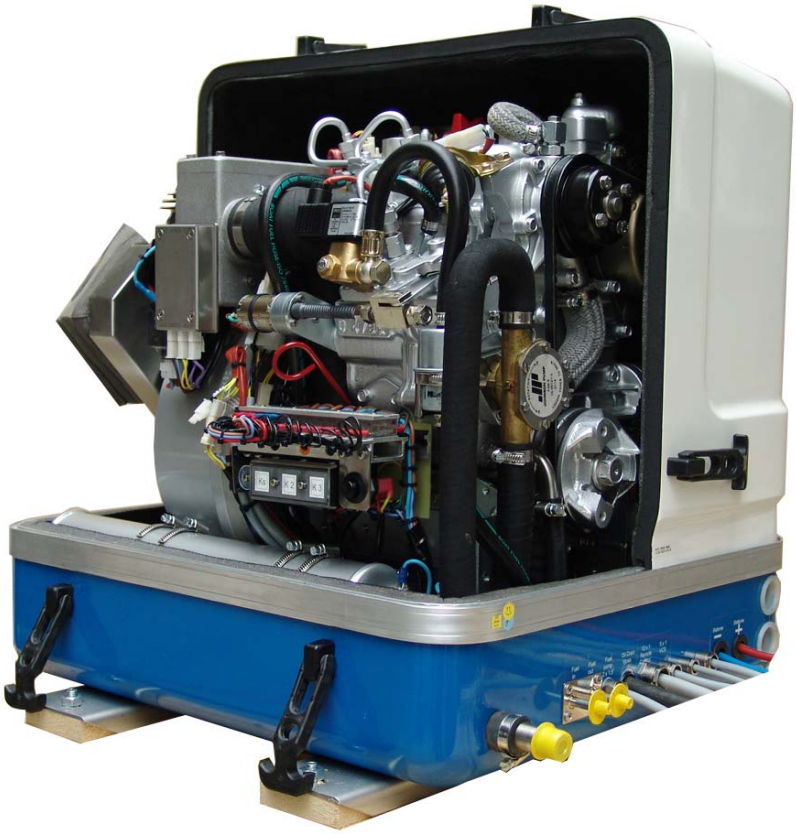
Fischer Panda®

Power wherever you are™



Manual Marine Generator

Panda PMS AGT 6000 24 V-72 V - 6 kVA

Panda AGT DC 5000 PMS - 12 V / 5 kVA

Super silent technology

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Dear Customer,

Thank you for purchasing a Fischer Panda Generator and choosing Fischer Panda as your partner for mobile power on board. With your generator, you now have the means to produce your own power – wherever you are - and experience even greater independence. Not only do you have a Fischer Panda generator on board, you also have worldwide support from the Fischer Panda Team. Please take the time to read this and find how we can support you further.

Installation Approval and Warranty

Every generator has a worldwide warranty. You can apply for this warranty through your dealer when the installation is approved. If you have purchased an extended warranty, please ensure that it is kept in a safe place and that the dealer has your current address. Consult your dealer about warranty options especially if you have purchased a used generator. He will be able to advise about authorised Fischer Panda Services worldwide.

Service and Support

To ensure that your generator operates reliably, regular maintenance checks and tasks as specified in this manual must be carried out. Fischer Panda can supply Service Kits which are ideal for regular servicing tasks. We only supply the highest quality components which are guaranteed to be the RIGHT parts for your generator. Service “Plus” Kits are also available and ideal for longer trips where more than one service interval may be required.

If you require assistance – please contact your Fischer Panda Dealer. Please do not attempt to undertake any repair work yourself, as this may affect your generator warranty. Your dealer will also be able to assist in finding your nearest Fischer Panda service station. Your nearest service station can also be found in our Global Service Network which can be downloaded from our homepage.

Product Registration

Please take the time to register your Fischer Panda Generator on our website at

http://www.fischerpanda.de/mypanda

By registering, you will ensure that you will be kept up to date on any technical upgrades or specific information on the operation or servicing of your generator. We can even let you know about new Fischer Panda products – especially helpful if you are planning to upgrade or expand your installation at a later date.

Fischer Panda Quality - Tried and Tested

DIN-certified according DIN ISO 9001

Thank you for purchasing a Fischer Panda Generator.

Your Fischer Panda Team

1. General Instructions and Regulations

1.1 Safety first!

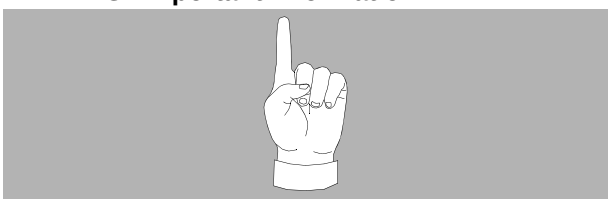
These symbols are used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury of lethal danger during certain maintenance work or operations. Read these instructions carefully.

Can cause acute or chronic health impairments or death even in very small quantities if inhaled, swallowed, or absorbed through the skin.

WARNING: Hazardous materials

This warning symbol draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in damage or destruction of equipment.

WARNING: Important information!



Warning of materials that may ignite in the presence of an ignition source (cigarettes, hot surfaces, sparks, etc.).

WARNING: Fire hazard

In the environment described / during the work specified, smoking is prohibited.

PROHIBITED: No smoking

Fire and naked light are ignition sources that must be avoided.

PROHIBITED: No fire or naked light

The equipment shall not be activated or started up while work is in progress.

PROHIBITED: Do not activate/start up

Touching of the corresponding parts and systems is prohibited.

PROHIBITED: Do not touch

Danger for life! Working at a running generator can result in severe personal injury.

The generator can be equipped with a automatic start device. This means, an external signal may trigger an automatic start-up. To avoid an unexpected starting of the generator, the starter battery must be disconnected before working at the generator.

DANGER: Automatic start-up

This danger symbol refers to the danger of electric shock and draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in severe personal injury or loss of life due to electric shock.

WARNING: Hazardous electric voltage

General warning of a hazard area

WARNING: General warning

Can cause acute or chronic health impairments or death even in very small quantities if inhaled or ingested.

WARNING: Danger due to inhalation and/or ingestion

Warning of live parts that may cause electric shock upon contact. Especially dangerous for persons with heart problems or pacemakers.

WARNING: Risk of electric shock upon contact

Danger of injury due to being pulled into equipment. Bruising and torn off body parts possible. Risk of being pulled in when touching with body part, loose-fitting clothing, scarf, tie, etc.

WARNING: Danger due to rotating parts

Warning of substances that may cause an explosion under certain conditions, e.g. presence of heat or ignition sources.

WARNING: Explosion hazard

Warning of hot surfaces and liquids. Burn/scalding hazard.

WARNING: Hot surface

Warning of substances that cause chemical burns upon contact. These substances can act as contaminants if introduced into the body.

WARNING: Danger due to corrosive substances, potential contamination of person

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!

Warning of hearing damages.

WARNING: Hearing damage

Warning of magnetic field.

WARNING: Magnetic field

Warning of overpressure.

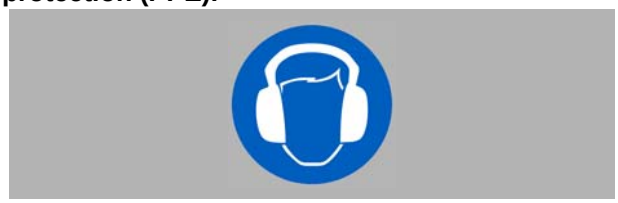
WARNING: Overpressure

Wearing the applicable snugly fitting protective clothing provides protection from hazards and can prevent damage to your health.

MANDATORY INSTRUCTION: Wear snugly fitting protective clothing (PPE).

Wearing hearing protection provides protection from acute and gradual hearing loss.

MANDATORY INSTRUCTION: Wear hearing protection (PPE).



Wearing safety goggles protects the eyes from damage. Optical spectacles are not a replacement for the corresponding safety goggles.

MANDATORY INSTRUCTION: Wear safety goggles (PPE).

Wearing protective gloves provides the hands from hazards like friction, graze, punctures or deep cuts and protects them from contact with hot surfaces.

MANDATORY INSTRUCTION: Wear protective gloves (PPE).

Compliance with the instructions in the manual can avert danger and prevent accidents. This will protect you and the generator.

MANDATORY INSTRUCTION: Observe the instructions in the manual.

Environmental protection saves our living environment. For you and for your children.

MANDATORY INSTRUCTION: Comply with environmental protection requirements.

1.2 Tools

These symbols are used throughout this manual to show which tool must be used for maintenance or installation.

	Spanners W.A.F X = width across flats of X mm
	Hook wrench for oil filter
	Screw driver, for slotted head screws and for Phillips head screws
	Multimeter, multimeter with capacitor measuring unit
	Socket wrench set
	Hexagon socket wrench set

	Clamp-on ammeter (DC for synchronous generators; AC for asynchronous generators)
	Torque wrench

1.3 Manufacturer declaration in accordance with the Machinery Directive 2006/42/EC

Manufacturer declaration in accordance with the Machinery Directive 2006/42/EC

The generator was designed in such a way that all assemblies correspond with the CE guidelines. If Machinery Directive 2006/42/EC is applied, then it is forbidden to start the generator until it has been ascertained that the system into which the generator is to be integrated also complies with the Machinery Directive 2006/42/EC. This includes the exhaust system, cooling system and electrical installations.

The evaluation of “protection against contact“ must be carried out when installed, in conjunction with the respective system. This also includes correct electrical connections, a safe ground wire connection, foreign body and humidity protection, protection against moisture due to excessive condensation, as well as overheating through appropriate and inappropriate use of the equipment in its installed state. The responsibility for implementing these measures lies with those who undertake the installation of the generator in the final system.

1.4 Customer registration and guarantee

Use the advantages of registering your product:

- you will receive a Guarantee Certificate after approval of your installation data
- you will receive extended product information that may be relevant to safety.
- You will receive free upgrades as necessary.

Additional advantages:

Based on your complete data record, Fischer Panda technicians can provide you with fast assistance, since 90 % of the disturbances result from defects in the periphery.

Problems due to installation errors can be recognized in advance.

1.4.1 Technical support

Technical Support via the Internet: info@fischerpanda.de

1.4.2 Caution, important information for start-up!

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

1.5 Safety Instructions - Safety First!

1.5.1 Safe operation

Careful handling of the equipment is the best insurance against an accident. Read the manual diligently, and make sure you understand it before starting up the equipment. All operators, regardless of their experience level, shall read this manual 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.

1.5.2 Observe safety instructions!

Read and understand this manual 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.

1.5.3 Personal protective clothing (PPE)

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, medications, or drugs.

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

1.5.4 Cleanliness ensures safety

Keep the generator and its environment clean.

Before cleaning the generator, shut down the equipment and secure it against accidental start-up. 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.

1.5.5 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 was 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.

1.5.6 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.

Exhaust gases from diesel motors and some components are carcinogenic and can cause deformities and other genetic defects.

1.5.7 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. Use caution around hot components such as parts containing exhaust fumes, radiator, hoses, and engine block during operation and after the generator was shut down.

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 bank 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 life span of the battery is significantly reduced, and the risk of explosion increases. Refill to a fluid level between maximum and minimum level without delay.

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

Check the charge level with an adequate voltmeter or acid siphon. Contact of a metal object across the terminals will result in short-circuiting, battery damage, and high explosion risk.

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

1.5.8 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 rotating parts such as V-belt, fans, pulleys, and flywheel. Contact can cause severe 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.

1.5.9 Anti-freeze and disposal of fluids

Anti-freeze 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 was 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.

1.5.10 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 extinguisher and a first aid box handy while performing maintenance work.

1.6 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.

1.6.1 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 being 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!

If a sound insulation covering will be produced at the place of installation, then easily visible signs must show that the generator must only be switched on while the capsule is closed.

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

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

1.6.1.1 Protective conductor and potential equalisation:

Electric current below 48 V may be life-threatening. Fort this reason systems are grounded with a protective conductor. In connection with a RCD the current supply will be disconnected in case of a failure.

Appropriate safety precautions like the RCD and corresponding fuses have to be provided by the customer to guarantee a save operation of the generator.

1.6.1.2 Protective conductor for Panda AC generators:

The generator is earthed“ as a standard (centre and ground are interconnected in the generator terminal box by a shunt). 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 „neutralisation“ (Protective Earthing Neutral - PEN) is only effective if all parts of the electrical system are jointly „earthed“ to 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 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 must always be disconnected if work on the generator or electrical system is to be carried out, so that the generator cannot be started up unintentionally.

1.6.1.3 Switch off all loads while working on the generator

All loads must be disconnected prior to working on the generator to avoid damage to the devices. In addition, the semiconductor relays in the AC control box must be disconnected in order to avoid the booster capacitors being activated during set-up. The negative terminal of the battery must be disconnected.

Capacitors are required to run the generator. These have two varying functions:

A) The working capacitors

B) The booster capacitors

Both groups are located in a separate AC control box.

Capacitors store electrical energy. High voltages may remain across the capacitor contacts even after they have been disconnected from the mains. As a safety precaution, do not touch the contacts. If the capacitors must be replaced or inspected, the contacts shall be short-circuited by connecting an electrical conductor to discharge potentially remaining potential differences.

If the generator is switched off normally, the working capacitors are automatically discharged via the winding of the generator. The booster capacitors are discharged by means of internal discharge resistors.

For safety reasons, all capacitors must be discharged through short-circuiting before work is carried out on the AC control box.

1.6.1.4 Potential equalisation for Panda AGT DC generators

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

1.6.1.5 Safety instructions concerning cables

Cable types

It is recommended to use cables that are in compliance with the standard UL 1426 (BC-5W2) 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. It must be ensured that the cable guide is not routed along hot surfaces such as the exhaust manifold or the engine oil drain screw but instead is installed free from any influence due to friction and crushing.

1.6.2 Recommended starter battery sizes

Use only batteries approved by the manufacturer as starter batteries.

Use the battery capacity recommended by the engine manufacturer.

ATTENTION!

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 start-up system (e. g. 2x 12 V in series)

1.6.3 Important instructions for batteries - starter and/or traction batteries

ATTENTION!!! Start-up:

Installation of battery connection lines.

Observe the instructions installation guidelines of the battery manufacturer.

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

The battery compartment and the corresponding installation shall be dimensioned adequately.

The batteries can be separated mechanically or with an adequate power relay.

Observe the applicable instructions concerning fire and explosion protection of the battery manufacturer.

Install a fuse of appropriate size in the positive connection of the starter battery. Install as close to the battery as possible but with a max. distance of 300 mm (12 in) from the battery.

The cable from the battery to the fuse shall be protected with a conduit/protective sleeve against fraying.

Use self-extinguishing and fire-protected cables for installation that are designed for max. temperatures of 90 °C, 195 °F.

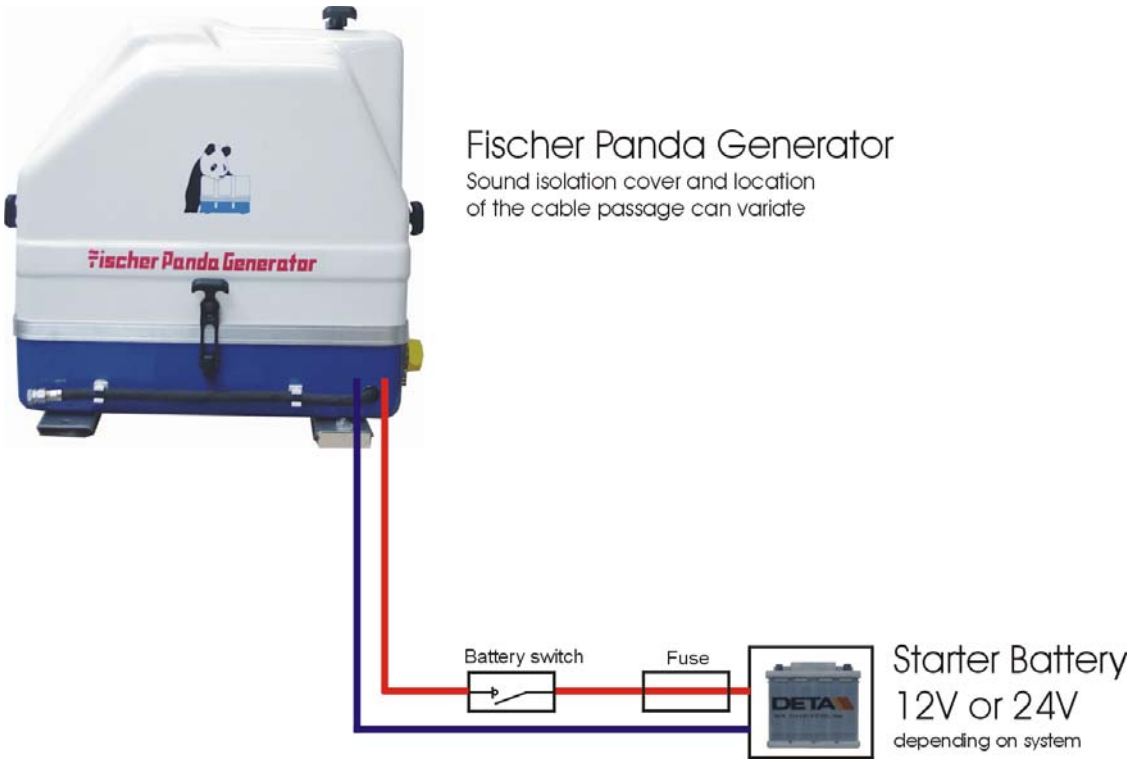
Install the battery cables in such a way that the insulation cannot be removed by chafing or other mechanical stresses.

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 installed so that it does not come into contact with rotating parts or such that heat up during operation such as pulley, exhaust manifold, exhaust pipe, and motor itself. Do not overtighten the cable, as it may be damaged otherwise.

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. 1.6-1: Sample diagram for starter battery installation



1.6.4 General safety instructions for 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 you have acid splashes on the skin or clothing, wash them out with lots of water and soap.
- If acid sprays into your eyes, immediately flush them with clean water until no more burning is felt. Immediately seek medical assistance.
- Do not smoke near the batteries. Avoid naked fire. 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 banks: 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 connection cables shall be installed with utmost care and shall be checked for excessive heating under load. Check the battery near vibrating components regularly for chafing and insulation defects.

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

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

2. Special Instructions and Hazards of AGT-DC Generators

2.1 General safety instructions for operating an AGT generator

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

It is mandatory to ensure that the battery is fitted with a main switch in an easily accessible area so that the main switch can be disconnected immediately in case of danger. The main switch must, however, also be installed directly on the battery. 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 DC battery with „Switch off in case of danger!“.

2.1.1 Diode block cooling

The diode block is water-cooled. Proper cooling of the diode block is therefore possible only while the cooling water supply of the generator functions properly.

Power rails and cooling devices are monitored with thermal switches. After a cooling system failure, the diodes shall be tested. See chapter on defects/maintenance in this manual.

The generator shall not be operated while the battery block is disconnected, the diodes could otherwise be destroyed!

WARNING: General warning

Touching the electric contacts can be LETHAL!

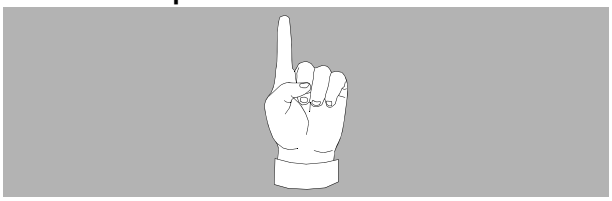
WARNING: Risk of electric shock upon contact

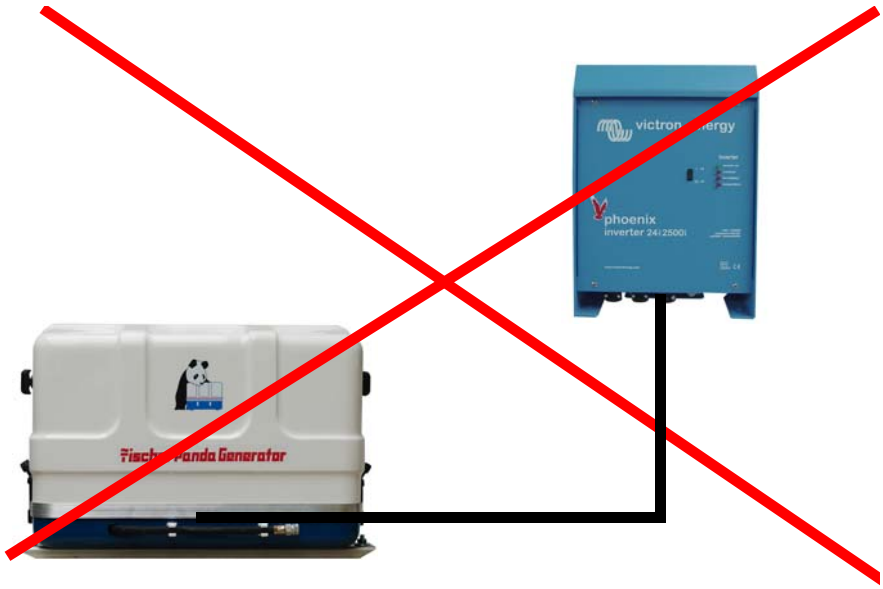
2.2 Sample system AGT DC generator

The AGT generator must not be directly connected to an inverter (without the batteries)!

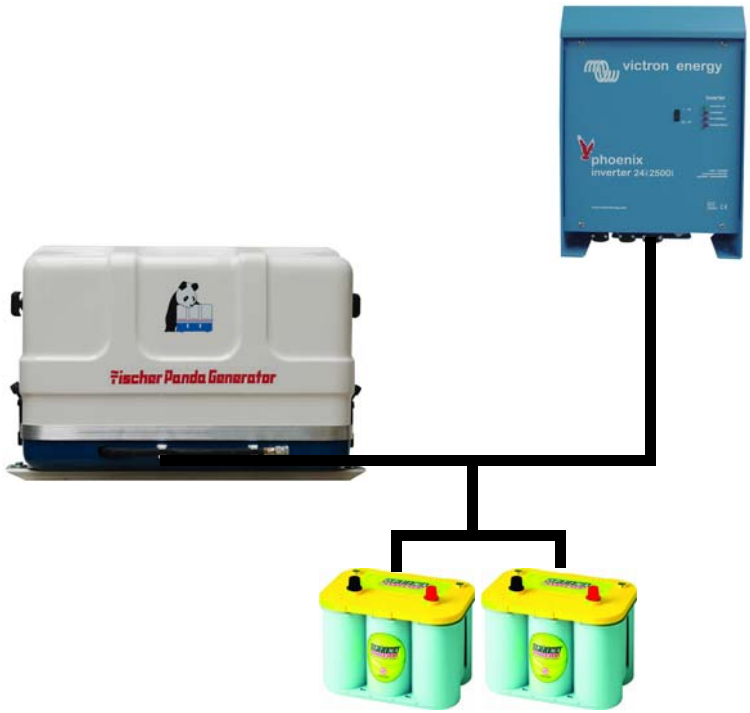
The inverter generates voltage peaks that can destroy the rectifier diodes of the generator!

WARNING: Important information!





Always connect a battery as a capacitive load together with the inverter!



The screws on the rectifier shall only be tightened with a torque wrench. Torque: see technical data sheet (e. g. 6 Nm mechanical and electrical connections of diode DD171N).

The battery cable shall be protected with the corresponding fuses on the generator and at the batteries.

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

2.2.1 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.

2.3 Additional tools

	Temperature measuring device
	Infra-red gun

Leere Seite / Intentionally blank

3. In case of Emergency First Aid / Im Notfall - Erste Hilfe

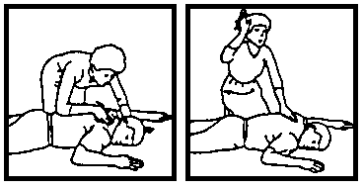
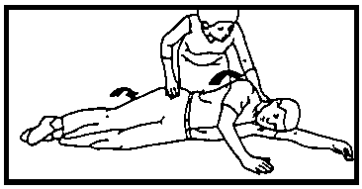
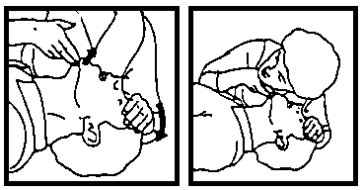
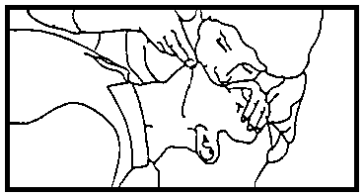
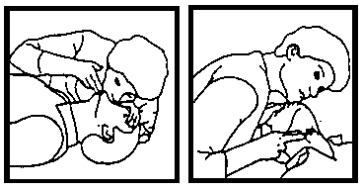


	First Aid in case of accidents by electrical shocks 5 Safety steps to follow if someone is the victim of electrical shock	
1	Do not touch the injured person while the generator is running.	
2	Switch off the generator immediately.	
3	If you cannot switch off the generator, pull, push, or lift the person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

3.1 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.

4. Basics

4.1 Intended use of the machine

The Fischer Panda generator is made to produce electrical energy out of diesel fuel.

The diesel fuel is converted to mechanical energy by the diesel engine. This mechanical energy drives the generator. In the genset, the mechanical energy is converted to electrical energy. This process is controlled by (sometimes external) components, the remote control panel and the voltage control system (VCS).

For the process is a sufficient amount of fuel and combustion air necessary. Arising exhaust and heat must be lead away.

If the electrical power should be applied to a local net, The regulation and installation instructions of the Net owner and the regional authorities must be respected. This includes lightening conductor, personal protection switch etc.

Misapplication of the Product can damage and destroy the product and the electrical net inclusive all load which is attached to the net, and contain hazards like short circuit. It is not allowed to modify the product in any case. Never open the sound cover during operation. The safety and hazard notes of the manual must be respected.

4.1.1 Purpose of the manual and description of the definitions trained person/operator/ user

This manual is work instruction and operation instruction for the owner and user of Fischer Panda generators.

The manual is the base and the guideline for the correct installation and maintenance of Fischer Panda Generators.

The manual does not substitute the technical evaluation and should be used as an example guide only.

The installation must be undertaken and proved by a suitable qualified/trained person and may in accordance with the law as required by the country and special situation.

4.1.1.1 Trained persons

Trained persons for the mechanical components are motor mechanics or persons with similar education and training.

Trained persons for the electrical components are electricians or persons with similar education and training.

After the Installation, the trained person must instruct the owner for operation and maintenance of the generator. This must include the hazards of the generator use.

4.1.2 Operator

The operator is the for the operation of the generator responsible person.

After the installation, the operator must be instructed for the operation ad maintenance of the generator. This must include the hazards during operation of the generator and a instruction for the maintenance.

The operator must read and follow the manual and must respect the hazard notes and safety instructions.

4.1.2.1 User

Users are persons, established by the operator, to operate the generator.

The operator must assure that the user read and understand the manual and that all hazard notes and safety instructions are respected. The user must be instructed by the operator regarding his activity at the generator.

4.2 Panda Transport Box

4.2.1 Bolted Fischer Panda Transport Box

1. Remove the bolts for cover / sidewalls
2. Remove the cover
3. Remove the loose accessories
4. Remove the bolts for sidewalls / floor pallet
5. Remove the sidewalls
6. Open the generator attachment

4.2.2 Fischer Panda Transport Box with metal tab closure

1. Bend up the metal tab closures on the transport box lid.
2. Remove the cover
3. Remove the loose
4. Bend open the metal tab closures on the transport box bottom.
5. Remove the sidewalls
6. Open the generator attachment

4.3 Transport and Loading/Unloading

4.3.1 Transporting the generator

- The generator must always be upright for transport.
- For transport, the Fischer Panda Transport Box shall be used for the generator. The generator shall be securely attached to the bottom of the box.
- For loading/unloading, an adequate industrial truck shall be used.
- Depending on the transport distance (e.g. air cargo), the generator fluids (coolant, engine oil, fuel) may have to be drained. The corresponding instructions and warnings must be fitted to the transport packaging.

4.3.2 Loading/unloading of the generator

For loading/unloading the generator, appropriate ring eye bolts shall be installed in the holes in the support rails. 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

Fig. 4.3-1: Lifting yoke (example)

4.4 Scope of delivery

The Fischer Panda PMS generator system contains following components:

4.4.1 PM generator

Fischer Panda Generator

representative picture

Fig. 4.4-1: Fischer Panda Generator

Remote control panel

representative picture

Fig. 4.4-2: Remote control panel

VCS (Voltage control system) for the voltage control

Fig. 4.4-3: VCS

representative picture

Rectifier unit

Depending on the model, the rectifier unit can be build at the generator or external. If the rectifier unit is an external one, the rectifier unit is apart of the generator and must be in the delivery. It is not allowed to use an independent rectifier unit or a unit from another Fischer Panda generator.

Fischer Panda Manual

Fig. 4.4.1-4: Fischer Panda Manual

The Fischer Panda Manual contains following components:

- Clear foil bag with general informations ect.
- Generator manual with added remote control panel manual
- Spare part catalogue „Installation & Service Guide“
- Engine manual from the engine manufacturer.
- Wiring diagram for the generator

representative picture

Optional components f.e.:

- Fuel pump
- Installation kit
- Water lock
- ect.

4.4.2 Opening the MPL sound insulation capsule

To open the sound insulation capsule, the closures must be rotated roughly 180° counter-clockwise. Use a flat head screwdriver. Pull the sidewalls out by gripping into the slots.

Fig. 4.4-1: Sound insulation capsule, side part

Closure locked

Fig. 4.4.2-2: Closure locked

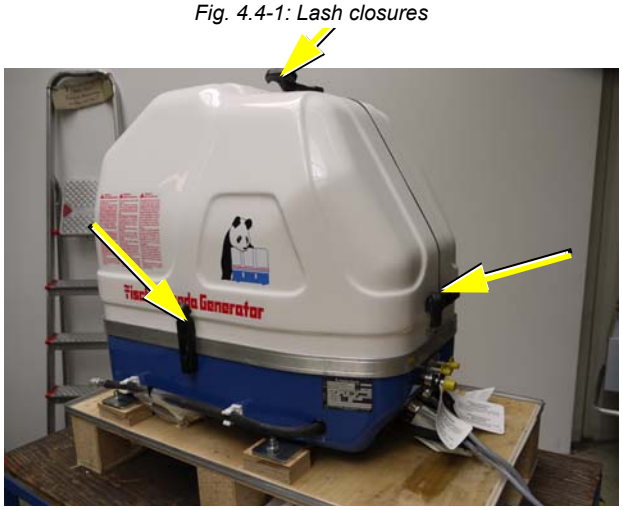
Closure open

Fig. 4.4-3: Closure open

4.4.3 Opening the GFK sound insulation capsule

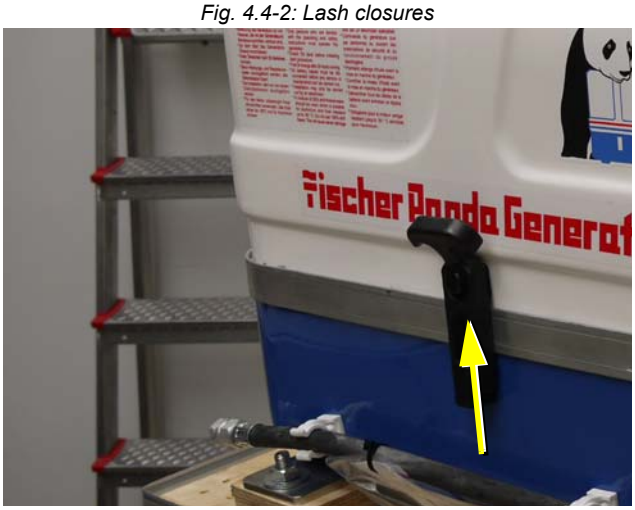
GFK sound insulation capsule with lash closures

Fig. 4.4-1: Lash closures



To open the lash closures pull the handle in arrow direction and lift the lash of the closure pin. After lifting of the lashes, the sound isolation cover upper pars can be removed.

Fig. 4.4-2: Lash closures



4.5 Special Service Instructions and Measures for Extended Machine Downtimes and Decommissioning

The decommissioning and storage must be undertaken and proved regarding the operation and storage situation.

Note:

Fischer Panda takes no responsibilty for damages through wrong decommissioning and storage.

Downtimes are categorised in the following groups:

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

4.5.1 Instructions for the starter battery for extended downtimes

Starter batteries

Self-discharge of batteries is a physical and chemical process and cannot be avoided even if the battery is disconnected

Note: Information starter battery

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

Depending on the battery type, check the acid level before charging and refill each cell up to the marking using distilled water as necessary.

Modern starter batteries are typically maintenance-free.

Deep discharge will damage the battery and can render it unusable.

Keep battery clean and dry. Clean battery poles (+ and -) and terminals regularly and coat with acid-free and acid-resistant grease. During assembly, ensure good contact of the terminal connections.

General limits for lead-acid batteries:

2.1 V / cell corresponds with full battery (charged).

1.95 V / cell corresponds with empty battery - recharge.

For a 12 V battery, the following applies:

- 11.7 V lower open-circuit voltage (battery empty), recharge battery.

- 12.6 V upper open-circuit voltage (full battery) - trickle charge full battery at 13.2 V.

For a 24 V battery, the following applies:

- 23.4 V lower open-circuit voltage (battery empty), recharge battery.

- 25.2 V upper open-circuit voltage (full battery) - trickle charge full battery at 26.4 V.

These values are based on a battery temperature of 20-25°C. Observe the instructions from the battery manufacturer.

Fischer Panda recommends:

- Install battery circuit breaker and switch to OFF on the machine. (Cutting the battery circuit.)
- Secure the battery plus terminal close to the battery.
- Regularly check contacts for corrosion.

Note: Starter battery recommendation

4.5.2 Measures for short downtimes

Short downtime (1 to 3 months)

- Measure battery charge status based on open-circuit voltage.
- During downtimes >7 days, disconnect battery (e.g. battery main switch to position 0).
- Check the battery within 2 months and allow the engine to warm up for min. 10 min.
- Fill fuel tank to 100% (level to full).

4.5.3 Measures for medium term downtimes / hibernation

Medium term downtimes (3 to 6 months)

4.5.3.1 Courses for preservation:

- Check battery charge status and recharge regularly, roughly every 2 months, as necessary. Observe instructions of the battery manufacturer.
- Check cooling water anti-freeze level and refill as necessary.

  The anti-freeze agent must not be older than 2 years. The anti-freeze content shall be between 40 % and 60 % to ensure corrosion protection of the cooling water circuit. Top off coolant if necessary.

  If the cooling water is drained, e.g. after engine surface protection is applied, no water may remain inside the engine during the downtime. The control unit must be marked accordingly with a note specifying “NO COOLING WATER“.
- Drain engine oil as specified. Refill engine with preservative oil to the max. level on the oil dipstick.
- Drain diesel from tank and refill with a protective mixture (90 % diesel and 10 % preservative oil) (level to full).

Crank engine without start.

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

Cover alternator 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 disks with preservative.
- Clean air filter housing and spray with preservative (metal housing only).
- Close off intake and exhaust apertures (e.g. with tape or end caps).

Before recommissioning, remove preservatives and protective measures. **Attention!**

4.5.3.2 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 cooling water anti-freeze level and cooling water level and refill as necessary.
- Drain engine oil. Replace oil filter and engine oil as per the specification.
- Remove preservatives from the engine with petroleum spirit.
- Degrease V-belt disks 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 delivery 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 battery. Close battery main switch.
- Hold stop lever on generator motor in neutral position and crank starter for approx. 10 seconds. Then, pause for 10 seconds. Repeat this procedure 2 times.
- Perform visual check of the generator similar to initial commissioning and start up generator.

4.5.4 Measures for extended downtimes / decommissioning

Downtimes (more than 6 months)

4.5.4.1 Courses for preservation:

- Check battery charge status and recharge regularly, roughly every 3 months, as necessary. Observe instructions of the battery manufacturer.
- Check cooling water anti-freeze level and refill as necessary.

  The anti-freeze agent must not be older than 2 years. The anti-freeze content shall be between 40 % and 60 % to ensure corrosion protection of the cooling water circuit. Top off coolant if necessary.

  If the cooling water is drained, e.g. after engine surface protection is applied, no water may remain inside the engine during the downtime. The control unit must be marked accordingly with a note specifying “NO COOLING WATER“.
- Drain engine oil as specified. Refill engine with preservative oil to the max. level on the oil dipstick.
- Drain diesel from tank and refill with a protective mixture (90 % diesel and 10 % preservative oil) (level to full).

Crank engine without start.

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

Cover alternator 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 disks with preservative.
- Clean air filter housing and spray with preservative (metal housing only).
- 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 delivery position and crank engine manually several times. Refit injection nozzles with new seals (at an operation hour of min. 100 hours after the last change). Observe torque values.
- Spray radiator cover and tank cover or radiator cover on expansion tank lightly with preservative oil and refit.
- Close off intake and exhaust apertures (e.g. with tape or end caps).

For storage for more than 12 months, the preservation measures shall be checked annually and supplemented as necessary. **Note:**

Before recommissioning, remove preservatives and protective measures. **Attention!**

4.5.4.2 Measures for removing surface protection after extended downtimes / recommissioning (over 6 months):

- Check battery charge status and recharge if necessary. Observe instructions of the battery manufacturer.

- Check cooling water anti-freeze level and cooling water level and refill as necessary.
- Drain engine oil. Replace oil filter and oil as per the specification.
- Remove preservatives from the engine with petroleum spirit.
- Degrease V-belt disks 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 delivery 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 battery. Close battery main switch.
- Hold stop lever on generator motor in neutral position and crank starter for approx. 10 seconds. Then, pause for 10 seconds. Repeat this procedure 2 times.
- Perform visual check of the generator similar to initial commissioning and start up generator.

