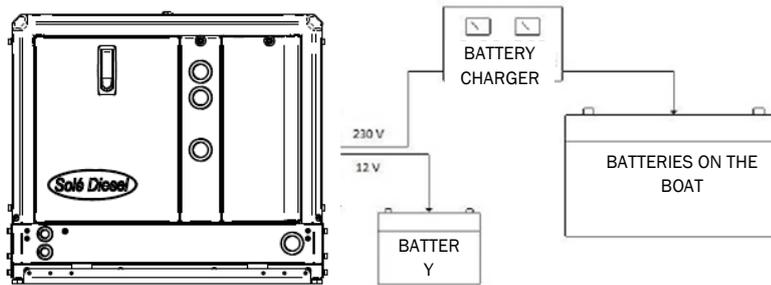


- Spray the connections with specially-designed mineral grease, to reduce oxidation or corrosion. The generator is equipped with an electronic device that automatically charges the starter battery, which is capable of supplying 10 A, at a voltage of 12V, when fully charged.

# Installation

## ⚠ NOTICE

Install the battery in a ventilated room, separate from the generator and any other device that may produce heat or sparks. Periodically check the condition of the terminal connections and the battery water level. If the cables need to be disconnected, reverse the order that was recommended for connecting them. Do not reverse the polarity of the connection cables. If this happens, the generator and the battery could be seriously damaged. Do not connect other loads to the battery. To minimize galvanic currents, the (-) of the generator battery should not be connected to the (-) of any of



the other on-board batteries.

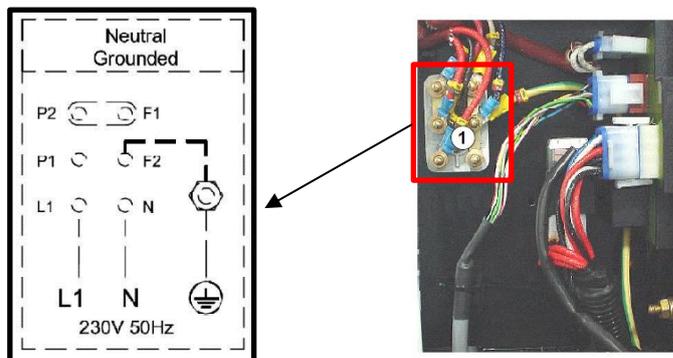
### 3.7.2. Control panel connection

Connect the control panel to the generator set using the wiring supplied with the engine. Before connecting the cable to the generator set, run the panel cable through the hole. Do not use any devices other than the control panel supplied with the set, as they may not be compatible with this generator. Connect the cables when the battery is disconnected. The control panel is supplied with a connection cable. It is important that this cable is not modified, as this could cause a malfunction of the dashboard circuit.

For further information, please refer to the user manual of the control panel that is supplied with the generator set.

### 3.7.3. Load connection (AC)

This connection can be made through the power supply terminal board, as shown in the below picture.



# Installation

## **⚠ CAUTION**

**Grounding a generator set.** High voltage can cause serious damage or death. Electrical conduction is possible whenever there is electricity. Disassemble the main thermal magnetic circuit breakers on all power outputs before making repairs to the equipment. Configure the installation so that the generator set and electrical circuits are grounded when in use. Avoid contact with electrical conductors or appliances when your feet are in water or on wet ground, as the risk of electrical conduct increases under these conditions

## **⚠ CAUTION**

**Short circuits.** High voltage can cause serious damage or death. Short circuits can cause physical damage and/or damage to equipment. Avoid coming into contact with electrical connections through equipment or jewellery. Do not wear wristwatches, rings and jewellery when working on the electrical circuits. Electrical feedback stops its operation. Feedback voltage can cause serious damage or death.

## **⚠ CAUTION**

Only connect the generator unit to the boat's electrical system through an approved electrical system. The feedback connection can cause serious injury or death to personnel working on the electrical lines and/or to personnel near the work area.

- Make sure that the sum of the loads to be powered does not exceed the rated power of the generator set.

- Although the unit is equipped with a magnetothermal relay, it is recommended that magnetothermal relays or similar protections be placed between the generator and the users.

- In order to have both parallel and serial connections, use the special jumpers supplied with the generator set accessories on the terminal board.

### 3.7.4. Switch (shore power connection/generator)

Since most boats have a 230 V power supply line installed that comes from the shore power connection, it is essential that the main socket and the generator are never be connected to the boat's installation at the same time.

A manual safety switch or an automatic safety switch must be provided.

Both lines, or the generator line at the very least, must be protected by a magnetothermal safety switch, which should be installed on the panel of the main switchboard. A switch must be installed on the network line to allow the power generated by the set to be switched over to power from an external source. The switch must be the correct size for the loads involved.

## **⚠ CAUTION**

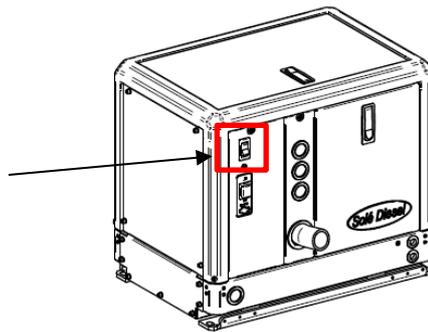
Do not connect the generator set to a public power system (e.g. docks, harbours, houses, other boats, etc.). The feedback connection can cause serious injury or death to personnel working on the electrical lines and/or to personnel near the work area.

## **CAUTION**

The generator should only be installed by qualified technicians. Malfunctions due to improper installation can cause injury or death. Do not modify the default electrical connections for other applications. If necessary, contact our distributors.

### 3.7.5. Emergency stop

In an emergency, the generator can be stopped by pressing the switch shown in the below picture:



### 3.7.6. Pre-Start Checklist

Carry out these checks and inspections to ensure that the generator set operates correctly. Some of the checks also require verification after the unit has been started up.

**AIR FILTER:** Check that a clean air filter is installed, in order to prevent unfiltered air from entering the generator set.

**AIR INLETS:** Check that the air inlets are clean and free from obstructions.

**BATTERY:** Check that the battery connections are tight.

**EXHAUST SYSTEM:** Check for exhaust leaks and obstructions. Check the condition of the muffler and piping system and verify that the exhaust system connections are tight. Check that the exhaust outlet is not obstructed.

