

Fischer Panda

Operation manual

Description of the generator and operation manual



Marine Generator
Panda AGT-DC 4000 PMS
Super silent technology

24V - 140A / 4kW

Icemaster Fischer Panda



since 1977
Icemaster GmbH



since 1978
Fischer Marine
Generators



since 1988
Conclusion Fischer -
Icemaster GmbH



since 1988
100 % water cooled
Panda generators



since 1988
Panda Vehicle
Generators

Fischer Panda

FISCHER GENERATORS have been manufactured since 1978 and are a well-known brand for first class diesel generators with especially effective sound-insulation.

Fischer has been one of the leading manufacturers in respect of quality and know-how during this period.

FISCHER, as the worldwide manufacturer of modern marine diesel generators, developed the Sailor-Silent series for example and produced a GFK sound-insulated capsule as early as 1979 and the basis for new generator technology.

The companies Fischer and Icemaster amalgamated under the direction of Icemaster in 1988, in order to concentrate on the development of new products. Production was moved to Paderborn.

The amalgamation of the two qualified companies led to the development of a complete new programme within a short space of time. The aggregates developed at that time set new technological standards worldwide.

The aggregates became more efficient and powerful than other aggregates in the same nominal performance range, because of the improved cooling. Panda generator demonstrated its superiority in several tests by renowned institutes and magazines during the past years. The patented VCS (voltage Control System) means it can meet all demands including motor speed. The start-booster (ASB) means Panda generators meet the highest demands in respect of voltage stability and starting values. A Panda generator, with the same drive motor, produces 15% more effective output than the majority of conventional generators. This superiority in efficiency also ensures a fuel saving to the same extent.

The 100% water-cooled Panda Aggregate are currently manufactured in the performance range from 2 to 100 kW in various versions. Fast running motors are preferred for performances up to approx 30 kW (Nominal speed 3000 rpm). The heavier slow runners are preferred for the higher range. The fast running aggregates have proved themselves many times for many uses, that they meet the demands in quality of yachts and vehicles, and offer space and weight saving of 50% compared to slow running generators.

In addition to the Panda series, Icemaster also supply the super compact high-tech sound-insulated battery charging aggregate from the DC/AC Panda AGT series, which is a very interesting solution for the production of mobile power.

The new HTG-alternators ensure that a charging rate of 285 amps is achieved that was scarcely thought possible for this compact construction. This alternator replaces a separate shipboard generators (constant 230 volts AC with up to 3500 kW from the main machine)

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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.



Attention, Important Directions regarding Operation!

1. The installation certificate must be completed when taken into use, and certified by a signature.
2. The installation certificate must be despatched within two weeks of use to ICEMASTER.
3. The official guaranty confirmation will be completed by ICEMASTER after receipt and sent to the customer.
4. A guaranty must be shown to make any claims.

Claims against the guaranty will not be accepted if the above said instructions are not, or only partially, carried out.

Manufacturer declaration in terms of the machine guideline 98/37/EG .

The generator is in such a way developed that all assembly groups correspond to the CE guidelines. If machine guideline 98/37/EG is applicable, then it is forbidden to bring the generator into operation until it has been determined that the system into which the generator is to be installed also corresponds to the regulations of the machine guideline 98/37/EG. This concerns among other things the exhaust system, cooling system and the electrical installation.

The evaluation of the "protection against contact" can only be accomplished in connection with the respective system. Likewise among other things responsibility for correct electrical connections, a safe ground wire connection, foreign body and humidity protection, protection against humidity due to excessive condensation as well as the overheating through appropriate and inappropriate use in its installed state on the respective machine lies within the responsibility of those who undertake installation of the generator in the system.

Use the advantages of the customer registration:

- Thus you receive extended product informations, which are sometimes safety-relevant
- you receive, if necessarily free Upgrades

Far advantages:

By your full information Fischer Panda technicians can give you fast assistance, since 90% of the disturbances result from errors in the periphery.

Problems due to errors in the installation can be recognized in the apron.

Technical Support per Internet: info@fischerpanda.de

Safety Instructions



The electrical Installations may only be carried out by trained and tested personnel!

The generator may not be taken into use with the cover removed.

The rotating parts (belt-pulley, belts, etc) must be so covered and protected so that there is no danger to life and body!

If a sound insulation covering must be produced at the place of installation, then well-placed signs must show that the generator can only be switched on with a closed capsule.

All servicing-, maintenance or repair work may only be carried out, when the motor is not running.

Electrical voltages above 48 volts (battery chargers greater than 36 volts) are always dangerous to life). The rules of the respective regional authority must be adhered to. Only an electrician may carry out installation of the electrical connections for safety reasons.

General safety references for the enterprise of a AGT generator.

With all energized systems, with which the current is more than 50 Ampère, special safety precautions must be made, in order to protect the environment of the components against fire.

It is to be ensured absolutely that at the battery a main switch in well accessible place is accommodated, so that with danger of the main switches can be separated immediately. The main switch must be however also directly at the battery installed. If this place is not well accessible, a power relay must be used instead of the main switch which can be served manually, which can be served then if necessary from different places. The switches for the power relay are to mark accordingly as main switches DC battery "with danger switch off!".

Cooling of the diode block.

The diode block is cooled with fresh water. A normal cooling of the diode block is therefore only possible, as long as the cooling water supply of the generator functions duly. The cooling water supply of the generator must be so furnished therefore that by a wide dirt deflector it is guaranteed that from outside no dirt can be sucked in into the line system. If this is not attainable, the supply must be secured by a flow switch or a negative pressure switch. The generator must be switched off, if the cooling water supply is impaired.

The temperature safety device on the diode block can be regarded only as additional safety device. The temperature rise at the diodes is so fast that the diodes can be damaged during a unique interruption of the cooling water supply. A safe protection from damage of the diodes is not possible by the temperature monitoring on the diode radiator box. Thus this can take place only by means of an appropriate external monitoring of the cooling system.

ATTENTION!

Do not connect the minus pole of the starter battery to the ground of the boat because of galvanic reason.

Warning!

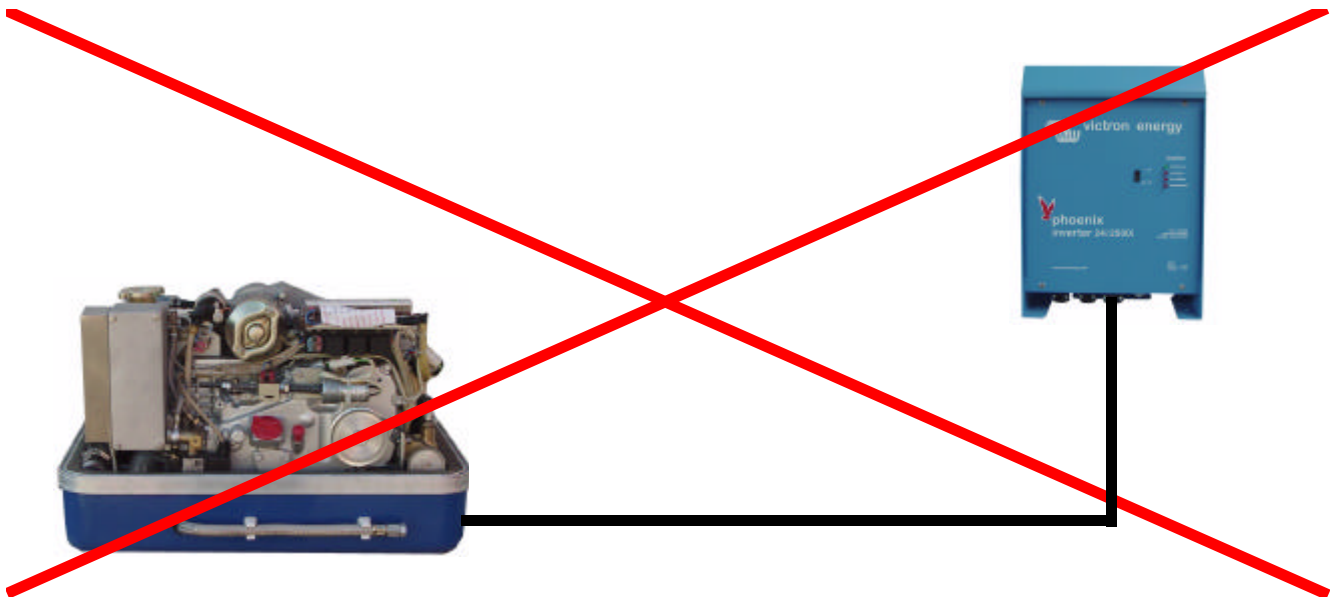
Never start the generator with the battery disconnected, the diodes will be damaged!

CAUTION!

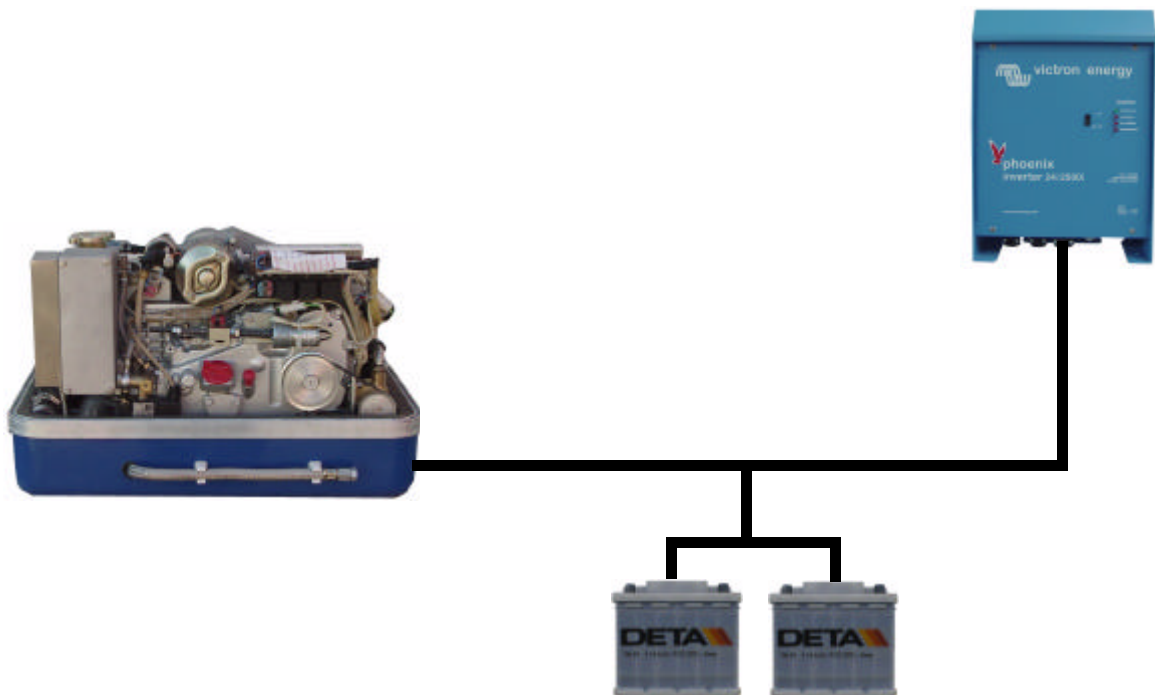
Contact of the electrical contacts may be DANGER TO LIVE!

CAUTION!

The AGT-generator is not allowed to be connected to an inverter (without batteries)!



The Inverter generates voltage peaks, which can destroy the rectifier diodes of the generator!



A battery must always be connected to the inverter as a capacity!

Recommended capacity at 12V \geq 240Ah at 24V \geq 120Ah

The screws at the electric rectifier may be pulled tight only with a torque wrench. Torque 4Nm.