Fischer Panda recommends:

After extended downtimes, a full 150 h inspection as per the inspection list should be performed.

Note:

5.The Panda Generator

5.1 Type plate at the Generator

Fig. 5.1-1: Type plate

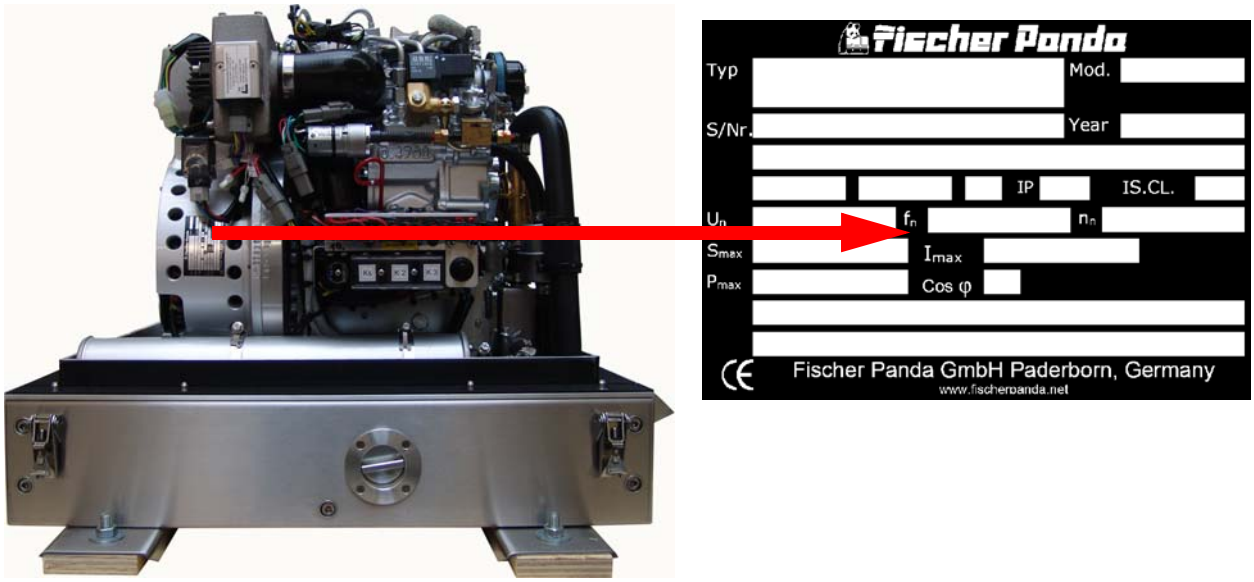
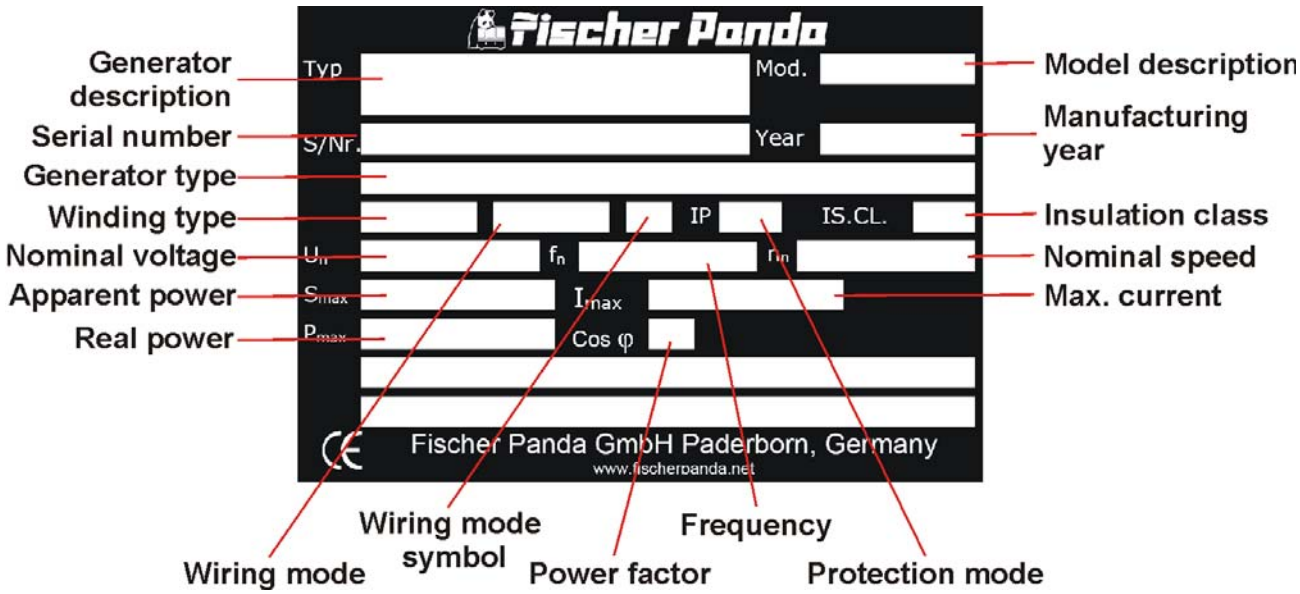


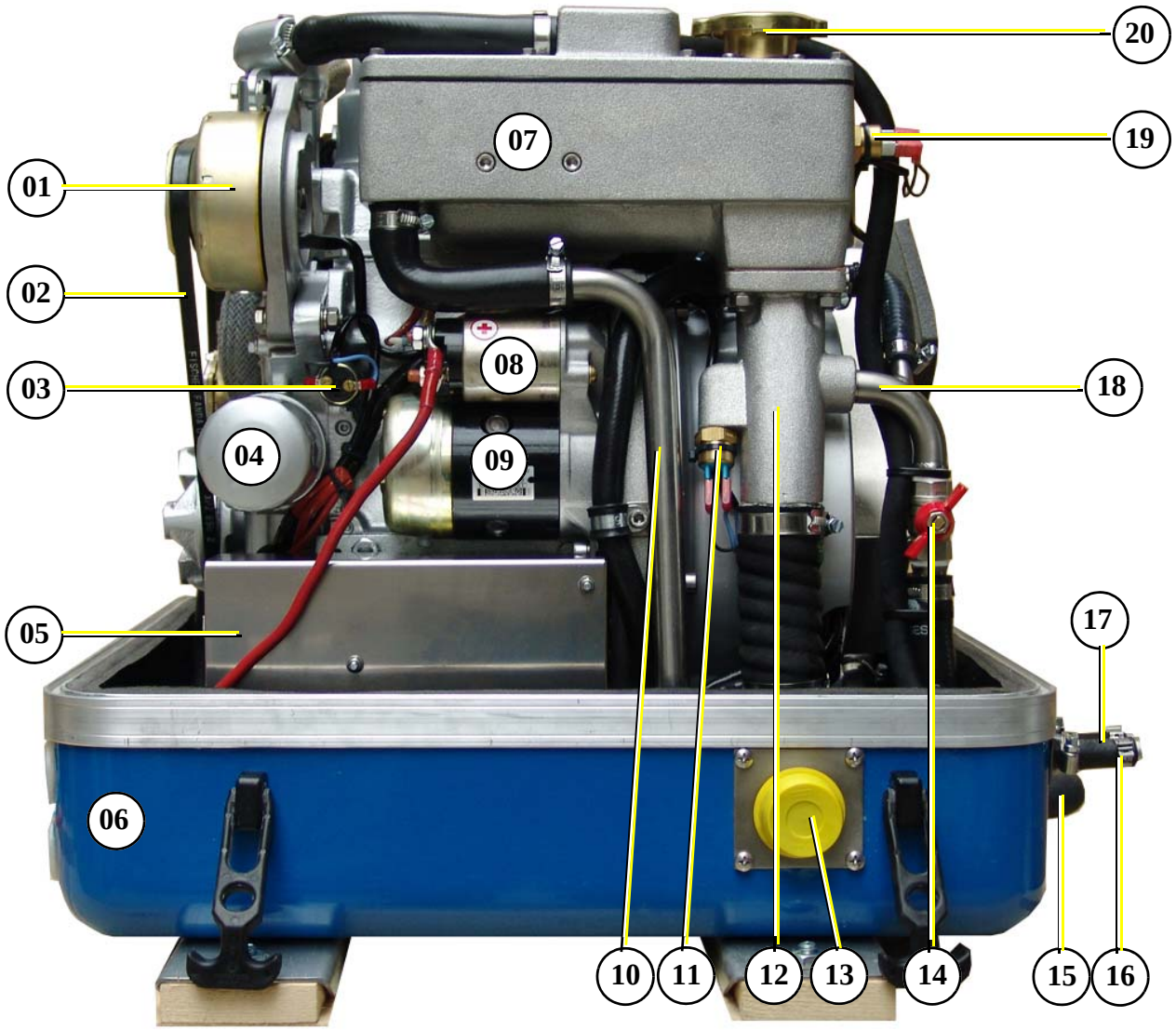
Fig. 5.1-2: Discription type plate



5.2 Description of the Generator

5.2.1 Right Side View

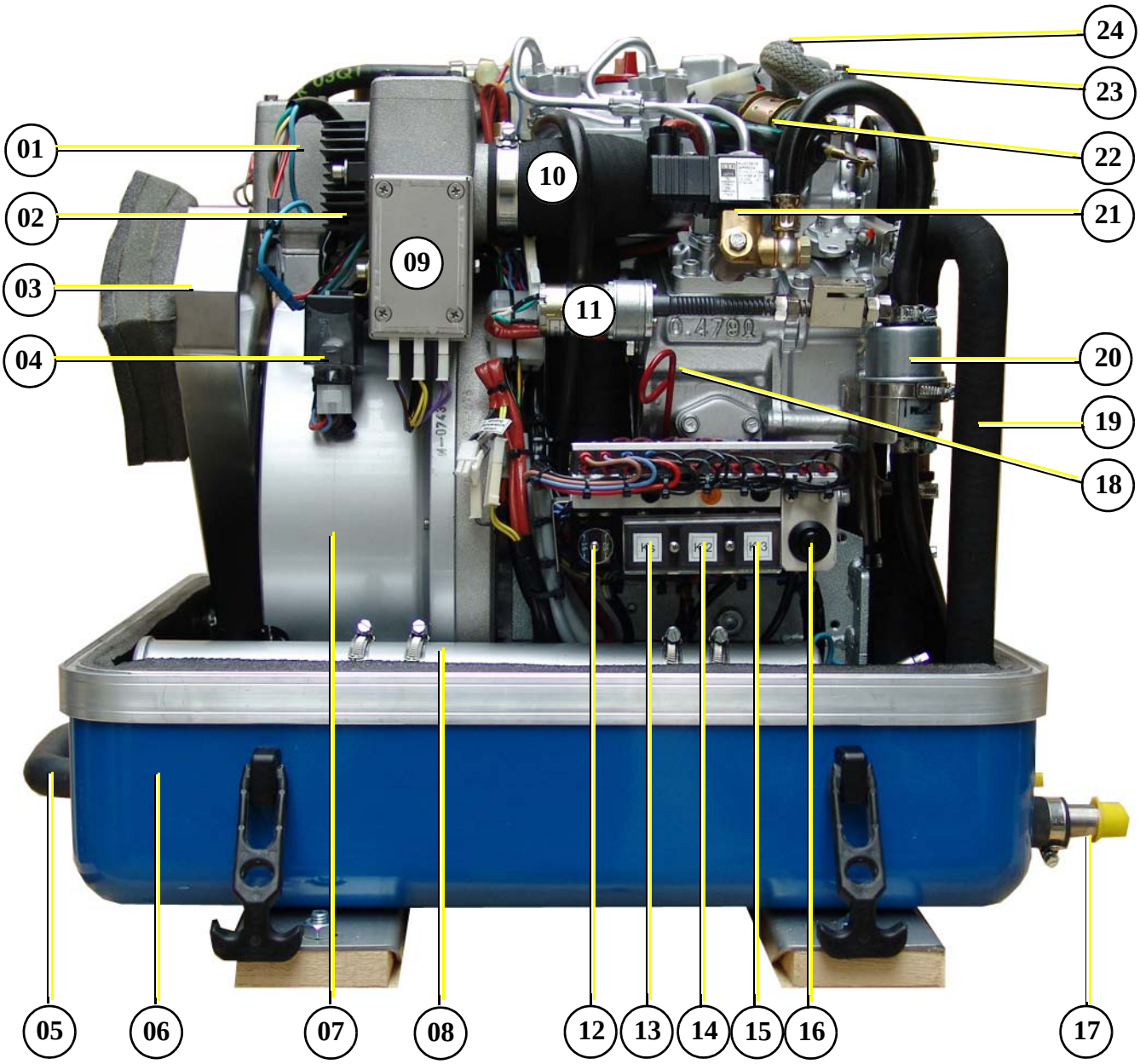
Fig. 5.2.1-1: Right Side View



01) DC-alternator 12V
02) V-belt für DC-alternator and cooling water pump
03) Oil pressure switch
04) Oil filter
05) Diode block under protection cover
06) Sound cover base part
07) Water-cooled exhaust elbow
08) Solenoid for starter motor
09) Starter motor
10) Cooling water return pipe
11) Thermo-switch exhaust
12) Exhaust connection port
13) Exhaust output
14) Stop-cock (optional)
15) Connection external ventilation valve
16) In-flow from external cooling water expansion tank
17) Return external cooling water expansion tank
18) Injection port raw water
19) Thermo-switch exhaust elbow
20) Cooling water filler neck

5.2.2 Left Side View

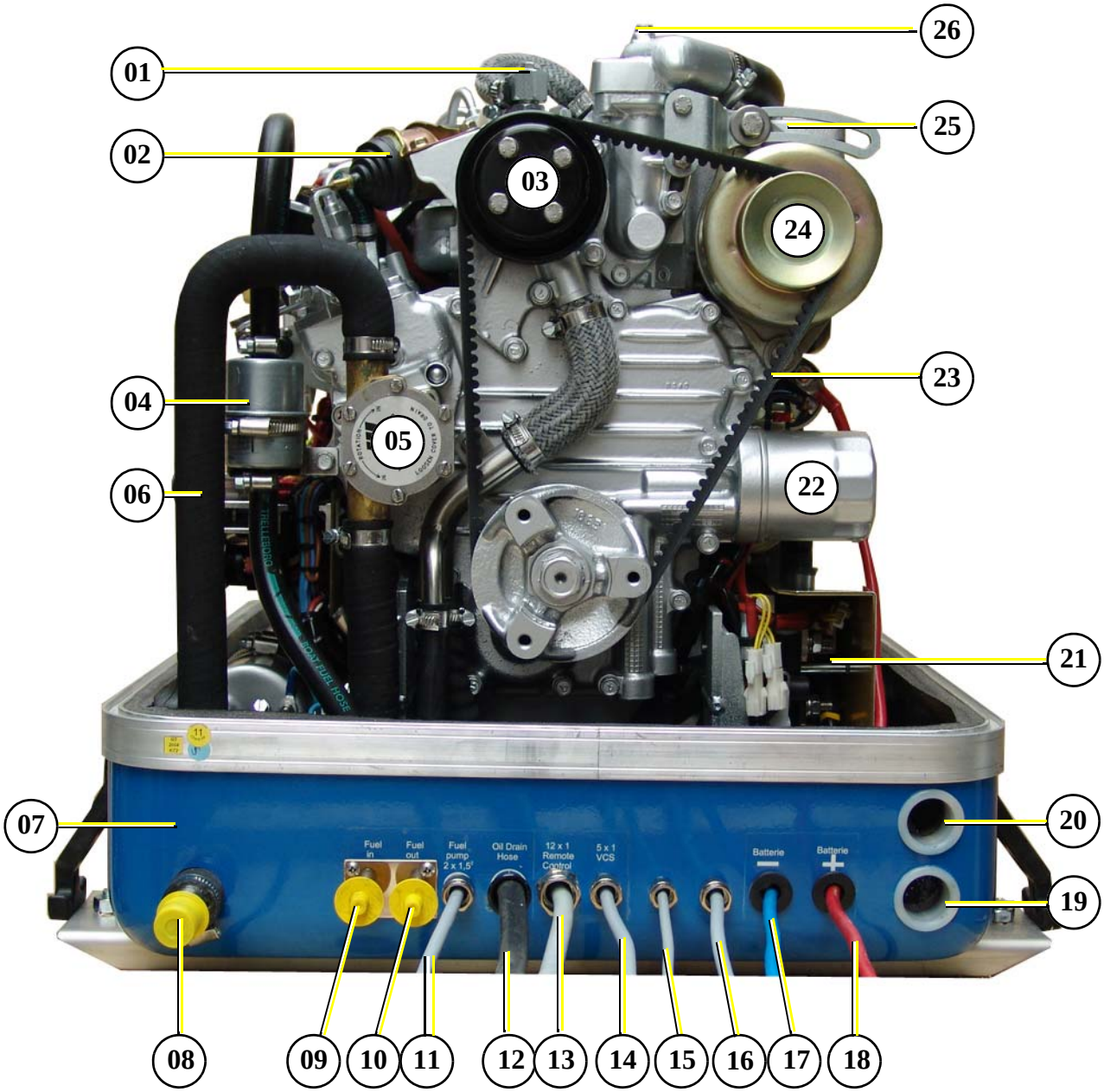
Fig. 5.2.2-1: Left Side View



01)	Air suction housing with air filter	13)	Starter-relay Ks
02)	Charge control for DC-alternator	14)	Pre-glow relay (glow plugs) K2
03)	Air suction port for coil cooling (GFK sound cover only)	15)	Fuel pump start relay K3
04)	Time relay for stop solenoid	16)	Failure bypass switch
05)	Connection for external ventilation valve	17)	Raw water intake
06)	Sound cover base part	18)	Oil dipstick
07)	Generator housing with coil	19)	Raw water intake hose
08)	Heat exchanger	20)	Fuel filter
09)	Electric starter control unit	21)	Fuel solenoid valve
10)	Suction hose, air suction housing - induction elbow	22)	Stop solenoid
11)	Actuator for rpm-regulation	23)	Ventilation screw cooling water pump
12)	Electrical fuses (blue=15A, white=25A)	24)	Ventilation screw thermostat housing

5.2.3 Front View

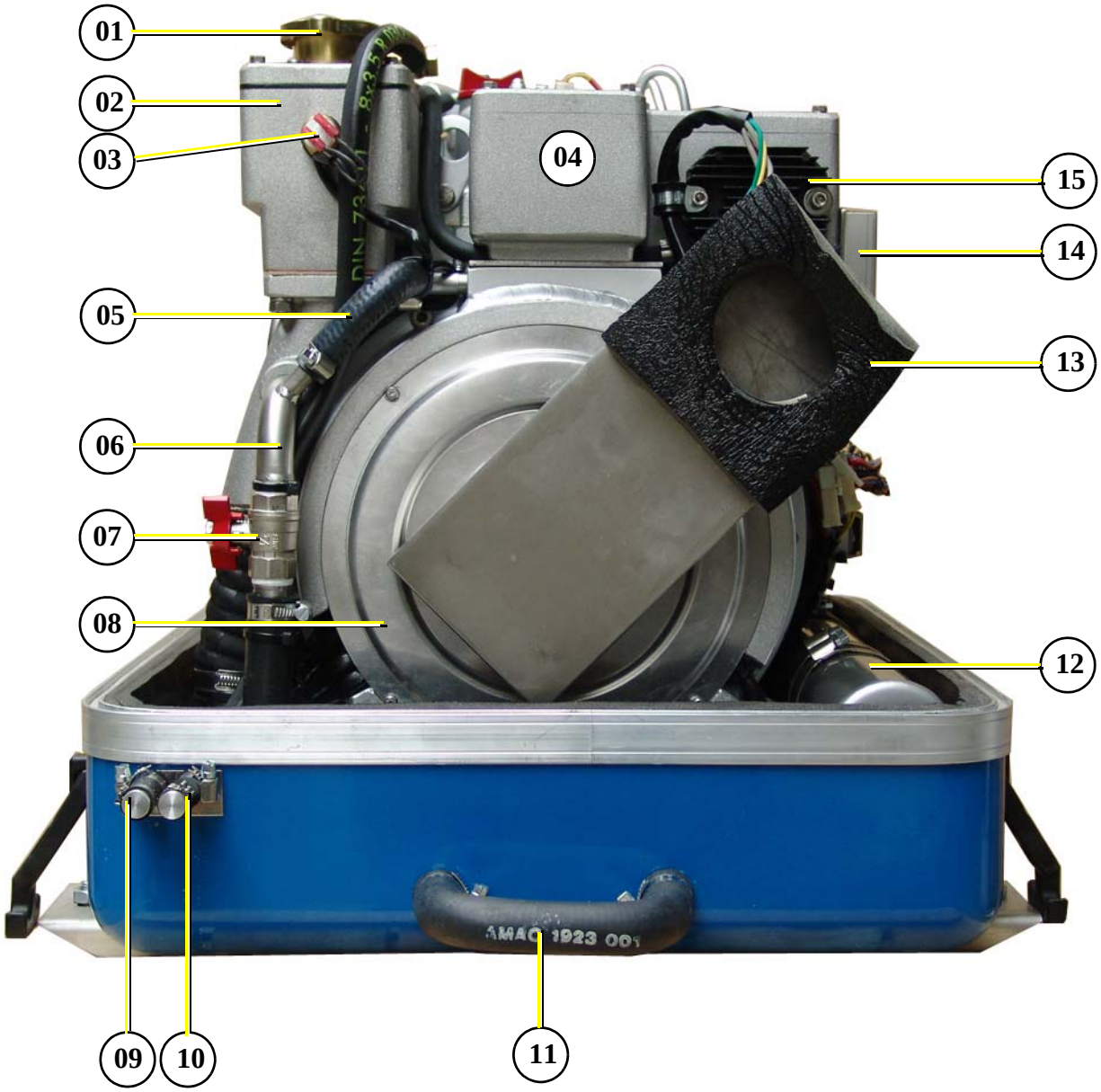
Fig. 5.2.3-1: Front View



01)	Ventilation screw internal cooling water pump	14)	Cable voltage control VCS (5x1mm²)
02)	Stop solenoid	15)	Voltage sense 24 V
03)	Pulley for internal cooling water pump	16)	Shunt measurement
04)	Fuel filter	17)	Starter battery minus (-)
05)	Raw water pump	18)	Starter battery plus (+)
06)	Raw water intake hose	19)	Passage for service battery cable
07)	Sound cover base part	20)	Passage for service battery cable
08)	Raw water intake	21)	Diode block
09)	Connection fuel in	22)	Oil filter
10)	Connection fuel out	23)	V-belt
11)	Cable fuel pump (2x1,5mm²)	24)	DC-alternator
12)	Oil drain hose	25)	Clamp device for DC-alternator
13)	Cable remote control panel (12x1mm²)	26)	Ventilation screw thermotast housing

5.2.4 Back View

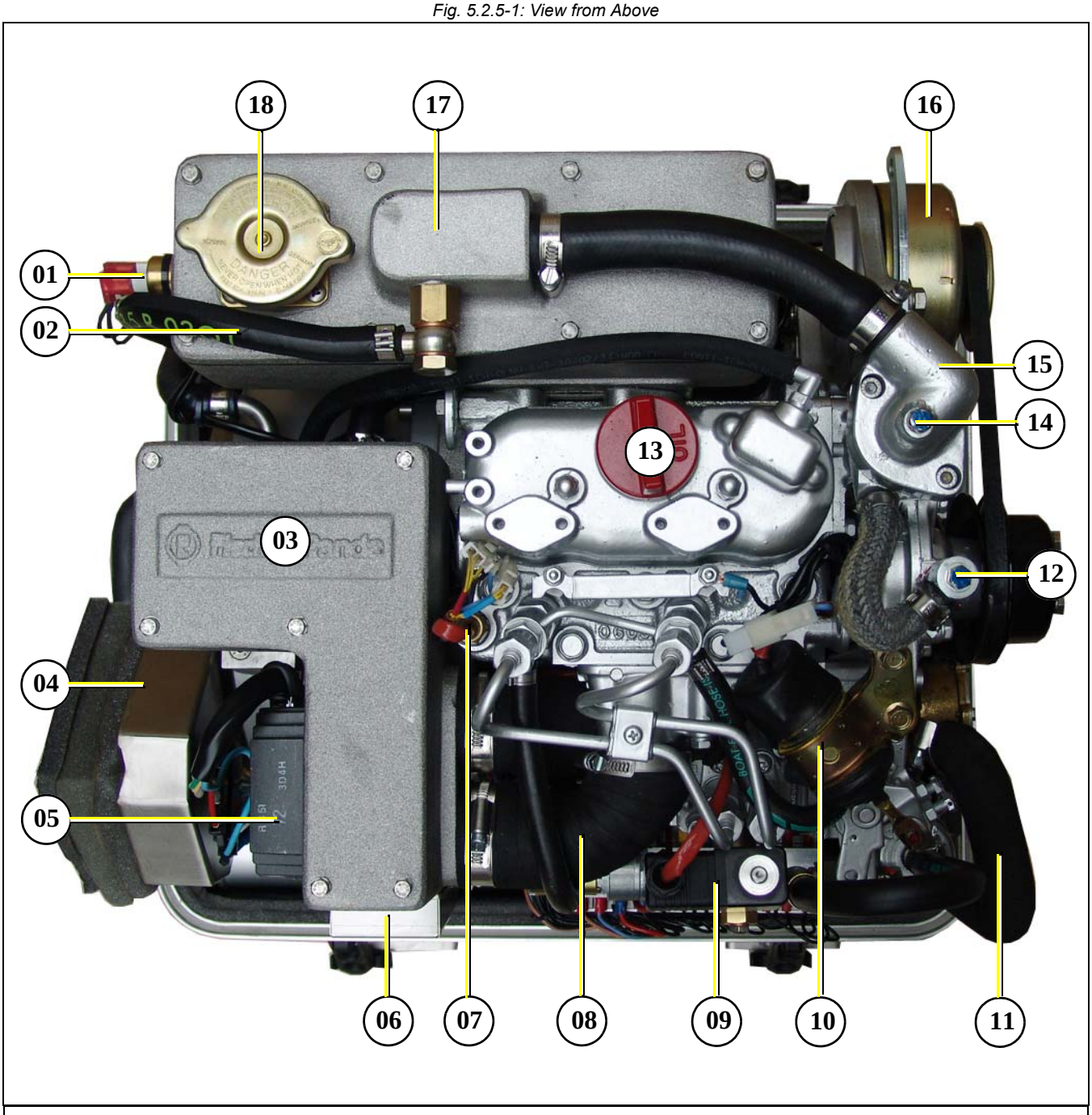
Fig. 5.2.4-1: Back View



01)	Cooling water filler neck	09)	In-flow from external cooling water expansion tank
02)	Water-cooled exhaust elbow	10)	Return to external cooling water expansion tank
02)	Thermo-switch exhaust elbow	11)	Connection external ventilation valve
04)	Air suction housing with air filter	12)	Heat exchanger
05)	Bypass for generator housing cooling	13)	Suction port for coil cooling (GFK sound cover only)
06)	Injection port raw water	14)	Electric starter control unit
07)	Stop-cock (optional)	15)	Charge control for DC-alternator
08)	Generator front cover		

5.2.5 View from Above

Fig. 5.2.5-1: View from Above



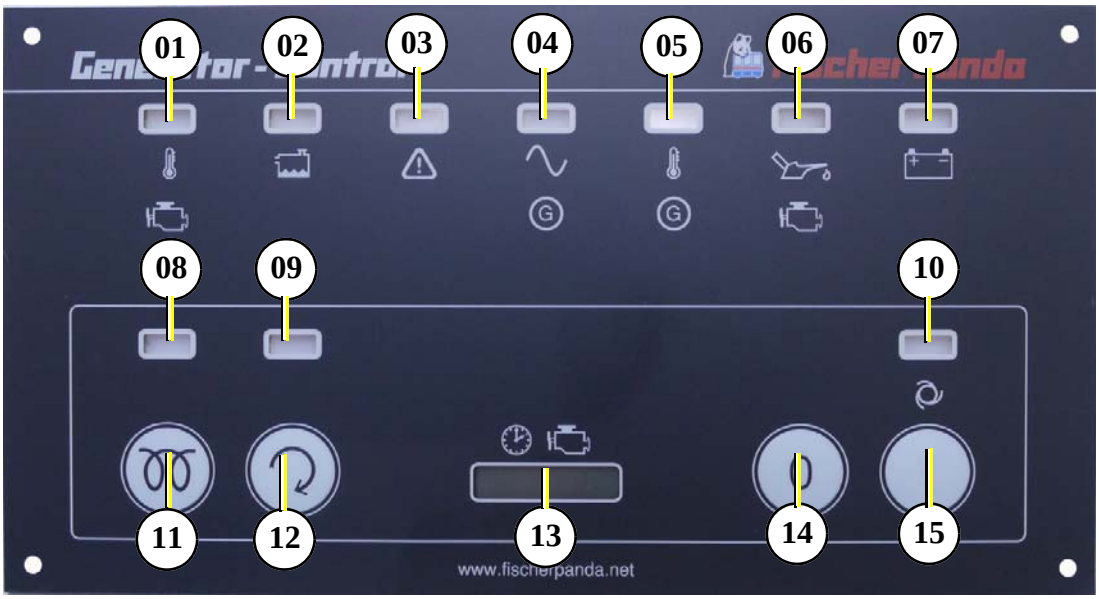
01)	Thermo-switch exhaust elbow	10)	Thermostat housing with thermostat
02)	Ventilation hose to external expansion tank	11)	Stop solenoid
03)	Air suction housing with air filter	12)	Ventilation screw internal cooling water pump
04)	Suction port for coil cooling	13)	Oil filler neck
05)	Charge control for DC-alternator	14)	Ventilation screw thermostat housing
06)	Eletctric starter control unit	15)	Thermostat housing
07)	Thermo-switch cylinder head	16)	DC-alternator
08)	Suction hose, air suction housing - induction elbow	17)	Water-cooled exhaust elbow
09)	Fuel solenoid valve	18)	Cooling water filler neck

5.3 Details of functional units

5.3.1 Control panel

The control panel is fitted with various monitoring functions, which increase functional reliability and operating safety of the generator. Various parts of the generator are monitored with sensors which, when triggered, generate an error message and can shut down generator operation under certain circumstances to prevent damage.

Fig. 5.3.1-1: Control panel



01. LED for cooling water temperature red[1]
02. LED for cooling water level red/yellow[1]
03. LED for fuel level and air filter replacement red/yellow[1]
04. LED for AC voltage ok green[1]
05. LED for winding temperature red[1]
06. LED for oil pressure red[1]
07. Battery loading voltage DC charging light
08. LED for pre-heat, „heat“ orange[1]
09. LED for generator „start“ green[1]
10. LED for generator „stand-by“ green[1]
11. Push-button for pre-heat, „heat“
12. Push-button for generator „start“
13. Operating hours counter
14. Push-button panel „off“
15. Push-button panel „on“

[1] LED green: normal operating mode, LED red: fault, LED yellow: warning, LED orange: active depending on jumper

See remote control panel data sheet for details!

Notice!:

5.3.2 Components of Cooling System (Raw water)

Raw water intake

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

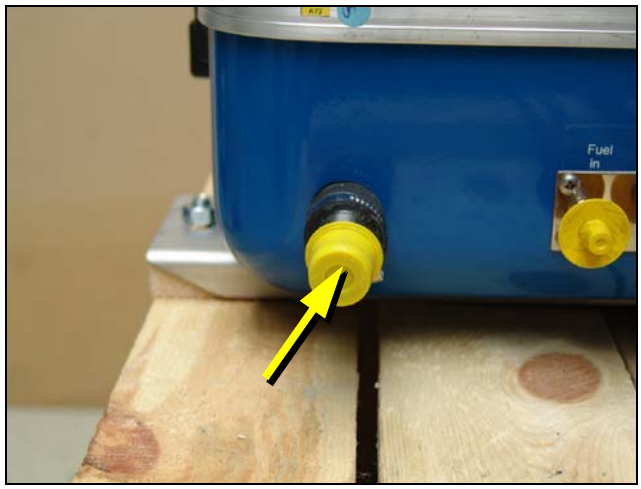


Fig. 5.3.2-1: Raw Water Intake

Raw Water Impeller Pump

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

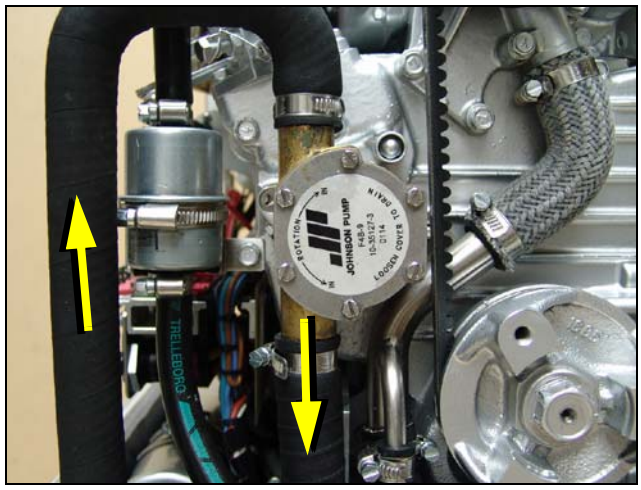


Fig. 5.3.2-2: Raw Water Impeller Pump

Heat Exchanger

Separates the raw water system from the fresh water system, so that the generator components do not have contact with the raw water circulation system. The raw water is fed direct to the exhaust connection piece at the heat exchanger outlet.

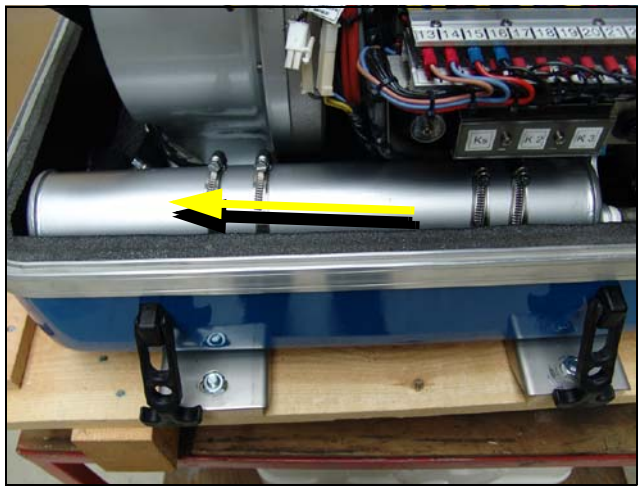


Fig. 5.3.2-3: Heat Exchanger

Ventilation valve

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

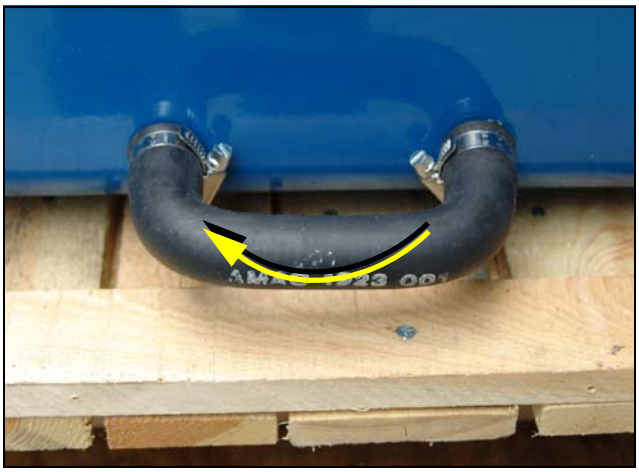


Fig. 5.3.2-4: Connection for Ventilation Valve

Stop-cock

The raw water is injected into the exhaust connection (A). Also raw water is leading to the diode block (B).

Adjust with the stop-cock an inpression that raw water is lead to the diode block.

ATTENTION: The stop-cock may never be completely opened or closed, since otherwise the diode block or exhaust connection can become too hot.

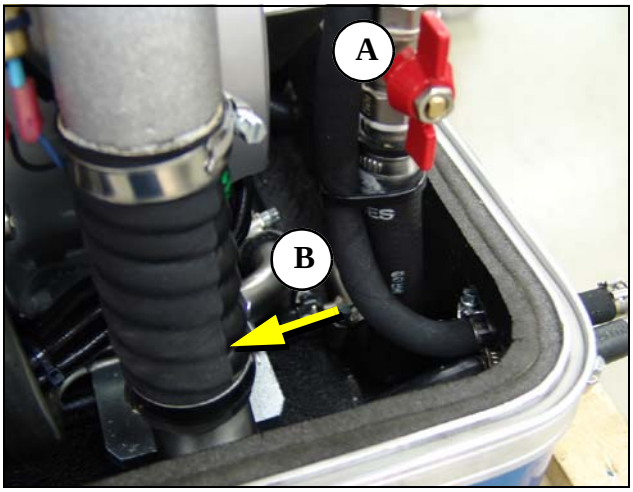


Fig. 5.3.2-5: Stop-Cock

Raw water hose

After the raw water has passed the diode block it is lead to the generator housing

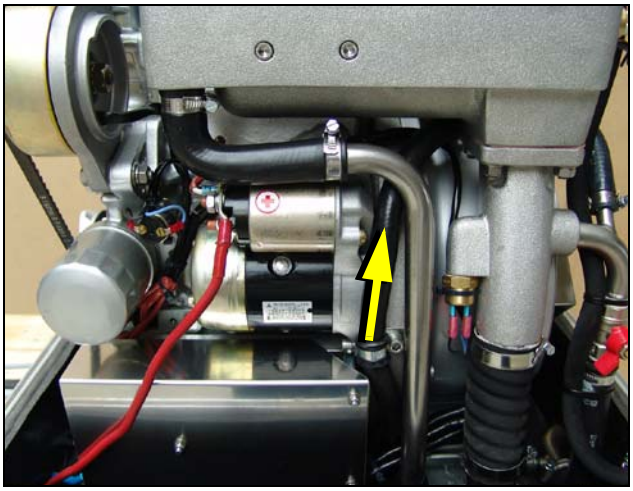


Fig. 5.3.2-6: Raw Water Hose

IN/OUT generator housing

The raw water cooles the coil in the generator housing.