**FUEL LEVEL:** Check the fuel level and keep the tank(s) filled up in order to ensure adequate fuel supply.

**OIL LEVEL:** Ensure that the oil level is kept below the higher marking on the dipstick, and above the lower marking.

**AREA OF OPERATION:** Check that there are no obstructions that could block the flow of the air intake.

**PRIMING THE SEA WATER PUMP:** Prime the sea water pump before the initial start-up. To prime the pump:

- Close the water intake valve
- Remove the hose from the outlet of the sea water filter
- Fill the hose and the sea water pump with clean water
- Reconnect the hose to the outlet of the water filter
- Open the water intake valve

Confirm that the sea water pump is operational at start-up. This is indicated by the discharge of water from the exhaust outlet.

# Installation

SUPPLY LINES: Check that the valves in the following supply lines are definitely open:

- Coolant salt water
- Fuel suction
- Excess fuel return

SAFETY SWITCH: Check that the main AC safety switch is SWITCHED OFF

SWITCH (SHORE POWER CONNECTION/GENERATOR): Check the position of the switch. This prevents the shore power connection from being simultaneously connected to the generator output.

# Operation

## Section 4 - Operation

### 4.1. Start-up of the generator set

- 1- Open the water intake valve: Before starting up the generator set, open the water intake valve to allow coolant water to flow through. Failure to do so could damage the water pump impeller and cause serious damage because of overheating.
- 2- Press the **START** button on the panel. The generator set takes a few seconds to start up (the time that this takes depends on the model)

#### ELECTRICAL START-UP

1. All AC loads must be disconnected before start-up. This precaution will prevent any damage that may be caused by the unexpected operation of AC machinery, and it will prevent the cold engine from stopping.
2. To start up the generator, press the **START** button on the control panel. The generator has a 12 V DC electric starter. The yellow start-up indicator will switch on and start flashing. As soon as the engine starts, the yellow start indicator will switch off and the green indicator will switch on.

If start-up fails, the yellow indicator will continue to flash. To reset the circuit, press the **STOP** button.

Then apply a light load to the generator and allow the engine to reach its operating temperature before applying any heavier loads.



If the engine is cold, it may not operate in a stable manner. This situation can be mitigated once the engine has heated up, and the generator loads are applied.

### 4.2. Stopping the generator set

1. **REMOVE THE LOAD FROM THE GENERATOR SET.**
2. **PRESS THE STOP BUTTON** on the control panel.
3. **TURN OFF THE WATER INTAKE VALVE**

# Operation

## 4.3. Operating the generator set at low temperatures

When the atmospheric temperature drops below zero, the following circumstances may occur:

- The coolant (salt water from the cooling system) can freeze.
- The oil increases in viscosity.
- There is a voltage drop at the battery terminals.
- The air inlet temperature is low, and it is more difficult to start the generator set.
- The fuel is less fluid.

To avoid the damage that can be caused by operation at low temperatures, the generator set must be prepared as follows:

1. Close the sea water valve when the generator set is stopped. Open the sea water filter cover and start-up the generator set, adding a mixture of fresh water and concentrated anti-freeze agent (see container label) until the sea water circuit is completely filled. Stop the generator set and replace the sea water filter cover. Before restarting the generator set, open the sea water valve.  
Repeat this operation whenever the generator set is being used at temperatures below 0 °C.
2. Use oil that is of suitable quality and viscosity. SAE 15W40 is recommended.
3. Cover the battery with a suitable material to protect it from the cold. Check that the battery is fully charged.  
It is also advisable to apply a dielectric spray to the electrical connections.
4. Before starting up the generator set, make sure that the spark plugs have heated up sufficiently.
5. If necessary, replace the diesel that is normally used with a specific low-temperature diesel. The accumulation of impurities in the fuel tank could lead to faulty ignition.

### **NOTICE**

All generator sets, when not in use, are susceptible to rust and corrosion on any machined surfaces that are not protected by a coating of paint. The degree of corrosion depends on changes in weather and climate. Therefore, the following recommendations are general in nature, but they may help to prevent or reduce the risk of damage caused by oxidation.

# Operation

## 4.4. Hibernation and prolonged storage

If the boat is not going to be used for a long period of time, or for the entire winter, certain tasks must be carried out to ensure that it remains in perfect working order. If care is not taken, internal parts can rust and cause damage to the generator set. When storing the generator set, the below instructions must be followed:

1. Clean the outer surface of the generator set.
2. Drain the seawater circuit, filling it with fresh water. Refill the seawater circuit with a mixture of fresh water and antifreeze agent.
3. Remove the impeller from the seawater pump, clean it with fresh water and store it in a place that is protected from dust and sunlight.
4. Replace the oil and oil filter of the generator set.
5. Cover the air inlet.
6. If the fuel tank is small, empty it completely and clean it. Fill it up again with a mixture of diesel and anti-corrosion additive. Solé Diesel S.A. recommends DIECYL PLUS. Add one measure of this additive for every 25 litres of diesel. On the other hand, if the fuel tank is large, add 1 litre of this additive for every 500 litres of diesel.
7. Clean and dry the area where the generator set is installed.
8. Loosen the straps.
9. Apply dielectric spray to the electrical connection, remove the battery and charge it several times during the period of time when it is not being used.
10. Apply moisture repellent spray to the generator set.

## 4.5. Restoration of operating conditions

When the generator set is being restarted after it has been in hibernation storage, certain operations must be carried out. Follow these steps:

1. Fill the fuel tank with clean diesel. The mixture of diesel and anti-corrosion additive that was in the tank during the winter storage period can be used to run the generator set.
2. Check the fuel filter. If the filter is obstructed, replace it.
3. Replace the engine oil.
4. Check the condition of the rubber hoses in the cooling circuit.
5. Reconnect the battery and apply a layer of neutral petroleum jelly to the terminals.
6. Remove the supports from the nozzles and clean the nozzles. If possible, check the adjustment of the nozzles in a workshop. Then install the clean nozzles.
7. Connect the cooling and exhaust systems. Open the salt water valve.
8. Check the fuel, cooling and oil systems for leaks

## Section 5 - Systems and Scheduled Maintenance

### 5.1. Description of operation

Information on special tools required and basic safety precautions.