The battery cable must be secured at the generator and at the batteries with appropriate safety devices.

The generator is also include into the CO₂ - fire-extinguishing system.

Measures to the fire protection.

All construction units in the environment of energized parts, which carry more than 50 Amp., must be fire protection-moderately secured.

All junction points at the energized parts must be examined regularly on heating up (infrared thermometers).

Safety Instructions for the Handling with Batteries

These instructions must be noticed additionally to the instructions of the battery manufacturer:

- If the batteries are working, someone should be in your near area to help you in a case of emergency.
- Water and soap must be hold ready if battery acid corrode your skin.
- Wear eye protection and protective clothing. During working with the batteries don't touch the eyes.
- If you got a acid splash on your skin or clothing grow it with much water and soap out.
- If you got acid in your eyes rinse them immediately with clear water until no cauterization is noticeable. Visit immediate a doctor.
- Don't smoke in the near of the batteries. Avoid naked flames or open fires. In the area of batteries exists danger of explosions.
- Pay attention that no tools fall on the battery poles, if necessary cover them.
- During the installation don't wear a wrist watch or arm jewels, you can create under these circumstances a battery short-circuit. Burning of the skin could be the result.
- Protect every battery contact against unintentional touch.
- Use only cyclical profoundly dischargeable batteries. Starter batteries are not appropriate. Lead-gel batteries are commended. They are maintenance-free, profoundly dischargeable and not produce gas.
- Do not charge a frozen battery.
- Avoid a batterie short-curcuit.
- Take care of a good ventilation of the battery to drain off developing gas.
- The battery connection terminals must be checked of a tight contact at least before operating.
- The battery connection cable must be carefully mounted and checked about incorrect heating at operation with load. The vibrating devices must be regulary checked about scour points and flaw in the isolation.

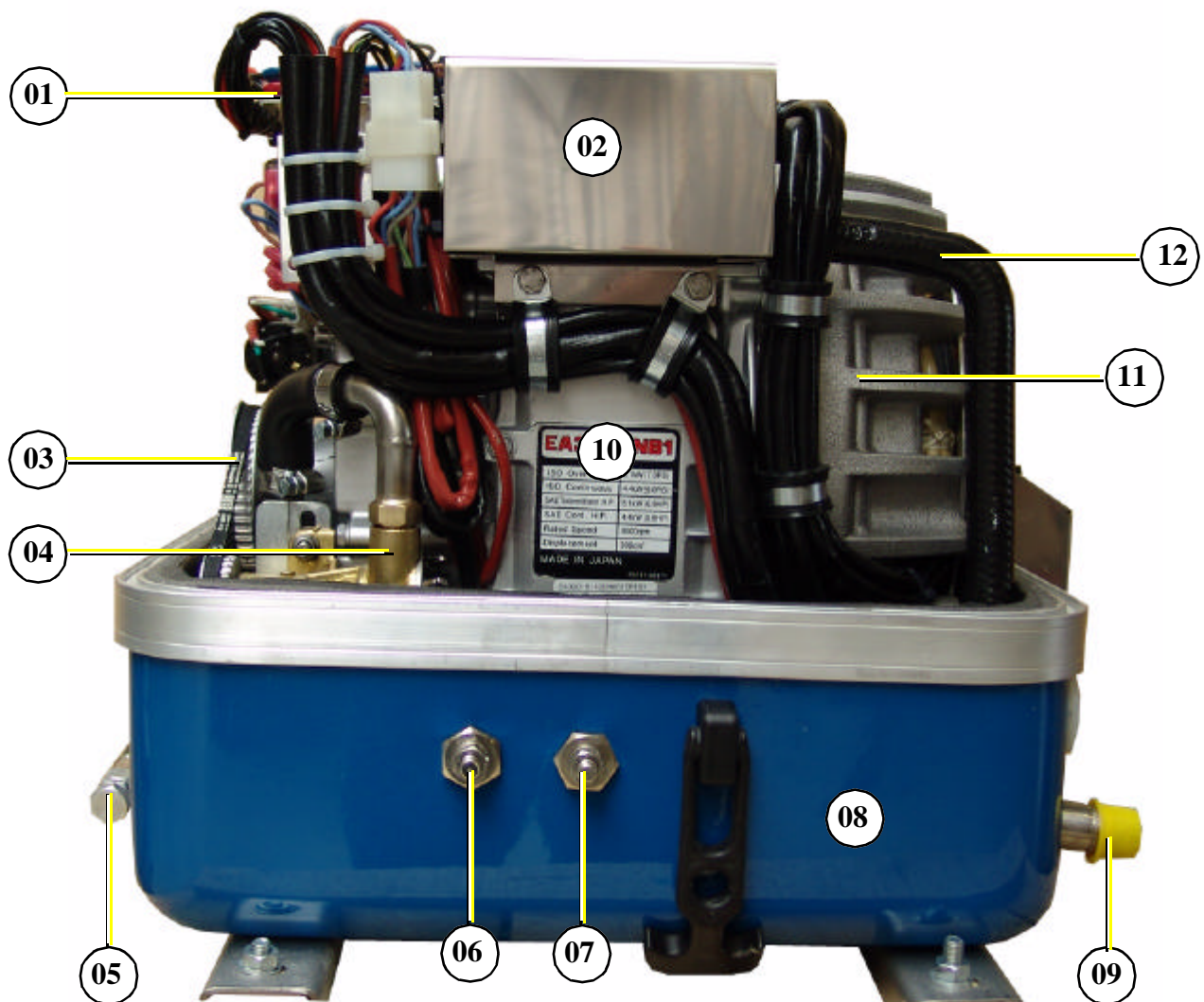
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A. The Panda Generator

A.1 Description of the Generator

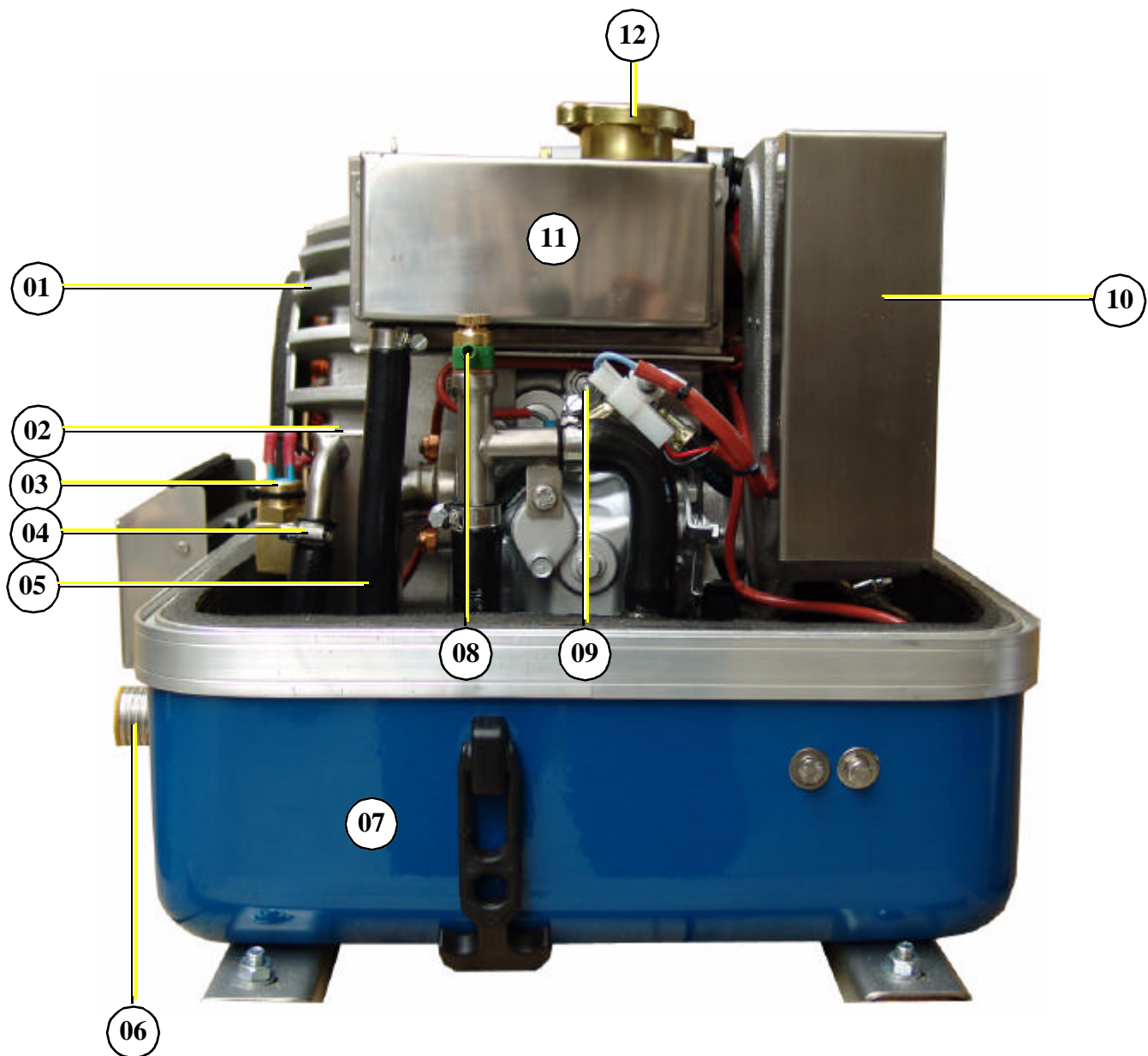
A.1.1 Right Side View



- 01) Terminal block for remote control panel, fuses and relays
- 02) Cooling water tank
- 03) Toothed belt
- 04) Raw water pump
- 05) Oil drain hose
- 06) Connection starter battery minus (-)

- 07) Connection starter battery plus (+)
- 08) Sound cover base part
- 09) Raw water inlet
- 10) Engine Kubota EA300
- 11) Generator housing with coil
- 12) Coolant pipe

