

Panda 20-VS PMS manual

Super silent technology

300-500 V_{DC} / 67 A_{DC} / 0-20 kW

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Dear valued customer,

Thank you for deciding to purchase a Fischer Panda generator and for choosing Fischer Panda as your on-board energy partner. Your generator offers you the possibility of generating your own power - wherever you are - making you all the more independent. Not only do you have a Fischer Panda generator on board; you are also supported worldwide by our Fischer Panda team. Please take the time to read this information. We can also assist you with:

Inspecting the generator installation and guarantee

Every generator has a world-wide guarantee. As soon as the installation has been completed, you can register your guarantee with your dealer. If you have obtained an extended guarantee, please ensure that this is properly filed and that your dealer has your current address. Please consult your dealer regarding guarantee options, especially when you have purchased a pre-owned generator. Your dealer will be happy to assist and can inform you regarding authorised Fischer Panda dealers world-wide.

Service and Support

To ensure that your generator runs faultlessly, regular servicing and maintenance tasks described in the handbook must be carried out. Fischer Panda can supply service kits intended for routine maintenance work. We only supply components of the highest quality and ensure that you receive the CORRECT spares for your generator. Service “Plus” Kits are also available and are ideal for longer cruises, which may last for more than one service interval.

Should you require any assistance, please contact your Fischer Panda dealer. Please do not attempt to carry out repairs yourself, as this can affect your generator guarantee. Your dealer can assist you in finding the nearest Fischer Panda service station. You can also find the nearest service station in our global service network, which is available as a download on our homepage.

Product registration

Please take the time to register your Fischer Panda generator on our website under

http://www.fischerpanda.de/mypanda.

By registering, you ensure that you are always informed and up-to-date. You will receive technical upgrades or special information concerning the operation and servicing of your generator. You will also be informed about new Fischer Panda products, which can be particularly helpful should you want to enhance your installation at a later date.

Fischer Panda quality - certified according to DIN ISO 9001

Thank you for purchasing a Fischer Panda generator

Your Fischer Panda Team

1. General instructions and regulations

1.1 The cardinal rule is safety!

Warning symbols are used throughout this manual to warn of the risk of personal injury or lethal danger when certain maintenance tasks or operating procedures are performed. Instructions marked in this way must always be read and followed carefully.

LETHAL DANGER! - Improper operation can cause harm to health and result in death.

The battery bank must always be disconnected (negative terminal first, then the positive terminal) if work on the generator or electrical system of the generator is to be performed, so that the generator cannot be started inadvertently.

Warning! Automatic start-up



Improper maintenance can result in severe personal harm and material damage. Therefore:

- Maintenance work must only be performed when the engine is switched off.
- Before commencing work, ensure that there is sufficient freedom of movement for installation work to be carried out..
- Take care the the workplace is neat and clean! Components and tools that are loosely stacked or lying around can result in accidents
- Perform maintenance work only with standard tools or special tools as customarily used in the trade. Incorrect or damaged tools can result in injuries

Warning! Risk of injury



Oil and fuel vapours can ignite upon contact with ignition sources. Therefore:

- Ensure that there are no open flames while working on the engine.
- Do not smoke.
- Remove oil and fuel residue from the engine and the floor

Warning! Fire hazard



Contact with engine oil, fuel and anti-freeze agents may result in harm to health when inhaled, swallowed or when coming into contact with skin. Therefore:

- Avoid skin contact with engine oil, fuel and anti-freeze.
- Remove splashed oil and anti-freeze from the skin immediately.
- Do not inhale oil and fuel vapours.

Caution! Risk of poisoning



LETHAL DANGER! - Improper operation can cause harm to health and result in death.

Electric voltages of more than 60V are potentially lethal in any situation. The rules of the respective regional authority must be adhered to during installation. For safety reasons, only an electrician may carry out the installation of the

Warning! Electrical voltage



electrical connections of the generator.

Generator and coolant may be hot during and after use. Risk of being burnt/scalded!

Warning! Hot surface/material



Excess pressure may develop in the cooling system when operating.

Batteries contain corrosive acids and alkalis.

Warning!



Improper handling can cause the batteries to heat up and burst. Corrosive acid/lye may leak. Under unfavourable conditions, an explosion may result.

Adhere to the instructions of your battery manufacturer.

Personal protective equipment must be worn as applicable. This consists of:

Imperative! Protective equipment required



- Snugly-fitting protective clothing
- Safety shoes
- Protective gloves
- Hearing protection
- Goggles, if required

All loads must be disconnected prior to working on the generator to avoid damage to the devices.

Attention! Switch off all loads.



1.2 Disposal

Engine fluids/batteries are harmful to the environment.

Imperative! Protect the environment.



Collect and dispose of drained engine fluids properly!

Dispose of batteries in the appropriate manner.

1.3 Customer registration and warranty

Use the advantages of registering your product:

- You will receive a guarantee certificate once your installation data has been checked.
- You will receive additional product information that may be safety-relevant.
- You will receive free upgrades, when necessary.

Further advantages:

By providing full details, the Fischer Panda technicians will be able to offer rapid assistance, as 90% of break-downs are caused by peripheral faults.

Problems due to installation errors can be recognised in advance.

1.3.1 Technical support

Technical support via the Internet: info@fischerpanda.de

1.3.2 Caution, important information for start-up!!

1. The commissioning report shall be filled in immediately after initial operation and shall be confirmed by signature.
2. The commissioning report must be received by Fischer Panda GmbH at Paderborn within 4 weeks of initial operation.
3. After receiving the commissioning report, Fischer Panda will make out the official guarantee certificate and send it to the customer.
4. If guarantee claims are made, the document with the guarantee certification must be submitted.

If the above requirements are not or only partly fulfilled, the warranty claim shall become void.

1.4 Safety Instructions - safety first!

1.4.1 Safe operation



Careful handling of the equipment is the best insurance against an accident. Read the handbook diligently, and make sure you understand it before starting up the equipment. All operators, regardless of their experience level, shall read this handbook and additional pertinent manuals before commissioning the equipment or installing an attachment. The owner shall be responsible for ensuring that all operators receive this information and are instructed on safe handling practices.

1.4.2 Observe the safety instructions!

Read and understand this handbook and the safety instructions on the generator before trying to start up and operate the generator. Learn the operating practices and ensure work safety. Familiarise yourself with the equipment and its limits. Keep the generator in good condition.

1.4.3 Personal protective clothing



For maintenance and repair work on the equipment, ***do not*** wear loose, torn, or ill-fitting clothing that may catch on protruding parts or come into contact with pulleys, cooling disks, or other rotating parts, which can cause severe injury.

Wear appropriate safety and protective clothing during work.

Do not operate the generator while under the influence of alcohol, medication or drugs.



Do not wear head phones or ear buds while operating, servicing, or repairing the equipment.



1.4.4 Cleanliness ensures safety



Keep the generator and its environment clean.

Before cleaning, the generator must be switched off and secured against unintended starting. Keep the generator free from dirt, grease, and waste. Store flammable liquids in suitable containers only and ensure adequate distance to the generator. Check the lines regularly for leakage and eliminate leaks immediately as applicable.

1.4.5 Safe handling of fuels and lubricants

Keep fuels and lubricants away from naked fire.



Before filling up the tank and/or applying lubricant, always shut down the generator and secure it against accidental start-up.

Do not smoke and avoid naked flame and sparking near fuels and the generator. Fuel is highly flammable and may explode under certain conditions.

Refuel in well-ventilated open spaces only. If fuel/lubricant has been spilled, eliminate fluids immediately.



Do not mix diesel fuel with petrol or alcohol. Such a mixture can cause fire and will damage the generator.

Use only approved fuel containers and tank systems. Old bottles and canisters are not adequate.

1.4.6 Exhaust fumes and fire protection

Engine fumes can be hazardous to your health if they accumulate. Ensure that the generator exhaust fumes are vented appropriately (leak-proof system), and that an adequate fresh air supply is available for the generator and the operator (forced ventilation).



Check the system regularly for leakage and eliminate leaks as applicable.

Exhaust gases and parts containing such fumes are very hot; they may cause burns under certain circumstances. Always keep flammable parts away from the generator and the exhaust system.

To prevent fire, ensure that electrical connections are not short-circuited. Check regularly that all lines and cables are in good condition and that there is no chafing. Bare wires, open chafing spots, frayed insulation, and loose cable connections can cause dangerous electric shocks, short-circuit, and fire.



The generator shall be integrated in the existing fire safety system by the operating company.

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.

Diesel engine exhaust fumes and other constituents are carcinogenic and may cause malformations and other genetic defects.



1.4.7 Safety precautions against burns and battery explosions



The generator and its cooling agents and lubricants as well as the fuel can get hot while the generator is operated. Handle hot components with care such as exhaust components, radiators, hoses and the engine block both during operation and after the generator has been switched off.



The cooling system may be pressurised. Open the cooling system only after letting the engine and the coolant cool down. Wear appropriate protective clothing (e.g. safety goggles, gloves).

Prior to operation, ensure that the cooling system is sealed and that all hose clamps are tightened.



The battery represents an explosion hazard, this applies both to the starter battery and the battery block of the AGT generators. While batteries are being charged, a hydrogen-oxygen mixture is generated, which is highly explosive (electrolytic gas).

Do not use or charge batteries if the fluid level is below the MINIMUM marking. The useful life of the battery is significantly reduced, and the risk of explosion increases. Always fill fluid levels to a point between the maximum and minimum levels.



Especially during charging, keep sparks and naked fire away from the batteries. To avoid sparking, ensure that the battery terminals are firmly connected and are not corroded. Use an appropriate terminal grease.

Check the charge level with an adequate voltmeter or acid siphon. A metal object lying over the poles will cause a short circuit, battery damage and a high risk of an explosion.

Do not charge frozen batteries. Heat the batteries to +16 °C (61 °F) prior to external charging.

1.4.8 Protect your hands and body from rotating parts!



Always keep the capsule closed while operating the generator.

To check the V-belt tension, always shut down the generator.

Keep your hands and body away from moving parts, such as belt pulleys, fans, V-belts and flywheels. Touching can result in serious injury.

Do not run the engine without the safety devices in place. Prior to start-up, mount all safety devices securely and check for proper attachment and function.

1.4.9 Antifreeze and disposal of fluids



Antifreeze contains toxic substances. To prevent injury, wear rubber gloves and wash off any anti-freeze immediately in case of skin contact. Do not mix different anti-freeze agents. The mixture may cause a chemical reaction generating harmful substances. Use only anti-freeze that is approved by Fischer Panda.



Protect the environment. Collect drained fluids (lubricants, anti-freeze, fuel), and dispose of them properly. Observe the local regulations for the respective country. Ensure that no fluids (not even very small quantities) can drain into the soil, sewers, or bodies of water.

1.4.10 Implementation of safety inspections and maintenance



Disconnect the battery from the engine before performing service work. Affix a sign to the control panel - both the main and the corresponding slave panel - with the instruction " DO NOT START UP - MAINTENANCE IN PROGRESS" to prevent unintentional start-up.

To prevent sparking due to accidental short-circuiting, always remove the earthing cable (-) first and reconnect it last. Do not start work until the generator and all fluids and exhaust system parts have cooled down.

Use only suitable tooling and appliances and familiarise yourself with their functions to prevent secondary damage and/or injury.



Always keep a fire extinguishing unit and a first aid box handy while performing maintenance work.

1.5 Warning and instruction signs

Keep warning and instruction signs clean and legible.

Clean the signs with water and soap and dry them with a soft cloth.

Immediately replace damaged or missing warning and instruction signs. This also applies to the installation of spare parts.

1.5.1 Special instructions and hazards of generators

The electrical installations may only be carried out by trained and qualified personnel!



The generator must not be operated with the cover removed.



If the generator is to be installed without a sound attenuation housing, it must be ensured that all rotating parts (belt pulley, V-belts etc.) are covered and protected so that there is no danger to life and body!

If a sound attenuation upgrade is to be manufactured at the place of installation, then well-placed signs must show that the generator can only be switched on with the sound attenuation housing closed.



All service, maintenance, or repair work may only be carried out when the engine is not running.

Electrical voltages above 50 V (in the case of battery chargers, already when greater than 36 volts) are always life-threatening. It is therefore imperative that the rules of the respective regional authority regarding installation and maintenance must be adhered to. For safety reasons, only an electrician may carry out the installation of the electrical connections of the generator.

1.5.1.1 Protective conductor and equipotential bonding

Electrical voltage greater than 50V may, in the event of contact, lead to life-threatening currents in the body. For this reason, systems are earthed with a protective conductor. In conjunction with an RCD (FI switch) or insulation monitoring, the power supply is disconnected in the event of a fault.

Appropriate protective measures, such as the RCD or appropriate fuses must be made available by the customer, to ensure the safe operation of the generator.

1.5.1.2 Switch off all loads when working on the generator

All loads must be disconnected prior to working on the generator to avoid damage to the devices.

1.5.1.3 Potential equalisation in Panda AGT-DC and VS generators

For further information specific to your generator, see the section on installation.

1.5.1.4 Safety instructions concerning cables

Cable types

It is recommended to use cables that are in compliance with the UL 1426 (BC-5W2) standard with Type 3 (ABYC section E-11).

Cable cross-section

The cable shall be selected taking into account the amperage, cable type, and conductor length (from the positive power source connection to the electrical device and back to the negative power source connection).

Cable installation

It is recommended to install a self-draining cable conduit classified as V-2 or higher in compliance with UL 94 in the area of the cable guide inside the capsule. Care must be taken that the cable routing is not run next to hot surfaces such as exhaust manifolds or motor oil drain plugs, but rather as free of any causes of friction or crushing as possible.

1.5.2 General safety instructions when handling batteries

These instructions shall apply in addition to the instructions of the battery manufacturer:

- While you are working on the batteries, a second person should be within earshot to help you if necessary.



- Keep water and soap ready in case battery acid is burning your skin.
- Wear eye protection and protective clothing. Do not touch your eyes while handling batteries.
- If acid splashes on your skin or clothing, wash if off with lots of water and soap.



- If acid enters your eyes, rinse them immediately with clean water, until the burning sensation has stopped. Immediately seek medical assistance.
- Do not smoke near the batteries. Avoid naked flames. The area around batteries is a potentially explosive atmosphere.
- Ensure that no tools are dropped on the battery terminals; cover them as necessary.



- Do not wear jewellery or watches on your arms during installation that might short-circuit the battery. Otherwise, there is a risk of skin burns.
- Protect all battery contacts against accidental contact.
- For battery blocks: Use only deep cycle batteries. Starter batteries are not suitable. Lead-acid gel batteries are recommended. They are maintenance-free, cycle stable, and do not release gases.



- Never charge a frozen battery.



- Avoid battery short-circuits.
- Ensure proper ventilation of the battery to vent gases that may be released.
- Battery connection terminals must be checked for proper seating before operation.
- Battery leads must be routed carefully and tested for undue heating under load. Check the battery near vibrating

components regularly for chafing and insulation defects.

ATTENTION! For battery charger generators (Fischer Panda AGT-DC and VS)!



Prior to installation, verify that the voltage of the battery bank complies with the output voltage of the generator.

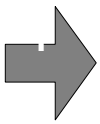
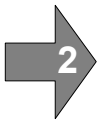
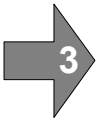
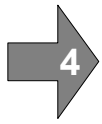
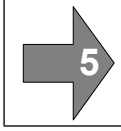


2. In case of Emergency First Aid







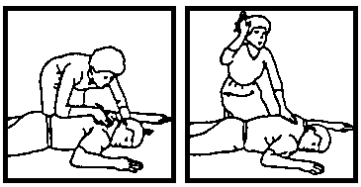
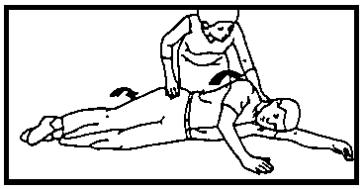
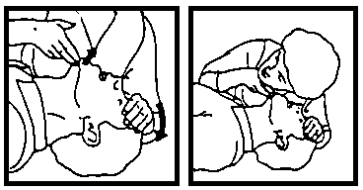
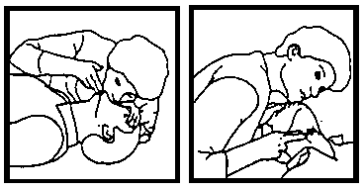
	First Aid in case of accidents by electrical shocks 5 Safety steps to follow if someone is the victim of electrical shock	
	Do not touch the injured person while the generator is running.	
	Switch off the generator immediately.	
	If you cannot switch off the generator, pull, push, or lift the person to safety using a wooden pole, rope or some nonconducting material.	
	Call an emergency doctor as soon as possible.	
	Immediately start necessary first aid procedures.	

2.1 WHEN AN ADULT STOPS BREATHING

DO NOT attempt to perform the rescue breathing techniques provided on this page, unless certified. Performance of these techniques by uncertified personnel could result in further injury or death to the victim.

Warning:



1 Does the Person Respond? Tap or gently shake victim. Shout, “Are you OK?“		2 Shout, “Help!“ Call people who can phone for help.
3 Roll Person onto Back. Roll victim towards you by pulling slowly.		
4 Open Airway. Tilt head back, and lift chin. Shout, “Are you OK?“		5 Check for Breathing. Look, listen, and feel for breathing for 3 to 5 seconds.
6 Give 2 Full Breaths. Keep head tilted back. Pinch nose shut. Seal your lips tight around victim's mouth. Give 2 full breaths for 1 to 1½ seconds each.		
7 Check for Pulse at side of Neck. Feel for pulse for 5 to 10 seconds.		8 Phone EMS for Help. Send someone to call an ambulance.
9 Begin Rescue Breathing. Keep head tilted back. Lift chin. Pinch nose shut. Give 1 full breath every 5 seconds. Look, listen, and feel for breathing between breaths.		10 Recheck Pulse Every Minute. Keep head tilted back. Feel for pulse for 5 to 10 seconds. If victim has pulse, not breathing, continue rescue breathing. If no pulse, begin CPR.

3. Special instructions and hazards in the case of VS-DC generators

3.1 General safety instructions for operating a VS-DC generator

VS-DC generators generate high DC voltages and DC current and special safety measures that safeguard the area around the components from fire and overvoltage must therefore be taken.

- High DC current poses a risk of fire due to the incorrect layout of lines and system components.
- High DC current poses a risk of fire due to incorrectly connected or bolted connections.
- High DC current poses a risk of electric arcing in the event of the conductors being interrupted suddenly.
- High DC voltages pose a risk of an electrical shock when live components are touched.

VS-DC generators can be operated individually with the fpControl Panel, or they can be integrated with a higher-level control system (power management system) by means of a CAN Bus interface.

When operated individually, it is essential that the HV battery is fitted with a main switch or an emergency-off switch in an easily accessible location so that the main switch can be disconnected immediately in case of danger. The main switch must, however, be installed directly on the HV battery; this is only possible if the physical proximity of the system components allows it.

If this location is not accessible, a power relay must be used instead of a manually operated main switch, which can then be operated from different locations, as well, if necessary.

The switches for the power relay shall be labelled accordingly as main switch for the HV DC battery with "Switch off in case of danger!".

If the VS-DC generator is integrated with a higher-level power management system then this system must ensure that the generator can be shut down and disconnected from the HV DC BUS in the event of an emergency. In addition, an emergency-off switch should be installed in close proximity to the VS-DC generator.

When performing maintenance, it must be possible to ensure that the generator cannot be switched on and that the HV battery can be disconnected permanently from the VS-DC generator (compliance with the five safety rules).

With all live systems, special safety precautions must be implemented to protect the components from fire.

3.1.1 “Hybrid-Charger” power electronics

VS-DC generators have an active DC/boost converter, which converts the AC generator voltage to the desired DC voltage. This power electronic component is the FP hybrid charger.

The hybrid charger is water-cooled. Proper cooling of the power electronics is therefore possible only as long as the cooling water supply of the generator functions properly.

Circuit breakers and the housing of the power electronics are monitored by temperature switches. After a cooling system failure, the proper functioning of the power electronics must be tested; should faults arise, they should be repaired by or sent to Fischer Panda.

The Hybrid Charger has HV intermediate circuit capacitors, which stores energy even after the device has been shut down. Should the equipment be opened, a check must be made to ensure that there is no voltage in the DC link (by electrician only, comply with the 5 safety rules).

The hybrid charger may only be operated in conjunction with Fischer Panda generators as the system is designed for each generator. It is not permitted to connect it to other generators or a three-phase network and this may lead to malfunction, destruction of the device, fire or a life-threatening shock.

Generally the hybrid charger is installed directly in the capsule of the VS generator. Should this be installed outside, then the shielded 3 phases of the generator may not be extended. The Hybrid Charger must be installed directly adjacent to the generator.

The Hybrid Charger is fused internally for the maximum current of the power electronics. A fuse that is matched to

the appropriate cross-section of the connecting cable must be supplied by the customer There is a fire risk if this is not the case.

3.1.2 Fire protection measures

All components in the vicinity of live parts shall be protected against fire.

All connection interfaces on live parts shall be regularly inspected for heat development (infra-red thermometer).

Temperature variations in particular indicate high contact resistance values or bad connections on the hotter contact.

The generator shall be integrated in the fire safety system (where applicable).

3.1.3 Insulation monitoring measures

An insulation monitor or a specific FI switch must be installed on the DC bus as a safeguard against electrical shock.

4. Basics

4.1 Proper use

The Fischer Panda generator serves to generate electrical current from diesel fuel.

The diesel fuel is converted into mechanical energy in a combustion engine. A generator installed on the engine converts this mechanical energy into electrical energy. The process is controlled and regulated by the (possibly external) remote-control panel and VCS (voltage-control system) components.

Adequate fuel and air for combustion is required for this process. The resulting exhaust gases and heat must be channelled away in accordance with regulations.

When electrical energy is fed into an electrical grid, the guidelines of the grid operator/utility as well as the directives of the specific territory's public authority regarding electrical grids/on-board power supply systems must be complied with. Appropriate safety systems and switches must be installed.

Any use other than that which has been described above will lead to damage to this product and the power grid as well as the consumers, and it is also associated with hazards such as short circuiting, etc. The product as a whole may not be modified or converted and the casing of the plant may not be opened. The safety instructions must be followed without fail.

4.2 Objectives of the manual and declaration of interested parties

This manual serves as the work and operating instructions for the user and operator of Fischer Panda generators.

The handbook serves as a foundation and guide for the installation and servicing of Fischer Panda generators in a manner that complies with legislation and regulation. It does not replace professional judgement and design, nor the modification of the installation to comply with local conditions and national/international regulations. All work must be carried out according to the state of the art.

4.2.1 Specialists

Specialists that are considered to be suitable to work on the mechanical components include qualified motor-vehicle mechanics or persons with equivalent qualifications.

Specialists considered to be suitable to work on the electrical systems include qualified electricians, electrical engineering technicians, or persons with equivalent qualifications.

After the installation, the specialist must instruct the user in the operation and servicing of the generator. He/she must point out the hazards that exist to the user.

4.2.2 Users

The user is considered to be the person who is responsible for operating the generator.

After installation, the user must be instructed regarding the handling and operation of the generator. This includes, in particular, instruction regarding the hazards that arise while operating, the various operating conditions and training regarding the maintenance of the generator,

The user must read the entire handbook and must take note of the safety instructions and regulations contained therein.

4.2.3 Operators

The operators are considered to be the persons who have been appointed by the owner/user to handle and operate the generator.

The owner/user must ensure that the operator has read the manual in full and that the appropriate safety instructions and regulations are complied with. The operator must, in accordance with his/her job description, be trained and made technically competent by the user. This is particularly important in the area of servicing.

4.3 Opening the Fischer Panda Transport Box

4.3.1 Bolted Fischer Panda Transport Box

1. Loosen the bolts for lid / side-walls
2. Remove the cover
3. Remove the loose accessories
4. Remove the bolts for side-walls / floor pallet
5. Remove the side-walls
6. Loosen the equipment lock

4.3.2 Fischer Panda Transport Box with metal tab closure

1. Bend open the metal tab closures on the transport box lid.
2. Remove the cover
3. Remove the loose accessories
4. Bend open the metal tab closures on the transport box bottom.
5. Remove the side-walls
6. Loosen the equipment lock

4.4 Transport and Loading

4.4.1 Transporting the generator

- The generator may only be transported in an upright position.
- The Fischer Panda transport box must be used when transporting the generator. The generator shall be securely attached to the bottom of the box.
- A suitable forklift must be used when loading.
- Depending on the means of transportation (e.g. air freight), the generator fluids (coolant, engine oil, fuel) may need to be drained. The corresponding instructions and warnings must be fitted to the transport packaging.

4.4.2 Loading the generator

Appropriate eye-bolts should be installed in the threaded holes of the support rails for loading. The load bearing capacity of each ring eye bolt must at least equal the generator weight.

An adequate lifting yoke shall be used for transport/ loading

Illustrative example

Fig. 4.4.2-1: Example of lifting yoke



4.5 Fischer Panda Generator scope of delivery

The scope of delivery of the Fischer Panda generators includes the following parts:

4.5.1 Variable speed generators

Fischer Panda VS generator

Fig. 4.5-1: Fischer Panda VS Generator



FP-TQ-Interface-V1

Fig. 4.5-2: FP-TQ-Interface-V1



Hybrid charger power electronics

The hybrid charger power electronics can also be permanently installed on the exterior of the generator.

Fig. 4.5-3: Hybrid charger power electronics



Fischer Panda manual

Fig. 4.5-4: Handbook

The Fischer Panda manual comprises the following components:

- Clear plastic folder with general information, guarantee conditions, installation protocol (installation report) and service list.
- Generator handbook with attached handbook for the remote-control panel.
- Engine manufacturer's handbook
- Circuit diagram of the generator

Example



Optional accessories

The following are examples of optional accessories:

- Fuel pump
- Installation kits

4.6 Opening the sound insulation capsule

1. To open the sound insulation capsule, the 8 closures must be opened.
2. To open the lash closures pull the handle and lift the lash of the closure pin. After lifting of the lashes, the sound isolation cover upper pars can be removed.
3. Close the capsule in the reverse order.

Fig. 4.6-1: Sound insulation capsule



4.7 Special servicing instructions and measures for extended downtime and decommissioning

The measures mentioned below must be adapted to the actual circumstances.

Note:



The measures mentioned here are "standard" measures for downtime/decommissioning as well as recommissioning.

As the precise circumstances of the downtime and decommissioning are not known to Fischer Panda, these directions can serve as a template and example. The measures must be adapted in accordance with the local circumstances and regulations by a qualified specialist.

Fischer Panda accepts no liability for incorrect, unsuitable storage/downtime/decommissioning and/or recommissioning.

If the components mentioned are not fitted to the generator/engine, the relevant operations can be skipped.

Downtimes are categorised in the following groups:

- Short term downtime (1 to 3 months)
- Medium term downtime / hibernation (3 to 6 months)
- Long term downtime / decommissioning (more than 6 months)

If the generator is not operated regularly, it must be ensured that it is warmed up thoroughly every 2 weeks. If this is not done, water may collect in the oil and exhaust tract, resulting in damage.

WARNING



4.7.1 Instructions regarding the starter battery during extended downtime

Starter batteries

Note:



The self-discharge of batteries is a physical and chemical process which cannot be avoided simply by disconnecting the battery.

- For extended downtimes, the battery shall be disconnected from the generator set.
- Charge battery regularly. Observe instructions of the battery manufacturer.

Depending on the battery type, the acid level must be checked before charging and each cell must be topped up to the marking using distilled water as necessary.

Modern starter batteries are typically maintenance-free.

Deep discharge will damage the battery and may render it unserviceable.

Keep battery clean and dry. Clean battery poles (+ and -) and terminals regularly and coat with an acid-free and acid-resistant grease. During assembly, ensure good contact of the terminal connections. The open-circuit voltage of the battery should not drop below approx. 1.95 V/cell. This corresponds to an open-circuit voltage of around 2.1V/cell when fully charged.

For a 12V battery, 11.7V lower open-circuit voltage (battery discharged) - trickle charging of 13.2V required.

For a 24V battery, 23.4V lower open-circuit voltage (battery discharged) - trickle charging of 13.2V required.

These values are based on a battery temperature of 20-25°C. Take note of the details supplied by the battery manufacturer.

Fischer Panda recommends:

- Install a battery disconnect switch and switch it to the “Off” position at the machine. (Cutting the battery circuit.)
- The positive pole of the battery must be secured close to the battery.
- Regularly check contacts for corrosion.

Note:



4.7.2 Measures for short-term downtimes

Short downtime (1 to 3 months)

- Measure battery charge status based on open-circuit voltage.
- During downtime >7 days, disconnect the battery (e.g. main battery switch in the 0-position).
- Drain the water lock and disconnect the water lock/generator connection and seal the connection with the generator.
- Run the engine for at least 20-30 mins until warm every 2--3 months.
- Fill the tank to the 100 % level (Full)

4.7.3 Measures for medium-term downtimes / hibernation

Medium-term downtimes (3 to 6 months)

4.7.3.1 Surface protection measures:

- Check battery charge status and recharge regularly, roughly every 3 months, as necessary. Follow the instructions of the battery manufacturer.
- Check coolant antifreeze level and refill as necessary.

  The antifreeze must not be older than 2 years. The proportion of antifreeze agent should lie between 40% and 60%, to ensure corrosion protection in the coolant circuit. Top off coolant if necessary.

  If the coolant has been drained - for example, after mothballing the engine - no water may remain in the engine during the downtime. The control unit must be marked accordingly with a note specifying "NO COOLANT".
- Drain engine oil as specified. Refill engine with preservative oil to the maximum level on the oil dipstick.
- Drain the diesel from the tank and fill up with a mothballing mixture (90% diesel and 10% preserving oil (Full level).

Allow the engine to run for 10 minutes to warm up.

- Dismount V-belt as specified, wrap and store in a dry location. Protect against UV radiation.

Cover alternator apertures!

Cleaning fluids and preservatives must not enter the alternator. Risk of destroying the alternator.

Attention!



- Clean engine as per manufacturer's instructions.
- Spray engine parts and V-belt pulleys with preservative.
- Clean air filter housing and spray with preservative.
- Seal the air intake and exhaust gas openings (e.g. with tape or end caps)
- Empty the raw water circuit.
- Close the sea-cock.

- Clean the raw water filter.
- Remove the impeller (if present) and store.

Before recommissioning, remove preservatives and protective measures!

Attention!



4.7.3.2 Measures for removing surface protection after medium-term downtimes (3 to 6 months)

- Check battery charge status and recharge if necessary. Observe instructions of the battery manufacturer.
- Check the level of antifreeze protection and the coolant level; top up as required.
- Drain engine oil. Replace oil filter and engine oil as per the specification.
- Remove preservatives from the engine with petroleum spirit.
- Degrease V-belt pulleys and mount V-belt according to instructions. Check V-belt tension!
- If applicable, open turbocharger oil pressure line and fill clean engine oil into channel.
- Hold engine stop lever in zero-power position and crank engine manually several times.
- Clean air filter housing with petroleum spirit, check air filter and replace if necessary.
- Remove covers from exhaust aperture and intake apertures.
- Connect the battery. Close battery main switch.
- Install the impeller (if present)
- Open the sea-cock.
- Check the raw water filter.
- Hold stop lever on generator motor in neutral position and crank starter for approx. 10 seconds. Then, pause for 10 seconds. Repeat this procedure twice.
- Perform visual check of the generator similar to initial commissioning and start up generator.

4.7.4 Measures for long-term downtime / decommissioning

Downtimes (more than 6 months)

4.7.4.1 Surface protection measures:

- Check battery charge status and recharge regularly, roughly every 3 months, as necessary. Follow the instructions of the battery manufacturer.
- Check coolant antifreeze level and refill as necessary.

  The antifreeze must not be older than 2 years. The proportion of antifreeze agent should lie between 40% and 60%, to ensure corrosion protection in the coolant circuit. Top off coolant if necessary.

  If the coolant has been drained - for example, after mothballing the engine - no water may remain in the engine during the downtime. The control unit must be marked accordingly with a note specifying "NO COOLANT".
- Drain engine oil as specified. Refill engine with preservative oil to the maximum level on the oil dipstick.
- Drain the diesel from the tank and fill up with a mothballing mixture (90% diesel and 10% preserving oil (Full level).

Allow the engine to run for 10 minutes to warm up.

- Dismount V-belt as specified, wrap and store in a dry location. Protect against UV radiation.
- Disconnect the battery. Coat terminals with acid-free grease.

Cover generator apertures

Attention!



Cleaning fluids and preservatives must not enter the alternator. Risk of destroying the alternator.

- Clean engine as per manufacturer's instructions.
- Spray engine parts and V-belt pulleys with preservative.
- Clean air filter housing and spray with preservative.
- Spray preservative on intake and exhaust side of exhaust turbocharger (where applicable) and reconnect the lines.
- Remove valve cover and spray inside of valve cover, valve stems, springs, rocker, etc. with preservative oil.
- Remove injection nozzle and coat cylinder surface with preservative oil. Hold stop lever in zero-power position and crank engine manually several times. Screw the injection nozzles back in with new seals. Observe torque values.
- Spray the radiator cover and tank cover or radiator cover on the expansion tank lightly with preservative oil and refit.
- Seal the air intake and exhaust gas openings (e.g. with tape or end caps)
- Empty the raw water circuit.
- Close the sea-cock.
- Clean the raw water filter.
- Remove and store the impeller

Before recommissioning, remove preservatives and protective measures!

Attention!



4.7.4.2 Measures for removing preservatives after long-term downtime / recommissioning (more than 6 months):

- Check battery charge status and recharge if necessary. Observe instructions of the battery manufacturer.
- Check the level of antifreeze protection and the coolant level; top up as required.
- Drain engine oil. Replace oil filter and oil as per the specification.
- Remove preservatives from the engine with petroleum spirit.
- Degrease V-belt pulleys and mount V-belt according to instructions. Check V-belt tension!
- If applicable, loosen the turbocharger oil pressure line and pour clean engine oil into the gallery.
- Hold engine stop lever in zero-power position and crank engine manually several times.
- Clean air filter housing with petroleum spirit, check air filter and renew if necessary.
- Remove covers from exhaust aperture and intake apertures.
- Connect the battery. Close battery main switch.
- Install the impeller (if present)
- Open the sea-cock.
- Check the raw water filter.
- Does not apply to all types of engines: Hold stop lever on generator motor in neutral position and crank starter for approx. 10 seconds. Then, pause for 10 seconds. Repeat this procedure twice.
- Perform visual check of the generator similar to initial commissioning and start up generator.

Fischer Panda recommends:

After long-term downtime, a complete inspection must be performed in accordance with the engine manufacturer.

Note:



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EC Declaration of conformity

in accordance with EC Machine Directive 2006/42/EC, Annex II A

Manufacturer	Fischer Panda GmbH Otto-Hahn-Straße 40 33104 Paderborn
Product	Fischer Panda Diesel Generator
Product Type	G AGT-VS 000020 PMS 300V-500V G3
Part No.	0034157
Year of manufacture	2022-
Function description20	The Fischer Panda diesel generator is intended solely for use as a permanently-installed power generator in (vehicles,trailers and mobile containers) (inland waterway vessels) (seagoing vessels).