#### Disassembly:

- ✓ Use the right tools and instruments. Using the wrong tools and instruments can cause injury, or serious damage to the generator set.
- ✓ Use a repair stand or workbench if necessary. Also, use assembly drawers to store the parts from the generator set in the order that they were removed.
- ✓ Keep the disassembled or cleaned parts in the order they were removed. This will save you time when it comes to reassembling.
- ✓ Pay attention to the markings on any assemblies, components and parts in order to see the correct position or direction. Make your own markings, if necessary, to help you reassemble it.
- ✓ Carefully check the parts for defects when removing or cleaning them. Any signs of abnormal wear are evidence of the fact that parts or assemblies are malfunctioning.
- ✓ When lifting or carrying heavy parts, ask someone for help if the part cannot be comfortably handled by one person. Use jacks and pulleys where necessary.

#### Reassembly:

- ✓ Clean all the parts of the generator set with cleaning solvent and dry them, except the oil seals, washers, rubber seals, etc.
- ✓ Only use the correct tools and instruments.
- ✓ Only use good quality lubricating and greasing oils. Be sure to apply a coat of oil, grease, or sealant to the parts, as specified.
- ✓ Use a torque wrench to adjust the parts that require specific torques.
- ✓ Put all seals and covers back in place. Apply an adequate amount of adhesive or liquid seal where required.

#### **▲ NOTICE**

- ✓ Increase the frequency of maintenance where the operating conditions are tough (frequent stops and starts, dusty surroundings, long winter season, no load operation).
- ✓ Risk of burns during maintenance operations that are carried out when the generator set is hot. Wear appropriate protective clothing.
- ✓ Cleaning the generator set with compressed air is strictly prohibited.
- ✓ Carrying out maintenance/cleaning operations when there are moving parts is strictly prohibited.
- ✓ Wear gloves, coveralls, etc. to protect your body from burns.

### 5.2. Programme for routine maintenance

Maintenance and fault diagnosis procedures entail risks that can lead to serious injury or death. Therefore, these procedures should only be carried out by qualified electrical and mechanical specialists. Before carrying out any maintenance or cleaning work, make sure that there are no moving parts, that the generator housing has cooled down to room temperature, that the power generating equipment cannot be accidentally switched on, and that all procedures are strictly adhered to.

# Systems and scheduled maintenance



	Element to be inspected	Intervals							
		Daily	First 20 – 50 h	Every 200 h	Every 400 h	Every 800 h	Annually	Every 2 years	Winter storage and maintenance
<b>General</b>	Tightening of screws, attachment.		I		I				
	Engine block.								C
	Clearance of valves.				I				
	Exhaust gas, noise and vibrations.	I							
	Compression pressure:					I			
<b>Lubrication system*</b>	Generator set oil.	I	R		R		R		R
	Oil filter.		R	R					
<b>Fuel system</b>	Fuel level.	I							
	Fuel tank.							C	E/C/I
	Fuel filter.				R				
	Water separator filter (if applicable).		E		R				
	Injection pump.					I			
	Injector.					I			
	Purging of the supply system.							I	
<b>Cooling System</b>	Coolant.	I						R	R
	Sea water circuit.								I/C
	Water filter.	I	C	C					
	Sea water valve.	I							
	Sea water pump impeller.			I/R	I				I/C
	Zinc anode.			I/R					
<b>Intake system</b>	Air filter (if installed)		I		R			R	I
<b>Electrical system</b>	Instruments.	I							
	Starter motor and alternator.				I				
	Belts.		I		I	R			I
	Battery level.		I	I		R			
	Main alternator - Electrical insulation.					I			I

\*Use oil with a viscosity of 15W40, and a quality no less than ACEA E5 or API CH-4/SJ. I: Inspect, adjust or fill. E: Empty. R: Replace. C: Clean.

# Systems and scheduled maintenance



## 5.3. Lubrication system

Forced oil lubrication system with a gear pump and without an oil filter.

### Oil specifications

Use oil with a viscosity of 15W40 (an all-season oil for temperatures between -15°C and +40°C), or select the viscosity that is most suitable for the atmospheric temperatures at which the generator set will be used. Use oil with a quality no less than ACEA E5/E3 or API CH-4/SJ. Other generator set oils may affect the coverage of the warranty, cause internal generator set components to seize up and/or shorten the life of the generator set.



Never mix different types of generator set oil. This could negatively affect the lubricating properties of the oil.

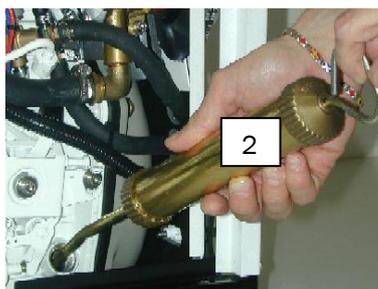
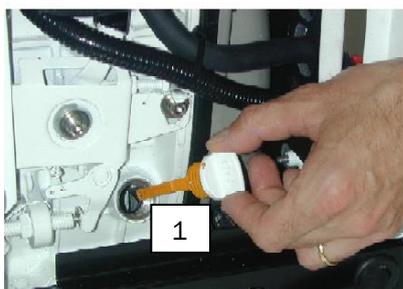
### Maintenance task. Checking oil level

Check the oil level using the dipstick shown in the picture below. The oil level must always be between the MAX and MIN marks shown on the measuring dipstick. When checking the level, make sure the engine is in a horizontal position.

### Maintenance task. Filling/Replacing oil

Use diesel engine oil. The engine oil must be filled or topped up via the hole in the engine block where the measuring dipstick is located. To replace the oil in the engine sump:

- 1- Remove the dipstick.
- 2- Suction out the oil using a special hand pump. It is advisable to drain the oil when it is still hot enough to allow it to flow easily.
- 3- Fill the tank with clean oil, up to the correct level.



N	PART
1	Level measuring dipstick
2	Oil extraction pump

### **NOTICE**

Wear gloves to protect your hands from contact with oil. In case of accidental contact with engine oil, wash the affected area thoroughly with soap and water.

### **WARNING**

When checking and filling the oil, always adhere to the indicated maximum level. Excess oil can damage the engine.

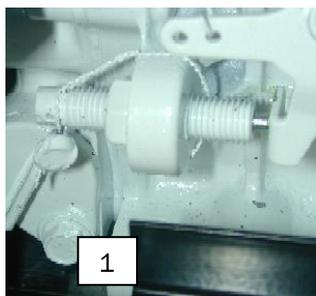
# Systems and scheduled maintenance



## Maintenance task. Replacing oil filter

To replace the engine oil filter, follow the procedure below:

- 1- Unscrew the oil filter and remove it.
- 2- After cleaning the rubber seal and the surface where the filter will be seated, and making sure that it is in perfect condition, put the new filter in place.



