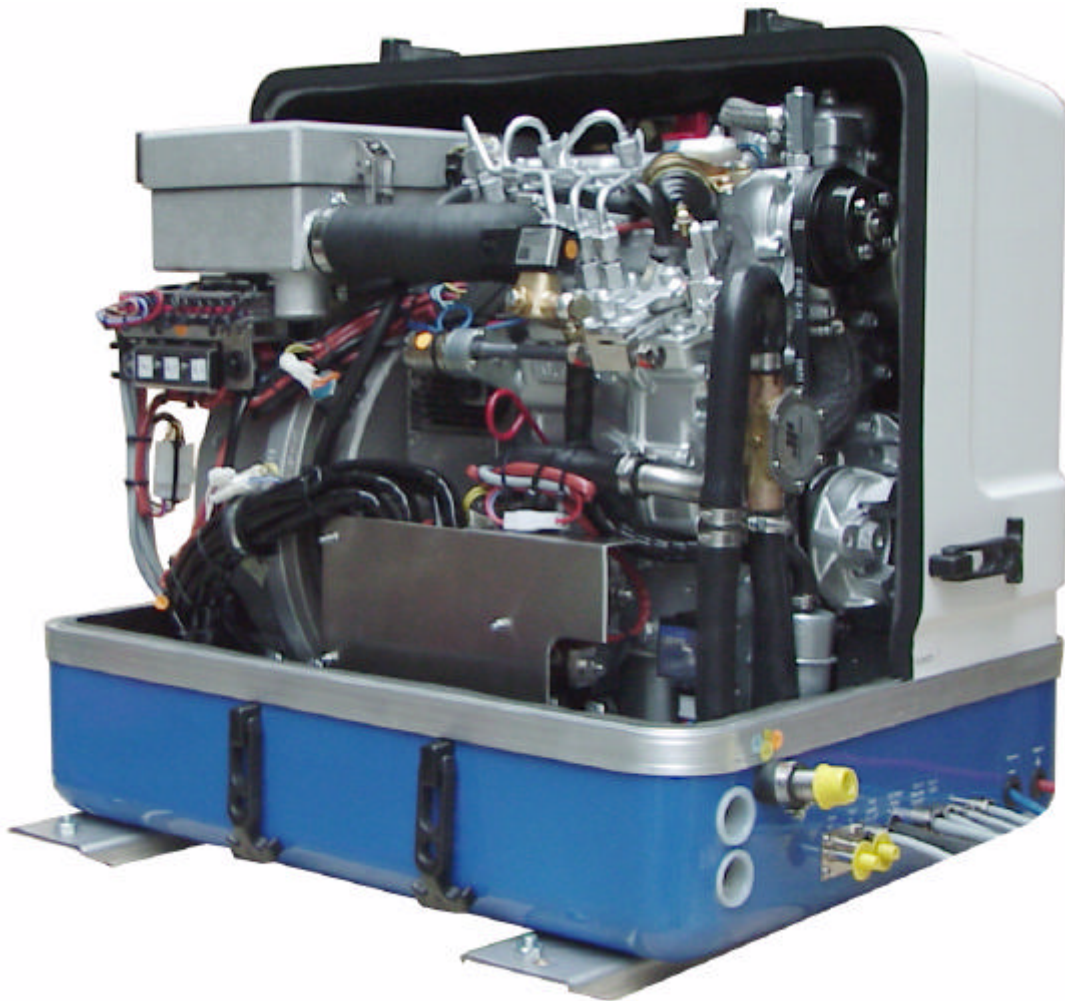


Fischer Panda

Operation Manual

Description of the generator and operation manual



Marine Generator
Panda AGT/DC 10000 PMS
Super silent technology

24V - 360A / 10kW

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)

ICEMASTER GmbH, 33104 Paderborn, reserves all rights regarding text and graphics. Details are given to the best of our knowledge. No liability is accepted for correctness. Technical modifications for improving the product without previous notice may be undertaken without notice. Before installation, it must be ensured that the Pictures, diagrams and related material are applicable to the aggregate supplied. Enquiries must be made in case of doubt.

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 in 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 to 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 do 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 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 impair.

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!

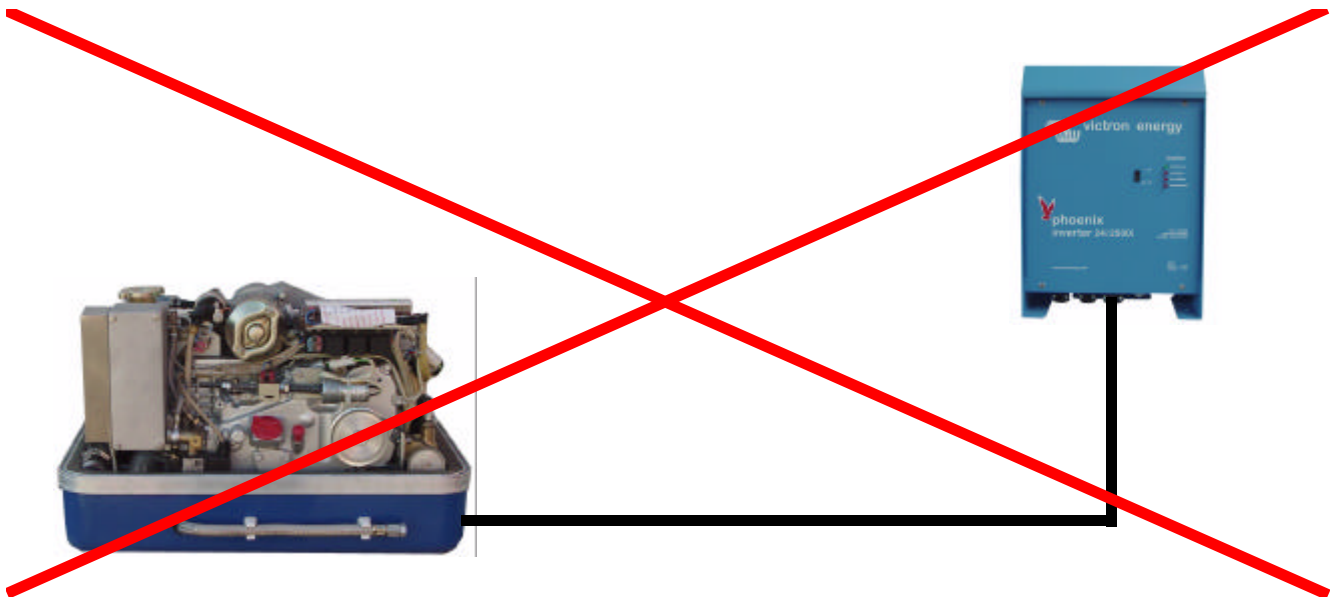
Never start the generator with the battery disconnected, the diodes will be damaged!

CAUTION!

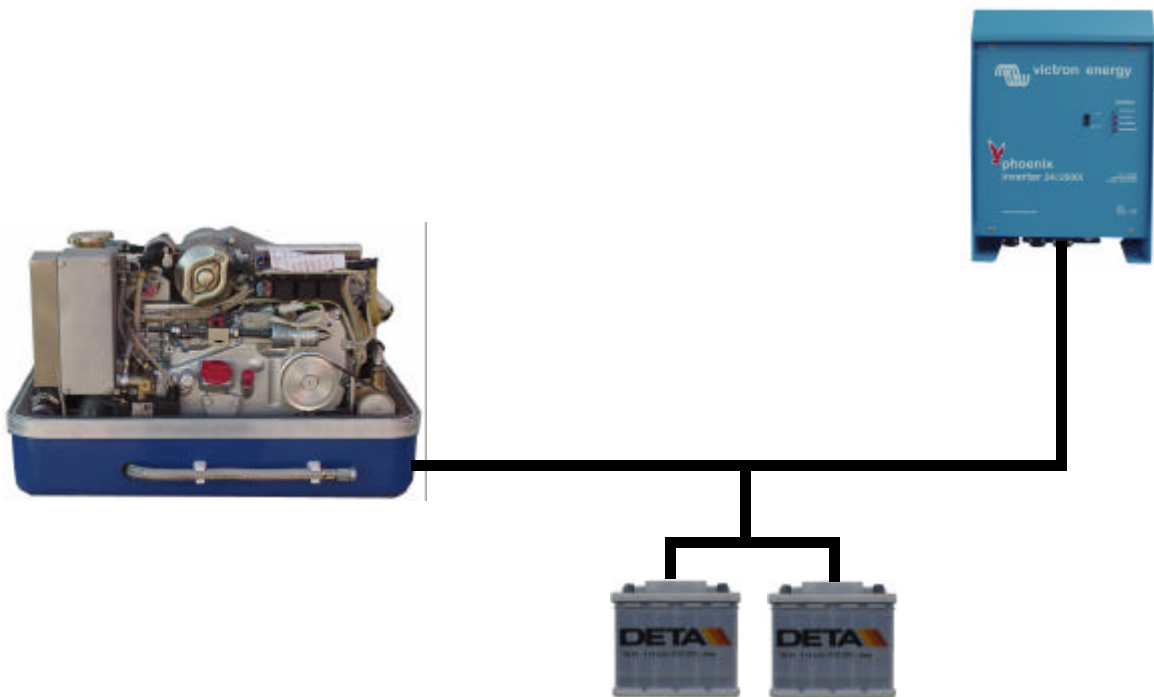
Contact of the electrical contacts may be DANGER TO LIVE!

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-circuit.
- 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.

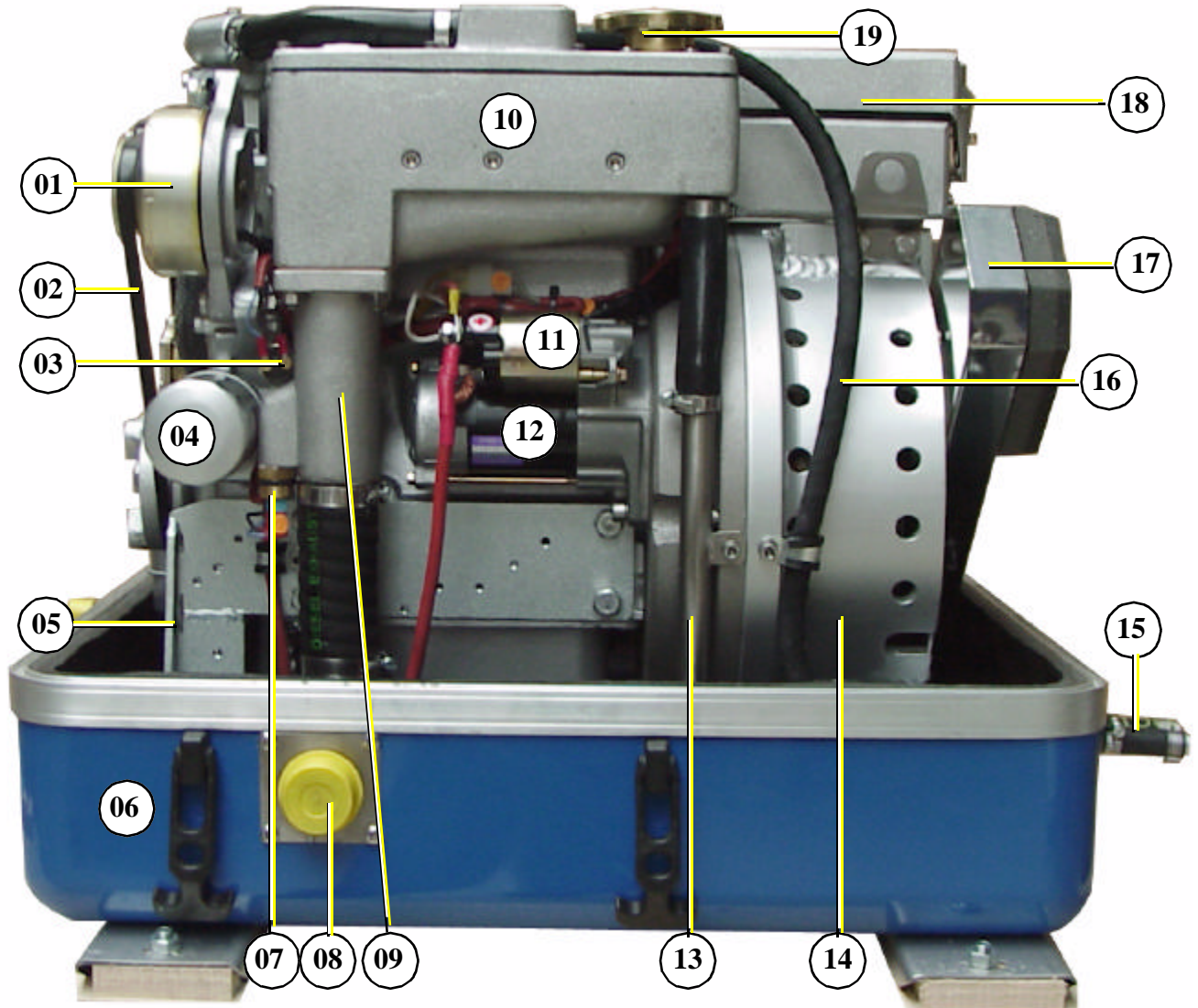
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A. The Panda Generator