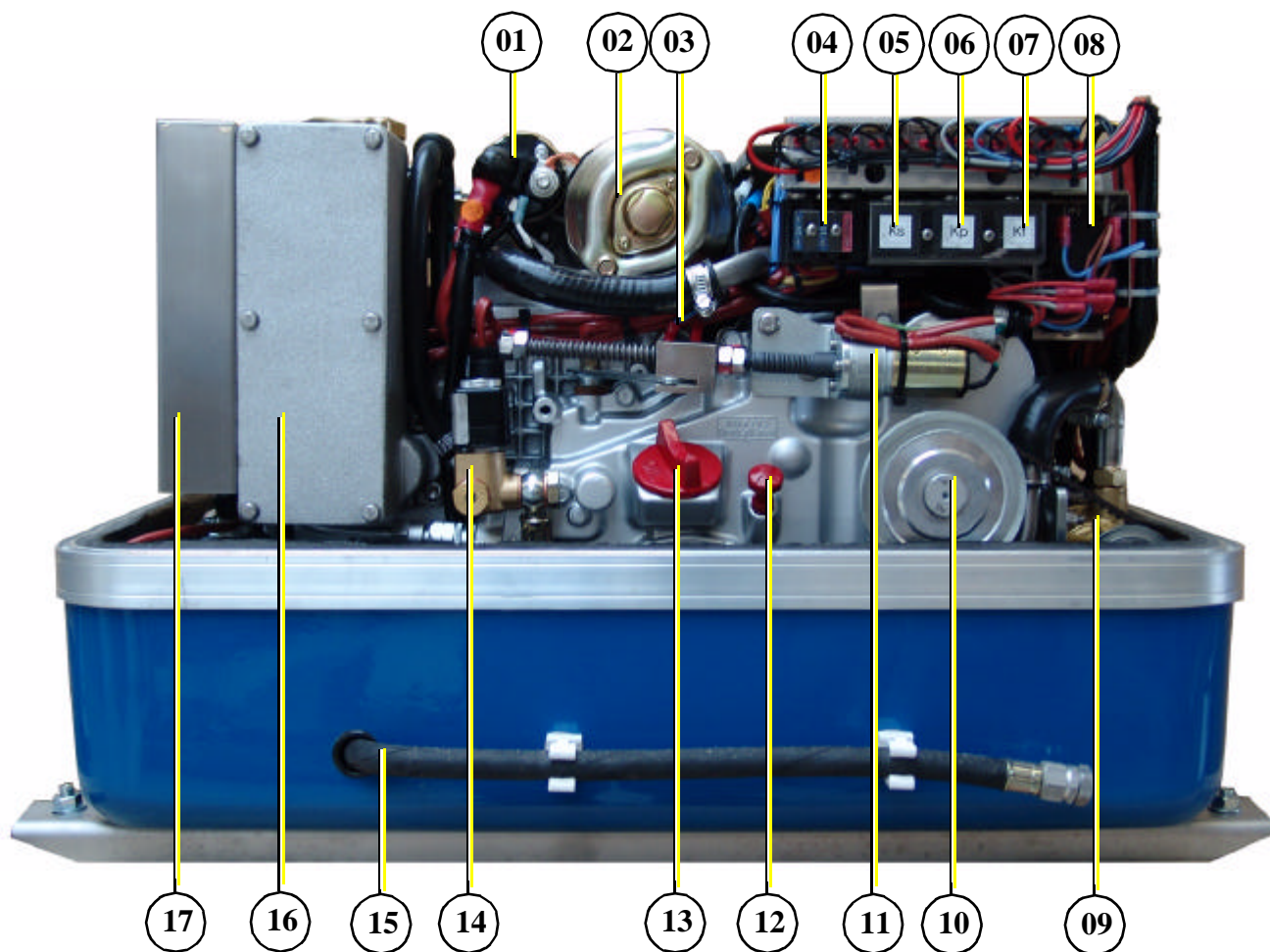
A.1.2 Left Side View



- 01) Generator housing with coil
- 02) Water-cooled exhaust elbow
- 03) Thermo-switch at exhaust elbow
- 04) Raw water injection pipe
- 05) Coolant pipe, water tank - heat exchanger
- 06) Exhaust outlet

- 07) Sound cover base part
- 08) Ventilation valve
- 09) Injection nozzle
- 10) Suction port at air suction housing
- 11) Cooling water tank
- 12) Cooling water filler neck

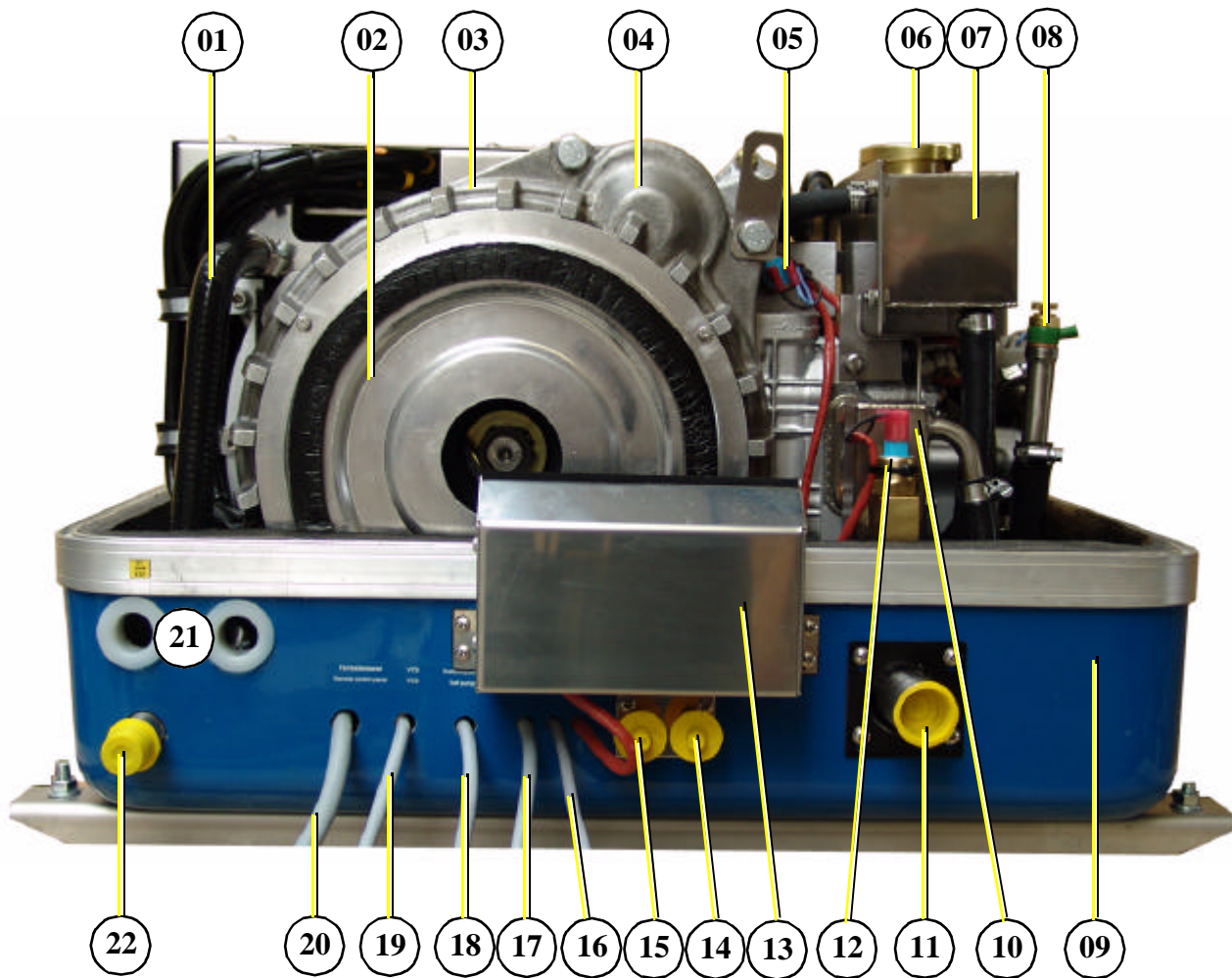
A.1.3 Front View



- 01) Solenoid switch for starter motor
- 02) Starter motor
- 03) Oil pressure switch
- 04) Electrical fuses (blue=15A, white=10A)
- 05) Start relay Ks
- 06) Glow-plug relay K2
- 07) Fuel pump relay K3
- 08) Release relay K4
- 09) Raw water pump

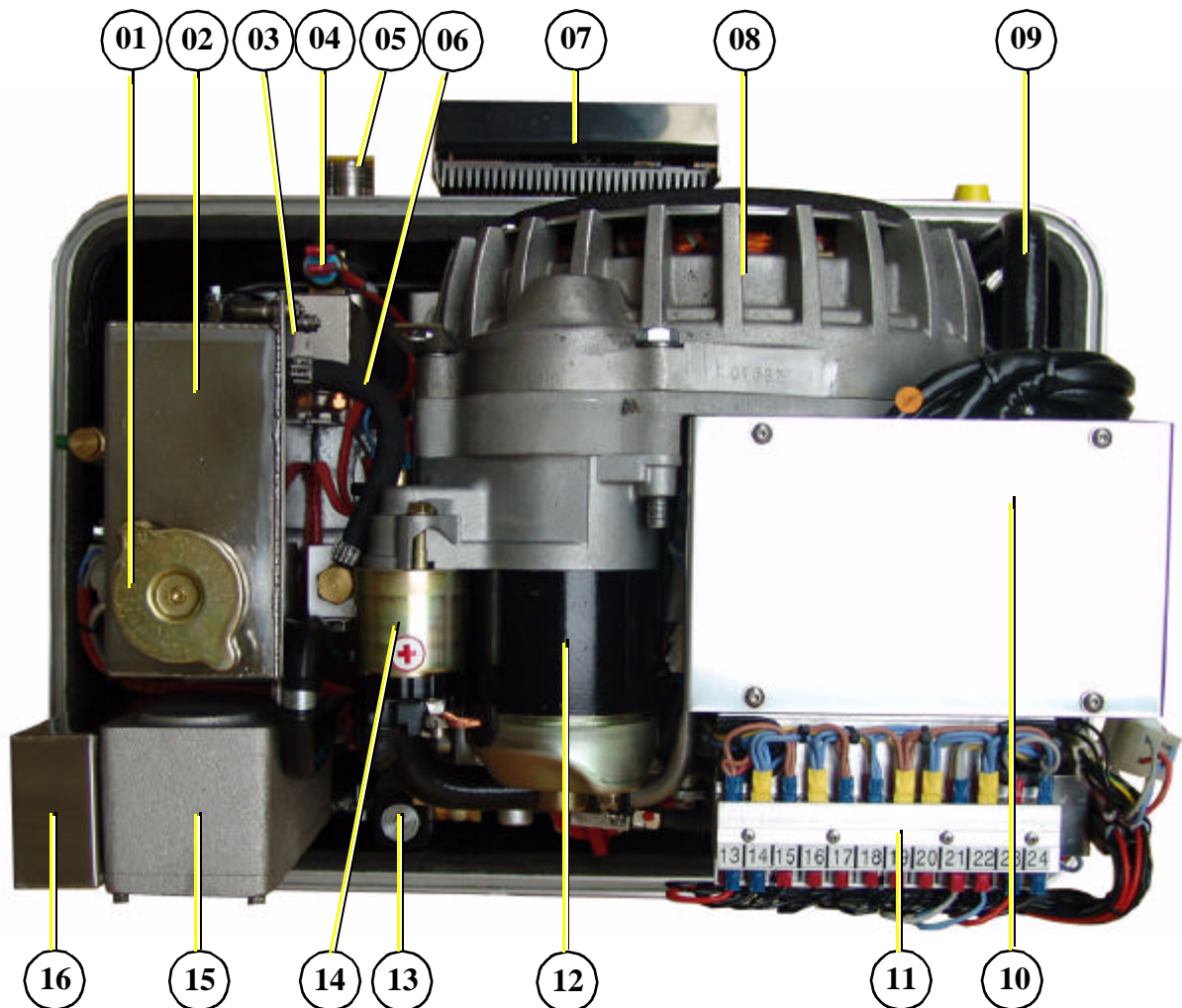
- 10) Pulley
- 11) Actuator
- 12) Oil dipstick
- 13) Engine oil filler neck
- 14) Fuel solenoid valve
- 15) Oil drain hose
- 16) Air suction housing with air filter inlet
- 17) Suction port

A.1.4 Back View



- | | |
|---------------------------------|---------------------------------------|
| 01) Coolant pipe | 12) Thermo-switch at exhaust elbow |
| 02) Generator front cover | 13) Cover for DC/DC-converter |
| 03) Generator housing with coil | 14) Connection for fuel OUT |
| 04) Starter motor | 15) Connection for fuel IN |
| 05) Thermo-switch at engine | 16) Cable for voltage sense |
| 06) Coolant filler neck | 17) Cable for shunt |
| 07) Cooling water tank | 18) Cable for fuel pump |
| 08) Ventilation valve | 19) Cable for VCS |
| 09) Sound cover base part | 20) Cable for remote control panel |
| 10) Water-cooled exhaust elbow | 21) Passage for cable of battery bank |
| 11) Exhaust outlet | 22) Raw water inlet |