N	PART
1	Oil filter assembly
2	Filter element

## 5.4. Air intake system

### Maintenance task. Cleaning and replacing the air filter

The generator has a dry air filter that prevents foreign bodies from entering the combustion chamber. For maintenance purposes, it is sufficient to clean the filter with diesel once a year, to remove any impurities.



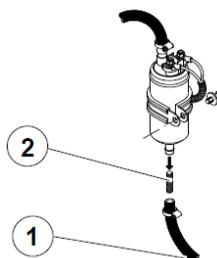
N	PART
1	Air filter element

## 5.5. Fuel system

### Maintenance task. Cleaning and replacing the fuel filter

To replace the engine oil filter, follow the procedure below:

- 1- Remove the fuel tube (2).
- 2- Remove the filter (1).
- 3- Clean it or replace it with a new one.
- 4- Install the clean filter (1).
- 5- Insert the fuel tube (2).
- 6- Purge the fuel system.



N	PART
1	Fuel tube
2	Filter element

## **CAUTION**

Do not touch the fuel directly with your hands. Wear protective gloves and goggles during maintenance operations. In case of contact with fuel, wash the part immediately and thoroughly with soap and water. Once the operation is complete, carefully clean off all traces of fuel and dispose of the used rags at the appropriate Collection Centres.

### Maintenance task. Purging the fuel circuit

The fuel system is designed to remove any air bubbles that may have entered the circuit. Automatic purging takes place when the fuel pump is activated for a few minutes before the engine is started up. The fuel pump is activated by turning on the control panel and pressing the START button during the preheating phase, before starting the engine.

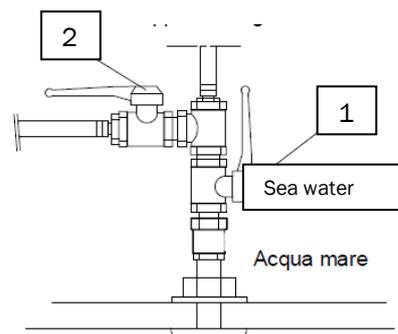
The presence of air bubbles within the fuel system causes the engine to operate unevenly. This can mean that it will not be capable of reaching the rated RPMs. Air can enter the circuit if a gasket is poorly sealed (pipe, filters, tank), or if the fuel inside the tank is at the minimum level.

## 5.6. Cooling System

To carry out maintenance on the cooling system, the seawater intake circuit must be emptied. This operation is carried out as follows:

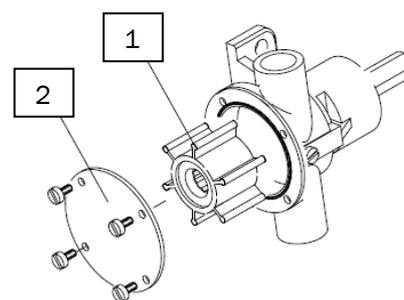
- 1- Close the water intake valve (1).
- 2- Open the drain valve until all the water has flowed out (2).
- 3 - Close the drain valve.

N	PART
1	Water intake valve
2	Drain valve



### Maintenance task. Inspecting the water pump impeller

At least once a year, it is necessary to check the integrity of the rubber impeller on the seawater pump. Before opening the seawater pump to inspect the impeller, the seawater cooling system must be drained. To access the impeller, the cover (2) must be removed and, with the help of a pair of pliers, the impeller (1) must be pulled out forcefully. To replace the impeller with a new one, repeat the operations described above in reverse order.



# Systems and scheduled maintenance



## 5.7. Electrical system

### Maintenance task. Inspection of the AC alternator

The alternator used in this model of generator is synchronous, and self-excited. This brushless model of alternator does not require any maintenance operation. Regular checks and maintenance are limited to removing any traces of moisture and oxidation that may damage it.

### Maintenance task. Inspection of the battery

Before installing a new battery, it is important for it to have undergone a full charge cycle. Check its electrolyte level at least once a month and refill it with distilled water if necessary.

If the generator is inactive for a long period of time, it is advisable to disconnect the battery and store it in a dry place, at a temperature of 10°C (50°F) or more. A full cycle of recharging should be performed once a month.

Before recharging the batteries, check their electrolyte level and, if necessary, restore it with distilled water. This operation must be repeated once the charging cycle is complete. The positive terminal of the battery must be protected with petroleum jelly to prevent corrosion and rust formation.

### **CAUTION**

Rubber gloves and protective glasses must be worn when filling up the batteries with distilled water to prevent the sulphuric acid from accidentally coming into contact with the skin. In case of accidental contact, carefully wash the affected area with soap and water and consult a doctor.

### **NOTICE**

If the battery is left completely discharged for long periods of time, it may be irreparably damaged.

### Maintenance task. Inspection of the sacrificial anode

To protect the water-air heat exchanger (1) from galvanic currents, a sacrificial zinc anode is installed inside it. It is necessary to check the state of wear and tear of these anodes periodically, and occasionally replace them, in order to prevent galvanic currents from irreparably corroding the exchanger. It is advisable to check the zinc anodes at least once a month and replace them once a year.



N	PART
1	Water-air exchanger
2	Zinc anode

### Maintenance task. Inspecting/Replacing the belt

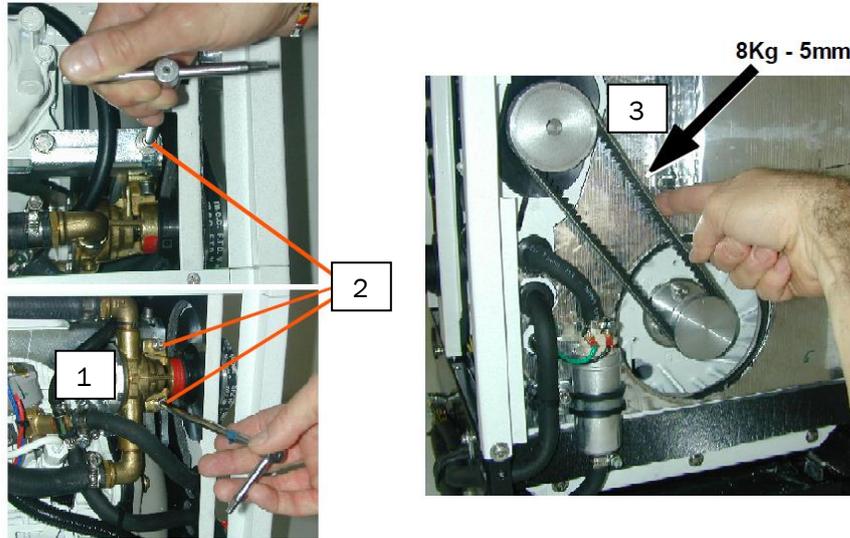
A V-belt is used to transmit the rotary motion from the crankshaft pulley to the seawater pump pulley. Over-tensioning the belt accelerates wear, while under-tensioning it causes the pulleys to idle, meaning that the pump's water circulation is insufficient. Adjust the tension of the belt as follows:

- 1- Loosen the two adjusting screws (2) and move the seawater pump (1) further away to increase the tension, or closer to decrease it.