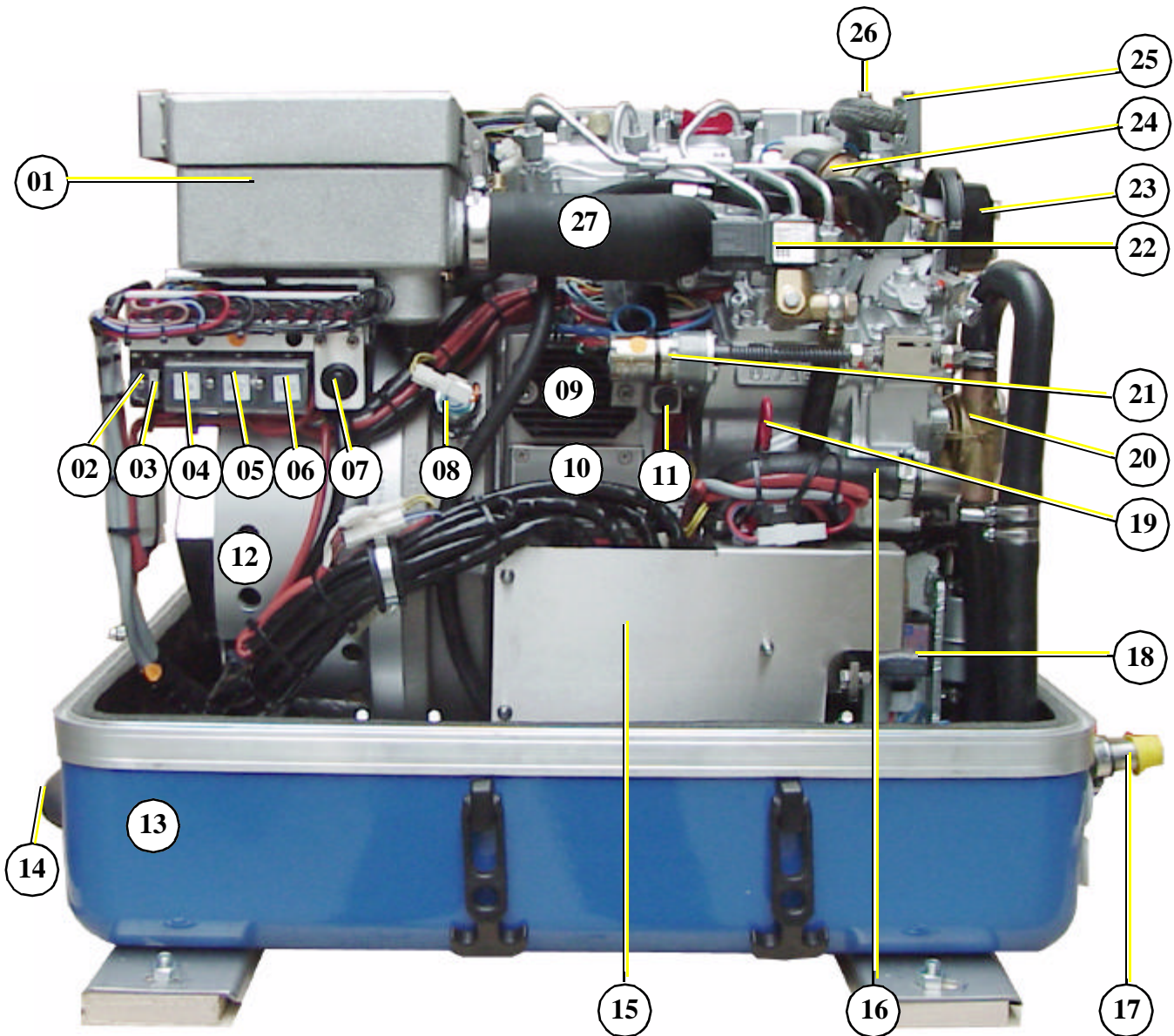
A.1 Description of the Generator

A.1.1 Right Side View



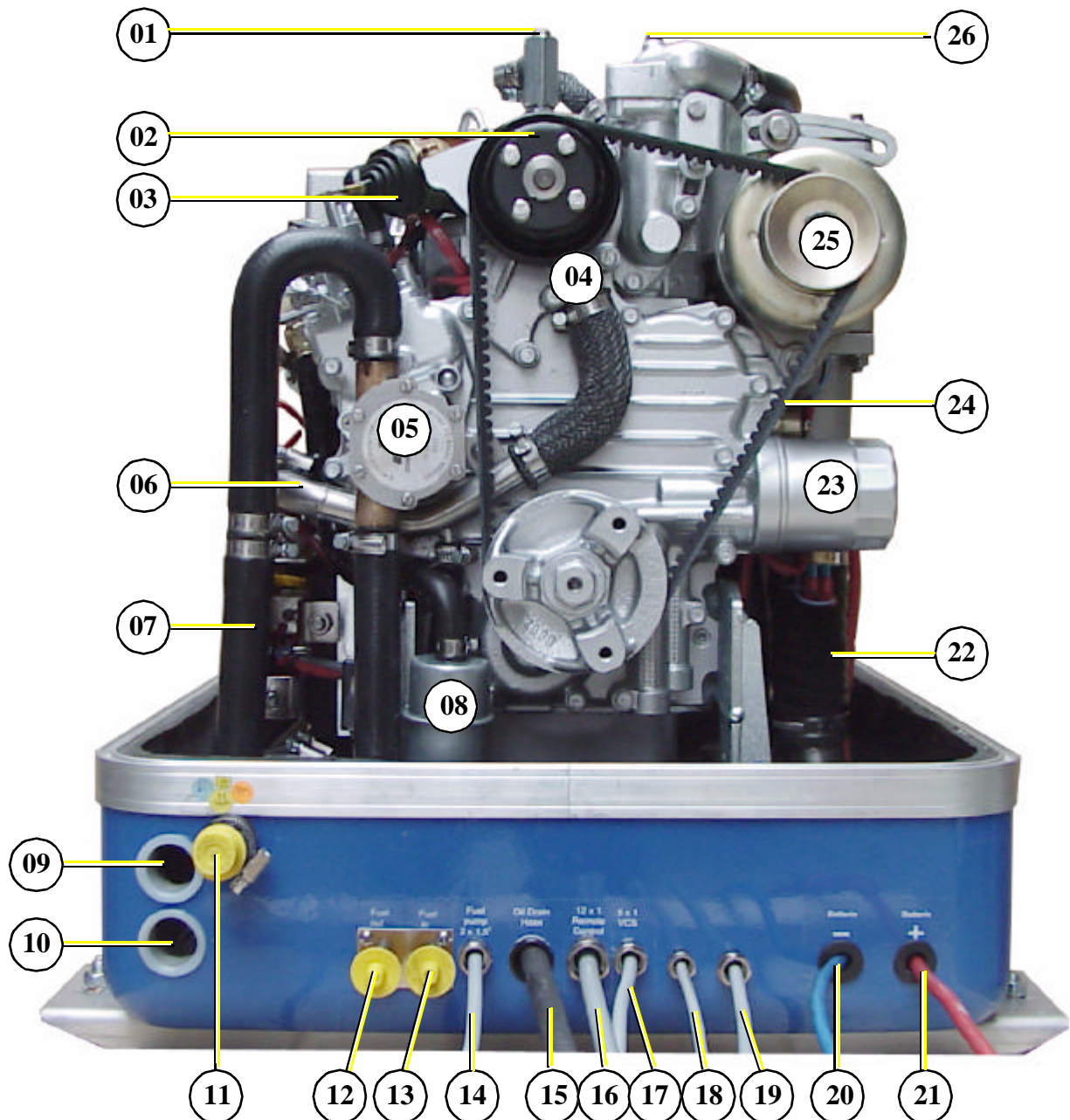
- 01) DC-alternator 12V
- 02) V-belt für DC-alternator and cooling water pump
- 03) Oil pressure switch
- 04) Oil filter
- 05) Engine bracket
- 06) Sound cover base part
- 07) Thermo-switch exhaust
- 08) Exhaust output
- 09) Exhaust connection port
- 10) Water-cooled exhaust elbow

- 11) Solenoid for starter motor
- 12) Starter motor
- 13) Cooling water return pipe
- 14) Generator housing with coil
- 15) Connections for external cooling water expansion tank
- 16) Coolant hose to the external expansion tank
- 17) Suction port for coil cooling
- 18) Air suction housing with air filter
- 19) Coolant filler neck

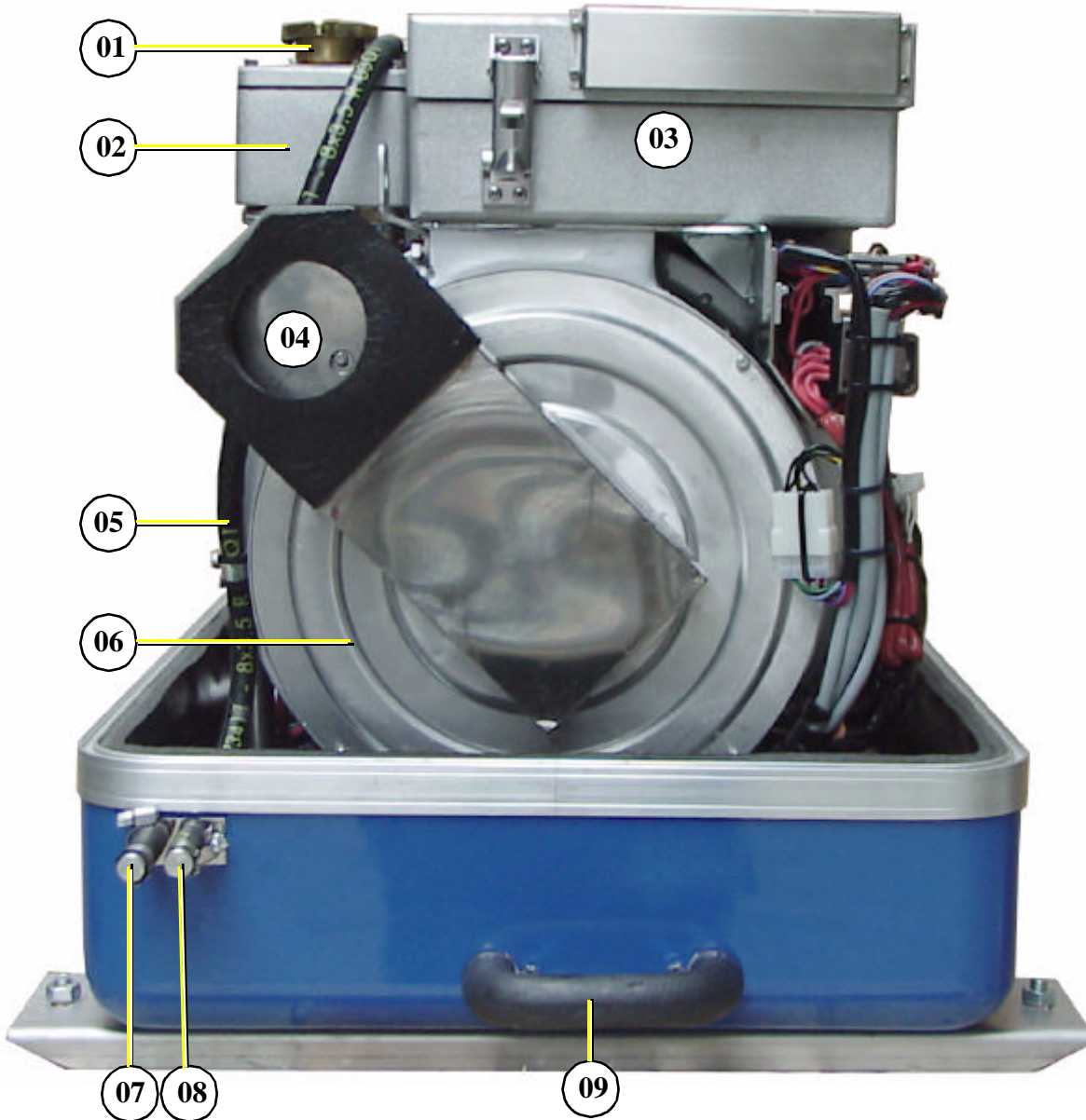
A.1.2 Right Side View


- | | |
|---|--|
| 01) Air suction housing with air filter | 15) Diodesplate under protection cover |
| 02) Electrical fuse 15A (blue) | 16) Cooling water pipe, diodesplate - cooling water pump |
| 03) Electrical fuse 25A (white) | 17) Seawater intake |
| 04) Starter-relay Ks | 18) Time relay for stop solenoid |
| 05) Pre-glow relay (glow plugs) K2 | 19) Oil dipstick |
| 06) Fuel pump start relay K3 | 20) Seawater pump |
| 07) Failure bypass switch | 21) Actuator for rpm-regulation |
| 08) Speed sensor | 22) Fuel solenoid valve |
| 09) Charge control for DC-alternator | 23) Pulley for internal cooling water pump |
| 10) Electronic starter control unit | 24) Stop solenoid |
| 11) Fuse for measuring voltage | 25) Ventilation screw cooling water pump |
| 12) Generator housing with coil | 26) Ventilation screw thermostat housing |
| 13) Sound cover base part | 27) Suction hose, air suction housing - induction elbow |
| 14) Connection for external ventilation valve | |