We hereby declare that this machine, on the basis of its design and construction and in the version that we have brought to market complies with the fundamental safety and health requirements of the following European and North American directives and regulations:

(EU) 2016/1628	Regulation concerning requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery
(EU) 517/2014	Regulation concerning fluorinated greenhouse gases and repealing Regulation (EC) No 842/ 2006
(EC) 661/2009	Regulation concerning type-approval requirements for the general safety of motor vehicles, their trailers andsystems, components and separate technical units intended therefor
2014/30/EU	Directive relating to electromagnetic compatibility
2014/35/EU	Low-voltage Directive
2006/42/EC	Machinery Directive
2005/88/EC	Amendment to Directive 2000/14/EC concerning the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors
2002/88/EC	Directive concerning measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery

This machine complies with the following standards and conventions:

DIN EN ISO 8528-13:2017-03	Alternating current generator sets driven by a reciprocating internal combustion engine - Part 13: Safety
DIN EN ISO 12100:2010	Safety of Machines - general design principles - risk assessment and risk reduction
DIN ISO 6826:2000-05	Reciprocating internal combustion engines - Fire protection
DIN EN 60034-1:2015-02	Rotating electrical machines - Part 1 Standard methods for determining losses and efficiency from tests
DIN EN 60204-1:2014-10	Safety of machines - electrical equipment of machines - Part 1: General requirements
ISO 3046-1:2002-05	Reciprocating internal combustion engines - Performance - Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods - Additional requirements for engines for general use
ISO 3046-3:2006-06	Reciprocating internal combustion engines - Performance - Part 3: Test measurements
ISO 3046-4:2009-12	Reciprocating internal combustion engines - Performance - Part 4: Governor
ISO 3046-5:2001-12	Reciprocating internal combustion engines - Performance - Part 5: Torsional vibrations
ISO 3046-6:1990-10	Reciprocating internal combustion engines - Performance - Part 6: Over-speed protection
ISO 8178-1:2017-04	Reciprocating internal combustion engines - Exhaust emission measurement - Part 1: Test-bed measurement systems of gaseous and particulate emissions

ISO 8178-4:2017-04	Reciprocating internal combustion engines - Exhaust emission measurement - Part 4: Steady-state and transient test cycles for different engine applications
DIN 6280-10:1986-10	Reciprocating internal combustion engines; generating sets with reciprocating internal combustion engines; small power generating sets; requirements and tests
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Emission

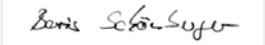
DIN EN 55014-1:2018-08; VDE 0875-14-1	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus
DIN EN 55016-1-2:2019-10; VDE 0876-16-1-2:2019-10	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus
DIN EN 55016-2-1:2019-11; VDE 0877-16-2-1:2019-11	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus
DIN EN 55016-2-3:2020-11; VDE 0877-16-2-3:2020-11	Requirements for for radio interference and immunity measuring apparatus and methods as well as methods of measurement of interference (radio interference) and immunity
DIN EN IEC 61000-6-4:2020-09; VDE 0839-6-4:2020-09	Electromagnetic Compatibility (EMC)

Immunity

DIN EN 61000-4-3:2011-04; VDE 0847-4-3:2011-04	Electromagnetic Compatibility (EMC) - Immunity test in respect of high-frequency electromagnetic fields
DIN EN 61000-4-4:2013-04; VDE 04/04/0847:2013-04	Electromagnetic Compatibility (EMC) - Testing and measurement techniques - Immunity test in respect of electrical fast transients
DIN EN 61000-4-6:2014-08; VDE 06/04/0847:2014-08	Electromagnetic Compatibility (EMC) - Testing and measurement techniques - Immunity test in respect of conducted interference induced by high-frequency fields

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Paderborn, _____22.08.2022_____	
Place, date	Dipl.-Ing. Stephan Backes (Managing Director)
Paderborn, _____22.08.2022_____	
Place, date	Boris Schönberger (Authorised signatory)

6. The Panda Generator

6.1 Position of the identification plate

Fig. 6.1-1: Identification plate on the generator

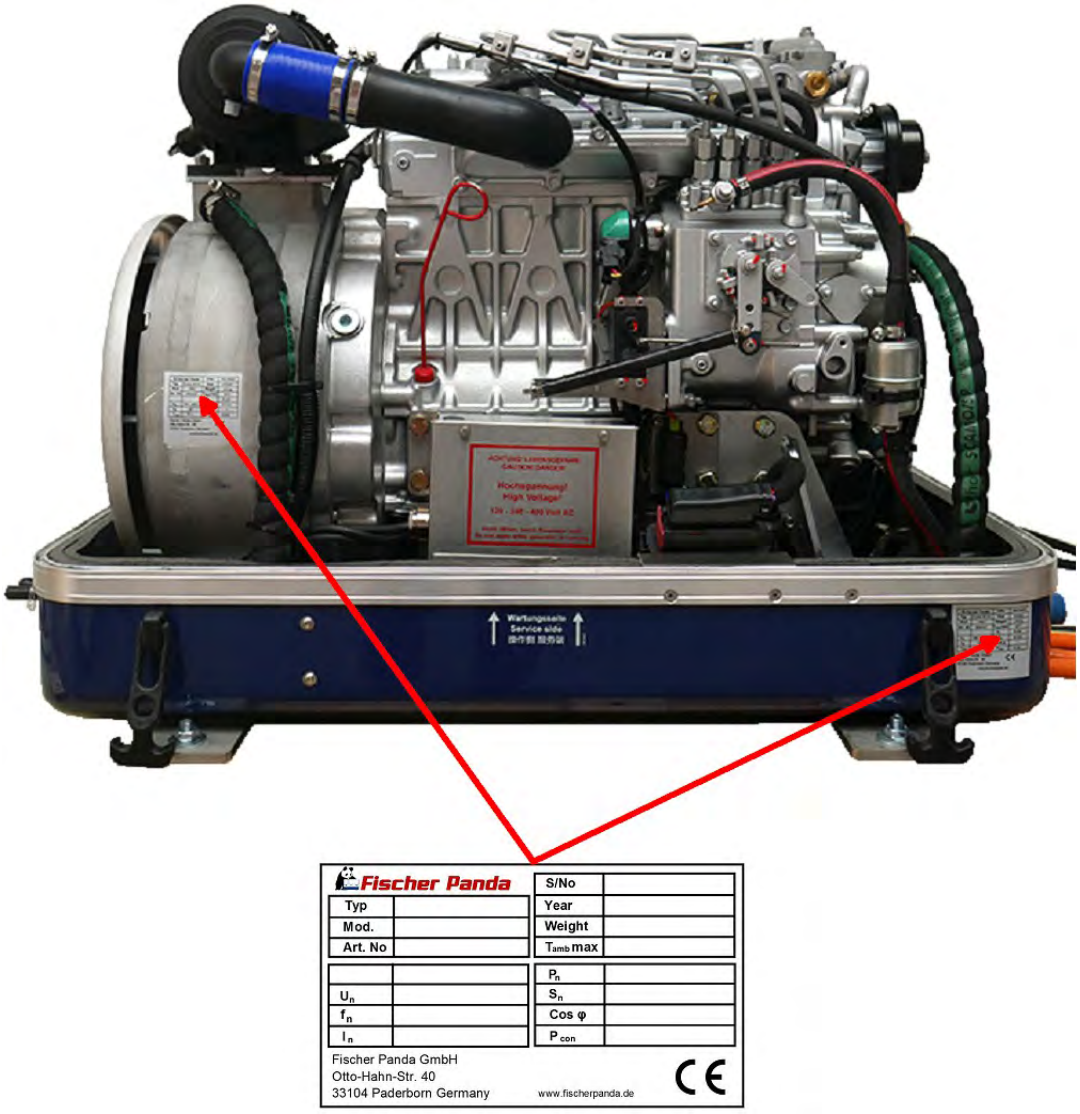
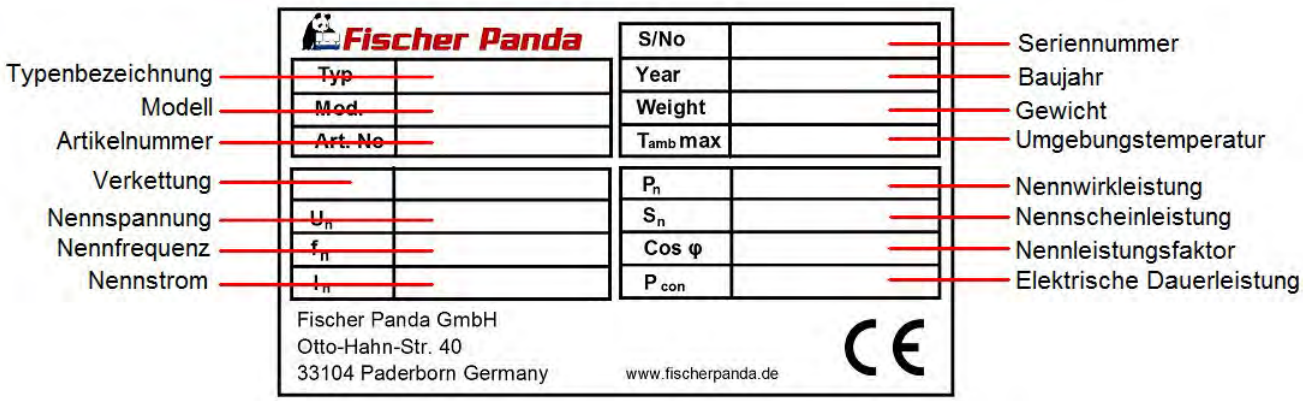


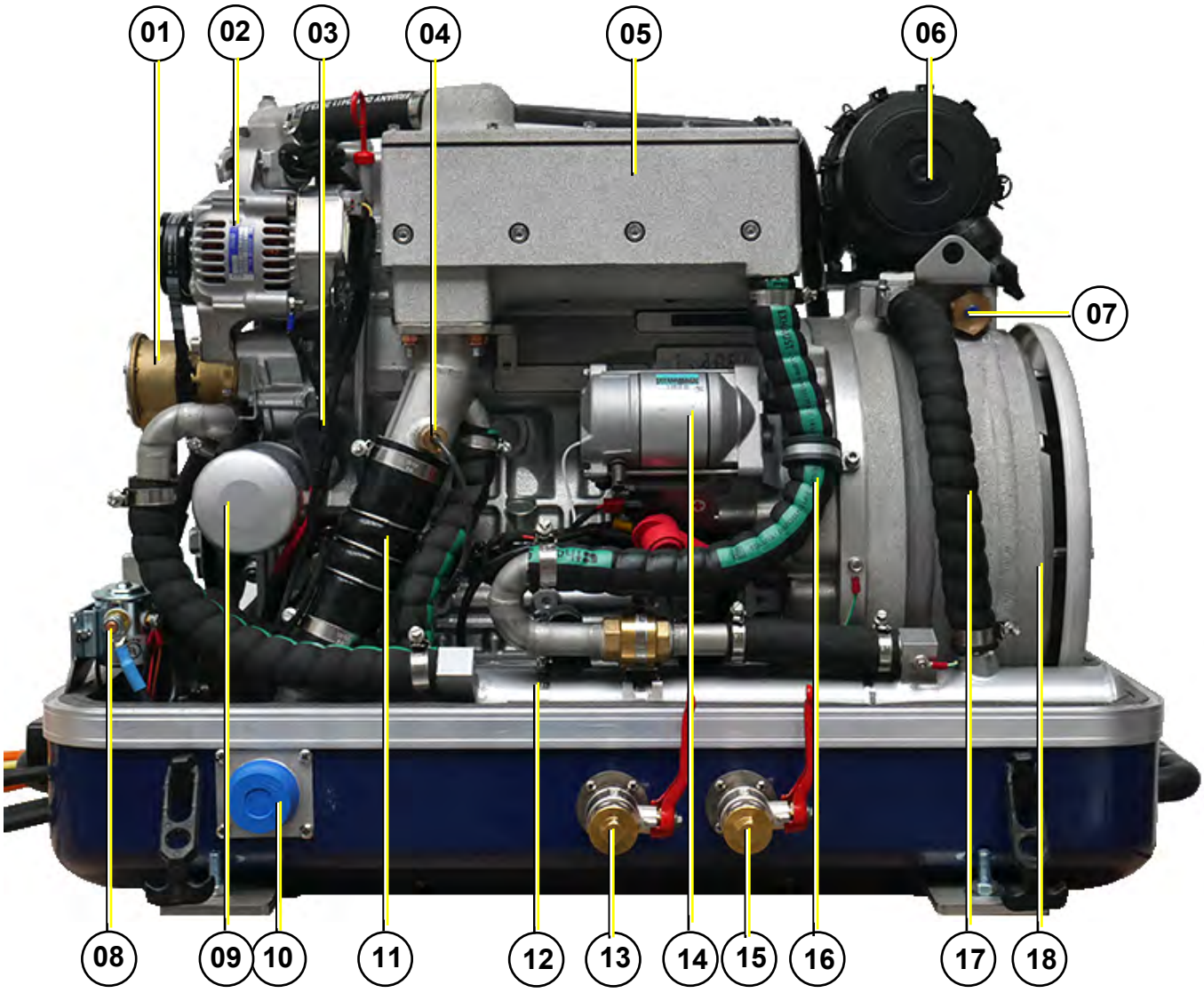
Fig. 6.1-2: Description of the identification plate



6.2 Description of the generator

6.2.1 Right-hand side view

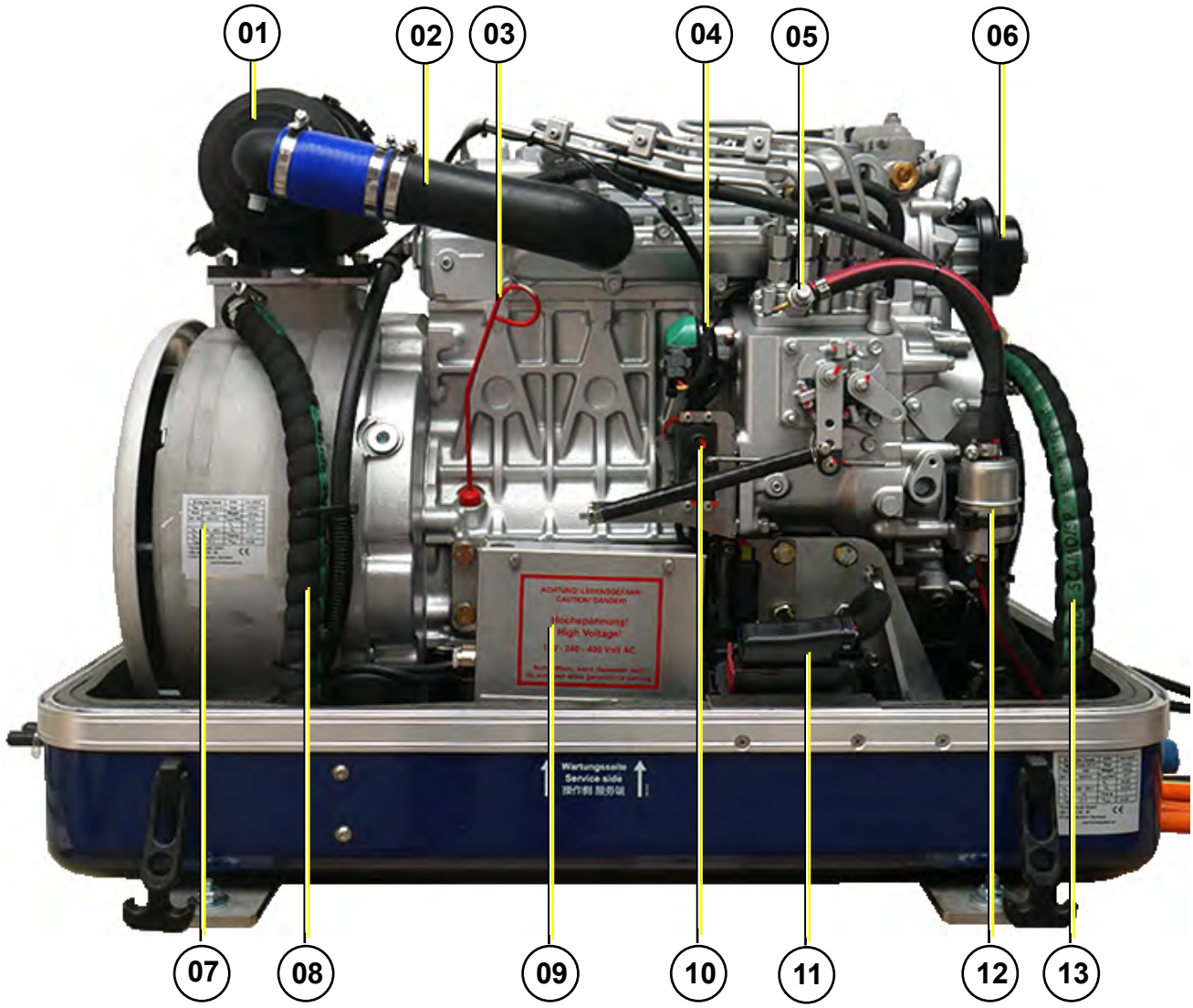
Fig. 6.2.1-1: Right-hand side view



01. Raw water impeller pump
02. DC-alternator
03. Oil pressure switch
04. Thermosensor mixing elbow
05. Water-cooled exhaust manifold
06. Air filter housing
07. Ventilation screw
08. GND isolator (option)
09. Oil filter
10. Exhaust output
11. Exhaust hose
12. Heat exchanger
13. Water out (hot side)
14. Starter motor
15. Water in (cold side)
16. Cooling water hose
17. Cooling water hose
18. Generator housing

6.2.2 Left-hand side view

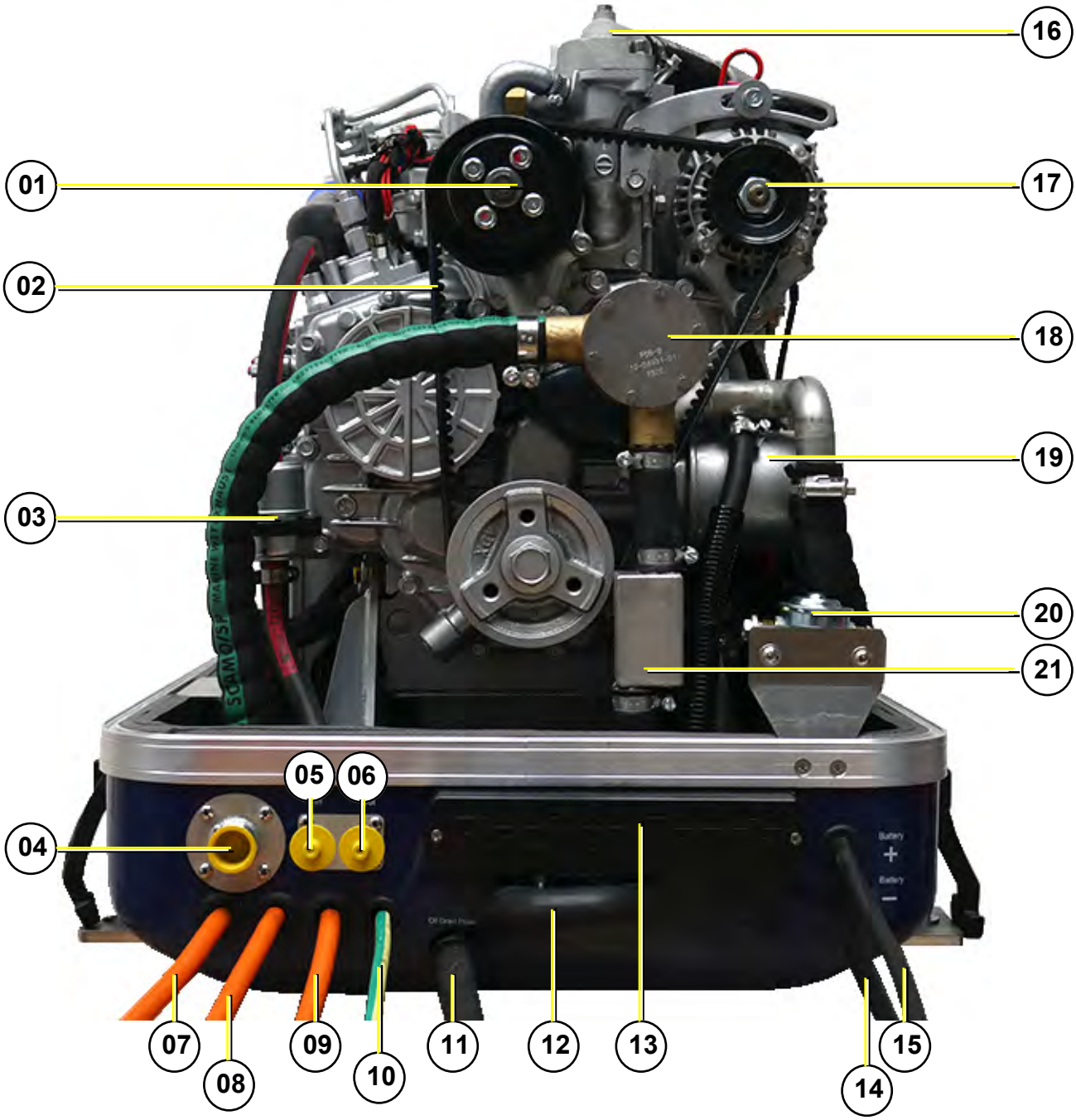
Fig. 6.2.2-1: Left-hand side view



01. Air filter housing
02. Suction hose
03. Dipstick
04. Stop solenoid
05. Ventilation screw injection pump
06. Pulley for internal water pump
07. Generator housing
08. Cooling water hose
09. Power terminal box
10. Actuator
11. fpControl circuit board
12. Fuel filter
13. Cooling water hose

6.2.3 Front view

Fig. 6.2.3-1: Front view



01. Pulley for internal water pump
02. V-belt
03. Cooling water hose
04. Raw water intake
05. Connection fuel IN
06. Connection fuel OUT
07. Generator output L1
08. Generator output L2
09. Generator output L3
10. Generator output PE
11. Oil drain hose
12. Connection external ventilation valve
13. fpControl ECU
14. Cable starter battery (+)
15. Cable starter battery (-)
16. Thermostat housing with ventilation screw
17. DC-alternator
18. Raw water impeller pump
19. Oil filter
20. GND isolator (option)
21. Impeller filter

6.2.4 Rear view

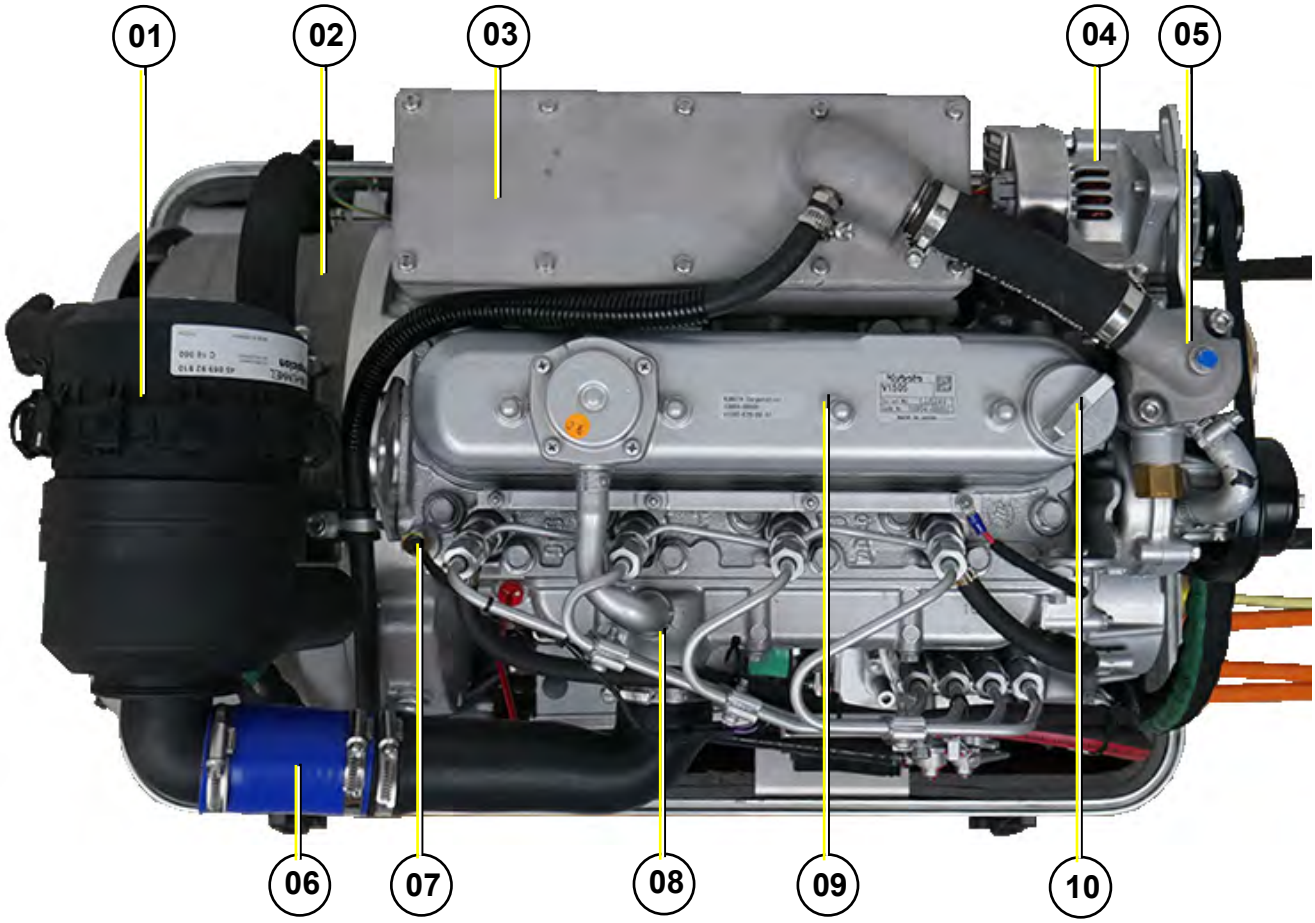
Fig. 6.2.4-1: Rear view



01. Water-cooled exhaust manifold
02. Air filter housing
03. Heat exchanger
04. Connection water IN (from Hybrid Charger)
05. Generator housing
06. Connection water OUT (to Hybrid Charger)
07. Return to external cooling water expansion tank (ventilation line)
08. In-flow from external cooling water expansion tank (feed line)

6.2.5 Top view

Fig. 6.2.5-1: Top view



01. Air filter housing
02. Generator housing
03. Water-cooled exhaust manifold
04. DC-alternator
05. Thermostat housing with ventilation valve
06. Suction hose
07. Thermosensor cylinder head
08. Induction elbow
09. Valve cover
10. Oil filler neck

6.2.6 Function groups and functional diagrams

6.2.7 fpControl Panel

The remote control panel is equipped with various monitoring functions, which increase the functionality and operational safety of the generator. Various areas of the generator are monitored that trigger an alarm on the remote control panel and that can shut down the generator as soon as a fault is detected.

Fig. 6.2-1: fpControl CP-G front



Fig. 6.2.7-2: fpControl CP-G rear



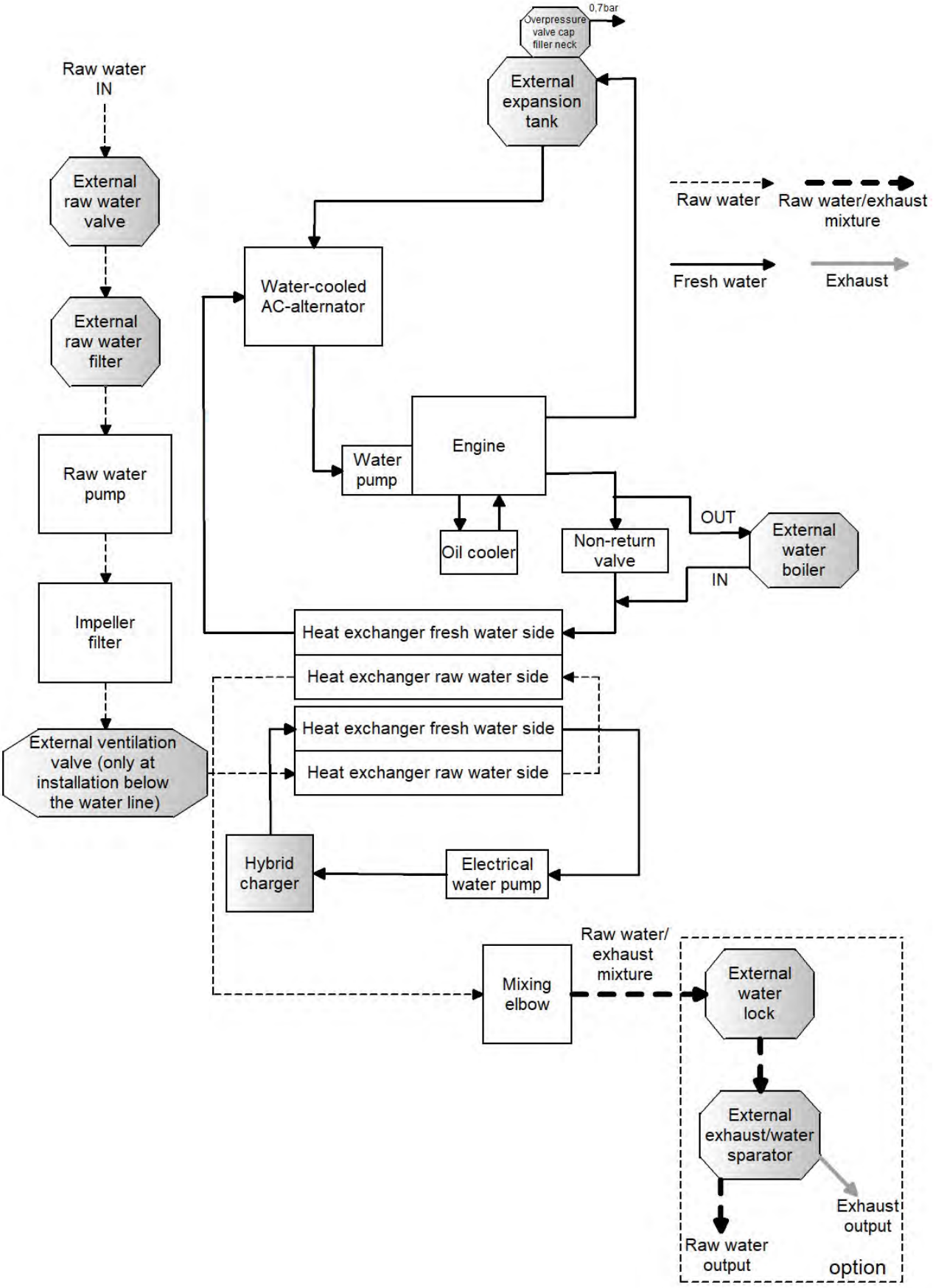
For further information, see the data sheet/manual of the fpControl!

Note!



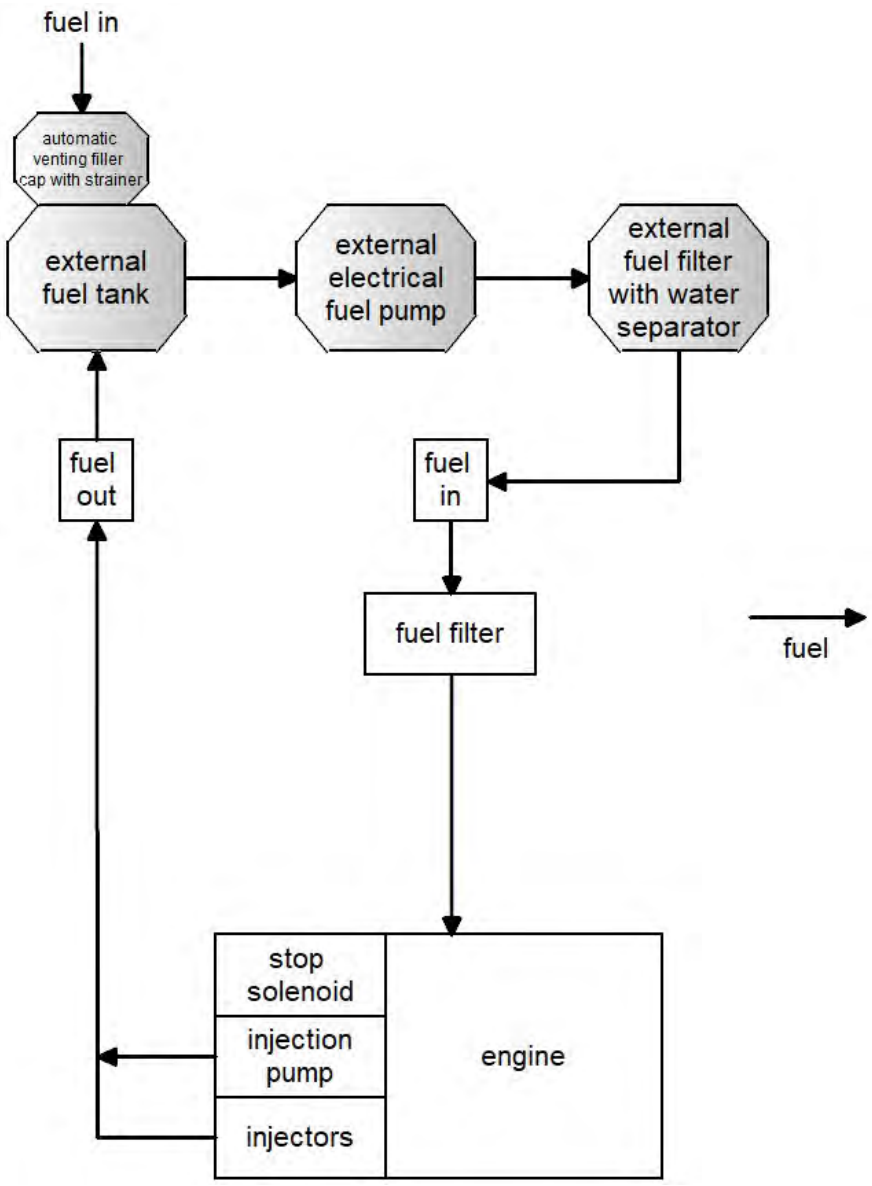
6.2.8 The cooling system

Fig. 6.2.8-1: The cooling system



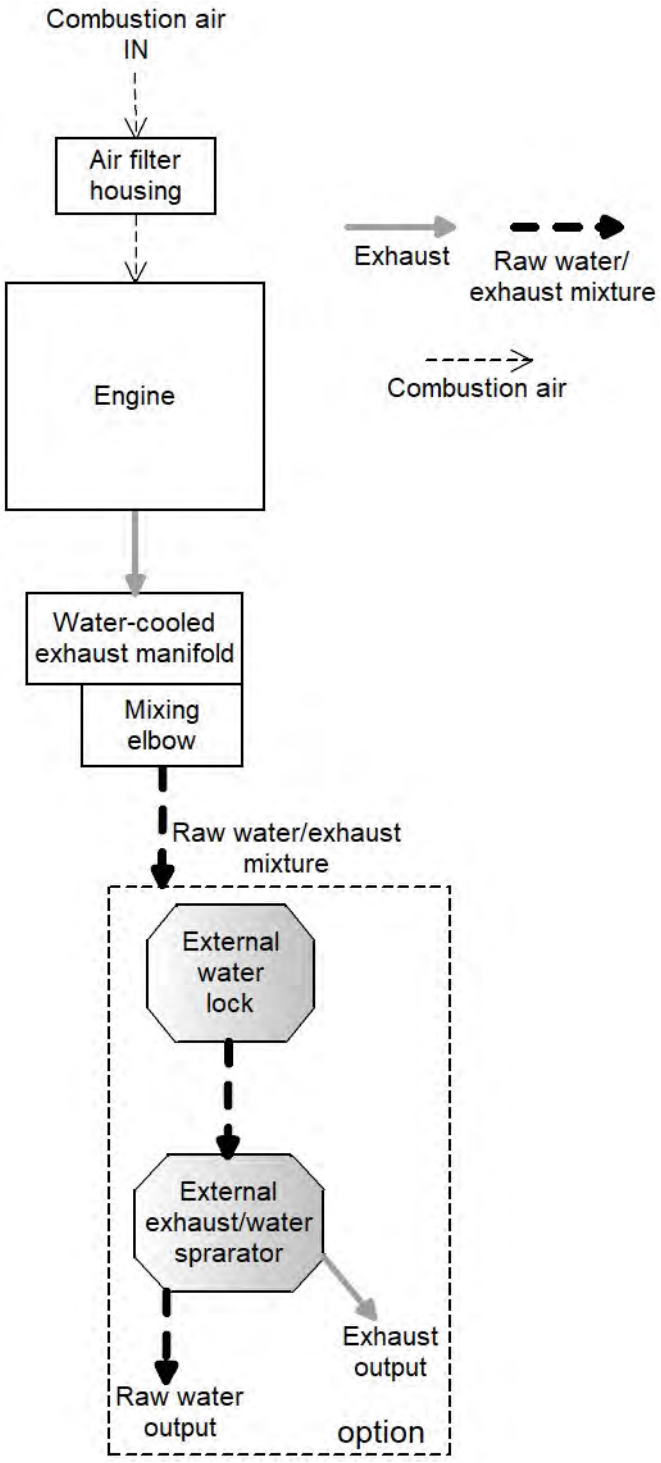
6.2.9 Fuel system

Fig. 6.2.9-1: Fuel system



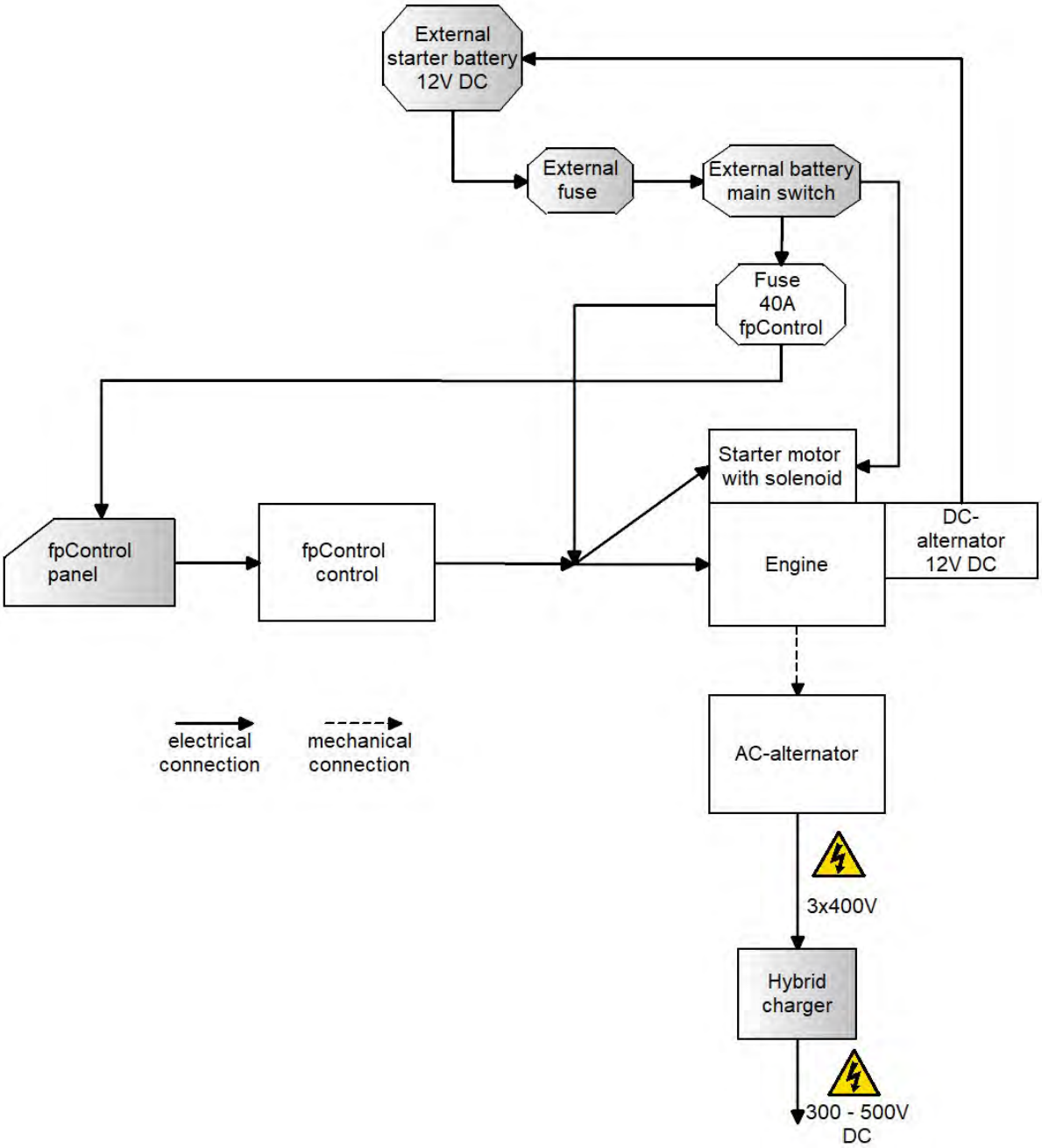
6.2.10 Combustion air system

Fig. 6.2.10-1: Combustion air system



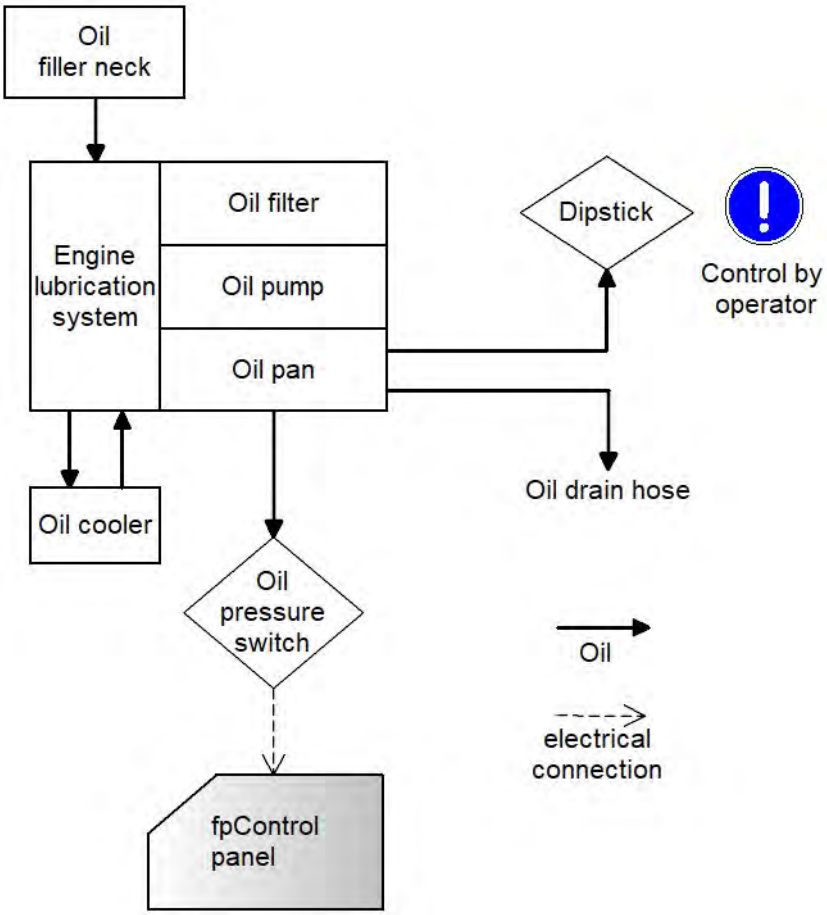
6.2.11 Electrical system

Fig. 6.2.11-1: Electrical system



6.2.12 Lubricant system

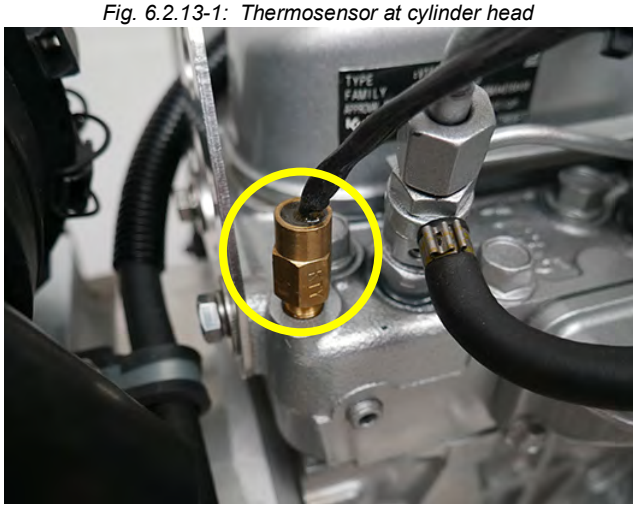
Fig. 6.2.12-1: Lubricant system



6.2.13 Sensors and switches for operational monitoring

Thermosensor at cylinder head

Fig. 6.2.13-1: Thermosensor at cylinder head



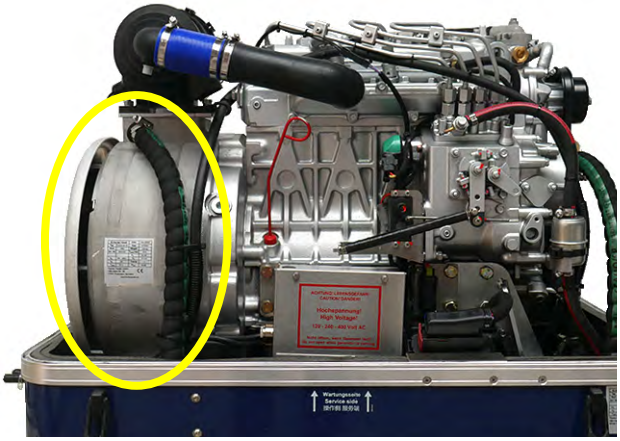
Thermosensor at the mixing elbow

Fig. 6.2.13-2: Thermosensor at the mixing elbow



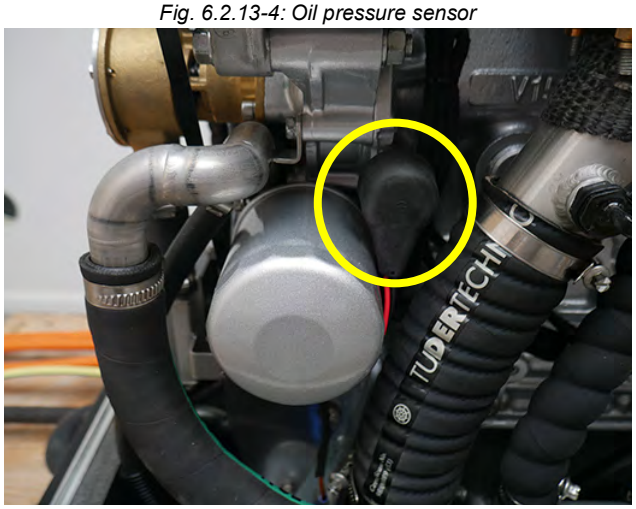
Thermo-switches and sensors on the winding

Fig. 6.2.13-3: Thermo-switches and sensors on the winding



Oil pressure sensor

Fig. 6.2.13-4: Oil pressure sensor



7. Installation Instructions

All connecting cables and instructions regarding the installation are designed and suitable for “standard” installation situations.