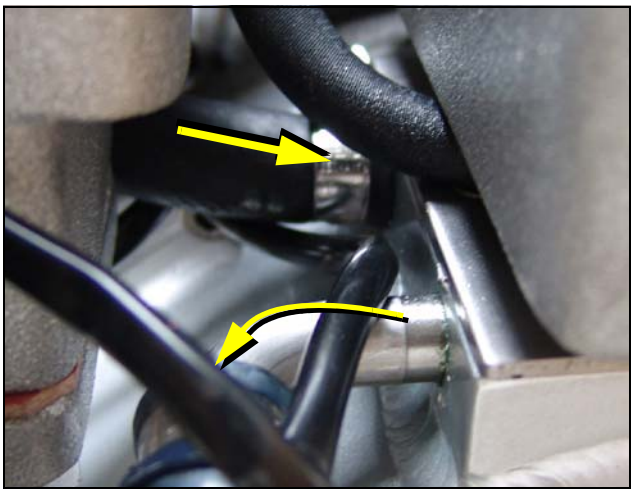


Fig. 5.3.2-7: In/Out Generator Housing

Cooling water injector nozzle

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

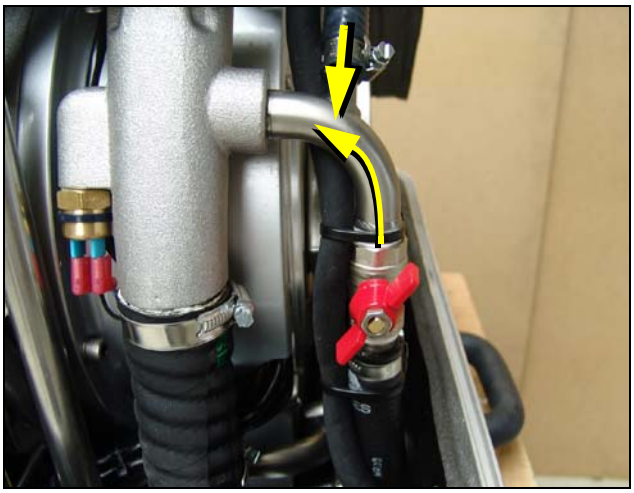


Fig. 5.3.2-8: Injetion Nozzles for Cooling Water

5.3.3 Components of Cooling System (Freshwater)

Filler neck

The cooling water filler necks situated at the water-cooled manifold are only used, when the generator is initially started. Since the generator is normally already filled with cooling water, these components are only by the user, if repairs are to be carried out. Topping up with cooling water may only carried out at the external cooling water compensation tank. Note that the water level in the cooling water compensation tank is only 20 % of the volume in a cold state.

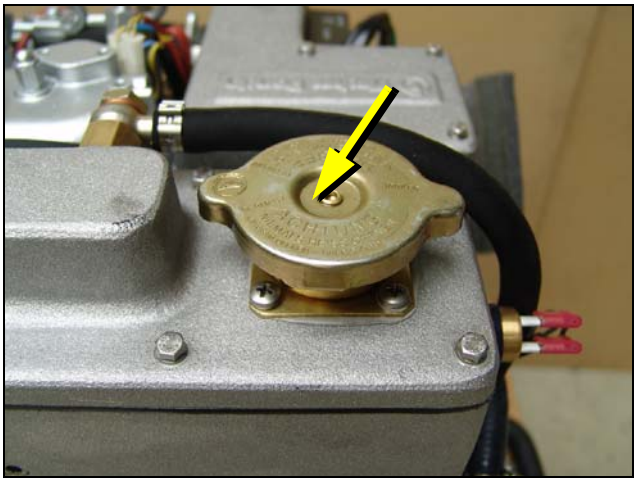


Fig. 5.3.3-1: Cooling Water Filler Neck

Freshwater backflow

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

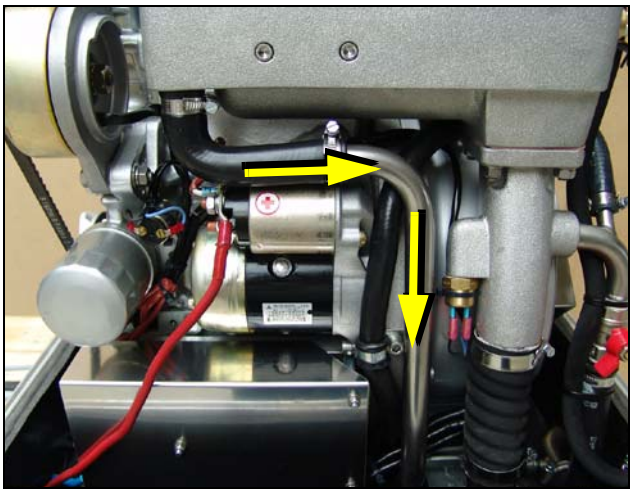


Fig. 5.3.3-2: Freshwater Backflow

Ventilation pipe

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

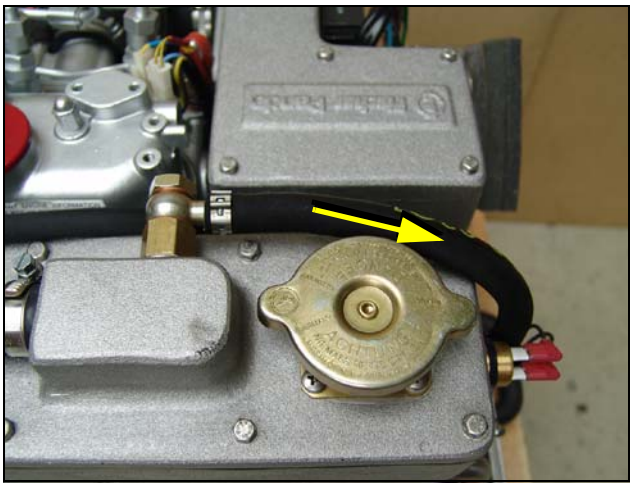


Fig. 5.3.3-3: Ventilation Pipe

Hose connection pieces for the external expansion tank

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

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

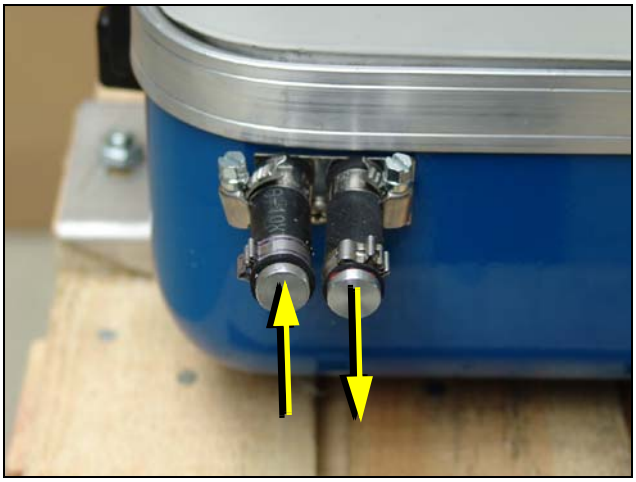


Fig. 5.3.3-4: External Expansion Tank

Heat exchanger

The internal freshwater circulation system is separated from the Raw water circulation system by the heat exchanger. This means the Raw water circulation system does not come into contact with the generator components. The Raw water is fed directly to the exhaust connection at the heat exchanger outlet.

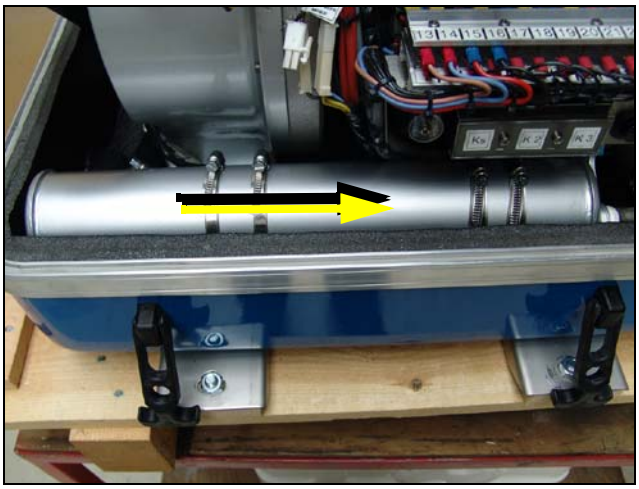


Fig. 5.3.3-5: Heat Exchanger

Cooling water intake

A.) To the thermostat housing

B.) From the external expansion tank

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

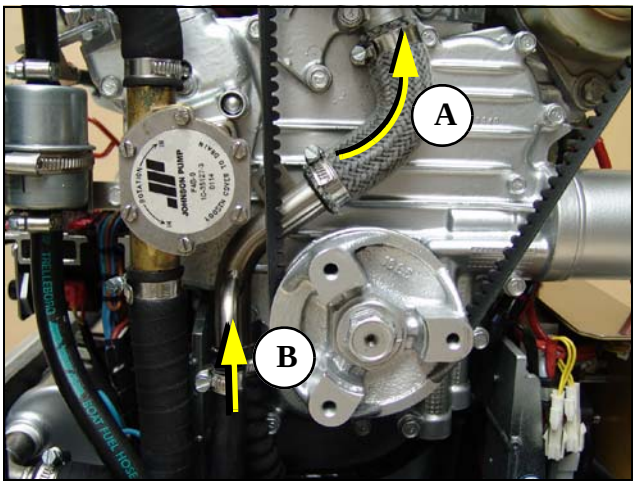


Fig. 5.3.3-6: Cooling Water Intake

Internal cooling water pump

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

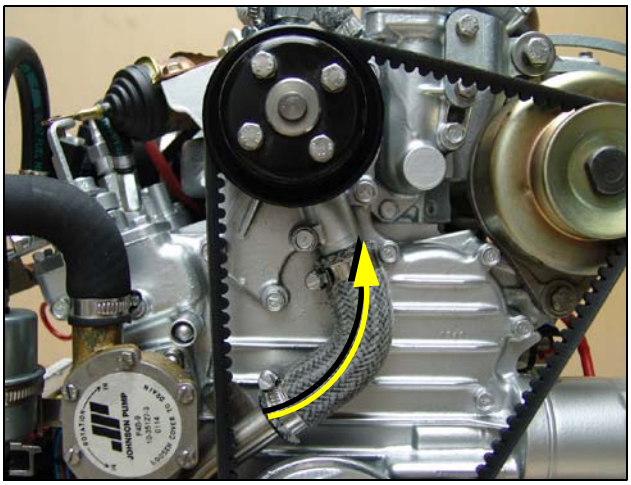


Fig. 5.3.3-7: Internal Cooling Water Pump

Internal cooling water pump

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

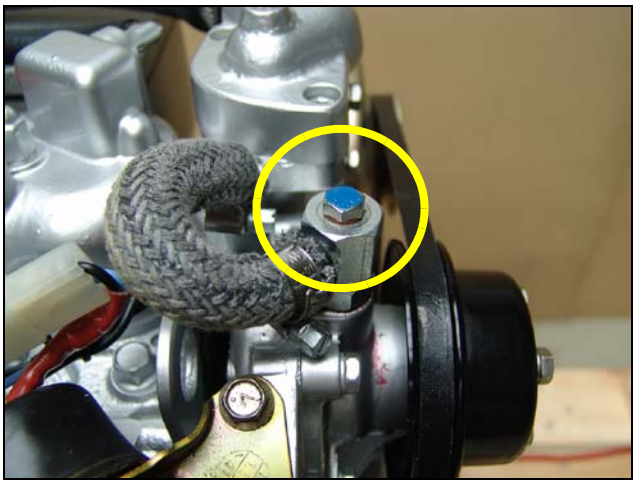


Fig. 5.3.3-8: Internal Cooling Water Pump

Ventilation screw thermostat housing

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

Fig. 5.3.3-9: Ventilation Screw Thermostat Housing

Water-cooled exhaust manifold

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

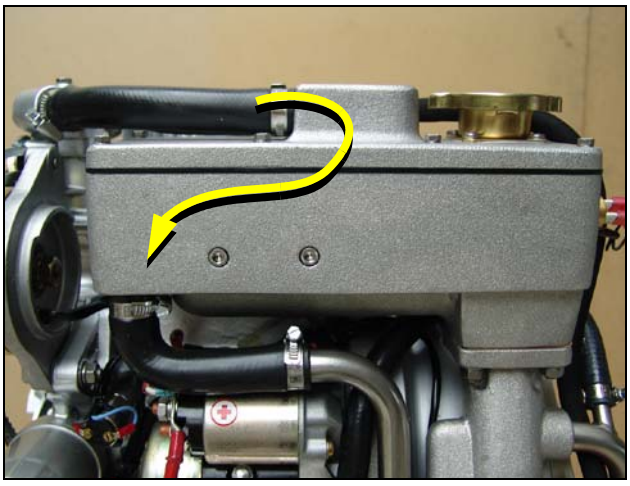


Fig. 5.3.3-10: Water-Cooled Exhaust Manifold

5.3.4 Components of the Fuel System

External fuel pump

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

Fig. 5.3.4-1: External Fuel Pump

Connecting Pieces for the Fuel Pipe

1. Fuel intake

2. Fuel backflow

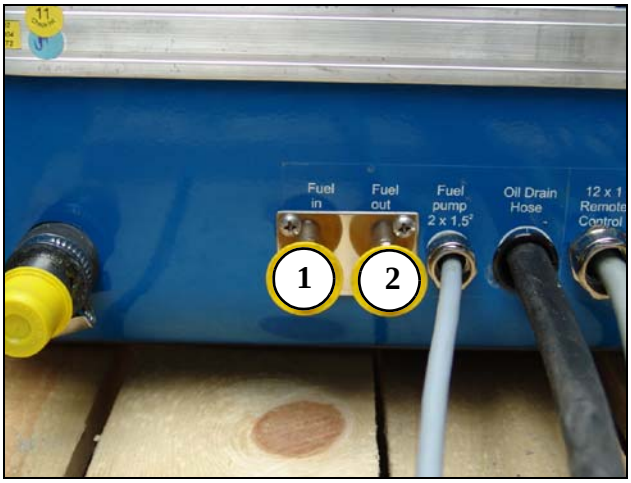


Fig. 5.3.4-2: Connection Pieces for the Fuel Pipe

Fuel Filter

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

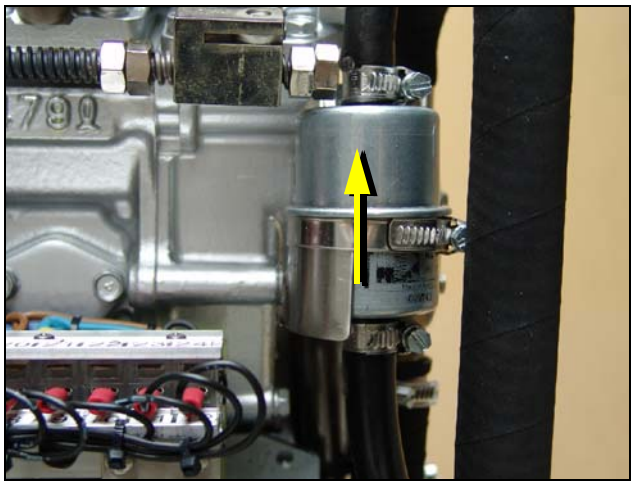


Fig. 5.3.4-3: Fuel Filter

Fuel Solenoid Valve

The fuel solenoid valve opens automatically if "START" is pressed on the remote control panel". The solenoid closes, if the generator is switched to "OFF"position. It takes a few seconds before the generator stops. If the generator does not start or does not run smoothly (i.e. stutters), or does not attain full speed, then the cause is fore-mostly the solenoid.

Fig. 5.3.4-4: Fuel Solenoid Valve

Injection Nozzle

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

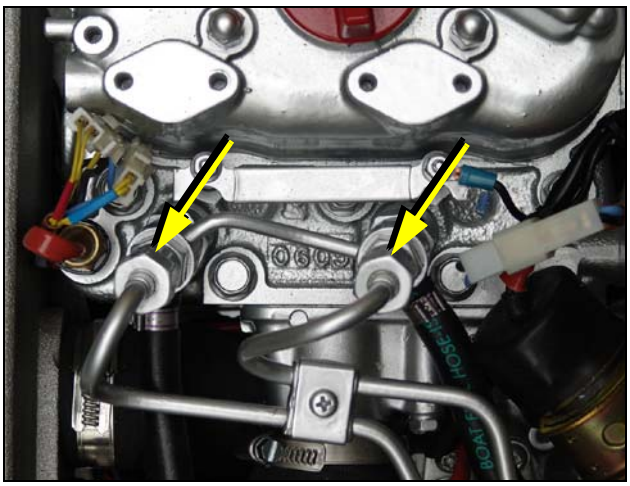


Fig. 5.3.4-5: Injection Nozzles

Glow Plugs

The glow plugs serve the pre-chamber for the heating with cold start. The glow device must be operated, if the temperature of the generator is below 16 ° C. This is practically the case with each start. The glow device and starter button are set so that neither may be used at the same time.

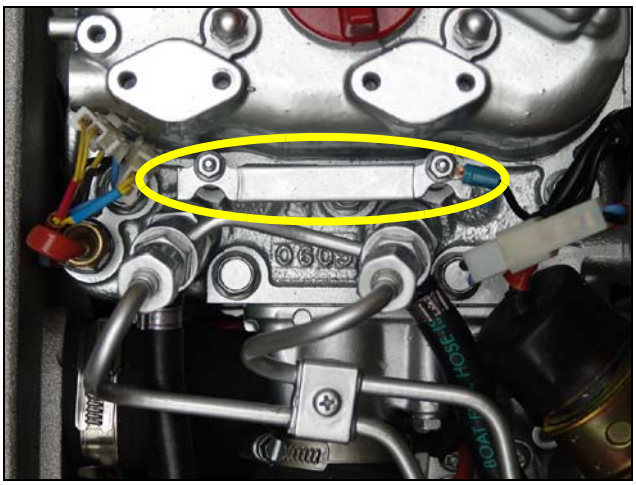


Fig. 5.3.4-6: Glow Plugs

Stop Solenoid for Engine Stop

Some models are additional equipped with a stop solenoid. The generator is stopped by the co-operation of the stop solenoid immediately after switching off. The adjustment of the stop solenoid must always be checked, in order to be sure that the stop lever operate freely and is not placed under pre-stress.

Fig. 5.3.4-7: Stop Solenoid for Engine Stop

5.3.5 Components of Combustion Air

Air suction openings at the sound cover

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

It must be consistently paid attention that the generator is installed in such a way that from no water can arrive into the proximity of these air openings. (minimum distance 150 mm)

Fig. 5.3.5-1: Combustion Air Intake

Cooling air for coil cooling

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

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

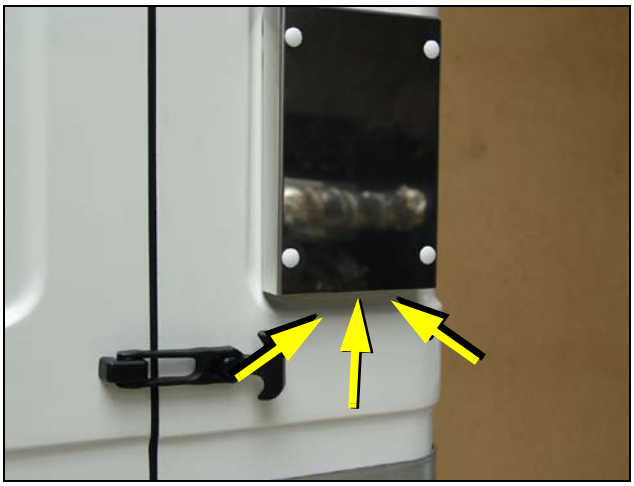


Fig. 5.3.5-2: Freshwater Intake

Air suction housing

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

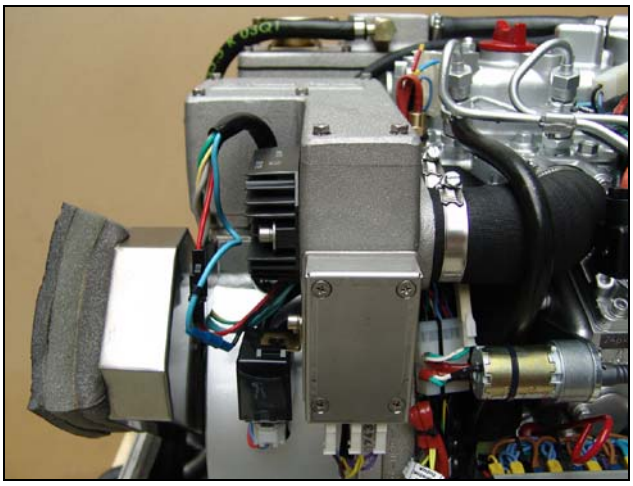


Fig. 5.3.5-3: Air Suction Housing

Air suction housing with air filter set

If the capsule is removed, the inside of the air suction housing becomes visible. In these air suction housings is a filter element. At the marine version the filter is normally not changed. It should be chekked once in a while.

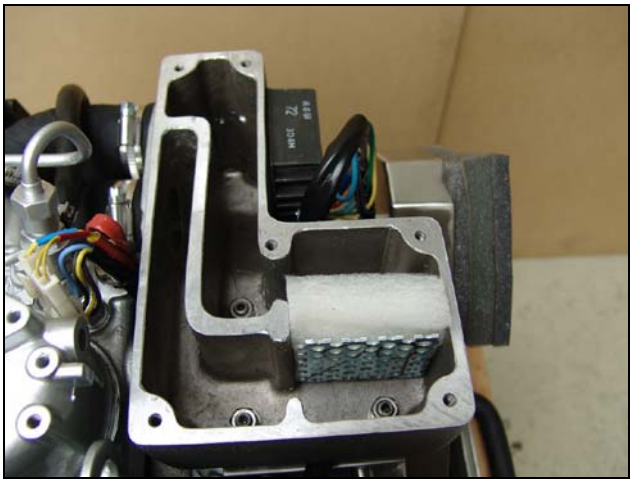


Fig. 5.3.5-4: Air Filter Set

Combustion chamber intake elbow

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

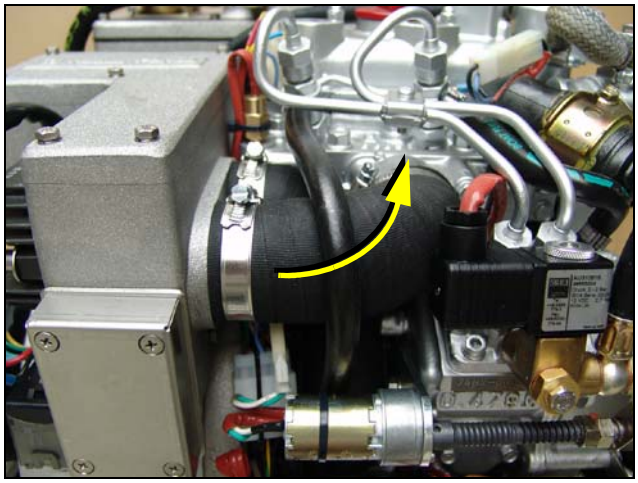


Fig. 5.3.5-5: Combustion Chamber Intake Elbow

Exhaust elbow

At the back side of the engine is the water-cooled exhaust elbow.

Underneath the exhaust elbow, the raw water is injected into the exhaust

On the top side, the pipe union for the internal raw water circuit is to be seen and the filler neck for the cooling water.

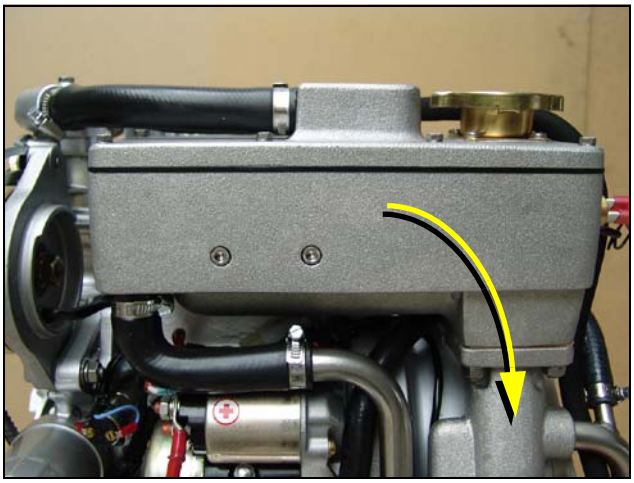


Fig. 5.3.5-6: Exhaust Elbow

Exhaust connection at the exhaust elbow

Raw water from the external cooling circle is fed here.

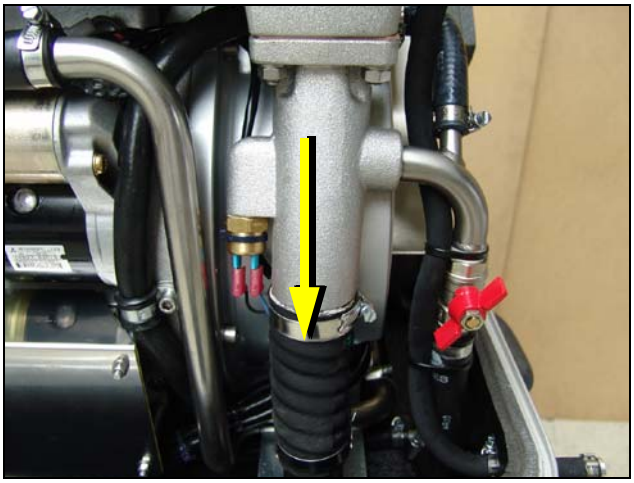


Fig. 5.3.5-7: Exhaust Connection

Exhaust outlet

Connect the exhaust pipe with the water lock.

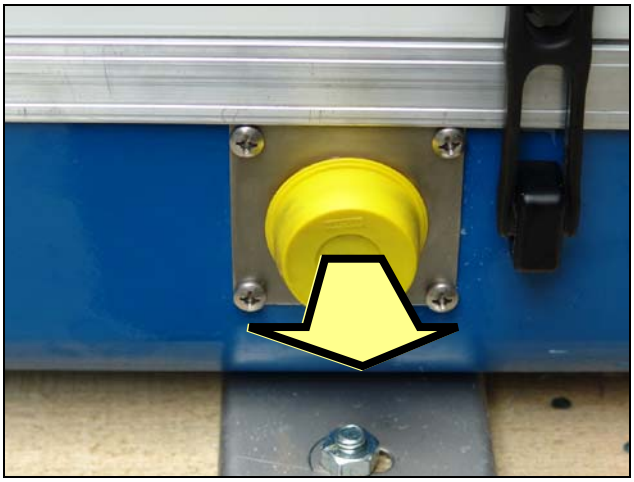


Fig. 5.3.5-8: Exhaust Outlet

5.3.6 Components of the Electrical System

Connection starter battery

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

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

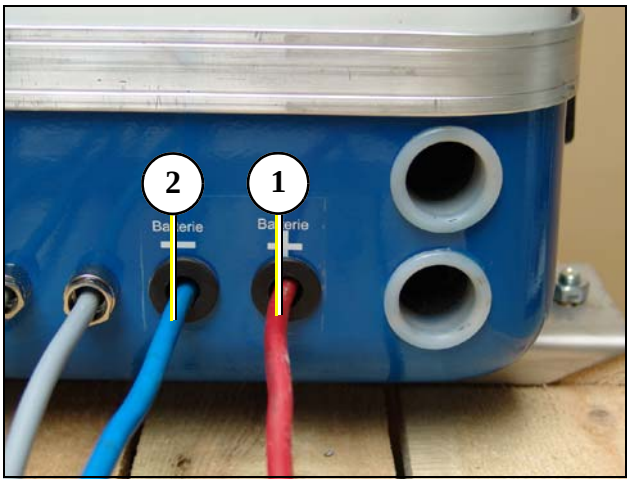


Fig. 5.3.6-1: Connection Starter Battery

Main power

At the front of the sound insulation cover is also the outlet for the main power cable. Here are also the cables for external condensers connections, depending upon type of generator (see Connection Diagram for the AC-Control box!)

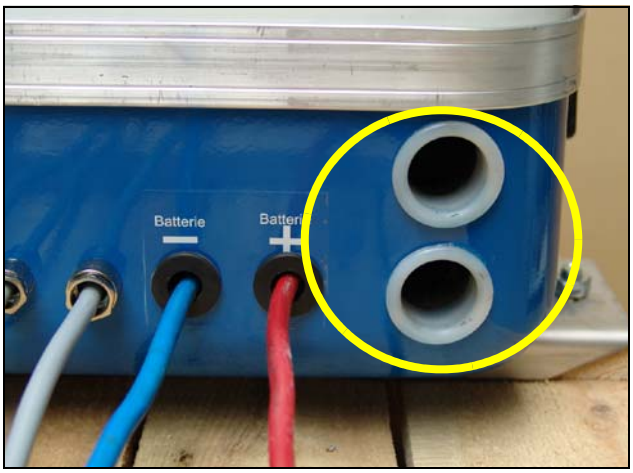


Fig. 5.3.6-2: Main Power

Electrical connections for control

All remaining cables are located at the front end of the generator for electrical connections, depending upon type. The connections are taken from the AC-Control Box Plan. See here:

1. Fuel pump
2. Remote control panel
3. VCS
4. AC-Control-Box

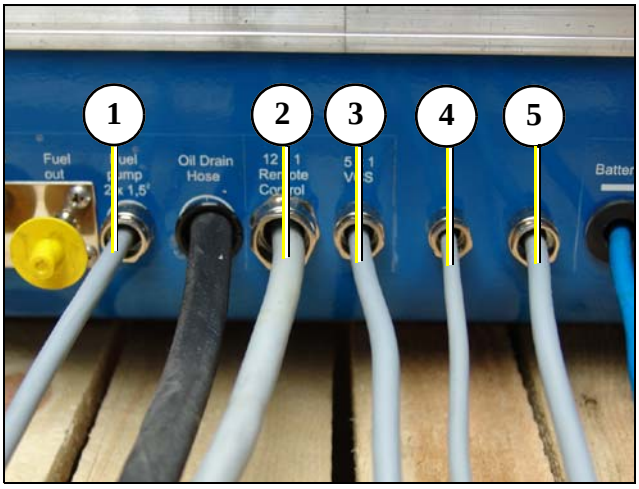


Fig. 5.3.6-3: Electrical Connections

Starter motor

1. Starter motor and

2. Solenoid switch

The diesel engine is started electrically. The electrical starter with the solenoid switch is located at the rear of the engine.

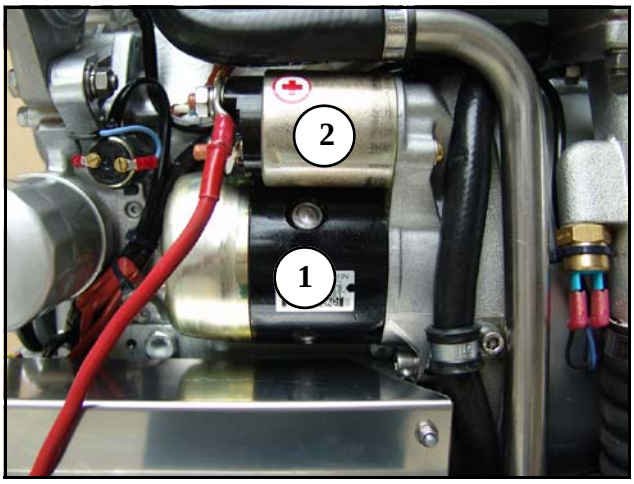


Fig. 5.3.6-4: Starter Motor

Actuator for speed regulation

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

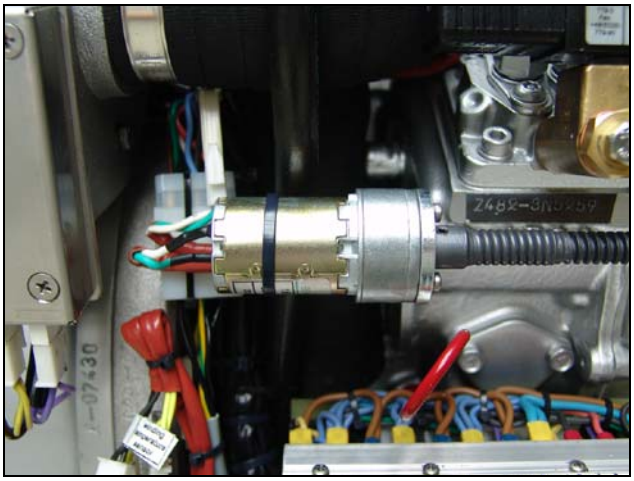


Fig. 5.3.6-5: Actuator

Plug for speed sensor

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

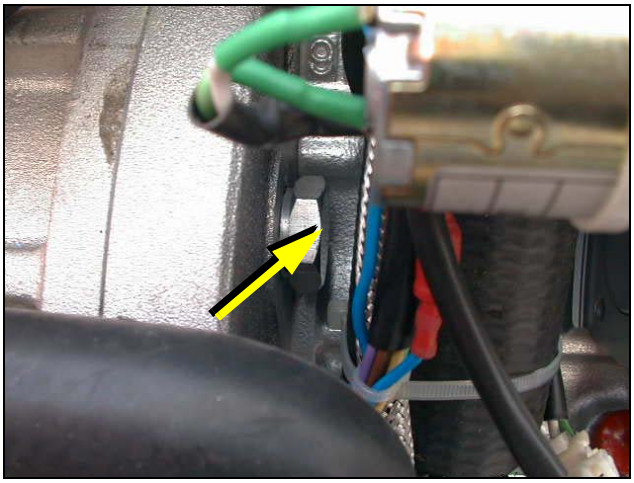


Fig. 5.3.6-6: Plug for Speed Sensor

DC-alternator

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

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

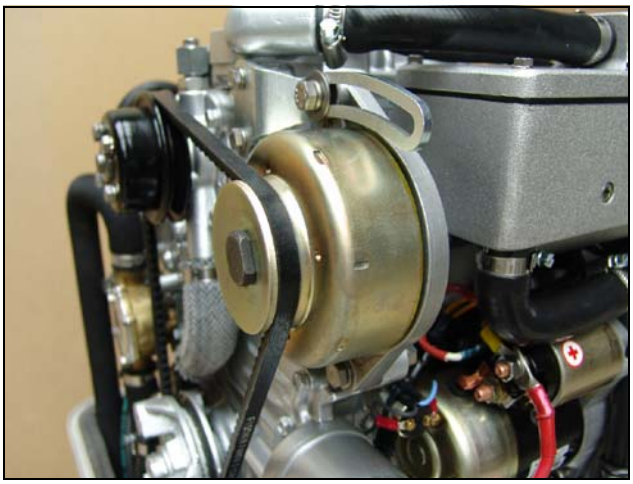


Fig. 5.3.6-7: Lichtmaschine

Charge control for DC-alternator

The voltage regulator for the 12 V DC-alternator is located at the back of the air suction housing. The housing is streamlined for cooling purposes. The voltage regulator may not be externally covered. The surface must be accessible for cooling.