A.1.5 View from Above

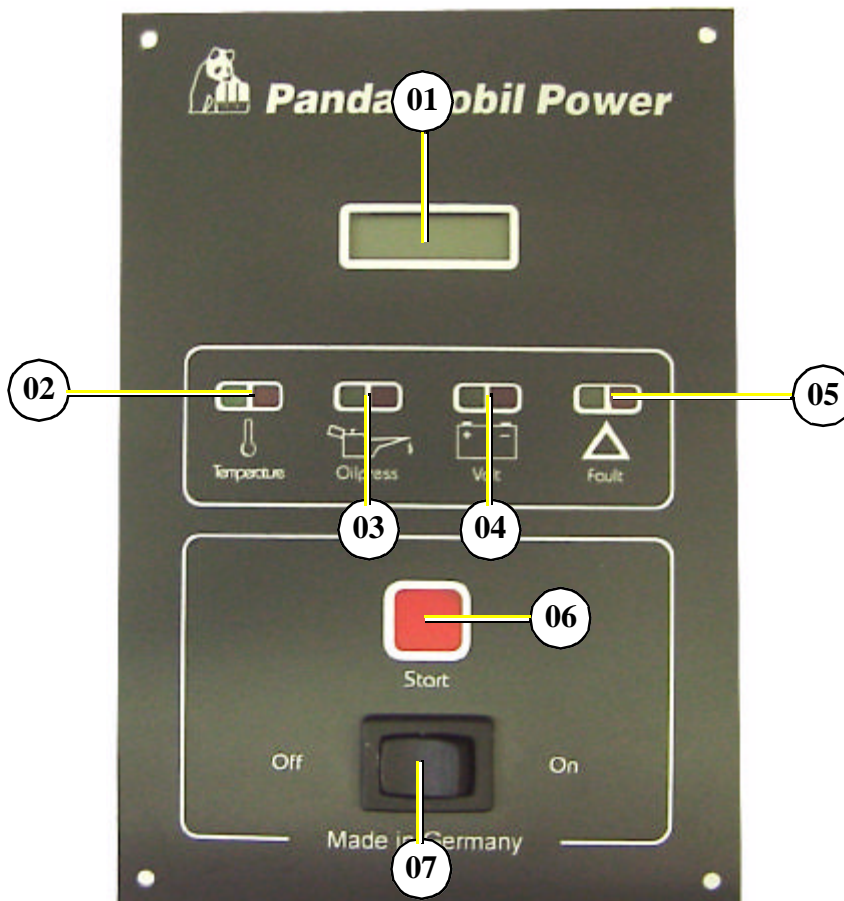


- 01) Cooling water filler neck
- 02) Cooling water tank
- 03) Water-cooled exhaust elbow
- 04) Thermo-switch at exhaust elbow
- 05) Exhaust outlet
- 06) Ventilation hose
- 07) Cover for DC/DC-converter
- 08) Generator housing with coil
- 09) Coolant pipe

- 10) Diode plate under protection cover
- 11) Terminal block for remote control panel, fuses and relays
- 12) Starter motor
- 13) Fuel solenoid valve
- 14) Solenoid switch for starter motor
- 15) Air suction housing with air filter inlet
- 16) Suction port

A.2 Details of functionl units

A.2.1 Remote control panel



- | | |
|--------------------------------------|---------------------------------|
| 01) Betriebsstundenzähler | 05) Leuchte für Betriebszustand |
| 02) Leuchte für Motortemperatur | 06) Generator „Start“-Taste |
| 03) Leuchte für Öldruckleuchte | 07) Panel „Stand by“-Taste |
| 04) Leuchte für Batterieladespannung | |

Fig. A.1: Remote control panel

Automatic Start Option

An automatic start option is available as an accessory. This includes a separate control board, which is connected to the main remote control board panel. The Automatic Start Option allows the generator to be started by means of an external signal (i.e Battery Monitor). A speed gauge and a sensor for speed pick-up are additionally necessary in addition to the automatic start option. (See Component Automatic Start)

A.2.2 Components of Cooling System (raw water)

Raw water inlet

The diagram shows the supply pipes for the generator. The connection neck for the raw water connection is shown on the left hand side. The cross-section of the intake pipe should be nominally larger than the generator connection.



Fig. A.2: Raw water inlet

Seawater impeller pump

The raw water pump is fitted with a rubber impeller. This pump is self-inductive. If, for example, you forget to open the sea valve, then you must expect the impeller to be destroyed after a short period of time. It is recommended to store several impellers on board as spare parts.

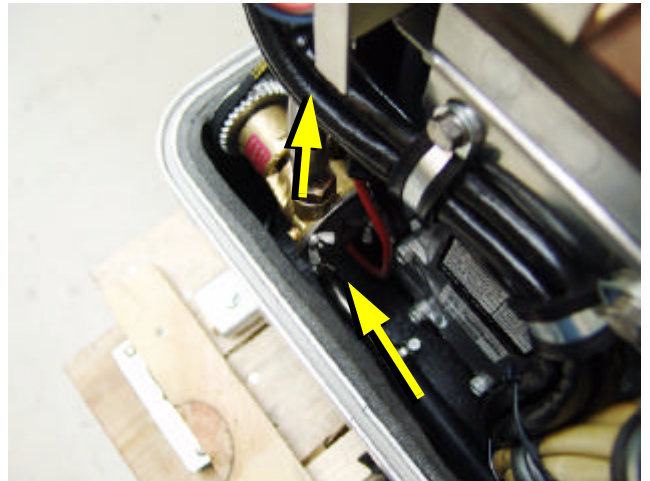


Fig. A.3: Raw water pump

Heat exchanger

Separates the seawater system from the freshwater system.

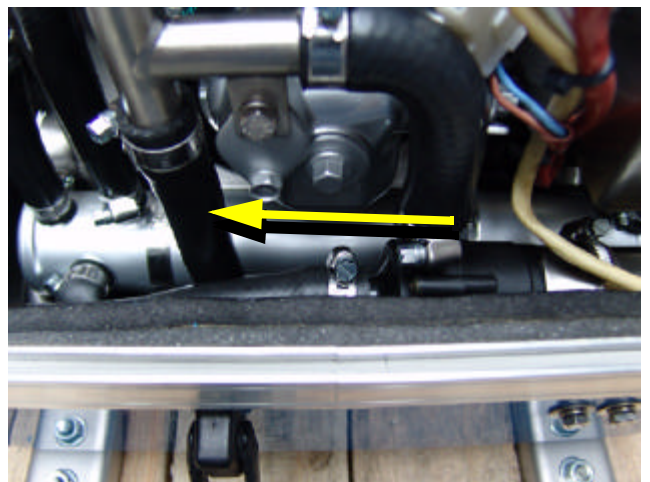
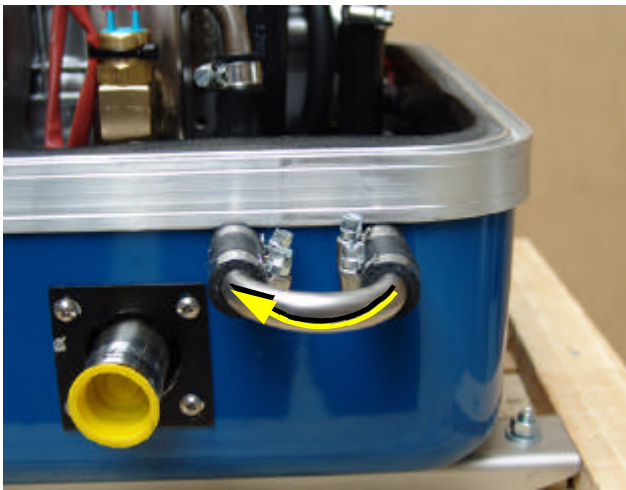
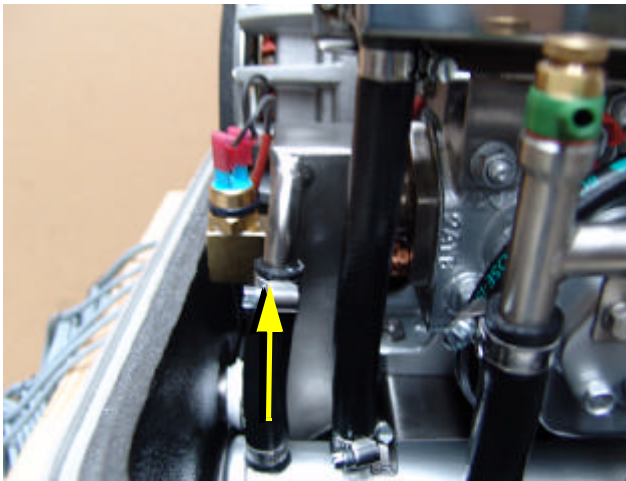


Fig. A.4: Heat exchanger

**Ventilation valve**

A siphon must be installed if the generator sinks below the water line because of the rocking of the boat, even if it is only for a short period of time. A hosepipe on the generator casing has been produced for this. Both connecting pieces are bridged by a formed piece of pipe.

Fig. A.5: Ventilation valve

**Cooling water injector nozzle**

The injection point for the marine generator water-cooled exhaust system is situated at the exhaust connection pieces. The exhaust connections must be regularly checked for signs of corrosion.

Fig. A.6: Cooling water injector nozzle

A.2.3 Components of Cooling Systems (Freshwater)

Cooling water filler neck

The cooling water filler neck is situated at the cooling water tank and only used, when the generator is initially started. Since the generator is normally already filled with cooling water, these components are only by the user, if repairs are to be carried out.

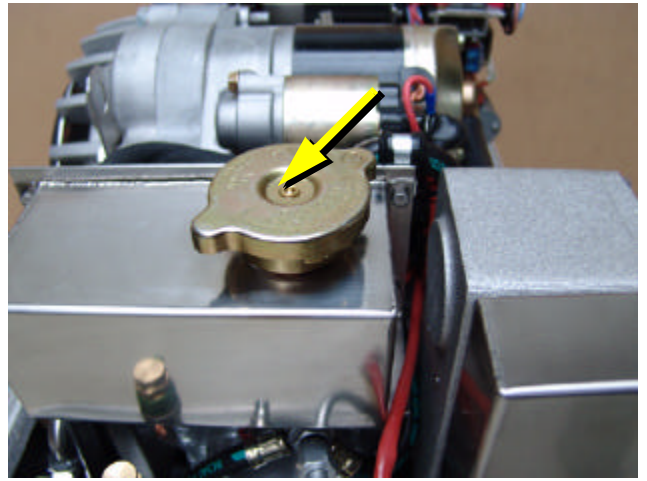


Fig. A.7: Cooling water filler neck

Freshwater backflow

The cooling water is fed to the heat exchanger from the cooling water tank by means of the pipe shown in the diagram.

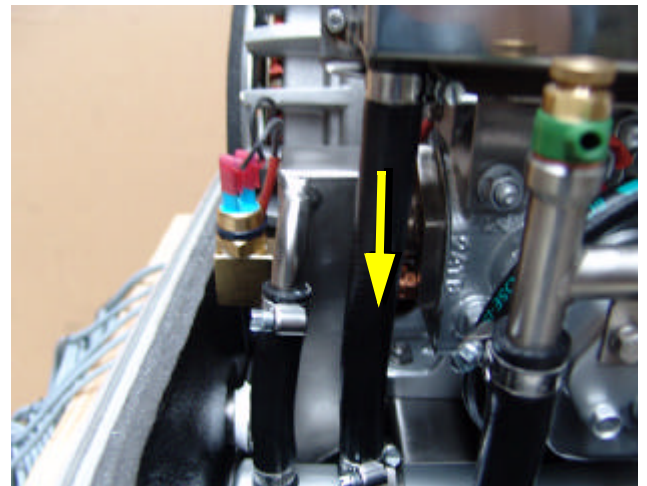


Fig. A.8: Freshwater backflow

Heat exchanger

Separates the seawater system from the freshwater system.