As the precise installation and operating situation (e.g. special vehicle type, high travelling speeds and special operating conditions, among others) are not known to Fischer Panda, these installation instructions can only serve as a template and example. The installation must be adapted in accordance with the local circumstances and regulations and performed by appropriate specialist.

Damage arising from an incorrect/ improperly adapted installation/mounting is not covered by the guarantee.

Attention! Lay out the system correctly.



7.1 Personnel

The installation described here should be performed only by specially trained technical personnel or by authorised workshops (Fischer Panda Service Points).

All loads must be disconnected prior to working on the generator to avoid damage to the devices.

Attention! Switch off all loads.



7.1.1 Hazard notes for the installation

see “Safety first!” on Page 12.

Follow the general safety instruction at the front of this manual.

Notice!



Working at a running generator can result in severe personal injury. Therefore before starting work at the generator:

Make sure that the generator ist stopped and the starter battery is disconnected to guarantee that the generator cannot be inadvertently started.

Do not run the generator with removed sound isolation cover.

Warning! Risk of injury



Improper installation can result in severe personal injuries or material damage.

- Always undertake installation work when the generator is switched off.
- Ensure there is sufficient installation clearance before start working.
- Ensure tidiness and cleanliness at the workplace. Loose components and tools lying around or on top of each other are sources of accidents.

Warning! Risk of injury



- Only perform installation work using commercially available tools and special tools. incorrect or damaged tools can result injuries.

Oil and fuel vapours can ignite on contact with ignition sources. Therefore:

- No open flames during work on the generator.
- Do not smoke.
- Remove oil and fuel residues from the generator and floor.

Warning! Danger of fire



Contact with engine oil, antifreeze and fuel can result in damage to health. Therefor:

- Avoid skin contact with engine oil, fuel and antifreeze.
- Remove oil and fuel splashes and antifreeze from the skin immediately.
- Do not inhale oil and fuel vapours.

Danger! Danger of poisoning



Danger for Life. Improper handling, operation, installation and maintenance can result in severe personal injury and/or material damage.

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.

ATTENTION! Danger to Life - High voltage



Generator, oil and antifreeze can be hot during/after operation. Risk of severe burns.

Warning! Hot surface/material



During Installation/maintenance personal protective equipment is required to minimize the health hazards.

- Protective clothing
- safety boots
- protective gloves
- Ear defender
- safety glasses

Instruction! Personal protective equipment necessary.



Disconnect all load during the work at the generator to avoid damages at the load.

Attention! Disconnect all load



7.2 Placement

7.2.1 Preliminary remarks

- There must be an adequate supply of fresh air for combustion.
- It must be ensured that there is an adequate cooling air flow from below and the sides.
- The sea cock must be open when operating.
- The generator may only be opened by qualified specialists.
- The generator may only be operated by authorised personnel.

7.2.2 Installation location and base

Since Fischer Panda generators have extremely compact dimensions, they can be installed in cramped locations; they are therefore often installed in places that are difficult to access. Please consider that even almost maintenance-free machinery must still be adequately accessible, at least at the front (drive belt, water pump) and the service-side (actuator, dipstick), as it remains, for example, necessary to check the oil level regularly in spite of the automatic oil-pressure sensor.

The generator should not be placed in close proximity to light walls or floors, which can have resonance vibrations because of transmitted noise. If this is unavoidable, then it is recommended that this surface be lined with 1mm lead foil, which will change the mass and the resonance behaviour.

Avoid mounting the generator on a smooth surface with little mass (e.g. plywood). In the worst case, this acts as an amplifier of airborne sounds. An improvement can be achieved by reinforcing these surfaces with ribs. In addition, openings should also be sawn to interrupt these surfaces. The lining of the surrounding walls with a heavy layer (i.e lead) and foam additionally improve the conditions.

As the motor sucks its combustion air through many openings in the base of the capsule, it must be mounted with sufficient room around the base to ensure an adequate air supply (at least 12 mm [½“]).

The generator draws air from the surrounding engine room. It must therefore be ensured that sufficient ventilation openings are present, so that the generator cannot overheat.

The following data are applicable to the output of the generator:

Ambient temperature: 20 °C

Air pressure: 1 000 mbar (100 m above mean sea level)

Raw water temperature: 20 °C

Rel. humidity: 30 % at ambient temperature

Fuel temperature: up to 20 °C

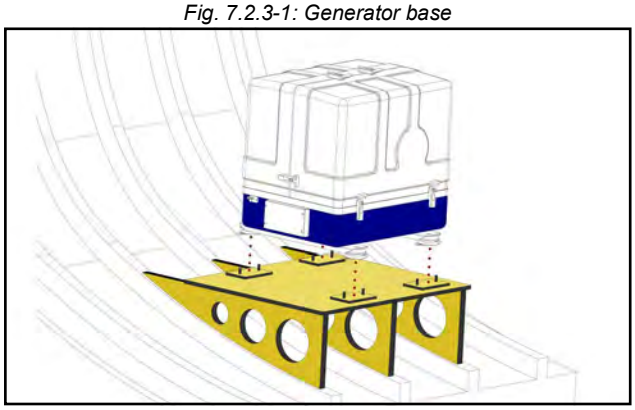
Exhaust back-pressure: 80 mbar (capsule outlet)

Deviations from this data, e.g. an ambient temperature of 40 °C due to installation in an engine room/vehicle with inadequate ventilation, lead to change in the output (derating).

7.2.3 Advice for optimal sound insulation

The appropriate base consists of a sturdy framework, on which the generator is fastened by means of vibration dampers. Since the power unit is "open" from below, the combustion air can be sucked in unhindered. In addition, this prevents vibrations, which would otherwise arise within a closed cover.

Fig. 7.2.3-1: Generator base



7.3 Generator connections

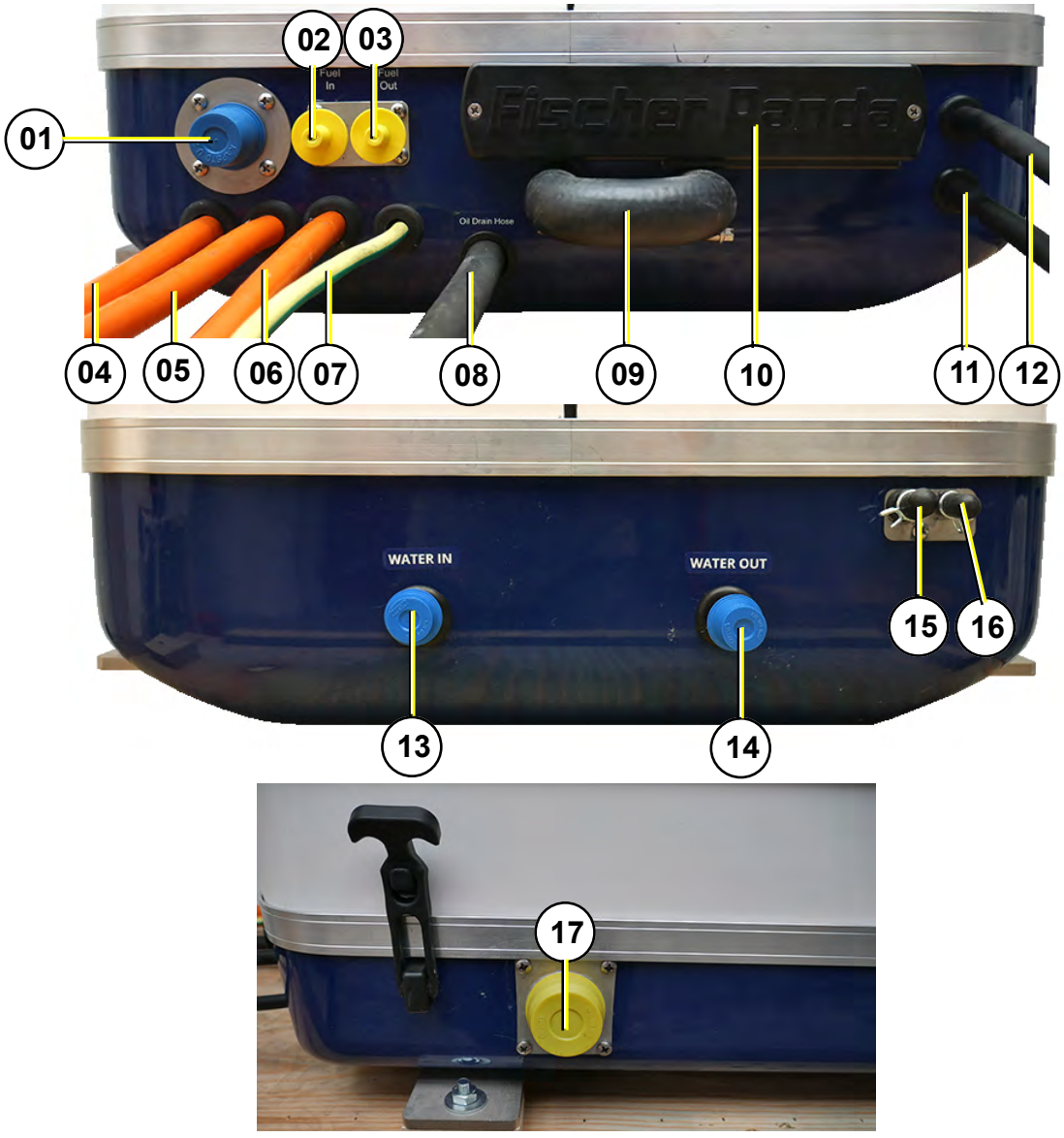
All electrical supply cables within the capsule must be securely connected to the engine and the generator. This is also applies to fuel lines and cooling water supply lines.

It is imperative that the electrical connections are laid out and implemented according to the applicable regulations. This also applies to the cable materials in use. The cable supplied is meant for "protected" laying (e.g. in a conduit) at a temperature up to a max of. 70°C (160°F). The on-board circuit must also be fitted with all the necessary fuses.

Attention! Lethal danger - High voltage



Fig. 7.3-1: Generator connections



01. Raw water intake
02. Connection fuel IN
03. Connection fuel OUT
04. Generator output L1
05. Generator output L2
06. Generator output L3
07. Generator output PE
08. Oil drain hose
09. Connection external ventilation valve
10. fpControl ECU
11. Cable starter battery (+)
12. Cable starter battery (-)
13. Connection water IN (from Hybrid Charger)
14. Connection water OUT (to Hybrid Charger)
15. Return to external cooling water expansion tank (ventilation line)
16. In-flow from external cooling water expansion tank (feed line)
17. Exhaust output

7.4 Connecting the cooling system - raw water

7.4.1 General instructions

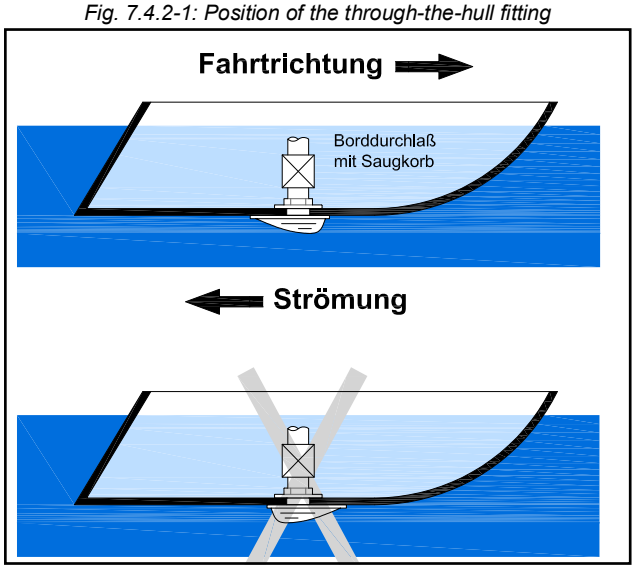
The generator should have its own feed line and should not be connected to the cooling systems of other engines. Ensure that the following installation instructions are complied with:

7.4.2 Arrangement of the through-hull fitting in yachts - schematic

It is good practice for yachts to use a through-hull fitting with an integrated strainer for the cooling water intake. The through-hull fitting (raw water intake) is often mounted facing the sailing direction to induce a greater water intake for cooling.

For generators, the through-hull inlet should under no circumstances point in the sailing direction as when sailing at higher speeds, a back-pressure may be created that forces water through the impeller, flooding the generator.

Fig. 7.4.2-1: Position of the through-the-hull fitting



7.4.3 Quality of the raw water suction line

In order to keep the suction resistance in the line to the pump as low as possible, the raw water intake hose must have at least the i9nternal diameter of the raw water connection. This applies also to installation components such as through-hull fitting, sea cock, raw water filter etc.

The intake suction line should be kept as short as possible. The through-hull fitting (raw water inlet should therefore be close to the generator.

The cooling water volume must be measured (e.g. by catching at the exhaust) after starting up. See the annex to this manual regarding the flow-rate, as well as the required cross-section of the cooling water pipe.

7.4.4 Installation of the generators above the waterline

When installing the generator, it must be ensured that the impeller pump is easily accessible.

Should this not be possible, an external, electrically-powered pump that is installed in an easily-accessible location can be used instead of a pump that is permanently installed in the capsule. If the generator is installed above the water line, significant impeller wear should be expected, as the pump runs dry for a few seconds after starting. In order for the pump not to suck air briefly, the raw water hose should be looped as close as possible to the raw water input of the generator (see figure). The impeller is lubricated by the raw water, and the service life is increased.

This problem can be reduced to a certain extent by installing a check valve in the raw water inlet line, which is located below the waterline.

If the raw water line is too long or the generator is installed too high above the waterline, an electrical pump can be installed in the suction line. In this case, the impeller should be removed from the impeller pump.

Note!

Contact Fischer Panda for further information.

Under no circumstances should the impeller be changed for many years without also exchanging the old pump.

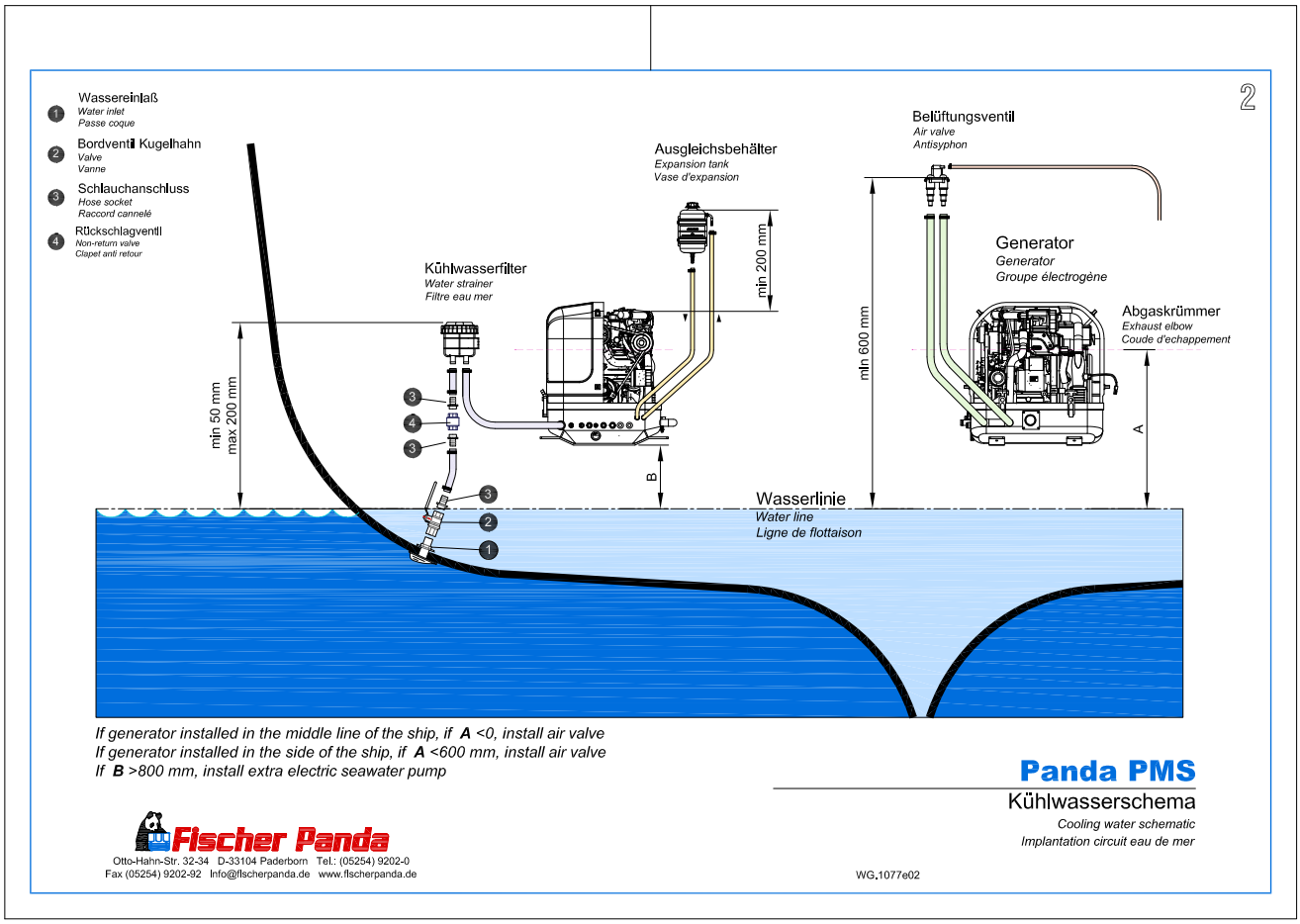
Note!

If the sealing ring within the pump is defective, raw water flows into the capsule of the generator. A repair is then very expensive.

A spare impeller and a spare pump should always be on board. The old pump can be sent back to Fischer Panda for a cost-effective general overhaul.

7.4.4.1 Raw water installation diagram

Fig. 7.4.4.1-1: Raw water installation diagram



7.4.5 Installing the generator below the waterline

If the generator cannot be fitted at least 600 mm above the waterline, it is essential that a vent valve is installed in the raw water line.

Possible heeling must be taken into consideration if installed to the side of the "mid-ship line"! The water hose for the external vent valve at the rear of the capsule is separated at the midpoint and extended by means of an additional hose and a connecting nipple at each end. Both hose ends must be led outside of the capsule to a single point - if possible 600mm above the waterline on the midship line. The valve is connected to the two hose ends at the highest point. If the valve is stuck, the cooling water line cannot be bled once the generator has been stopped; the water column cannot be interrupted and the water can enter the combustion chamber of the motor. This will quickly lead to the destruction of the motor.

Fig. 7.4.5-1: Air-bleed valve

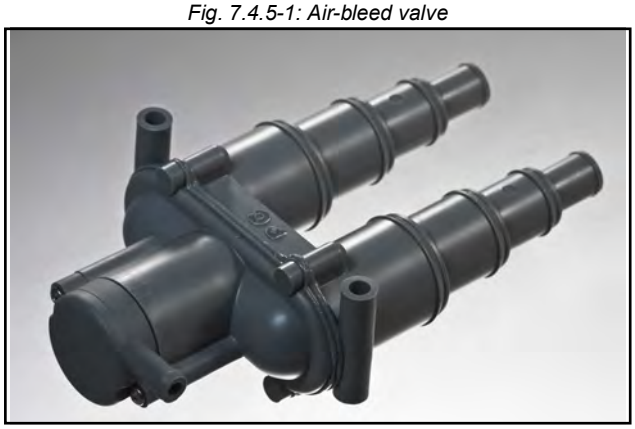
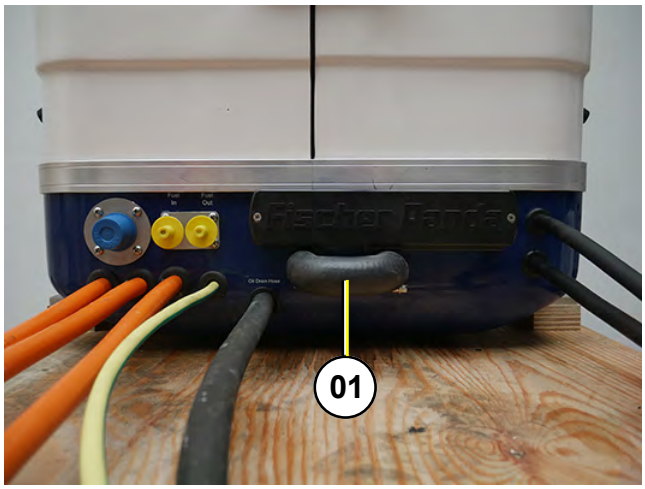


Fig. 7.4.5-2: Rubber hose for the vent valve

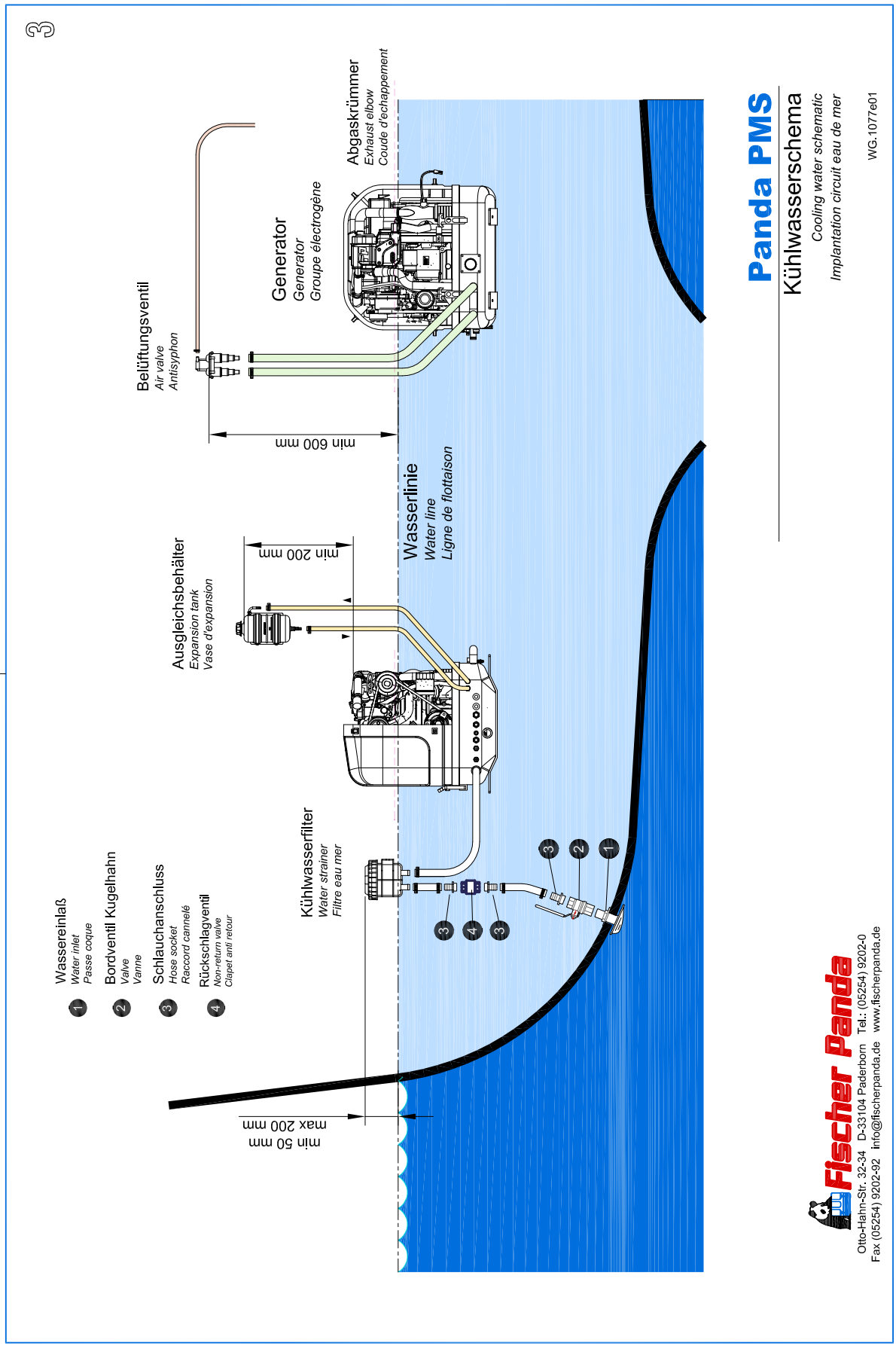


The hose clamps on the rubber hose (01) for the external vent valve are loosened and the hose is bent upwards.

Both ends are now extended by means of a hose and attached to a vent valve at a height of above 600 mm above the waterline.

7.4.5.1 Raw water installation diagram

Fig. 7.4.5.1-1: Example of the raw water installation diagram

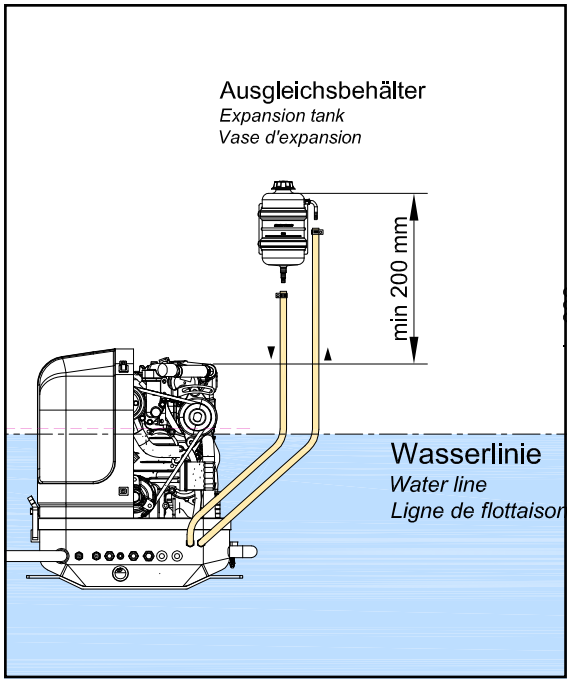


7.4.6 Position of the external cooling water expansion tank

The Fischer Panda generator is usually supplied with a supplementary external cooling water expansion tank. This tank must be installed in such a way that its lower edge is at least 200 mm higher than the upper edge of the noise attenuation capsule.

Should this 200 mm distance not be met, meaning that the cooling water expansion tank is installed at a lower point, significant problems may arise when filling and venting. In this case, the hose lines must be extended and laid to a point outside or even on deck.

Fig. 7.4.6-1: Position of the external cooling water expansion tank



The external cooling water expansion tank may only be filled to the max. mark of the filling level in a cold condition.

Attention!

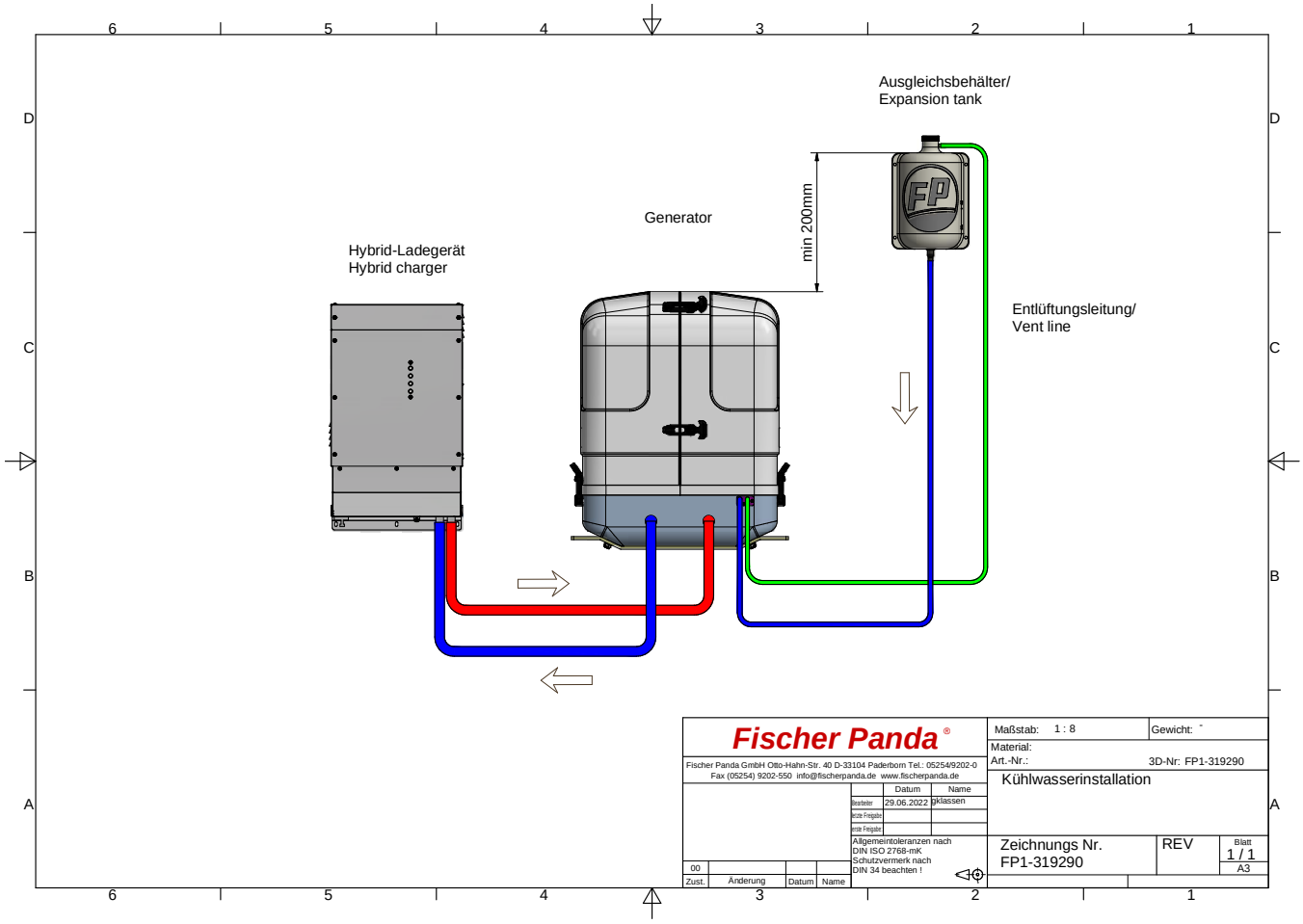


Generators with an internal expansion tank have no connection points for an external expansion tank (e.g. generators with the EA300 engine). An external expansion tank is not required for these generators.

Note!



Fig. 7.4.6-2: External cooling water expansion tank



7.4.7 Installation of the Hybrid charger in the cooling system

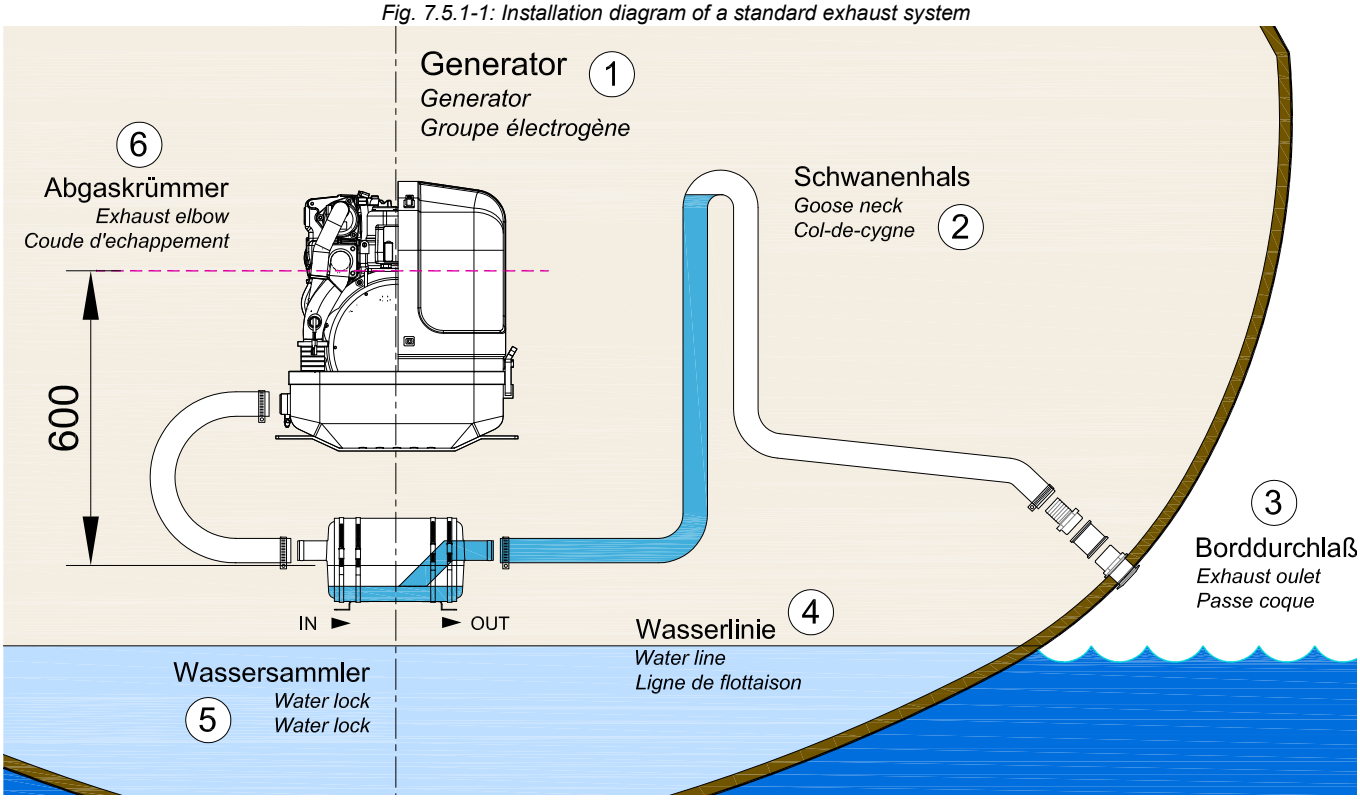
For more information see the separate description of the Hybrid charger!

7.5 Installation of the standard exhaust system - diagram

7.5.1 Layout of the exhaust system

The generator exhaust system must be led through the side of the vessel to the outside completely separately from the exhaust system of the main engine or other units. A special water lock is offered in the Fischer Panda accessory list, which also offers highly efficient noise attenuation. The water lock should be installed as close as possible to the generator and at the lowest point of the exhaust system. It must be of such a size that the cooling water inside it is collected from the highest point (normally a "goose neck") to the lowest point, without being able to rise into the machine. The exhaust hose descends from the capsule to the water lock. The hose then rises via the goose neck to the silencer (see drawing). The goose neck must lie on the centreline of the vessel. In order to prevent the exhaust back-pressure from becoming too great, the total length of the exhaust line should not exceed 6 metres.

Fig. 7.5.1-1: Installation diagram of a standard exhaust system



7.6 Installation of the "water lock"

Take note of the correct direction of flow through the water lock.

Note!



An unfavourable installation location may lead to raw water entering the combustion chamber of the diesel engine and causing irreparable damage.

This requires further clarification:

If raw water enters the internals of the engine, it is not the result of an error in the design of the generator or an engine fault. This can only occur via the exhaust line into the combustion chamber and thus into the engine. The position of the generator and the water lock as well as the layout of the cooling water and exhaust lines are the decisive factors.

If the water lock is unfavourably laid out, the cooling water back-flow can rise so high in the exhaust line, that an exhaust lock is achieved. As at least one exhaust valve is always open when the engine is stopped, the raw water

has free access to the combustion chamber. The raw water then flows by capillary attraction past the pistons and into the engine oil.

If it has been ascertained that the engine oil level is unusually high and/or the oil has a grey colour, the engine may no longer be used. This is a sure sign, that cooling water has entered the sump. If the engine is operated under these conditions, the water and the oil will mix to form an emulsion. The oil then quickly becomes as viscous as a paste. In this phase the narrow oil galleries become blocked and a few moments later, the engine seizes due to insufficient lubrication. Before this point is reached, one must immediately perform an oil change. As the water can only enter the engine via the combustion chamber, one must assume that corrosion has occurred in the area of the piston rings. These consequences must be discussed with an engine expert. As a "first-aid" measure, it is sensible to spray generous quantities of penetrating oil through the inlet manifold and then crank the engine slowly using the starter

Cooling water can enter the exhaust area via the exhaust line as well as the cooling water supply.

7.6.1 Potential causes for water in the exhaust line

7.6.1.1 Potential cause: Exhaust line

If the cause lies in the exhaust line itself, the following points of the exhaust line must be checked:

a. The water lock is positioned too high. Water reaches the exhaust duct.

b. The water lock is positioned too far from the mid-point of the generator. The water reaches the exhaust duct when the boat is heeling.

c. The water lock is too small in relation to the exhaust line.

7.6.1.2 Potential cause: Coolant line

If the generator is not in fact installed 600 mm above the waterline, the cooling water supply must be equipped with a vent valve that is positioned at least 600 mm above the waterline. This position must be maintained at any listing/ heeling angle. The vent valve should therefore be positioned amidships, so that it will not go beyond the limits when listing/heeling.

a) The vent valve is positioned too low. The water reaches the exhaust duct when heeling.

b) The position of the air-bleed valve is too far removed from the centre line. The water reaches the exhaust duct when heeling.

c) The vent valve is not functioning, as it has become stuck or clotted with contamination (the functioning of the vent valve must be checked regularly).

As the associated functional risks are not always recognised when installing the exhaust line, the following explanations refer expressly to the exhaust line. Here the orientation, size, and position of the “exhaust water lock” play a very important role.

7.6.2 Installation location of the exhaust water lock

In the case of a water-cooled exhaust system, strict attention must be paid that under no circumstances can any water flow from the exhaust line to the exhaust manifold on the engine. If this occurs, the cooling water can flow into an open valve into the combustion chamber. This will result in irreparable damage to the engine.