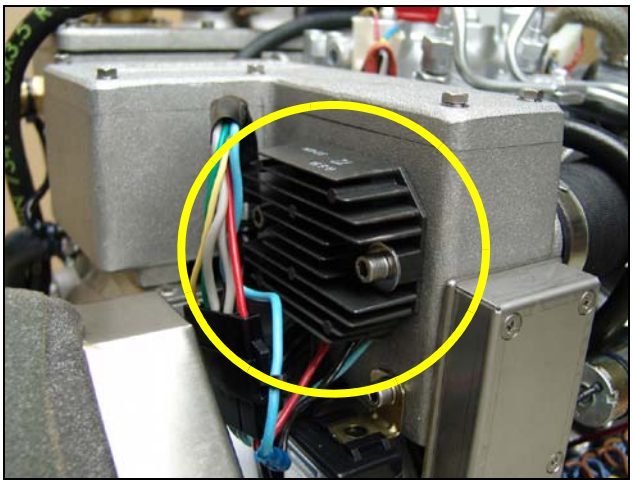


Fig. 5.3.6-8: Charge Control

Restart Protection

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

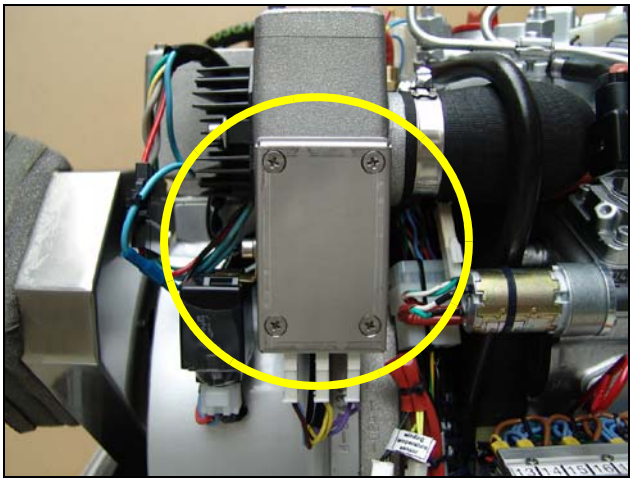


Fig. 5.1: Restart Protection

Time relay for stop solenoid

Fig. 5.3.6-9: Time Relay for Stop Solenoid

Diode plate

Fig. 5.3.6-10: Diode plate

Fuse for measurement voltage

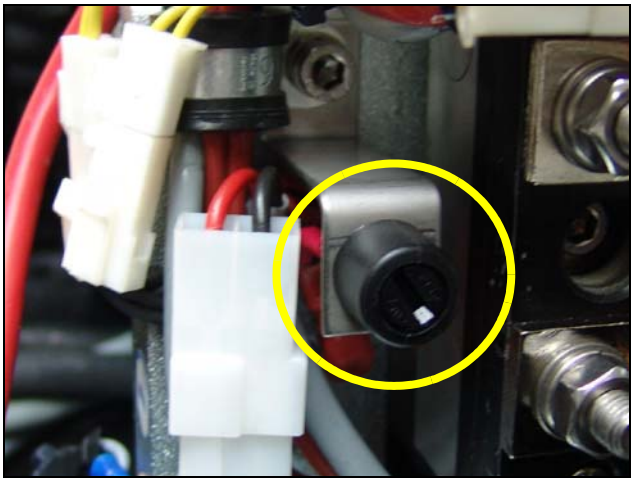


Fig. 5.3.6-11: Fuse for Measurement Voltage

Terminal block for remote control cable with fuses and power relais

F1 fuse 15 A for DC wiring

F2 fuse 25 A for starter relay

Ks power relais for Starter

K2 power relais for Glow plugs

K3 power relais for Fuel pump

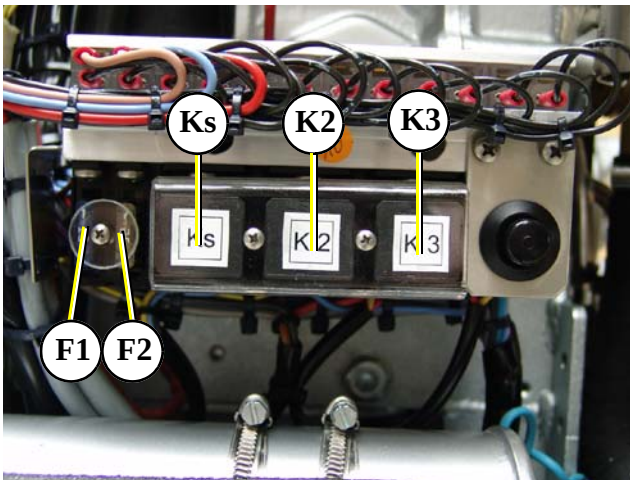


Fig. 5.3.6-12: Terminal block

5.3.7 Sensors and Switches for Operating Surveillance

Thermo-switch at cylinder head

The thermo-switch at the cylinder head serves to monitor the generator temperature. All thermo-switches for the generators from Panda 6.000 upward are two-pole (earthed), so called "openers". This means the contacts are open in normal cases and close only when the limits have been exceeded.

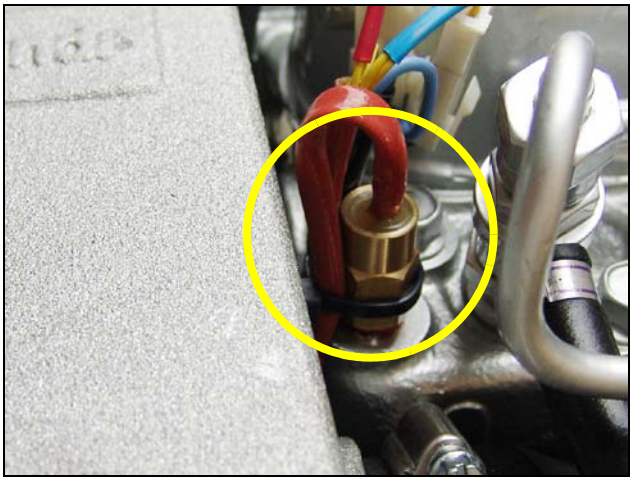


Fig. 5.3.7-1: Thermo-switch at Cylinder Head

Thermo-switch at watercooled exhaust elbow

This thermo switch is located at the water-cooled exhaust elbow and serves to monitor the freshwater circulation system. It takes a measurement at the warmest spot, since the combustion gases are guided from the cylinder head to the exhaust elbow.

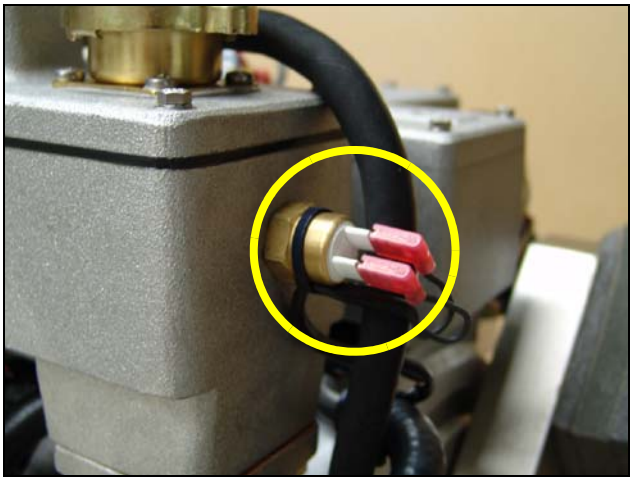


Fig. 5.3.7-2: Thermo-switch at Watercooled Exhaust Elbow

Thermo-switch at exhaust connection

If the impeller pump stops and delivers no more seawater, the exhaust connection becomes extremely hot. The thermo-switch controls the raw water circuit.

Fig. 5.3.7-3: Thermo-switch at Exhaust Connection

Thermo-switch in the Generator Winding

1. Generator winding
2. Thermo-switch
3. Housing

Two thermo-switches inside the windings to protect the generator winding, which for safety reasons are installed independently in parallel.

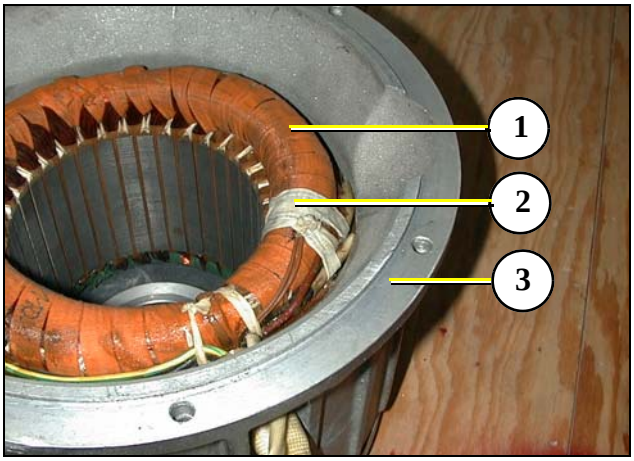


Fig. 5.3.7-4: Thermo-switch in the Generator Winding

Thermo-switch on the (-)-bar

(-)-bar at the diode block

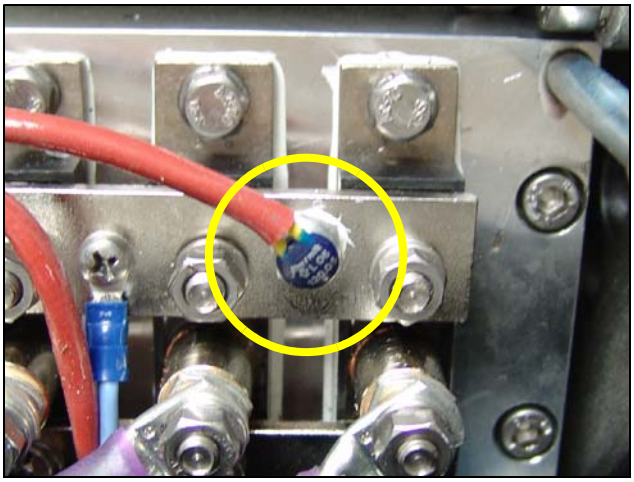


Fig. 5.3.7-5: Thermo-switch on the (-)-bar

Thermo-switch on the (+)-bar

(+)-bar at the diode block

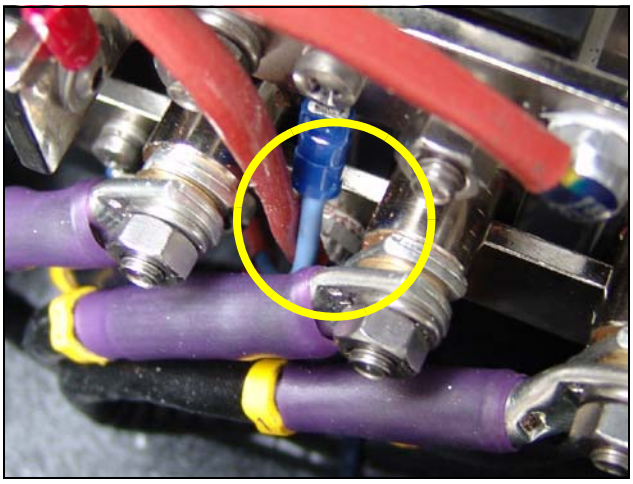


Fig. 5.3.7-6: Themo-switch at the (+)-bar

Oil pressure switch at the diesel engine

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

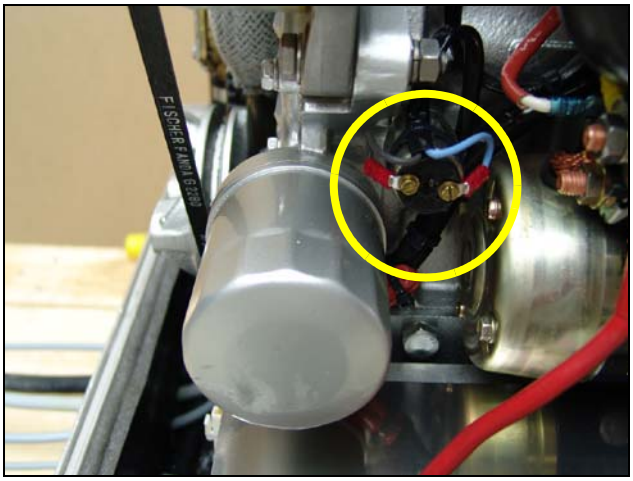


Fig. 5.3.7-7: Oil pressure switch

Failure Bypass Switch

The failure bypass switch offers the possibility of starting the generator if the electrical control switches off due to overheating of the cooling system.

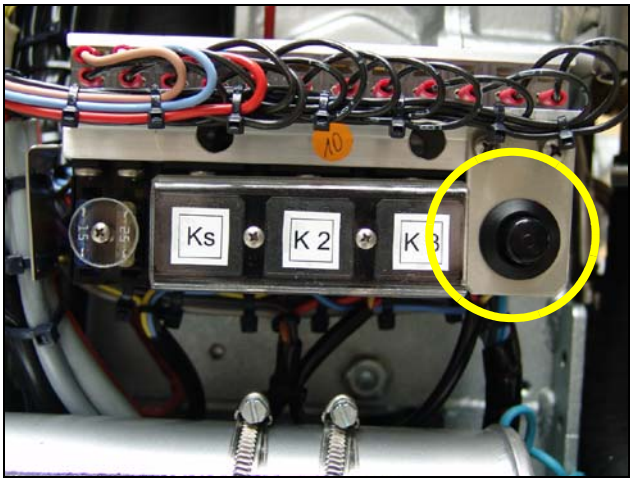


Fig. 5.3.7-8: Failure Bypass Switch

5.3.8 Components of the Oil Circuit

Oil filler neck with cap

Normally the filler neck for the engine oil is on the top side of the valve cover. A second filler neck is additionally attached at the operating side for numerous generator types. Please ensure the filler necks are always well secured after filling with engine oil.

Consider also the references to the engine oil specification.

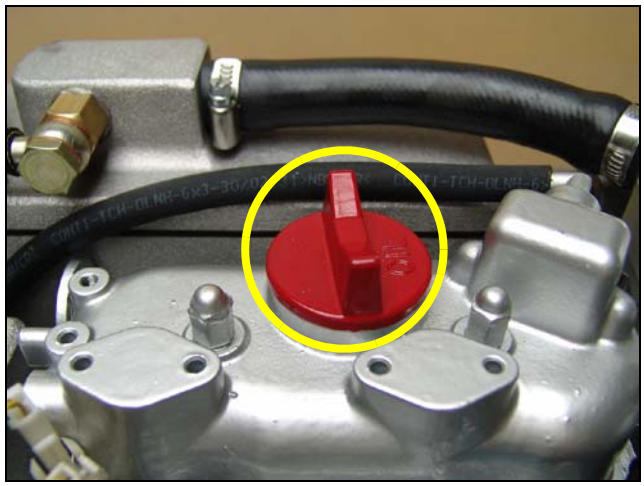


Fig. 5.3.8-1: Oil Filler Neck with Cap

Oil dipstick

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

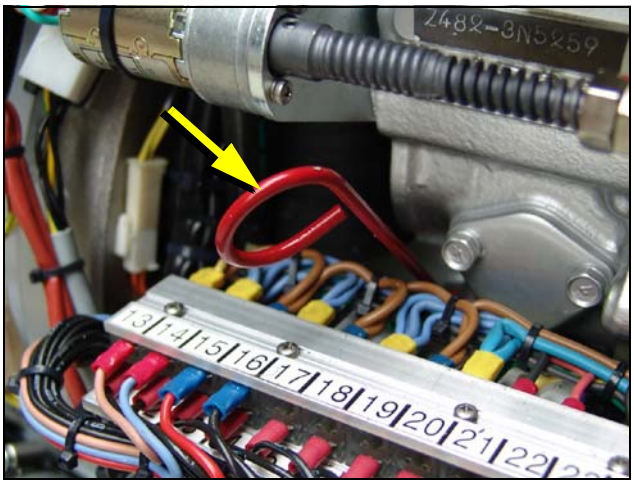


Fig. 5.3.8-2: Oil Dipstick

Oil filter

The oil filter should also be replaced, when an oil change is carried out.

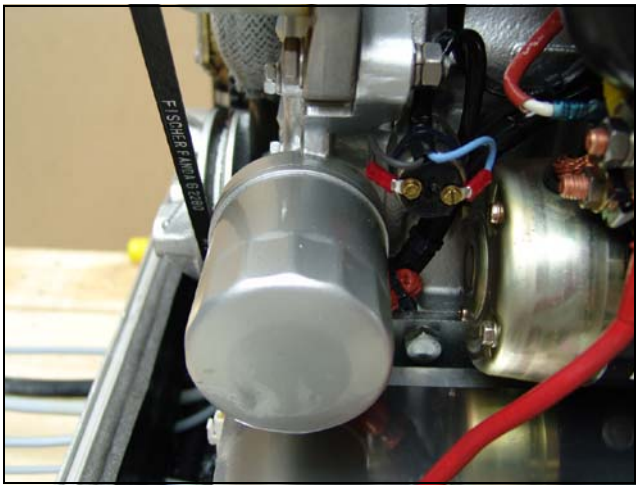


Fig. 5.3.8-3: Oil Filter

Oil drain hose

The Panda generator is equipped so that the engine oil can be drained by means of a hose. The generator should be installed in such a way, that a collecting basin can be placed deeply enough. If this is not possible, an electrical oil drain pump must be installed.

Note: Lubricating oil should be drained warm!

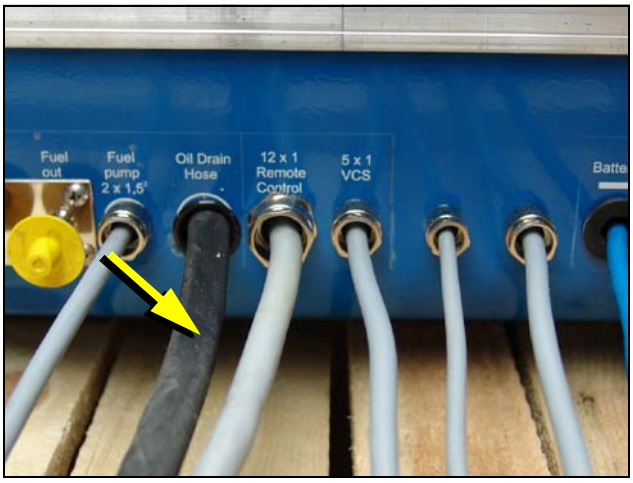


Fig. 5.3.8-4: Oil Drain Hose

5.3.9 External Components

Voltage control VCS

The diagram shows the control circuit board for the VCS. The control signals are passed to the actuator for speed regulation by means of this circuit control board. The VCS board allows for voltage adjustment.

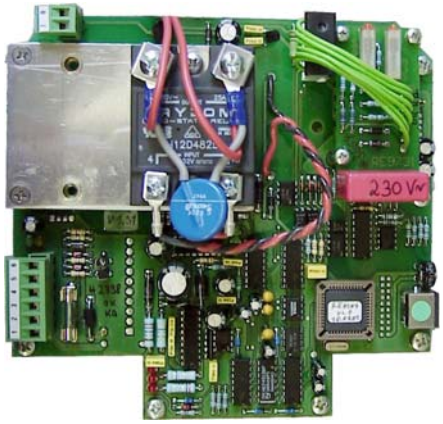


Fig. 5.3.9-1: VCS

Battey Monitor

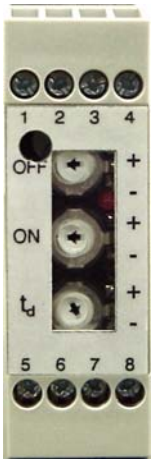


Fig. 5.3.9-2: Battery Monitor

5.4 Remote Control Panel - see separate Control Panel Manual

5.4.1 Starting the Generator - see separate Control Panel Manual

5.4.2 Stopping the Generator - see separate Control Panel Manual

6. Installation Instructions

All connections (hoses, wires etc) and installation instructions are designed and suited for “standard” installation situations.

In situations where Fischer Panda has no detailed information concerning certain installation requirements (such as boot hull specifications, maximum boot speed - and all other conditions concerning special operating situations) the installation instructions should be used as an example guide only.

The installation must be undertaken and proved by a suitable qualified/trained person and may in accordance with the law as required by the country and special situation.

Damages caused by faulty or incorrect installation are not covered by the warranty.

Attention!

6.1 Personal requirements

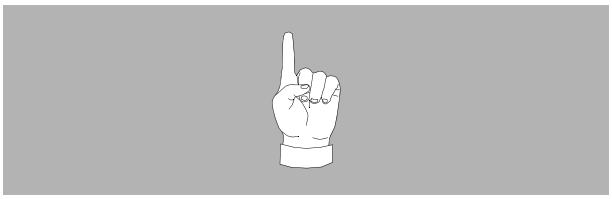
The described installation must be done by a technical trained person or a Fischer Panda service point.

6.1.1 Hazard notes for the installation

see “Safety first!” on Page 10.

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.

Warning!: Risk of injury

Do not run the generator with removed sound isolation cover.

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

6.2 Place of installation

6.2.1 Preliminary remark

- There must be sufficient fresh air supply for the combustion air.
- It has to be ensured that the cooling air supply from underneath or sidewise is sufficient.
- During operation the sea cock has to be opened.
- The generator may only be opened by a technical trained person.
- The generator may only be operated by a trained person.

6.2.2 Preparing the base - placement

Since Panda generators have extremely compact dimensions, they can be installed in tight locations. Attempts are sometimes made to install them in almost inaccessible places. Please consider that even almost maintenance-free machinery must still remain accessible at least at the front (drive belt, water pump) and the service-side (actuator, dipstick). Please also note that in spite of the automatic oil-pressure sensor it is still essential that the oil level has to be checked regularly.

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

You should avoid fixing the generator on a slippery surface with little mass (i.e. plywood). This acts as an amplifier of airborne sounds in the most unreasonable case. An improvement can be achieved by reinforcing these surfaces with ribs. In addition, the breakthroughs, which interrupt these surfaces, should be sawed off. The lining of the surrounding walls with a heavy layer (i.e lead) and foam additionally improve the conditions.

As the generator sucks in its combustion air via several drill holes in the capsule base, the capsule base must be installed with sufficient space to the basement so that the air supply is guaranteed (at least 12 mm/½“)

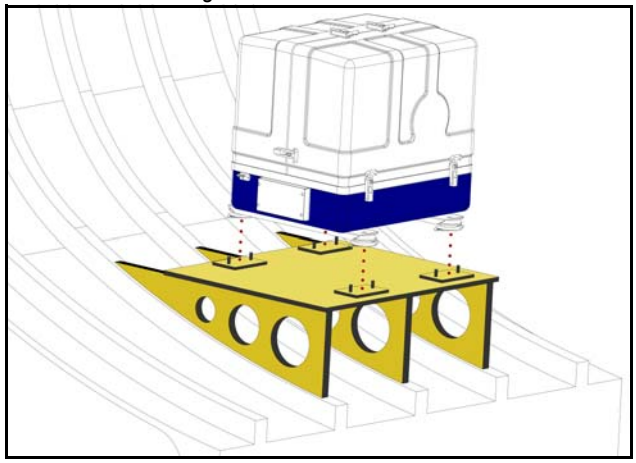
The generator sucks its air from the surrounding engine room. Therefore it must be ensured that sufficient ventilation openings are present, so that the generator cannot overheat.

High temperature of the intake air declines the power of the generator and increases the coolant temperature. Air temperatures of more than 40 °C reduce the power by 2 % per temperature rise of 5 °C. In order to keep these effects as small as possible, the temperature in the engine room should not be higher than 15 °C in relation to the outside temperature.

6.2.3 Advice for optimal sound insulation

The convenient base consists of a stable framework, on which the generator is fastened by means of shock-mounts. Since the aggregate is „free“ downwards, the combustion air can be sucked in unhindered. In addition the vibrations are void which would arise with a closed capsule base.

Fig. 6.2.3-1: Generator base



6.3 Generator Connections

Sample for the connection at the Fischer Panda generator. See the description of the generator for the original location.

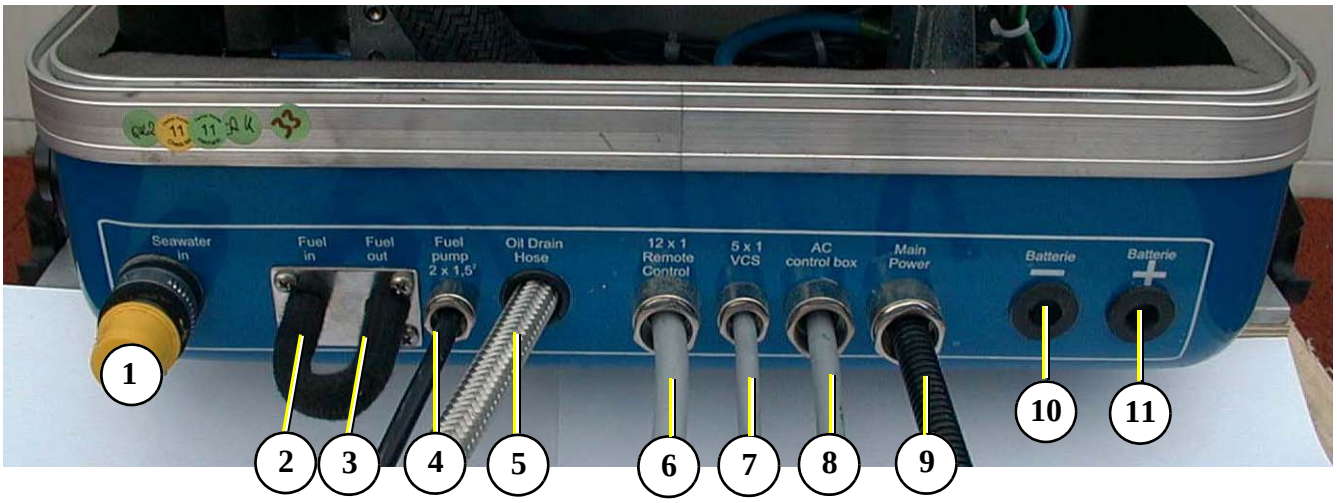
All electrical wires are connected within the capsule tightly to the motor and the generator. This is also the case for fuel lines and cooling water lines.

The electrical connections MUST be carried out according to the respective valid regulations. This also concerns used cable materials. The cable supplied is meant for laying „protected“ (i.e. in pipe) at a temperature up to a max of. 70 °C (160 °F). The on-board circuit must also be fitted with all essential fuses.

Before working (installation) on the System read the section „Safety Instructions“ in this manual.

ATTENTION!

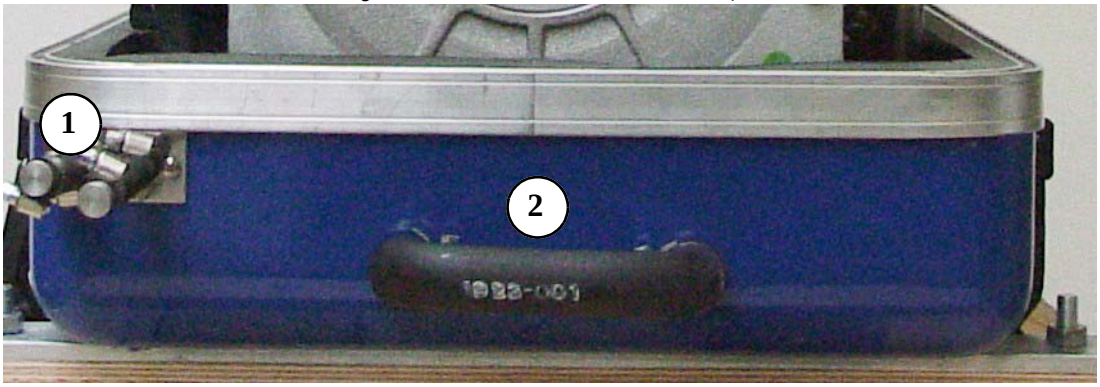
Fig. 6.3-1: Connection at the Generator - sample



1. Raw water intake
2. Fuel intake from tank to generator
3. Fuel return from generator to tank
4. Electrical line for fuel pump
5. Engine oil drain hose
6. Electrical line for remote control panel
7. Electrical cable for AC control box (VCS-control)
8. Electrical cable for AC control box (230V und 400V)
9. Generator AC-output
10. Generator starter battery negative cable (-)
11. Generator starter battery positive cable (+)

Example - see section 5.2 for detailed information

Fig. 6.3-2: Connection at the Generator - sample



1) External cooling water expansion tank
2) External ventilation valve

Example - see section 5.2 for detailed information

6.4 Cooling system installation - raw water

6.4.1 General information

The genset should have its own raw water (coolant water) inlet and should not be connected to any other engine systems. Ensure that the following installation instructions are complied with:

For the avoidance of galvanic corrosion, refer to the chapter „Service instruction for marine generators (corrosion protection)“.

6.5 Installation of the cooling system - raw water

6.5.1 General information

The genset should have its own raw water (coolant water) inlet and should not be connected to any other engine systems. Ensure that the following installation instructions are complied with:

6.5.2 Fischer Panda installation kit - raw water

The following additional components will be required for the specified installation. You can purchase them as an installation kit or separately at Fischer Panda.

Note:

Through hull fitting with strainer

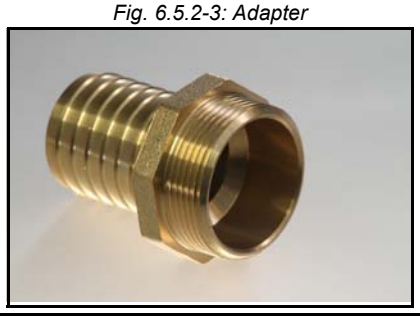
Fig. 6.5.2-1: Thru hull fitting with strainer

Sea cock

Fig. 6.5.2-2: Sea cock

Adapter

Fig. 6.5.2-3: Adapter

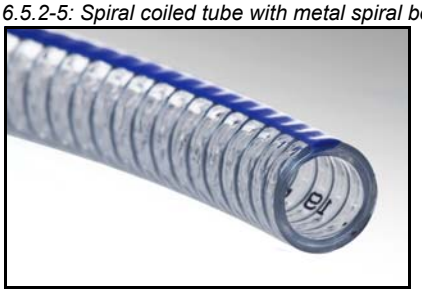


Raw water filter

Fig. 6.5.2-4: Raw water filter

Spiral coiled tube with metal spiral bead

Fig. 6.5.2-5: Spiral coiled tube with metal spiral bead



Ventilation valve

Fig. 6.5.2-6: Ventilation valve

Hose clamps

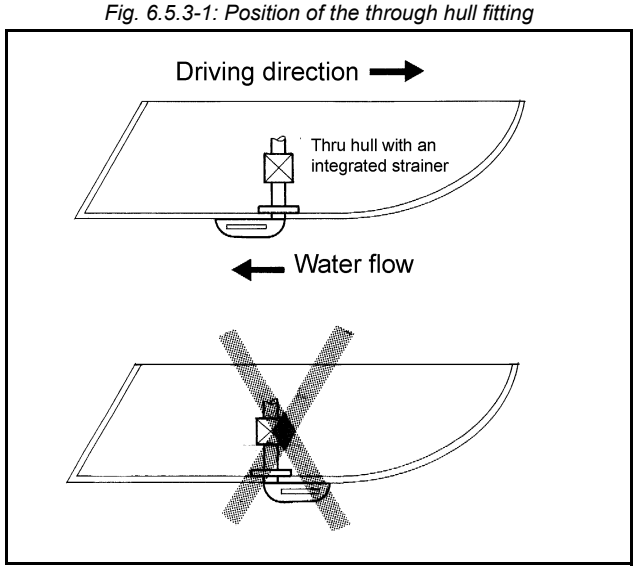
Fig. 6.5.2-7: Hose clamps

6.5.3 Installation of the through hull fitting in Yachts - scheme

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

For Panda generators, the through hull inlet should NOT point in the sailing direction! When sailing at higher speeds more water will be forced into the inlet than the pump can handle and your generator will flood.

Fig. 6.5.3-1: Position of the through hull fitting



6.5.4 Quality of the raw water sucking in line

In order to keep the suction resistance in the line at a minimum, the raw water intake system must have an inner diameter of at least 1" (25 mm).

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. Install the raw water inlet in close proximity to the genset.

After start-up the cooling water quantity must be measured (e.g. by catching at the exhaust). The flow rate, as well as the necessary cross section of the cooling water pipe see section 11.10, “Diameter of conduits,” on page 219

6.5.5 Generator installation above waterline

The Panda is equipped with a water intake pump mounted on the motor. Since the intake pump is an impeller pump there are wearing parts which are likely to require replacement after a period of time. Ensure that the genset is installed so that the intake pump can be easily accessed. If this is not possible, an external intake pump could be installed in an easily accessible location

If the generator is installed above the waterline, it is possible that the impeller will wear out faster, because after starting, the pump runs dry for some seconds. The raw water hose should form a loop as near as possible to the raw water inlet of the generator (see picture below). This ensures the pump only sucks in air for a short time. The impeller pump will be lubricated by raw water and the impeller life span will be increased.With the installation of a non return valve in the raw water inlet line, which is under the waterline, this problem can be restricted.

When starting the generator you should always consider when raw water runs out of the exhaust system. If this takes longer than 5 seconds you should replace the impeller pump because it sucks in air for too long before it delivers raw water. The impeller has lost its effect and cannot suck in raw water anymore. This results to an overheating of the motor. If the impeller is not exchanged early enough the impeller blades may break into pieces and plugging the cooling water cycle. It is very important to exchange the impeller after a couple of months.

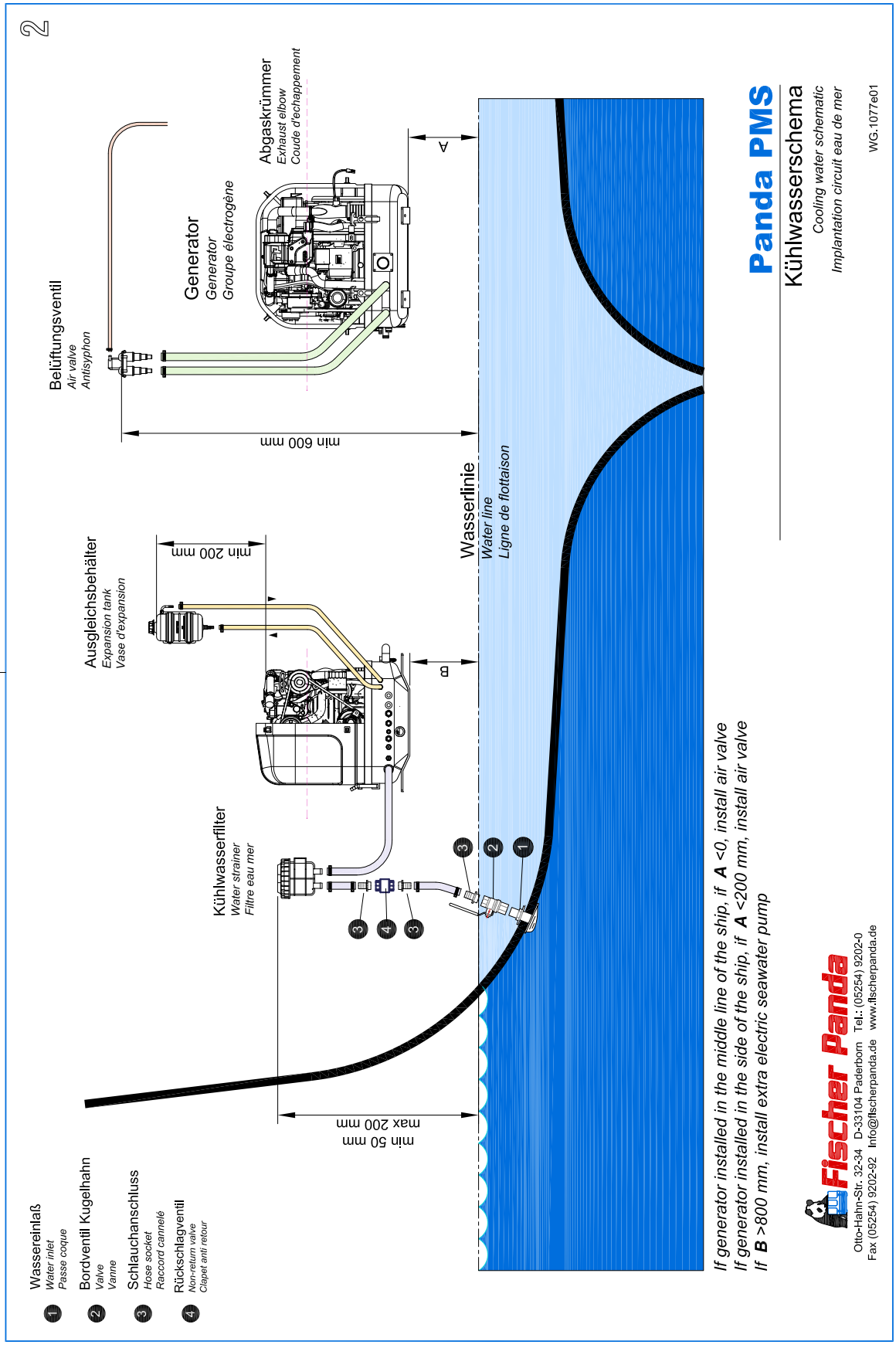
Never change the impeller for many years, without exchanging the old pump. If the sealing ring is defective within the pump, raw water runs into the sound cover of the genset. A repair is then very expensive.

NOTE:

Replacement impeller and also a spare pump should always be on board. The old pump can be sent back to Fischer Panda for cost-effective repair.

6.5.6 Raw water installation scheme

Fig. 6.5.6-1: Raw water installation schema



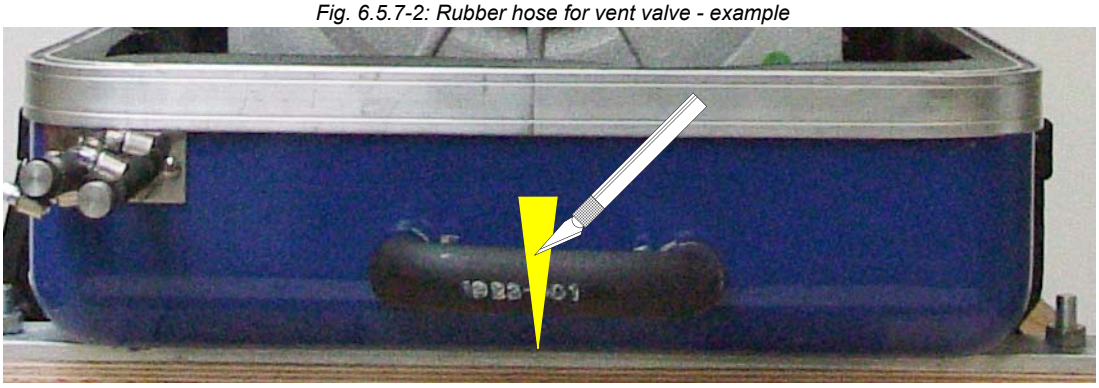
6.5.7 Generator installation below waterline

If the generator cannot be attached at least 600 mm above the waterline, a vent valve must be installed at the raw water line.

Possible heeling must be taken into consideration if installed at the "mid-ship line"! The water hose for the external vent valve is located at the back of the sound insulated capsule. This hose is split in the middle and extended respectively at each end by an additional hose and a connecting nipple. Both hose ends must be led outside of the sound cover, if possible 600 mm over the waterline in the mid-ship line. The valve is connected at the highest place to the two hose ends. If the valve jams the cool water line cannot be de-aerated after stopping the generator, the water column is not discontinued and water can penetrate into the combustion chamber of the engine. This will lead to damage the engine in a short term!