A.1.3 Front View



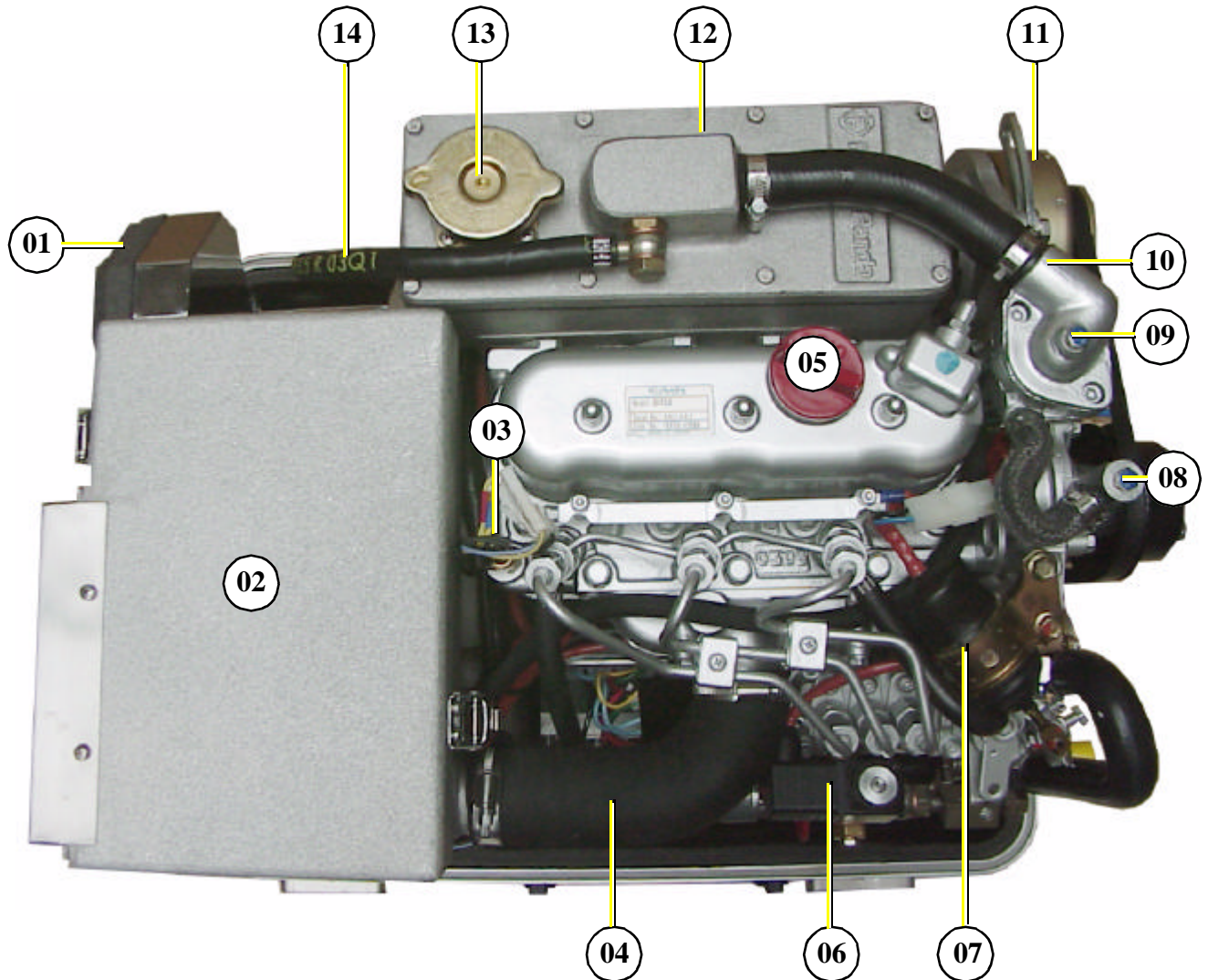
- | | |
|---|---|
| 01) Ventilation screw internal cooling water pump | 14) Cable fuel pump (2x1,5mm ²) |
| 02) Pulley for internal cooling water pump | 15) Oil drain hose |
| 03) Stop solenoid | 16) Cable remote control panel (12x1mm ²) |
| 04) Internal cooling water pump | 17) Cable voltage control VCS (5x1mm ²) |
| 05) Seawater pump | 18) Measuring shunt |
| 06) Pipe, formed, for cooling intake | 19) Measuring voltage 24V (red/black) |
| 07) Seawater intake hose | 20) Starter battery minus (-) |
| 08) Fuel filter | 21) Starter battery plus (+) |
| 09) Passage for battery cable | 22) Exhaust hose |
| 10) Passage for battery cable | 23) Oil filter |
| 11) Seawater intake | 24) V-belt for internal cooling water pump |
| 12) Connection fuel out | 25) DC-alternator 12V |
| 13) Connection fuel in | 26) Ventilation screw thermostat housing |

A.1.4 Back View


- 01) Cooling water filler neck
- 02) Water-cooled exhaust elbow
- 03) Air suction housing with air filter
- 04) Suction port for coil cooling
- 05) Cooling water hose to external expansion tank

- 06) Generator front cover
- 07) In-flow to external cooling water expansion tank
- 08) Return from external cooling water expansion tank
- 09) Connection external ventilation valve

A.1.5 View from Above



- 01) Suction port for coil cooling
- 02) Air suction housing with air filter
- 03) Thermo-switch cylinder head
- 04) Suction hose, air suction housing - induction elbow
- 05) Oil filler neck
- 06) Fuel solenoid valve
- 07) Stop solenoid

- 08) Ventilation screw internal cooling water pump
- 09) Ventilation screw thermostat housing
- 10) Thermostat housing with thermostat
- 11) DC-alternator 12V
- 12) Water-cooled exhaust elbow
- 13) Cooling water filler neck
- 14) Cooling water hose to external expansion tank

A.2 Details of functional units

A.2.1 Remote control panel

Remote control panel

The remote control panel is necessary to control the generator and to evaluate the motor/generator properties. The generators will automatically cutout if it does not run as required. The generator may not be run without the remote control panel.

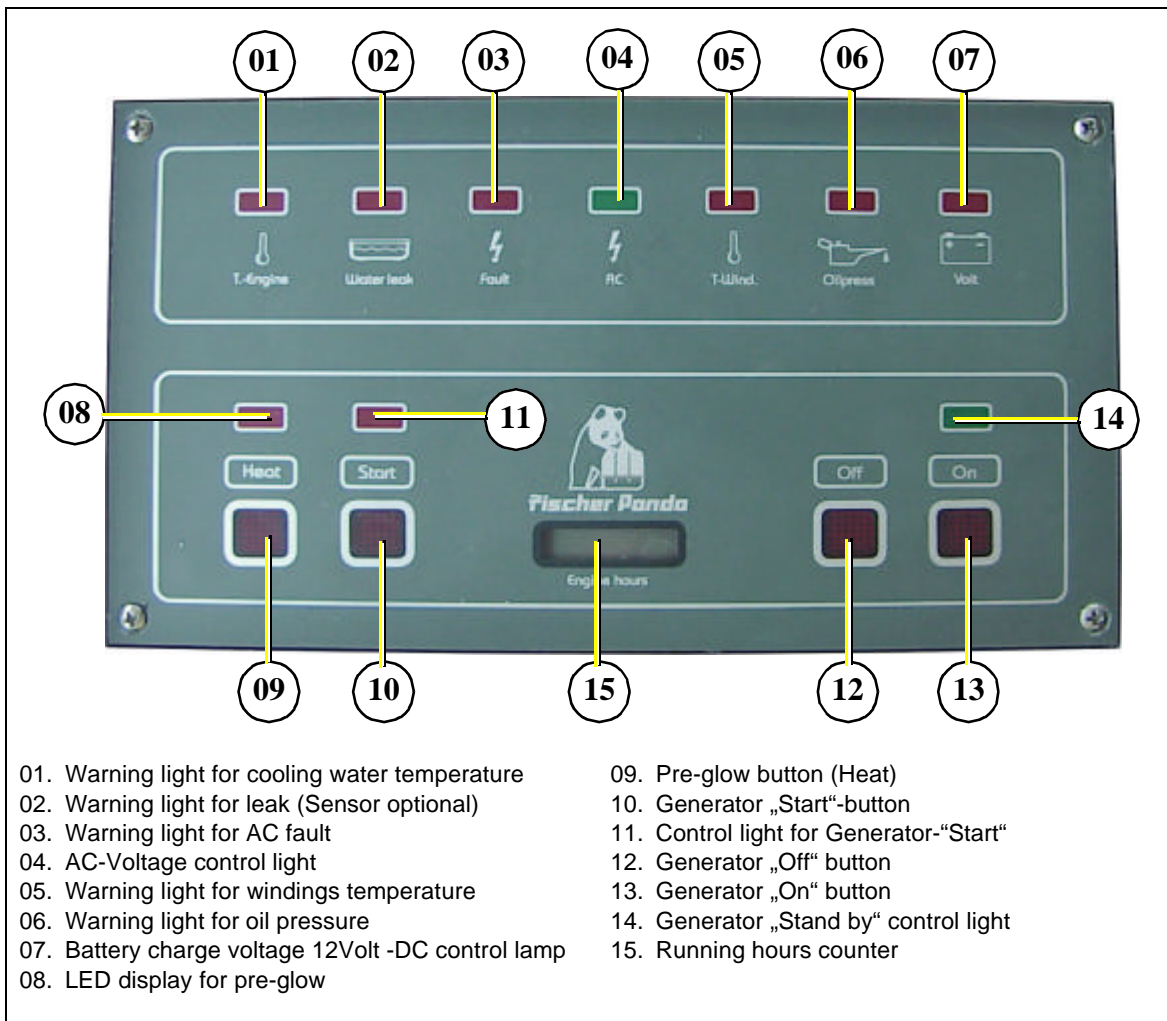


Fig. A.1: Fernbedienpanel

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 (Seawater)

Seawater intake

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

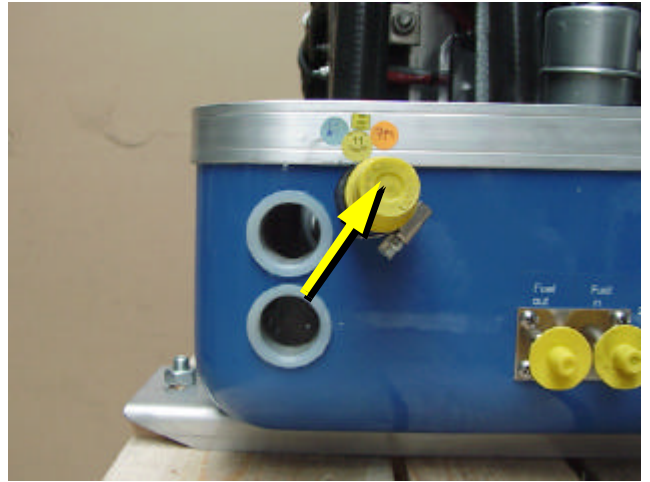


Fig. A.2: Seawater intake

Seawater impeller pump

The seawater 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.

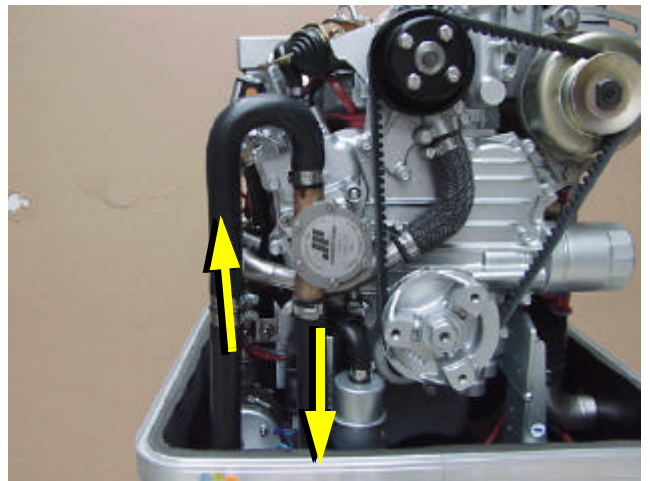


Fig. A.3: Seawater impeller pump

Heat exchanger

Separates the seawater system from the freshwater system.

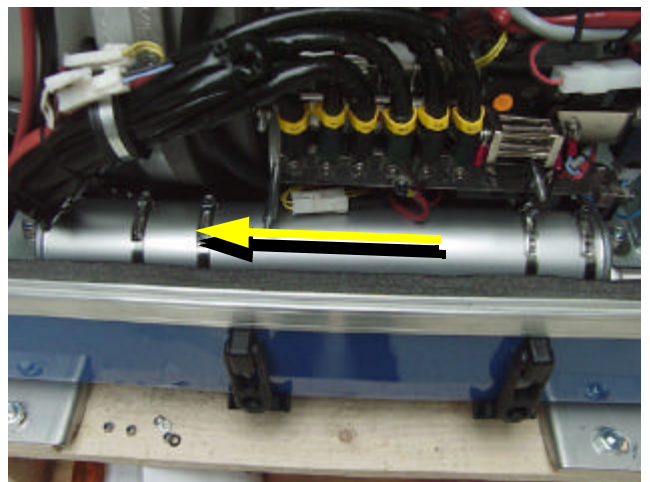
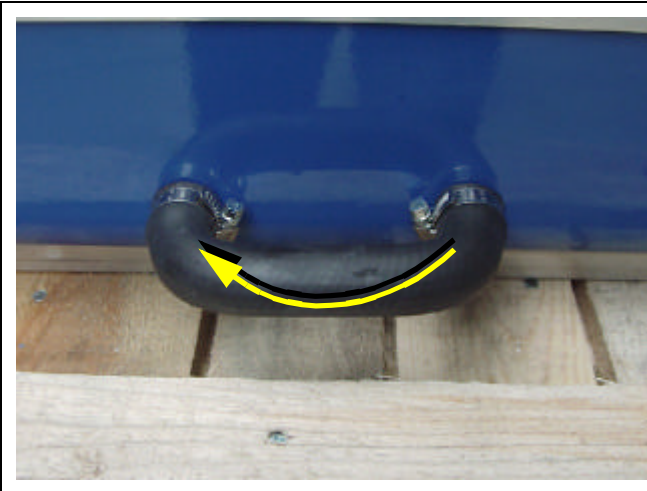


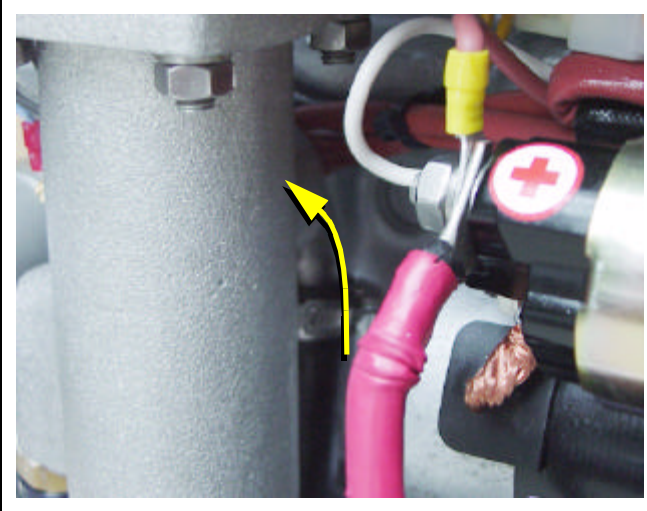
Fig. A.4: Heat exchanger



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 hose.