Additionally, the angle of heel must always be taken into consideration in the case of sailing yachts, so the position of the water lock is very important. Generally, one can say that:

The deeper the water lock is positioned below the generator, the better the protection against the entry of water in the combustion chamber.

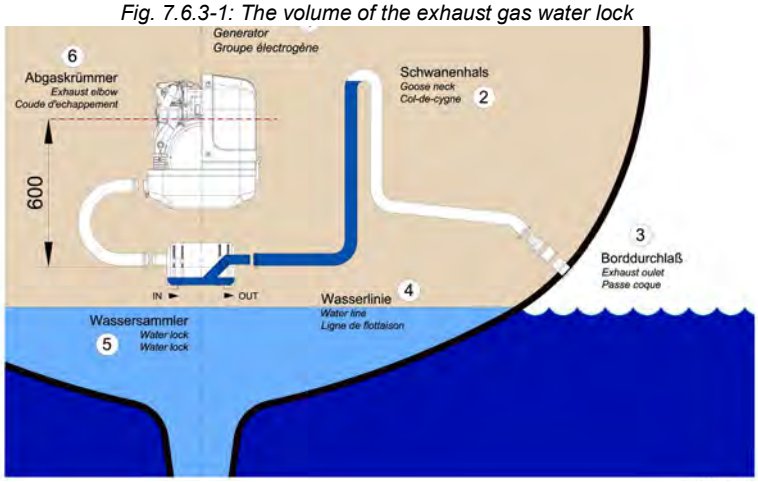
In the sketch below, the distance between the critical point of the exhaust manifold and the highest permissible level of the water in the exhaust line is specified as 600 mm. This distance must be understood as the minimum.

7.6.3 The volume of the exhaust water lock

The exhaust water lock must be of such dimensions that it can contain the total volume of water flowing back from the exhaust line. The volume of water depends on the length (L) and the diameter of the exhaust line. While the diesel engine is running, cooling water is continuously sprayed into the exhaust system and then forced out by the back pressure of the exhaust gases. When the engine is switched off, the revolutions of the diesel engine decrease relatively rapidly. The point is thus reached where the exhaust gas pressure is no longer sufficient to force the cooling water outwards. All cooling water that still remains in the exhaust line, drains back into the water lock. At the same time, the diesel engine will also continue to deliver water through the cooling pump, as long as it continues to turn.

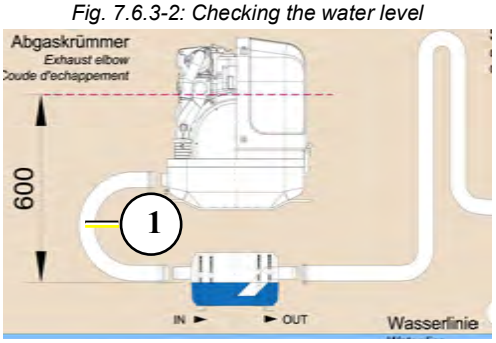
The water lock must certainly be of such dimensions that it can contain the total volume of the cooling water and that the prescribed difference in height between it and the critical point of the exhaust manifold does not exceed 600mm.

Fig. 7.6.3-1: The volume of the exhaust gas water lock



If doubt exists, a test can be conducted with relative ease by temporarily using a transparent hose (1) as an exhaust pipe. This allows the level of the cooling water to be determined very easily.

Fig. 7.6.3-2: Checking the water level



7.6.3.1 Ideal position of the water lock

The ideal position of the water lock is amidships below the generator.

Only this position ensures that the water level cannot change markedly in the case of heeling, when the water lock may depart significantly from the centre line.

See the sketches that follow:

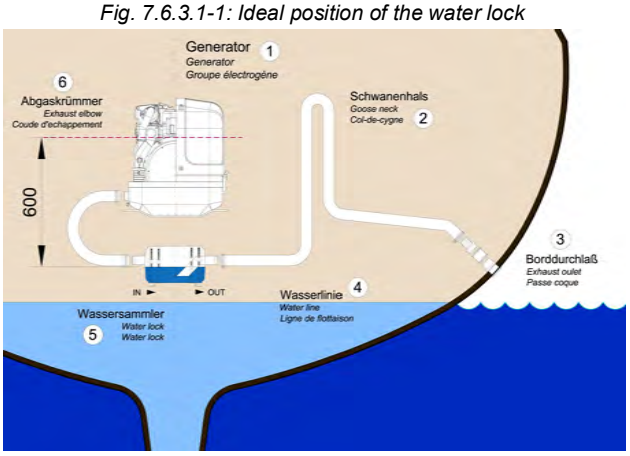
Important information!



Ideal position of the water lock

As depicted in Fig. 7.6.3.1-1 the water lock is mounted amidships below the generator. When heeling, the position of the water lock relative to the critical point on the exhaust line changes only minimally.

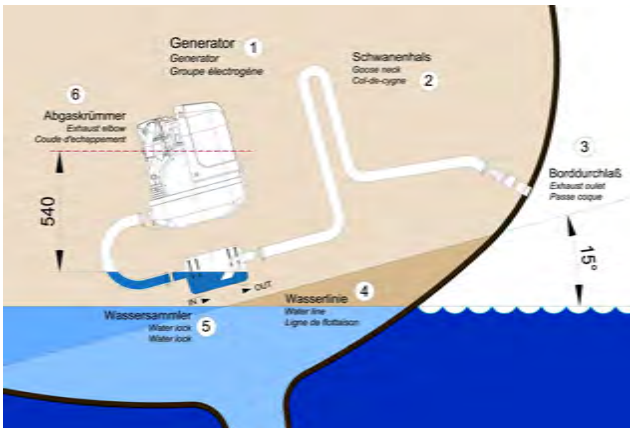
Fig. 7.6.3.1-1: Ideal position of the water lock



15 degree heel - Fig. 7.6.3.1-2

The distance between the exhaust manifold and the water column has been reduced to 540mm.

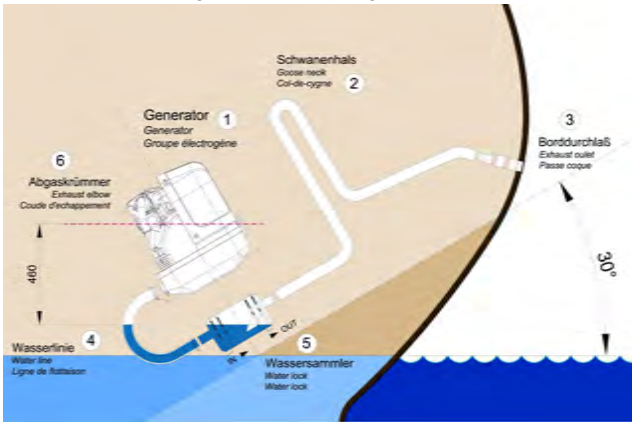
Fig. 7.6.3.1-2: Heel - 15 degrees



30 degree heel - Fig. 7.6.3.1-3

The distance to the water line also changes, so that in the case of the ideal installation position, only a distance of 458 mm remains. The critical distance is already not achieved at this point.

Fig. 7.6.3.1-3: 30 degree heel

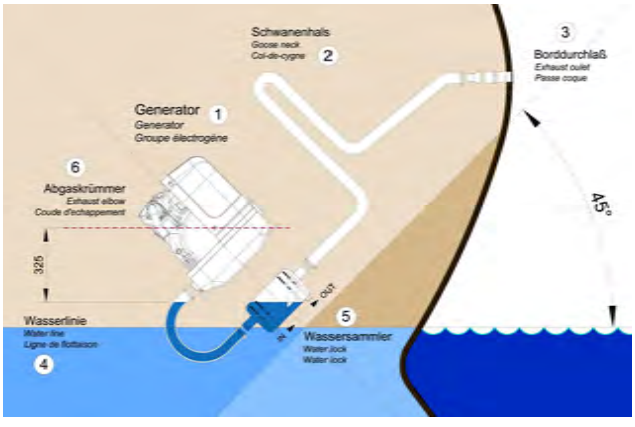


45 degree heel - Fig. 7.6.3.1-4

In this case the water line has risen so high that the distance is now only 325 mm.

In the extreme case of a 45 degree heel, the danger exists that even in the ideal installation position, water can shift ("slosh") into the area immediately around the exhaust stub. It is thus clear that the distance of 600mm represents a minimum, because even in the case of the ideal installation, the danger still can arise that in the event of a sharp heel, water can slosh into the exhaust manifold.

Fig. 7.6.3.1-4: Heel - 45 degrees



Summary:

It is imperative that the specified minimum height of 600 mm is maintained and this applies only if the water lock is installed in the ideal position amidships below the generator. A higher position is strongly recommended, if a heel of 45 degrees must be taken into account.

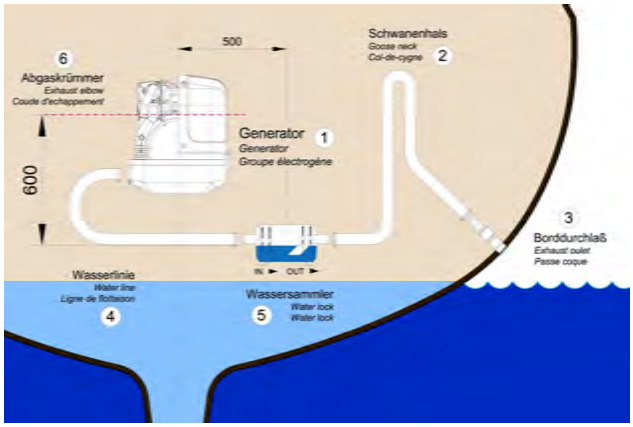
7.6.3.2 Example for the installation of the water lock outside of the mid-line with possible consequences:

The following examples are most relevant to the installation of the generator with a water lock in the case of sailing yachts. In the case of motor yachts, the change in the installation position as a result of heeling need not be taken into consideration. Here one need only take care that the volume of the water lock is sized so that back-flowing water can be completely contained and that a minimum distance of 600 mm is still maintained in this situation.

A) Installation of the water lock 500 mm from the centre line of the generator:

Installation of the water lock 500 mm from the centre line of the generator

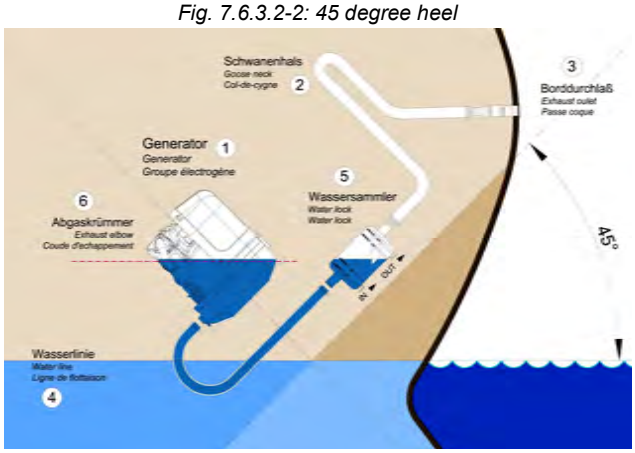
Fig. 7.6.3.2-1: Water lock 500 mm from the centre line of the generator



45 degree heel - Fig. 7.6.3.2-2

Fig. 7.6.3.2-2: 45 degree heel

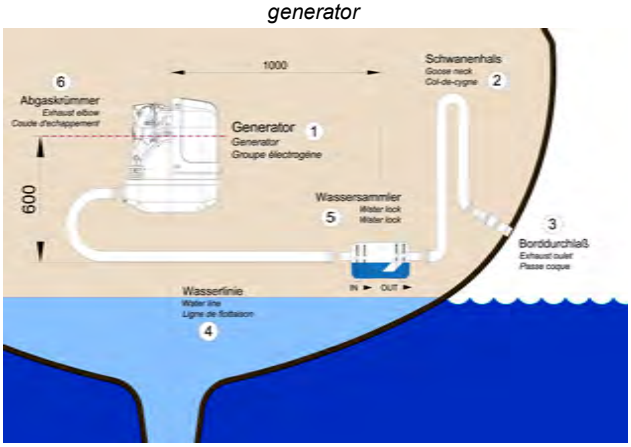
The water line is now at the same height as the critical point in the exhaust manifold. With this installation, if the vessel is sailed with a 45 degree angle of heel, then the entry of cooling water into the combustion chamber is unavoidable. Irreparable damage is then inevitable.



B) Installation distance of 1 000 mm between the exhaust water lock and the centre line of the generator:

Installation distance of 1 000 mm between the exhaust water lock and the centre line of the generator:

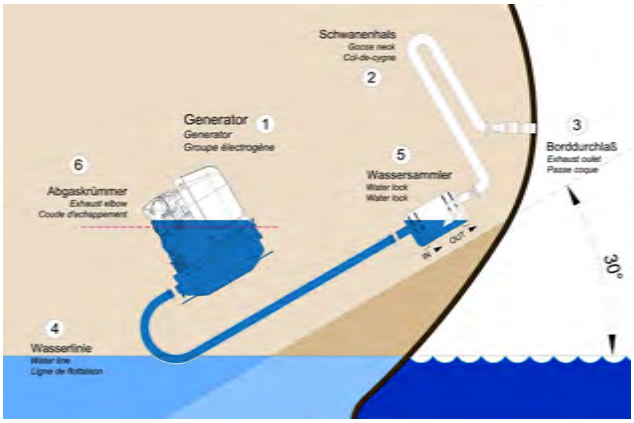
Fig. 7.6.3.2-3: Water lock 1 000mm from the mid-line of the generator



30 degree heel - Fig. 7.6.3.2-4

Fig. 7.6.3.2-4: 30 degree heel

The water line is now at the same height as the critical point in the exhaust manifold. With this installation, if the vessel is sailed with a 30 degree angle of heel, then the entry of cooling water into the combustion chamber is unavoidable. Irreparable damage is then inevitable.



Summary:

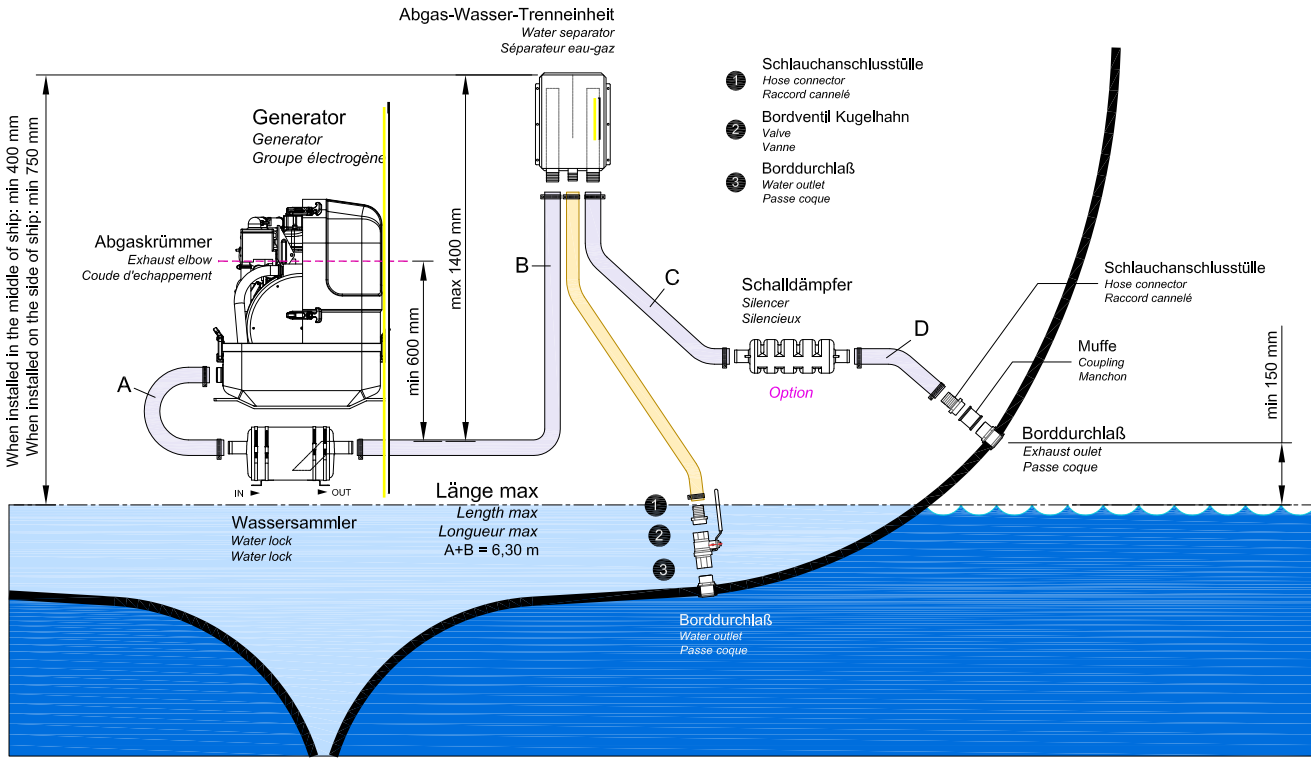
In the case of sailing yachts, it is very important that care is taken to mount the water lock under the mid-line of the generator, at least in relation to the mid-line of the vessel. This prevents significant "leakage" of the water lock in the event of a sharp heel.

The "leakage" of the water lock leads to the water-level rising and approaching the critical point in the exhaust manifold too closely.

7.7 Exhaust/water separator

For optimal reduction of the exhaust noise, the use of an additional silencer close to the through-hull fitting is recommended. Fischer Panda offers a component for this purpose that acts as both an "exhaust goose neck" and a water separator. This "exhaust/water separator" enables the cooling water to be led away via a separate line. This greatly reduces the exhaust noise on the outside of the yacht. "Water splash" in particular is eliminated.

Fig. 7.7-1: Installing the exhaust/water separator

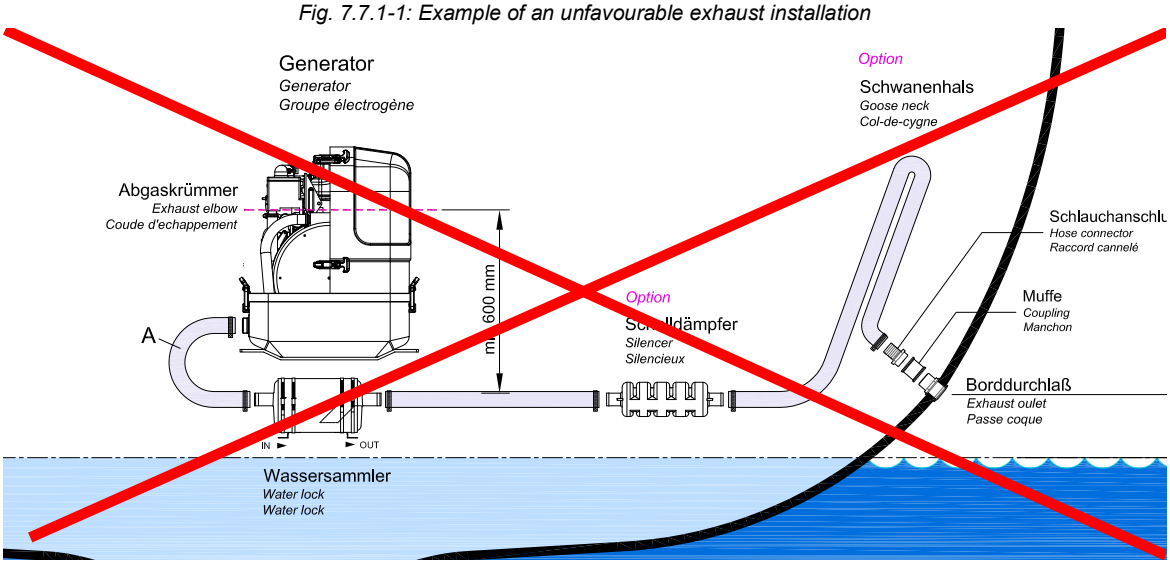


7.7.1 Installing the exhaust/water separator - schematic

If the exhaust/water separator is mounted sufficiently high, then a goose-neck is no longer required. The exhaust/ water separator fulfils the same function. Exhaust noise is practically inaudible if the “Supersilent” exhaust system has been installed correctly and neighbouring boats are not disturbed. The best result is achieved if the hose line through which the cooling water is piped, is located on the shortest downward path directly to the outlet, and this outlet is below the waterline.

If the through-hull exhaust outlet has to be mounted far from the generator, an exhaust-water separator must definitely be installed. The raw water from the separator must then run along the shortest possible path to the through-hull outlet. In the case of a longer path, the diameter of the exhaust pipe can be increased (e.g. from NS40 mm to NS50 mm) in order to keep back pressure as low as possible.. If the hose diameter is increased, the exhaust line can be more than 10m in length. An additional outlet exhaust muffler close to the hull outlet will further help to reduce noise emissions.

Fig. 7.7.1-1: Example of an unfavourable exhaust installation



Example of an unfavourable installation:

- Water lock not far enough below the level of the generator
- Distance between the water lock and the goose neck too great

Schematic diagram

7.8 Fuel system installation

7.8.1 The following items need to be installed:

- Fuel supply pump (DC)
- Pre-filter with water separator (not part of the delivery)
- Fine particle fuel filter
- Non return valve (not part of the delivery)
- Return fuel line to fuel tank (unpressurized)

The external Fuel pump should be installed near the tank.

Electrical fuel pump

With the Fischer Panda generator is usually supplied an external, electrical fuel pump (DC). The fuel pump must be installed close at the fuel tank. The electrical connections is prepared at the generator.

Fig. 7.8.1-1: electrical fuel pump

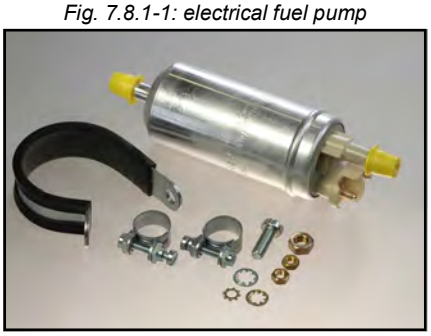
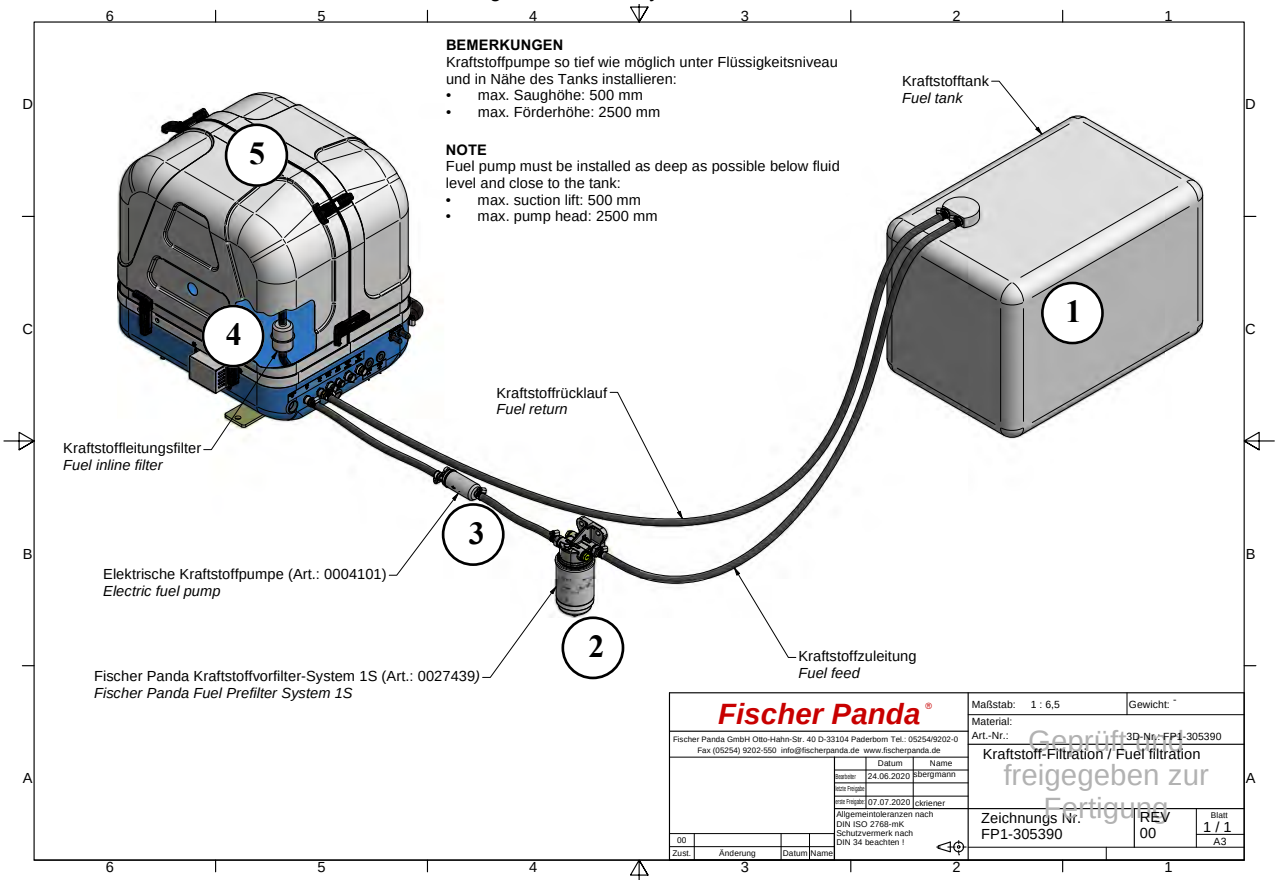


Fig. 7.8.1-2: Fuel system - scheme



1. Fuel tank
2. external fuel prefilter with water separator
3. external fuel pump
4. Fuel inline filter
5. Generator

7.8.2 Connection of the fuel lines at the tank

General fuel feed and return line must be connected to the tank at separate connection points.

Note:



Connection of the return pipe to the tank

The return pipe connected to the tank must be dropped to the same depth as the suction pipe, if the generator is mounted higher than the tank, in order to prevent fuel running back into the tank after the motor has been switched off, which can lead to enormous problems, if the generator is switched off for a long period.

Non-return valve in the suction pipe

A non-return valve must be fitted to the suction pipe, which prevents the fuel flowing back after the generator has been switched off, if it is not possible to use the return flow pipe as a submerge pipe placed in the tank. The instructions „Bleeding Air from the Fuel System“ must be read after initial operation or after it has stood still for a long period, in order to preserve the starter battery.

Non-return valve for the fuel return pipe

Attention!



If the fuel tank should be installed over the level of the generator (e.g. daily tank), then a non-return valve must be installed into the fuel return pipe to guarantee that through the return pipe no fuel is led into the injection pump.

7.8.3 Position of the pre-filter with water separator

Additionally to the standard fine filter a pre-filter with water separator must be installed outside of the sound insulation capsule in the fuel system line (not included in the delivery).

Fig. 7.8.3-1: Fischer panda fuel pre-filter S1 with water separator



7.9 Installing the generator DC system

7.9.1 General safety instructions when dealing with batteries

Take note of the instructions and installation guidelines of the battery manufacturer.

Only use batteries that are approved by the battery manufacturer for this application.

Warning!:



These instructions shall apply in addition to the instructions of the battery manufacturer:

- While you are working on the batteries, a second person should be within earshot to help you if necessary.
- Keep water and soap ready in case battery acid is burning your skin.
- Wear eye protection and protective clothing. Do not touch your eyes while handling batteries.
- If acid splashes on your skin or clothing, wash if off with lots of water and soap.
- If acid enters your eyes, rinse them immediately with clean water, until the burning sensation has stopped. Immediately seek medical assistance.
- Do not smoke near the batteries. Avoid naked flames. The area around batteries is a potentially explosive atmosphere.
- Ensure that no tools are dropped on the battery terminals; cover them as necessary.
- Do not wear jewellery or watches on your arms during installation that might short-circuit the battery. Otherwise, there is a risk of skin burns.
- Protect all battery contacts against accidental contact.
- For battery blocks: Use only deep cycle batteries. Starter batteries are not suitable. Lead-acid gel batteries are recommended. They are maintenance-free, cycle stable, and do not release gases.
- Never charge a frozen battery.
- Avoid battery short-circuits.
- Ensure proper ventilation of the battery to vent gases that may be released.
- Battery connection terminals must be checked for proper seating before operation.
- Battery leads must be routed carefully and tested for undue heating under load. Check the battery near vibrating components regularly for chafing and insulation defects.

7.9.2 Connecting the starter battery

As a rule, Panda generators, from the Panda 6000 upwards, have a built-in alternator/dynamo to charge the starter battery. For generators without an alternator/ dynamo, the starter battery must be charged by an external charger.

Note!



To avoid large voltage losses, the battery must be installed as close as possible to the generator. The positive terminal of the battery is connected to the red cable, the negative terminal is connected to the blue cable.

It must be ensured that the cables are connected first to the generator and then to the battery.

Attention! Check the connection sequence



Use the battery capacity recommended by the engine manufacturer.

Prior to installation, verify that the voltage of the starter battery complies with the start-up system voltage.

e.g. 12 V starter battery for 12 V start-up system

e.g. 24 V starter battery for 24 V starting system (e.g. 2x 12 V in series)

Too high a starter battery voltage can destroy parts of the generator!

7.9.3 Installation of the starter battery connection lines

Observe the regulations "ABYC regulation E11 AC and DC electrical systems on boats“ and/or EN ISO 10133:2000 "Small craft -- Electrical systems -- Extra-low-voltage d.c. installations" as applicable!

Attention!



- The battery compartment and the corresponding installation shall be dimensioned adequately.
- The batteries can be separated mechanically or with an adequate power relay.
- Install a fuse of the appropriate rating in the positive lead of the starter battery as close as possible to the battery, but no further than 300 mm (12 inches) from the battery.
- The battery cable must be protected against chafing by a protective pipe/sleeve.
- Use self-extinguishing and fireproof cable suitable for temperatures up to 90 °C, 195 °F.
- Install the battery cables in such a way that the insulation cannot be removed by chafing or other mechanical stresses.
- The battery terminals must be protected against accidental short-circuiting.
- Inside the Fischer Panda generator capsule, the positive battery cable must be routed so that it is protected from heat and vibrations by means of an adequate conduit/protective sleeve. It must be routed so that it does not touch parts that rotate or become hot during operation, such as belt pulleys, exhaust manifolds, exhaust pipes and the engine itself. Do not over-tighten the cable, as this may damage it.

After completing the installation, perform a test run of the generator and check the battery cable installation during and after the test run. Implement corrections as necessary.

Fig. 7.9.3-1: 12 V starter battery connection - Schematic diagram



01. Generator
02. Main battery switch
03. Fuse
04. Starter battery 12 V_{DC}

7.9.4 Connecting the remote control panel

The remote control panel must be connected as described in the data sheet of the remote control panel.

7.10 Connection box – Generator fpControl – CB-G

The fpControl CB-G is the external interface of the generator equipped with a xControl System.

The panel and the fuel pump are connected at this interface. It is optionally possible to connect emergency stop, auto start, load contactor and boost.

Fig. 7.10-1: CB-G

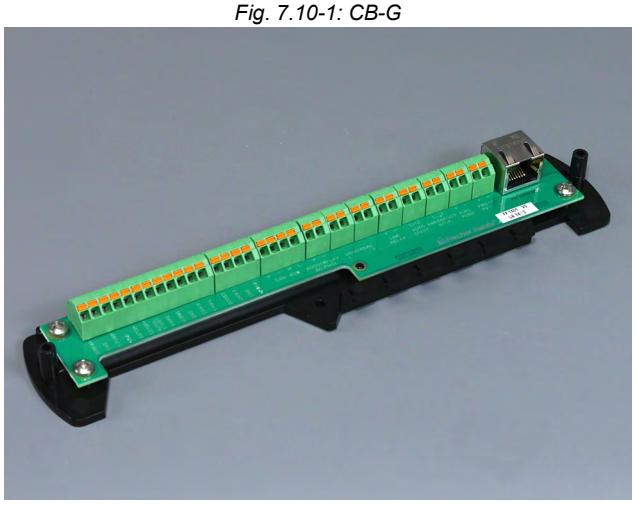
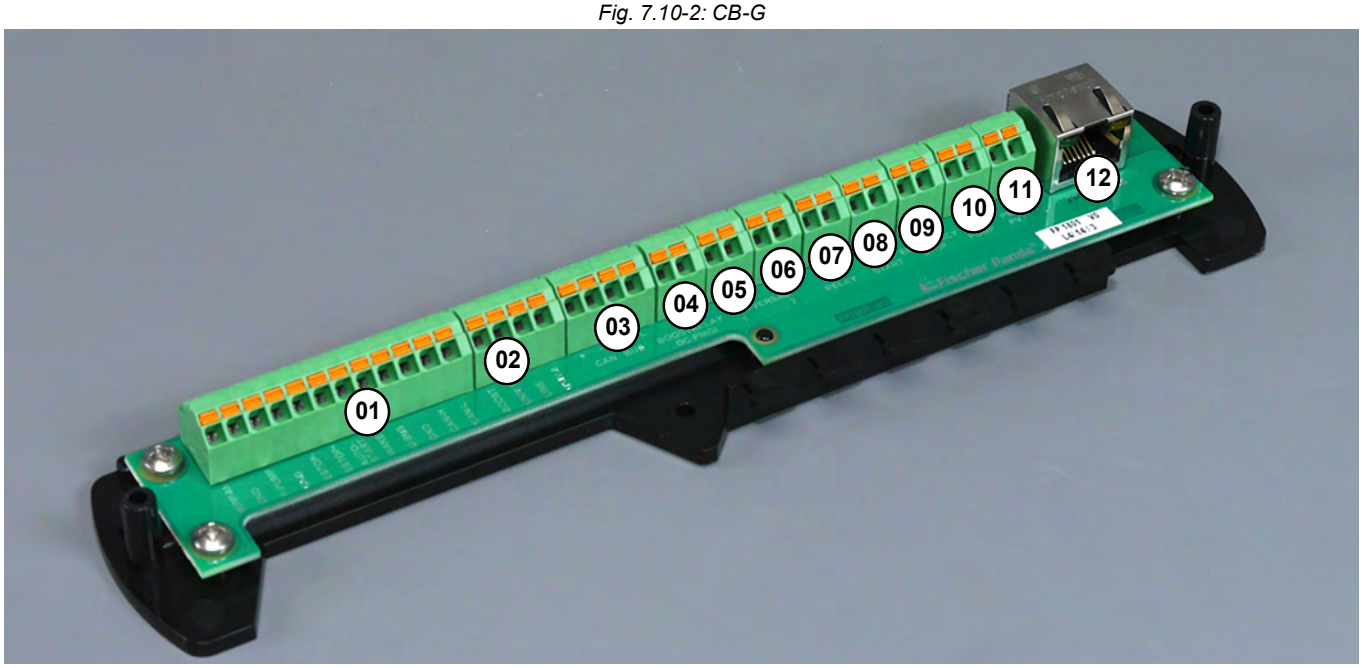


Fig. 7.10-2: CB-G



01. Terminal fpControl ECU
02. Terminal fpControl ECU
03. FP CAN-Bus for internal use
04. Terminal boost relay
05. Terminal universal out 1 (5 A)
06. Terminal universal out 2 (1 A)
07. Terminal line relay
08. Terminal automatic start
09. Terminal emergency stop
10. Terminal fuel pump (5 A)
11. Terminal optional DC-Out (PMS=Waterpump; PV=Fan)
12. Terminal FP CAN-Bus

7.10.1 fpControl ECU 12 pin

The fpControl ECU is the main module of the fpControl.

installation and modification are only allowed by Fischer Panda or authorized service points.

7.10.2 fpControl ECU 4 pin

The fpControl ECU is the main module of the fpControl.

installation and modification are only allowed by Fischer Panda or authorized service points.

7.10.3 FP CAN-Bus for internal use

The FP CAN-Bus terminal is for internal use only.

7.10.4 Boostrelay (optional)

The Boostrelay connect extra capacitors to the generator for a short time to compensate peak load.

7.10.5 Universal out 1

These terminal can have different set ups. (max. out 5 A)

7.10.6 Universal out 2

These terminal can have different set ups. (max out 1 A

7.10.7 Line relay (optional)

The line relay protect the consumers against undervoltage and overvoltage. At standard following parameters are set:

Warning: +/- 6% generator nominal voltage.

Relay off: +/- 10% generator nominal voltage.

7.10.8 Autostart (optional)

With the autostart the generator can be started by an external signal (f.e. SPS).

7.10.9 Emergency stop (optional)

With the emergency stop the generator will be stopped as soon as possible. All DC out will be disconnected (Line relay, fuel pump, optional DC out etc.).

If not used, the connection must be bridged.

7.10.10 Fuel pump

The fuel pump is controlled by the fpControl ECU. (max out 5 A)

7.10.11 Optional DC-OUT

The optional DC out is pre configurated. (max out 5 A)

At PMS generators for the external electrical water pump.

At vehicle generator for the fan control.

7.10.12 FP CAN-Bus RJ45

Connection for the external components of the fpControl (Controlpanel, Paralleling Device etc.). At the end a termination resistor must be set in.

7.11 Generator AC system installation

Before the electrical system is installed, take note of the safety instructions in the respective chapter. When the electrical system is installed, it is essential to comply with the local regulations of the respective electric utility company are complied with. In particular, this includes compliance with regulations regarding the protective earth conductor, personal protection switch, etc.

ATTENTION! Lethal danger - High voltage

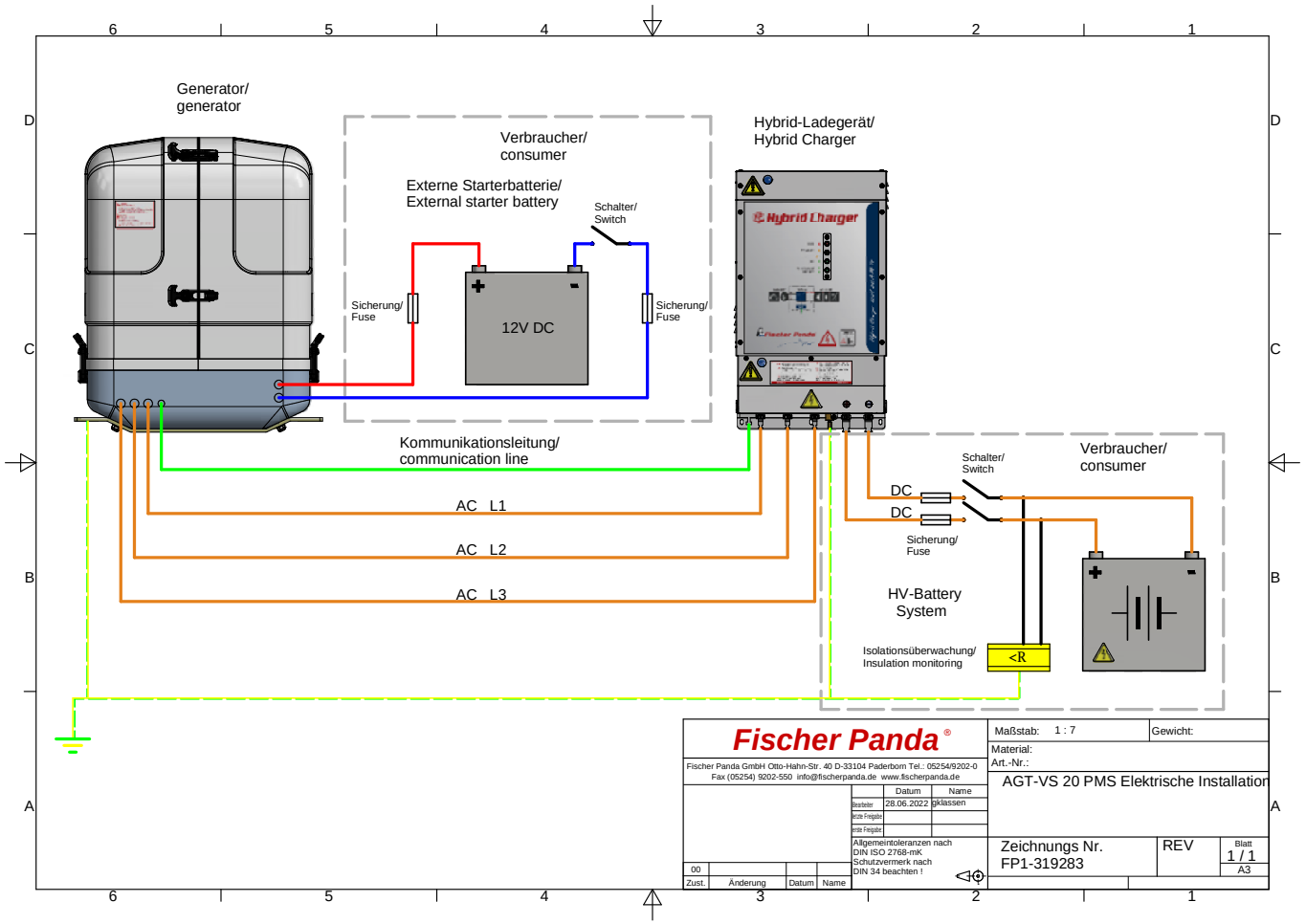


All safeguards and electrical safety measures must be implemented on board.