# Systems and scheduled maintenance



- 2- Lock the screws and check the belt's tension. Correct belt tension allows a performance of approximately 5 mm (2) under thrust force of 8 kg (17.7 lb).



## Section 6 - Troubleshooting

GENSET FAILURE	SYSTEM	PROBABLE CAUSES	RECOMMENDED ACTIONS
<b>The starter turns, but the main motor does not start</b>	<b>General</b>	Lack of fuel supply.	Check if there is fuel inside the tank.
		Malfunction of the stop solenoid.	Check the stop solenoid.
		Emergency switch in OFF position.	Check that the emergency switch is in the ON position. Turn it to the ON position.
		Air bubbles in the fuel tank.	Bleed the fuel circuit.
<b>The motor protection module is not activated by pressing the START</b>	<b>Electric</b>	Open magneothermics.	Check the operating status of the magnetoreemics.
		Bad connection of cables and terminals.	Check the battery connection cables and terminals and the electrical connections. (Reconnect)
		Battery	Check the battery charge status.
<b>The genset stops</b>	<b>General</b>	Control Panel Lack of fuel supply.	Check if there are any active alarms. Check if there is fuel inside the tank.
<b>Engine runs erratically</b>	<b>Fuel</b>	Blocked fuel filters. Air bubbles in the fuel tank.	Check the fuel filters. Replace them if necessary. Bleed the fuel circuit.
<b>Alternator voltage is too low</b>	<b>Electric</b>	Low engine rotation speed.	Check motor speed: 3120 rpm (52 Hz).
		Load too high.	Check connected loads.
		Damaged condenser.	Contact an Official Service.
		Alternator damaged.	Contact an Official Service.
<b>Exhaust smoke</b>	<b>General</b>	Bad wiring connection.	Check the electrical connections.
		Excess oil in the engine.	Verify that the oil level in the sump does not exceed the MAX index.
		Load too high.	Check that the group is not overloaded. (Reduce the load).
<b>Discharged starter battery</b>	<b>Sistema Eléctrico</b>	Injectors malfunction.	Check the calibration of the injectors.
		Bad condition of the battery.	Check the electrolyte level inside the battery.
		DC alternator malfunction.	Check the operation of the DC alternator.
<b>Generator does not generate voltage</b>	<b>Electric</b>	Bad condition of the battery.	Check the battery voltage.
		Open circuit breaker.	Check that the circuit breaker is in the "ON" position.
		Damaged condenser.	Contact an Official Service.
		Alternator damaged.	Contact an Official Service.
		Bad wiring connection.	Check the electrical connections.



## Section 7 - Technical Specifications

**Single-Phase****General data**

<b>Maximum power*:</b>	3 kW (3 kVA)	<b>Voltage:</b>	230 V
<b>Prime Power**:</b>	2,7 kW	<b>Amperage:</b>	13 A
<b>Frequency:</b>	50 Hz	<b>Phases:</b>	1

**Dimensions and weights**

<b>Total length without canopy:</b>	-	<b>Total length with canopy:</b>	590 mm
<b>Total width without canopy:</b>	-	<b>Total width with canopy:</b>	406 mm
<b>Total height without canopy:</b>	-	<b>Total height with canopy:</b>	515 mm
<b>Dry weight without canopy:</b>	-	<b>Dry weight with canopy:</b>	96 Kg

**Engine**

<b>Base engine manufacturer:</b>	Yanmar	<b>Diameter:</b>	78 mm (3,07 in)
<b>Model Solé Diesel:</b>	L70N5	<b>Stroke:</b>	67 mm (2,64 in)
<b>Type:</b>	4 No. of Strokes	<b>Compression ratio:</b>	20:1
<b>Engine RPM:</b>	3000	<b>Injection system:</b>	Mechanical and direct
<b>Number of cylinders:</b>	1	<b>Intake system:</b>	Naturally aspirated
<b>Total displacement:</b>	320 cc	<b>SAE Flywheel housing:</b>	-
<b>Oil type:</b>	SAE 15W40	<b>Coolant capacity:</b>	1,2 L (0,32 gal)
<b>Oil capacity:</b>	#jVALOR!	<b>Flywheel:</b>	-
<b>Power:</b>	4,5 kW (6,12 CV)	<b>Coolant flow rate:</b>	-
<b>Salt water flow rate:</b>	20 l/min (5,28 gal/m)	<b>Intake air flow rate:</b>	0,4 m3/m
<b>Starting aid:</b>	#N/D		

**Fuel system details**

<b>Consumption:</b>	0,4 L/H (0,11 Gal/H)	<b>Fuel type:</b>	Diesel
<b>Consumption at 50 %:</b>	0,7 L/H (0,18 Gal/H)	<b>Fuel standards:</b>	Fueloil diesel ASTM
<b>Consumption at 75 %:</b>	1,1 L/H (0,29 Gal/H)	<b>Injection pump type:</b>	Individual
<b>Consumption at 100 %:</b>	1,3 L/H (0,34 Gal/H)	<b>Governor type:</b>	Mechanical

**Electrical system**

<b>Battery voltage:</b>	12 V	<b>Stop solenoid type:</b>	ETS
<b>Starter motor:</b>	1,2 kW	<b>Alternator:</b>	-
<b>Battery cable section:</b>	N/A mm2	<b>Battery cable length:</b>	N/A m