Fig. A.5: Connection ventilation valve

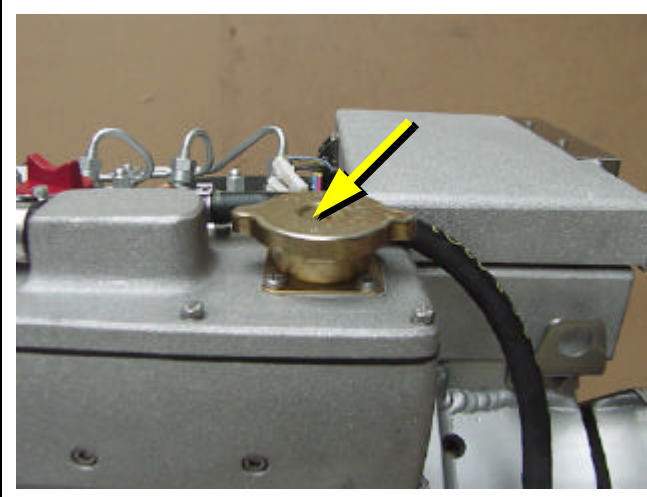


Cooling water injector nozzle

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 System (Freshwater)



Cooling water filler neck

The cooling water filler neck situated at the water-cooled manifold are 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. Topping up with cooling water may only be carried out at the external cooling water compensation tank. Note that the water level in the cooling water compensation tank is only 20% of the volume in a cold state.

Fig. A.7: Cooling water filler neck

Freshwater backflow

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

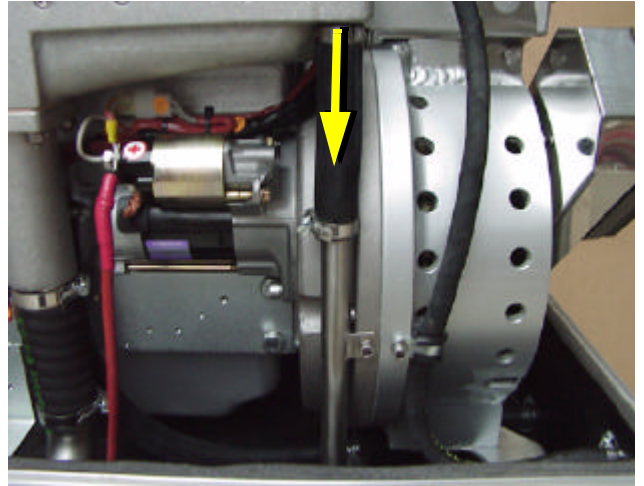


Fig. A.8: Freshwater backflow

Ventilation pipe

The ventilation pipe at the water-cooled exhaust manifold leads to the external expansion tank. This pipe only serves as a ventilation pipe, if both pipes are to be connected to the external expansion tank (ventilation pipe and intake pipe).

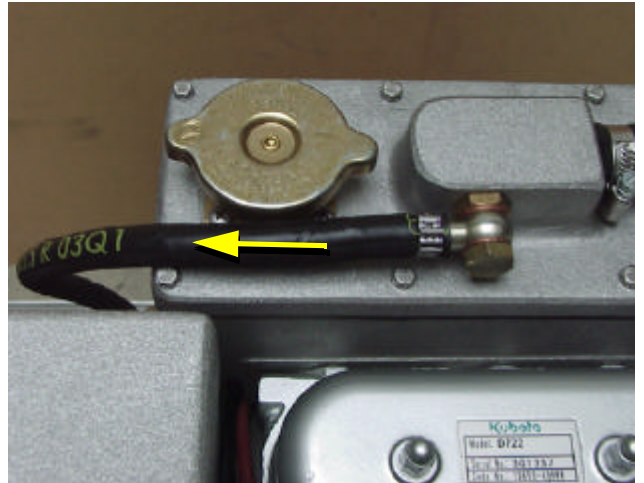


Fig. A.9: Ventilation pipe

Hose connection pieces for the external expansion tank

The external expansion tank is connected by two hose connections. The connecting pieces shown here serves as constant ventilation for the water-cooling system.

In case the external expansion tank is connected with two hoses, the system will ventilate itself. In this case, additional ventilation is only necessary when the generator is initially filled, or if the cooling water is not circulating.

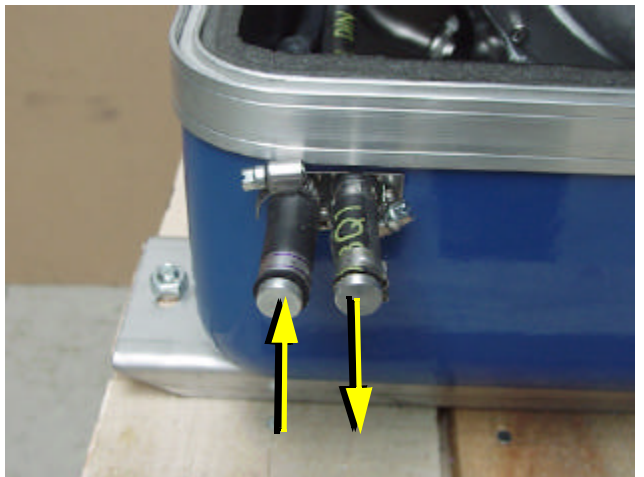
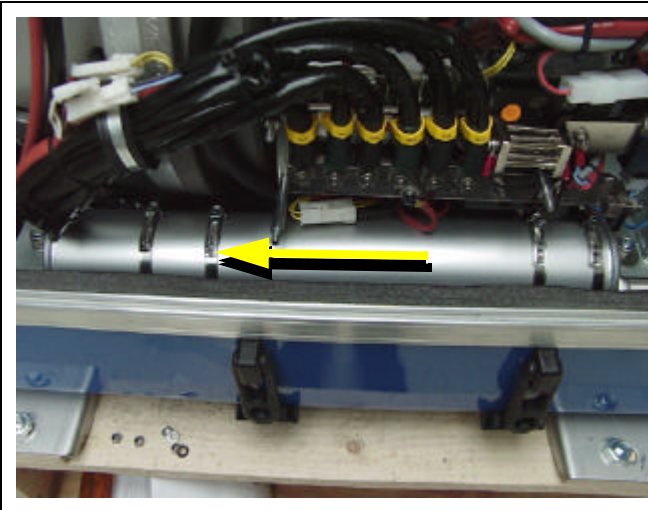
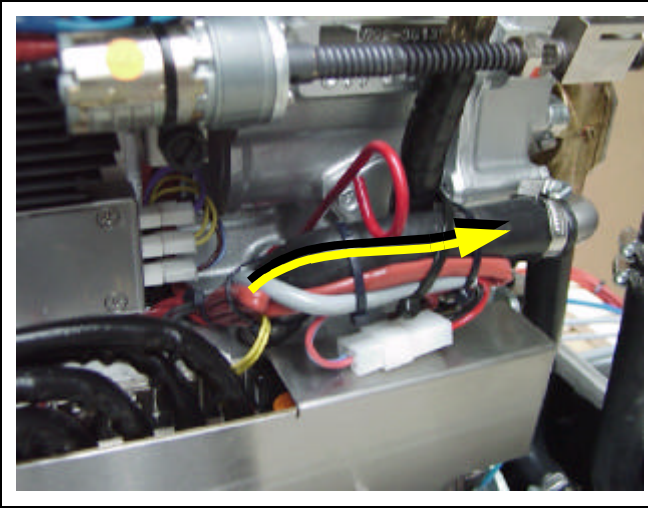


Fig. A.10: External expansion tank

**Heat exchanger**

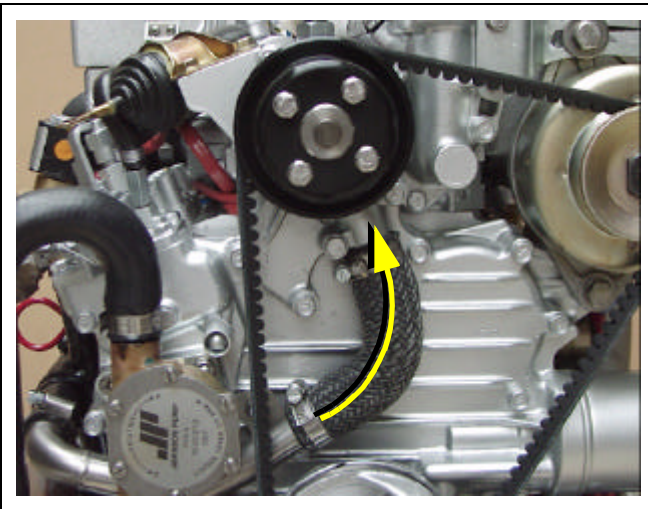
Separates the seawater system from the freshwater system.

Fig. A.11: Heat exchanger

**Cooling water connection block**

The diode plate is cooled with the cooling water connection block. The cooling water connection block must be regularly checked about tightness and leakage.

Fig. A.12: Cooling water connection block

**Internal cooling water pump**

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

Fig. A.13: Internal cooling water pump

Cooling water intake

- A.) To the thermostat housing
- B.) From the external expansion tank

The intake pipe from the external cooling water expansion tank is connected to the point shown with „B“.

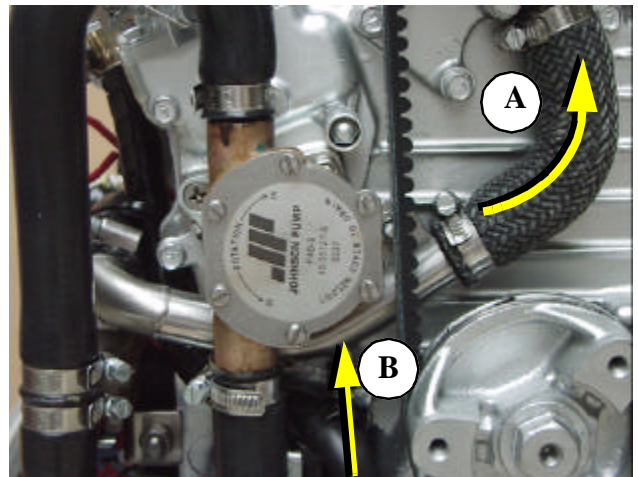


Fig. A.14: Cooling water intake

Ventilation screw 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.



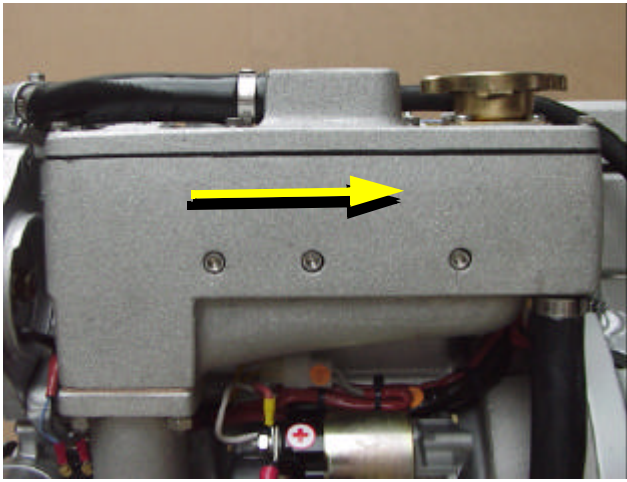
Fig. A.15: Ventilation screw cooling water pump

Ventilation screw thermostat housing

The ventilation screw on the thermostat housing should occasionally be opened for control purposes. Standing machinery should principally carry out ventilating.



Fig. A.16: Ventilation screw thermostat housing

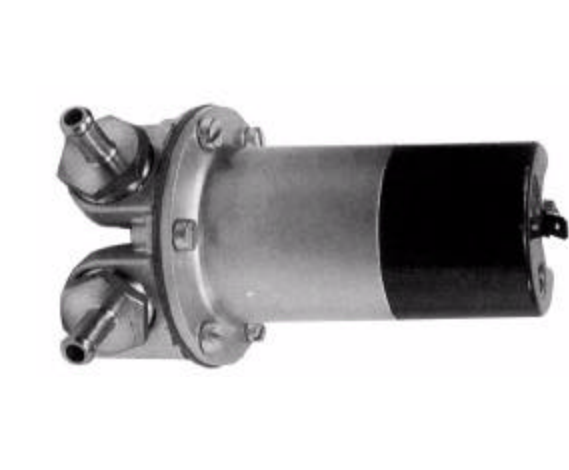


Water-cooled exhaust elbow

The manifold is cooled by means of the internal cooling system (freshwater). The cooling water filler necks on the casing of the elbow may not be opened. These cooling water necks are only required to fill the motor with cooling water in cases of repair. The normal cooling water controls may only be carried out at the external expansion tank.

Fig. A.17: Water-cooled exhaust elbow

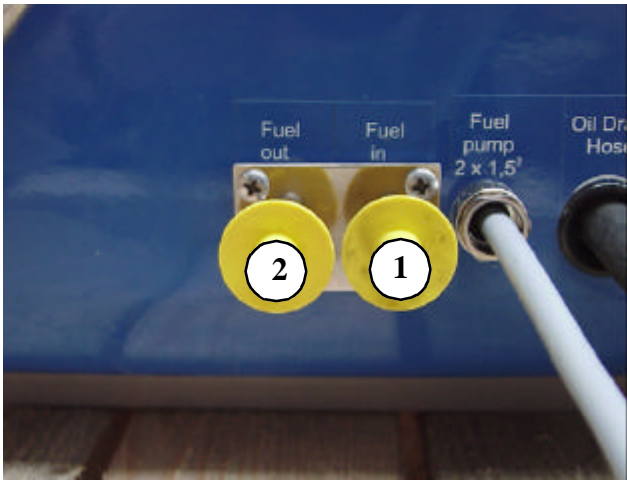
A.2.4 Components of the fuel system



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.18: External fuel pump



Connecting pieces for the fuel pipe

1. Fuel intake
2. Fuel backflow

Fig. A.19: Fuel connections

Fuel filter

A consequential filtering of fuel is especially important for all marine systems. A fine filter, which is firmly attached to the inside of the sound insulation capsule for the marine version, is supplied on delivery, and loose for other makes. In all cases a further pre-filter with water separator must be installed. See directions for fuel filter installation.