Fig. 6.5.7-1: Vent valve

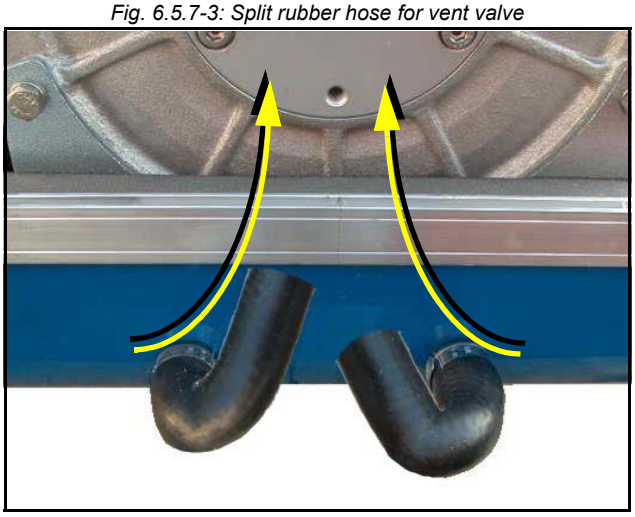
Fig. 6.5.7-2: Rubber hose for vent valve - example



The rubber hose for the external vent valve will be cut...

...and bend upwards.

Fig. 6.5.7-3: Split rubber hose for vent valve

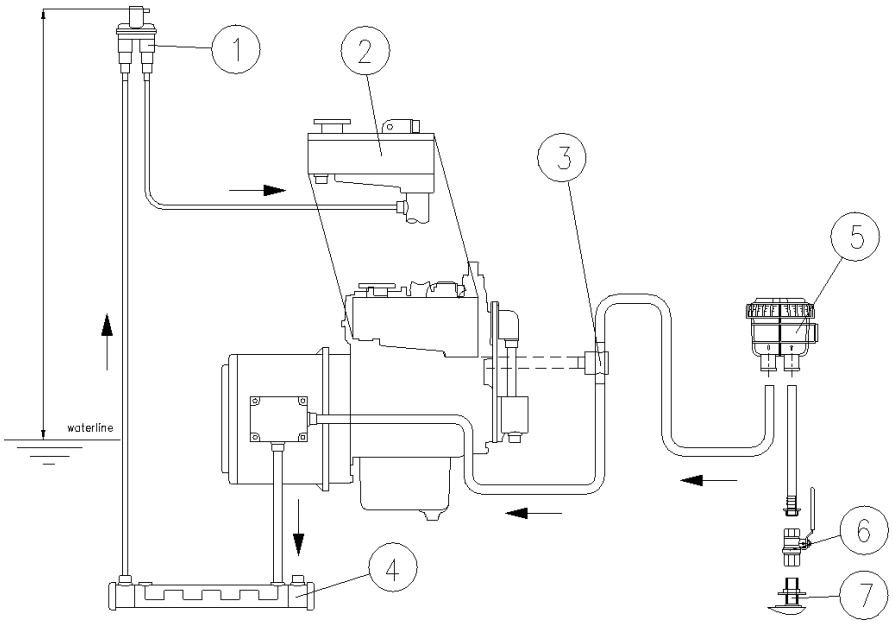


Both hose ends will be extended respectively with a hose and connected with a vent valve 600 mm over the waterline.

Example

6.5.8 Generator Housing cooled by raw water

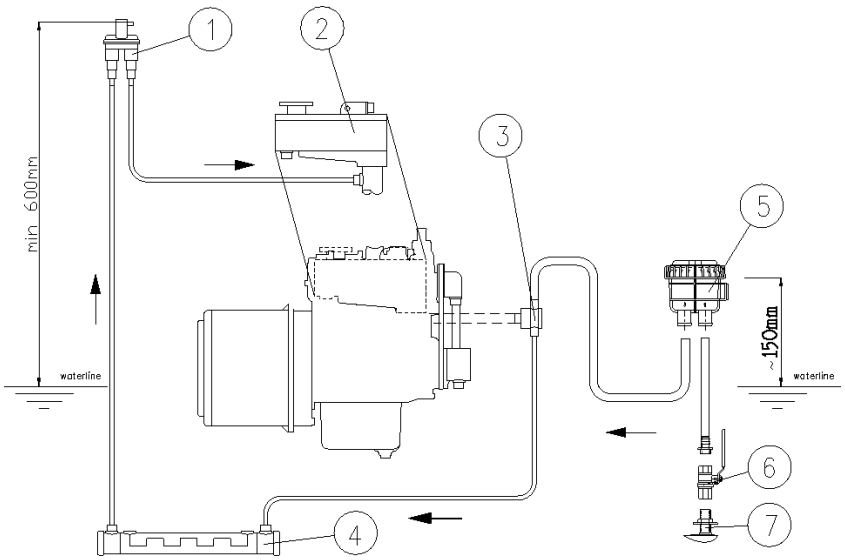
Fig. 6.5.8-1: Installation scheme for direct cooling



1. Vent valve
2. Coolant connection block
3. Raw water pump
4. Exhaust manifold
5. Raw water filter ø 1"
6. Water cock ø1“
7. Through hull

6.5.9 Indirect cooling of the genset housing (by the heat exchanger)

Fig. 6.5.9-1: Installation scheme indirect cooling of the genset housing



1. Vent valve
2. Exhaust manifold
3. Raw water pump (Raw water impeller pump)
4. Heat exchanger
5. Raw water filter
6. Water cock
7. Hull inlet

6.6 Installation of the cooling system - fresh water

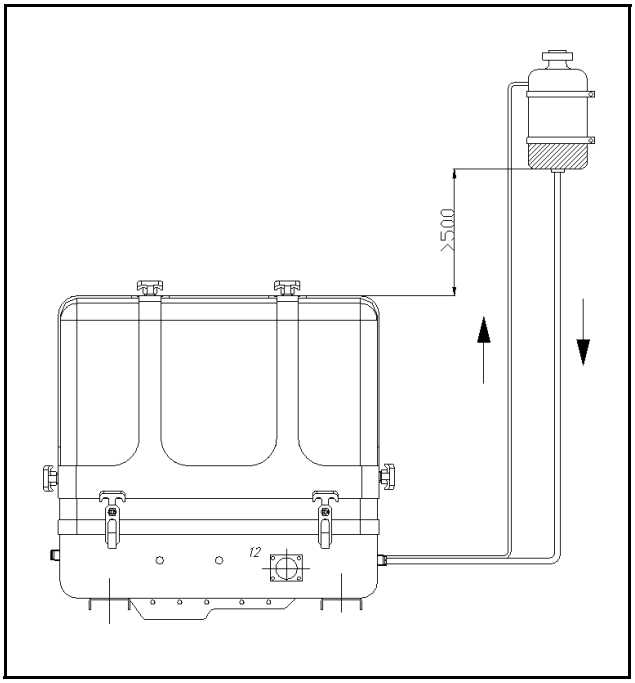
6.6.1 Position of the external cooling water expansion tank

Position of the external cooling water expansion tank

The Panda generator is normally supplied with an additional, external cooling water expansion tank. This tank must be installed in such a way that its lower edge is at least 500 mm more highly arranged than the upper edge of the sound cover.

If this 500 mm should be fallen below, i.e. the cooling water expansion tank is lower installed, very large problems can occur with filling and ventilating. Extend and displace the hose lines to the outside or possibly even up to the deck.

Fig. 6.6.1-1: Position of the External Cooling Water Expansion Tank

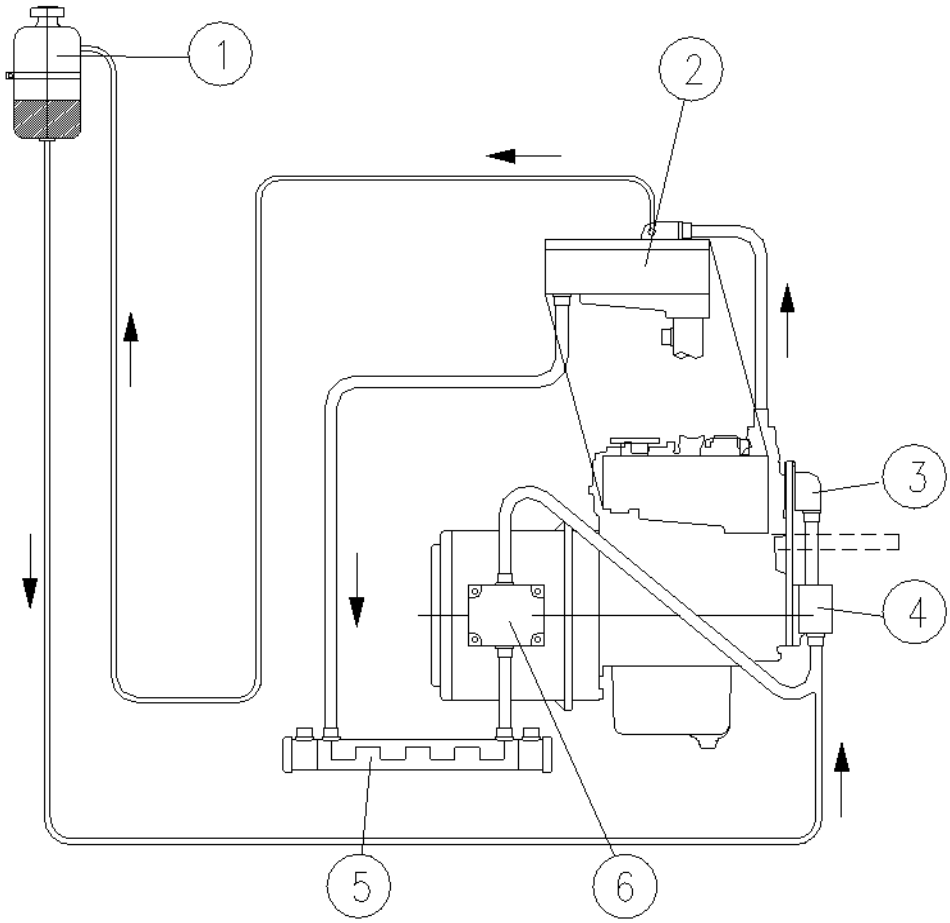


The external cooling water expansion tank may be filled only up to the lower edge of the lower tension tape (see note „max“) in the maximum filling level in cold condition.

ATTENTION!

6.6.2 Scheme for freshwater circuit at two circuit cooling system

Fig. 6.6.2-1: Scheme for freshwater circuit at two circuit cooling system



1. Expansion tank
2. Exhaust manifold
3. Thermostat housing
4. Fresh water pump
5. Heat exchanger
6. Cooling water connection block

6.7 Installation of the water cooled exhaust system

6.7.1 Fischer Panda installation kit - Exhaust System

The following additional components will be required for the specified installation. You can purchase them as an installation kit or separately at Fischer Panda.

Note:

Waterlock

Fig. 6.7.1-1: Waterlock

Exhaust-Water-Seperator

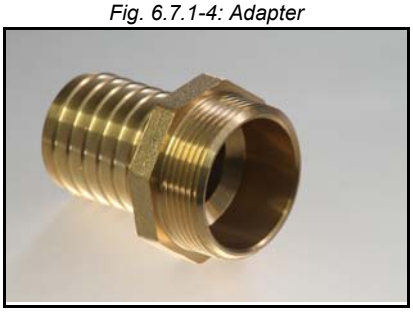
Fig. 6.7.1-2: Exhaust Water seperator

Through hull fitting without strainer

Fig. 6.7.1-3: Through hull fitting without strainer

Adapter

Fig. 6.7.1-4: Adapter



Sleeve adapter

Fig. 6.7.1-5: sleeve adapter

Exhaust hose black with wireinlay

Fig. 6.7.1-6: Exhaust hose black with wireinlay

Seacock

Fig. 6.7.1-7: Seacock

Hoseclamps

Fig. 6.7.1-8: Hoseclamp

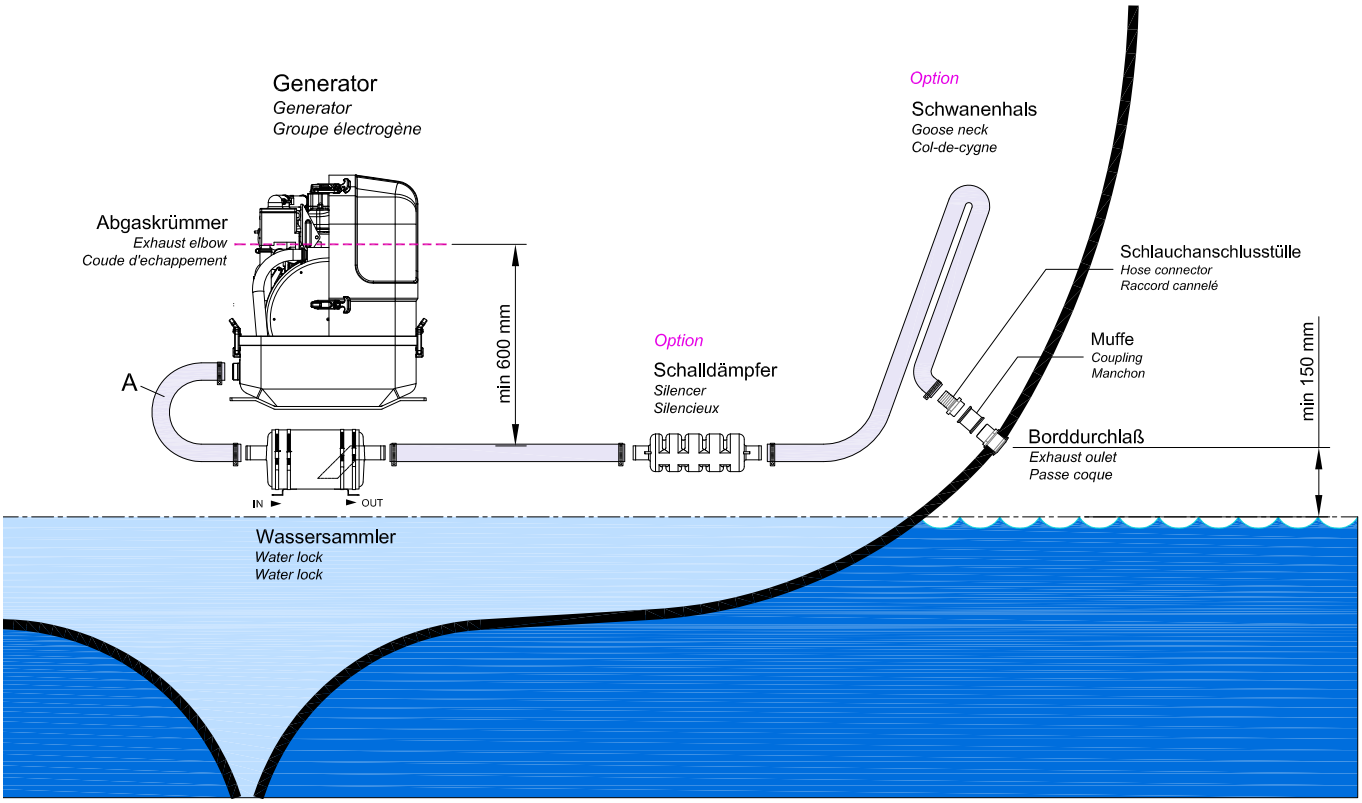
6.7.2 Installation of the standard exhaust system

The generator exhaust system must remain completely independent and separate from the exhaust system of any other unit(s) on board. The water lock must be installed at the lowest point of the exhaust system. An optional noise insulated water lock can also be installed. The exhaust hose descends from the capsule to the water lock. Then the hose rises via the „goose neck“ to the silencer (see drawing). The goose neck must be vertical and sit preferably along the ship's keel centre line. In order that the back pressure inside the exhaust is not to high, the total length of the exhaust system should not exceed 6,3 m.

By injecting the outlet raw water into the exhaust manifold, the exhaust gases are cooled and the noise emissions from the exhaust system are reduced.

Exhaust diameter see section 11.10, “Diameter of conduits,” on page 219.

Fig. 6.7.2-1: Installation Scheme Standard Exhaust System



6.8 .Installation of the waterlock

Pay attention to the right flow direction throught the waterlock.

Note!:

Unfortunately, it can occasionally occur that, because of an disadvantageous mounting position of the waterlock, sea water gets into the diesel engines' combustion chamber. This disables the diesel engine by irreversible damages. Quite frequently, this leads to discussions during which the parties involved in the yachts' construction or the installation of the generator have to explain themselves.

One point in this situation can be clarified definitely:

If sea water gets into the inner section of the engine, this is not possible due to constructional defects of the generator or to malfunctions on the engine itself. It can only reach the combustion chamber via the exhaust hose and thus get into the engine.

Thereby, the position of the generator and the waterlock, as well as the arrangement of the cooling water and exhaust hoses play the decisive role.

If the waterlock is arranged in an unfavourable position, the cooling water flowing back in the exhaust hose can rise so high, that it reaches the exhaust stack. Since at least one discharge valve is always open when the engine is shut off, the sea water has free access to the combustion chamber. By capillary action, this sea water then flows past the cocks and even reaches the engine oil in that way. (In fact, a surprisingly high oil level is a first indication of an upcoming catastrophe).

If an usual high oil level can be detected and/or the oil is of a greyish colour, the engine must not be used anymore. This is a certain sign for cooling water that got into the oil pan. If the engine is started under these conditions, the water and the oil are mixed into an emulsion. The oil will quickly become so viscous that one will have to call it a paste. In this phase the fine oil hoses are blocked and a few moments later the machine gets destroyed because of insufficient lubrication. Before this happens, an immediate oil change should be made. Since the water can only reach the engine via the combustion chamber, it can be assumed that the compression rings will start to corrode. These effects have to be discussed with an engine expert. It will

certainly be reasonable to immediately inject plenty penetrating oil through the intake stack and to slowly turn the engine with the starter motor.

The cooling water can reach the exhaust area via the exhaust hose as well as via the cooling water feed.

6.8.1 Possible cause for water in the exhaust hose

6.8.1.1 Possible cause: exhaust hose

If the cause is the exhaust hose itself, the following points are to be checked at the hose:

a) Position of the waterlock is too high. The water reaches the exhaust hose.

b) Position of the waterlock is too far away from the middle of the generator. The water reaches the exhaust hose in tilted position.

c) The waterlock is too small relating to the length of the exhaust hose.

6.8.1.2 Possible cause: cooling water hose

If the generator is not clearly installed 600 mm over the water line, the cooling water feed must be equipped with a „venting valve“ which is at least led out 600 mm over the water line. (This position must also be assured in every tilted position. Therefore, the venting valve should be located in the ships’ center line, so that it cannot move in tilted position).

a) Position of the venting valve is too low. The water flows into the exhaust area when the ship is tilted.

b) Position of the venting valve is too far from the ships’ center line. The water reaches the exhaust area when the ship is tilted.

c) The venting valve does not work, because it jams or it is clotted. (The venting valve’s function needs to be checked regularly.)

As it consistently happens that functioning risks are not realised during the laying of the exhaust hose, the following explanations refer explicitly to the exhaust hose. Here, the location, the size and the position of the „waterlock“ play a very decisive role:

6.8.2 Installation area of the waterlock

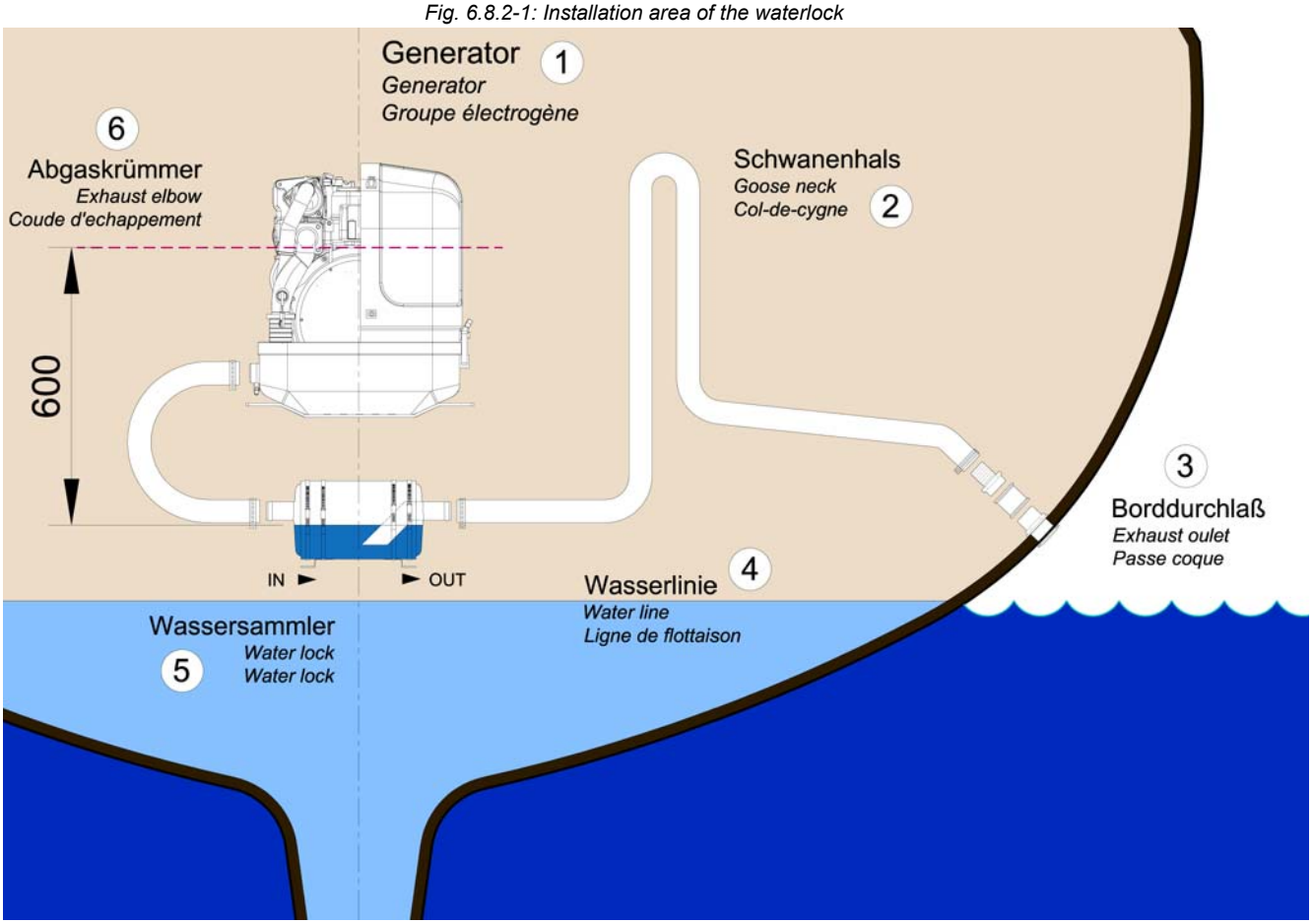
Concerning a water-cooled exhaust system, it must be regarded that - under no circumstances - cooling water from the exhaust hose can get into the exhaust elbow area at the engine. If this happens, the cooling water can get into the combustion chamber via an open discharge valve. This would lead to irreparable damage at the engine.

In addition to that, one has to reckon with possible tilted positions of sailing yachts, which makes the position of the waterlock even more important. In general one could say that:

The deeper the waterlock is located underneath the generator, the better the protection from entering water into the combustion chamber.

The picture below shows that the distance between the critical point at the exhaust elbow and the maximum permissible water level in the exhaust hose is stated with 600 mm. This distance should be understood as a minimum distance.

Fig. 6.8.2-1: Installation area of the waterlock

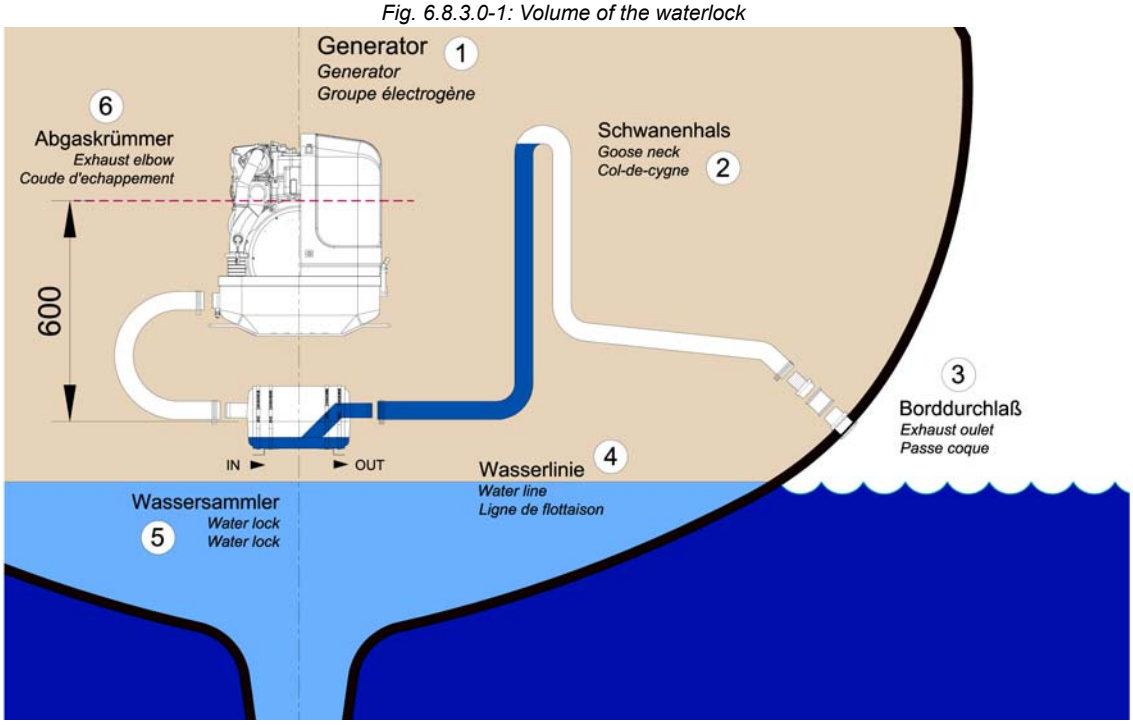


6.8.3 The volume of the waterlock

The waterlock must be measured so large, that it can take the entire amount of water flowing back from the exhaust hose. The amount of water depends on the hoses' length (L) and its cross section. While the diesel engine is running, cooling water is continuously injected into the exhaust system and is carted outside with the emissions by the exhaust gas pressure. When the engine is turned off, the number of revolutions sinks quite fast. By doing so, the point is reached where the exhaust gas pressure does not suffice anymore to cart the cooling water out. All cooling water remaining in the hose at that point flows back into the waterlock. At the same time, the diesel engine itself continues to cart cooling water through the cooling water pump, as long as it keeps on rotating.

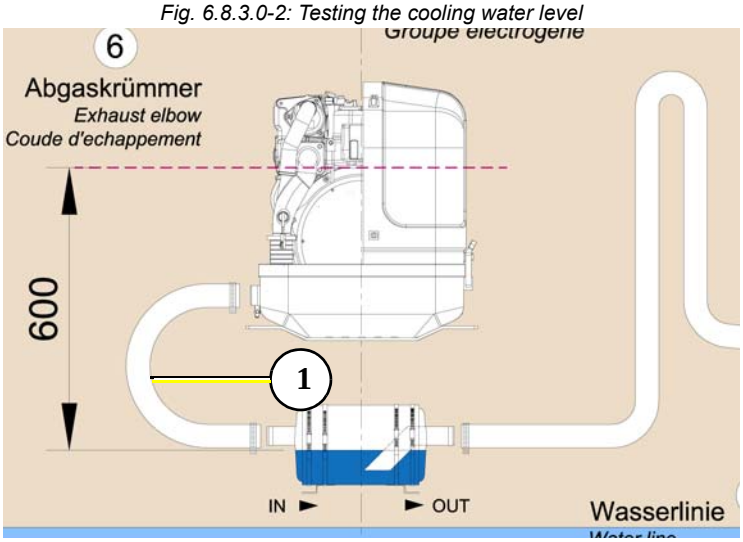
The waterlock must necessarily be measured large enough that it can take the entire amount of cooling water and, at the same time, does not exceed the prescribed vertical height of 600 mm up to the critical point at the exhaust elbow.

Fig. 6.8.3.0-1: Volume of the waterlock



If there are any doubts, a verification can easily be made by temporarily using a clear-sighted hose (1) as exhaust hose. In that way, the cooling water level can be checked very easily.

Fig. 6.8.3.0-2: Testing the cooling water level

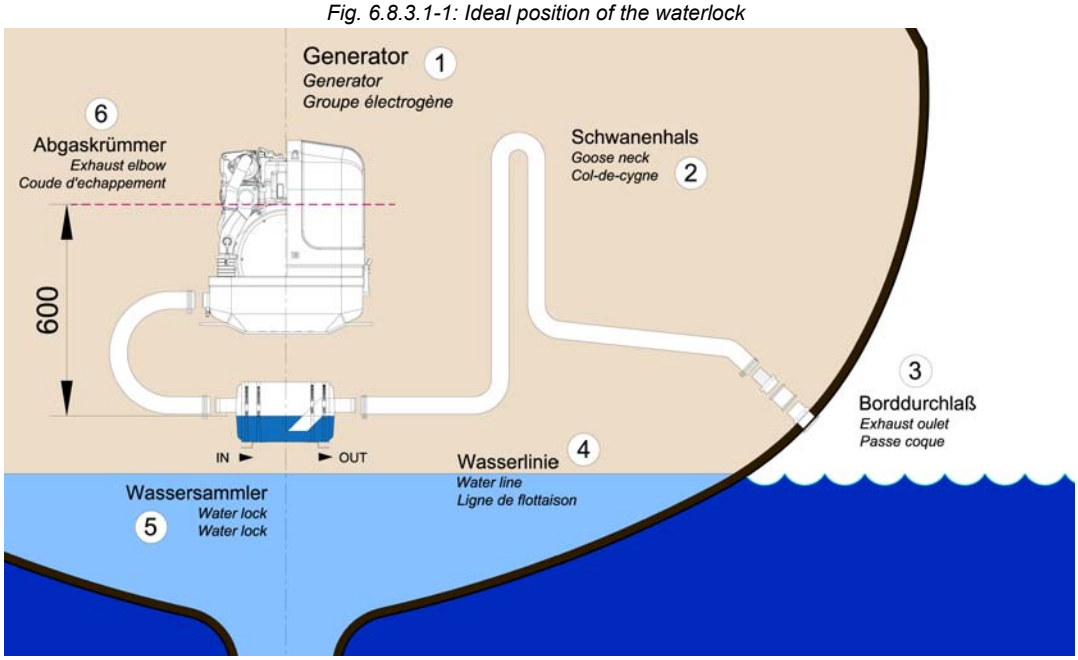


6.8.3.1 Ideal position of the waterlock

Important Note!

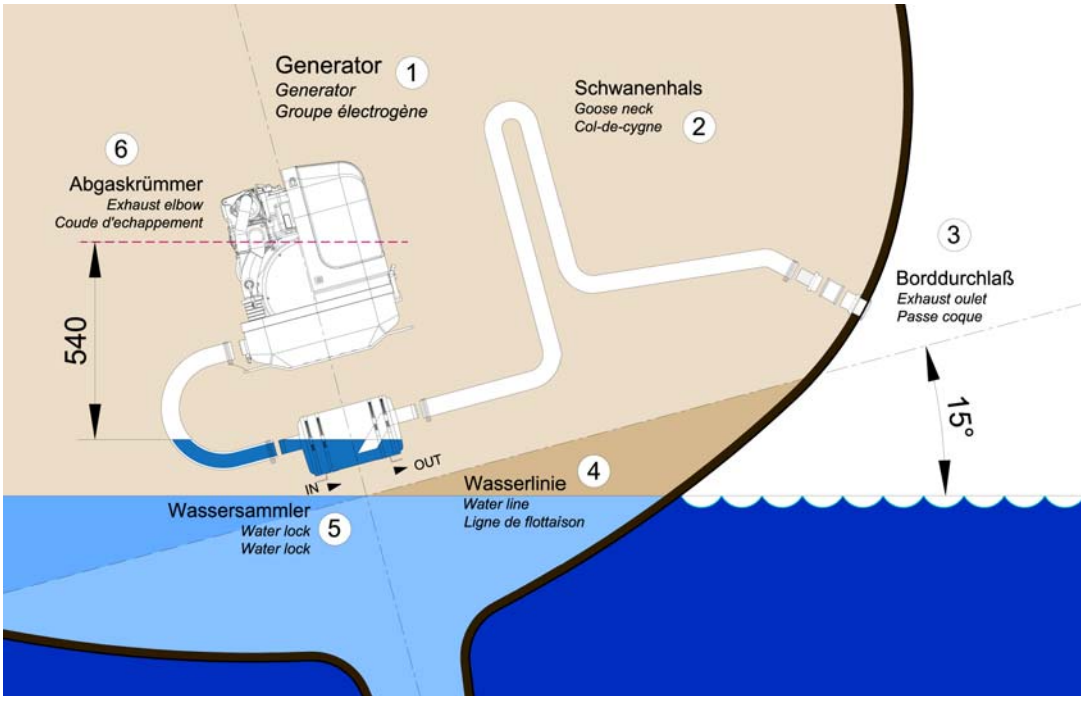
The ideal position of the waterlock would be in center underneath the generator. Only in this position it is assured that the water level cannot change drastically in tilted position by the waterlock moving out of the center line. See the following pictures:

Fig. 6.8.3.1-1: Ideal position of the waterlock



In Fig. 6.8.3.1-1, the waterlock is mounted in center underneath the generator. When the ship tilts, the position of the waterlock related to the critical point at the exhaust hose, changes only slightly.

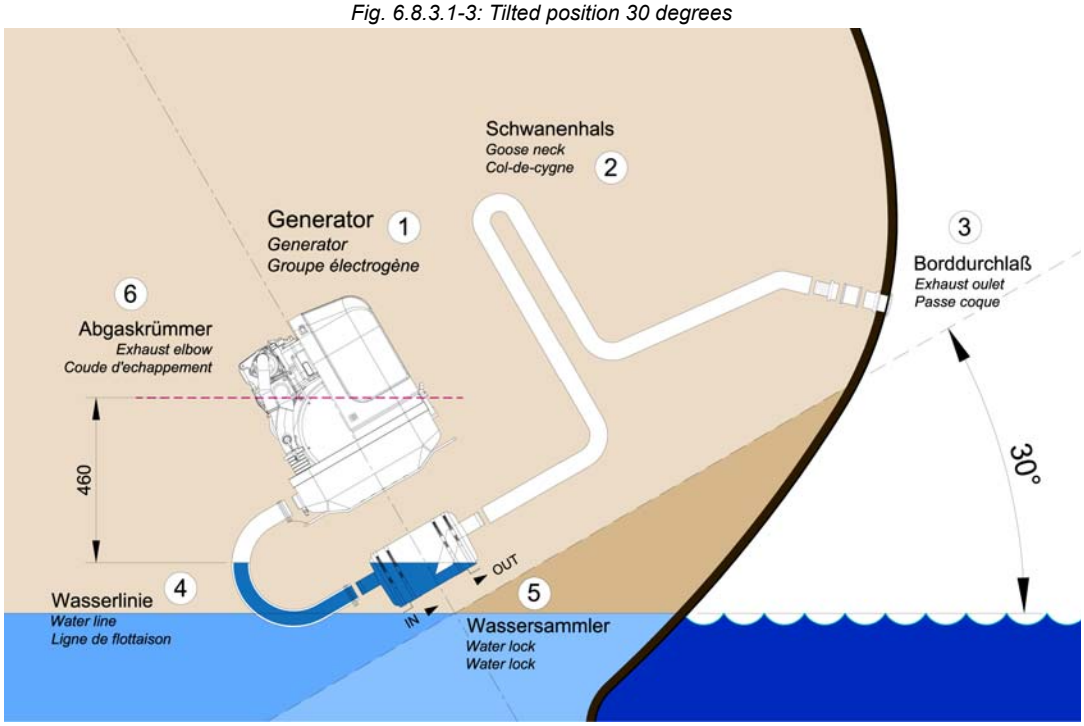
Fig. 6.8.3.1-2: Tilted position 15 degrees



Tilted position 15 degrees - Fig. 6.8.3.1-2

The distance from the exhaust elbow to the hydrostatic head has derated to 540 mm.

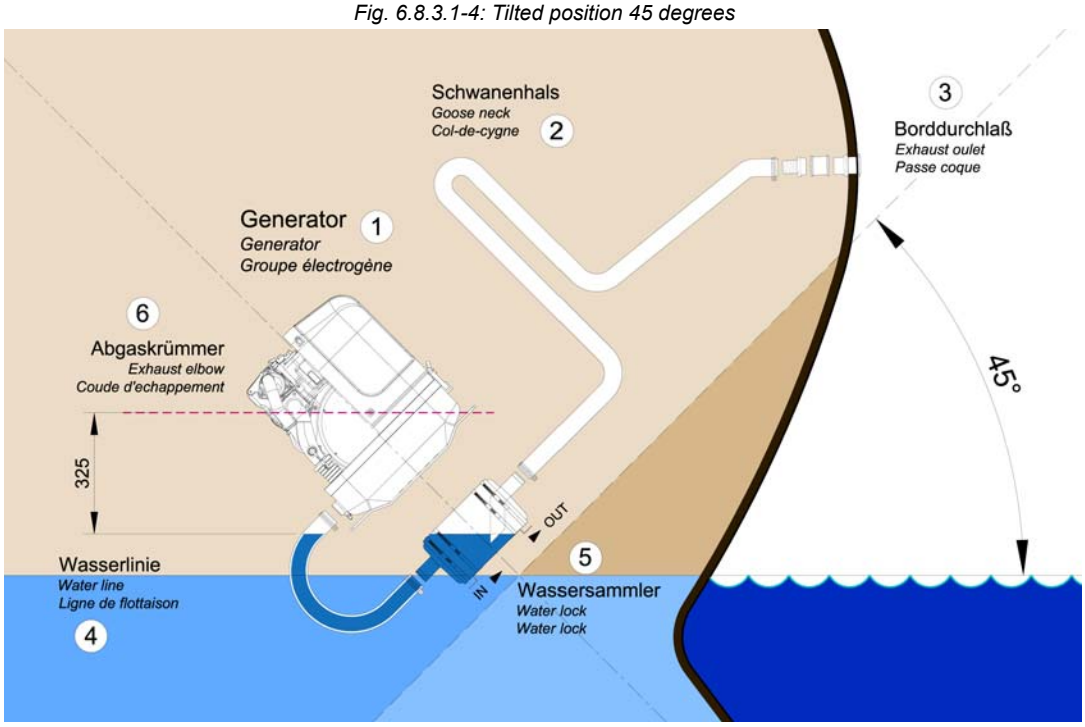
Fig. 6.8.3.1-3: Tilted position 30 degrees



Tilted position 30 degrees - Fig. 6.8.3.1-3

The distance of the water level, even in ideal position, changes that only 458 mm distance remain. So the critical distance is under-run already.