**Installation details**

<b>Exhaust hose inner diameter:</b>	45 mm (1,77 in)	<b>Maximum fuel lift height:</b>	1 m (3,28 ft)
<b>Sea water hose inner diameter:</b>	13 mm (0,51 in)	<b>Maximum raw water lift height:</b>	1 m (39,37 in)
<b>Fuel feeding hose inner diameter:</b>	8 mm (0,31 in)	<b>Maximum sea water temperature:</b>	32 °C (32 °F)
<b>Fuel return hose inner diameter:</b>	8 mm (0,31 in)	<b>Maximum installation angle***:</b>	20 °
<b>Minimum battery capacity:</b>	12 V 60 Ah		

**Alternator details**

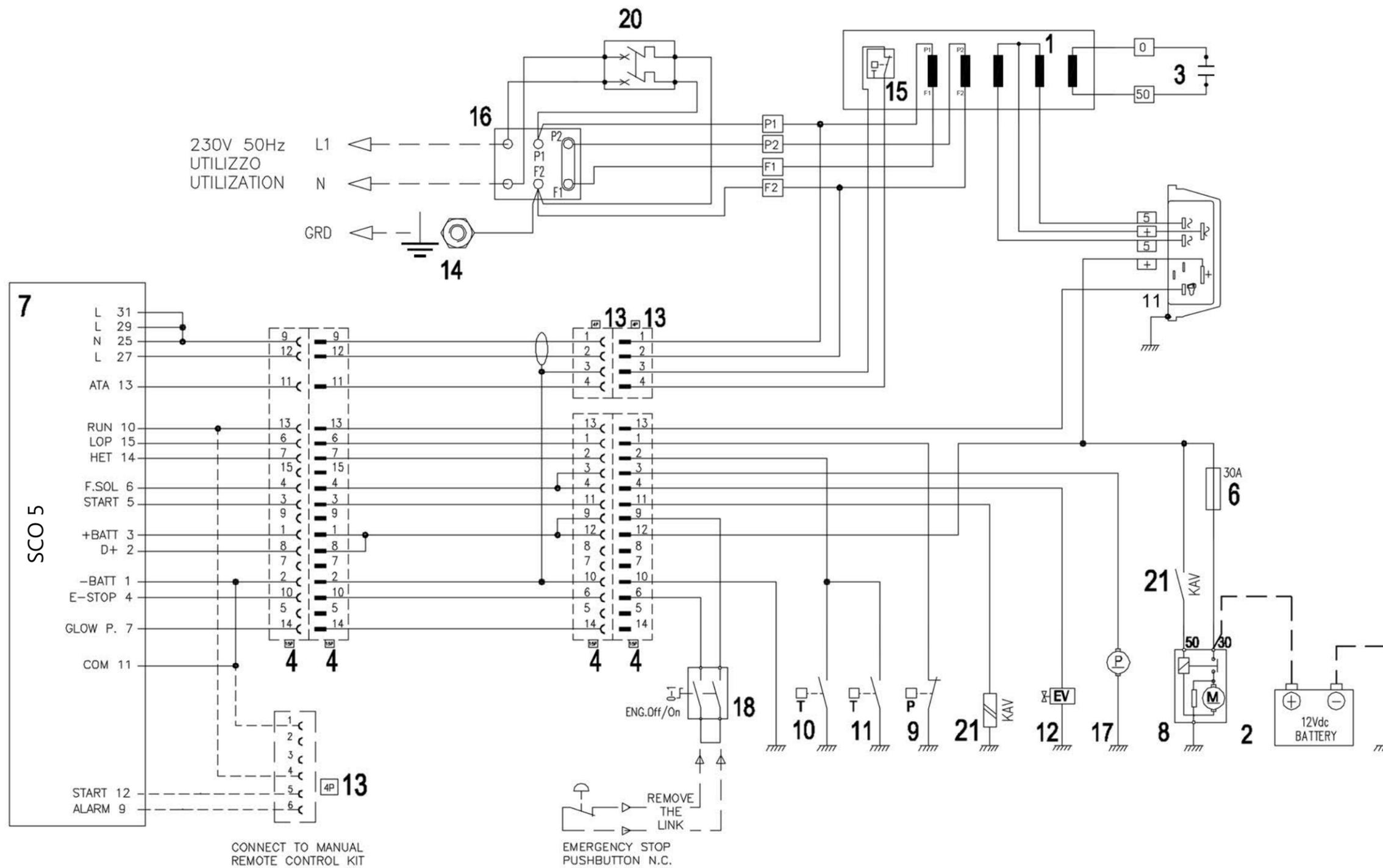
<b>Brand:</b>	MA4	<b>Cos φ:</b>	1
<b>Model:</b>	VO90	<b>Tropicalized:</b>	S
<b>Regulator type:</b>	CAPACITOR	<b>Excitation system:</b>	BRUSHLESS
<b>Number of poles:</b>	2	<b>Voltage regulation accuracy**:</b>	1
<b>Isolation type*:</b>	-	<b>Standards:</b>	EN60034-1, IEC 60034-1, ISO 8528-3
<b>IP protection*:</b>	-	<b>Alternator type:</b>	Synchronous