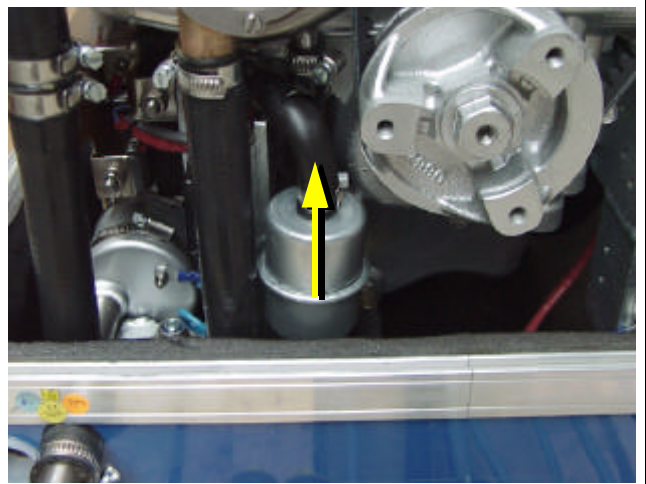


Fig. A.20: Fuel filter

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.

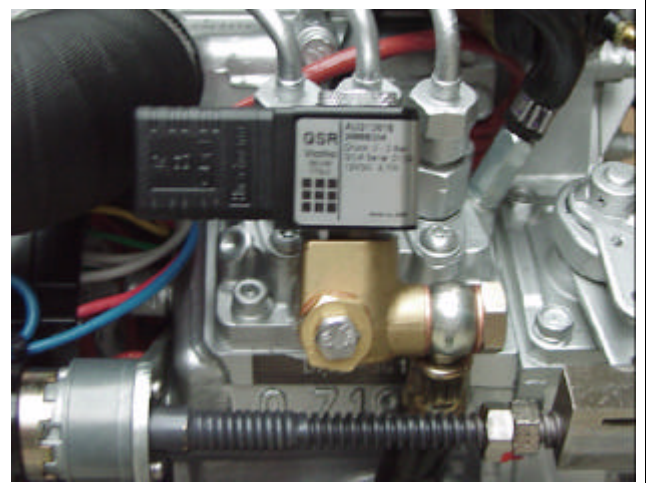


Fig. A.21: Fuel solenoid valve

Injection nozzles

If the engine does not start after the ventilation, the fuel injection lines must be de-aerated individually.

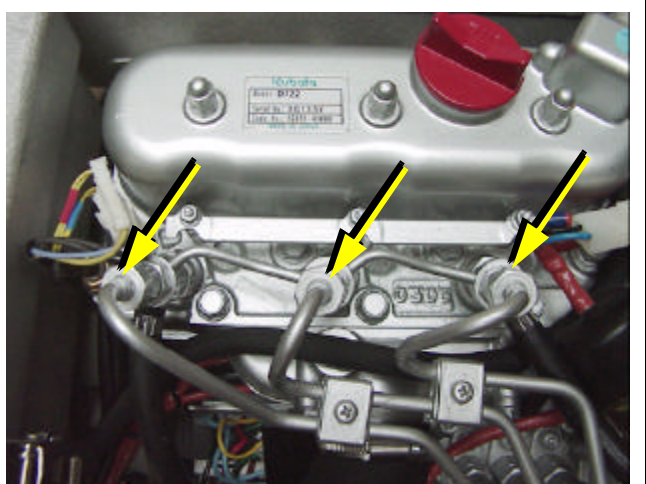
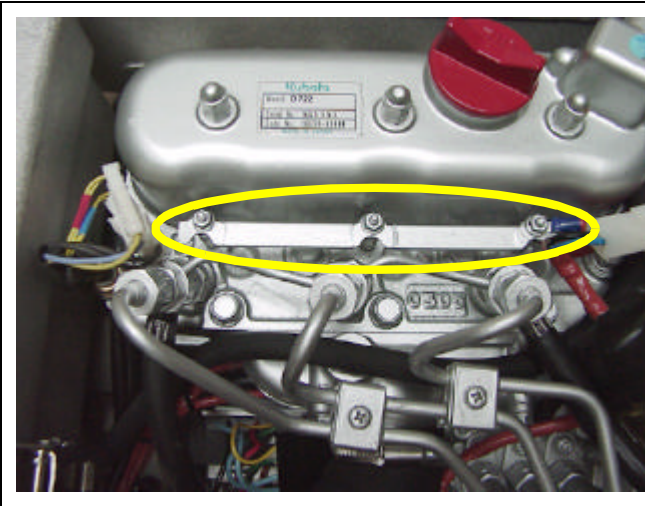


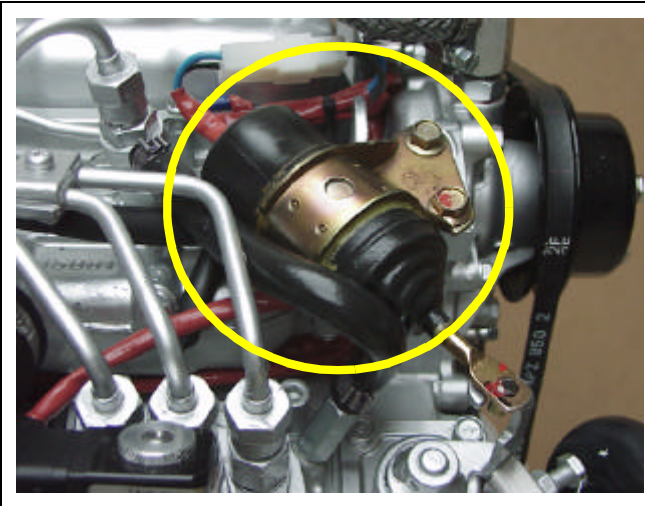
Fig. A.22: Injection nozzle



Glow plugs

The glow plugs 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.23: Glow plugs

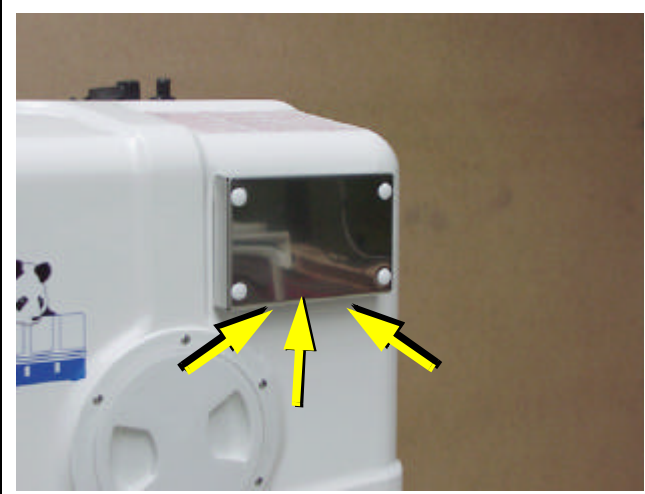


Stop solenoid for engine stop

Some model are additional equipped with an stop solenoid. The generator is stopped by the co-operation of the stop solenoid immediately after switching off. The adjustment of the stop solenoid must always be checked, in order to be sure that the stop lever can move also during the operation freely and is not under pre-stressing.

Fig. A.24: Stop solenoid

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. (minimum distance 150 mm)

Fig. A.25: Combustion air intake

Cooling air for coil cooling

The sound cover upper surface is provided at back side with drillings, through which the cooling 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.

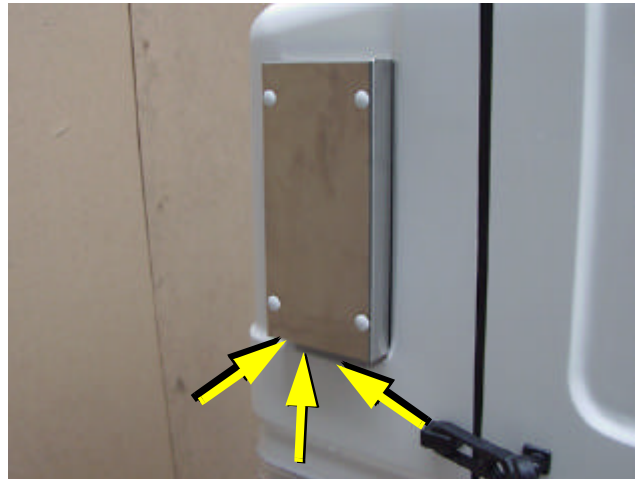


Fig. A.26: Cooling air intake

Air suction housing

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

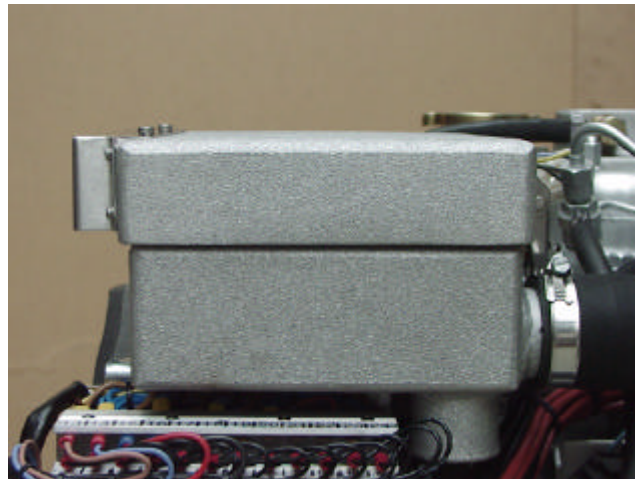


Fig. A.27: Air suction housing

Air suction housing with air filter set

The figure shows the air filter element in the air suction housing. However the return pipe of the crank case exhaust flows also into the air suction housing, it can be faced with older generators and/or with engines on high running time that oil vapors affect the air filter. Therefore an check is advisable once in a while.

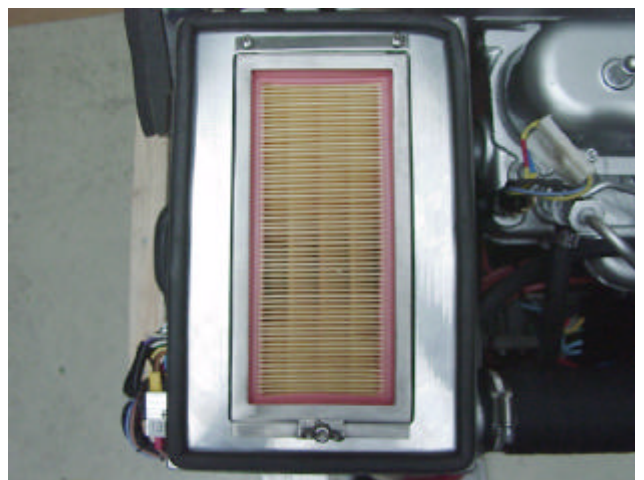
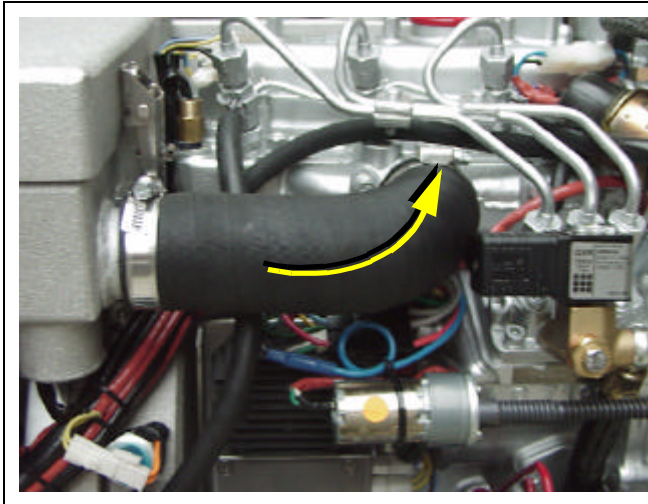


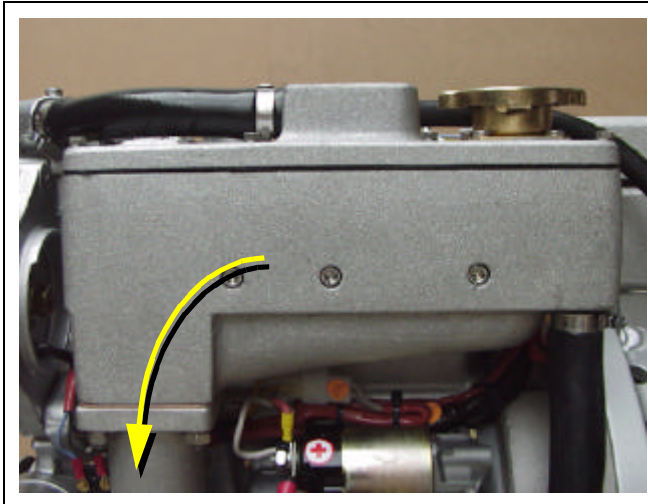
Fig. A.28: Air filter



Induction elbow

The figure shows the induction elbow at the combustion engine. At the front of this induction elbow you can see the hose connection between air suction housings and induction elbow. The air filter must be checked, if this hose pulls together at operation.

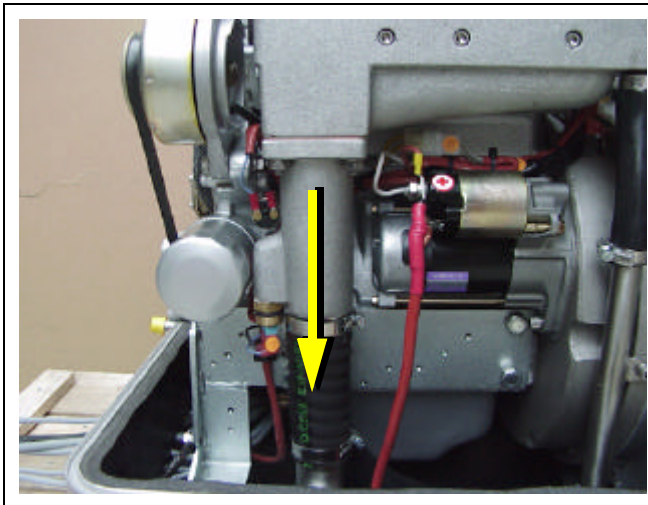
Fig. A.29: Induction elbow



Exhaust elbow

On the back of the engine is the water-cooled exhaust elbow. On the top side the pipe union for the internal seawater circuit is to be seen and the filler neck for the cooling water. This cooling water filler neck is used only at first filling. Control of the cooling water and if necessary refill takes place at the external cooling water expansion tank.

Fig. A.30: Water-cooled exhaust elbow



Exhaust connection at the exhaust elbow

Seawater from the external cooling circle is fed here.