Fig. 6.8.3.1-4: Tilted position 45 degrees



Tilted position 45 degrees - Fig. 6.8.3.1-4

In this case the water level rise so high, that the distance constitutes only 325 mm.

Even when the water lock is mounted in the ideal spot, at an extremely tilted position of 45 degrees there is still the risk that water can get straight into the discharge stack area through strong rocking motions („sloshing“). This shows that the distance of 600 mm represents a minimum size at which, even when installed ideally, the water can slosh into the exhaust elbow when the ship is very tilted or rocks very hard.

Summary:

The preset minimum height of 600 mm must be regarded unconditionally and is only valid if the waterlock is mounted in its ideal position in center underneath the generator. A higher position is highly recommended if it has to be reckoned with tilted positions of 45 degrees.

6.8.3.2 Example of the installation of the waterlock off-center and possible effects:

The following pictures are primarily relevant for an installation of the generator with the waterlock on sailing yachts. A change in the mounting position caused by tilted position does not have to be reckoned concerning motor yachts. Here it is only necessary to regard that the volume of the waterlock is measured so large that it can take the entire amount of water flowing back, and at the same time, maintains the minimum distance of 600 mm.

A) Installation of the waterlock 500 mm next to the generator's center line:

Fig. 6.8.3.2-1: waterlock, 500 mm next to the center line

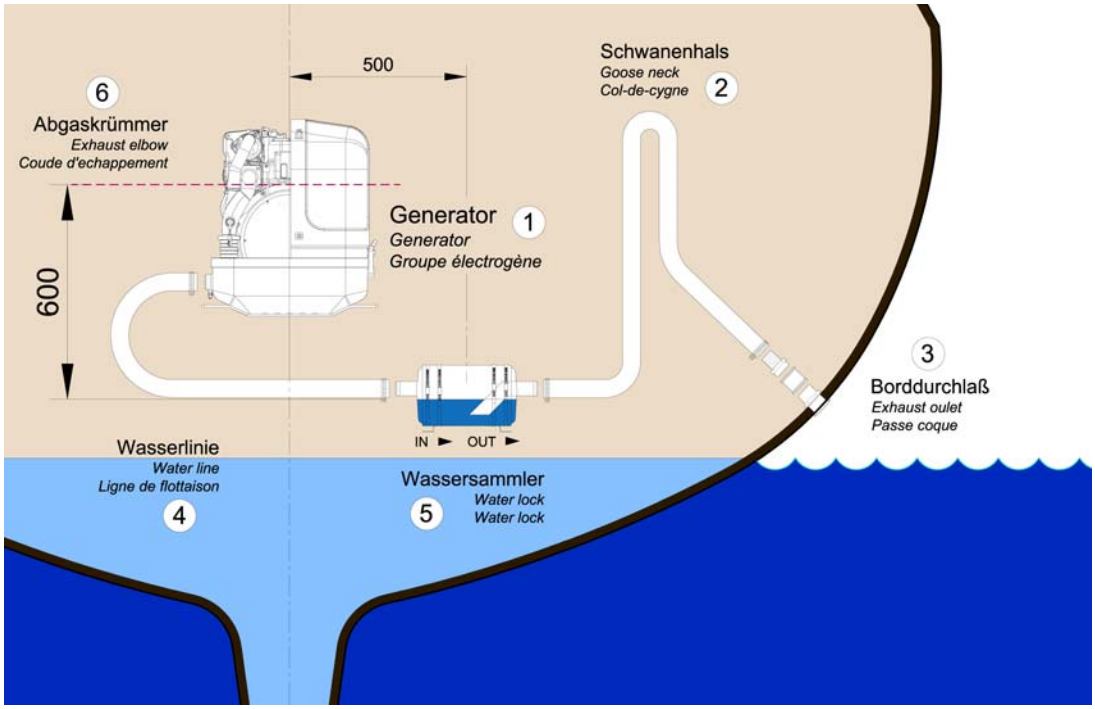
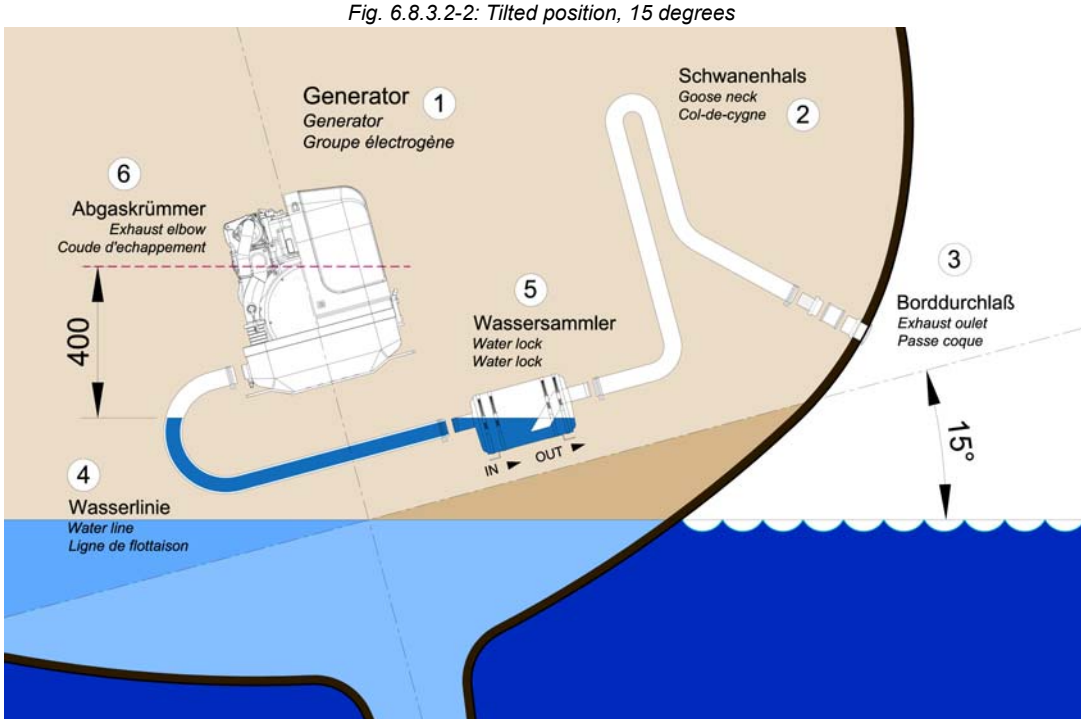


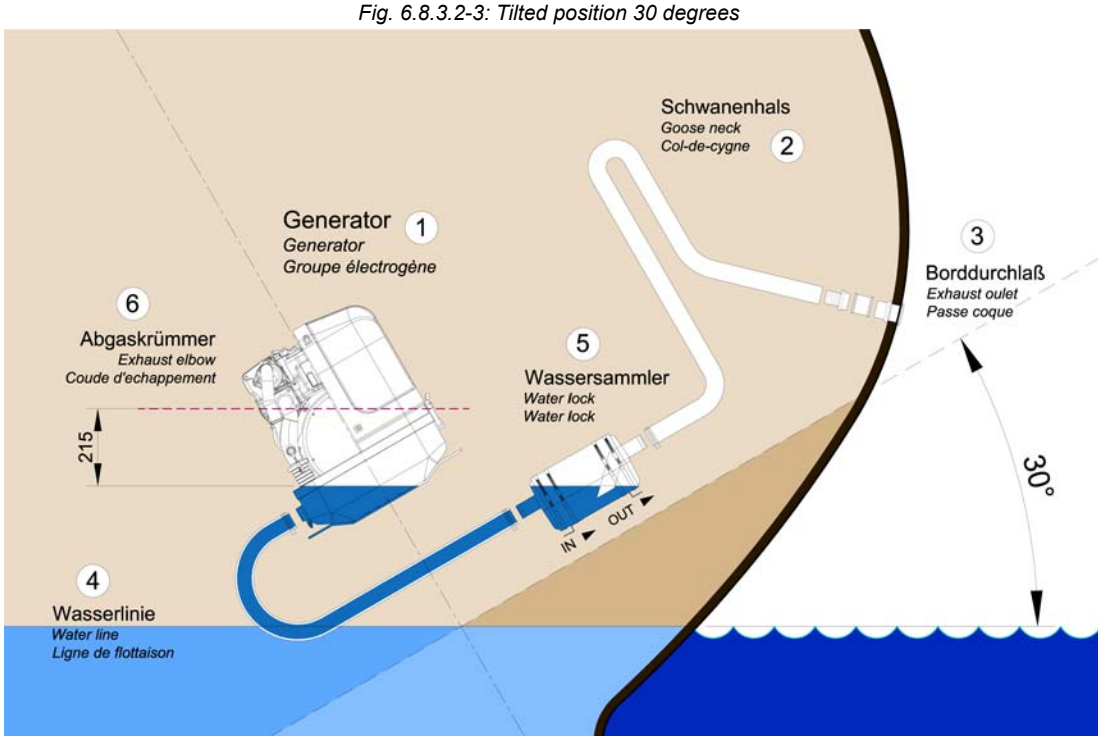
Fig. 6.8.3.2-2: Tilted position, 15 degrees



Tilted position 15 degrees - Fig. 6.8.3.2-2

The distance is only 404 mm instead of the original 600 mm. So this is very close to the critical point.

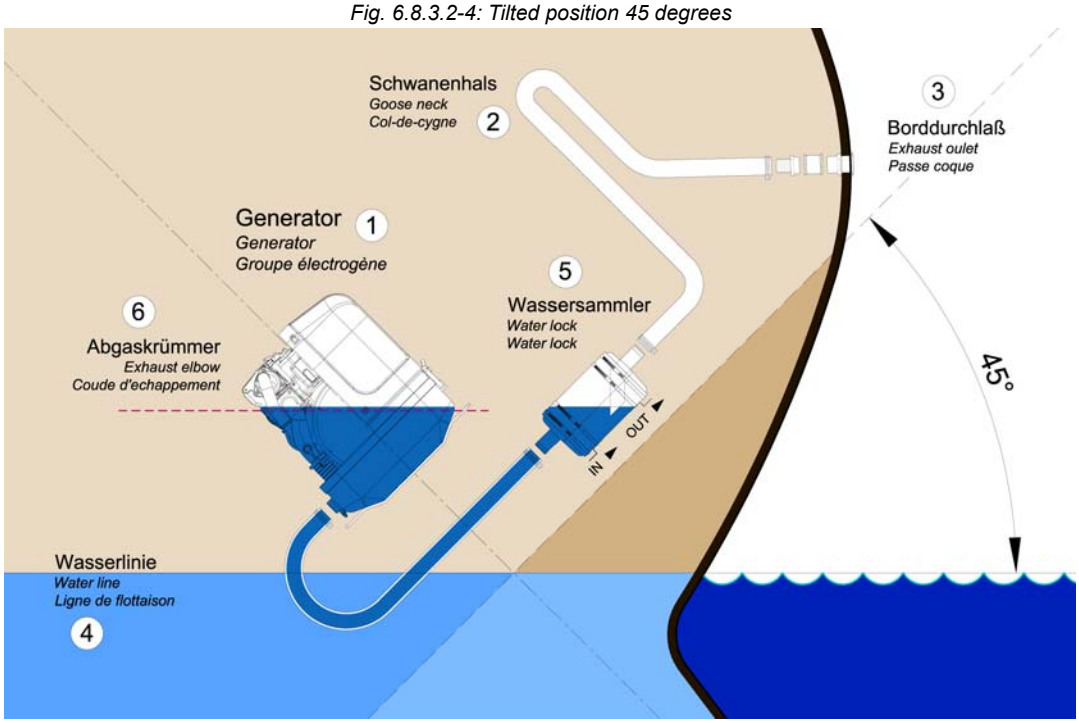
Fig. 6.8.3.2-3: Tilted position 30 degrees



Tilted position 30 degrees - Fig. 6.8.3.2-3

The distance between the hydrostatic head and the critical point at the exhaust elbow is only 216 mm. This means that in a tilted position of 30 degrees you already face the highest risk of sea water sloshing into the combustion chamber.

Fig. 6.8.3.2-4: Tilted position 45 degrees



Tilted position 45 degrees - Fig. 6.8.3.2-4

The water level is now at the same height as the critical point at the exhaust elbow. If the ship is sailed in a tilted position of 45 degrees with an installation like this, the ingress of cooling water into the combustion chamber is inevitable. Irreparable damages are pre-programmed.

B) Installation distance between waterlock and the generator's center line 1000 mm

Fig. 6.8.3.2-5: waterlock, 1000 mm next to center line

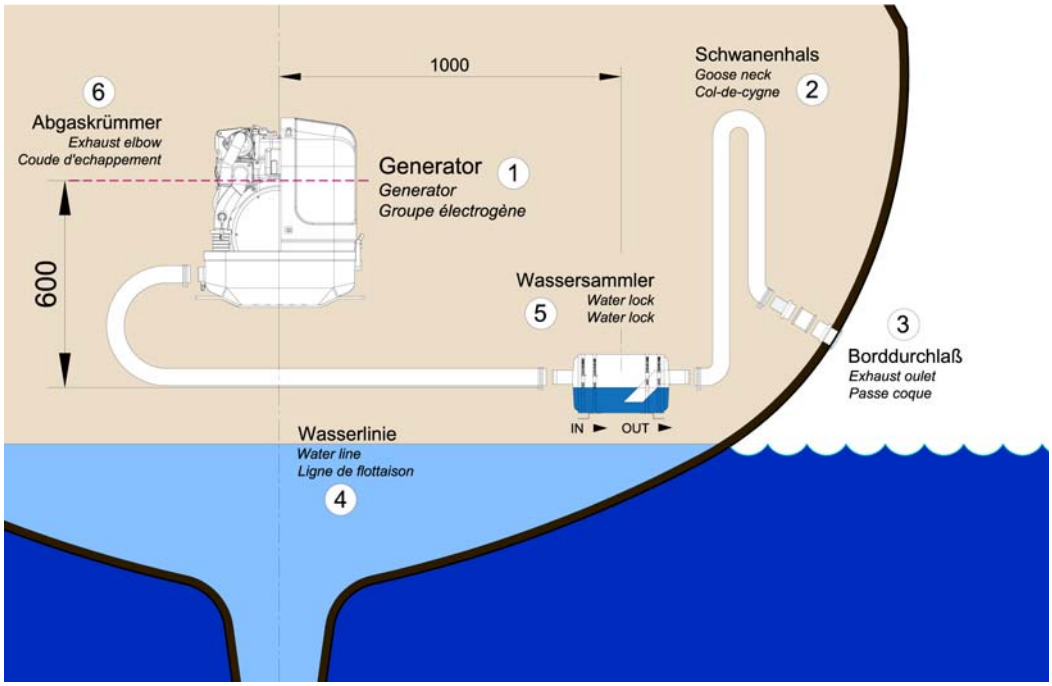
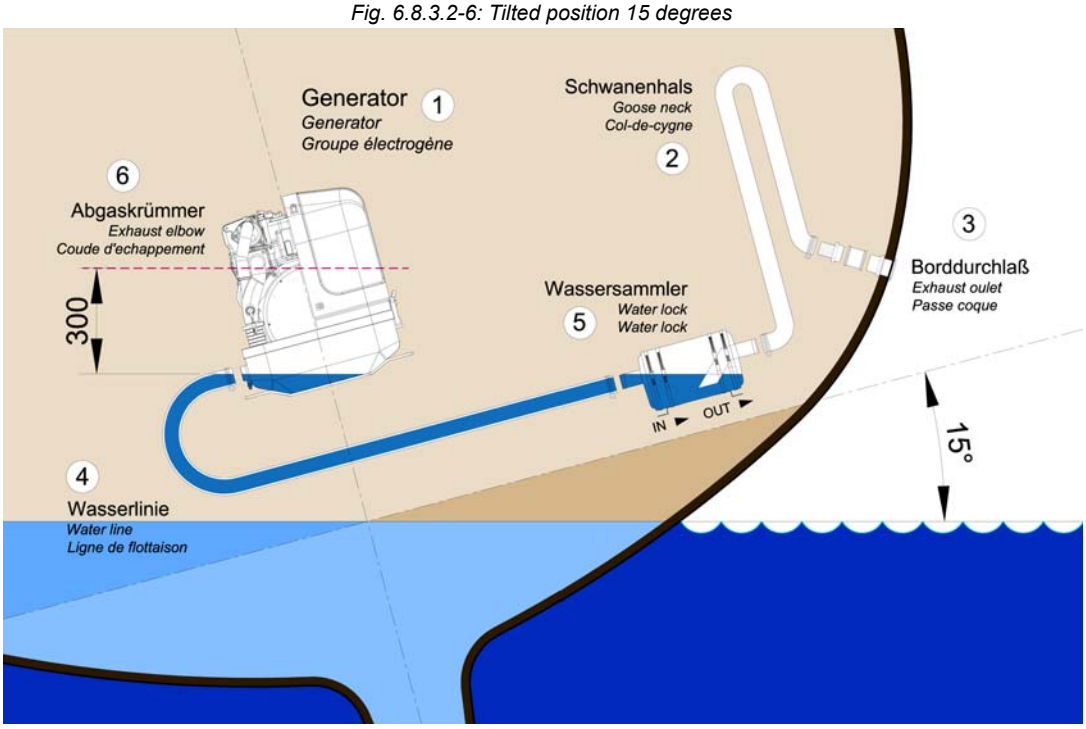


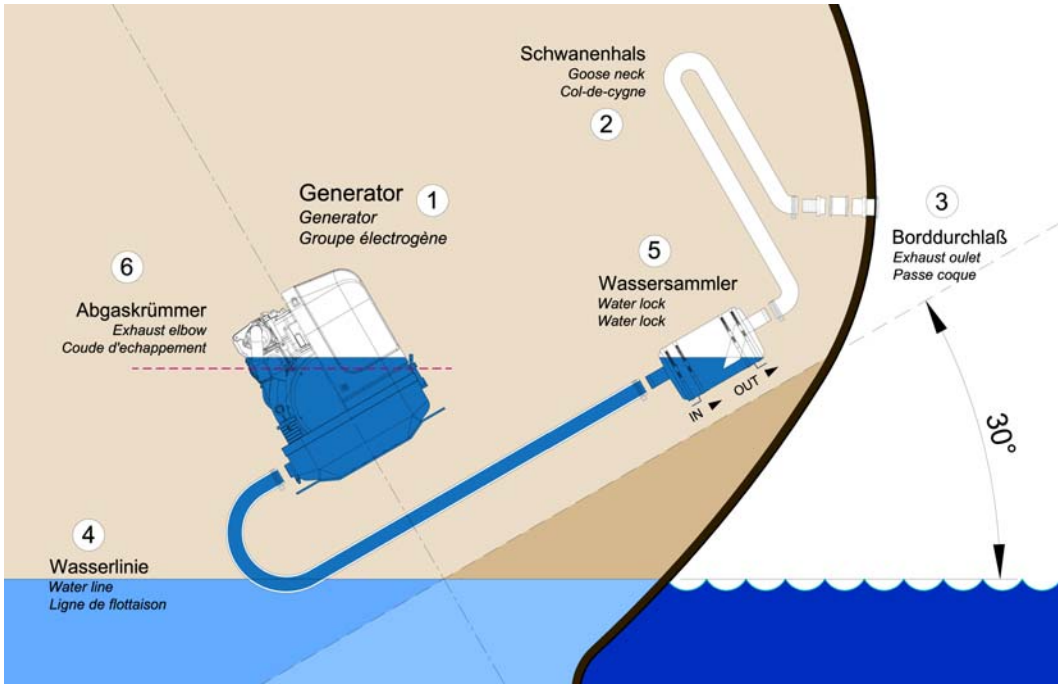
Fig. 6.8.3.2-6: Tilted position 15 degrees



Tilted position 15 degrees - Fig. 6.8.3.2-6

The distance is, contrary to the original 600 mm, only 327 mm. This is very close to the critical point already.

Fig. 6.8.3.2-7: Tilted position 30 degrees



Tilted position 30 degrees - Fig. 6.8.3.2-7

The water level and the critical point at the exhaust elbow are at the same level now. If the ship is sailed in a tilted position of 30 degrees with an installation like that, the infiltration of cooling water into the combustion chamber is inevitable. Irreparable damages are pre-programmed.

Summary:

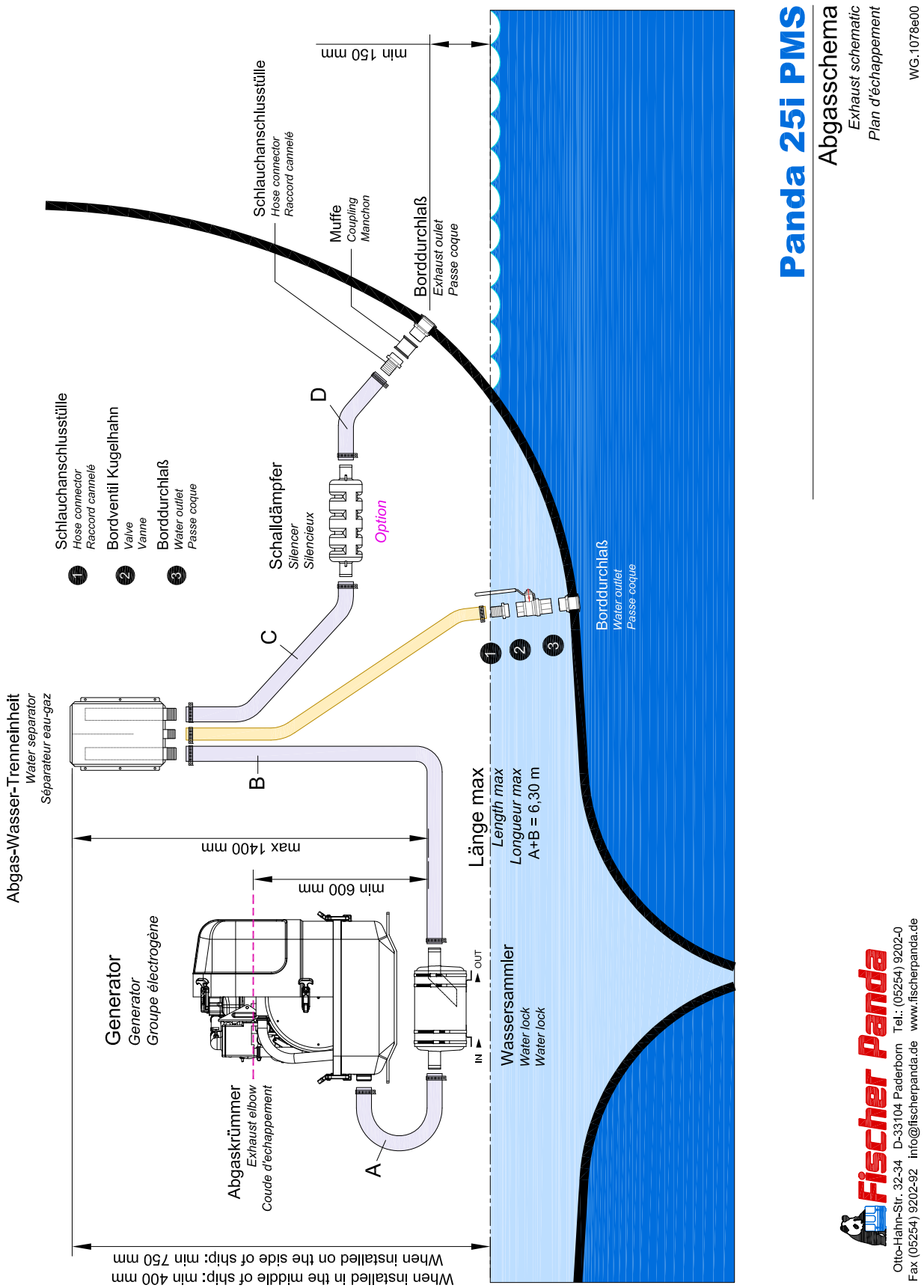
Concerning sailing yachts it must be regarded, that the waterlock is mounted in center underneath the generator, at least in reference to the ships' center line. Thus the waterlock is prevented from „leaking" very strongly when the ship is tilted.

The „leaking" of the waterlock leads to a rise of the water level which then gets too close to the exhaust elbow's critical point.

6.9 Exhaust / water separator

In order to reduce the noise level of the generator unit to a minimum, an optional exhaust outlet muffler can be mounted next to the through-hull fitting. Additionally there is a component at Fischer Panda, which acts as both an „exhaust goose neck", and water separator. With this „exhaust/water separator" the cooling water is derived over a separate pipe. The exhaust noises emanating from the exterior of the yacht are strongly decreased. Particularly the „water splash".

Fig. 6.9.0-1: Installation Scheme exhaust / water separator



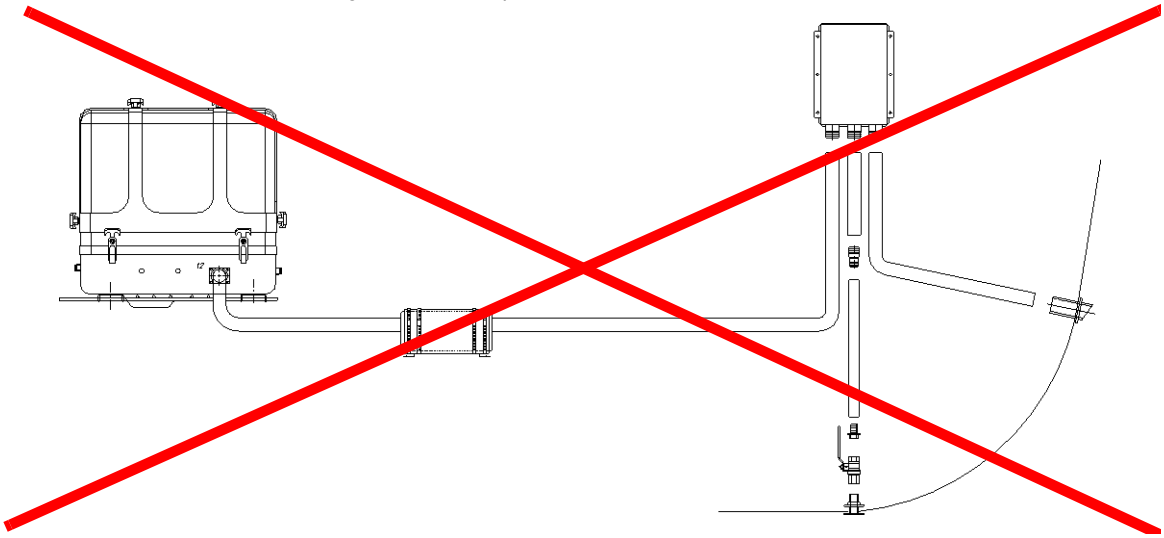
6.9.1 Installation exhaust water separator

If the exhaust water separator was sufficiently highly installed, a goose neck is no longer necessary. The exhaust/ water separator fulfils the same function. If the „Super silent“ exhaust system were installed correctly, the generator will not disturb your boat neighbour. The exhaust noise should be nearly inaudible. The best result is reached, if the hose line, which derive the cooling water, is relocate on a short way „falling“ directly to the outlet and this outlet is under 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 in the through-hull outlet. For such long exhaust routes, the exhaust hose diameter should also be increased, f.e. from NW40mm to NW50mm in order to reduce the back-pressure. The exhaust may have a length of over 10 m (32 ft.) if the exhaust hose diameter is increased. An additional outlet exhaust muffler close to the hull outlet will help further to reduce noise emissions.

The generator will not disturb your boat neighbours, if the „Super silent exhaust system has been correctly installed. The exhaust noise should be almost inaudible.

Fig. 6.9.1-1: Example for an unfavourable Installation



Example of an unfavourable installation:

- Water lock not far enough below the lowest level of the generator
- Distance water lock to exhaust/water separator too large

6.10 Fuel system installation

6.10.1 Fischer Panda installation kit - Fuel system

The following additional components will be required for the specified installation. You can purchase them as an installation kit or separately at Fischer Panda.

Note:

Fuel hose

representative picture

Fig. 6.10.1-1: Fuel hose

No return valve

representative picture

Fig. 6.10.1-2: No return valve

Pre filter with water separator

representative picture

Fig. 6.10.1-3: Pre filter with water separator

Pre filter with water separator

Alternative Article

representative picture

Fig. 6.10.1-4: Pre filter with water separator

Quick connector for fuel lines

representative picture

Fig. 6.10.1-5: Quick connector for fuel lines

Hose clamps

representative picture

Fig. 6.10.1-6: Hose clamps

6.10.1.1 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
- Return fuel line to fuel tank (unpressurized)

The external Fuel pump should be installed near the tank

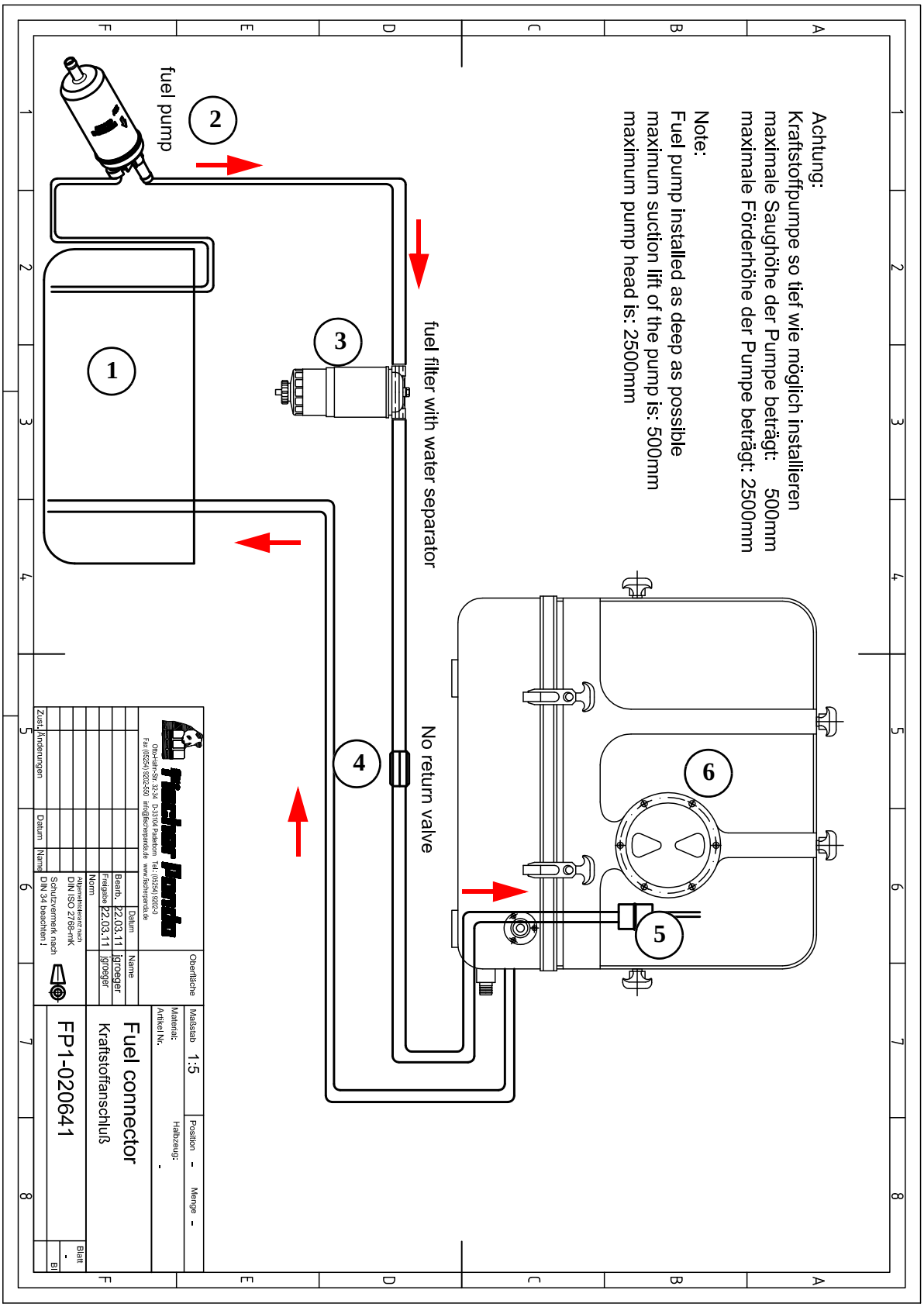
Electrical fuel pump

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.

Some generators (f.e. with Deutz diesel engine) has an engine driven internal fuel pump. At these generators the electrical fuel pump is optional,.

Fig. 6.10.1-1: electrical fuel pump

Fig. 6.10.1-2: Fuel system - schema



1. Fuel tank
2. external fuel pump
3. external fuel prefilter with water separator
4. Non return valve
5. Fuel fine filter
6. Generator

External fine filter

At generators with Kubota EA 300 or Farymann engines, the fine filter is delivered with the generator. This fine filter should be installed in the fuel feed line next to the generator.

representative picture

Fig. 6.10.1-3: externer Feinfilter

6.10.2 Connection of the fuel lines at the tank

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

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.

6.10.3 Position of the pre-filter with water separator

Inside the generator capsule itself, there is the fuel filter installed (exception: Panda 4500). Additional fuel filters (with water separator) must be mounted outside the capsule in easily accessible places in the fuel lines between the tank intake fuel pump and the diesel motor's fuel pump.

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).

representative picture

Fig. 6.10.3-1: Pre-filter with water separator

6.11 Generator DC system installation

Before the electrical system is installed, READ the SAFETY INSTRUCTIONS of this manual FIRST! Be sure that all electrical installations (including all safety systems) comply with all required regulations of the regional authorities. This includes lightening conductor, personal protection switch, fuses etc.

ATTENTION!

6.11.1 Connection to the Starter Battery-Block

It is necessary to install a starter battery for the generator. The generator has its own alternator to charge a starter battery.

It must be ensured that the cable is firstly attached to the generator and finally to the battery. Furthermore, the battery should be fitted as close as possible to the generator, in order to avoid greater voltage deviation. The positive pole is connected to the red lead and the negative pole to the blue lead. The positive wire must be secured with corresponding fuses.

ATTENTION! Consider correct connection sequence

Battery Bank Connection

Wrong connection of the battery bank can cause a short-circuit and fire.

ATTENTION! Right connection of the battery bank.

Install an appropriate fuse and a battery circuit breaker in the plus pole cable of the batterie, but with a distance to the battery of up to 300 mm (12 inch) at maximum.

The cable from the battery to the safety device must be secured with protective pipe/sleeve against chafing through.

For the connection use self-extinguishing and fire-protected cables, which are appropriate for temperatures up to 90 °C, 195 °F.

The batteries must be installed in such a way that they do not chafe through or other mechanical load can be stripped.

The battery poles must be secured against unintentional short-circuit.

The positive battery cable within the generator must be shifted in such a way that it is protected against heat and vibrations by appropriate sleeve/protective pipe. It must be shifted in such a way that it does not affect rotary parts or parts, that become hot in operation, e.g. wheel, exhaust elbow union, tail pipe and the engine. Do not lay the cable too tautly, since otherwise it could be damaged.

Make a test run after the installation and check the laying of the batteries during the test run and afterwards. If necessary, correct the laying.

Examine regularly the cable laying and the electrical connections.

6.12 Generator DC system installation

The Panda generators from 6000 upwards have their own dynamo to charge a DC starter battery.

It is recommended to install an additional starter battery for the generator.

The generator is then independent from the remaining battery set. This enables you to start the genset at any time with its own starter battery even if the other batteries are discharged. A further advantage of a separate starter battery is that it isolates the generator's electric system from the rest of the boat's DC system, i.e. minus pole (-) is not connected electrically to Earth/Ground.

The generator is then Earth/Ground free.

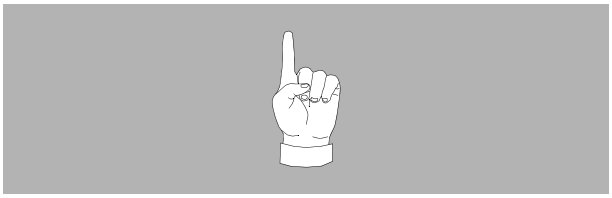
6.12.1 Connection of the starter battery block

IAn own separate starter battery must be installed for the generator.

The positive cable (+) of the battery is attached directly at the solenoid switch of the starter motor (position 1). The negative cable (-) of the battery is attached underneath the starter motor at the engine mount (position 2).