# Technical appendices

## Section 8 - Technical Appendices



1 ALTERNATORE	ALTERNATOR	ALTERNATEUR	WECHSELS TROMGENERATOR	ALTERNADOR
2 BATTERIA	BATTERY	BATTERIE	BATTERIE	BATERIA
3 CONDENSATORE	CAPACITOR	CONDENSATEUR	KONDENSATOR	CONDENSADOR
4 CONNETTORE 15P	15 POLES CONNECTOR	CONNECTEUR 15P	VERBINDER 15P	CONECTOR 15P
21 RELE START	START RELAY	RELAIS DE DEMARRAGE	STARTRELAIS	RELE ENCENDIDO
6 FUSIBILE	FUSE	FUSIBLE	SICHERUNG	FUSIBLE
7 MODULO PROTEZIONE MOTORE	ENGINE PROTECTION MODULE	MODULE PROTECTION MOTEUR	MOTORSCHUTZMODUL	MODULO PROTECCION MOTOR
8 MOTORINO DI AVVIAMENTO	STARTER MOTOR	DEMARREUR	STARTERMOTOR	MOTOR DE ARRANQUE
9 PRESSOSTATO OLIO	OIL PRESSURE SWITCH	PRESSOSTAT HUILE	ÖLDRUCKWÄCHTER	PRESOSTATO ACEITE
10 TERMOSTATO MOTORE	ENGINE THERMOSTAT	THERMOSTAT MOTEUR	MOTOR THERMOSTAT	TERMOSTATO MOTOR
11 TERMOSTATO ALTERNATORE	ALTERNATOR THERMOSTAT	THERMOSTAT ALTERNATEUR	MOTOR THERMOSTAT	TERMOSTATO ALTERNADOR
12 ELETTROVALVOLA INTERCETTAZIONE CARBURANTE	FUEL CUT-OUT SOLENOID	ELECTROVALVE ARRET CARBURANT	ELEKTROSPERRVENTIL TREIBSTOFF	ELECTROVALVULA INTERCETTAZIONE CARBURANTE
13 CONNETTORE 4P	4P CONNECTOR	CONNECTEUR 4P	VERBINDER 4P	CONECTOR 4P
14 VITE COLLEGAMENTO A TERRA	EARTH CONNECTION SCREW	VIS BRANCHEMENT A LA TERRE	ERDUNGSSCHRAUBEN	TORNILLO CONEXION A TIERRA
15 TERMOSTATO ALTERNATORE	ALTERNATOR THERMOSTAT	THERMOSTAT ALTERNATEUR	THERMOSTAT WECHSELS TROMGENERATOR	TERMOSTATO ALTERNADOR
16 MORSETTIERA DI POTENZA	POWER TERMINAL BOARD	TERMINAL DE PUISSANCE	LEISTUNGSKLEMMENBREIT	TERMINAL DE POTENCIA
17 POMPA COMBUSTIBILE	FUEL PUMP	POMPE COMBUSTIBLE	KRAFTSTOFFPUMPE	BOMBEA COMBUSTIBILE
18 INTERRUTTORE 0/1	0/1 SWITCH	INTERRUPTEUR 0/1	SCHALTER 0/1	INTERRUPTOR 0/1
20 MAGNETOTERMICO	MAGNETOTHERMAL SWITCH	MAGNETOTHERMIQUE	MAGNET-THERMOSCHALTER	MAGNETOTERMICO

## INSTALACIÓN POSTERIOR SCO 05 (4 GSCH)

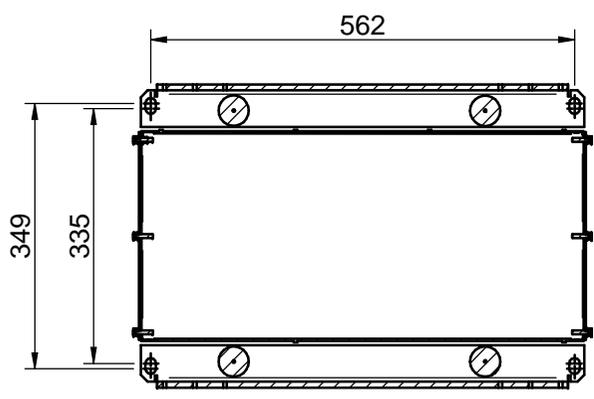
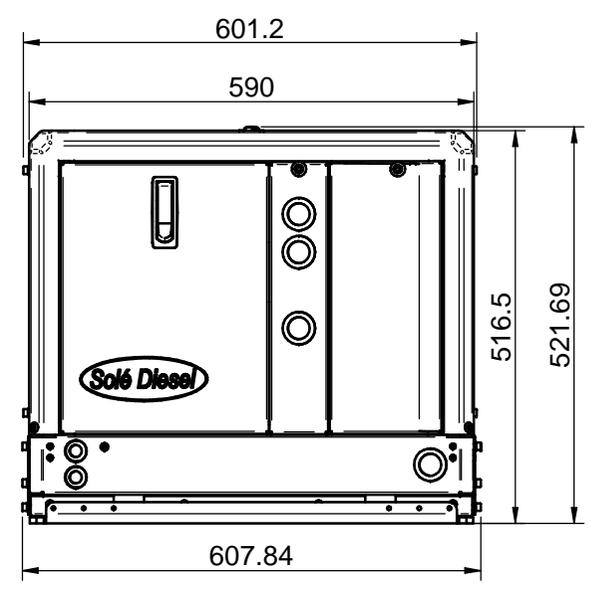
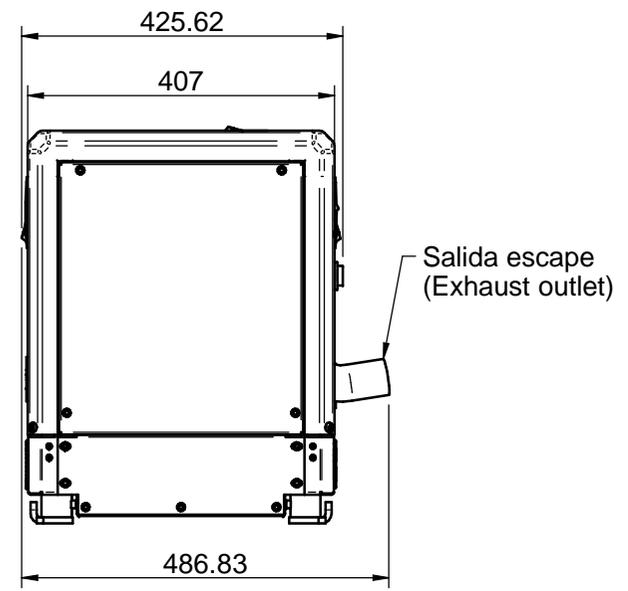
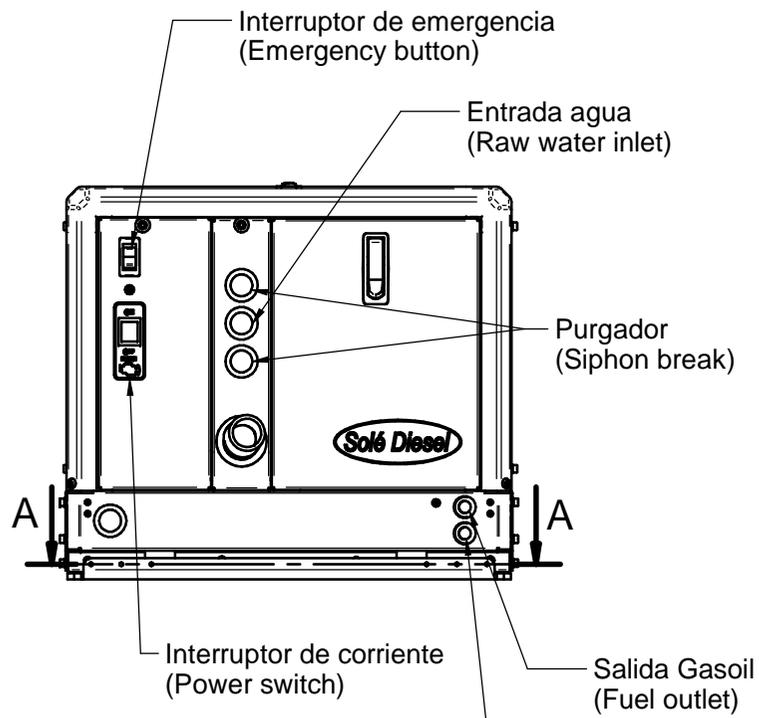
DIBUJADO MARC G.	VERIFICADO RUBEN D.	FECHA CREACIÓN 28/9/2020	ÚLTIMA REVISIÓN	PÁGINA
		SOLÉ, S.A.	1D020333	1