Required cable cross-sections:

As a minimum requirement for a proper installation, the cable cross-sections of the connecting lines must comply with the local regulations.

Fig. 7.11-1: Electrical connections - example



7.11.1 Installation of the Hybrid charger in the electrical system

For more information see the separate description of the Hybrid charger!

7.12 Start-up

After completing the installation, the system must be started up.

For this purpose, the start-up log is processed and completed by the specialist who installs the equipment. The completed log shall be handed over to the operating company.

The operating company shall be instructed in the operation, maintenance, and hazards of the generator. This includes the service procedures and hazards set down in the handbook, as well as other matters relating to the specific installation and the connected components.

The original start-up log of the generator must be sent to Fischer Panda to obtain the full warranty. Make sure that you retain a copy for your records.

Note!



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8. Generator Operating Instructions

8.1 Personnel

The generator may only be started up by authorised and instructed personnel. The operator shall read the manual in its entirety before starting up the equipment and shall familiarise themselves with the hazards and safety precautions. This applies to both the generator itself and external equipment, attachment parts, and auxiliary units.

8.1.1 Safety instructions regarding operation

Ensure compliance with the general safety instructions at the beginning of this manual.

Note!



LETHAL DANGER! Improper operation can result in severe personal harm and material damage.

The generator can be equipped with an Autostart device. This means that the generator can be started by means of an external signal.

The battery bank must always be disconnected (negative terminal first, then the positive terminal) if work on the generator or electrical system of the generator is to be performed, so that the generator cannot be started inadvertently.

Warning! Automatic start-up



Rotating parts! Improper operation can result in severe personal harm and material damage.

The generator must not be operated with the cover removed.

If operation with the cover removed is necessary during a test run, particular caution is required. Never perform these tasks when alone!

Caution! Danger to life and limb



Electric voltage - LETHAL DANGER! Improper operation may cause harm to health and result in death.

Electric voltages of more than 48V are potentially lethal in any situation. The rules of the respective regional authority must be adhered to during installation. For safety reasons, only an electrician may carry out the installation of the electrical connections of the generator.

Attention! Lethal danger - High voltage



8.2 General instructions regarding operation

8.2.1 Operating at low temperatures

The engine can be started at temperatures down to minus 20 °C, provided that the other operating conditions are adequate. In particular, operating fluids such as coolant, fuel and engine oil must be suitable for the respective temperature. They should be checked before starting the generator. Appropriate operating fluids and/or additives are available from specialised retailers. Cold-starting aids such as sprays, etc. may not be used -> the warranty is voided!

8.2.1.1 Pre-heating the diesel engine

Pre-combustion chamber diesel engines are equipped with a glow plug. The maximum preheating time may not exceed 20 secs. At 20 °C and higher, preheating should last for 5-6 secs. Below 20 °C, the preheating time must be lengthened accordingly. Die fpControl system preheats automatically.

Preheating enables the generator at temperatures down to -20 °C.

If the operating fluids (fuel, coolant, etc.) are drained and replaced with operating fluids for low temperatures, then the generator must run for at least 10 minutes in order to ensure that the generator has been flushed with fresh operating fluids.

Note!



8.2.1.2 Tips regarding the starter battery

Fischer Panda recommends the use of a commercially available starter batteries. The recommended starter battery capacity (Ah) should be doubled for use in extreme winter conditions. It is recommended that the starter battery be charged regularly (every 2 months). Appropriate battery chargers are to be used for this purpose. A properly charged starter battery is a prerequisite for use of the generator at low temperatures.

8.2.2 Operating at reduced load and idling

If a combustion engine is operated at a reduced load such as 25-30 % of its nominal power, carbon may build up in the generator, creating a cause for concern. This mode of operation results in increased oil consumption and oil escaping from the intake and exhaust manifolds. To a certain extent, this also arises on generators in Standby mode.

8.2.2.1 Reasons for carbon building up in the generator

The cylinders do not achieve their normal operating temperature and optimal fuel combustion thus cannot be assured. In addition, oil carbon builds up on the valves, the pistons and the exhaust system (carbon buildup). Unburned fuel is dissolved in the lubrication oil and contaminates it.

8.2.2.2 In order to avoid generator sooting, take note of the following items:

Operation at low load should be kept as brief as possible.

In order to burn the carbon deposits in the exhaust system, the generator should run at full load for at least 4 hours within a period of 50 hours of operation, If necessary, a dummy load must be connected for this purpose. This should be increased slowly from 30 % to 100 % within a period of 3 hours and then be maintained at 100 % for one hour.

8.2.3 Load placed on the engine in continuous use and overloading

Kindly ensure that the generator is not overloaded. Overloading of the generator occurs when the electrical load is greater than that which can be delivered by the generator. This will damage the engine in the long run. Overloading can lead to the generator running unevenly and roughly, excessive fuel and oil consumption and deterioration of emission values.

In the interests of the engine's long service life, a continuous load should be calculated as 70 % - 80% of the nominal load. Continuous use is understood to be uninterrupted operation of the generator for many hours. It poses no problem for the engine to deliver the full nominal output for 2--3 hours.

The overall design of Fischer Panda Generator ensures that even when operated at full load under extreme conditions, overheating of the engine will not occur. It must, however, be taken into account that when the engine is operated at full load, the exhaust emissions (soot formation) will deteriorate.

8.2.4 Protection conductor

The generator is "earthed " as a standard feature (the centre and earth are connected by means of a jumper in the generator terminal box). This is a basic first-level safety measure, which offers protection as long as no other measures are installed. Above all, it is designed for delivery and a possible test run.

This earthing (PEN) only functions when all parts of the electrical system are earthed on a common potential. The shunt can be removed if this is necessary for technical reasons and another protective system has been set up instead.

While the generator is being operated, the full voltage of 120/230 V or 230/400 V is applied to the AC control box, as well. Therefore, it is essential to ensure that the control box is closed and secured against touch while the generator is running.

The battery bank must always be disconnected if work on the generator or electrical system of the generator is to be performed, so that the generator cannot be started inadvertently.

8.2.5 Operational monitoring system on the Fischer Panda Generator

Fischer Panda generators are equipped with multiple sensors/temperature switches for operational monitoring. In addition, the combustion engine has an oil pressure switch, which is switched off as soon as the oil pressure drops below a specific value.

8.3 Checks before starting - see the Remote Control Panel data sheet

The notes and instructions in the Remote Control Data sheet must be complied with. **Note!**



Ensure compliance with the general safety instructions at the beginning of this manual.

8.4 Starting the generator - see Remote Control Panel data sheet

The notes and instructions in the Remote Control Data sheet must be complied with. **Note!**



Ensure compliance with the general safety instructions at the beginning of this manual.

8.5 Switching off the generator - see separate Remote Control Panel data sheet

The notes and instructions in the Remote Control data sheet must be complied with.

Note!



Ensure compliance with the general safety instructions at the beginning of this manual.

9. Generator Faults and Errors

9.1 Personnel

The work described here can be performed by the operator unless highlighted differently.

Further repair work may only be performed by specially trained technical personnel or by authorised workshops (Fischer Panda Service Points). This applies particularly to setting the valves, work on the fuel injection system and engine repairs.

All loads must be disconnected prior to working on the generator to avoid damage to the devices.

Warning: Switch off all loads



9.1.1 Hazard warnings for this chapter

Ensure compliance with the general safety instructions at the beginning of this manual.

Note!



LETHAL DANGER! Improper operation may cause harm to health and result in death.

Warning: Automatic start-up



The generator can be equipped with an Auto-start function. This means that the Auto-start is controlled by an external signal. The battery bank must always be disconnected (negative terminal first, then the positive terminal) if work on the generator or electrical system of the generator is to be performed, so that the generator cannot be started inadvertently.

Improper maintenance can result in severe personal harm and material damage. Therefore:

Warning: Risk of injury



- Maintenance work must only be performed when the engine is switched off.
- Before commencing work, ensure that there is sufficient freedom of movement for installation work to be carried out..
- Take care the the workplace is neat and clean! Components and tools that are loosely stacked or lying around can result in accidents
- Perform maintenance work only with standard tools or special tools as customarily used in the trade. Incorrect or damaged tools can result in injuries

Oil and fuel vapours can ignite upon contact with ignition sources. Therefore:

Warning: Fire hazard



- Ensure that there are no open flames while working on the engine.
- Do not smoke.
- Remove oil and fuel residue from the engine and the floor

Contact with engine oil, fuel and anti-freeze agents may result in harm to health when inhaled, swallowed or when coming into contact with skin. Therefore:

- Avoid skin contact with engine oil, fuel and anti-freeze.
- Remove splashed oil and anti-freeze from the skin immediately.
- Do not inhale oil and fuel vapours.

Caution: Risk of poisoning



LETHAL DANGER! Improper operation may cause harm to health and result in death.

Electric voltages of more than 48V are potentially lethal in any situation. The rules of the respective regional authority must be adhered to during installation. For safety reasons, only an electrician may carry out the installation of the electrical connections of the generator.

Warning: Electrical voltage



Generator and coolant may be hot during and after use. Risk of being burnt/scalded!

Excess pressure may develop in the cooling system when operating.

Warning: Hot surface/material



Batteries contain corrosive acids and alkalis.

Improper handling can cause the batteries to heat up and burst. Corrosive acid/lye may leak. Under unfavourable conditions, an explosion may result.

Adhere to the instructions of your battery manufacturer.

Warning:



Personal protective equipment must be worn as applicable. This consists of:

- Snugly-fitting protective clothing
- Safety shoes
- Protective gloves
- Hearing protection
- Goggles, if required

Imperative: Protective equipment required



9.2 Tools and measuring instruments

In order for you to be able to deal with faults while travelling, the following tools and measuring instruments should belong to the equipment kept on board:

- Multimeter for voltage (AC/DC), frequency and resistance
- Measuring instrument for inductance
- Measuring instrument for capacity
- Current absorbing clamps
- Thermometer (an infra-red thermometer is ideal)
- Pliers for squeezing

9.3 Overloading the generator

Kindly ensure that the engine is not overloaded. This must be taken into account, especially with regards to multi-power units. In this case, the extra load including the electrical output may be considerably greater than the drive performance of the engine, which can eventually lead to a damaged engine. In addition, the exhaust gases are contaminated with soot (environment)

The full nominal performance of the generator is primarily for short term use. It is, however, required to start electric motors or to enable special starting procedures to be implemented.

In the interests of a long service life, a continuous load should be calculated as 70 % - 80 % of the nominal load.

(Continuous use is understood to be uninterrupted operation of the generator for many hours). It poses no problem for the engine to be run occasionally for 2-3 hours at full nominal load. The overall design of the Panda Generator ensures that even when operated continuously under extreme conditions, overheating of the engine will not occur. In principle, it must be taken into account that when the engine is operated at full load, the exhaust emissions (soot formation) will deteriorate.

Effects of short-circuiting and overloading on the generator

It is practically impossible for the generator to be damaged by a short-circuit and overload. Both a short-circuit and overload cause the generator to stop generating electricity. The generator stops generating electricity and the voltage fails. This condition is immediately reversed if the short-circuit is eliminated or the overload is switched off.

9.3.1 Generator output voltage is too low

Before working on the system, see “Safety Instructions - safety first!” on page 15.

ATTENTION!

If the generated AC voltage is too low, then the consumers should be disconnected, one after the other, in order to reduce the load on the generator. Generally the problem is solved at this point. If the output voltage continues to be too low, even when all loads are switched off - and the generator thus runs without a load - it can be assumed that one or more capacitors are defective.

9.4 Starting problems

9.4.1 Clogged fuel filter

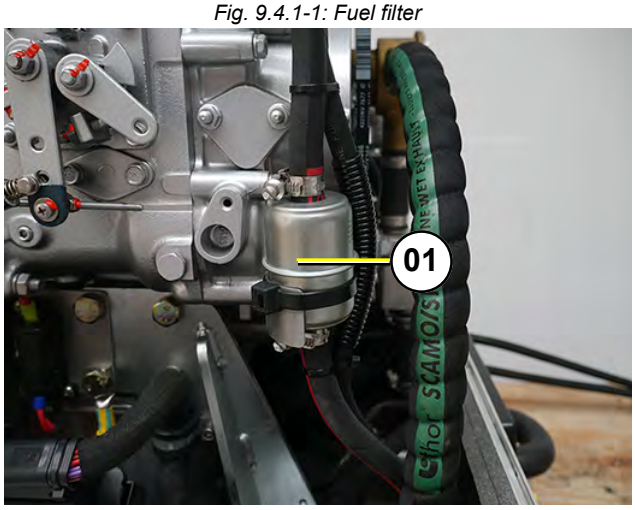
If the fuel filter is clogged, the filter element must be exchanged.

To exchange the filter element, kindly refer to the Hatz operating manual.

Fuel filter

01. Filter element

Fig. 9.4.1-1: Fuel filter



10. Maintenance Instructions

10.1 Personal requirements

The maintenance described here can be carried out by the operator unless otherwise indicated.

Further maintenance work may only be carried out by specially trained specialist personnel or authorized repairers (Fischer Panda Service Points). This is especially true for work on the valve setting, diesel injection system and for engine repair.

The work described here can be taken as a guide. Since Fischer Panda does not know the exact installation and storage conditions, the work instructions and materials must be adapted by a local specialist. Damages caused by improper maintenance / repair are not covered by the warranty.

Attention!



10.1.1 Hazard notes for the maintenance

Follow the general safety instruction at the front of this manual.

Note!



Danger for life! - The generator can be equipped with a automatic start device. This means the generator can be started by an external signal. To avoid an unexpected starting of the generator, the starter battery must be disconnected before start working at the generator.

Warning! Automatic start



Working at a running generator can result in severe personal injury. Therefore before starting work at the generator:

Warning! Risk of injury



Make sure that the generator is stopped and the starter battery is disconnected to guarantee that the generator cannot be inadvertently started.

Do not run the generator with removed sound isolation cover

Improper installation/maintenance can result in severe personal injuries or material damage.

Warning! Risk of injury



- Always undertake installation/maintenance work when the generator is switched off.
- Ensure there is sufficient installation clearance before start working.
- Ensure tidiness and cleanliness at the workplace. Loose components and tools lying around or on top of each other are sources of accidents.
- Only perform installation work using commercially available tools and special tools. incorrect or damaged tools can result injuries.

Oil and fuel vapours can ignite on contact with ignition sources. Therefore:

- No open flames during work on the generator.
- Do not smoke.
- Remove oil and fuel residues from the generator and floor.

Warning! Danger of fire



Contact with engine oil, antifreeze and fuel can result in damage to health. Therefor:

- Avoid skin contact with engine oil, fuel and antifreeze.
- Remove oil and fuel splashes and antifreeze from the skin immediately.
- Do not inhale oil and fuel vapours.

Danger! Danger of poisoning



Danger for Life. Improper handling, operation, installation and maintenance can result in severe personal injury and/or material damage.

Electrical voltages above 60 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.

Attention! Danger to Life - High voltage



Generator, oil and antifreeze can be hot during/after operation. Risk of severe burns.

Warning! Hot surface/material



During Installation/maintenance personal protective equipment is required to minimize the health hazards.

- Protective clothing
- safety boots
- protective gloves
- Ear defender
- safety glasses

Instruction! Personal protective equipment necessary.



Disconnect all load during the work at the generator to avoid damages at the load.

Attention! Disconnect all load



Batteries contains acid or alkalis.

Improper handling can result in battery explosion and leakage. Acid or alkalis can run out. An explosion of the battery is possible.

See the operation and safety instruction from your battery manufacturer.

Batteries contain corrosive acids and lyes.

Improper handling can cause the batteries to heat up and burst. Corrosive acid/lye may leak. Under unfavorable conditions, the battery may explode.

Warning!



Observe the instructions from your battery manufacturer.

The different liquid systems (Cooling System, Fuel system etc. may pressurised after operation. When the system is opened, the pressure can be relieved abruptly and expel hot gases and fluids. Risk of injury due to parts flying about, burn hazard due to liquids and gases.

Warning! System may be pressurised!



10.2 Environmental protection

Danger to the environment due to mishandling!

Significant environmental damage can occur, particularly for incorrect disposal, if environmentally hazardous operating materials are mishandled. Therefore:

- Always observe the instructions mentioned below.
- Take immediate action if environmentally hazardous materials reach the environment. Inform the responsible local authorities about the damage in the case of doubt.

The disposal must be performed by a specialist disposal company.

Environmental protection!



10.3 Maintenance interval

For the maintenance interval, please see the „General information for PMS generators“ which are attached to this manual.

At generator with dynamic operation hours (f.e. Generators with iControl2 system) the maintenance interval can may be extended.

With the dynamic operation hours the service interval can be raised up to 30 % (200 h max.). Make sure that the dynamic operation hours are not reset accidently between the service interval.

Note:



10.4 General maintenance instructions

10.4.1 Checks before each start

- Oil level
- Leaks in the cooling system
- Visual check for any changes, leaks in the oil drain system, v-belt, cable connections, hose clips, air filter, fuel lines

Once a month

- Grease/oil the servo motor - Trapezoid thread-spindle
- Maintenance intervals - see separate data sheet

10.4.2 Check of hoses and rubber parts in the sound insulated capsule

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to environmental influences. They wear out quickly in an environment of dry air, oil and fuel vapours, and high temperatures. The hoses must be checked regularly for elasticity. There are operating situations, when hoses must be renewed once a year.

Additionally to usual tasks of maintenance (oil level check, oil filter control etc.) further maintenance activities are to be accomplished for marine generators, such as control of the sacrificial anode (cooling water connection block) and the front seal cover at the generator.

10.5 Oil change intervals

To avoid damage to the engine, the specified oil change intervals of the engine manufacturer absolutely to follow.

For the corresponding intervals, see general information for vehicle / marine generators.

Oil quality and oil quantity:

See section 11.1, “Engine oil,” on Page 115 and section 11.4, “Technical data,” on Page 117.

10.5.1 Checking and refilling oil level

Wear personal protective equipment. (Gloves, protective goggles, protective clothing and safety shoes).

ATTENTION!



Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!



10.5.1.1 Checking oil-level

Required tools /spare parts / material	Paper towels and rags

The generator must be placed at level.

- with vehicular generators: Place the vehicle on a levelled surface.
- with PSC generators: Place the generator on a levelled surface.
- with marine generators: Measure the oil-level when the ship is not lop-sided.

Run the generator for about 10 minutes to ensure that the engine is warm. Wait for 3 minutes, so the oil can flow back into the oil pan.

- Assure generator against accidental start.
- Open the generator capsule.
- Pull the oil dipstick out of the check rail.
- Clean oil dipstick.
- Put the oil dipstick back into the check rail and wait for 10 seconds.
- Pull the oil dipstick out of the check rail and read off the oil-level at the lower end of the stick.

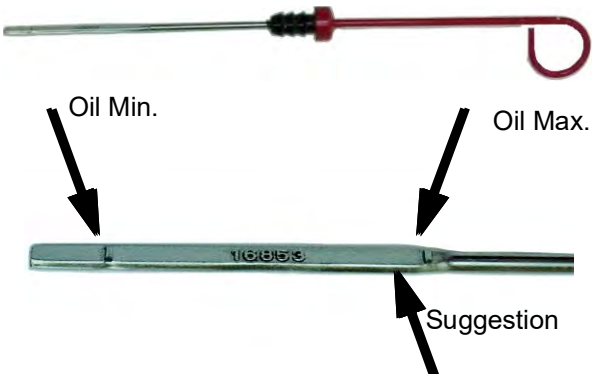
Oil dipstick

The oil-level is to be checked by means of the oil dipstick.
The prescribed filling level must not cross the „Max“-mark.

We recommend an oil-level of 3-4mm below MAX mark.

Sample picture

Fig. 10.5-1: Oil dipstick - Sample



Oil should be refilled, if the oil-level is under 1/3 between the minimum and the maximum mark.

Fischer Panda recommends an oil-level of 2/3 between the minimum and the maximum mark.

If the oil-level is under the MIN-mark, check how many operating hours went by since the last oil change, by means of your service manual or an existing oil change tag.

- if the oil-level is under the minimum mark by less than 50 h, there might be a technical problem! In that case, we recommend going to a shop or a Fischer Panda service point.
- if the oil is cloudy or even „creamy“, coolant might have mixed with the oil. See a garage or a Fischer Panda service point immediately.

10.5.1.2 Refilling oil

Required tools /spare parts / material	Engine oil

1. Check oil-level as described under section 10.5.1.1, “Checking oil-level,” on Page 93.
2. Oil dipstick is pulled out of the check rail.
3. Open the oil filler cap.
4. Fill in oil (approx. 1/2 litre) and wait for about 2 min. so this it can flow into the oil pan.
5. Wipe off the oil dipstick and put it into the check rail.
6. Pull the oil dipstick out of the check rail and check the oil-level. See section 10.5.1.1, “Checking oil-level,” on Page 93.

If oil-level is still too low: repeat steps 4-6.

10.5.1.3 After the oil level check and refilling the oil

- Put the oil dipstick back into the check rail.
- Close the oil filling cap.
- Remove potential oil stains and splashes from the generator and surroundings.
- Close the generator capsule.
- Remove lock against accidental generator start.

10.5.2 Replacement of engine oil and engine oil filter

Required tools /spare parts / material	Set of spanners, oil filter wrench / new oil filter, sealing drain screw / Container to collect used oil (heat resistant and of sufficient size), oil resistant mat, so prevent used oil from getting into underground water, paper towels and rags, engine oil

The generator must be placed at level.

- with vehicular generators: Place the vehicle on a levelled surface.
- with PSC generators: Place the generator on a levelled surface.
- with marine generators: Change the oil when the ship is not lop-sided.

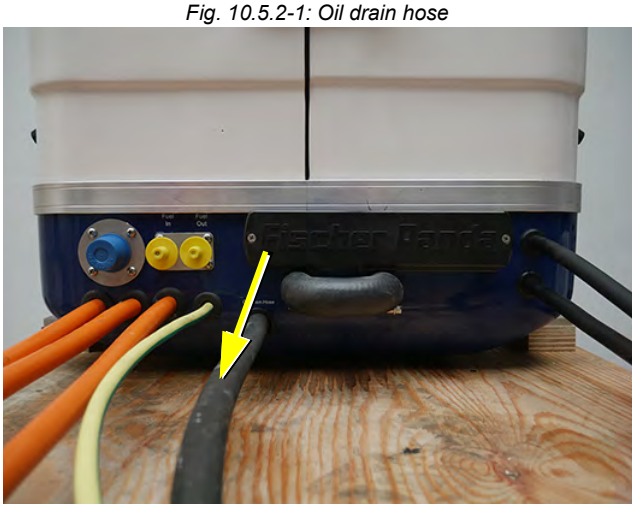
Run the generator for about 10 minutes to ensure that the engine is warm.

Wait for 3 minutes, so the oil can flow back into the oil pan.

1. Prepare generator.
   - Assure generator against accidental start.
   - Open the generator capsule.

- an external oil drain hose: Release the oil drain hose from the mounting.

Fig. 10.5.2-1: Oil drain hose



2. Loosen oil filling cap

   Unscrew the oil filling cap. This is necessary, because otherwise a vacuum will form and the oil can not completely drain off.

Fig. 10.5.2-2: Oil filling cap



3. Open oil drain screw.

   Unscrew the oil drain screw by means of the open-ended wrench from the oil drain hose (rotating direction left). Use a second open-ended wrench to lock. Make sure to do this over the container.



Fig. 10.5.2-3: Oil drain screw



4. Discharge used oil.

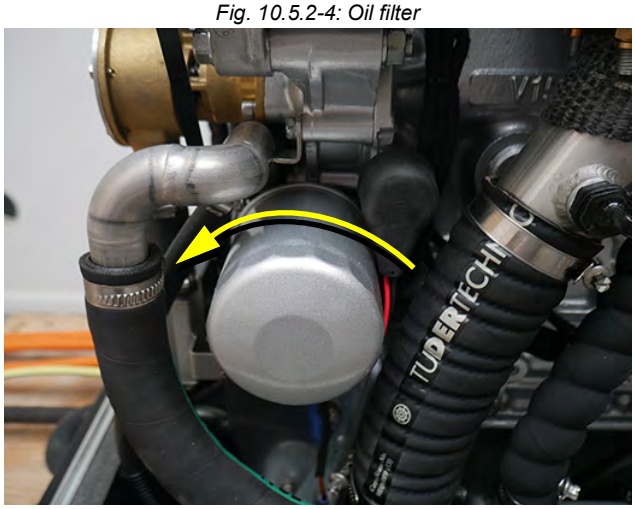
   Let the entire amount of oil drain out of the engine. This can take several minutes.

5. Remove used oil filter / clean oil screen

   Release the oil filter by turning the filter wrench counterclockwise. The filter might be full of oil. Make sure to not spill anything and avoid skin contact.



Fig. 10.5.2-4: Oil filter



6. Preparing a new filter

   Clean the engines' filter holder brush a thin oil layer on the sealing of the new filter.

Fig. 10.5-5: Oil screen sealing ring



7. Mounting the new filter

   Carefully screw in the new filter by hand. It must not be tightened too much. Screw in the oil drain screw again and tighten is with the wrench. Use a new sealing for the oil drain screw.

8. Fill in oil. (oil fill capacity: see attachment)

   Fill the engine oil into the engine via feed hopper. Check oil-level after every 2 litres with the oil dipstick.

9. Check proper filling level. See section 10.5.1.1, "Checking oil-level," on Page 93.

   When the proper filling level is reached, screw in the oil cap again. Run the engine for 10 minutes and then turn it off. Check the oil-level once more after several minutes with the oil dipstick. If it is too low, refill some oil.

10. Clean up

    Wipe off all oil splashes from the generator and make sure that the drain screw has no leak.

10.5.3 After the oil change

- Put the oil dipstick back into the check rail.
- Close the oil filling cap.
- Remove potential oil stains and splashes from the generator and surroundings.
- Close the generator capsule.
- Remove lock against accidental generator start.
- Duly dispose of used oil and filter.

Used oil is very toxic and must not be disposed with domestic waste. It is prohibited to dispose used oil with waste water! Make sure that used oil is disposed properly (e.g.: where oil is bought or at collection stations).

ATTENTION!



10.6 Verifying the starter battery and (if necessary) the battery bank

Check the condition of the battery. Proceed here as prescribed by the battery manufacturer.

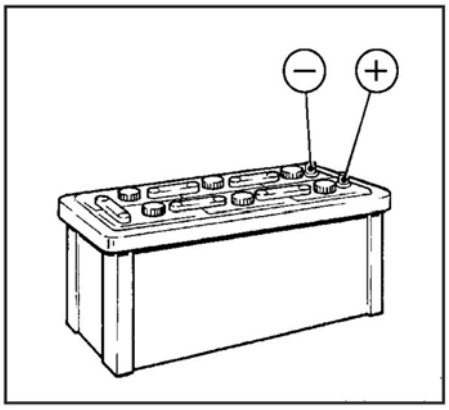
If from the battery manufacturer not otherwise mentioned.

10.6.1 Battery

10.6.1.1 Check battery and cable connections

- Keep battery clean and dry.
- Remove dirty clamps.
- Clean terminal posts (+ and -) and clamps of the battery, and grease with acid-free and acid-resistant grease.
- When reassembling, ensure that clamps make good contact. Tighten clamp bolts hand-tight.

Fig. 10.6.1.1-1: Battery

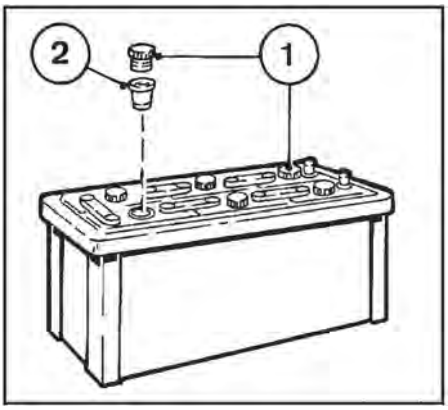


10.6.1.2 Check electrolyte level

- Remove sealing caps 1.
- If testers 2 are present:
- Electrolyte level should reach the base of these.
- Without testers:

  The electrolyte level should be 10-15 mm above the top of the plates.
- If necessary, top up with distilled water.
- Screw sealing caps back in.

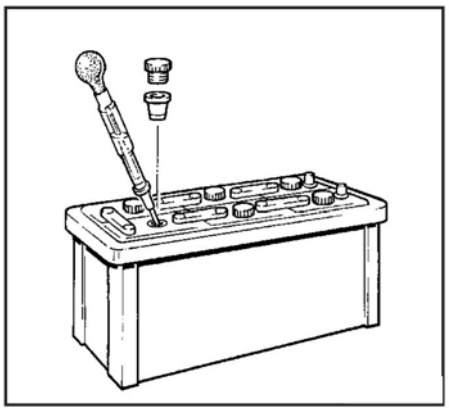
Fig. 10.6.1.2-1: Battery



10.6.1.3 Check electrolyte density

- Measure the electrolyte density of individual cells with a commercial hydrometer. The hydrometer reading (see table on following page) indicates the battery's state of charge. During measurement, the temperature of the electrolyte should preferably be 20 °C.

Fig. 10.6.1.3-1: Battery



Electrolyte density		
in [kg/ l]		Charge status
Normal	Tropical	
1.28	1.23	well charged
1.20	1.12	semi-charged, re-charge
1.12	1.08	discharged, immediately charge

Attention



The gases emitted by the battery are explosive! Keep sparks and naked flames away from the battery!

Do not allow battery acid to come into contact with skin or clothing!

Wear protective goggles!

Do not rest tools on the battery!

10.7 Fuel circuit maintenance

10.7.1 Checking the water separator in the fuel supply

The pre-filter with water separator has a cock at its lower surface, with this cock the downward sunk water can be discharged.

Fig. 10.7.1-1: Fuel filter with water separator



10.7.2 Ventilating the fuel system

Required tools /spare parts / material	Set of spanners / paper towels and rags

Normally, the fuel system is designed to ventilate air itself i.e. as soon as the electric starter motor starts operation the fuel pump starts working and the fuel system will be de-aerated after some time automatically. It is nevertheless essential to ventilate the system as follows prior to the first operation (as all hoses are empty):

Start the fuel pump

The external fuel pump can be started manual by an option in the fpControl panel. See fpControl manual for details.

Note:



Ventilation Screw

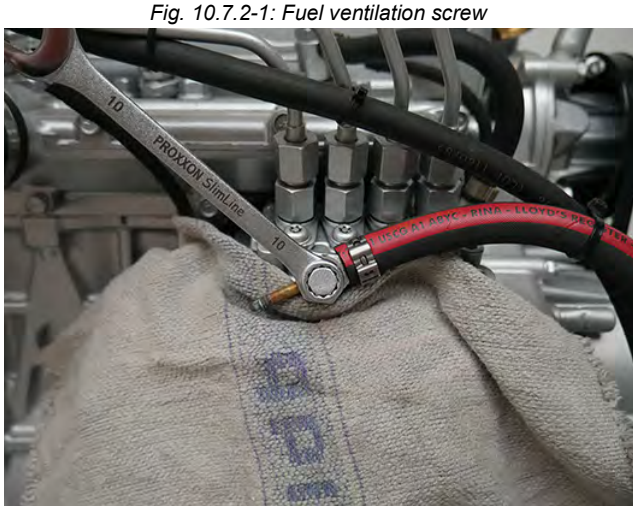
Fig. 10.7.2-1: Fuel ventilation screw

1. Open the ventilation screw located at the injection pump.



Set the fuel pump in the fpConrol menue to „1“. Open the ventilation screw.

A large cloth or paper tissue must be laid beneath the connection to prevent escaping fuel running into the capsule. If the fuel runs out without air bubbles, then the ventilation screw can be closed.



If present: Operate the mechanical fuel pump with hand lever manualy

Set the fuel pump in the fpControl menue to „0“

2. Switch the panel „OFF“.

This procedure must be repeated several times, until fuel (nonporously) withdraws perfectly at the ventilation screw.

3. If this does not occur, then a union nut fitted to the injection line must be loosened and starting procedure repeated. Retighten the union nut after successfully starting.

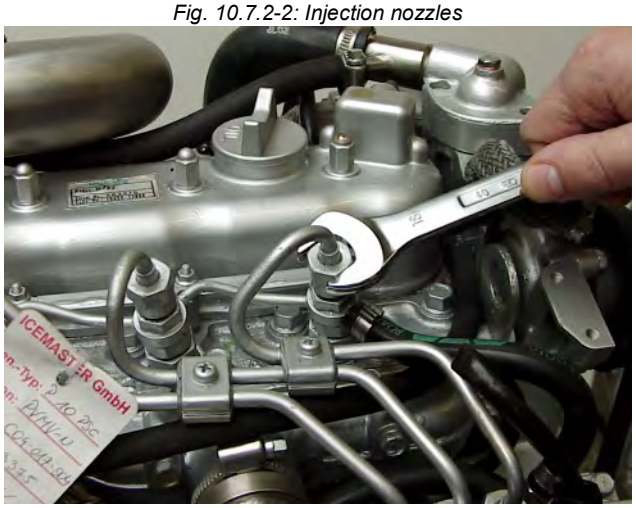


Sample picture

Note:



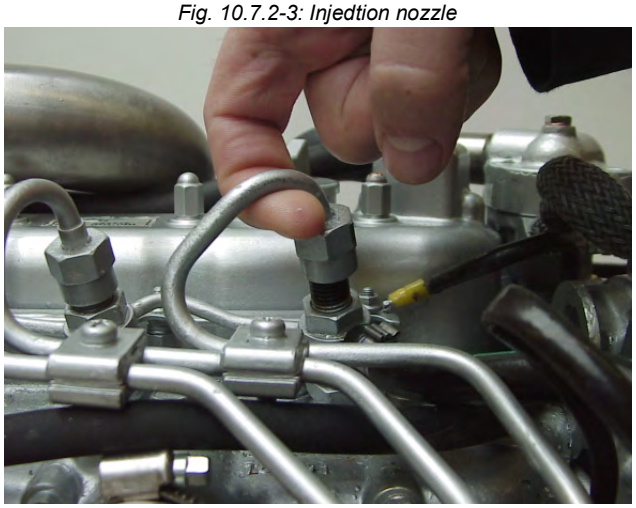
Fig. 10.7.2-2: Injection nozzles



4. The injection line must be raised by several millimetres.
5. Start the engine and as soon as fuel escapes without air bubbles, close the union nut again.
6. Start the engine and check that it is running properly.
7. Switch main switch „OFF“.

Sample picture

Fig. 10.7.2-3: Injedtion nozzle



8. Press the „off“ button (switch off).
9. Main switch of the control panel "OFF".
10. Remove potential fuel stains and splashes from the generator and surroundings.
11. Close the capsule.

10.7.3 Replacement of the fuel filter

Required tools /spare parts / material	Set of screwdriver, set of pliers / Filter element / Container, hose clamp, paper towels and rags

Wear personal protective equipment. (Gloves, protective goggles, protective clothing and safety shoes).

ATTENTION!



The replacement of the fuel filter depends on the contamination of the fuel, but should replaced at least every 150 operating hours.

1. Place the generator on a level surface.
2. Secure the generator against unintentional start.
3. Open the capsule.
4. Interrupt fuel feed line with hose clamp.

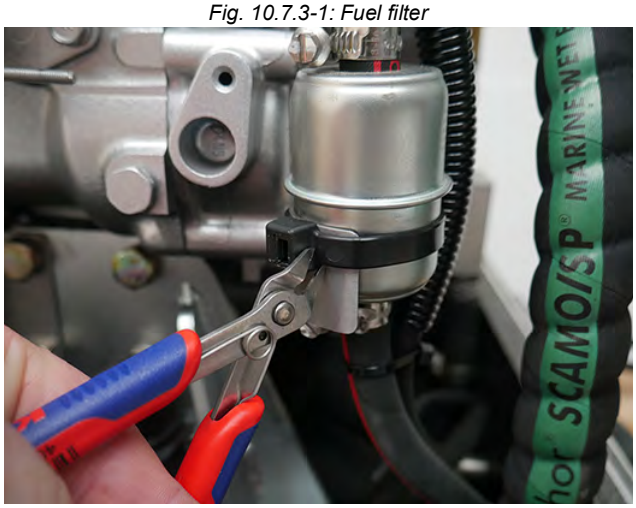


5. Remove all cable tie.



To avoid fuel getting in the sound cover a piece of cloth or absorbent paper should be put under the fuel filter.

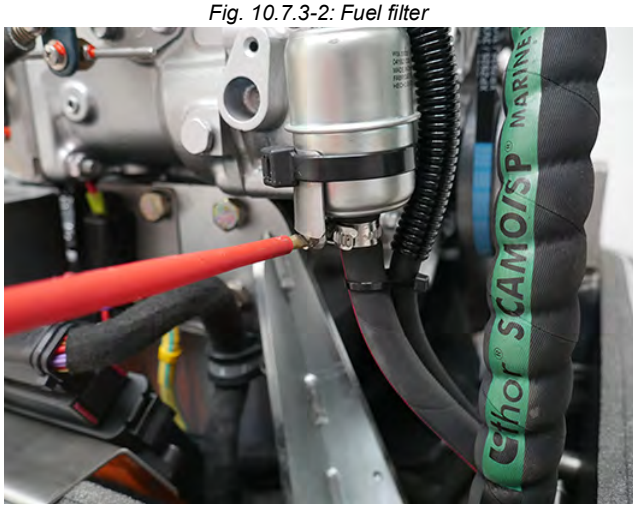
Fig. 10.7.3-1: Fuel filter



6. Loose the hose clamp and remove the fuel hose.



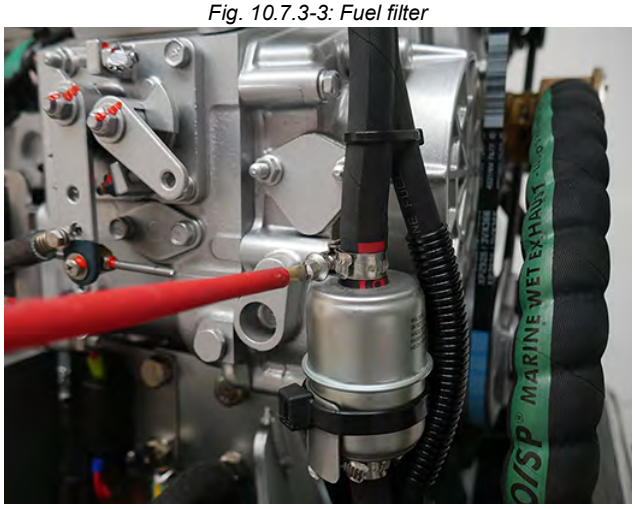
Fig. 10.7.3-2: Fuel filter



7. Loose the hose clamp and remove the fuel hose.



Fig. 10.7.3-3: Fuel filter



8. Replace in reverse order. The arrow on the filter housing indicates the direction of the fuel flow. A clogged filter causes a decreased power output of the generator.