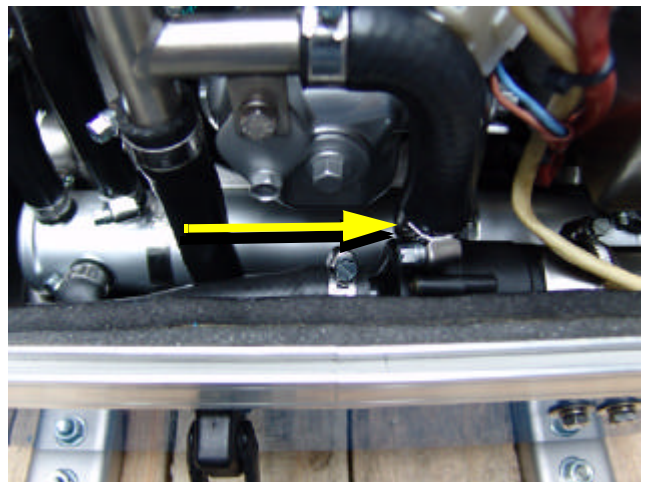
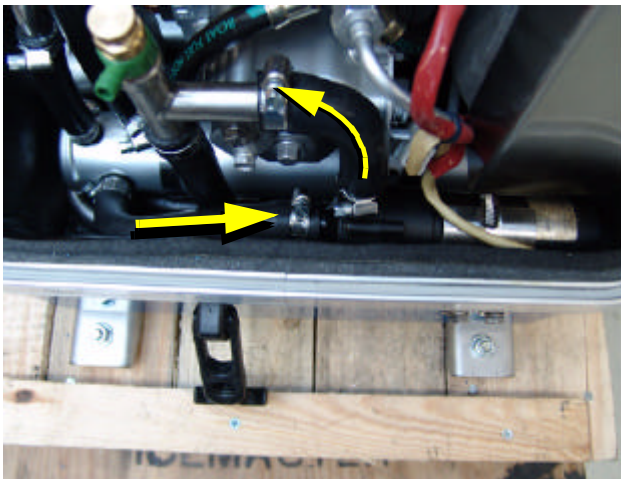


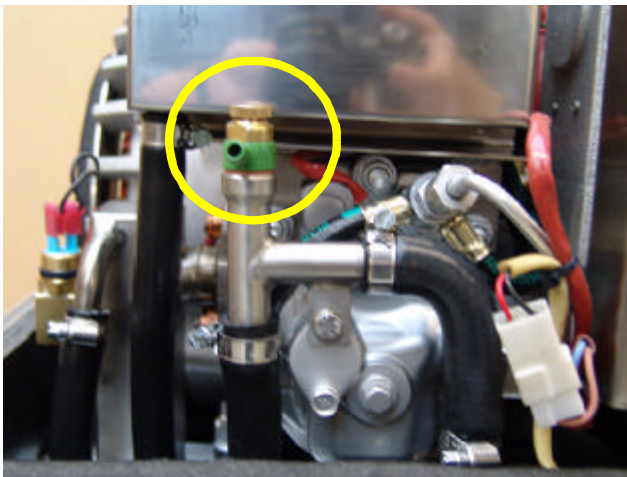
Fig. A.9: Heat exchanger



Internal cooling water pump

The diesel motor cooling water pump (see arrow) aids the circulation of the internal freshwater system.

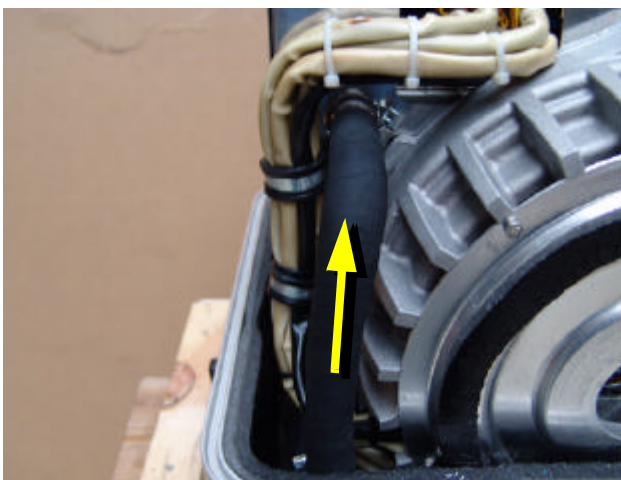
Fig. A.10: Internal cooling water pump



Ventilation valve cooling water pump

The ventilation screw above the cooling water pump casing may not be opened, whilst the generator is running. If this occurs by mistake, air will be drawn through the opening. Extensive ventilation of the whole system is then necessary.

Fig. A.11: Ventilation valve cooling water pump



Water-cooled diode plate

Coolant pipe intake into the diode plate.

Fig. A.12: Water-cooled diode plate

Coolant pipe, dioden plate - engine

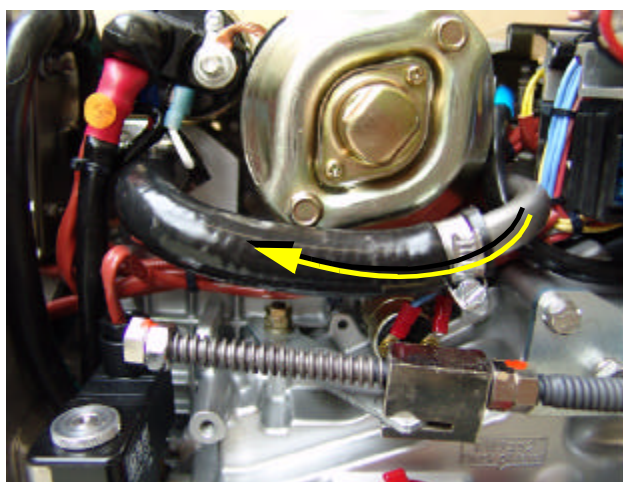


Fig. A.13: Coolant pipe

Coolant outtake engine

The coolant gets below of the engine out into the heat exchanger.

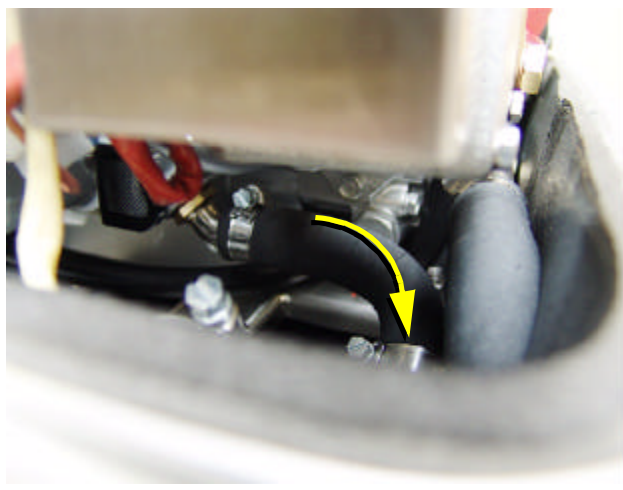


Fig. A.14: Coolant outtake engine

Ventilation pipe

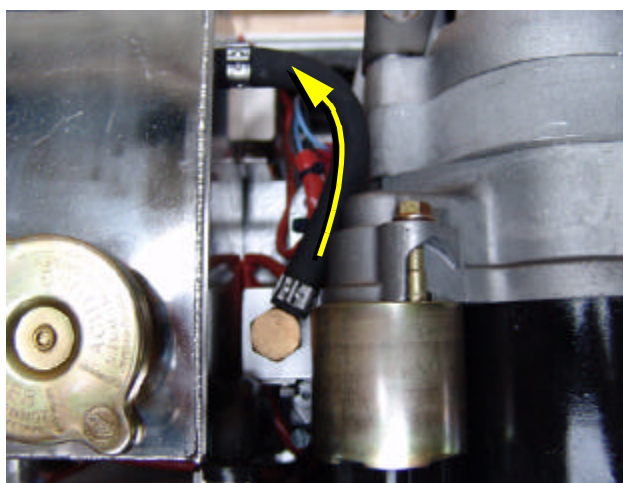


Fig. A.15: Ventilation pipe

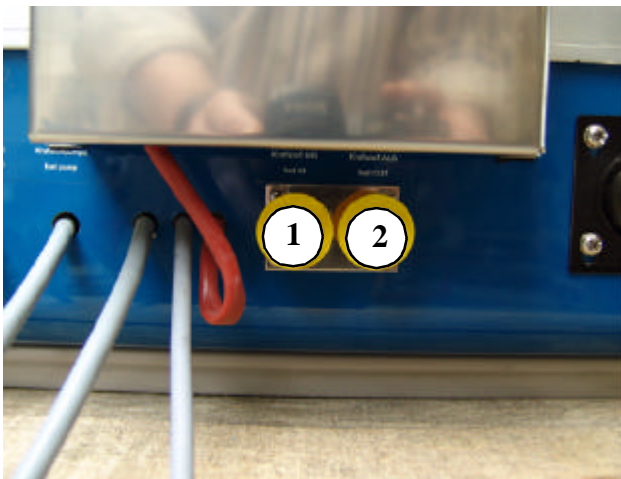
A.2.4 Components of the Fuel System



External fuel pump

The Panda generator is always supplied with an external, electrical (12 V of DC) fuel pump. The fuel pump must be always installed in the proximity of the tank. The electrical connections with the lead planned for it are before-installed at the generator. Since the suction height and the supply pressure are limited, it can be sometimes possible that for reinforcement a second pump must be installed.

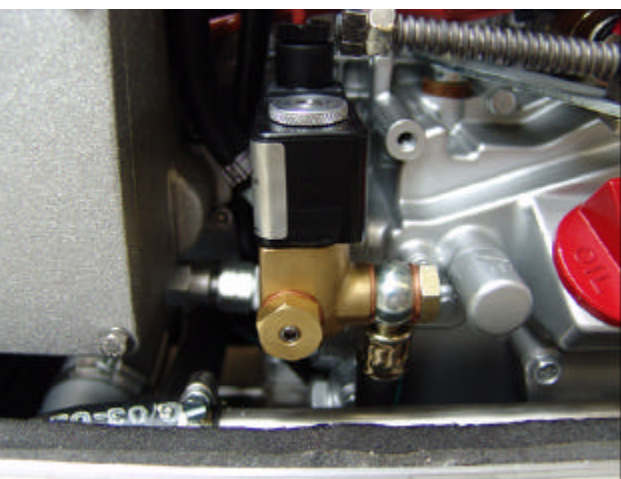
Fig. A.16: External fuel pump



Connecting pieces for the fuel pipe

1. Fuel intake
2. Fuel backflow

Fig. A.17: Fuel connections



Fuel solenoid valve

The fuel solenoid valve opens automatically if „START“ is pressed on the remote control panel“. The solenoid closes, if the generator is switched to „OFF“ position.

It takes a few seconds before the generator stops. If the generator does not start or does not run smoothly (i.e. stutters), or does not attain full speed, then the cause is fore-mostly the solenoid.

Fig. A.18: Fuel solenoid valve

Injection nozzle

If the engine does not start after the ventilation, the fuel injection line must be deaerated.