# Technical appendices



# Technical appendices

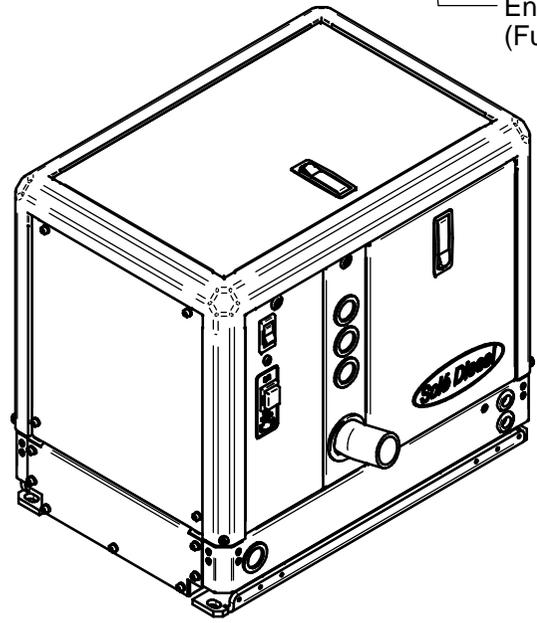
## 8.2. General dimensions



CORTE A-A

**DATOS TÉCNICOS / TECHNICAL DATA**

- \* Racor entrada agua salada / Sea water fitting intake: Ø16mm
- \* Manguera entrada combustible / Fuel hose intake: Ø8mm
- \* Manguera retorno combustible / Diesel Fuel return hose: Ø8mm
- \* Manguera escape / Exhaust hose: Ø45mm
- \* Purgador / Siphon break: Ø15mm



Medidas Nominales (mm)		GRUPO 4 GSCH V3 12V 230V				
Medidas Nominales (mm)		GENSET 4 GSCH V3 12V 230V				
100	a	300	±0.2	±0.5	±1.2	
30	a	100	±0.15	±0.3	±0.8	
6	a	30	±0.1	±0.2	±0.5	
0	a	6	±0.05	±0.1	±0.2	
Grado de Precisión DIN-7168	Fino	Medio	Bastio			
		MATERIAL		ACABADO	TRATAMIENTO	PRESENTACION
		DIBUJADO		VERIFICADO	GRADO PRECISIÓN	FECHA CREACIÓN
		ORIOLG		P.IGLESIAS	MEDIO	31/03/2020
						ÚLTIMA REVISIÓN
						---
				<b>SOLÉ, S.A.</b>		<b>GD001V0041C01</b>

# Instructions for replacement, disposal and removal



## Section 9 - Instructions for replacement, disposal and removal

When you decide to replace the generator set, please contact SOLÉ S.A. We will then provide you with the relevant instructions regarding the laws in force at the time. When disposing of the entire generator set or its components, please comply with the LAWS IN FORCE IN THE COUNTRY OF INSTALLATION.

For more information about the materials that the individual components of the generator set are made from, please contact SOLÉ S.A

# Pre-delivery inspection of generator sets



## Section 10 - Pre-delivery inspection of generator sets

INSPECTION PRIOR TO THE DELIVERY OF GENERATOR SETS			
<b>Installer / Marina information</b>			
Installer Company:		Installation Date:	
Contact Tel. No.:		E-mail:	
<b>Owner's Information</b>			
Name and surnames:			
Contact Tel. No.:		Email:	
<b>Generator Set Information</b>			
Generator set model:			
Generator set serial number:		Alternator serial No. (if applicable):	
<b>Installation Information</b>			
Type of electrical installation:		Total power consumption: kw	
Machine chamber operating temperature:			°C
Angle of the generator set (boat moored):			°
Maximum angle of the generator set (navigation conditions)			°
Is the wet exhaust elbow above or below the floating line?		above	below
<b>Exhaust, Cooling and Fuel Line Information</b>			
Int. Diameter of exhaust hose (if applicable):	mm	Int. Diameter of sea water intake to the pump	mm
Int. Diameter of diesel intake:	mm		
Int. Diameter of diesel return intake	mm		
Has an exhaust collector been installed?	YES	Has an air trap been installed?	YES
	NO		NO
<b>Verifications Prior to Start-Up</b>		<b>V/x</b>	<b>Notes</b>
Correct engine alignment.			
Electrical installation connections.			
Engine oil level			
Coolant level and concentration.			
Control panel operation.			
Transmission belts and belt tension.			
Airtight water cock			
<b>Verification of Generator Set No. - Load Operation</b>		<b>V/x</b>	<b>Notes</b>
Oil pressure			
Bleed the fresh water cooling system.			
Verify the control panel: normal indications and alarm operation.			
Water, oil and fuel leaks in the engine.			

# Pre-delivery inspection of generator sets



<b>INSPECCIÓN PREENTREGA GRUPOS ELECTRÓGENOS</b>		
<b>Comprobaciones Grupo en Carga</b>	<b>V/x</b>	<b>Observaciones</b>
Verificar la potencia eléctrica y voltaje del grupo a máxima carga.		
Regimen del motor y funcionamiento del alternador a carga variable.		
Temperatura del motor y presión de aceite.		
<b>Información para el Propietario</b>	<b>V/x</b>	<b>Observaciones</b>
Entrega del manual de instrucciones y documentación asociada al motor.		
Revisión del manual de instrucciones del grupo generador.		
Estudiar las funciones del cuadro de control del grupo generador.		
Informar de la fecha de primera revisión.		
Informar del calendario de mantenimiento indicado en los manuales.		







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