Fig. A.31: Exhaust port

Exhaust outlet

Connect the exhaust pipe with the water lock.

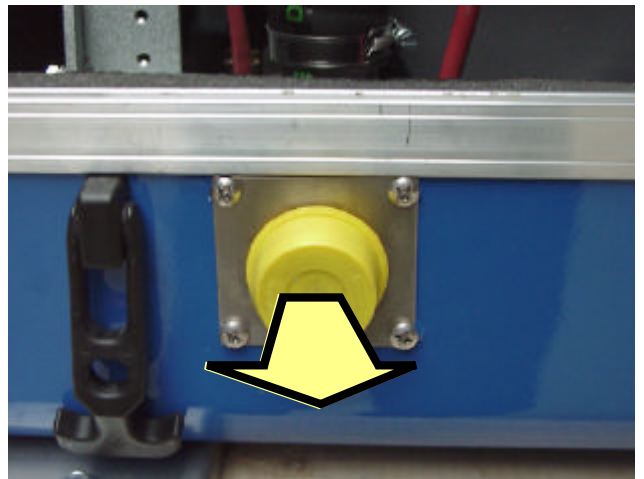


Fig. A.32: Exhaust outlet

A.2.6 Components of the electrical system

Connection starter battery

1. Cable for starter battery (plus)
2. Cable for starter battery (minus)

During the connection to the starter battery it must be always ensured that the contact is perfectly guaranteed.

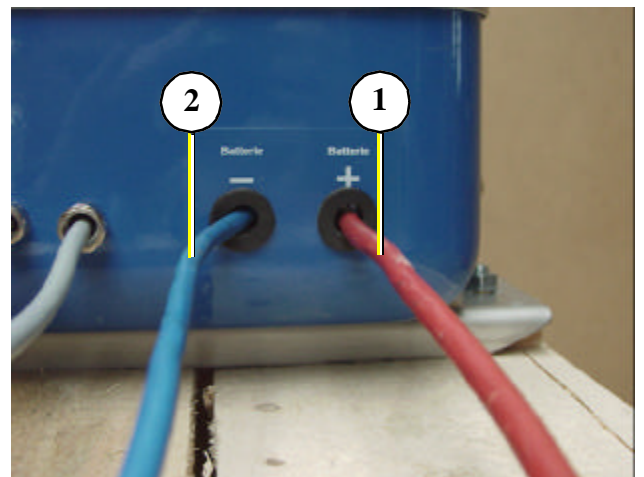


Fig. A.33: Cable for starter battery

Main power

At the front of the sound cover is also the withdrawal for the cable for the main power.

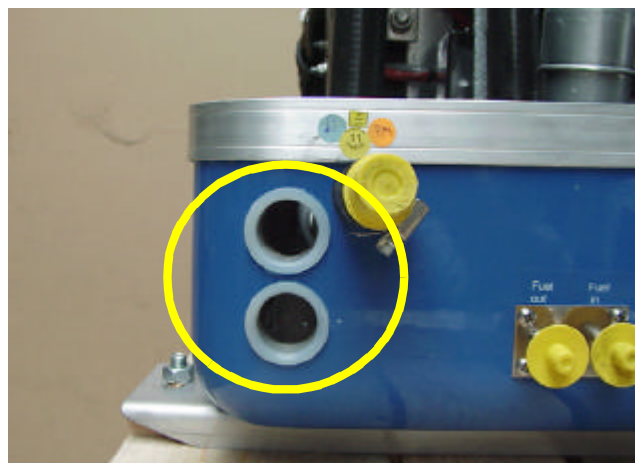
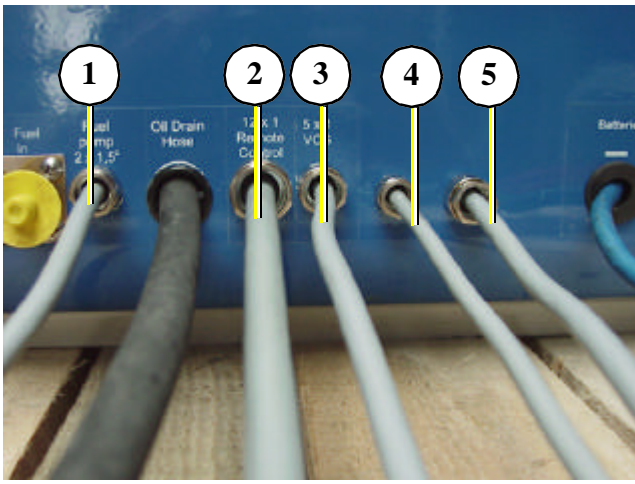


Fig. A.34: Main power

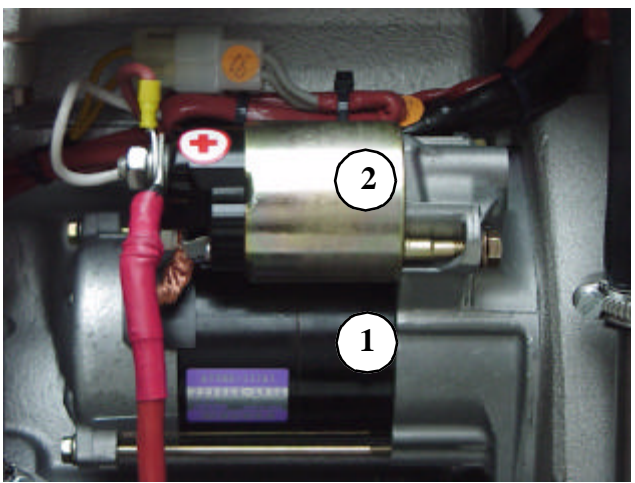


Electrical connections for control

At the front of the generator also all remaining cables for the electrical connections are depending upon type. The allocation of the connections result from the plan for the AC-Control box. See here:

1. Fuel pump
2. Remote control panel
3. VCS
4. Measuring shunt
5. Measuring voltage 24V

Fig. A.35: Electrical connections




Starter motor

1. Starter motor and
2. Solenoid switch

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

Fig. A.36: 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.37: Actuator

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.

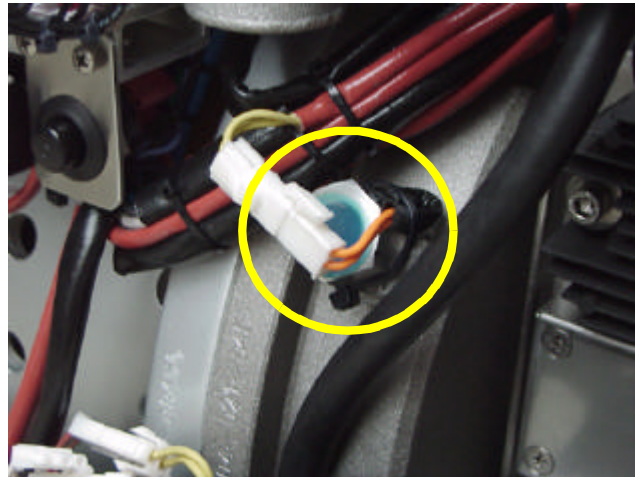


Fig. A.38: Speed sensor

Electronic starter control unit

If there is an automatic starting requirement and if the remote control panel is switched off, then this automatic starting requirement is ignored. Automatic starting is only possible if after switching on of the remote control panel the automatic starting requirement takes place.

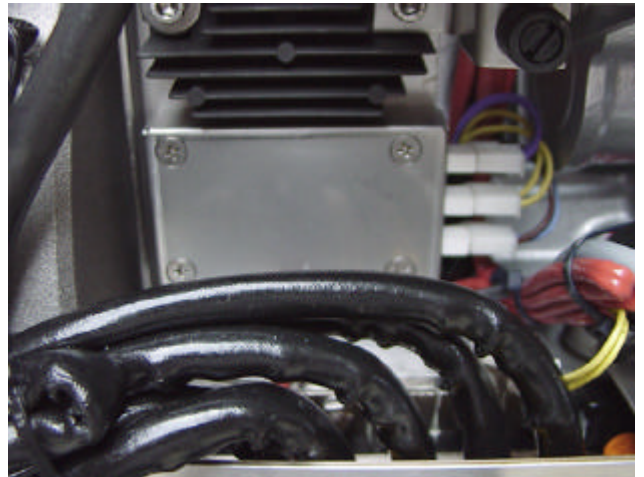


Fig. A.39: Electronic starter control unit

DC-alternator

All Panda generators from Panda 6.000 are provided with its own charge system for the 12V DC mains. This DC-alternator is powered over a v-belt together with the internal cooling water pump.

The 12V charge system may be used only for the generator-own starter battery.

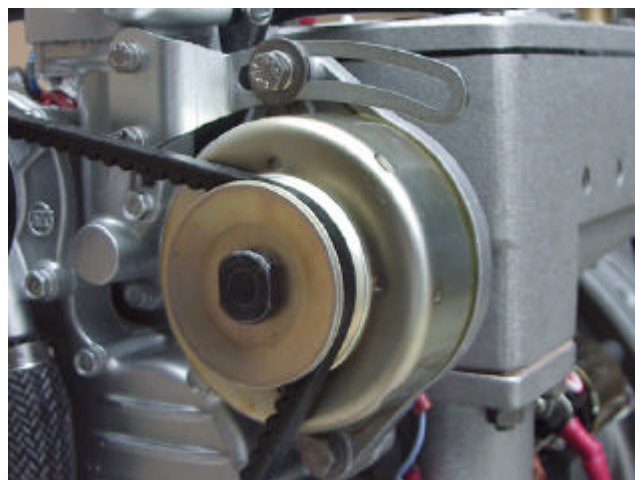
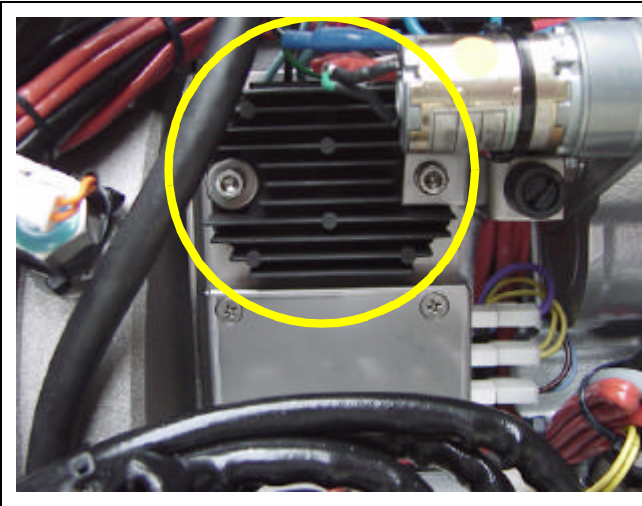


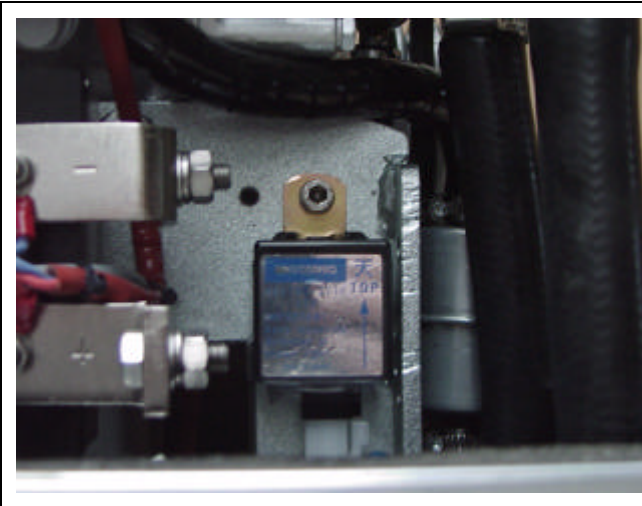
Fig. A.40: DC-alternator



Charge control for DC-alternator

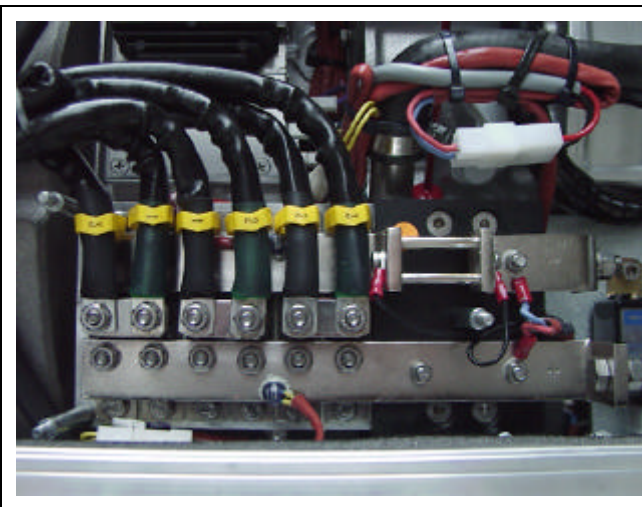
The voltage regulator for the 12V DC-alternator is on the back of the air suction housing. The housing is formed for cooling purposes. The voltage regulator may not be covered from the outside. The surface must be accessible for the cooling.