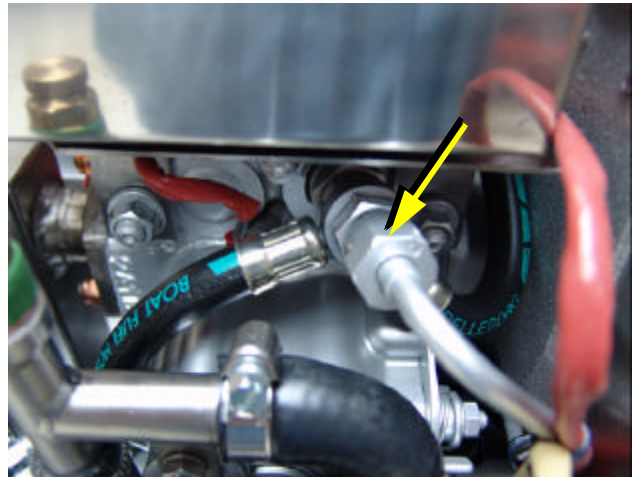


Fig. A.19: Injection nozzle

Glow plug

The glow plug serve the pre-chamber for the heating with cold start. The heat-treat fixture must be operated, if the temperature of the generator is under 16°C. This is practically with each start the case. The heat-treat fixture may be held down also during start and favoured the starting procedure.

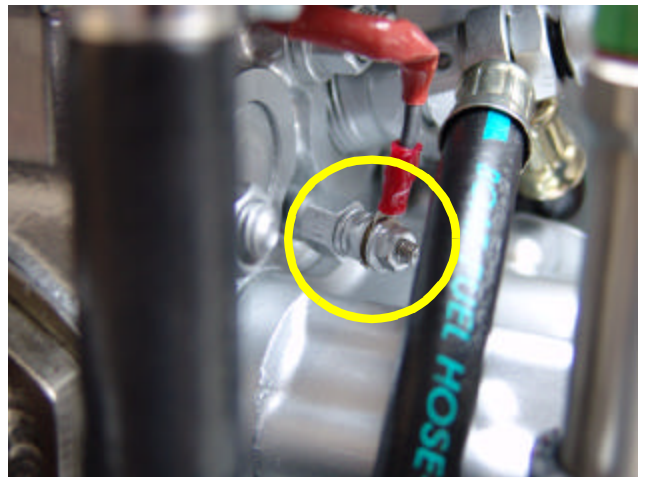
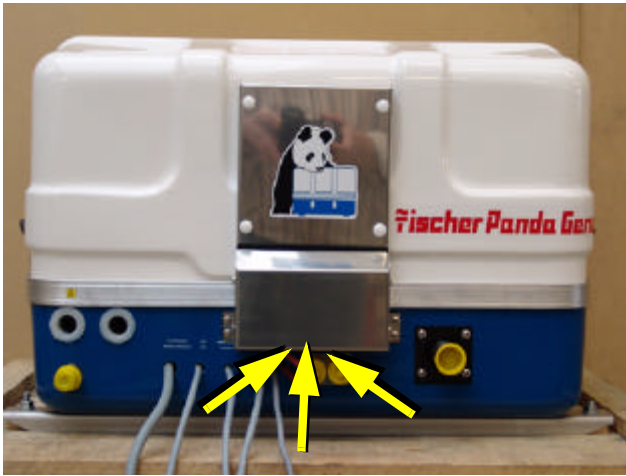


Fig. A.20: Glow plug

A.2.5 Components of Combustion Air

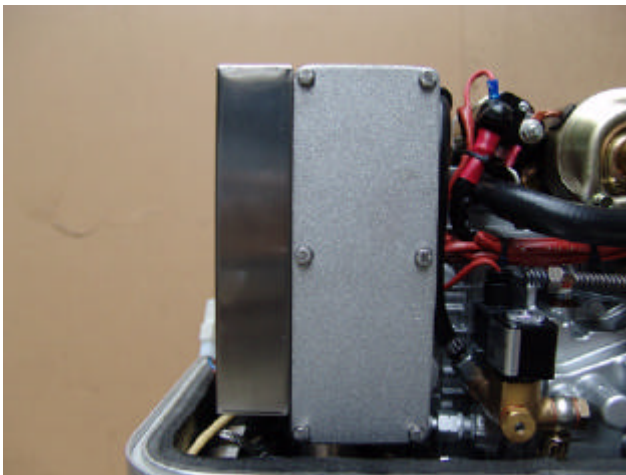


Air suction openings at the sound cover

The sound cover is provided at the upper surface with drillings, through which the combustion air can influx.

It must be consistently paid attention that the generator is installed in such a way that from no water can arrive into the proximity of these air openings.

Fig. A.21: Combustion air intake



Air suction housing

Remove the cover to look inside the housing. There is a filter element. This must be checked from time to time.

Fig. A.22: Air suction housing



Air suction housing with air filter set

The figure shows the air filter element in the air suction housing. An check is advisable once in a while.

Fig. A.23: Air filter set

Exhaust elbow

After the combustion air was led through the engine it occurs into the water-cooled exhaust elbow. On the top side the pipe union for the internal raw water circle is to be seen.

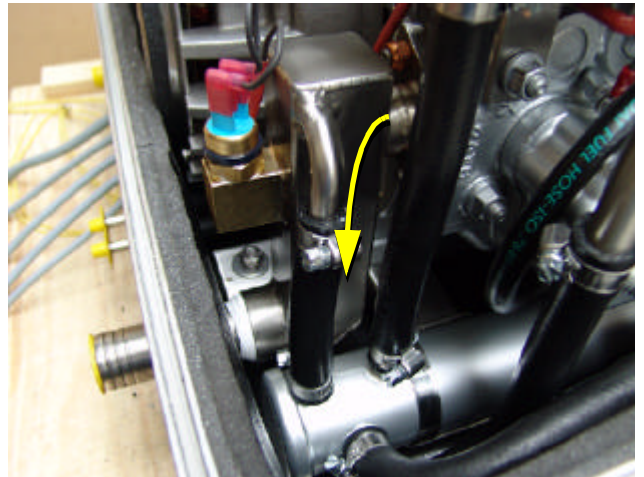


Fig. A.24: Exhaust elbow

Exhaust outlet

Connect the exhaust pipe with the water lock.

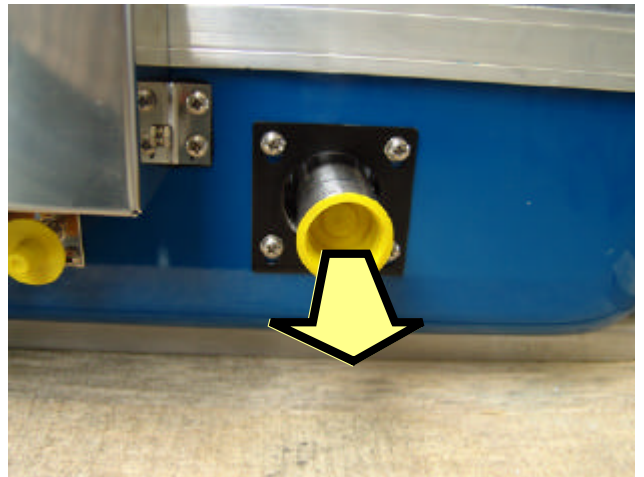


Fig. A.25: Exhaust outlet

A.2.6 Components of the Electrical System

Connection starter battery

Connect here the cables of the starter battery.

1. Cable starter battery minus (-)
2. Cable starter battery plus (+)

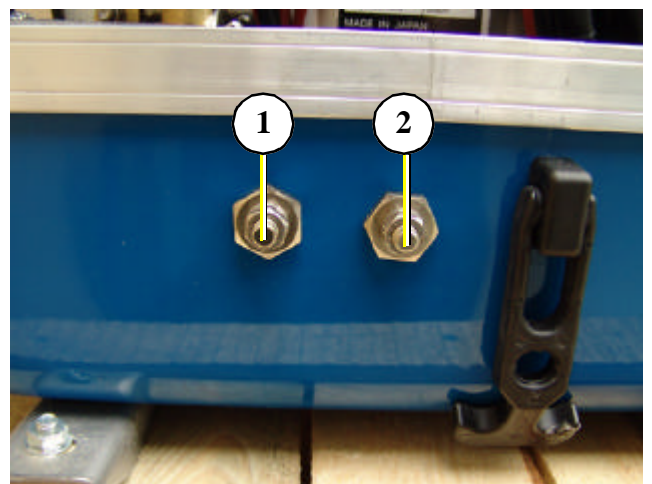
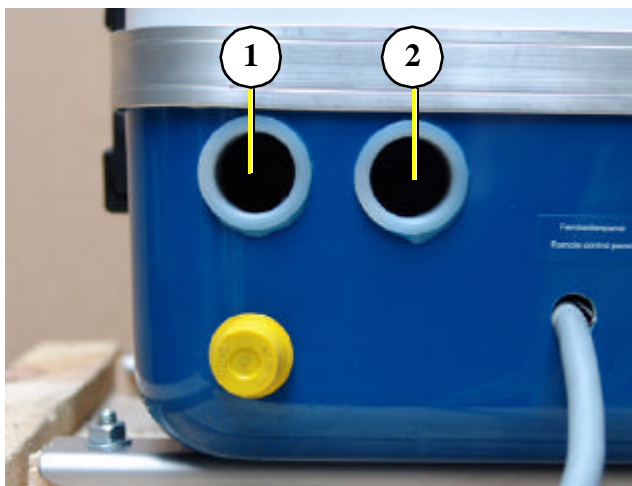


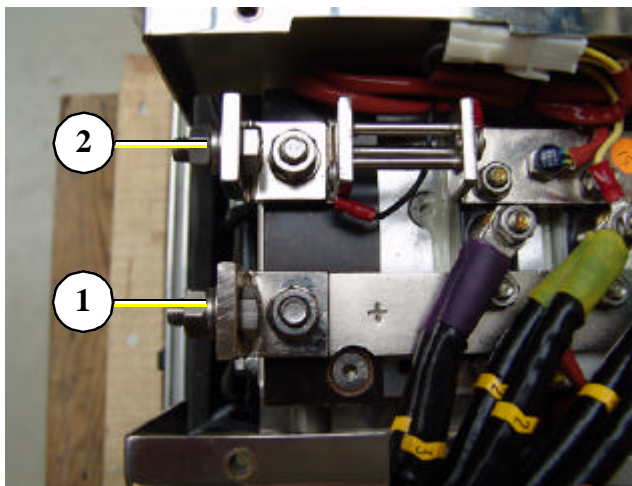
Fig. A.26: Connection starter battery



Passage for battery cable

The battery cables of the battery bank must be laid through this passage to the clamps at the diode plate.

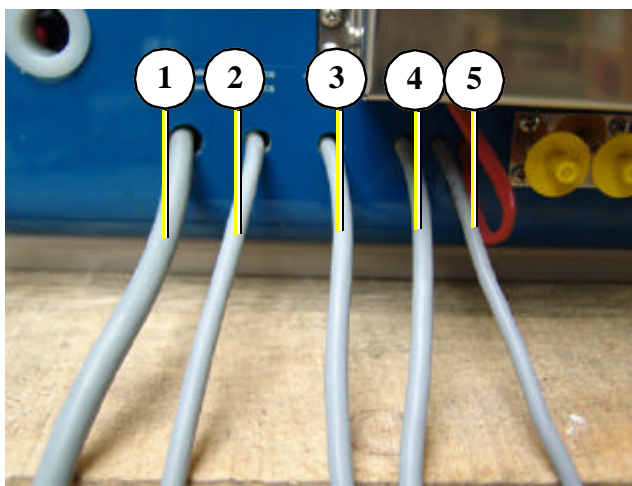
Fig. A.27: Passage



Clamps for battery cable

1. Cimap (+) for battery cable (+)
2. Clamp (-) for battery cable (-)

Fig. A.28: Connections battery cable



Electrical connection for control

At the front of the generator also all remaining cables for the electrical connections are depending upon type. See here:

1. Remote control panel
2. VCS
3. Fuel pump
4. Voltage sense 24V
5. Shunt

Fig. A.29: Electrical connections

Starter motor

1. Starter motor and
2. Solenoid switch

The Diesel engine is electrically started. On the top of the engine is accordingly the electrical starter with the solenoid switch.