Fig. 10.7.3-4: Fuel filter



Sample picture

9. Remove the hose clamp.
10. Remove potential fuel stains and splashes from the generator and surroundings.
11. Remove lock against unintentional start of the generator.
12. Bleed the fuel system, see section 10.7.2, “Ventilating the fuel system,” on Page 99.
13. Close the generator capsule.-

10.8 Air circuit maintenance

10.8.1 Replace the air filter

Required tools /spare parts / material	Filter element / Compressed air, paper towels and rags

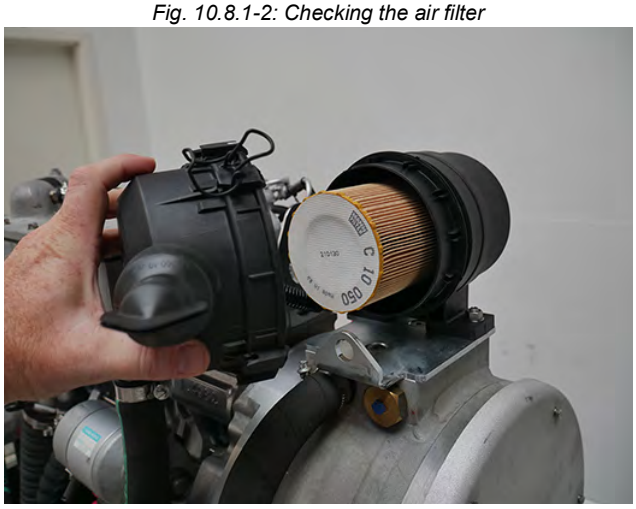
1. Open both fasteners on the air filter housing.

Fig. 10.8.1-1: Checking the air filter



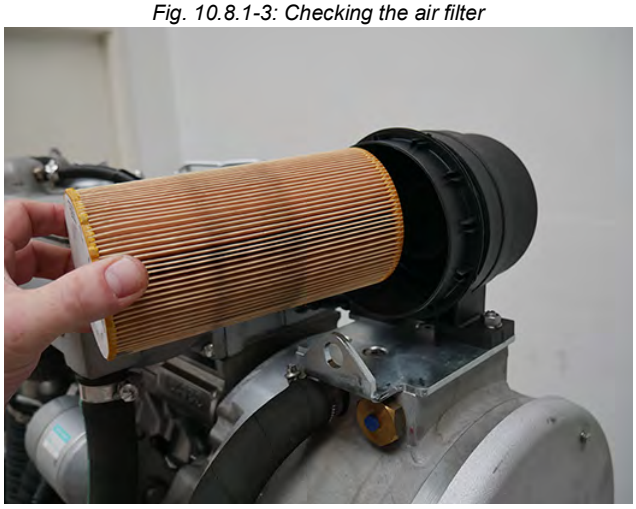
2. Remove the cover.

Fig. 10.8.1-2: Checking the air filter



3. Remove the main filter element by slightly turning the internal support tube.
4. Clean the main filter element by blowing it out with dry, compressed air (max. 5 bar) or replace the main filter element after one year at the latest.
5. Reassemble in reverse order.
6. Close the generator capsule.
7. Remove the securing device that prevents an unintended start-up of the generator.

Fig. 10.8.1-3: Checking the air filter



10.9 Coolant circuit maintenance

10.9.1 Ventilation of the coolant circuit / freshwater

Required tools /spare parts / material	Set of spanner / Coolant, paper towels and rags

ATTENTION!



The generator must be switched off before opening the ventilating points!

Pay attention that the external coolant expansion tank is connected with the generator by the intended connection point.

Further it should be guaranteed that the expansion tank is attached in sufficient height (200 m) over the level of the generator highest point.

Fig. 10.9.1-1: External cooling water expansion tank



If the cooling water is drained, or if other air has entered the cooling system, it is necessary to ventilate the cooling system. This ventilating procedure must be repeated several times.

1. Place the generator on a level surface.
2. Open the capsule.
3. Open the ventilating screw at the generator winding.



To avoid coolant getting in the sound cover a piece of cloth or absorbent paper should be put under the connection.

Fig. 10.9.1-2: Ventilation screw generator winding



The external expansion tank should be filled to a max mark in a cold state. It is very important that a larger expansion area is maintained above the cooling water level.

Fig. 10.9-3: External cooling water expansion tank



4. Pour cooling water into the external expansion tank.
5. If the cooling water level no longer drops / bubble-free cooling water is emerging from the vent screw, close the filler cap and the cooling water screw and start the generator.
6. Run the generator for approx. 60 seconds, then switch off.
7. Refill cooling water via the expansion tank.
8. Repeat this procedure several times.
9. When the cooling water level ceases to change, the generator can be started and run for 5 minutes. After that, the bleeding process must be repeated two to three times.
10. It is useful to repeat the bleeding process after several days to ensure that air bubbles potentially still remaining within the system are reliably removed.
11. Remove potential coolant stains and splashes from the generator and surroundings.
12. Close the generator capsule.

10.9.2 Check the coolant hoses

1. The side walls are removed from the generator where possible, and the hoses are checked visually. Pinch hoses with your hand.
2. At small leakage re-tighten hose clamps.
3. If a hose is brittle or defective, it must be replaced.
4. Depending on operation and demand replace the hoses every 2 -5 years.
5. Close the generator capsule.

10.9.3 Clean the raw water filter

The raw water filter should be released regularly from arrears. In each case the water cock must be closed before. It is mostly sufficient to beat the filter punnet.

If water should seep through the cover of the raw water filter, this may be sealed in no case with adhesive or sealant. Rather must be searched for the cause for the leakage. In the simplest case the sealing ring between caps and filter holders must be exchanged

Sample picture

Fig. 10.9.3-1: Raw water filter



10.9.4 Causes with frequent impeller waste

1. Improper operating conditions

The impeller of the cooling water pump must be regarded as wearing part. The life span of the impeller can be extremely different and exclusively depends on the operating conditions. The cooling water pumps of the PANDA generators are laid out in such a way that the number of revolutions of the pump lies low compared with other gensets. This is for the life span of the pump a positive effect.

2. Long intake system of the cooling water

Unfavourable affects the life span of the impeller, if the cooling water sucking in way is relatively long or the supply is handicapped, so that the cooling water sucking in range develops a negative pressure. This can reduce first of all the power of the cooling water pump extremely that the wings of the impeller are exposed to very strong loads. This can shorten the life span extremely.

3. Operation in polluted water

Further the operation of the impeller pump loaded in waters with a high portion of suspended matters. The use of the impeller pump is particularly critical in coral water bodies. Cases are well-known, which a impeller pump had so strongly run after 100 hours already that the lip seal on the wave was ground in. In these cases sharp crystal parts of the coral sand assess in the rubber seal and affect like an abrasive the high-grade steel shank of the impeller pump.

4. Generator ist über der Wasserlinie montiert

If the generator were mounted over the water level it is particularly unfavourable for the impeller pump. After the first start some seconds will pass by, until the impeller can suck in cooling water. This short unlubricated operation time damages the impeller. The increased wear can lead after short time to the loss. (see special notes: "Effects on the impeller pump, if the generator is mounted over the waterline")

10.9.5 Replace the impeller

Required tools /spare parts / material	Set of screwdriver; set of pliers / Impeller; gasket / paper towels and rags; Silicone spray

Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!



Wear personal protective equipment (Gloves, protective goggles, protective clothing and safety shoes).

ATTENTION!

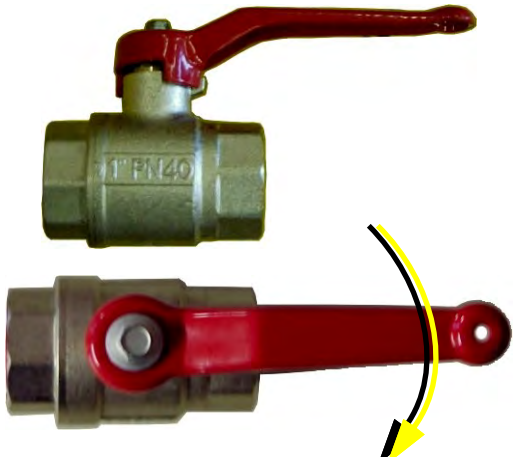


1. Place the generator on a level surface.
2. Secure the generator against unintentional start.
3. Open the capsule.

4. Close the raw water stop cock

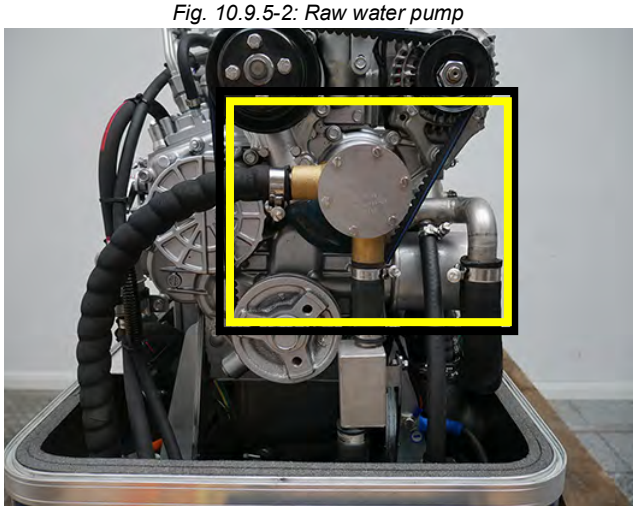
Sample picture

Fig. 10.9.5-1: Raw water stop cock



5. Raw water pump on the front side of the generator.

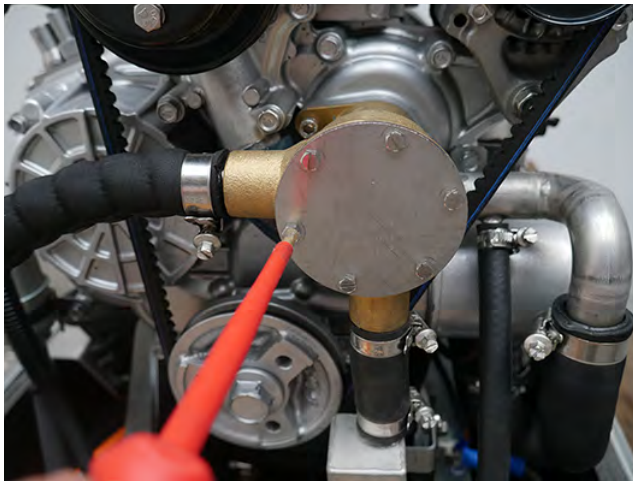
Fig. 10.9.5-2: Raw water pump



6. Remove the cover of the raw water pump by loosen the screws from the housing.



Fig. 10.9.5-3: Housing raw water pump



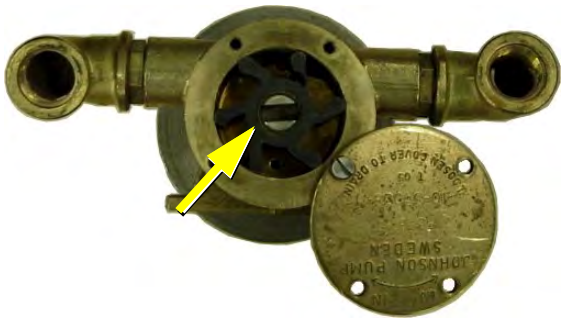
7. Pull out the impeller with a multigrip pliers of the shaft.



8. Mark the impeller, to make sure that these is used in the correct position at re-installation.

Sample picture

Fig. 10.9.5-4: Impeller



9. Check the impeller for damage and replace if tit is necessary.
10. Before the reinsertion into the housing the impeller should have been lubricated with glycerin or with a non-mineral oil based lubricant e.g. silicone spray.

Sample picture

Fig. 10.9.5-5: Impeller



11. The impeller is attached to the pump shaft (if the old impeller is used, pay attention to the before attached marking).
12. Fastening the cover and use a new gasket.





Sample picture

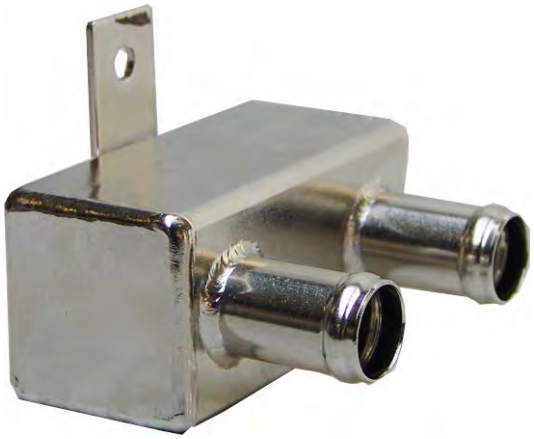
Fig. 10.9.5-6: Deckel Pumpemwelle



13. Open the raw water stop cock.
14. Close the generator capsule.
15. Remove lock against unintentional start of the generator.

10.9.6 Impeller filter

Fig. 10.9.6-1: Impeller filter



10.9.6.1 Operating method

When the impeller breaks, pieces of rubber will penetrate into the cooling system. This pieces can stock in the pipes with lower diameter (such as the heat exchanger) and reduce the cooling water flow. Expensive reconstruction and cleaning of the raw water circle is necessary.

The Fischer Panda impellerfilter hold this pieces of rubber back, so they can be easely removed. The flow through diameter of the cooling water is expanded in the impellerfilter, in emergency situation (like heavy sea) it is possible to change only the impeller itself and clean the impellerfilter afterwards at a better time. an emergency stop of the generator in fact of a to low cooling water flow and an overheating will be nearly banned.

The impellefilter must be cleaned after each impeller break. If you are not sure that every piece of rubber is removed at the cleaning we recommend to change the impellerfilter.

10.9.6.2 Clean and replace the impeller filter

Required tools /spare parts / material	Set of spanner; set of socket wrench / Impeller filter / compresed air

Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!



Wear personal protective equipment (Gloves, protective goggles, protective clothing and safety shoes).

ATTENTION!

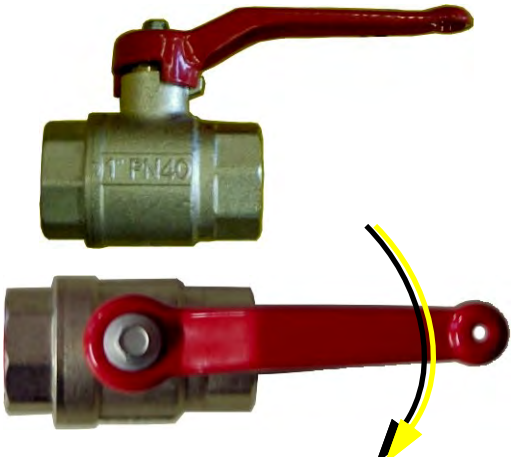


1. Place the generator on a level surface.
2. Secure the generator against unintentional start.
3. Open the capsule.

4. Close the raw water stop cock.

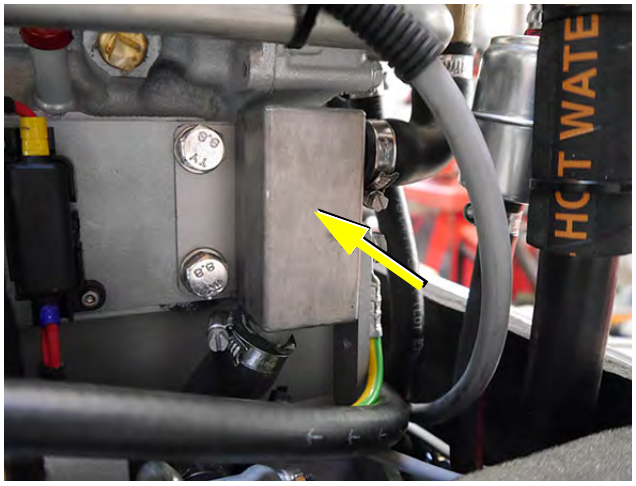
Sample picture

Fig. 10.9.6.2-1: Raw water stop cock



5. The impeller filter is installed at different places depending on the generator type. It is installed always behind the raw water pump.

Fig. 10.9.6.2-2: Localisation

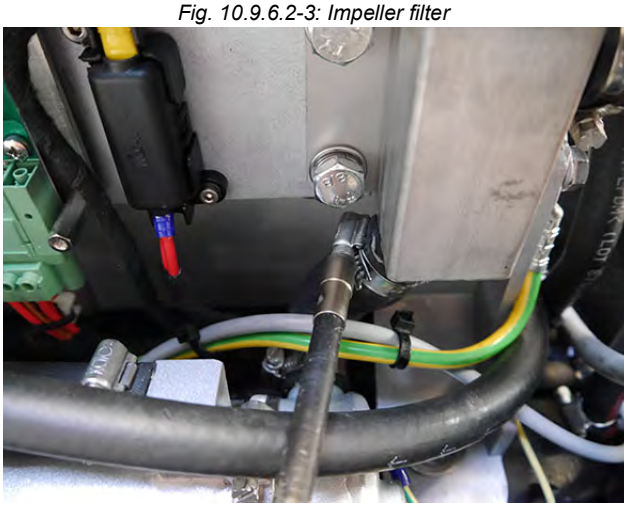


6. Loosen the hose clamps at the in- and output of the impeller filter and pull of the hoses.



Sample picture

Fig. 10.9.6.2-3: Impeller filter

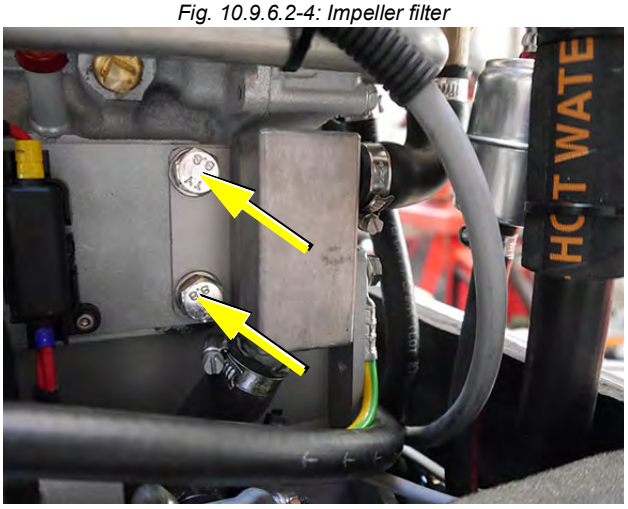


7. Loosen the fixing screws of then impeller filter (different screw sizes).



Sample picture

Fig. 10.9.6.2-4: Impeller filter



8. Cleaning of the impeller filter with water.

   The best cleaning will be to flush the filter against the flow direction.

Sample picture

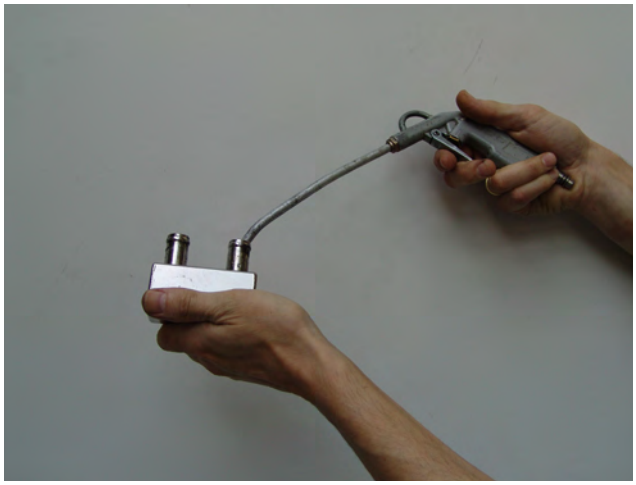
Fig. 10.9.6.2-5: Cleaning



9. Option: Cleaning of the impeller filter with compressed air

Sample picture

Fig. 10.9.6.2-6: Ausblasen



10. If the filter is defective or cleaning is not possible, the filter must be replaced.
11. Replace in reverse order.
12. Open the raw water stop cock.
13. Close the generator capsule.
14. Remove lock against unintentional start of the generator.

10.10V-belt replacement for the internal cooling water pump

Required tools /spare parts / material	Set of spanner / V-belt

The V-belt wears in a short time due to high ambient temperature within the closed capsule (approx. 85 °C). The air in the generator capsule is not only warm but also very dry. Therefore it is possible, that the „softener“ in the rubber composers wear after a very short time of operation.

Therefore, the V-belt must be checked in short time distances. It may be possible, that the V-belt must be changed after a few weeks. Therefore the V-belt must be checked every 150 hours. The v-belt must be seen as a wearing part. Therefore it is necessary to have enough spare V-belts on board. We therefore recommend to have the Fischer Panda Service Kit on board.

Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!



Wear personal protective equipment (Gloves, protective goggles, protective clothing and safety shoes).

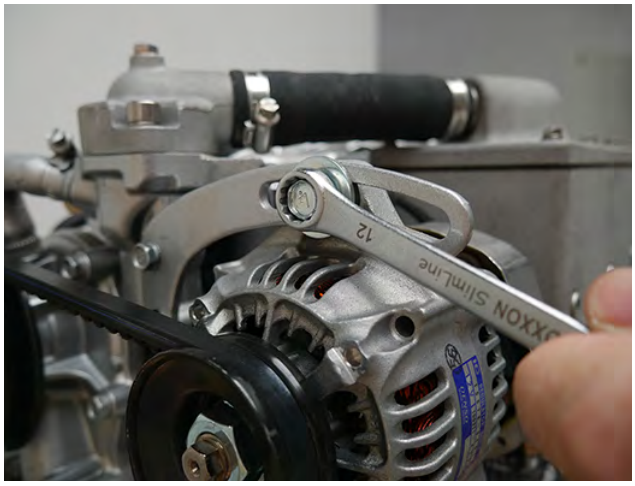
ATTENTION!



1. Place the generator on a level surface.
2. Secure the generator against unintentional start.
3. Open the capsule.
4. Loose the screw on the upper alternator mounting.



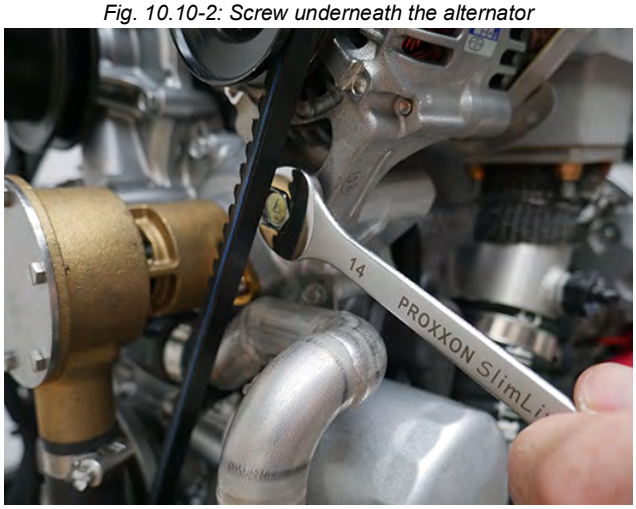
Fig. 10.10-1: Alternator screw



5. Loose the screw underneath the alternator.

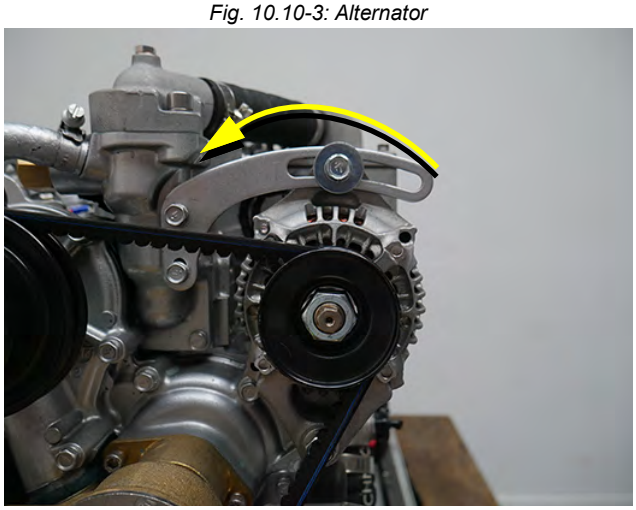


Fig. 10.10-2: Screw underneath the alternator



6. The alternator must be pressed in the direction of the thermostat housing.
7. Replace the V-belt.

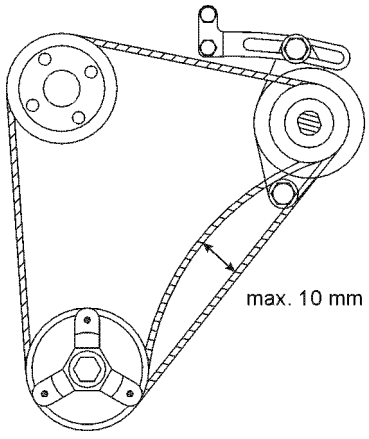
Fig. 10.10-3: Alternator



8. Afterwards, the V-belt must be tightened again.
9. The V-belt must be tightened in such a way, that it is possible to press it about approx. 10 mm.
10. Tighten the screws above and underneath the alternator.
11. Close the generator capsule.
12. Remove lock against unintentional start of the generator.

Sample picture

Fig. 10.10-4: V-belt



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11. Annex

11.1 Engine oil

11.1.1 Engine oil classification

The quality of an engine oil is specified by the API standard („American Petroleum Institutes“).

The API designation is to be found on each engine oil bundle. The first letter is always a C.

See technical data for the specificated engine oil **Notice!**



Fig. 11.1.1-1: Engine oil type.

Engine oil type	
over 25 °C	SAE10W-40; SAE 15W-40;SAE 20W-50
0 °C to 25 °C	SAE10W-40
below 0 °C	SAE10W-40;SAE 5W-40

11.2 Coolant specification

Use a mixture of water and antifreeze. The antifreeze needs to be suitable for aluminium. The antifreeze concentration must be regularly checked in the interests of safety.

Fischer Panda recommend to use the product: GLYSANTIN PROTECT PLUS/G 48

Engine coolant automotive industry Product description	
Product name	GLYSANTIN ® PROTECT PLUS / G48
Chemical nature	Monoethylenglycol with inhibitors
Physical form	Liquid

Chemical and physical properties		
Reserve alkalinity of 10ml	ASTM D 1121	13 – 15 ml HCl 01 mol/l
Density, 20 °C	DIN 51 757 procedure 4	1,121 – 1,123 g/cm^3
Water content	DIN 51 777 part 1	max. 3,5 %
pH-value undiluted		7,1 – 7,3

11.2.1 Coolant mixture ratio

Water/antifreeze	Temperature
70:30	-20 °C
65:35	-25 °C
60:40	-30 °C
55:45	-35 °C
50:50	-40 °C

11.3 Fuel

Use a clean Diesel fuel oil according to DIN590:1999 or better. For Generators with common rail or particle filter use DIN590:2009 or better.

Do not use alternative fuel, because its quality is unknown or it may be inferior in quality. Kerosene, which is very low in cetane rating, adversely effects the engine.

11.4 Technical data

11.4.1 Technical Data for Engine

Model	V1505
Type	Vertical, water-cooled, 4-cycle diesel engine
Number of cylinder	4
Bore	78 mm
Stroke	78,4 mm
Total displacement	1498 cm³
Combustion chamber	Spherical Type (ETVCS)
SAE NET Intermittent (SAEJ1349)	25,0 kW / 3000 rpm
SAE NET Continuous (SAEJ1349)	21,6 kW / 3000 rpm
Maximum bare speed	3200 rpm
Minimum bare idling speed	800 to 900 rpm
Order of firing	1-3-4-2
Direction of rotation	Counter-clockwise (viewed from flywheel side)
Injection pump	Bosch MD Type mini pump
Injection pressure	13,73 MPa, 1991 psi (140 kgf/cm²)
Injection timing (Before T.D.C.)	18°
Compression ratio	24:1
Fuel	Diesel Fuel No. 2-D
Lubrication (API classification)	above CD
Lubrication capacity	6,0 l
Fuel consumption [1]	approx. 1,9-5,0 l
Oil consumption	max. 1 % of fuel consumption
Dimensions (length x width x height)	591,3 x 396,0 x 613,7 mm
Dry weight	110,0 kg
Cooling water requirement for seawater circuit (Marine generators only)	28-40 l/min
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction
Recommend starter battery size	12 V, 70 Ah equivalent
Recommend cable cross size starter battery cable *Length 4 meter max.*	25 mm²
Max. exhaust back pressure	10,7 kPa 107 Millibar
Min. distance capsule bottem to waterlock	170 mm

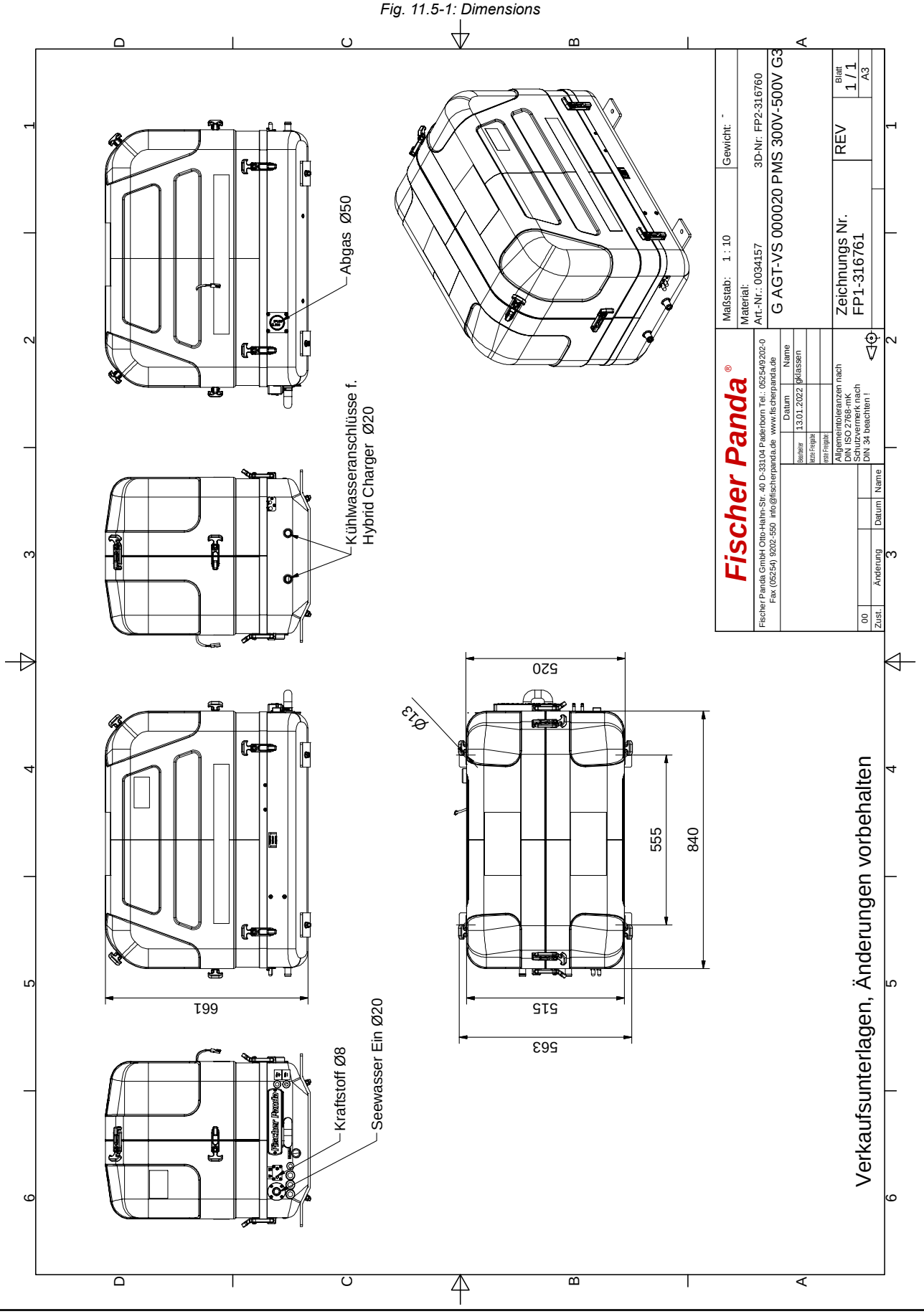
[1] *0,35 l/kW electrical power, the randomized values between 30 % and 80 % of the rated speed*

11.4.2 Technical Data for Generator

Type designation	Panda 20-VS
Model	PMS
Part number	0034157
Interconnection	-
Rated output	300 - 500 V
Rated frequency	DC
Rated current	67 A
Year of manufacture	07/2022
Weight	230 kg
Ambient temperature	40 °C
Rated output	20 kW
Nominal apparent power	20 kVA
Rated power factor	1
Continuous electrical output	18 kW

11.5 Dimensions

Fig. 11.5-1: Dimensions

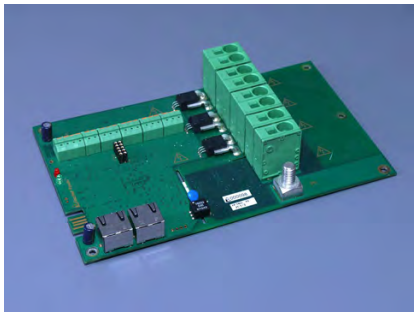


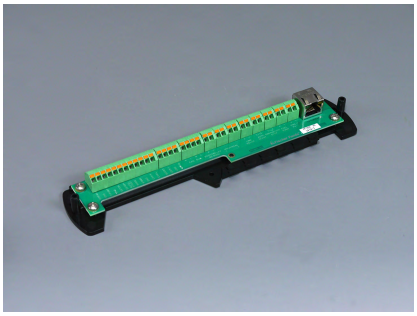
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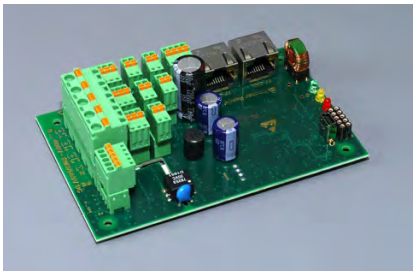












Panda fpControl Manual

0037985 G AGT-DC 018000 PMS 48V G4 SV03 MTR HW_frz.R01.2_22.7.25

Current revision status

	Document
Current:	0037985 G AGT-DC 018000 PMS 48V G4 SV03 MTR HW_frz.R01.2_22.7.25
Replaces:	

Revision	Page

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12.1 Download


Weitere verfügbare Sprachen dieses Handbuches können unter dem unten angegebenen Link heruntergeladen werden.


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13. Panda fpControl Safety Instructions

13.1 Personnel

The settings described here can be performed by the operator unless highlighted differently.

The installation should be implemented by specially trained technical personnel or by authorised workshops (Fischer Panda Service Points), only.

13.2 Safety instructions

Adhere to the safety instructions in the Fischer Panda generator manual.

If these instructions are not to hand, they can be requested from Fischer Panda GmbH, 33104 Paderborn, Germany.

Note!



An external signal may trigger an automatic start-up.

Warning! Automatic start-up



The generator must not be operated with the cover removed.

Warning!



If the generator is to be installed without a sound insulation capsule, it must be ensured that all rotating parts (belt pulley, belts etc.) are covered and protected so that there is no danger to life and body!

All service, maintenance, or repair work may only be carried out when the unit is not running.

Electric voltage - Deadly Danger!

Warning! Electrical voltage



Electric voltages of more than 48 V are potentially lethal in any situation. The rules of the respective regional authority must be adhered to for installation and maintenance.

For safety reasons, only an electrician may carry out the installation of the electrical connections of the generator.

Disconnect battery before working on the generator

Attention!



The battery must always be disconnected (first the negative terminal, then the positive terminal) if work on the generator or electrical system is to be performed, so that the generator cannot be started inadvertently.

This applies in particular to systems with an automatic start-up function. The automatic start-up function shall be deactivated before starting work.

The flooding valve must be closed. (For PMS version only.)

Also observe the safety instructions for the other components of your system.

Note!



13.3 Function description

The fpControl system is intended for the operation, monitoring and control of piston-powered generators.

13.4 Proper use

Intended exclusively for use with Fischer Panda generators, the proper use of which arises from the declaration of conformity of the complete machine.

14. Panda fpControl

14.1 Components of the fpControl

14.1.1 fpControl - CP-G

(**C**ontrol **P**anel – **G**enerator)

Display and Control Element of the fpControl

The fpControl CP-G is the display and control element

Power is supplied via the bus cable. Multiple control elements can be installed in a single system.

Fig. 14.1.1-1: Control Panel - Generator



14.1.1.1 Environmental specifications, physical data of the fpControl CP-G

Storage temperature	-10 °C – +60 °C
Operating temperature	-20 °C – +50 °C
Supply voltage	12 V or 24 V, automotive (12–13,5 V or 24–28 V)
Rated current consumption	< 21 mA @ 12 V (without display heating) < 18 mA @ 24 V (without display heating)
Max. current consumption	120 mA (with display heating)
Current consumption in Standby mode / Off	0 A
Housing	ABS plastic
Protection class	IP30 (RJ45 plug plugged in)
Overall dimensions	120 x 65 x 35 mm (L x B x H), Cutout: 109,2 x 54,5 mm
Weight	0.11 kg
FP part number	0029338
Circuit board	FP1403

14.1.2 fpControl - GC-S

(**G**enerator **C**ontrol - **S**ervo)

Main module of the fpControl.

Fig. 14.1.2-1: Generator Control - Servo



The module contains the control electronics.

The fpControl GC-S is usually installed in the generator capsule.

The fpControl GC-S takes over the monitoring and control of the diesel engine of the Fischer Panda generator, as well as the control of the output voltage and frequency of the generator.

The fpControl GC-S is suitable for 12 V and 24 V starting systems. The connected actuators are supplied with power via switching outputs with input voltage.

Current measurement is single-phase and can be done directly. A voltage sensor is not necessary. Current measurement takes place via an external current sensor. An additional three-phase module can be used for 3-phase generators.

14.1.2.1 Environmental specifications, physical data of the fpControl GC-S

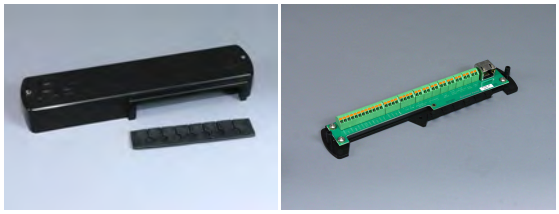
Ambient temperature	-40 °C – +125 °C (max.)
Operating temperature	90 °C
Supply voltage	12 V or 24 V, automotive (12–13,5 V or 24–28 V)
Rated current consumption	< 66 mA @ 12 V < 77 mA @ 24 V
Housing	Automotive, PBT GF30
Protection class	IP65
Overall dimensions	117 mm x 136 mm (incl. plug)
Weight	0.25 kg
FP part number	0029554
Circuit board	FP1704

14.1.3 fpControl - CB-G

(**C**onnection **B**ox - **G**enerator)

The fpControl CB-G is usually installed in the generator capsule (externally).

Fig. 14.1.3-1: Connection Box - Generator



The fpControl CB-G is the external terminal block for the fpControl generator.

The control element and the fuel pump are connected here. Emergency stop devices, auto-start devices, load relays and boosters can be connected as options.

Only qualified electricians may perform work on the fpControl CB-G.

Note:



14.1.3.1 fpControl CB-G connections

1 x RJ45	Control Panel/fpCAN
1 x 2-pole Phoenix contact socket	Boost relay/Inverter power supply
1 x 2-pole Phoenix contact socket	Multifunction output 1 A)
1 x 2-pole Phoenix contact socket	Multifunction output 5 A)
1 x 2-pole Phoenix contact socket	Powerline relay
1 x 2-pole Phoenix contact socket	Automatic start-up contact
1 x 2-pole Phoenix contact socket	Emergency-stop
1 x 2-pole Phoenix contact socket	Fuel pump (5 A)
1 x 2-pole Phoenix contact socket	Water pump/Fan (5 A)
1 x 4-pole Phoenix contact socket	Alternative for the fpCAN
1 x 4-pole Phoenix contact socket	Boost relay Universal output 1 Universal output 2
1 x 12-pole Phoenix contact socket	Digital output - Water pump/Fan Digital output - Fuel pump Emergency-stop Automatic start-up contact Wake-up line CAN-High CAN-Low Bus voltage GND

14.1.3.2 Environmental specifications, physical data of the fpControl CB-G

Storage temperature	-40 °C – +125 °C
Operating temperature	-20 °C – +100 °C
Supply voltage	without own power supply
Rated current consumption	--
Housing	Plastic
Protection class	IP12
Overall dimensions	216,9 x 50,1 x 29,6 mm (L x B x H)
Weight	0.13 kg
FP part number	0000306
Circuit board	FP1801

14.1.4 fpControl CAN Interface - SAE J1939 (fpControl CI-SAE J1939)

The »fpControl CAN Interface - SAE J1939« manages the communication between the »fpCAN« and an external SAE J1939-CAN-BUS. The interface protects the internal »fpCAN« by filtering the data of the external CAN-Bus. The internal and external CAN-Bus are galvanically isolated. The fpControl CI-SAE J1939 is supplied with power via the fpCAN.