Fig. A.41: Charge control



Time relay for stop solenoid

Fig. A.42: Time relay for stop solenoid



Diode plate

Fig. A.43: Diode plate

Terminal block for remote control cable with fuses and power relays

- F1 fuse 15A for DC
- F2 fuse 25A for starter
- Ks relay for starter
- K2 relay for glow plugs
- K3 relay for fuel pump

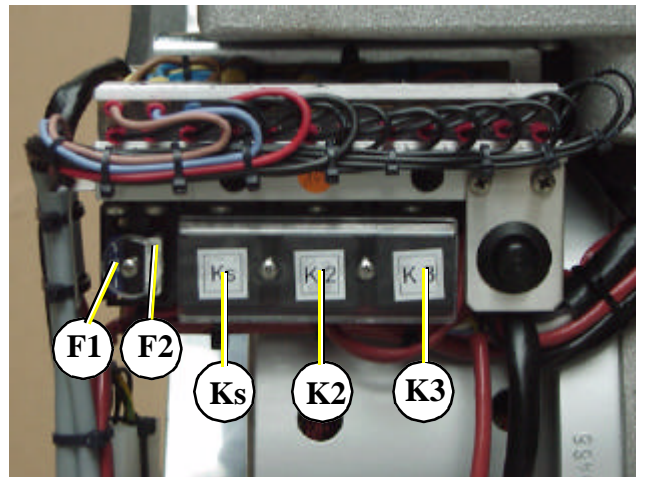


Fig. A.44: Terminal block

Fuse for measuring voltage

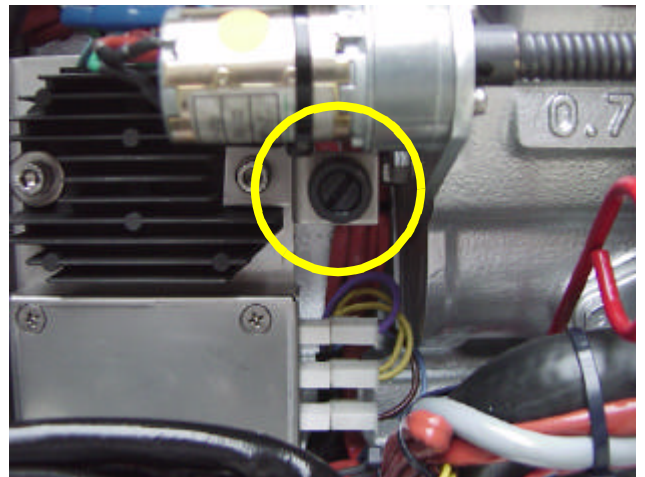


Fig. A.45: Fuse for measuring voltage

A.2.7 Sensors and switches for operating surveillance

Thermo-switch at cylinder head

The thermo-switch at the cylinder head serves the monitoring of the generator temperature. All thermo-switches for the generators from Panda 6.000 upward are two-pole and laid out as "openers".



Fig. A.46: Thermo-switch at cylinder head

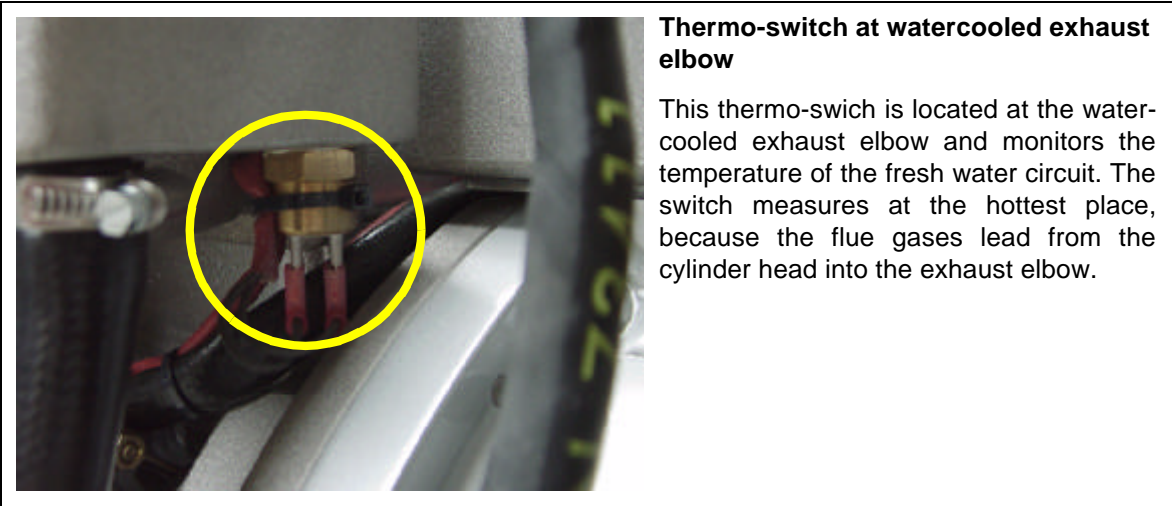


Fig. A.47: Thermo-switch at exhaust elbow

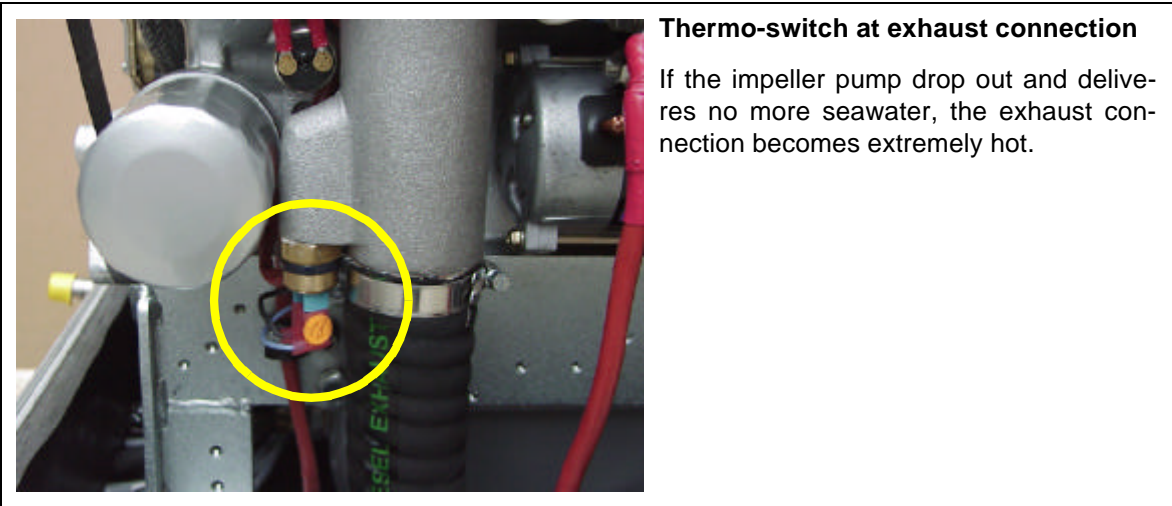


Fig. A.48: Thermo-switch at exhaust connection

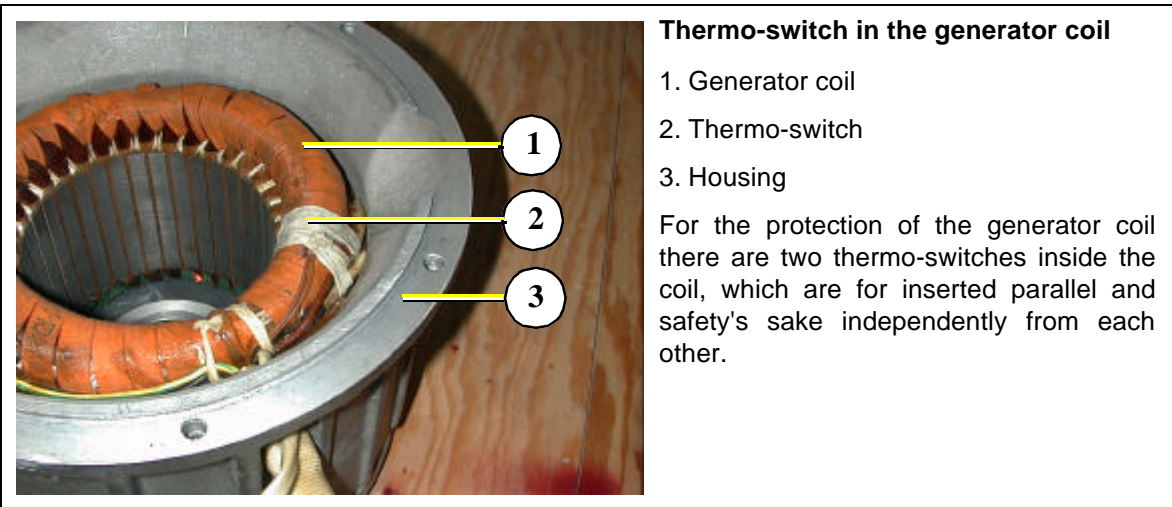


Fig. A.49: Thermo-switch coil

Oil pressure switch

In order to be able to monitor the lubricating oil system, an oil pressure switch is built into the system. The oil pressure switch is on the back of the engine (before the electrical starter).

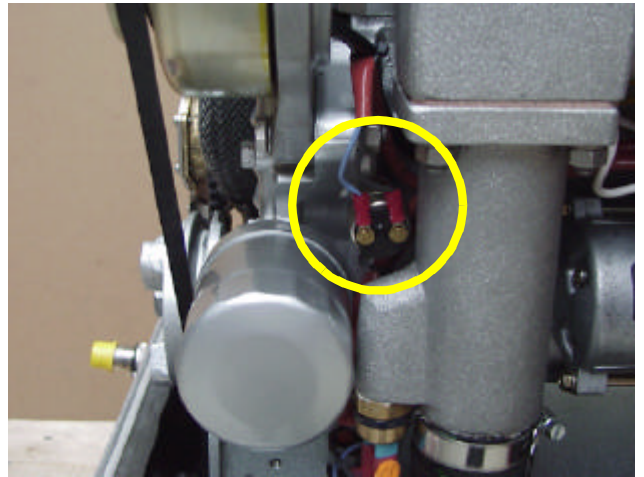


Fig. A.50: Oil pressure switch

Failure bypass switch

The failure bypass switch offers the possibility of starting the generator if the electrical control switched off due to an error in the cooling system by overheating.

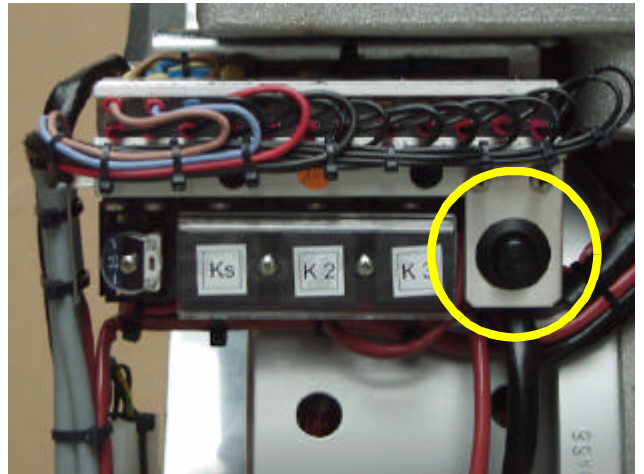


Fig. A.51: Failure bypass switch

Thermo-switch on the (-)-bar

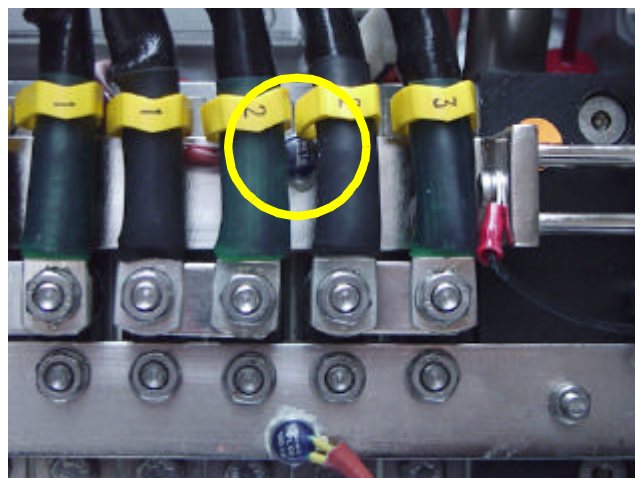
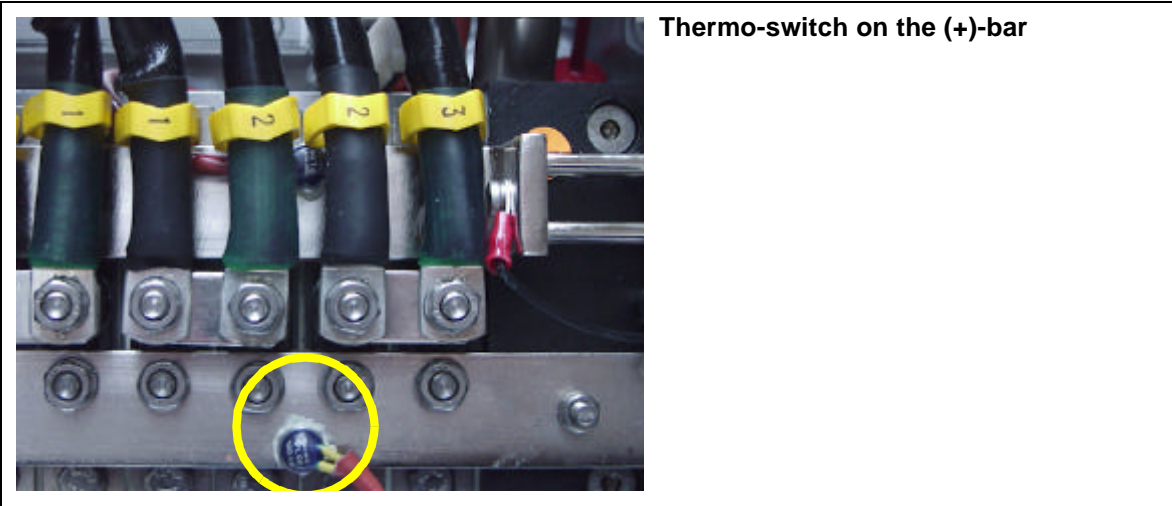