Panda Generators Panda 6000 and higher normally provided with an alternator/dynamo to charge the starter battery. At generators without alternator/dynamo it is needed to charge the starter battery with an external battery charger.

NOTE:



Make sure that the voltage of the starter battery fits to the start system voltage

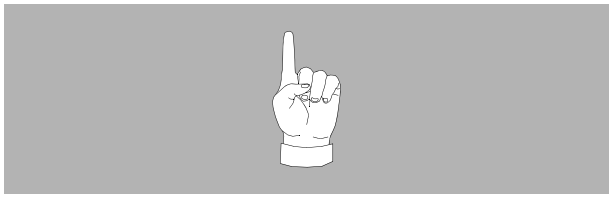
f.e. 12 V starter battery for a 12 V start system

f.e. 24 V starter battery for a 24 V start system (2x12 V batteries in a row)

ATTENTION!

To avoid large voltage drops the battery should be installed as near as possible to the generator. The positive terminal of the battery is attached at the red cable, the negative pole at the blue cable.

NOTE:



It must be guaranteed that first the cables are attached at the generator and then at the battery.

ATTENTION!: Consider correct connection sequence

Battery connection

Wrong connection of the battery bank can cause a short-circuit and fire.

ATTENTION!: Right connection of the battery.

Install an appropriate fuse and a battery circuit breaker in the plus pole cable of the battery, but with a distance to the battery of up to 300 mm (12 inch) at maximum.

The cable from the battery to the safety device must be secured with protective pipe/sleeve against chafing through.

For the connection use self-extinguishing and fire-protected cables, which are appropriate for temperatures up to 90 °C, 195 °F.

The batteries must be installed in such a way that they do not chafe through or other mechanical load can be stripped.

The battery poles must be secured against unintentional short-circuit.

The positive battery cable within the generator must be shifted in such a way that it is protected against heat and vibrations by appropriate sleeve/protective pipe. It must be shifted in such a way that it does not affect rotary parts or parts, that become hot in operation, e.g. wheel, exhaust elbow union, tail pipe and the engine. Do not lay the cable too tautly, since otherwise it could be damaged.

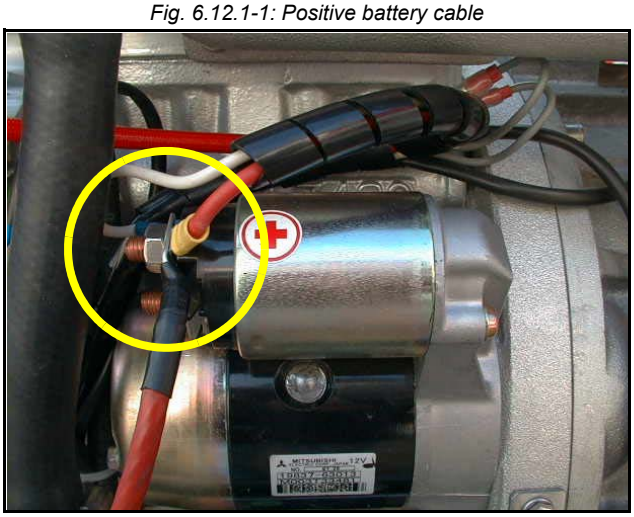
Make a test run after the installation and check the laying of the batteries during the test run and afterwards. If necessary, correct the laying.

Examine regularly the cable laying and the electrical connections.

Positive battery cable

The positive (+) battery cable is connected directly to the solenoid switch of the starter.

Fig. 6.12.1-1: Positive battery cable

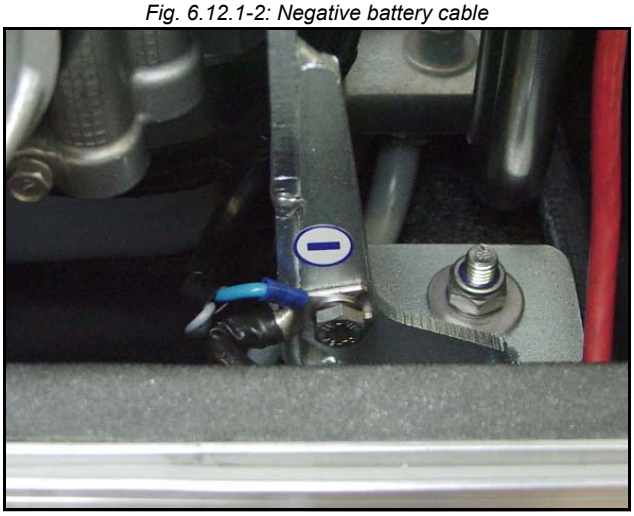


Negative battery cable

The negative (-) battery cable is connected to the engine foot.

Note! The battery negative pole may not be connected with the boat ground or with the protective grounding of the 12 V installation!

Fig. 6.12.1-2: Negative battery cable



DC starter motor

All Panda generators are equipped with an independent DC starter motor.

1. Solenoid switch for starter motor

2. Starter motor

Fig. 6.12.1-3: DC starter motor

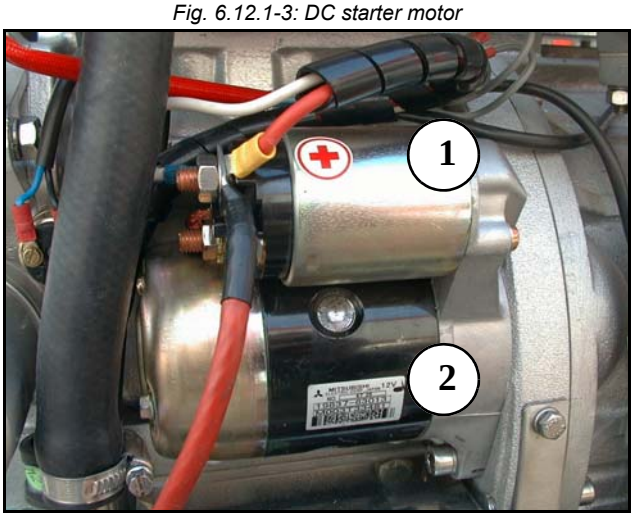
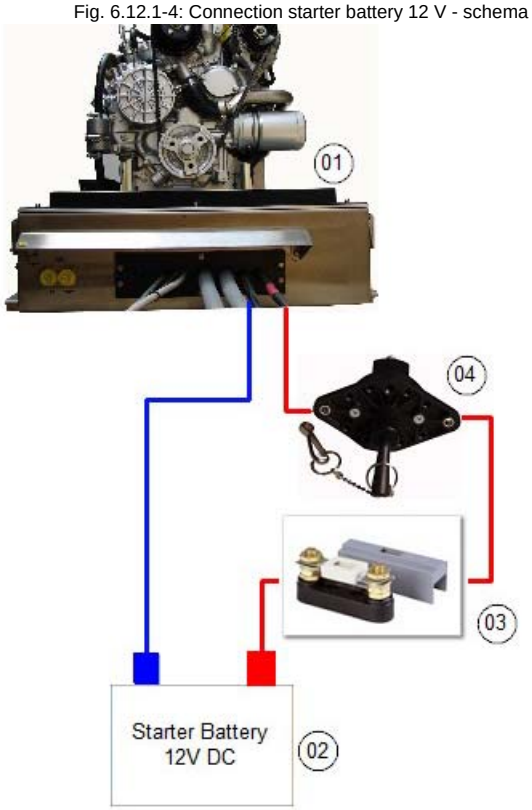
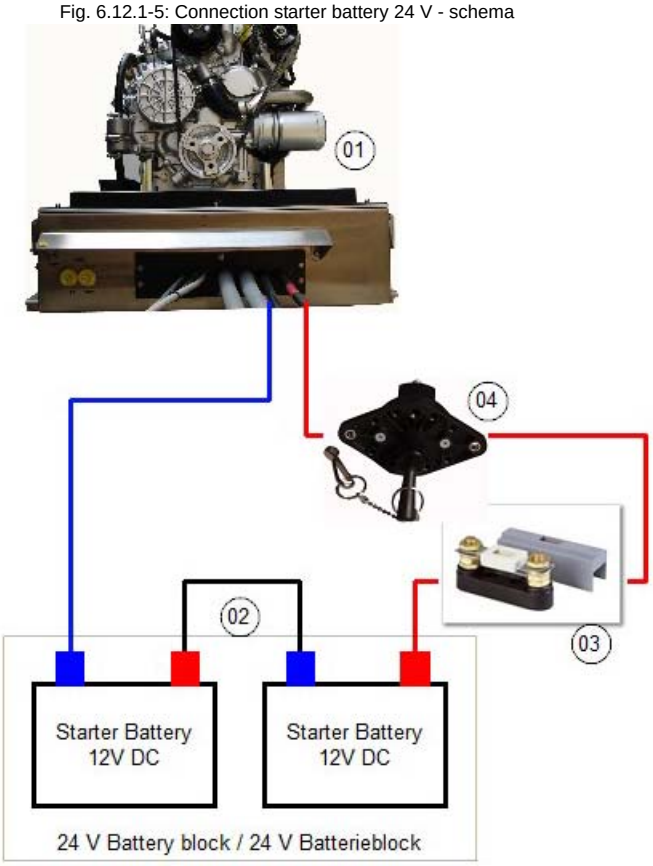


Fig. 6.12.1-4: Connection starter battery 12 V - schema



1. Generator
2. Battery block
3. Fuse
4. Battery main switch

Fig. 6.12.1-5: Connection starter battery 24 V - schema



1. Generator
2. Battery block
3. Fuse
4. Battery main switch

6.12.2 How to connect two 12 V batteries to a 24 V battery bank

The starter batteries have to be connected in this order:

1. (+) cable of first battery

Fig. 6.12.2-1: Installation starter battery

2. (-) cable of second battery

Fig. 6.12.2-2: Installation starter battery

3. (+) cable of second battery

Fig. 6.12.2-3: Installation starter battery

4. (-) cable of first battery
5. Disconnect the batteries in reverse procedure.

Fig. 6.12.2-4: Installation starter battery

6.12.3 Connection of the remote control panel - see separate control panel manual

6.12.4 Connection of the remote control panel - see separate control panel manual

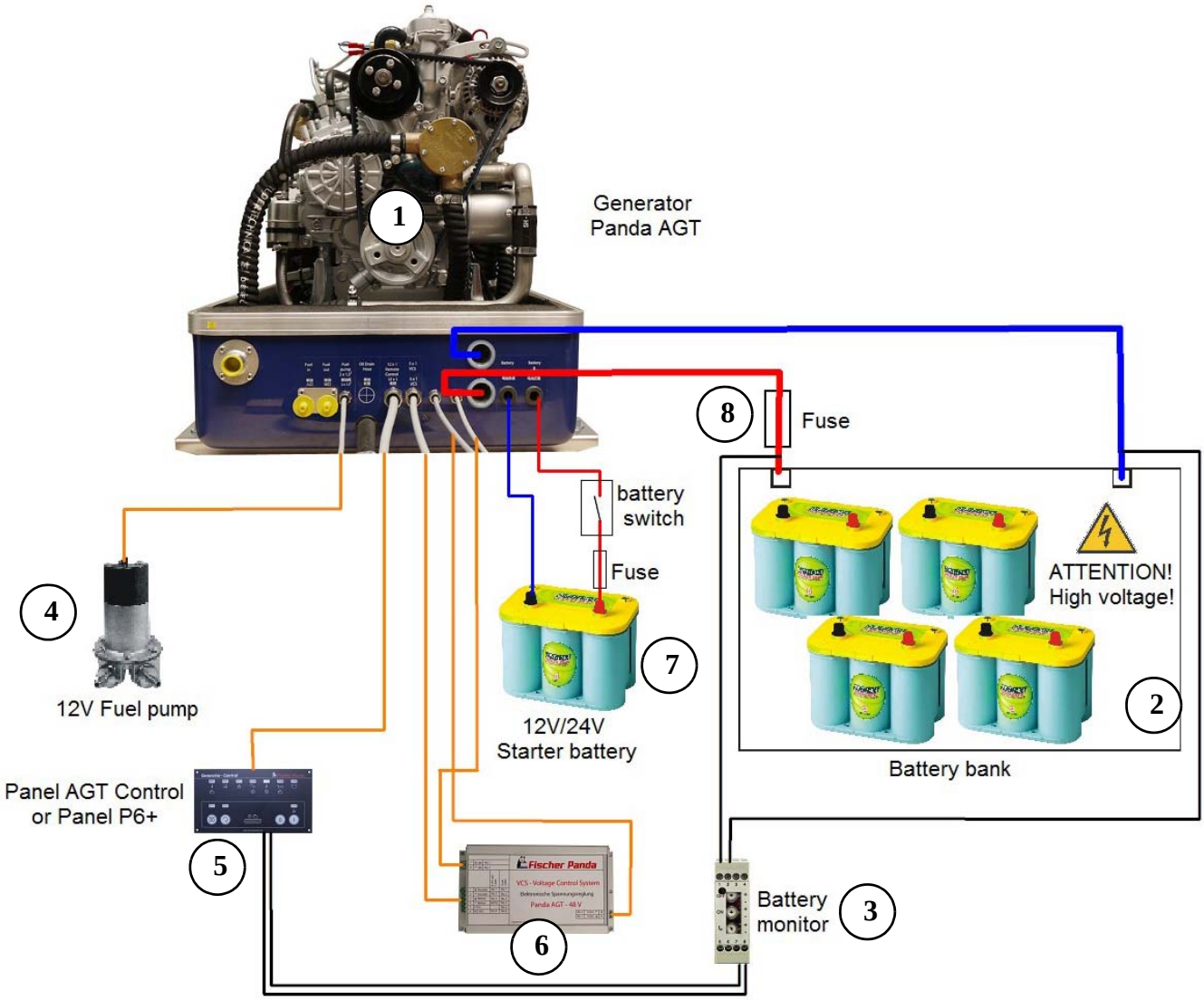
As standard a 12 core connection-cable is included in the supply. Cores are numbered from 1 to 11 and the 12th core is coloured (yellow/green). The control cables are securely connected to the genset. On the back of the control panel there are terminals numbered from 1 - 12. Connect the cores of the control-cable in respective order.

Please ensure that the remote control panel is installed in a protected, dry and easily accessible place.

6.12.5 Installation Panda AGT 12 V starter system and internal rectifier unit - sample schema

Sample schema for a standard installation

Fig. 6.12.5-1: AGT 24V DC output 12V starter system



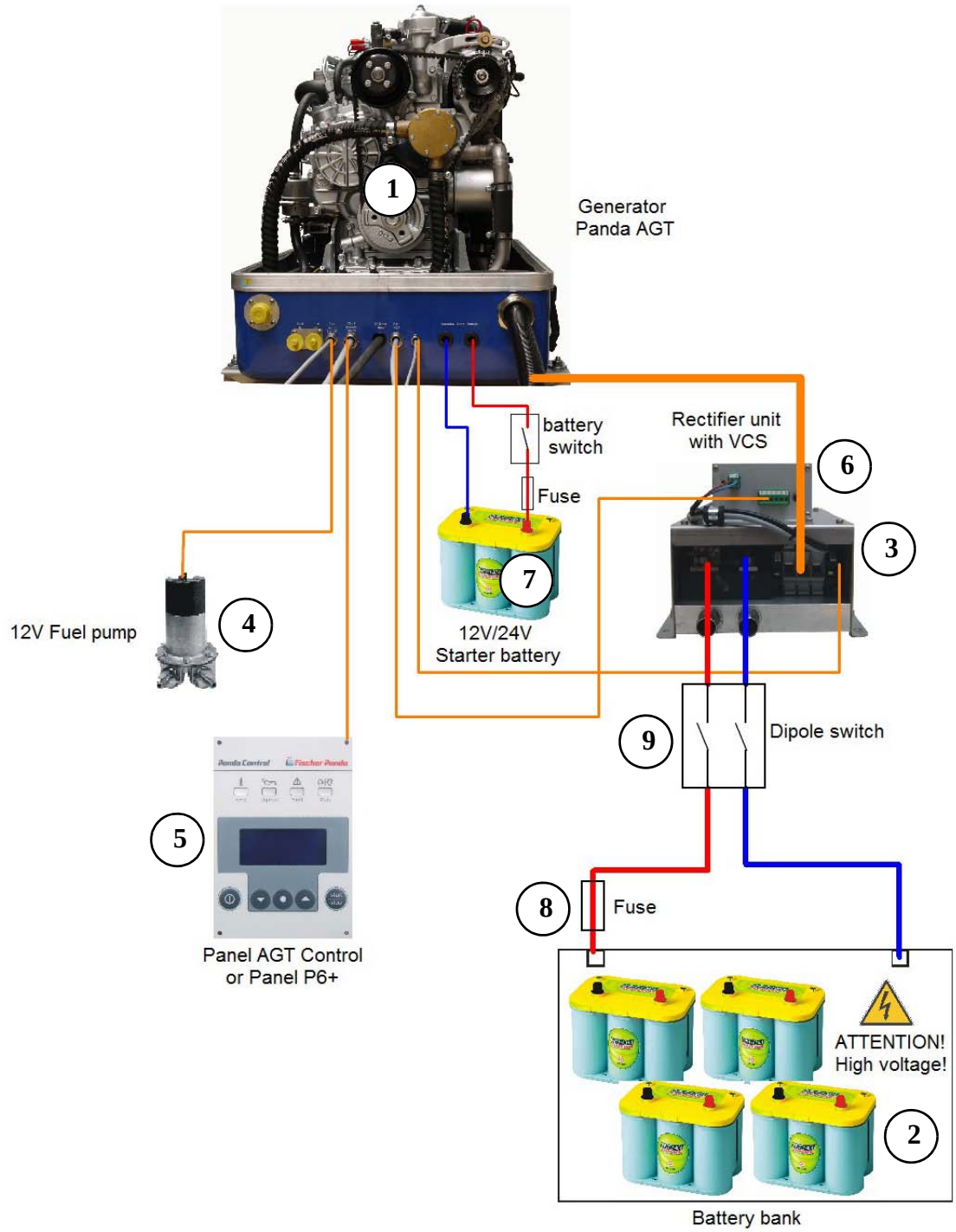
1. Generator
2. Battery bank
3. Battery monitor (optional unit)
4. Fuel pump
5. Remote control panel
6. Voltage control system VCS
7. Starter battery
8. Fuse

All electrical safety installations have to be made on board.

6.12.6 Installation Panda AGT 12 V start system and external rectifier unit - sample schema

Sample schema for a standard installation

Fig. 6.12.6-1: AGT 48V DC output 12V starter system and external rectifier



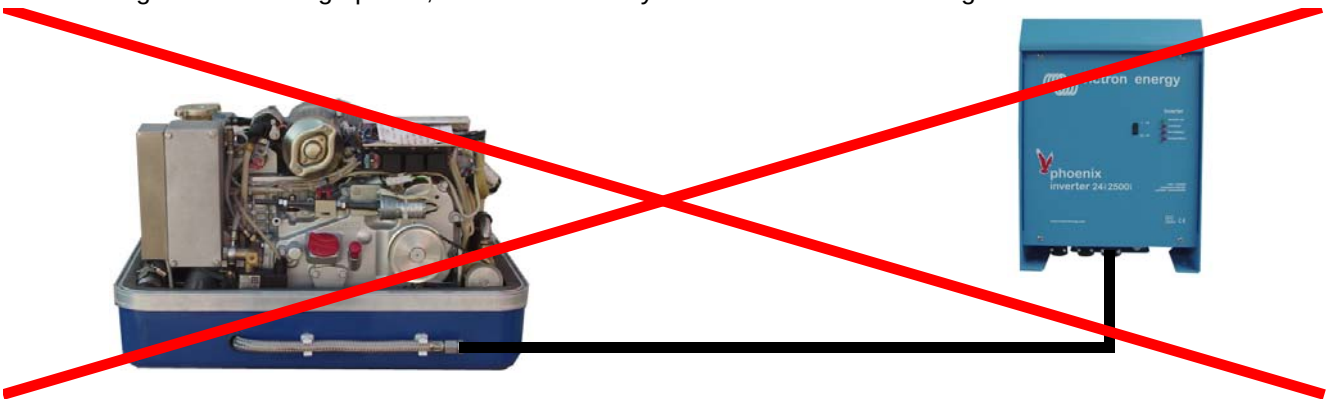
1. Generator
2. Battery bank
3. external rectifier unit
4. Fuel pump
5. Remote control panel
6. Voltage control system VCS
7. Starter battery
8. Fuse
9. Dipole switch

All electrical safety installations have to be made on board.

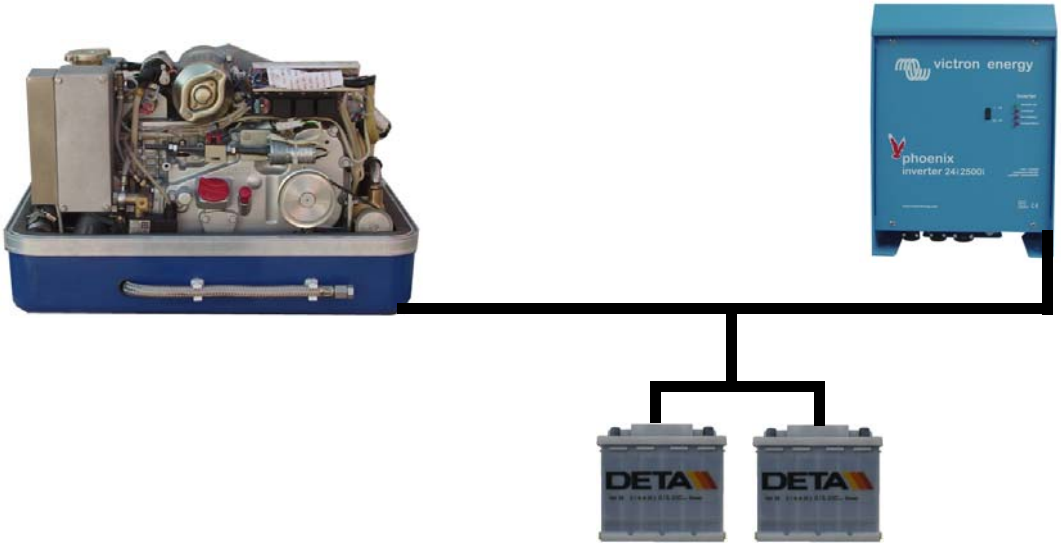
The AGT-generator is not allowed to be connected to an inverter (without batteries)!

CAUTION!

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



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



Required cable cross-sections

The following recommended electrical cable dimensions (cross sections) are the minimum required sizes for a safe installation.

Länge/length	1 - 3 m	4 - 6 m	7 - 10 m	11 - 15 m	16 - 20 m
16 mm²	70 A	63 A	55 A	48 A	42 A
25mm²	112 A	100 A	88 A	75 A	63 A
35mm²	155 A	140 A	125 A	110 A	95 A
50mm²	225 A	200 A	175 A	150 A	125 A
70mm²	315 A	285 A	250 A	220 A	190 A
95mm²	425 A	380 A	340 A	300 A	260 A
120mm²	540 A	490 A	440 A	400 A	360 A

All electrical safety installations have to be made on board.

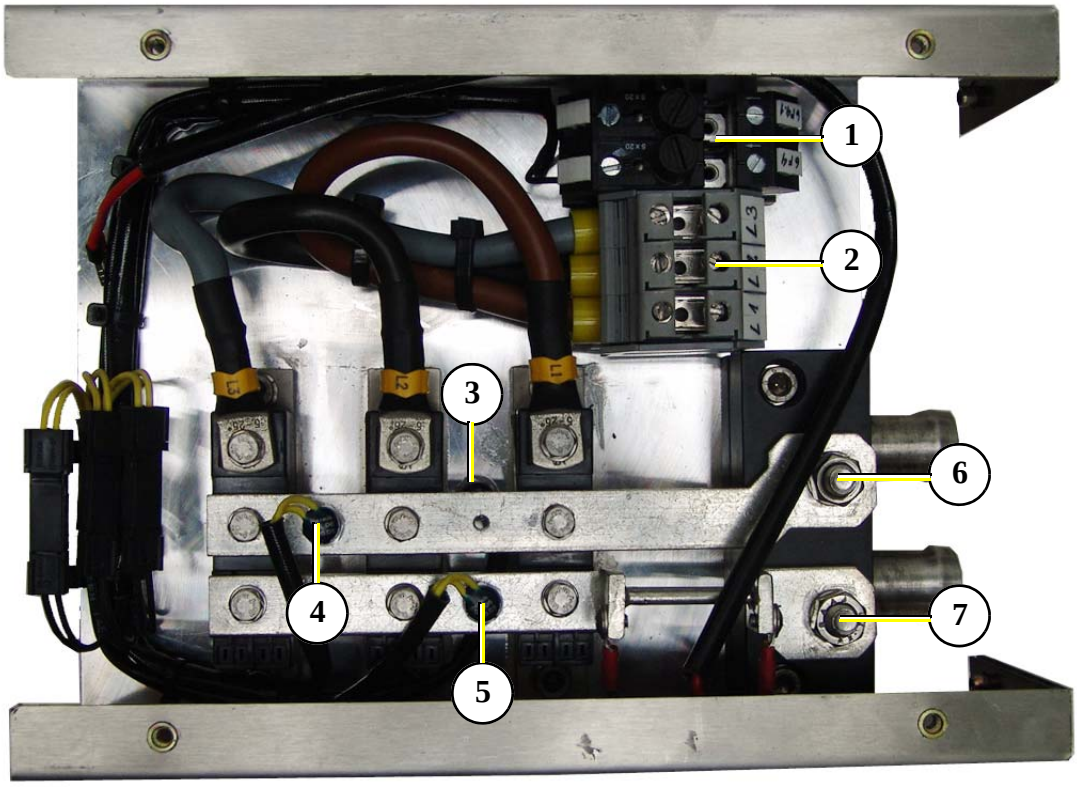
6.12.6.1 Electrical fuses - Dipole switch at battery bank

It is absolutely essential that the electrical system installation is inspected by a qualified electrical technician. The generator should have its own DC fuse and battery switch in the connection line rectifier unit to battery bank. The fuses should be sized such that the rated current of the generator is not exceeded by more than 25%.

The fuses must be of the slow type.

6.12.7 Generators with external rectifier unit

Fig. 6.12.7-1: External rectifier unit



1. Electrical fuses and connection thermo-switch heat sink
2. Main terminal block
3. Thermo-switch heat sink
4. Thermo-switch (+) rail
5. Thermo-switch (-) rail
6. Connection storage batteries (+)
7. Connection storage batteries (-)

The external rectifier unit must be installed in a fireproof protected area!

ATTENTION!

6.12.7.1 Installation of the rectifier unit

Cooling water connection.

If the generator has no special connection points, the external rectifier unit can be installed in line with the external ventilation valve. (between ventilation valve and generator)

see Fig. 6.4, “Cooling system installation - raw water,” on Page 73

6.13 Voltage Control System - see VCS datasheet

The VCS control is used for the adjustment of the number of revolutions of the engine and thus the voltage of the generator. It belongs to the accessories and is externally attached.

6.14 Set into operation

After the installation the generator must be brought in service. For this the „Service record and warranty registration must be worked through and filled out by the installing technical trained person.

This document must be handed out to the owner. The owner must be instructed for the operation, maintenance and hazards of the generator. These include the in the manual mentioned hazards and further ones, which are the result of the specific installation and the connected components.

Send the original Service and warranty record to Fischer Panda to get full warranty. Make a copy for your hands.

Note!:

7. Maintenance Instructions

7.1 Personal requirements

All maintenance, if not special marked, can be done by the trained persons.

Further maintenance must be done by technical personal or Fischer Panda service points.

7.2 Hazard notes for the maintenance

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

Notice!:

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:

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

Warning!: Risk of injury

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

- 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.

Warning!: Risk of injury

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

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.

Observe the instructions from your battery manufacturer.

Warning!:

7.3 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.

7.4 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:

7.5 General maintenance instructions

7.5.1 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

7.5.2 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.

7.6 Oil circuit maintenance

The first oil change is to be accomplished after a period of operation from 35 to 50 hours. Afterwards the oil is to be changed after 100 hours. For this the oil SAE30 for temperatures over 20 °C and SAE20 for temperatures between 5 °C and 20 °C is to be used. At temperatures under 5°C oil of the viscosity SAE10W or 10W-30 is prescribed.

Type and amount of required oil see:

See section , “The AGT-DC system consists of the AGT generator in conjunction with the rectifier unit named on the type plate and is only allowed in this combination!,” on page 155.

7.7 Checking oil-level

You require:

paper towels / cloth for the oil dipstick

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.

Generator and coolant can be hot during and after operating.

Caution: Burn hazard!

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

- Assure generator against accidental start.
- Open the generator casing.
- 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.

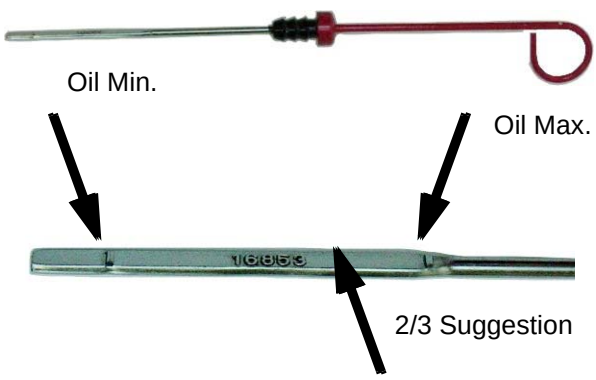
Oil dipstick

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 2/3.

Sample picture

Fig. 7.7-1: Oil dipstick - Sample



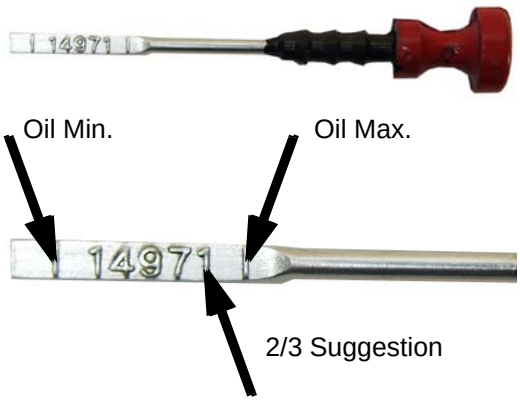
Oil dipstick EA 300 Engine

Fig. 7.7-2: 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 2/3.

Sample picture



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. - with operating hours between 50 and 150 hours it is only necessary to refill oil. See „Refilling oil“ on page 2.

- with 150 operating hours or more the oil should be changed (See your generators' service table)
- if the oil-level is under the minimum mark by less than 50h, 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.

7.7.1 Refilling Oil

You require:

Engine oil

1. Check oil-level as described under section 7.7, “Checking oil-level,” on page 118.
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 7.7, “Checking oil-level,” on page 118.

If oil-level is still too low (under 2/3): repeat steps 4-6.

7.7.2 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 casing.
- Remove lock against accidental generator start.

7.8 Replacement of engine oil and engine oil filter

You require:

- Engine oil. See attachment.

- New oil filter (not with generators with EA300 engines)

- Sealing for oil drain screw

- Personal protective gear

- Container to collect used oil (heat resistant and of sufficient size)

- Open-ended wrench for oil drain screw

- Paper towels and cloth

- Oil filter wrench

- Oil resistant mat, so prevent used oil from getting into underground water

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.

Generator and coolant can be hot during and after operating.

Caution: Burn hazard!

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

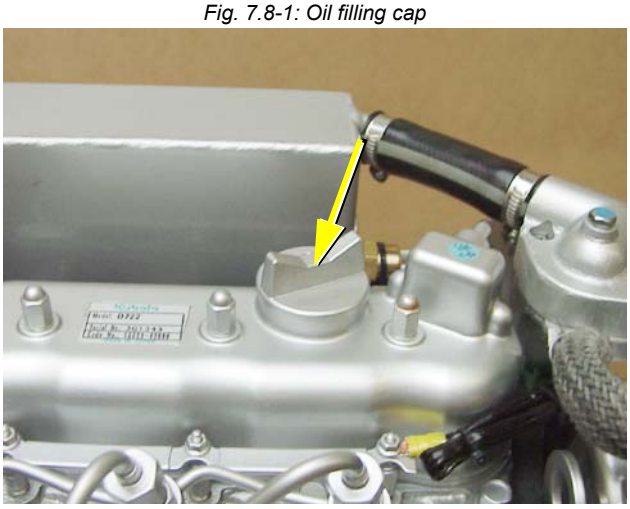
1. Prepare generator.
   - Assure generator against accidental start.
   - Open the generator casing.
   - with generators that have an external oil drain hose: Release the oil drain hose from the mounting.
   - with generators that have an internal oil drain hose: Open the lead-through for the oil drain hose (left turn of the sealing). Pull out the sealing with the oil drain hose.

   Place an oil resistant mat under the oil drain hose area and prepare the container.

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.
   Sample picture

Fig. 7.8-1: 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.
   Use spanner size 17 mm.

Fig. 7.8-2: Oil drain hose

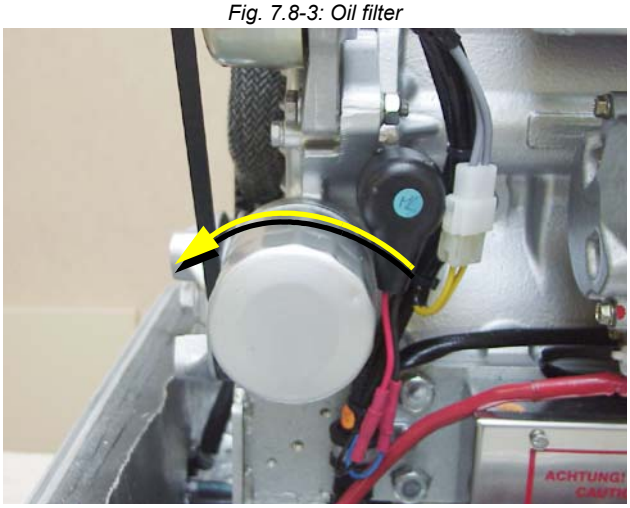
4. Discharge used oil.

   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.
   Sample picture

Fig. 7.8-3: Oil filter



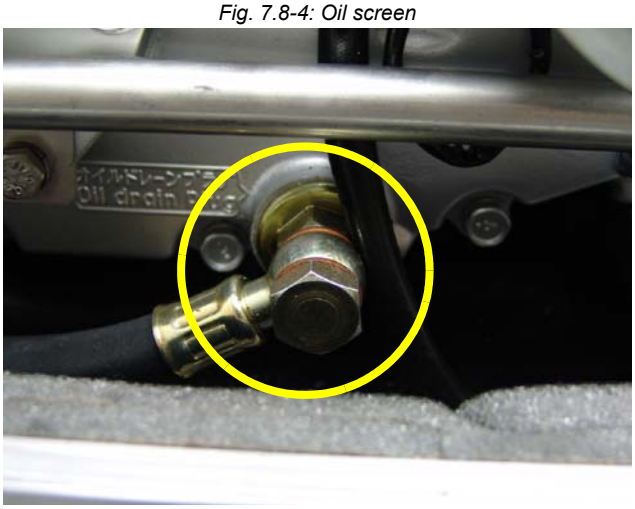
Oil screen with generators with EA300 engines

The oil screen should be cleaned every 500 operating hours: to do so follow the instructions in the engine manual.

Use spanner size 17 mm.

Sample picture

Fig. 7.8-4: Oil screen



6. Preparing a new filter

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

Fig. 7.8-5: 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 7.7, "Checking oil-level," on page 118.

   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.

7.8.1 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 casing.
- 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).

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

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

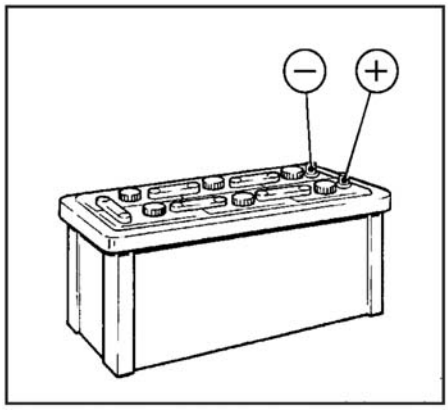
If from the battery manufacturer not otherwise mentioned.

7.9.1 Battery

7.9.1.1 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. 7.9.1.1-1: Battery

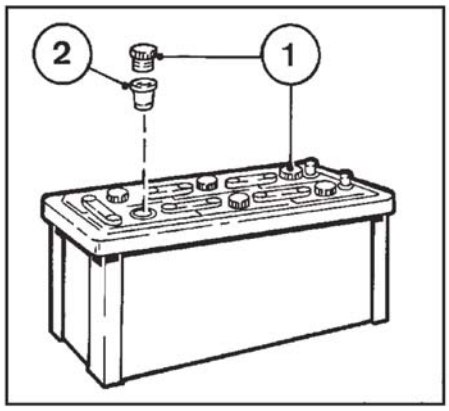


7.9.1.2 Check electrolyte level

- 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.

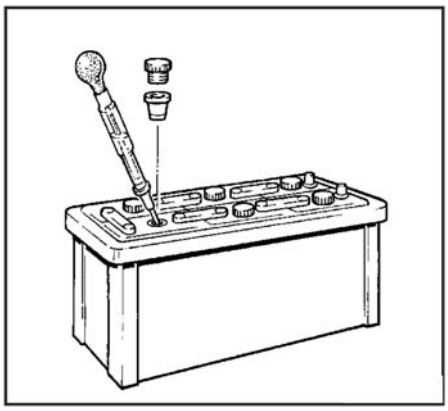
Fig. 7.9.1.2-1: Battery



7.9.1.3 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. 7.9.1.3-1: 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!