Figure: »fpControl CAN Interface - SAE J1939« (fpControl CI-SAE J1939), Illustration shows an older hardware status

Fig. 14.1.4-1: fpControl CAN Interface - SAE J1939



14.1.4.1 fpControl CI-SAE J1939 connections

2 x RJ45	Power supply and internal fpCAN (FP CAN BUS 1)
2 x RJ45	external fpCAN (FP CAN BUS 2)
1 x 4-pole Phoenix contact socket	Alternative for the external fpCAN (USER CAN BUS)

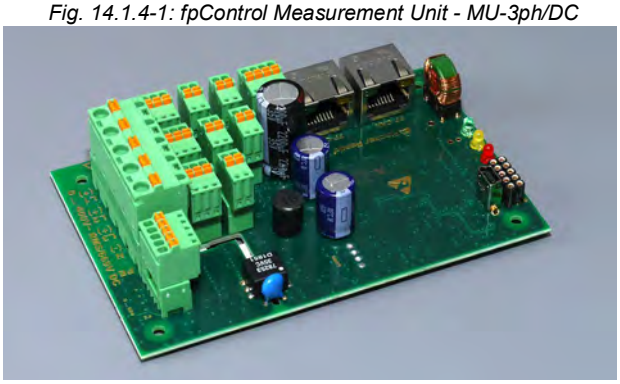
14.1.4.2 Environmental specifications, physical data of the fpControl CI-SAE J1939

Storage temperature	-30 °C – +60 °C
Operating temperature	-20 °C – +50 °C
Supply voltage	12 V or 24 V, automotive (12–13,5 V or 24–28 V)
Rated current consumption	< 32 mA @ 12 V < 17 mA @ 24 V
Housing	ABS plastic
Protection class	IP30
Overall dimensions	151 x 80 x 60 mm (L x B x H)
Weight	0.25 kg
FP part number	0006107
Circuit board	FP1409

14.1.4.3 fpControl Measurement Unit - MU-3ph/DC (fpControl MU-3ph/DC)

The fpControl Measurement Unit - MU-3ph/DC« is used for AC and DC generators. On AC generators, the module measures the 3-phase AC voltage up to 400 V and three times the AC current by means of an external sensor. When used on DC generators, the module measures the 2-phase DC voltage in a range from 12 V to 600 V and twice the DC current by means of an external sensor.

Fig. 14.1.4-1: fpControl Measurement Unit - MU-3ph/DC



14.1.4.4 fpControl MU-3ph/DC connections

2 x RJ45	Power supply and fpCAN
1 x 4-pole Phoenix contact socket	Alternative for the external FP Bus (USER CAN BUS)
1 x 5-pole Phoenix contact socket	**AC:** Voltage measurement L1, L2, L3 and N (0 … 400 V~ RMS) and PE **or** **DC:** 3 x (+), 1 x (-), 1 x PE (669 V DC)
1 x 3-pole Phoenix contact socket	external transformer L1
1 x 3-pole Phoenix contact socket	external transformer L2
1 x 3-pole Phoenix contact socket	external transformer L3
1 x 5-pole Phoenix contact socket	Voltage measurement (0 … 69 V DC) 3 x (+), 1 x (-), 1 x PE
3 x 2-pole Phoenix contact socket	Temperature sensor
1 x 2-pole Phoenix contact socket	Boost
1 x 2-pole Phoenix contact socket	AUX

14.1.4.5 Environmental specifications, physical data of the fpControl MU-3ph/DC

Storage temperature	-30 °C – +60 °C
Operating temperature	-20 °C – +50 °C
Supply voltage	12 V or 24 V, automotive (12–13.5 V or 24–28 V)
Rated current consumption	< 139 mA @ 12 V < 91 mA @ 24 V
Housing	--
Protection class	IP30
Overall dimensions	114 mm x 72.5 mm (L x B) (circuit board)
Weight	0.094 kg (circuit board)
FP part number	0029859
Circuit board	FP1901

14.1.5 fpControl Measurement Unit - MM-3 (fpControl MM-3)

The »fpControl Measurement Unit - MU-MM-3/DC« is used for AC generators. The module measures the 3-phase AC voltage and three times the AC current. Current measurement is performed by the module directly by means of three internal current sensors. The measuring range is 65 A per phase. Higher currents can be measured by means of optional external current sensors.

Fig. 14.1.5-1: fpControl Measurement Unit - MM-3 (fpControl MM-3)

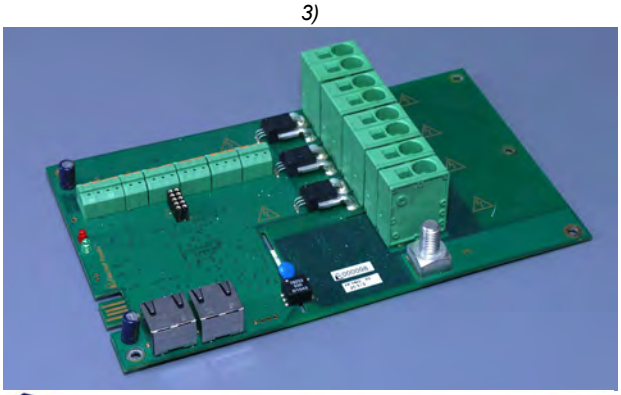


Figure: »fpControl Measurement Unit - MM-3« (fpControl MM-3) - Circuit board



Figure: »fpControl Measurement Unit - MM-3« (fpControl MM-3) in housing

fpControl MM-3 connections

2 x RJ45	Power supply and fpCAN
1 x 4-pole Phoenix contact socket	Alternative for the external FP Bus (USER CAN BUS)
1 x 3-pole Phoenix contact socket	external transformer N
1 x 3-pole Phoenix contact socket	external transformer L1
1 x 3-pole Phoenix contact socket	external transformer L2
1 x 3-pole Phoenix contact socket	external transformer L3
1 x 2-pole Phoenix contact socket	Voltage measurement / internal transformer L1, max. 65 A
1 x 2-pole Phoenix contact socket	Voltage measurement / internal transformer L2, max. 65 A
1 x 2-pole Phoenix contact socket	Voltage measurement / internal transformer L3, max. 65 A
2 x 1-pole Phoenix contact socket	N
1 x 1-pole Phoenix contact socket	PE

14.1.5.1 Environmental specifications, physical data of the fpControl MM-3

Storage temperature	-30 °C – +60 °C
Operating temperature	-20 °C – +50 °C
Supply voltage	12 V or 24 V, automotive (12–13.5 V or 24–28 V)
Rated current consumption	< 71 mA @ 12 V < 36 mA @ 24 V
Housing	ABS plastic
Protection class	IP30
Overall dimensions	151 x 80 x 60 mm (L x B x H)
Weight	0.212 kg (circuit board, fitted)
FP part number	0023600 (Circuit board FP1405 V7)
Circuit board	FP1405

14.2 Installation

14.2.1 Installation of the Electronic Control Unit (ECU) fpControl - GC-S

The ECU fpControl - GC-S is pre-installed. The ECU can be exchanged easily. All connections are mechanically coded and prevent the risk of confusion.

14.2.2 Installation of the Connection Box fpControl - CB-G

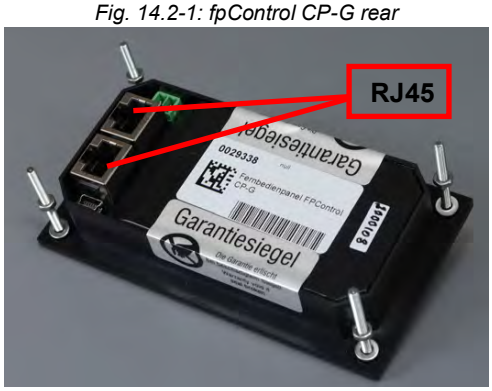
The connection box is pre-installed. External components are connected in accordance with the installation manual and the circuit diagram of the fpControl generator.

14.2.3 Installation of the fpControl - CP-G

The fpContol - CP-G is a CAN Bus module. All Fischer Panda CAN bus modules have two RJ45 ports. One for connection to the module on the CAN bus, the second to relay the CAN bus. The last module on the CAN bus must have a terminating resistor in the RJ45 port.

Connection by means of the Fischer Panda bus cable is mandatory.

Fig. 14.2-1: fpControl CP-G rear



14.3 Operation

The fpControl is operated by means of the fpControl CP-G panel.

Fig. 14.3-1: fpControl CP-G front with buttons



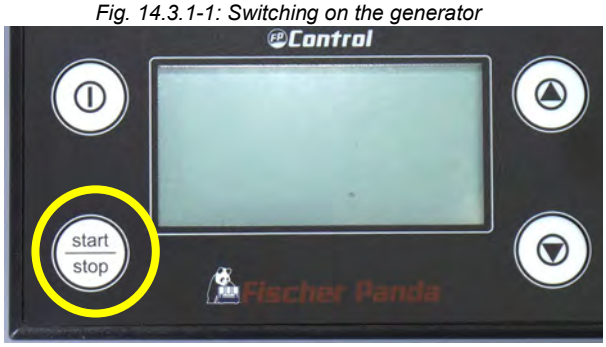
14.3.1 Switching on the generator

Press the "ON/OFF" button to switch on the control system of the generator.

The fpControl Generator thereby switches to "Standby Mode".

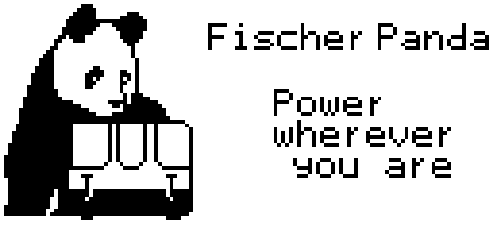
If automatic starting is activated at the menu, the generator can henceforth be started by means of an external signal.

Fig. 14.3.1-1: Switching on the generator



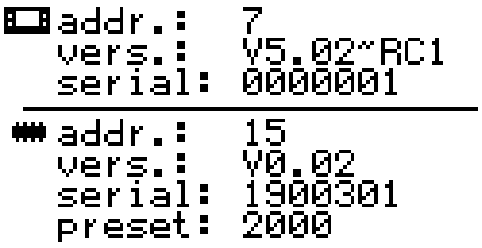
The CP-G Panel displays the home page for two seconds.

Fig. 14.3.1-2: Home Page



The CP-G then displays the address page for one second.

Fig. 14.3.1-3: Address Page

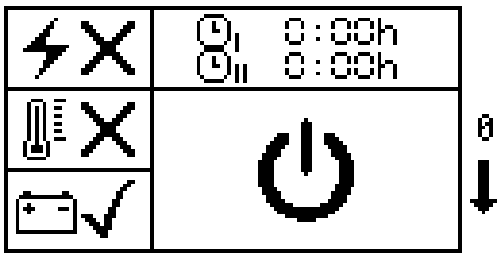


At the end of the power-on routine, the CP-G displays the first overview page.

The language as well as the display mode can be set in the menu.

Overview Page 1 is the same in all display modes/languages.

Fig. 14.3.1-4: Overview Page 1



14.3.1.1 Overview page with Autostart activated

Deadly danger! - The generator can be equipped with an Autostart function. This means that the generator is started by an external signal. In order to prevent an inadvertent start-up, the starter battery must be disconnected before work on the generator may commence.

Warning! Autostart



The “Autostart” also remains active, if the fpControl CP-G is switched off and on again.

If a fault should arise when the generator is started or is already operating, it is stopped and the Autostart is set to "off".

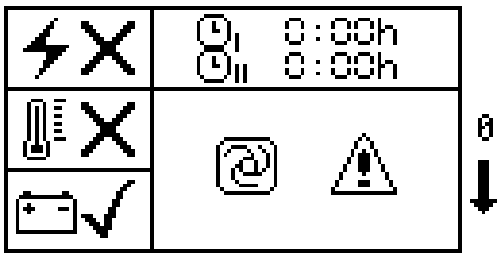
If the generator is operated by Autostart and is stopped manually, the Autostart is set to "off".

Once the system has been switched off and then on again, the Autostart is active once more.

The first overview page shows if the Autostart is active.

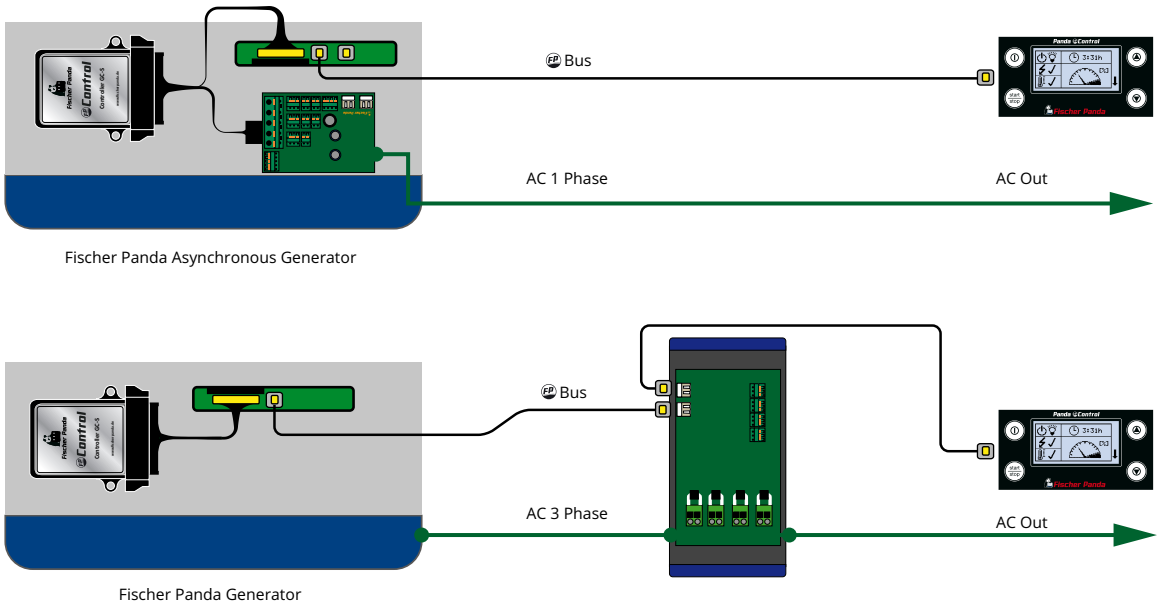
Overview Page 1 with Autostart function activated.

Fig. 14.3.1-1: Overview Page 1 with Autostart



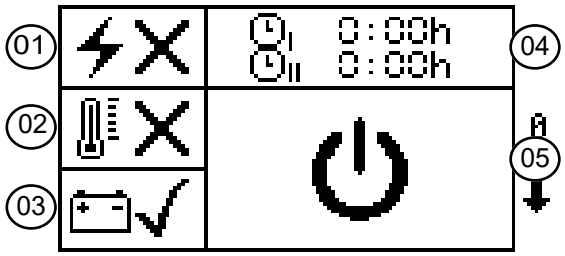
14.3.2 The fpControl VCS overview pages

The display mode/language of the display can be set in the menu.



Overview Page 1:

Fig. 14.3.2-1: Symbols used - Overview Page 1



01. Generator Status (on/off)

02. AC OK

03. Temperature of the generator (OK/Error)

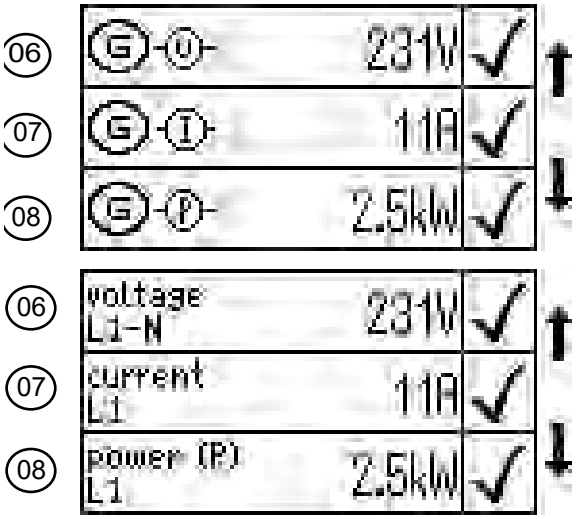
04. Operating hours of the generator

05. Info screen

Overview Page 1 is the same in all languages.

Overview Page 2 (Generator):

Fig. 14.3.2-2: Overview Page 2 Symbols/English



06. Output voltage [V]

07. Generator current [A]

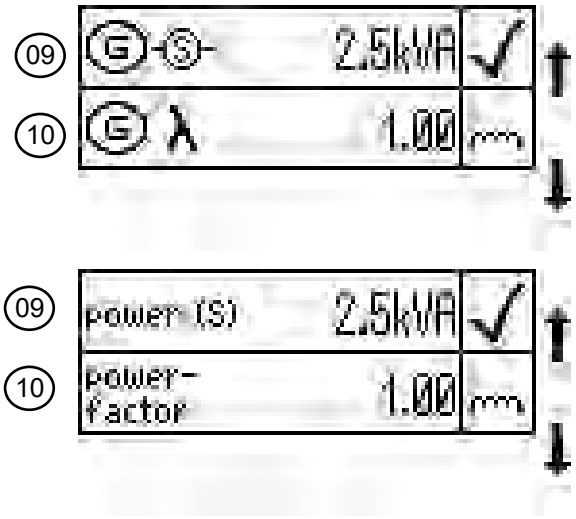
08. Generator active power [kW]

Overview Page 3 (Generator):

09. Generator apparent power [kVA]

10. Power Factor

Fig. 14.3.2-3: Overview Page 2 Symbols/English

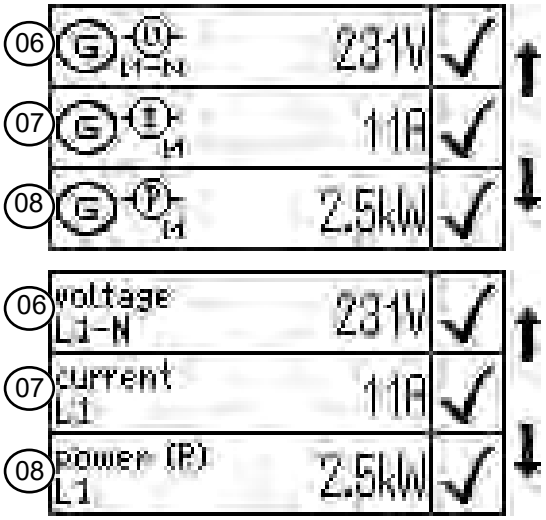


In the case of 3-phase generators, the voltage, the current and the electrical power are shown on separate pages. Each page shows the value of one of the three phases one below the other.

Example of the voltage display of a 3-phase generator.

Note:

Fig. 14.3.2-4: Voltage display 3-P Symbols/English/



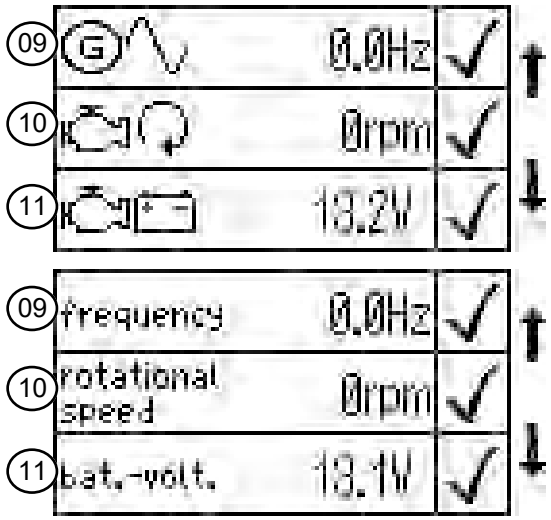
Overview Page 4:

09. Frequency of the generator [Hz]

10. Generator speed (r.p.m.)

11. Voltage of the starter battery [V]

Fig. 14.3.2-5: Overview Page 3 Symbols/English



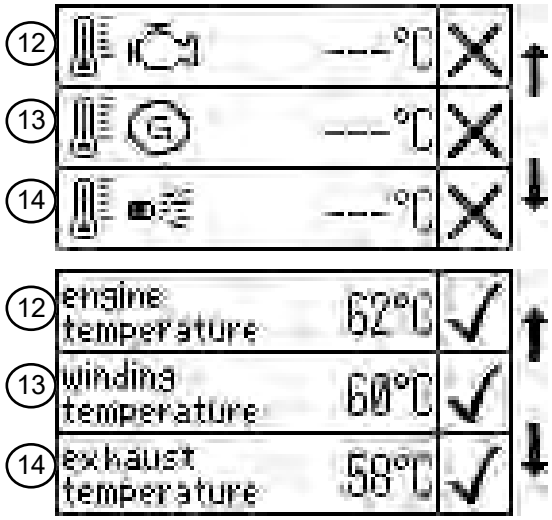
Overview Page 4:

12. Temperature of the cylinder head

13. Temperature of the generator winding

14. Temperature at exhaust manifold

Fig. 14.3.2-6: Overview Page 4 Symbols/English



If the information pages of optional components (e.g. fuel gauge, oil pressure) are available, then these pages are inserted after Overview Page 4.

Whether these pages are displayed automatically, always or not at all can be set in the Panel menu.

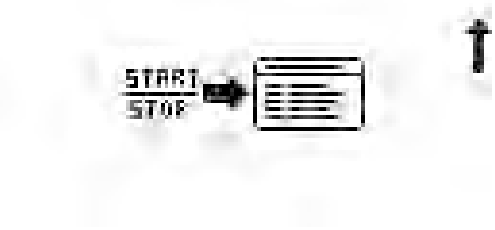
Note:

Final Overview Page:

Proceed to this menu by pressing the Start/Stop - Enter key

Overview Page 5 is the same in all display modes/languages.

Fig. 14.3.2-7: Final overview page



14.3.3 The fpControl AGT overview pages

The display mode/language of the display can be set in the menu.

The battery-specific charging parameters are set by the Fischer Panda Service Point.

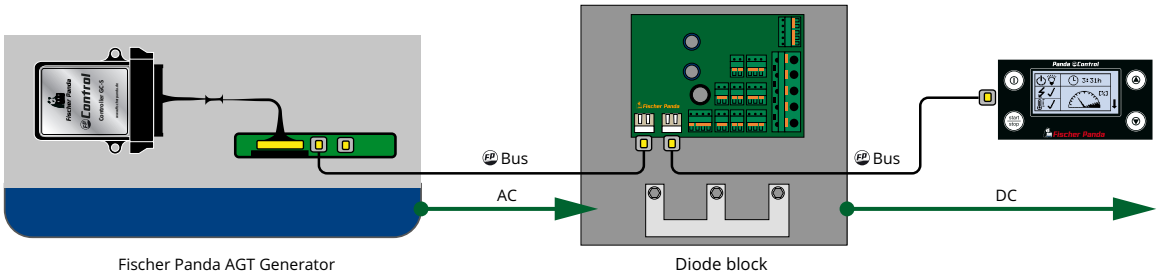
When exchanging a battery this must be checked and adjusted accordingly.

Warning:



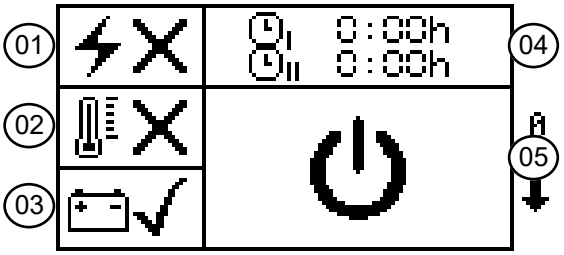
Incorrect setting of the charging parameters may result in the battery being damaged or destroyed. The specifications of the battery manufacturer must be adhered to.

.



Overview Page 1:

Fig. 14.3-1: Symbols used - Overview Page 1



01. Generator Status (on/off)

02. AC OK

03. Temperature of the generator (OK/Error)

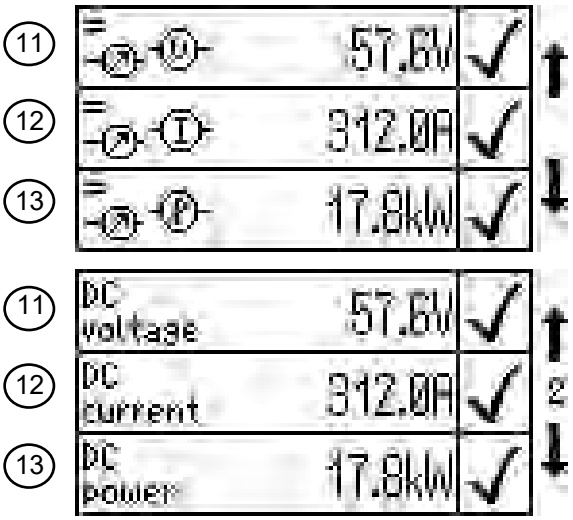
04. Operating hours of the generator

05. Info screen

Overview Page 1 is the same in all languages.

Overview Page 2:

Fig. 14.3.3-2: Overview Page 2 Symbols/English



11. DC voltage [V]

12. DC current [A]

13. DC output [kW]

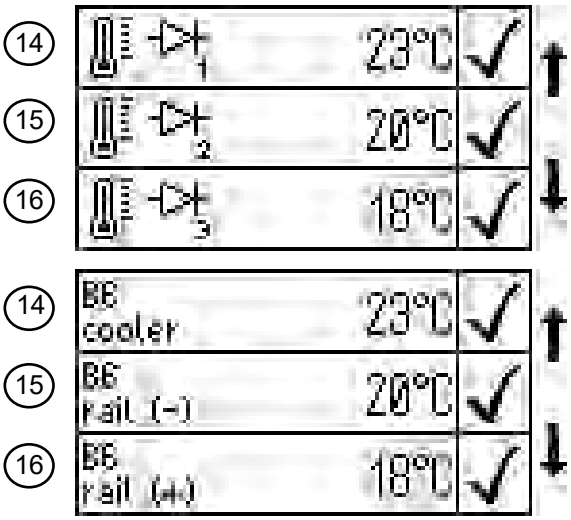
Overview Page 3:

14. Temperature of the diode plate fan

15. Temperature of the diode plate busbar (-)

16. Temperature of the diode plate busbar (+)

Fig. 14.3.3-3: Overview Page 3 Symbols/English



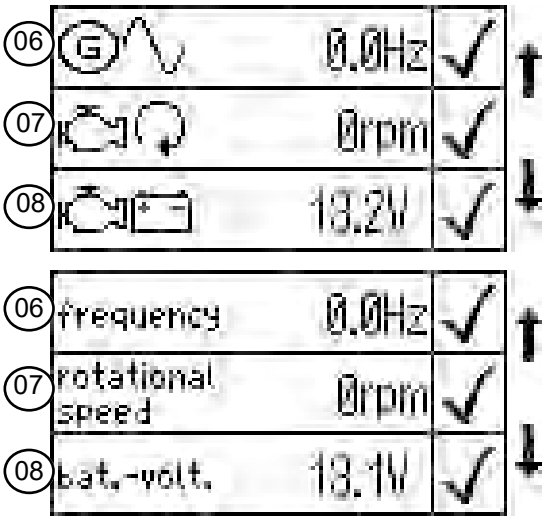
Overview Page 4:

06. Frequency of the generator [Hz]

07. Generator speed (r.p.m.)

08. Voltage of the starter battery [V]

Fig. 14.3.3-4: Overview Page 4 Symbols/English



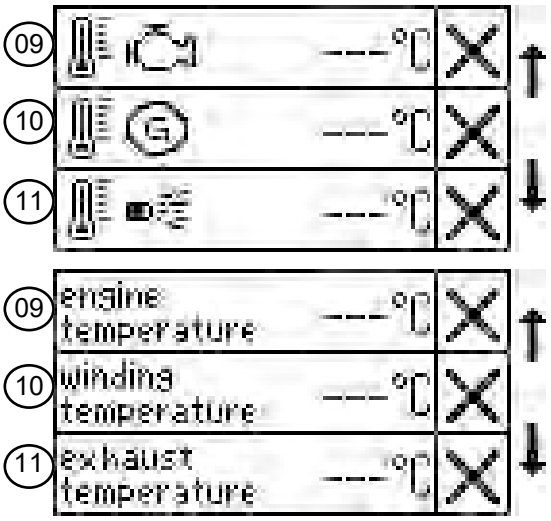
Overview Page 5:

09. Temperature of the cylinder head

10. Temperature of the generator winding

11. Temperature at exhaust manifold

Fig. 14.3.3-5: Overview Page 5 Symbols/English



If the information pages of optional components (e.g. fuel gauge, oil pressure) are available, then these pages are inserted after Overview Page 4.

Note:



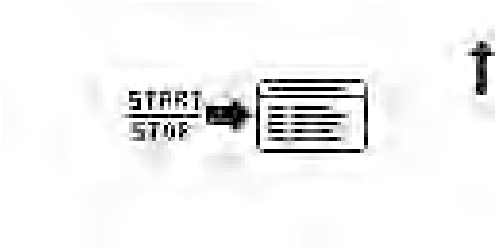
Whether these pages are displayed automatically, always or not at all can be set in the Panel menu.

Final Overview Page:

Proceed to this menu by pressing the Start/Stop - Enter key

Overview Page 5 is the same in all display modes/languages.

Fig. 14.3.3-6: Final overview page



14.3.3.1 Battery guard

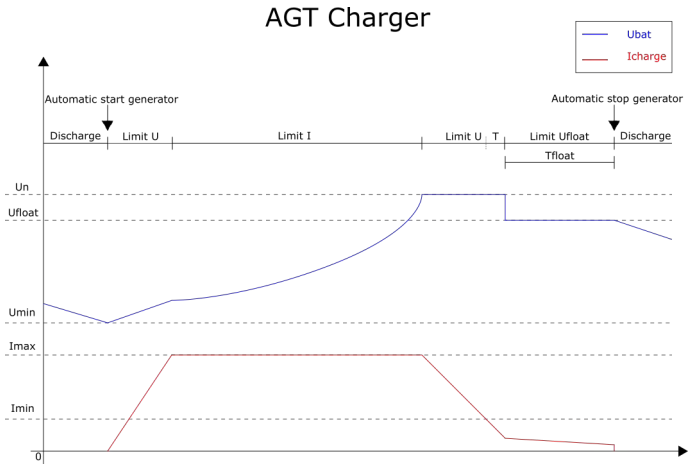
Generator must be in Standby mode (remote control panel switched on; generator off)

When the battery monitor is activated in the Service menu, the generator starts automatically as soon as the connected battery bank has reached the set minimum voltage. After the charging process (UIU) has ended, the generator switches off (back to Standby).

Activation of the battery monitor as well as the storage of individual parameters for UIU charging/the connected battery bank are performed by your Fischer Panda Service Point.

14.3.3.2 Functional description of the UIU charging process

Fig. 14.3.3.2-1: UIU charging curve of AGT-DC generator with FP Control



The UIU charging process: **linearly increasing voltage – constant current – constant voltage**

When the battery voltage has reached its minimal value $\mathbf{U_{min}}$ when discharging, the battery charger starts automatically, if the battery guard is activated. The UIU charging process begins:

Phase »Limit U«:	In the first phase, charging takes place with linearly increasing voltage This phase continues until the charging current has reached its maximum value $\mathbf{I_{max}}$.
Phase »Limit I«:	In the second phase, charging takes place at **constant current**. In this phase, the maximum charging current $\mathbf{I_{max}}$ flows to the battery.
Phase »Limit U«	In the third phase, charging takes place at **constant voltage $\mathbf{U_n}$** (absorption voltage). During this phase, the charging current drops to its minimum value $\mathbf{I_{min}}$.
Phase »T«	Once the charging current has reached its minimum value $\mathbf{I_{min}}$, the battery voltage is maintained at the $\mathbf{U_n}$ (absorption voltage) value throughout a hysteresis time **T**. The charging current continues to decrease during hysteresis.
Phase »Limit Ufloat«	After hysteresis the battery charger switches from loading at constant voltage $\mathbf{U_n}$ to float voltage $\mathbf{U_{float}}$, thus ensuring that the fully charged condition of the battery is maintained throughout $\mathbf{T_{float}}$.

Once the float time T_{float} has elapsed, the generator stops automatically.

Parameters of the charging curve

Parameter	Meaning	Corresponding menu item in "battery charger"
U_{min}	Battery voltage at which the battery charging generator is started automatically.	**min. voltage [V]**
U_n	Constant charging voltage (absorption voltage), until the charging current has dropped to the minimum value I_{min}.	**absorption-voltage [V]**
U_{float}	Once the battery has been charged, the float voltage ensures that the fully charged condition of the battery is maintained throughout the float time T_{float}.	**float-voltage [V]**
I_{min}	If the minimum charging current is not achieved, the battery is fully charged. At this point in time, hysteresis **T** begins and continues until switching to the float voltage U_{float}.	**min. current [A]**
I_{max}	Maximum charging current flowing to the battery.	**max. current [A]**
T	Once this time has elapsed, the system switches over to the float voltage U_{float}.	**hysteresis [ms]**
	“On” – Battery guard is activated, automatic generator start/stop is active. The generator is started automatically if the battery voltage drops below the minimum U_{min}. “Off” – Battery guard is deactivated, automatic generator start/stop is deactivated.	**battery guard [On/Off]**
T_{float}	Once the float time has elapsed, the generator is stopped automatically if the battery guard is activated.	**float-timeout [min]**

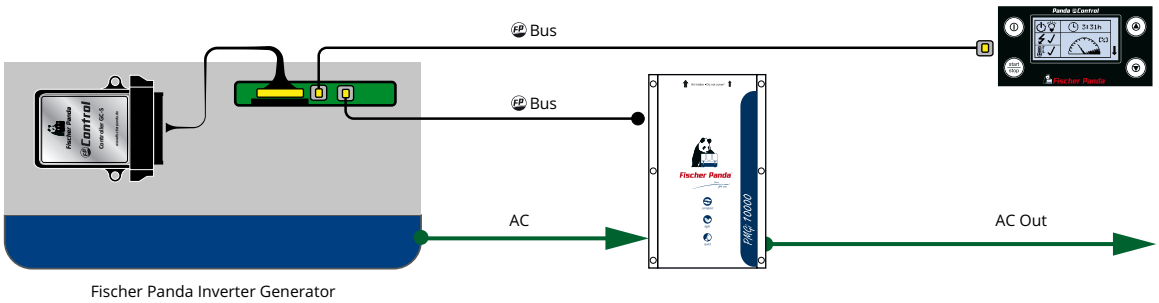
The graphic display of the UIU charging curve displays the basic principle and symbolises the functionality.

NOTE:



14.3.4 The fpControl Inverter overview pages

The display mode/language of the display can be set in the menu.



Overview Page 1:

01. Generator Status (on/off)

02. AC OK

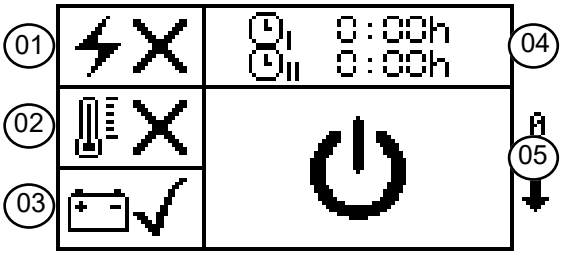
03. Temperature of the generator (OK/Error)

04. Operating hours of the generator (I. Operating hours total, II. Operating hours since last service)

05. Info screen

Overview Page 1 is the same in all languages.

Fig. 14.3.4-1: Symbols used in Overview Page 1



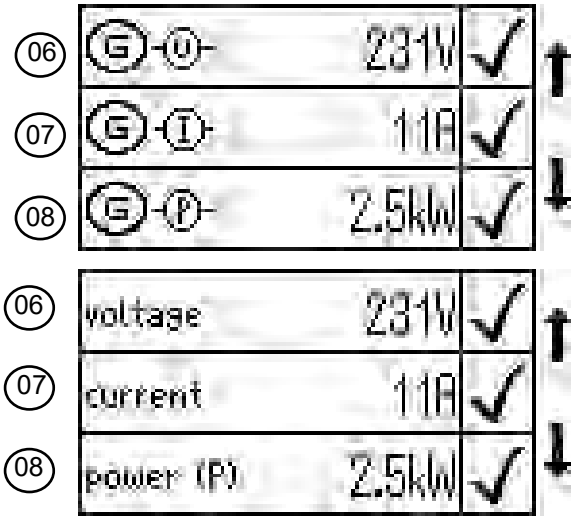
Overview Page 2 (Generator):

06. Output voltage [V]

07. Generator current [A]

08. Generator active power [kW]

Fig. 14.3.4-2: Overview Page 2 Symbols/English

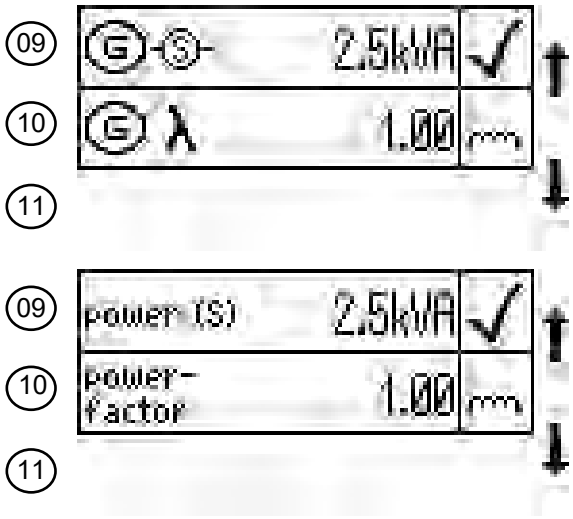


Overview Page 3:

09. Generator apparent power [kVA]

10. Power Factor

Fig. 14.3.4-3: Overview Page 3 Symbols/English

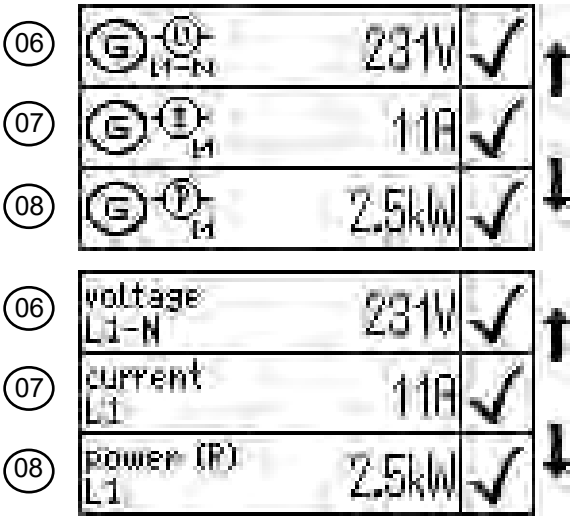


In the case of 3-phase generators, the voltage, the current and the electrical power are shown on separate pages. Each page shows the value of one of the three phases one below the other.

Note:

Example of the voltage display of a 3-phase generator.