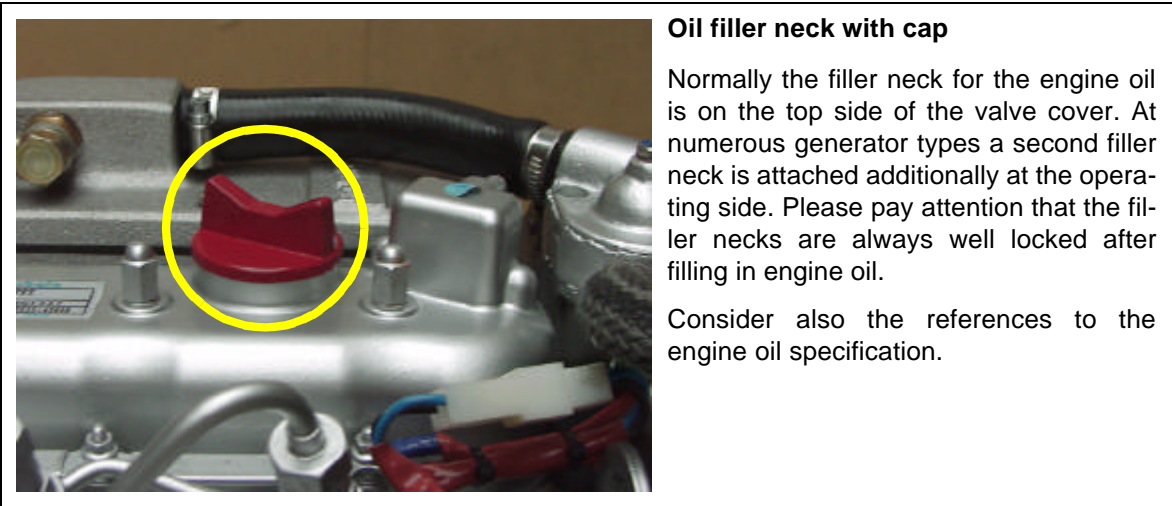
Fig. A.52: Thermo-switch on (-)-bar



Thermo-switch on the (+)-bar

Fig. A.53: Thermo-switch on (+)-bar

A.2.8 Components of the oil circuit

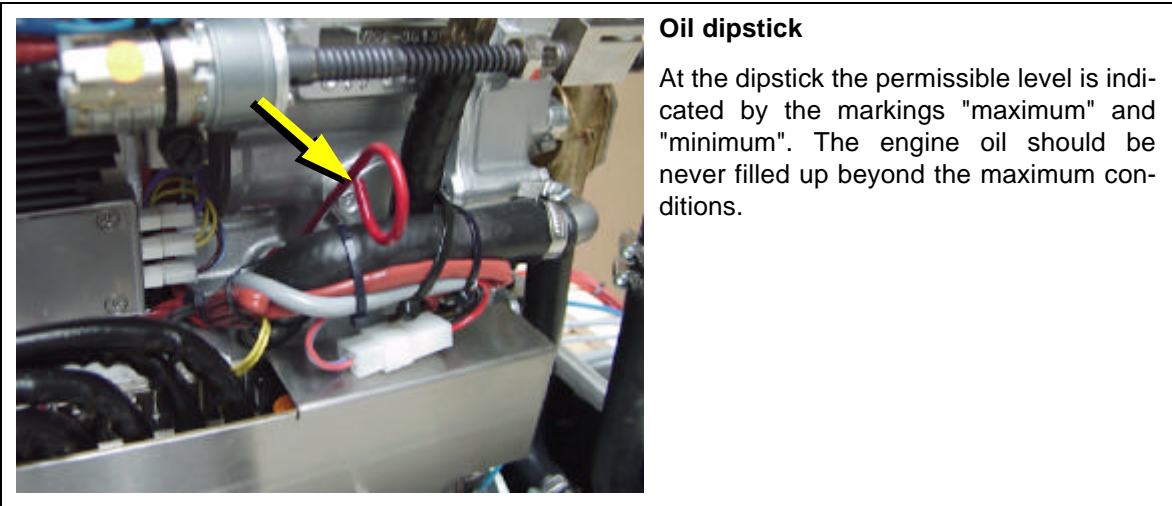


Oil filler neck with cap

Normally the filler neck for the engine oil is on the top side of the valve cover. At numerous generator types a second filler neck is attached additionally at the operating side. 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.54: 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.55: Oil dipstick

Oil filter

The oil filter should be exchanged with an oil change.

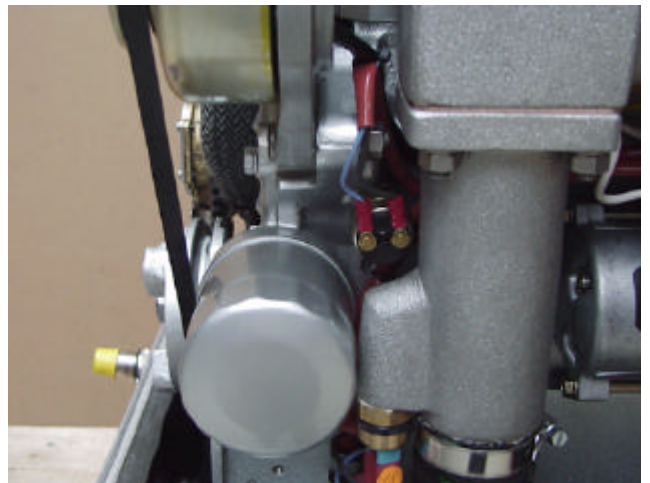


Fig. A.56: Oil filter

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!

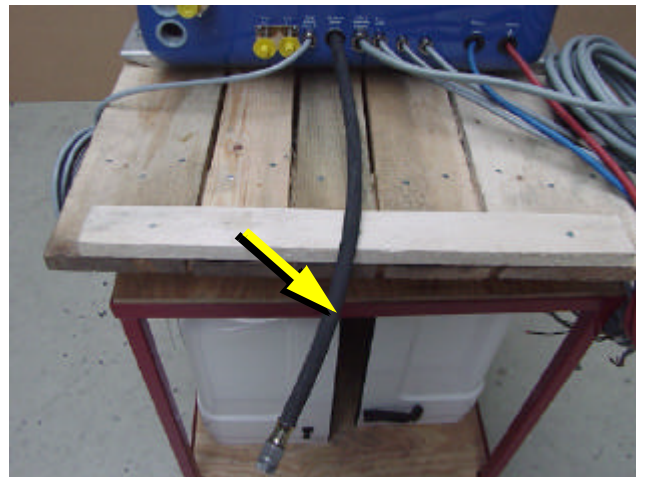


Fig. A.57: Oil drain hose

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.

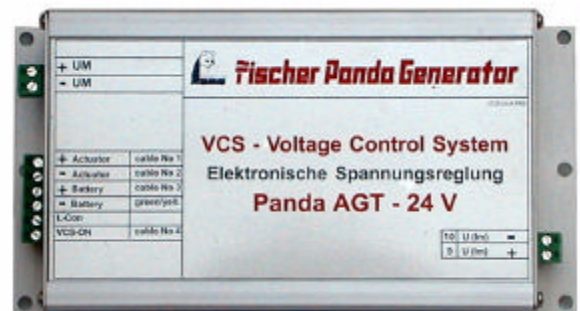


Fig. A.58: VCS

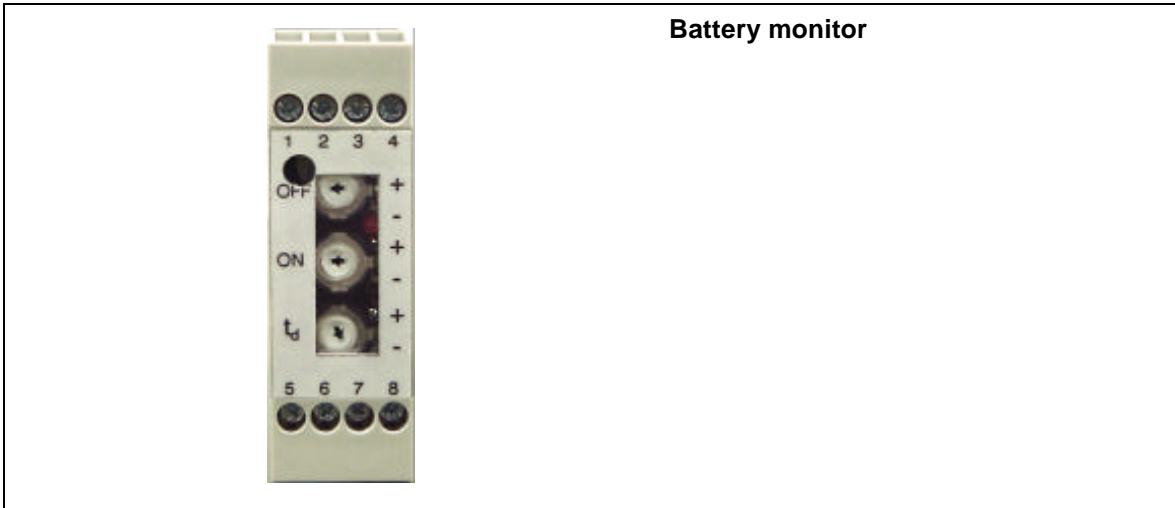


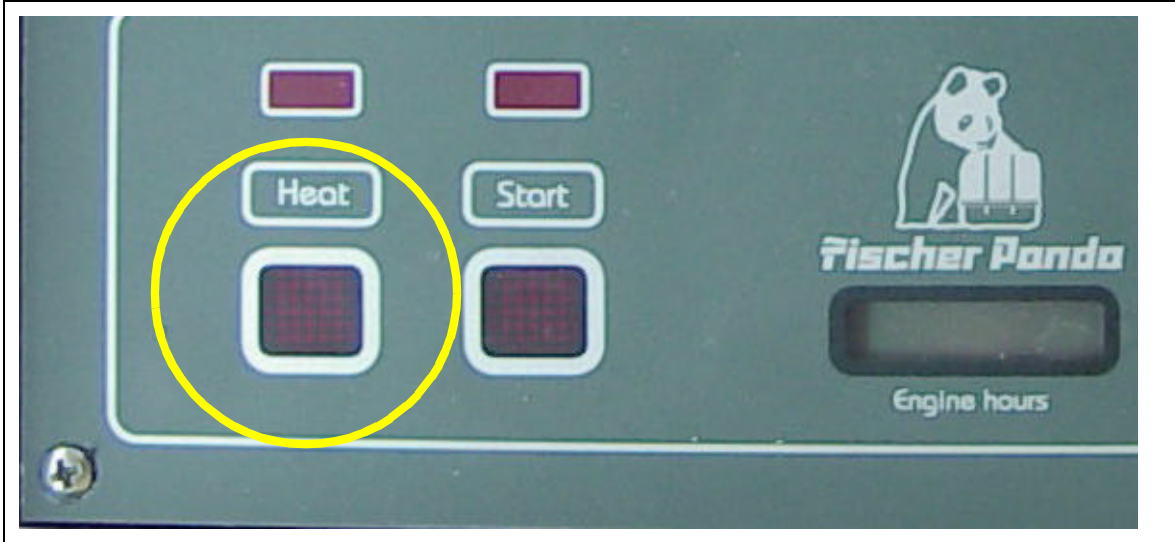
Fig. A.59: Battery monitor

A.3 Operation Instructions

A.3.1 Preliminary remark

Pre-heating the diesel motor

The motor must be pre-heated, if the diesel motor is designed as a "pre-combustion chamber motor" for indirect fuel injection. A quick glow fitting is used for all Kubota-diesel motors. This glow fitting may only be used for a maximum of 20 seconds without a pause. A pre-glow period of 5 - 6 seconds suffices for ambient temperatures above 20°C (plus). For lower temperatures the preglow period should be increased.



Tips regarding Starter Battery

Fischer Panda recommends normal starter battery use. If an aggregate is required for extreme winter conditions, then the starter battery capacity should be doubled. It is recommended that the starter battery be regularly charged by a suitable battery-charging device (i.e., at least every 2 Months). A correctly charged starter battery is necessary for low temperatures.

A.3.2 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.

You should change the oil, regardless off the ambient temperature. Table F.5, "Engine oil," on Page IX. Engine oil amounts Table F.2, "Technical Data Engine," on Page VI.

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 excitate 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.3.3 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.

NOTE: If the red control light for oil pressure illuminates if the panel is switched on, this is an sign that the panel has an error. In this case the generator can not stop automatically if there is a disturbance.

Control light for "ON" Button must light up.

5. Pre-heat engine.

Pre-heating is necessary for every running temperature. Pre-heating is not necessary, only if the generator has just been run. The heating period should take at least 6 seconds, however, 20 seconds at the maximum. Heating must last for 20 seconds at a temperature of +5°C. If a second attempt is to be made, then a pause of at least 60 seconds is required.

The generator can be started with the assistance of a pre-heating device at temperatures as low as -20°C. Please note that the generator can only be run at temperatures below -8°C with winter fuel and additional special additives.

6. Press „START“ button.

The electric starter may only be used for a maximum of 20 seconds. Thereafter, a pause of, at least, 60 seconds is required. If the aggregate does not immediately start, then the fuel intake should be checked to ensure it is flowing freely. (For temperatures below -8°C check whether there is winter fuel)

7. Check if voltage and frequency and is within the tolerance rage (Frequency and voltage).
8. Switch on load.

A.3.4 Stopping the Generator

1. Switch off consumers.
2. If the load is higher than 70% of the nominal load, the generator temperatures should be stabilised by switching off the consumers for at least 5 minutes.

At higher ambient temperatures (more than 25°C) the generator should always run for at least 5 minutes without load, before it is switched off, regardless of the load.

3. Press „OFF“ button and switch off the generator.
4. Activate additional switches (Battery switch, fuel stop valve etc.).

NOTE: Never switch off the battery until the generator has stopped.

5. If necessary, close sea cock.

A.3.5 Starting the Generator by a „Failure bypass switch“

There is a "pressure switch" at the terminal block. Faults (e.g. caused by overheating) can be manually overcome by means of this switch. The generator can be started by using the remote control panel. The operating temperature can be reduced for a short period of time (without stress of course), so that the fault switch returns to the original position should overheating cause the generator to shut down because of overheating.

ATTENTION: - Before using the failure bypass switch, it is important to check the oil level, since the oil gauge is deactivated by the switch. For a further reason it is important to switch off the generator electrical load before the generator is shut down:

Before stopping the generator it is highly recommended that electrical devices (e.g. refrigerating compressors, air conditioning compressors etc) are switched off, because the voltage drops as the rotational speed (rpm) decreases as the engine comes to a halt.

(Also see information regarding voltage control with automatic shut-off for protection of consumers when over or undervoltage occurs).

This is also the case when the generator is started when consumers are switched on.

Normally the generator will no longer excite if a certain amount of base load is stepped up. The electrical load should also be shut-off before starting the generator.

If started under electrical load, the engine will still run but the generator will not generate the proper voltage (or even no voltage) since the stator windings do not have the chance to reach full excitation. Electrical units which are switched on in this condition could possibly be damaged (special caution should be practised with electric motors to avoid burnout).