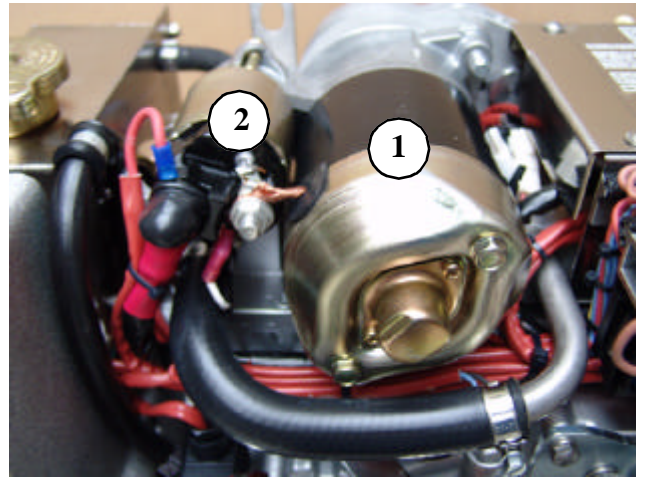


Fig. A.30: Starter motor

Actuator for speed regulation

The generator voltage is determined by progressive speed control through "VCS" in conjunction with the speed actuator. Speed increases with increasing load.

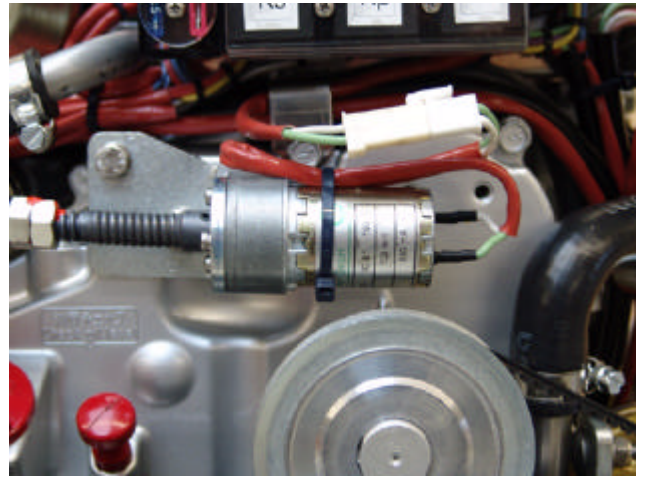


Fig. A.31: Actuator

Plug for speed sensor

All Panda generators can be equipped with an external automatic start. For the operation of this automatic starting system a separate speed sensor is necessary. At some models the speed sensor is standard installed.

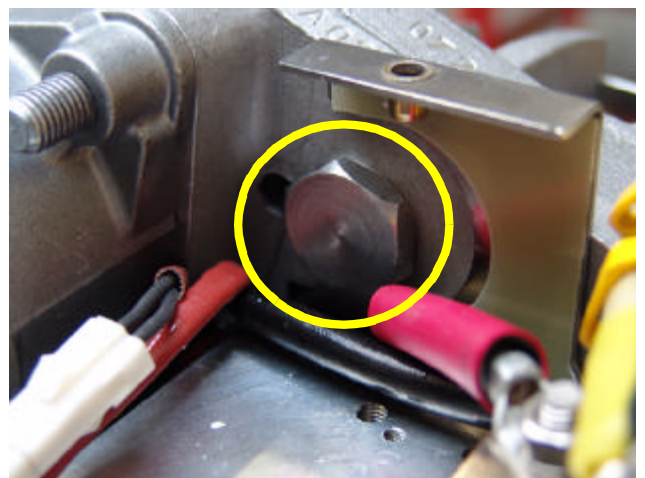
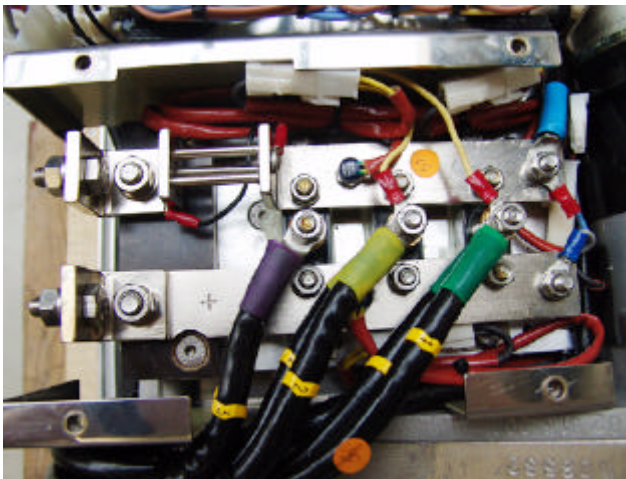
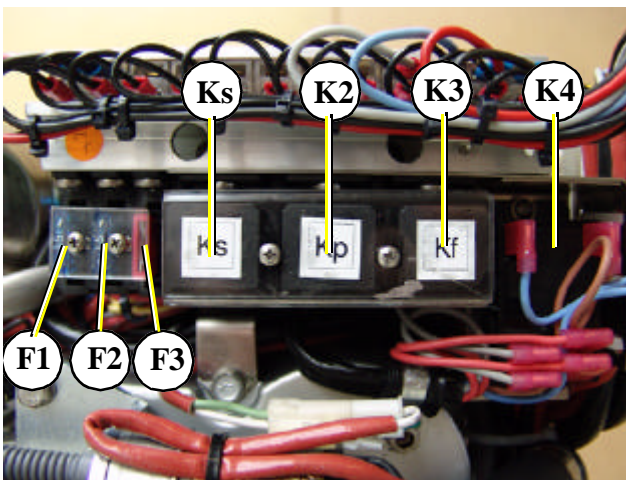


Fig. A.32: Plug for speed sensor



Diode plate

Fig. A.33: Diode plate



Terminal block for remote control panel, fuses and relays

F1 fuse 15A for release relay

F2 fuse 15A for DC-system

F2 fuse 10A for AC-system

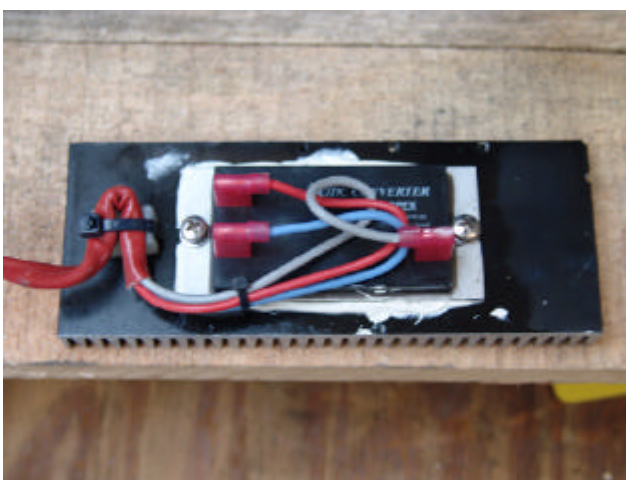
Ks relay for starter motor

K2 relay for plow plug

K3 relay for fuel pump

K4 Release relay

Fig. A.34: Terminal block



DC/DC-converter

Fig. A.35: DC&DC/converter

A.2.7 Sensors and switches for operating surveillance

Thermo-switch at engine

The thermo-switch at the engine is used for monitoring the engine temperature.

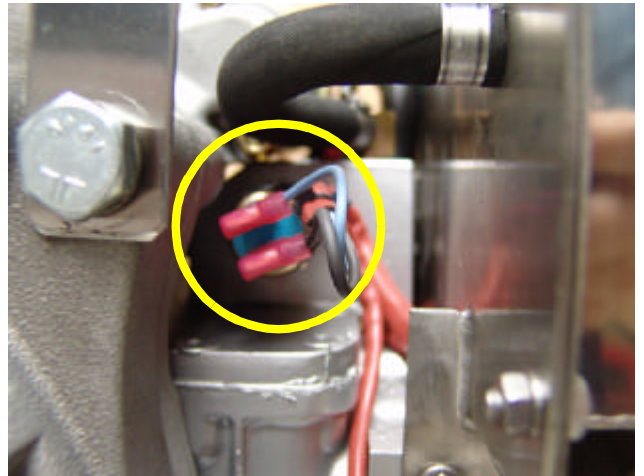


Fig. A.36: Thermo.switch at engine

Thermo-switch at exhaust connection

If the impeller pump drop out and delivers no more seawater, the exhaust connection becomes extremely hot.

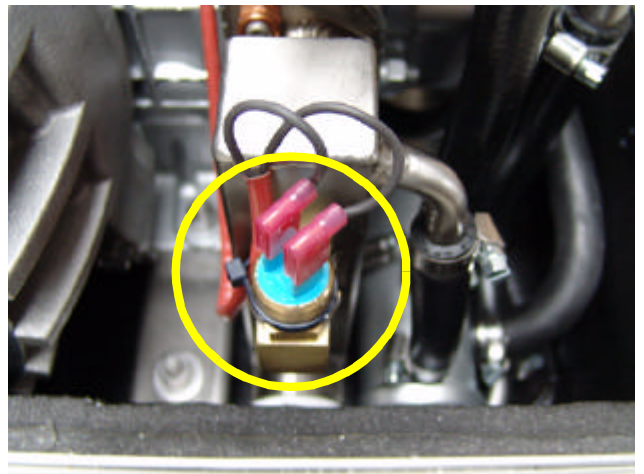


Fig. A.37: Thermo-switch at exhaust connection

Thermo-switch coil

1. Thermo-switch coil 125°C
2. Generator housing
3. Thermo-sensor NTC 981S (for measuring)

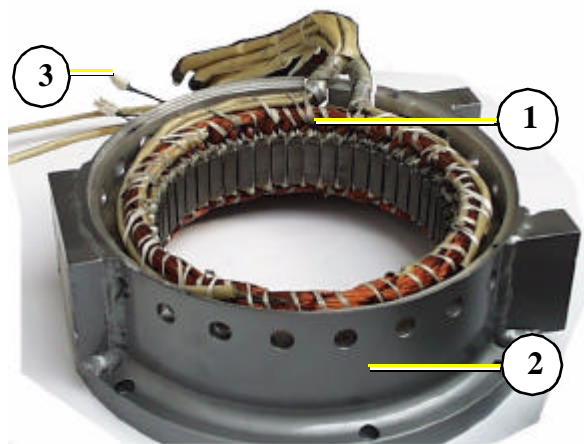
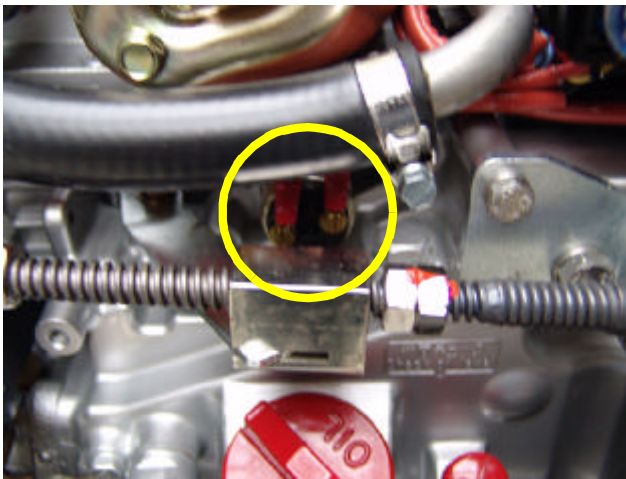


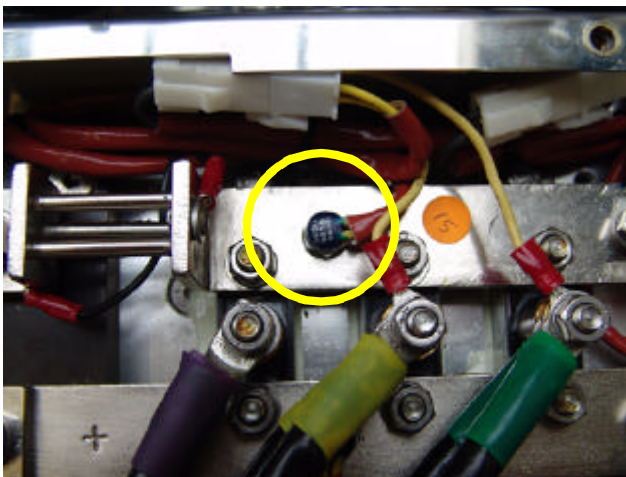
Fig. A.38: Thermo-switch coil



Oil pressure switch

In order to be able to monitor the lubricating oil system, an oil pressure switch is built into the system.