Fig. 14.3.4-4: Voltage display 3-P Symbols/English/



Overview Page 3:

09. Phase/Phase voltage

10. Generator apparent power [kVA]

11. Power Factor

Fig. 14.3.4-5: Overview Page 3 Symbols/English



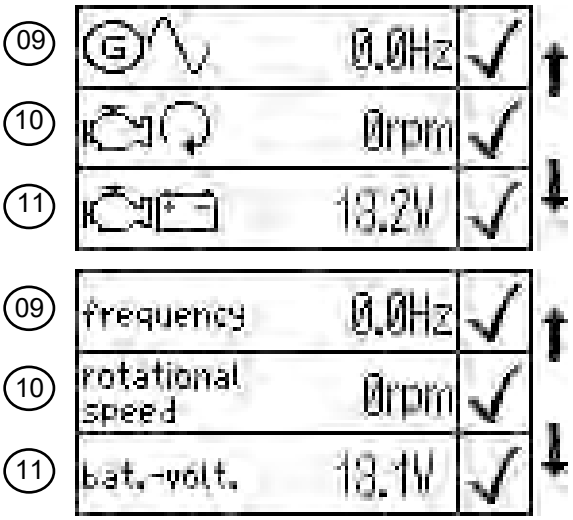
Overview Page 4:

09. Frequency of the generator [Hz]

10. Generator speed (r.p.m.)

11. Voltage of the starter battery [V]

Fig. 14.3.4-6: Overview Page 4 Symbols/English



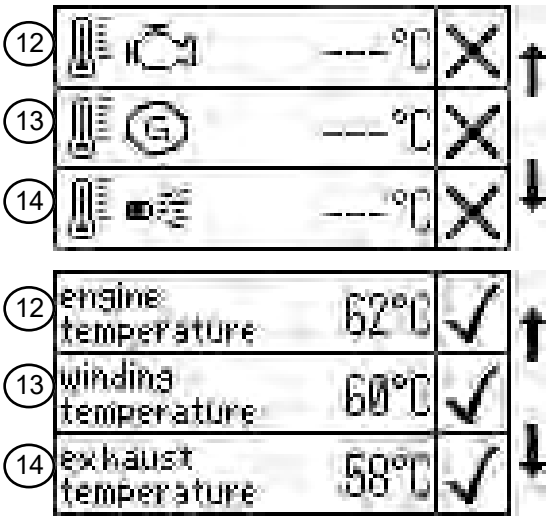
Overview Page 5:

12. Temperature of the cylinder head

13. Temperature of the generator winding

14. Temperature at exhaust manifold

Fig. 14.3.4-7: Overview Page 5 Symbols/English



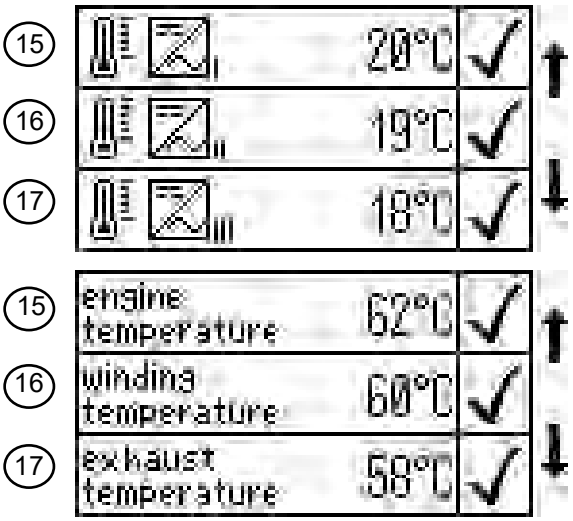
Overview Page 6:

15. Inverter Temperature L1

16. Inverter Temperature L2

17. Inverter Temperature L3

Fig. 14.3.4-8: Overview Page 6 Symbols/English



If the information pages of optional components (e.g. fuel gauge, oil pressure) are available, then these pages are inserted after Overview Page 4.

Note:



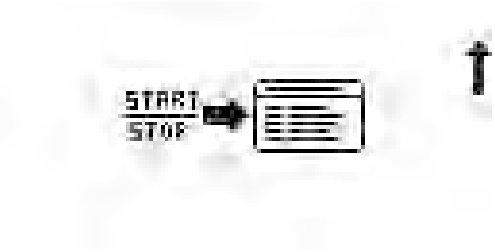
Whether these pages are displayed automatically, always or not at all can be set in the Panel menu.

Final Overview Page:

Proceed to this menu by pressing the Start/Stop - Enter key

Overview Page 5 is the same in all display modes/languages.

Fig. 14.3.4-9: Final overview page



14.4 Starting up the generator

14.4.1 Preparations for starting up / Checks (daily) for marine version

1. Oil level check (ideal level: 2/3 Max).

   The level should be about 2/3 of the maximum level when the engine is cold.

   Furthermore, if installed, the oil level of the oil-cooled bearing must be checked before each start - see sight glass on generator front cover!.

2. Check cooling water level.

   The external expansion tank should be filled to 1/3 in a cold state. It is very important that there is sufficient volume for expansion of the coolant.

3. Check if the raw water intake valve is open.

   For safety reasons, the raw water intake valve must be shut after the generator has been switched off. It should be re-opened before starting the generator.

4. Check raw water filter.

   The raw water filter must be regularly checked and cleaned. If the raw water intake is restricted by detached residue, this increases wear on the impeller.

5. Visual inspection

   Control fixing bolts, check hose connectors for leaks, check electrical connections. Check electrical lines for damage/chafing.

6. Switch off loads.

   The generator should only be started without a load.

7. Open fuel valve, if installed.
8. Close main battery switch (switch on).

14.4.2 Preparations for starting up / Checks (daily) for vehicle version

1. Oil level check (ideal level: 2/3 Max).

   The level should be about 2/3 of the maximum level when the engine is cold.

   Furthermore, if installed, the oil level of the oil-cooled bearing must be checked before each start - see sight glass on generator front cover!.

2. Check cooling water level.

   The external expansion tank should be at 1/3 in a cold state. It is very important that there is sufficient volume available for expansion of the coolant.

3. Visual inspection

   Control fixing bolts, check hose connectors for leaks, check electrical connections. Check electrical lines for damage/chafing.

4. Switch off loads.

   The generator should only be started without a load.

5. Open fuel valve, if installed.
6. Close main battery switch (switch on).
7. Open the raw water intake valve (only in the case of Fischer Panda Marine generators)

14.4.3 Starting up the generator

Deadly danger! - The generator can be equipped with an Autostart function. This means that the generator is started by an external signal. In order to prevent an inadvertent start-up, the starter battery must be disconnected before work on the generator may commence.

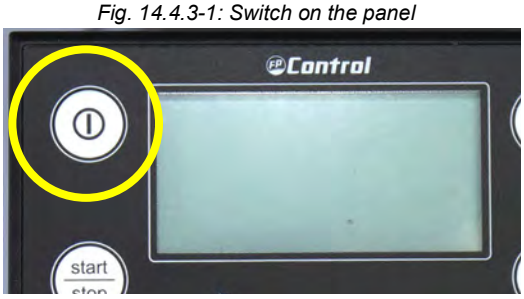
Warning! Automatic start-up



1. Switch on the fpControl CP-G

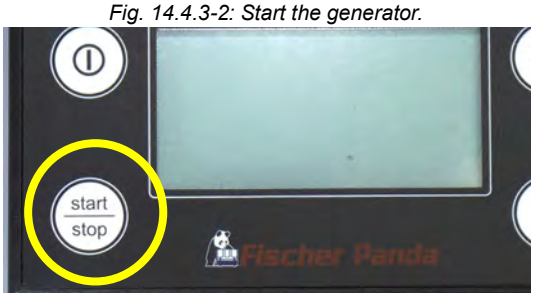
   The remote control panel is started by pressing the On/Off button. The On/Off button must be pressed until the Home page is displayed.

Fig. 14.4.3-1: Switch on the panel



2. Press the Start/Stop - Enter key

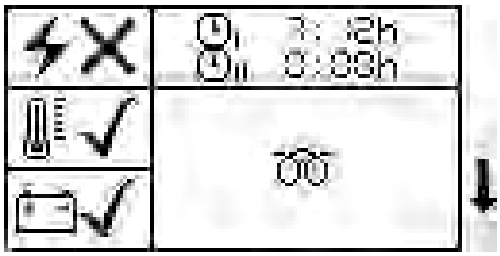
Fig. 14.4.3-2: Start the generator.



3. The fpControl preheats the diesel engine.

After preheating, the generator is started by the fpControl system.

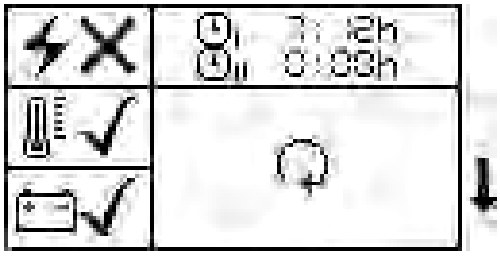
Fig. 14.4.3-3: Preheating



4. Starter on.

In order to minimise current consumption, preheating is interrupted briefly when the starter is operated.

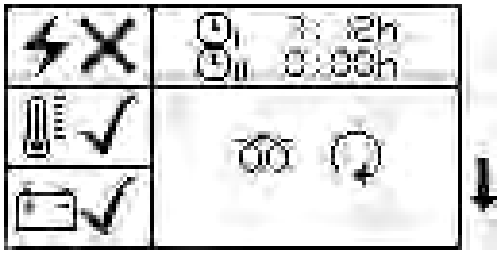
Fig. 14.4.3-4: Electric starter



5. Starter and preheater

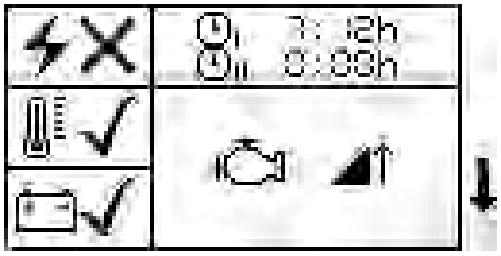
As soon as the high inrush current of the starter has dropped, preheating is switched on again.

Fig. 14.4.3-5: Preheating



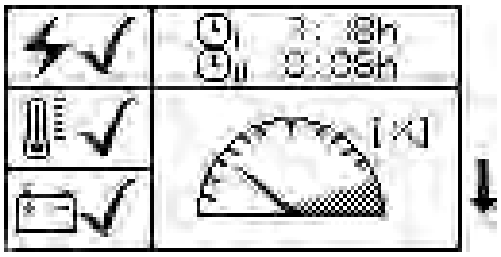
The engine idles for the first few seconds. Thereafter, the fpControl increases the speed to the operating speed and indicates this in the display.

Fig. 14.4.3-6: Increase revolutions



As soon as the AC voltage is within limits (e.g. 207 V-253 V at 230 V) (normal operating mode), the consumer can be connected.

Fig. 14.4.3-7: AC OK



Close the raw water intake valve in the event start-up problems (Panda Marine generators only).

ATTENTION:



If multiple attempts to start up are required (e.g. to bleed the fuel lines), then the raw water intake valve must definitely be shut while the attempts are being made. The cooling water impeller turns during the starting process and feeds cooling water. As long as the engine has not started up, the exhaust gas pressure is insufficient to discharge the coolant water that has been introduced. This protracted start-up process would flood the exhaust system with water. This can damage/destroy the generator/engine.

Re-open the raw water intake valve as soon as the generator has started.

14.4.4 Stopping the generator

1. Switch off loads.
2. Recommendation: With turbo engines and under a load that exceeds 70 % of the rated output, allow the generator temperature to stabilise for at least 5 minutes with load switched off.

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

3. Press "Start/Stop" button (to switch off).

Fig. 14.4.4-1: Stopping



NOTE: Never switch off the main battery until the generator has stopped, shut the fuel valve if necessary!

ATTENTION:



4. Close the raw water intake valve (only in the case of Fischer Panda Marine generators)

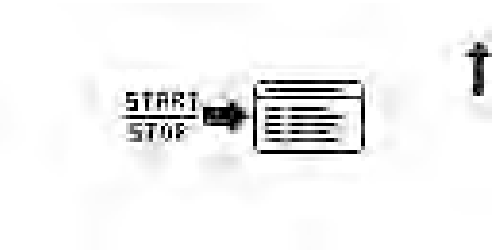
14.5 The Menu

The menu can be accessed from the final overview page.

Switch on the CP-G and scroll down to "Enter Menu" page.

Press the Start/Stop - Enter key to enter the menu.

Fig. 14.5-1: Menu entry symbols



14.5.1 Main Menu

You can choose from the following sub-menus in the main menu:

Fig. 14.5.1-1: Main Menu



1. "Panel" sub-menu - The display of the of the panel can be adapted in the "Panel" sub-menu (e.g. brightness, language, etc.).

2. "Generator" sub-menu - All settings related to the generator can be made in the "Generator" sub-menu, e.g. bleeding the fuel pump etc.

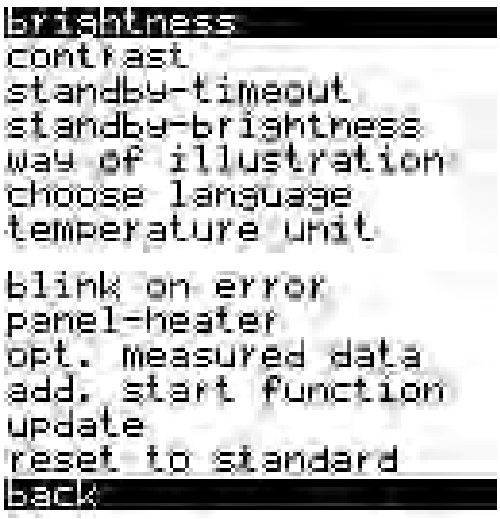
3. The "Service" sub-menu is blocked and can only be accessed by trained personnel and Fischer Panda employees.

4. Back - back to the overview pages

14.5.2 Sub-menu: "Panel"

The following items can be selected in the Panel sub-menu:

Fig. 14.5.2-1: Sub-menu: Panel



1. Lighting

   - changes the brightness of the display in Normal mode.

2. Contrast

   - changes the contrast of the display.

3. Standby Time

   - to set the time until the panel switches to Standby mode.

4. Standby Lighting

   - changes the brightness of the display in Standby mode.

5. Display Mode

- changes the display mode of the overview pages.

6. Language selection

   - changes the language of the panel

7. Temperature Unit

   - to set the temperature unit to °C or °F

8. Audible alarm

   - to activate the audible alarm in the event of faults

9. Flashing when faulty

   - to activate panel flashing in the event of faults

10. Panel heating

    - to activate panel heating at temperatures <+10°C

11. Optional measurement data

    - to manage the additional information pages, e.g. tank display

12. Additional start-up functions (only in the case of inverter generators)

    - Start without inverter/Inverter Softstart

13. Update

    - Software update for the panel

14. Reset to standard

    - to reset the "Panel" sub-menu to the factory settings

15. back

    - Switching from the "Panel" sub-menu to the Main Menu

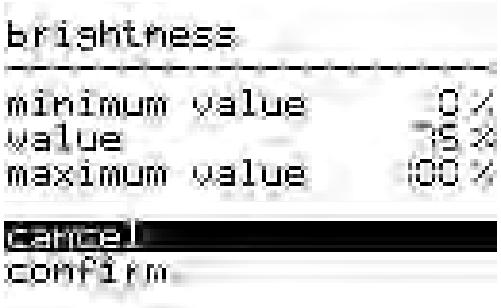
14.5.2.1 Setting the illumination of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

The value is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

Fig. 14.5.2.1-1: Sub-menu: Illumination



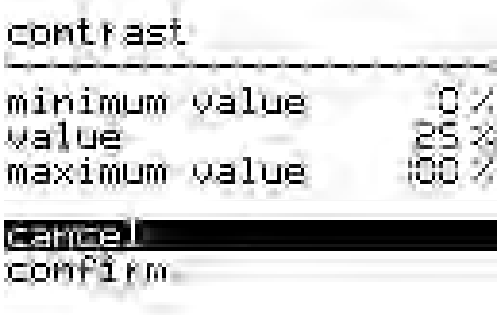
14.5.2.2 Setting the contrast of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

The value is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

Fig. 14.5.2.2-1: Sub-menu: Contrast



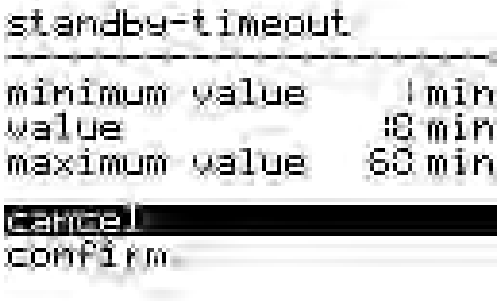
14.5.2.3 Setting the standby time of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

The value is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

Fig. 14.5.2.3-1: Sub-menu: Standby Time



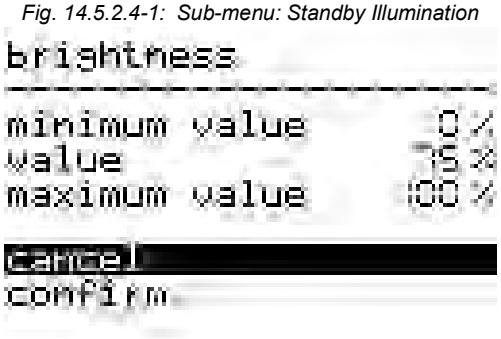
14.5.2.4 Setting the standby illumination of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

The value is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop - Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop - Enter“ key.

Fig. 14.5.2.4-1: Sub-menu: Standby Illumination



14.5.2.5 Setting the display mode of the CP-G overview page

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Symbolic View" or "Text View" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

The "back" item returns you to the "Panel" sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.2.5-1: Sub-menu: Display Mode



14.5.2.6 Setting the language of the text pages of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

Select the corresponding language by using the "Step-up"/ "Step-down" keys and then confirm with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.2.6-1: Sub-menu: Language Selection



14.5.2.7 Setting the Temperature Unit

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"°C“ for "degrees Celsius" or "°F" for "degrees Fahrenheit“ can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop - Enter“ key.

The "Back" item returns you to the Panel sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop - Enter“ key.

Fig. 14.5.2.7-1: Sub-menu: Temperature Unit



14.5.2.8 Setting the Aural Alarm

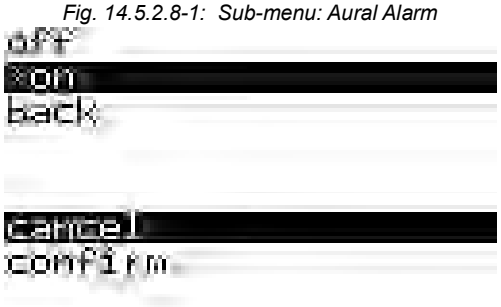
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Off" or "On" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

The "Back" item returns you to the Panel sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

Fig. 14.5.2.8-1: Sub-menu: Aural Alarm



14.5.2.9 Setting the display to flash in the event of a fault

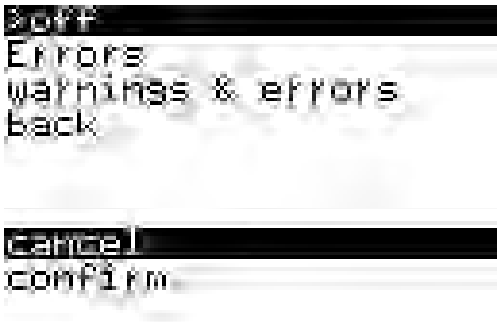
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Off" or "Error" or "Warning and Error" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

The "Back" item returns you to the Panel sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

Fig. 14.5.2.9-1: Sub-menu: Flashing when Faulty



14.5.2.10 Setting the Panel Heating

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Off" or "On" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

The "Back" item returns you to the Panel sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop - Enter“ key.

Fig. 14.5.2.10-1: Sub-menu: Panel Heating



14.5.2.11 Setting the display of the optional measurement data

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

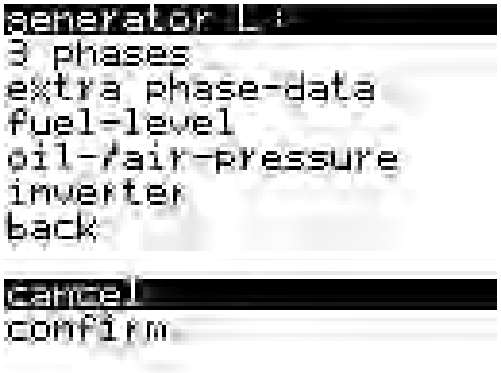
The desired optional measurement data is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

The desired option is selected by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

The "Back" item returns you to the Panel sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.2.11-1: Sub-menu: Optional Measurement Data



14.5.2.12 Supplementary Start-up functions

This menu item is only available in the case of inverter generators

Fig. 14.5.2.12-1: Note



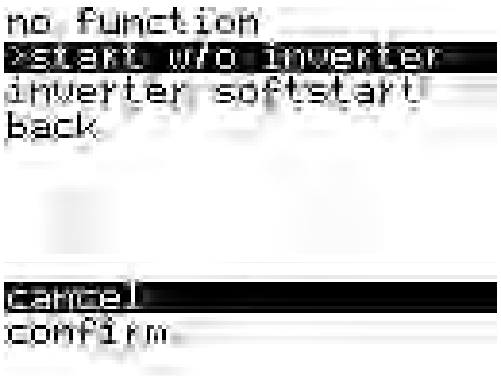
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

The desired option is selected by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

The "Back" item returns you to the Panel sub-menu.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.2.12-2: Sub-menu: Supplementary Start-up functions



14.5.2.13 Resetting all values of the Panel sub-menu to default values

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.2.13-1: Resetting all values



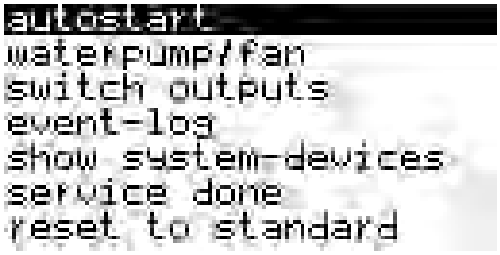
14.5.2.14 Return to Main Menu

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

14.5.3 Sub-menu: "Generator"

The following items can be selected in the Generator sub-menu:

Fig. 14.5.3-1: Generator Sub-Menu



1. Autostart

   - configuring the Autostart function

2. Water pump/Fan

   - setting the optional DC outputs

3. Switch Outputs

   - manual switching of the individual digital outputs

4. Event Memory

   - displaying the event memory

5. Display System Devices

   - displaying the detected system devices

6. Service performed

   - resets the service interval

7. Reset to standard

   - all parameters of the "Generator" sub-menu are reset to the factory settings

8. back

   - Switching from the "Generator" sub-menu to the Main Menu

14.5.3.1 Setting the Autostart of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

A choice can be made between "Switch on/off" and "Number of start-up attempts" in in the "Autostart" sub-menu.

Fig. 14.5.3.1-1: Autostart



Switching On / Off

"Off" for deactivated or "On" for activated can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

Fig. 14.5.3.1-2: Autostart



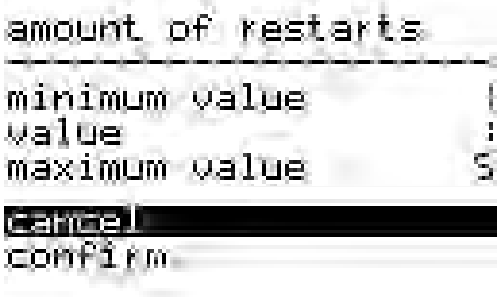
Number of start-up attempts

The value is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/ Stop-Enter“ key.

For safety reasons, the number of start-up attempts is limited to one in the case of marine (PMS) generators.

Fig. 14.5.3.1-3: Autostart



Deadly danger! - The generator can be equipped with an Autostart function. This means that the generator is started by an external signal. In order to prevent an inadvertent start-up, the starter battery must be disconnected before work on the generator may commence.

Warning! Automatic start-up.



The "Autostart" also remains active if the fpControl CP-G is switched off and then on again.

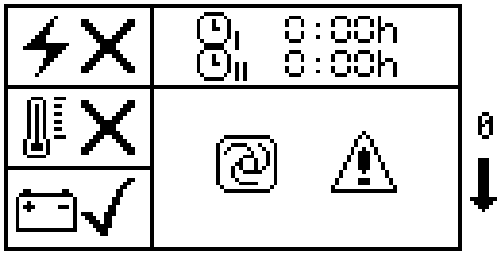
If a fault should arise when the generator is started or is already operating, it is stopped and the Autostart is set to "off".

If the generator is operated by Autostart and is stopped manually, the Autostart is set to "off".

Once the system has been switched off and then on again, the Autostart is active once more.

The first overview page shows if the Autostart is active.

Fig. 14.5.3-4: Overview Page 1 with Autostart



14.5.3.2 Setting the optional water pump/fan DC output of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Operating Mode" or "Follow-up Time" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

The "Back" item returns you to the "Generator" sub-menu.

Select “cancel” or “confirm” by using the "Step-up"/"Step-down" keys and then confirm with the "Start/Stop-Enter“ key.

Fig. 14.5.3.2-1: Sub-menu: Optional DC Output

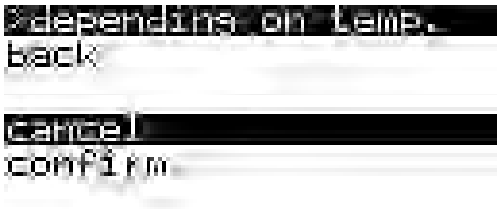


Setting the “Operating mode” for the optional DC output (DP) of the CP-G

An option can be selected by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.3.2-2: Sub-menu: Operating Mode

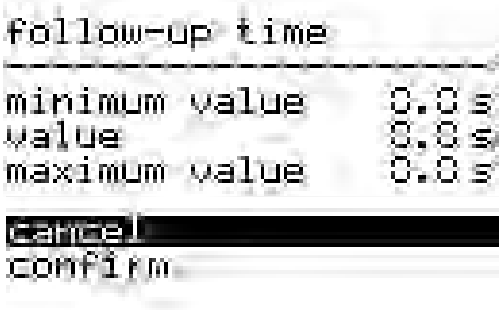


Setting the follow-up time of the optional DP Output of the CP-G

The value is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.3.2-3: Sub-menu: Follow-up Time



14.5.3.3 Switching the switching outputs of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

Select "Fuel Pump" or "Opt. DC Outputs" by using the "Step-up"/"Step-down" keys and then confirm with the "Start/Stop-Enter“ key.

The "Back" item returns you to the "Generator" sub-menu.

The value of the output can be set to "0" for deactivated or "1" for activated by using the "Step-up"/"Step-down" keys. Confirm with the "Start/Stop-Enter“ key.

Fig. 14.5.3.3-1: Sub-menu: Switching Outputs



14.5.3.4 Reading out the Event Memory of the CP-G

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

Siehe “Table of Faults” auf Seite 160. Siehe “Description of the symbols” auf Seite 162.

Fig. 14.5.3.4-1: Event Memory



One can scroll through the event memory by using the "Step-up"/"Step-down" keys and then return to the Generator menu with the "Start/Stop-Enter“ key.

By using the QR Code, the relevant fault page of the knowledgebase.fischerpanda.de can be called up via the Internet.

Note

To do so, simply scan the QR Code with a smartphone (Internet connection required).

14.5.3.5 Resetting all values of the Generator sub-menu to the default values

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

"Cancel" or "Confirm" can be selected by using the "Step-up"/"Step-down" keys and then confirmed with the "Start/Stop-Enter“ key.

Fig. 14.5.3.5-1: Resetting all values



14.5.3.6 Returning the Main Menu

The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

14.5.4 Resetting the panel language to the default (English)

1. Press and hold the "Step down" key with the panel switched off.
2. Switch on the panel and hold down the "Step down" key until the first overview screen is displayed.
3. The panel language has now been reset. All other settings are retained.

14.5.4.1 How to set the panel language after a reset.

1. Switch on the fpControl Panel CP-G
2. Wait until the first overview screen appears.
3. Scroll to the last overview screen.
4. Press the "Start/Stop-Enter" key to access the menu.
5. Scroll down to the "Panel" menu item.
6. Press the "Start/Stop-Enter" key to access the "Panel" sub-menu.
7. Scroll down to the "Choose language" menu item.
8. Press the Start/Stop-Enter key to access the "Language Selection" sub-menu.
9. Scroll to the desired language and confirm with the "Start/Stop-Enter" key.

10. Scroll down to the "confirm" menu item and press the "Start/Stop-Enter" key.

The menu text is now set to the selected language.

14.6 Faults

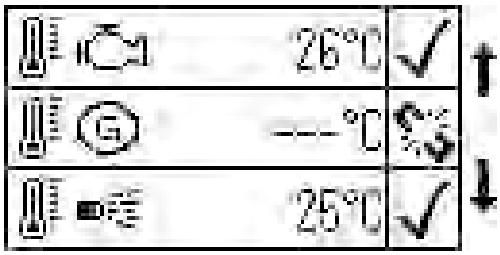
14.6.1 Symbols and messages on the display

14.6.1.1 Example of message - "Sensor defective"

A soon as a defective sensor is detected, the fpControl reports this on the display.



Fig. 14.6.1.1-1: Sensor defective

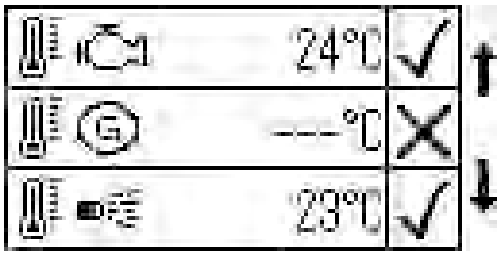


14.6.1.2 Example of message - "Sensor/Cable break"

If the sensor has failed or the cable is broken, the following report is displayed:



Fig. 14.6.1.2-1: Sensor/Cable break



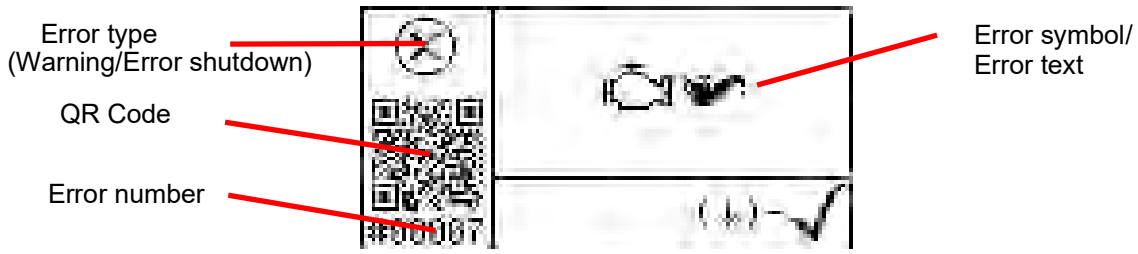
14.6.2 Error code

An error code is displayed if a parameter lies beyond its operating limits.

Siehe “Table of Faults” auf Seite 160. Siehe “Description of the symbols” auf Seite 162.

Example: Error No. 7 - Oil pressure too low -Fault led to emergency shutdown

Fig. 14.6.2.0-1: Sub-menu: "Event Memory"



By using the QR Code, the relevant fault page of the knowledgebase.fischerpanda.de can be called up via the Internet.

To do so, simply scan the QR Code with a smartphone (Internet connection required).

Note



14.6.2.1 Table of Faults

See also the "Faults" chapter in the manual of the generator.

The relevant fault page of the knowledgebase.fischerpanda.de can be called up via the Internet.

Note



(Internet connection required).

Fig. 14.6-1: Table of faults

No.	Description	Basic
1	AC Voltage L1	AC Voltage L1 is below its lower limit
2	AC Frequency L1	AC Frequency L1 is below its lower limit
5	Emergency-Off	Emergency-off switch is active/has been pressed
7	Oil pressure	Engine oil pressure is below its lower limit
8	Cylinder head temperature	Cylinder head temperature sensor not available/Contact open/Cable break
9	Winding temperature	Winding temperature sensor not available/Contact open/Cable break
10	Exhaust temperature	Exhaust temperature sensor not available/Contact open/Cable break
11	Electronics temperature	Temperature sensor for the electronic system (sensor on the fpControl circuit board) not available/defective
13	Starter motor current	Starter motor not connected/Starter motor defective
14	Glow plug circuit	One or more glow plugs not connected or defective
16	Fuel supply	Fuel valve/fuel pump not connected or defective
17	ETR Stop Solenoid hold	Current at output of the ETR hold coil is below the lower limit
18	ETR Stop Solenoid pull	Current at output of the ETR pull coil is below the lower limit
19	Water pump/Fan	Fan/water pump not connected or defective
20	Current sensor	Current sensor not available/Contact open/Cable break
21	Boost relay current	Boost relay not connected or defective
25	Starter battery voltage	Starter battery voltage too low
26	Engine speed error	Engine speed (r.p.m.) too low
30	AC Voltage L2	AC Voltage L2 is below its lower limit
31	AC Frequency L2	AC Frequency L2 is below its lower limit
34	AC Voltage L3	AC Voltage L3 is below its lower limit
35	AC Frequency L3	AC Frequency L3 is below its lower limit
38	Inverter DC supply	Current at output of the DC supply voltage of the inverter is below the lower limit
39	Universal output 1 (1A)	Electrical load on Universal output 1 is defective/no consumer connected
40	Universal output 2 (5A)	Electrical load on Universal output 2 is defective/no consumer connected
41	AGT DC voltage 1	Battery voltage too low
42	AGT DC current 1	Battery current too low
43	AGT DC voltage 2	Total voltage compared to battery voltage too low
44	AGT DC current 2	Sum of battery and load current too low
45	AGT B6 radiator	Temperature sensor not available/Contact open/Cable break
46	AGT B6 busbar (-)	Temperature sensor not available/Contact open/Cable break
47	AGT B6 busbar (+)	Temperature sensor not available/Contact open/Cable break
62	Fuel temperature	Temperature sensor not available/Contact open/Cable break
63	Fuel level	The fuel level has reached its lower limit
65	AC Voltage L1	AC Voltage L1 is above upper limit
66	AC Frequency L1	AC Frequency L1 is above upper limit
67	AC Current L1	AC Current L1 is above upper limit
68	AC Output L1	AC Output L1 is above upper limit

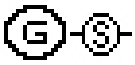
No.	Description	Basic
70	Servomotor current	Servomotor current is above upper limit
71	Oil pressure	Oil pressure is above upper limit
72	Cylinder head temperature	Temperature of the diesel engine / Cylinder head is above upper limit
73	Winding temperature	Winding temperature is above upper limit
74	Exhaust temperature	Exhaust temperature is above upper limit
75	Electronics temperature	Temperature of electronic system above upper limit
77	Starter motor output	Current at output of starter motor is above upper limit
78	Glow plug circuit	Current at output of the glow plugs is above upper limit
79	Flame-start system	Current at output of flame-start system is above upper limit
80	Fuel supply	Current at output of the fuel valve / fuel pump / DC generator exciter is above upper limit
81	Stop Solenoid hold	Current at output of the hold coil of the stop solenoid is above upper limit
82	Stop Solenoid pull	Current at output of the pull coil of the stop solenoid is above upper limit
83	Water pump/Fan	Current at output of the water pump/fan is above upper limit
84	Current sensor supply	Current at output of the current sensor is above upper limit
85	Boost relay	Boost relay fault
86	Bus current	Current at the CAN bus is above upper limit
89	Starter battery voltage	Starter battery voltage is above upper limit
93	Power output relay	Current at output of load-breaking relay is above upper limit
94	AC Voltage L2	AC Voltage L2 is above upper limit
95	AC Frequency L2	AC Frequency L2 is above upper limit
96	AC Current L2	AC Current L2 is above upper limit
97	AC Output L2	AC Output L2 is above upper limit
98	AC Voltage L3	AC Voltage L3 is above upper limit
99	AC Frequency L3	AC Frequency L3 is above upper limit
100	AC Current L3	AC Current L3 is above upper limit
101	AC Output L3	AC Output L3 is above upper limit
102	Inverter DC supply	Current at output of the DC supply of the inverter is above the upper limit
103	Universal Output 1 (1A)	Current at Universal Output 1 is above upper limit
104	Universal Output 2 (5A)	Current at Universal Output 2 is above upper limit
105	AGT DC Voltage 1	Battery voltage too high
106	AGT DC Current 1	Battery current too high
107	AGT DC Voltage 2	Total voltage compared to battery voltage too high
108	AGT DC Current 2	Sum of battery and load current too high
109	AGT B6 Radiator	Temperature at heat sink of the B6 bridge too high/Sensor error: Short circuit on temperature sensor
110	AGT B6 Busbar (-)	Temperature at busbar (-) of the B6 bridge too high/Sensor error: Short circuit on temperature sensor
111	AGT B6 Busbar (+)	Temperature at busbar (+) of the B6 bridge too high/Sensor error: Short circuit on temperature sensor
126	Fuel temperature	Fuel temperature too high/Sensor error Short circuit on temperature sensor
130	CAN communication interrupted	The panel has lost contact with the control system
131	CAN communication interrupted	The control system has lost contact with the panel
132	Service interval	Service due
133	BUS Module lost (3ph measurement)	Communication with the 3-ph Module interrupted
134	BUS Module lost (DC measurement)	Communication with the AGT Module interrupted
135	Synchronisation error	Problem with synchronisation of the output voltages of generators switched in parallel.
136	External motor controller communication	Communication with the external motor controller (ECU) has been interrupted
137	Air filter	Air filter has generated an error message
138	Diagnostic message (ECU)	Control device of the diesel engine has transmitted a diagnostic warning

No.	Description	Basic
139	Synchronisation module communication	Communication with the synchronisation module has been interrupted
140	Load distribution	Load balancing error
141	Synchronisation deactivated	Synchronisation module deactivated
142	Error message from engine control unit	The diesel engine control unit has generated a Red Stop Lamp Error
148	Rotary field error	The phases are connected in the incorrect sequence
149	Fuel level sensor error	Communication with the fuel level sensor has been interrupted
151	"Watchdog", control system restart	Control system is restarted after a malfunction
152	Temperature Inverter L1	Temperature of L1 of the inverter above upper limit
153	Temperature Inverter L2	Temperature of L2 of the inverter above upper limit
154	Temperature Inverter L3	Temperature of L3 of the inverter above upper limit
155	Temperature Inverter DC intermediate circuit	Temperature of the DC intermediate circuit of the inverter is above upper limit
157	Inverter communication	Communication with the inverter has been interrupted
163	Inverter DC intermediate circuit load	DC intermediate circuit current is above upper limit
164	Inverter DC intermediate circuit voltage	Inverter DC intermediate circuit voltage too high
167	No rev analysis/Monitoring	Simulation of the engine speed for start-up without inverter
245	Factory setting changed	User input in Factory menu
251	Parameter changed in Admin Level	User input in Admin menu

14.6.2.2 Description of the symbols

Fig. 14.6-1: Description of the symbols

Symbol	Description			Symbol	Description	
	WARNING				Current	Generator output
	Error shutdown				Frequency	Generator output
	Faults	No contact			Voltage	Generator output
	Broken	Short circuit			(%)/Load	
	OK				Generator runs	
	AC Voltage				Generator off	
	Run-up phase/Over-ride	Generator start-up			Temperature	
	Standby				Engine	
	Automatic start-up.				Exhaust system	
	Starter battery				Winding	

Symbol	Description			Symbol	Description	
	Operating hours				Preheating	
	Oil pressure				Speed/RPM	
	Self test				Tank gauge %	
	Apparent power				Starter turns	
Example:  Error73: Error shutdown due to winding temperature						

14.7 Accessories:

FP Bus Cable (15 m): 34.02.02.131H

Fig. 14.7-1: FP Bus Cable (15 m): 34.02.02.131H



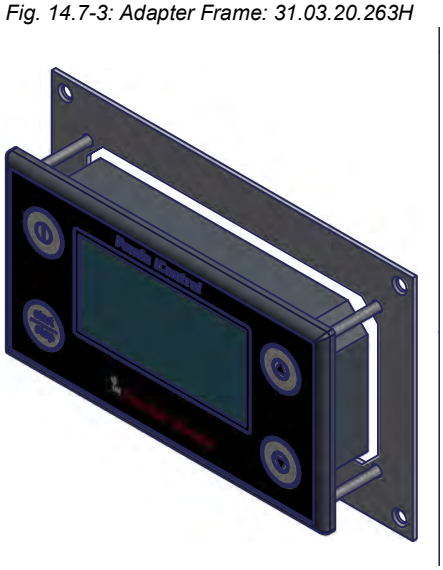
Terminating resistor:34.02.02.133H

Fig. 14.7-2: Terminating resistor:34.02.02.133H



Adapter Frame: 31.03.20.263H

Fig. 14.7-3: Adapter Frame: 31.03.20.263H



xContol CP-G in a Generator Control (P6+) section

14.7.1 Dimensional drawing

Fig. 14.7.1-1: CP-G