Fig. A.39: Oil pressure switch



Thermo-switch on the (-)-bar

Fig. A.40: Thermo-switch on the (-)-bar



Thermo-switch on the (+)-bar

Fig. A.41: Thermo-switch on the (+)-bar

A.2.8 Components of the Oil Circuit

Oil filler neck with cap

Please pay attention that the filler necks are always well locked after filling in engine oil.

Consider also the references to the engine oil specification.

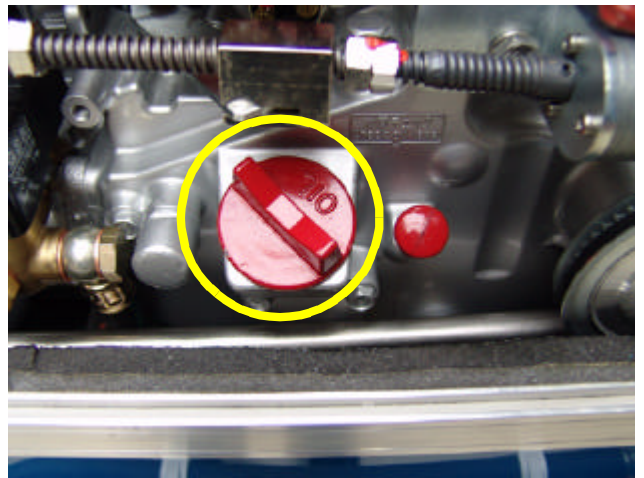


Fig. A.42: Oil filler neck

Oil dipstick

At the dipstick the permissible level is indicated by the markings "maximum" and "minimum". The engine oil should be never filled up beyond the maximum conditions.

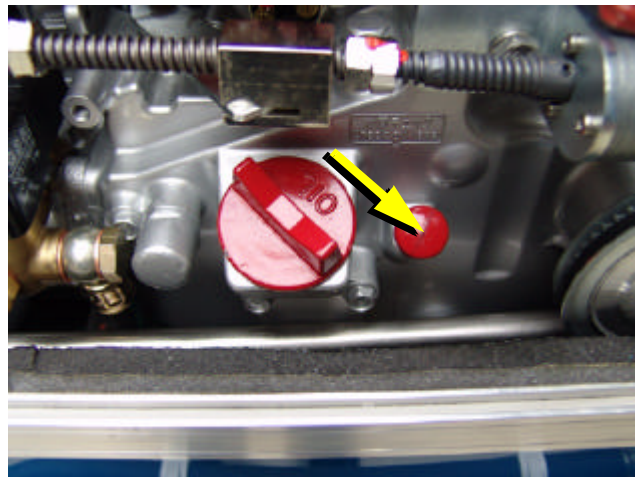


Fig. A.43: Oil dipstick

Oil strainer

The oil strainer should be cleaned every 500 operating hours.

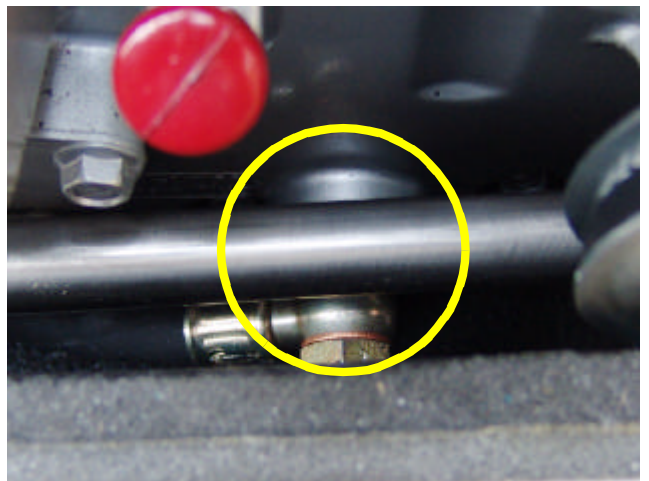
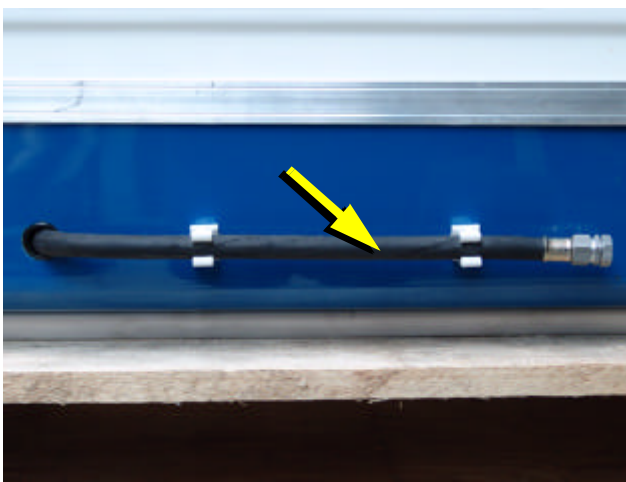


Fig. A.44: Oil strainer



Oil drain hose

The Panda generator is equipped that the engine oil can be drained over an drain hose. The generator should be always installed therefore that a collecting basin can be set up deeply enough. If this is not possible, an electrical oil drain pump must be installed.

Note: Lubricating oil should be drained in the warm condition!

Fig. A.45: Oil drain hose

A.2.9 External Components



Voltage control VCS

The figure shows the control printed board for the VCS voltage regulation. Over this control printed board the control signals are given for the actuator for speed regulation. On the VCS board are also adjustment possibilities for the control parameters.

Fig. A.46: VCS



Battery monitor

Fig. A.47: Battery monitor

A.3 Operation Instructions

A.3.1 Daily routine checks before starting



1. Oil Level Control (ideal level: MAX).

ATTENTION! OIL PRESSURE CONTROL!

True, the diesel motor automatically switches off when there is a lack of oil, but it is very damaging for the motor, if the oil level drops to the lowest limit. Air can be sucked in suddenly when the boat rocks in heavy seas, if the oil level is at a minimum. This affects the grease in the bearings. It is therefore necessary to check the oil level daily before initially running the generator. The oil level must be topped up to the maximum level, if the level drops below the mark between maximum und minimum levels.

2. State of Cooling Water.

The external compensation tank should be filled up to a maximum of in a cold state. It is very important that large expansion area remains above the cooling water level.

3. Open Sea Cock for Cooling Water Intake.

For safety reasons, the seacock must be closed after the generator has been switched off. It should be re-opened before starting the generator.

4. Check Seawater Filter.

The seawater filter must be regularly checked and cleaned. The impeller fatigue increases, if residual affects the seawater intake.

5. Check all Hose Connections and Hose Clamps are Leakage.

Leaks at hose connections must be immediately repaired, especially the seawater impeller pump. It is certainly possible that the seawater impeller pump will produce leaks, depending upon the situation. (This can be caused by sand particles in the seawater etc.) In this case, immediately exchange the pump, because the dripping water will be sprayed by the belt pulley into the sound insulated casing and can quickly cause corrosion.

6. Check all electrical Lead Terminal Contacts are Firm.

This is especially the case with the temperature switch contacts, which automatically switch off the generator in case of faults. There is only safety if these systems are regularly checked, and these systems will protect the generator, when there is a fault.

7. Check the Motor and Generator Mounting Screws are Tight.

The mounting screws must be checked regularly to ensure the generator is safe. A visual check of these screws must be made, when the oil level is checked.

8. Switch the Land Electricity/Generator Switch to Zero before Starting or Switch Off all the Consumers.

The generator should only be started when all the consumers have been switched off. The excitation of the generator will be suppressed, if the generator is switched off with consumers connected, left for a while, or switched on with extra load, thus reducing the residual magnetism necessary for excitation of the generator to a minimum. In certain circumstances, this can lead to the generator being re-excited by means of a DC source. If the generator does not excite itself when starting, then excitation by means of DC must be carried out again.

9. Check the Automatic Controls Functions and Oil Pressure.

Removing a cable end from the monitoring switch carries out this control test. The generator should then automatically switch off. Please adhere to the inspection timetable (see Checklist in the appendix).

A.3.2 Starting Generator

1. If necessary, open the fuel valve.
2. If necessary, close the main battery switch.
3. Check if all the consumers have been switched off.

The consumers are switched off, before the generator is switched off. The generator is not to be started with consumers connected. If necessary, the main switch or fuse should be switched off or the consumers should be individually switched off.

4. Press „ON“ button.

If an automatic start is requested during the switching on process, the generator is started and the panel switches to automatic mode; if there is no automatic start request, the panel switches to delay mode.

5. Press „START“ button.

Press the "START"-button for a short period. The generator is started automatically. As soon as the motor turns over, the starter switches off automatically. It must be monitored every time it is started. The generator must be immediately switched off if the starter is still audible after the engine revs up.

The "START"-button fulfills several functions in the different operation modes of the panel:

If the panel is in **delay mode**, the generator is started and the panel switches to manual mode, that means the automatic stop functions are not carried out. If the "AGT"-generator is started manually, it must be stopped manually, too. In this case there is **no** automatic stop!

In the **manual mode**, the generator continues to run and the panel switches to automatic mode, that means if the last automatic start programm is dispensed with, the generator is stopped and the panel switches to delay mode; if there is no automatic start programm, the generator is stopped and the panel switches to delay mode.

6. Check coolant flow.

Immediately after starting it must be checked whether sufficient coolant flows out at the exhaust.

7. Check electrical voltage.

In order protect the electrical system, especially the onboard batteries from being damaged, the generator voltage must be continually monitored (Voltmeter).

An automatic voltage monitor should be installed, which switches the generator off when overvoltage or undervoltage occurs or sounds an alarm.

A.3.3 Stopping the Generator

1. The generator can only be switched off at the remote control panel by use of the "ON/OFF"-switch during manual operation.
2. During automatic operation the generator can also be switched off by use of the remote control "ON/OFF"-switch or by opening the switch contact for automatic control (also see circuit diagram).

In cases of emergency the generator can be stopped by using the decompression lever.