7.10 Fuel circuit maintenance

7.10.1 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. 7.10-1: Fuel filter with water separator

7.11 Ventilating the fuel system

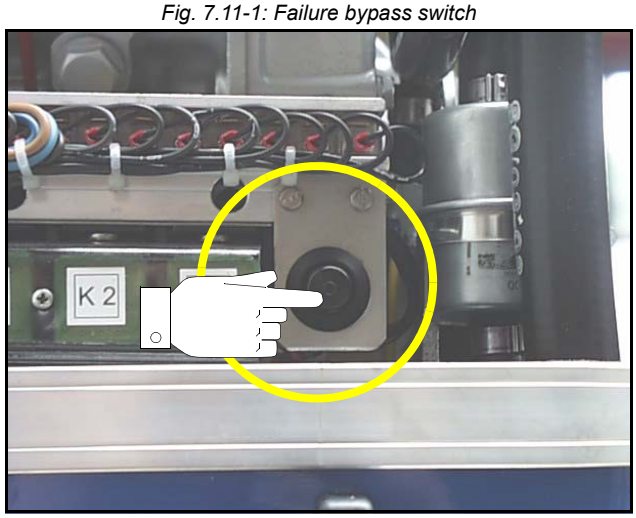
Normally, the fuel system is designed to ventilate air itself i.e. as soon as the electric starter motor starts operation the fuel pump starts working and the fuel system will be de-aerated after some time automatically. It is nevertheless essential to ventilate the system as follows prior to the first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

Generators with iControl system do not need a Failure bypass switch. At these generators the fuel pump can be activated by an option of the control panel. See Control panel manual.

Attention:

1. Main power switch „OFF“
2. Press failure bypass switch and keep firmly pressed. The electrical fuel pump must be audible. Switching on and off the solenoid valve at the generator will be audible by pressing the failure bypass switch (if capsule removed).

Fig. 7.11-1: Failure bypass switch



Note!

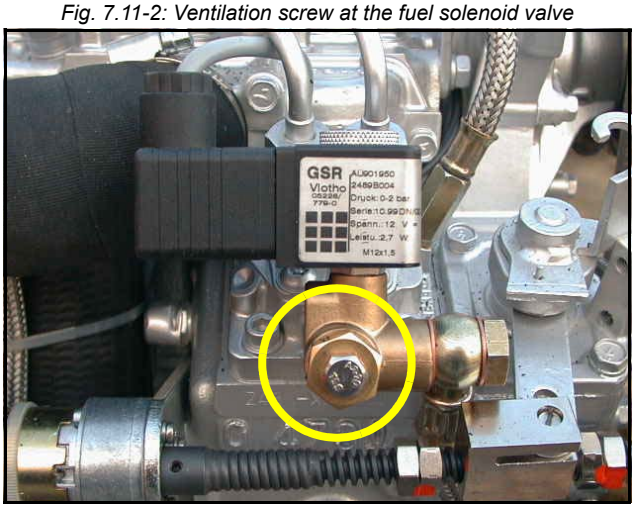
Generators with iControl system has no failure bypass switch. The Fuel pump can be activated at the iControl panel.

Please see iControl manual for details.

3. Pressing the failure bypass switch for approx 3 - 4 minutes will loosen the ventilation screw located at the fuel solenoid valve. The button must continue to be pressed, whilst opening the screw. A large cloth or Kleenex 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. Only then may the button be released.

   Use spanner size 10 mm.

Fig. 7.11-2: Ventilation screw at the fuel solenoid valve



Not all generator models has a fuel solenoid valve. At generators without fuel solenoid valve, a single ventilation screw is installed.

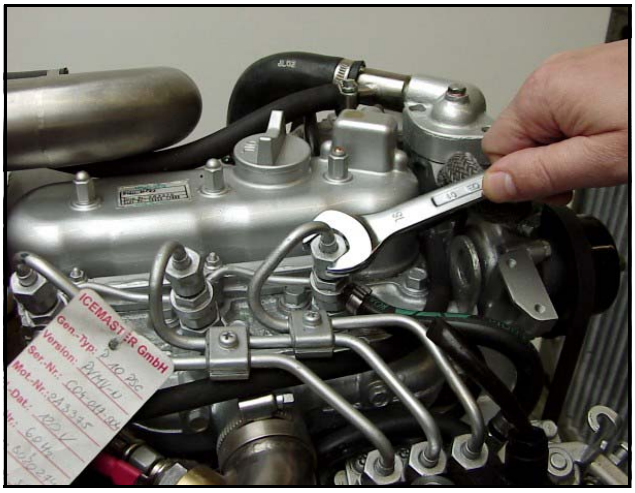
Note!:

4. Pressing the starter button can now start the machine. The machine should start after a short period.
5. If this does not occur, then a connecting nut fitted to the injection line must be loosened and starting procedure repeated. Retighten the washers after successfully starting. The injection line must be raised by several millimetres.

   Use spanner size 17 mm.

6. Switch main switch „OFF“.

Fig. 7.11-3: Injection nozzles



7.11.1 Replacement of the fuel filter

Exchanging the filter, depending upon fuel contamination, should take place after 300 operational hours at the very least. The inlet must be clamped, before exchanging the filter.

Remove the hoses from the used filter and fasten them to the new filter. 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. 7.11.1-1: Fuel Filter

7.11.1.1 Optional fuel filter with sight glass

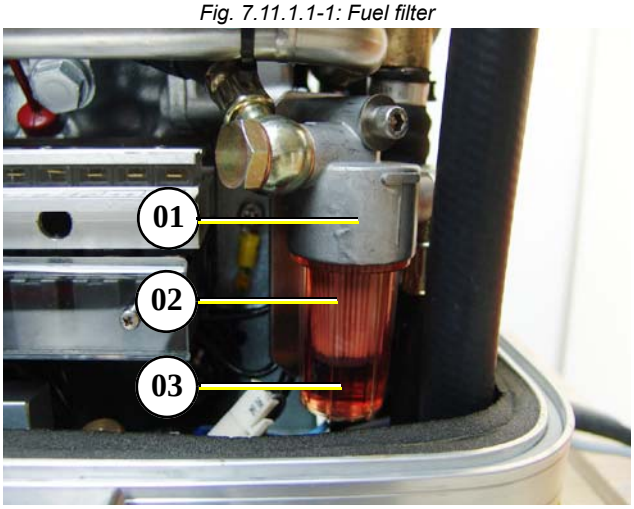
The filter change depends on the fuels' degree of pollution, but should be executed every 300 operating hours at the latest.

01. Fuel filter housing

02. Fuel filter element

03. Sight glass

Fig. 7.11.1.1-1: Fuel filter

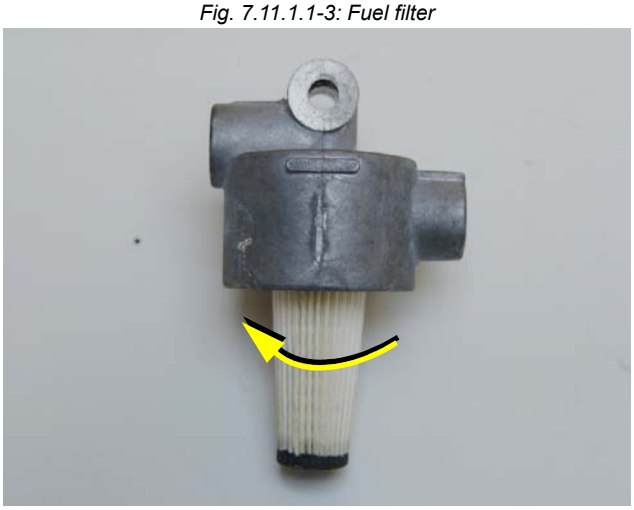


1. Unscrew the housing from its mount (left hand rotation).

Fig. 7.11.1.1-2: Fuel filter

2. Unscrew the filter element from the mount (left hand rotation).

Fig. 7.11.1.1-3: Fuel filter



3. Screw the new filter element into the mount.
4. Lubricate the sight glasses o-ring with a heat resistant grease (Specification: Antiseize) and screw the sight glass back into its mount (right hand rotation).

Fig. 7.11.1.1-4: Fuel filter

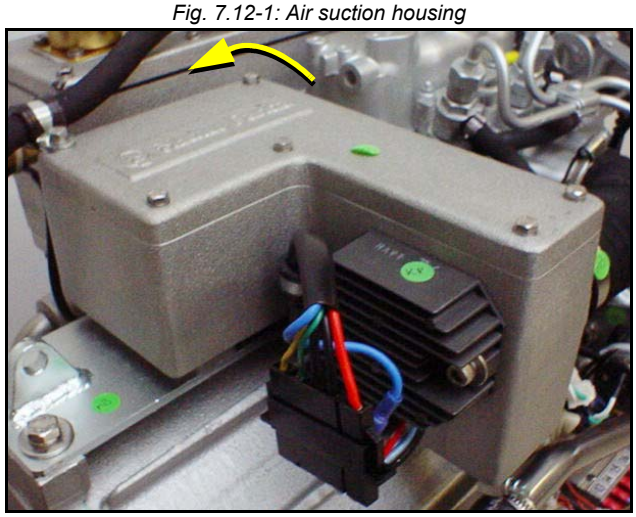
7.12 Air circuit maintenance

7.12.1 Replace the air filter mat

1. Open the air suction housing by loosen the six screws on the housing cover.

   Use spanner size 8 mm.

Fig. 7.12-1: Air suction housing



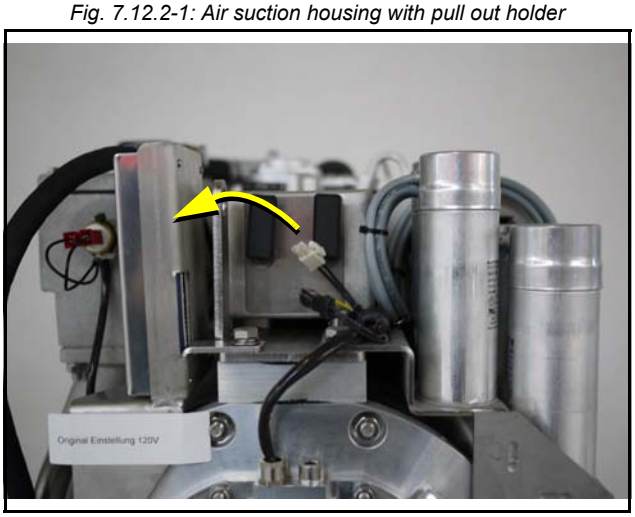
2. Change the air filter mat.
3. Close the suction air housing.

Fig. 7.12-2: Opened air suction housing

7.12.2 Alternative replacement of the air filter mat with pull out holder

1. Air filter housing with pull out holder.

Fig. 7.12.2-1: Air suction housing with pull out holder

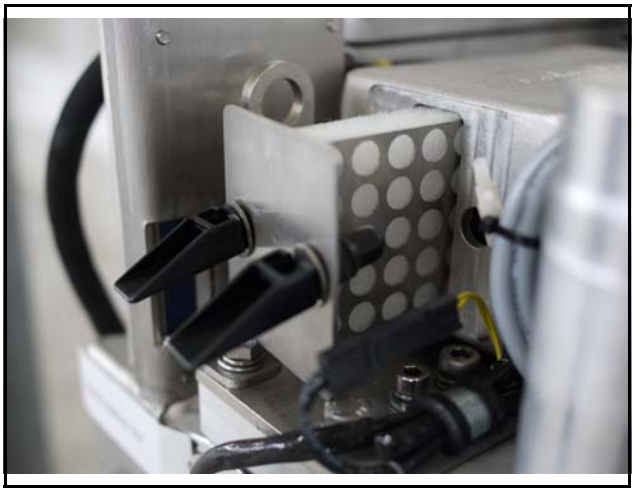


2. Tip the two fasteners 90°.

Fig. 7.12.2-2: Air suction housing with pull out holder

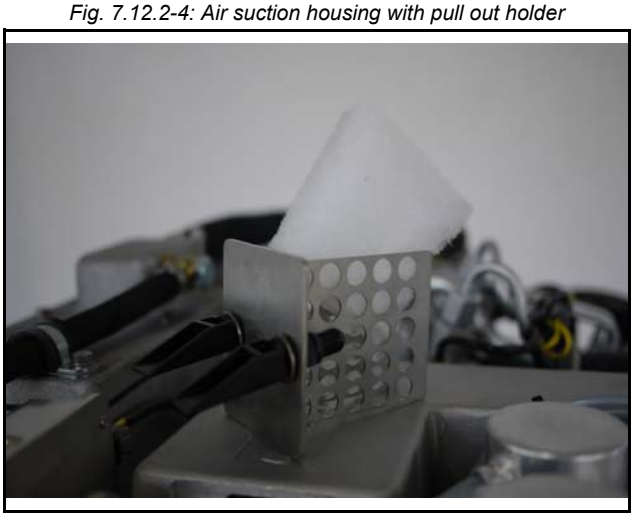
3. Pull the filter mat holder out.

Fig. 7.12.2-3: Air suction housing with pull out holder



4. Replace the air filter mat.
5. Re-assembly in reversed order.

Fig. 7.12.2-4: Air suction housing with pull out holder

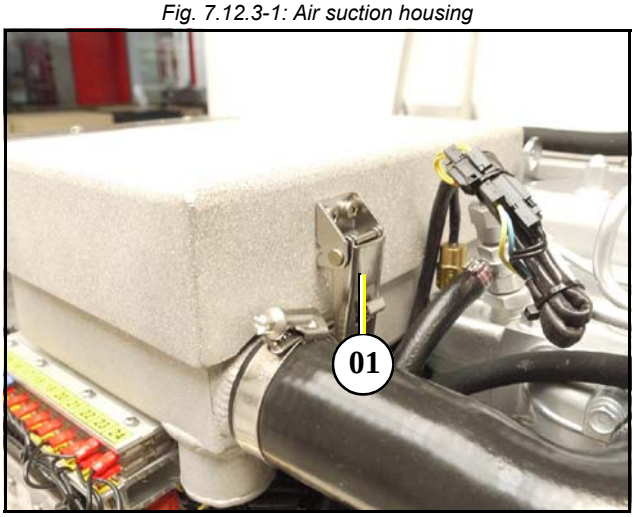


7.12.3 Alternative replacement of the air filter at housing with snap fasteners

1. Open the combustion air housing by loosening the closure on the right side of the housing.

   01. Closure

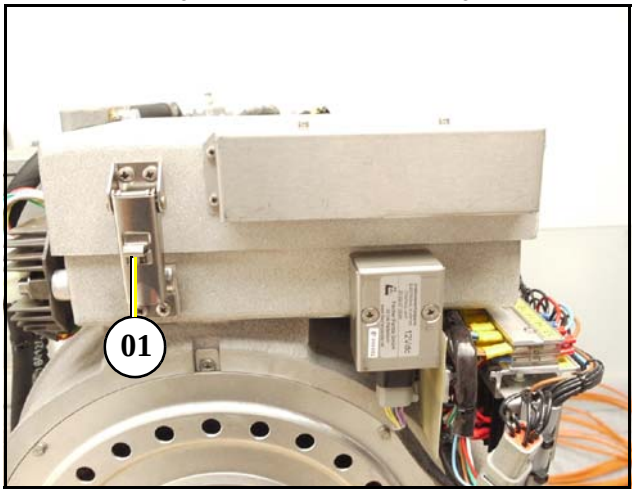
Fig. 7.12.3-1: Air suction housing



2. Open the combustion air housing by loosening the closure on the left side of the housing.

   01. Closure

Fig. 7.12.3-2: Air suction housing

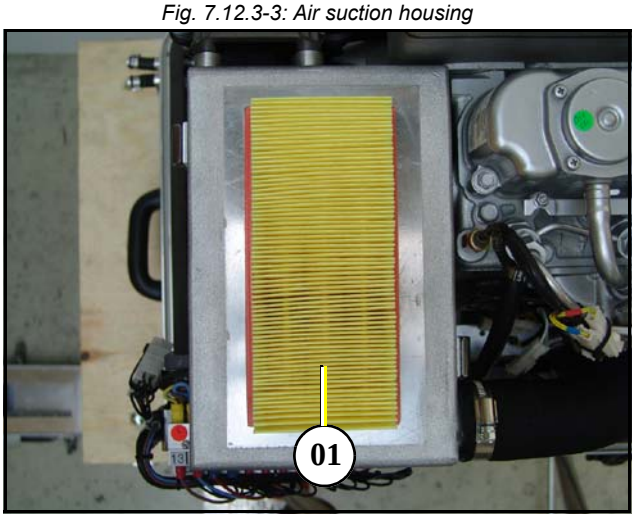


3. Open the air housing by pulling the cover.
4. Lift out the air filter element of the cover of the air filter housing.

   01. Air filter
5. Replace cover in reverse procedure.

Sample picture

Fig. 7.12.3-3: Air suction housing



7.13 Coolant circuit maintenance

7.13.1 Ventilation of the coolant circuit / freshwater

Special notes for the ventilation of the cooling system

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:

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

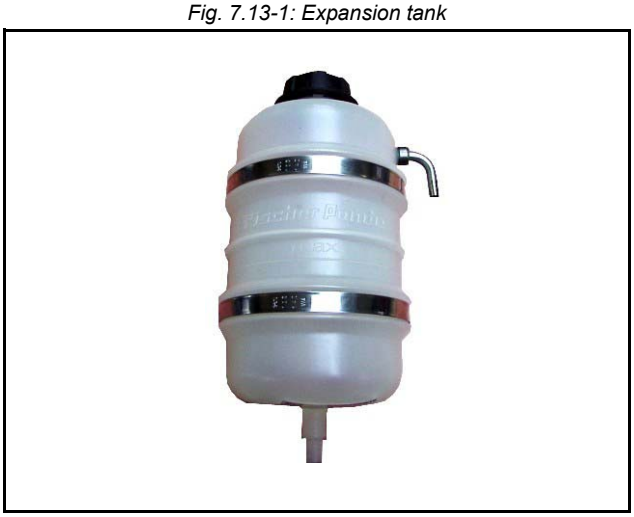
Pay attention that the external coolant expansion tank is connected with the generator by the intended connection point.

Further it should be guaranteed that the expansion tank is attached in sufficient height (600 m) over the level of the generator exhaust elbow union.

Attention

Expansion tank

Fig. 7.13-1: Expansion tank

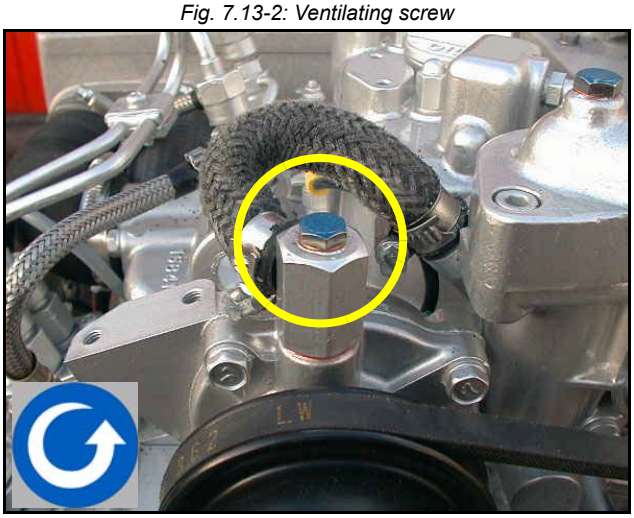


1. Open the ventilating screw above the cooling water pump casing. Not present at all models

   Use spanner size 10 mm.

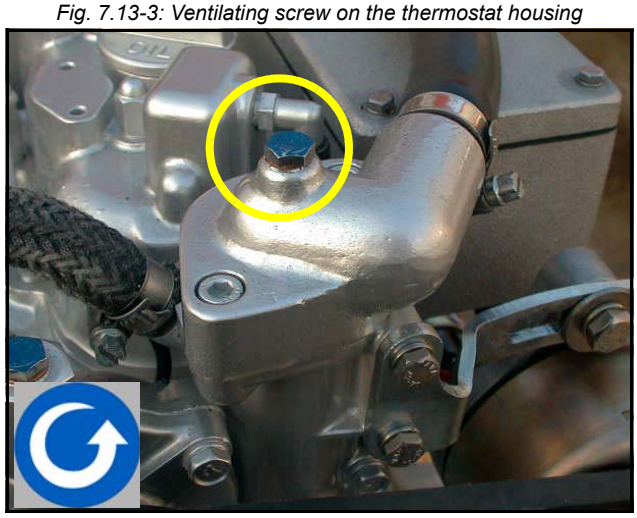
Not present at all models

Fig. 7.13-2: Ventilating screw



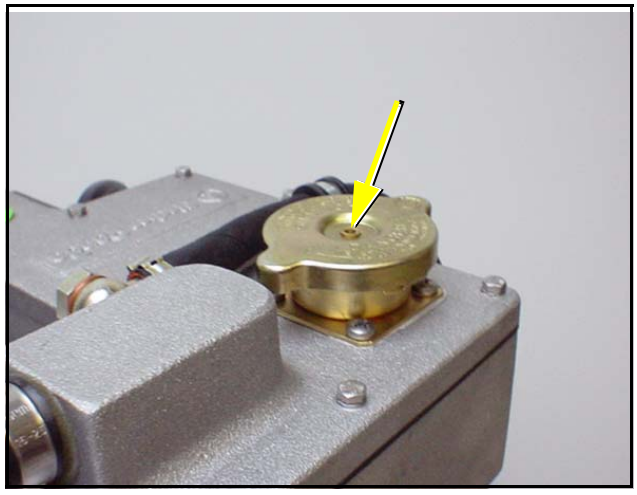
2. Open the ventilating screw on the thermostat casing.
   Use spanner size 10 mm.

Fig. 7.13-3: Ventilating screw on the thermostat housing



3. Pour cooling water into the cooling water filling necks. (At generators without filler, The cooling water can be filled into the external expansion tank instead)
4. If the cooling water level no longer drops (the cooling water level in cold waters must cover the tin in the exhaust elbow), close the filler cover and the cooling water screws and then start the generator.
5. Run the generator for approx. 60 Seconds, then switch off
6. Refill cooling water via the compensation tank.
7. The compensation tank is connected to the generator by two hoses.

Fig. 7.13-4: Cooling water filler cap



The external compensation tank should be filled to a max 20 % in a cold state. It is very important that a larger expansion area is maintained above the cooling water level.

8. Repeat this procedure 1 - 5 times.

If there is no change to the state of the cooling water level, the generator is re-started for 5 minutes. Thereafter the de-aeration must be repeated two to three times.

The ventilation screw above the cooling water pump casing may not be opened under any circumstances, whilst the generator is running. Air will be sucked through the opening, if this should happen by mistake. Venting the whole system afterwards is necessary and very difficult.

Fig. 7.13-5: Ventilation screw above the cooling water pump casing

7.14 V-belt replacement for the internal cooling water pump

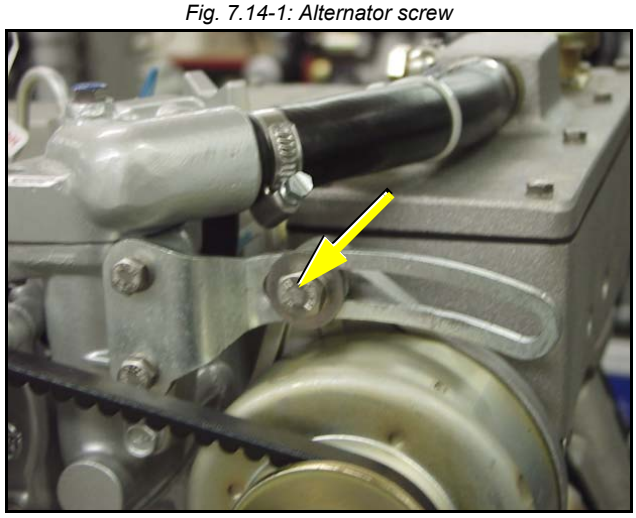
The V-belt wears in a short time due to high ambient temperature within the closed capsule (approx. 85 °C). The air in the generator capsule is not only warm but also very dry. Therefore it is possible, that the „softener“ in the rubber composers wear after a very short time of operation.

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.

1. Loose the screw on the upper alternator mounting.

Sample picture

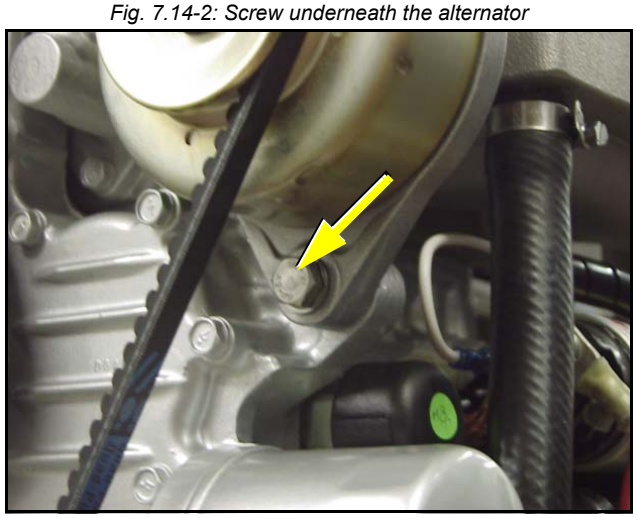
Fig. 7.14-1: Alternator screw



2. Loose the screw underneath the alternator.

Sample picture

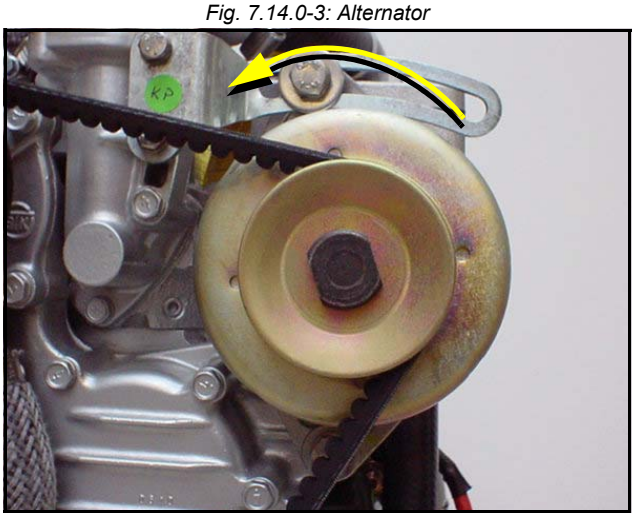
Fig. 7.14-2: Screw underneath the alternator



3. The alternator must be pressed in the direction of the thermostat housing.
4. Exchange the V-belt.

Sample Picture

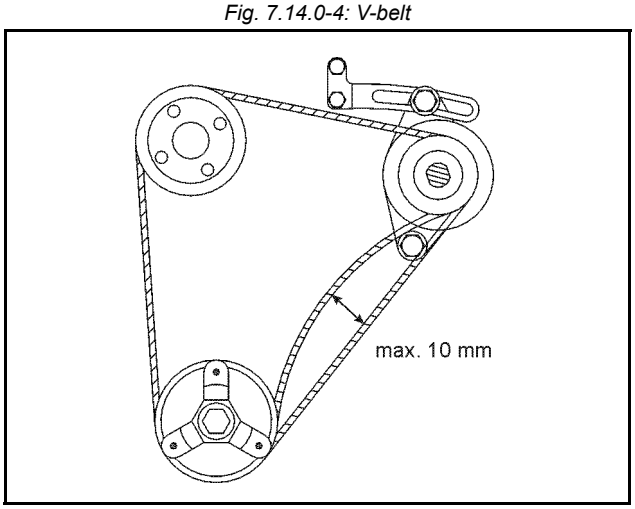
Fig. 7.14.0-3: Alternator



5. Afterwards, the V-belt must be tightened again.
6. The V-belt must be tightened in such a way, that it is possible to press it about approx. 10 mm.
7. Tighten the screws above and underneath the alternator.

Sample picture

Fig. 7.14.0-4: V-belt



7.15 The raw water circuit

7.15.1 Clean 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.

Fig. 7.15.1-1: Raw water filter

7.16 Causes with frequent impeller waste

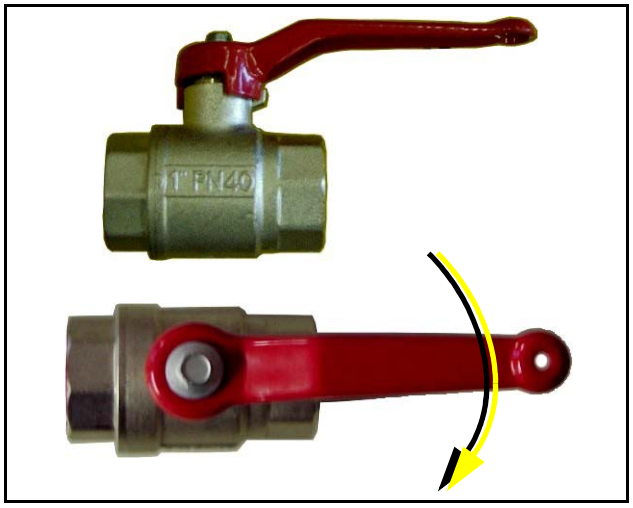
The impeller of the cooling water pump must be regarded as wearing part. The life span of the impeller can be extremely different and exclusively depends on the operating conditions. The cooling water pumps of the PANDA generators are laid out in such a way that the number of revolutions of the pump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

7.16.1 Replacement of the impeller

Close the raw water stop cock.

Representative picture

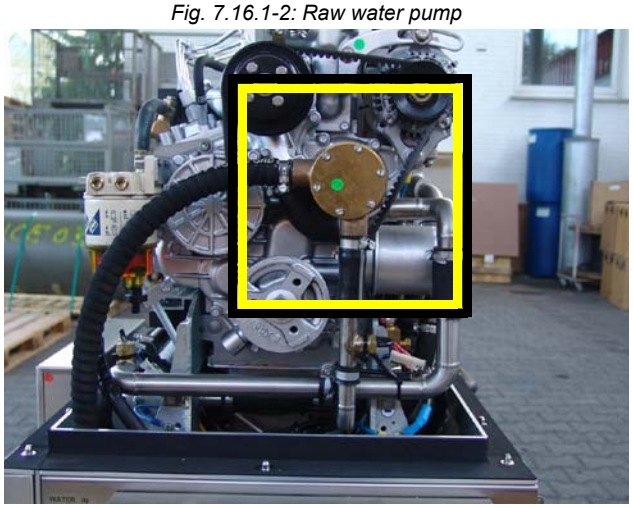
Fig. 7.16.1-1: Raw water cock



Raw water pump on the front side of the genset.

Representative picture

Fig. 7.16.1-2: Raw water pump



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

Representative picture

Fig. 7.16.1-3: Cover raw water pump

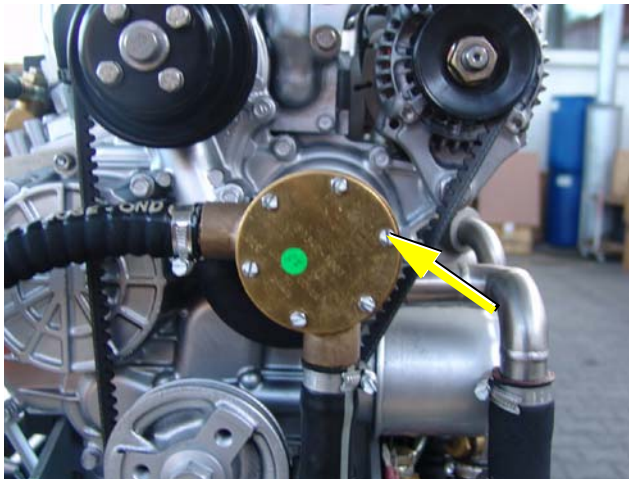
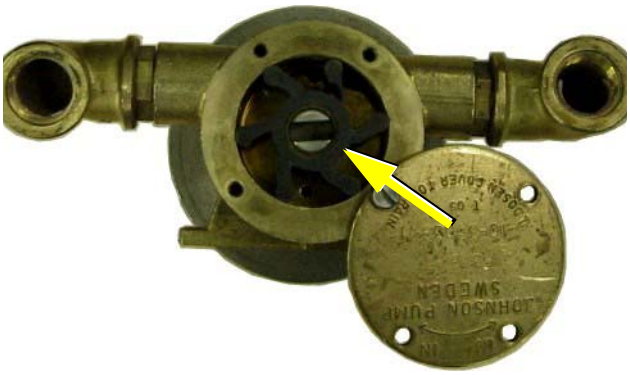


Fig. 7.16.1-4: Impeller pump

Pull to the impeller with a multigrip pliers of the wave.



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

Representative picture

Fig. 7.16.1-5: Impeller

Check to the impeller for damage and replace it if necessary.

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.

The impeller is attached to the pump wave (if the old impeller is used, pay attention to the before attached marking).

Representative picture

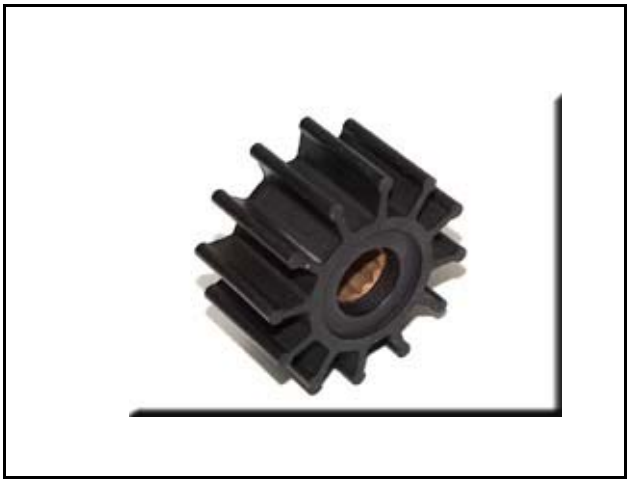
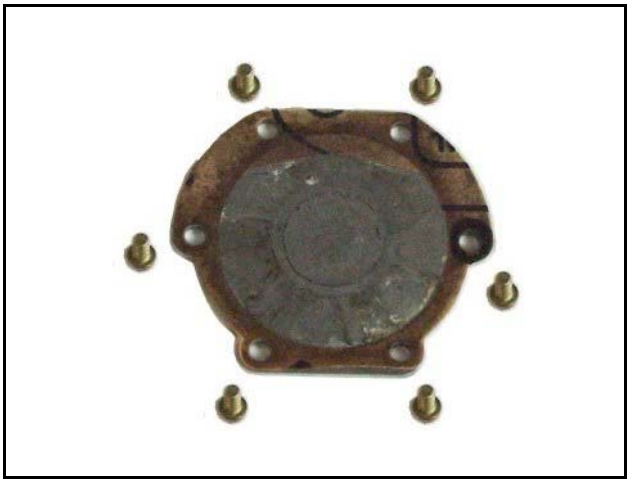


Fig. 7.16.1-6: Gasket

Fastening the cover and use a new seal.

Representative picture

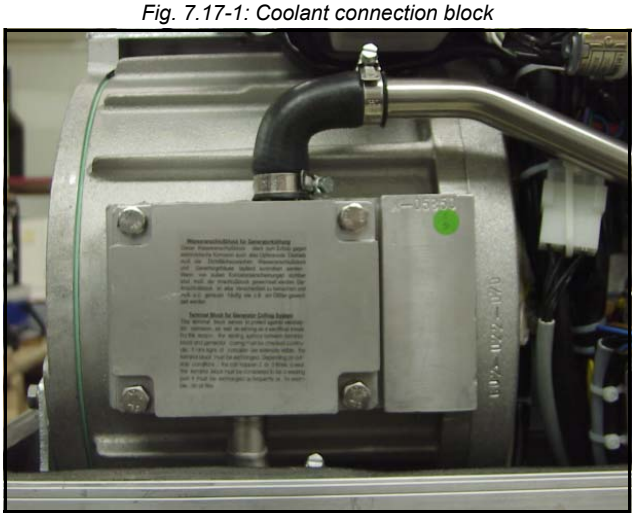


7.17 Coolant connection block at the generator capsule

Control of the coolant connection block

The coolant terminal block at the side of the generator housing must be thoroughly checked in the case of all seawater-cooled generators.

Fig. 7.17-1: Coolant connection block



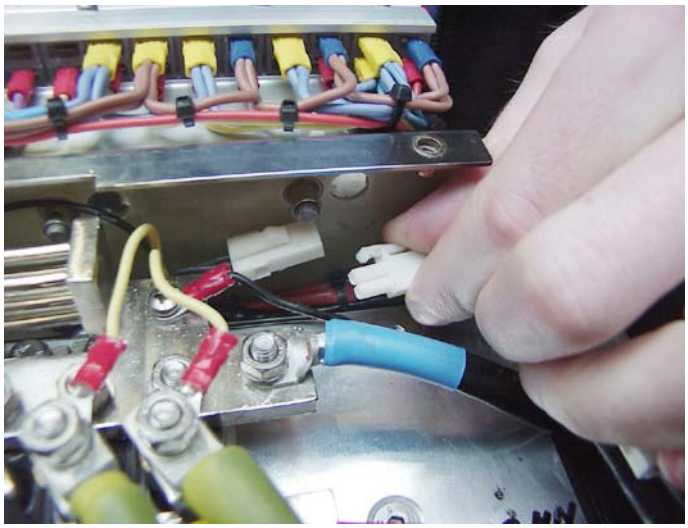
7.18 Rectifier maintenance

Furthermore in addition to the standards checks according to the manual following points of the generator have to be checked:

- Automatic shut down of the generator in case off high heating temperature

  This shall be done by disconnecting the thermo-switch of the heat sink. Next to the rectifier you will find a 2-pole connector. If you disconnect this connector from the opposite socket, the generator shall shut down – or, when the generator is not running you will get a signal on the panel.

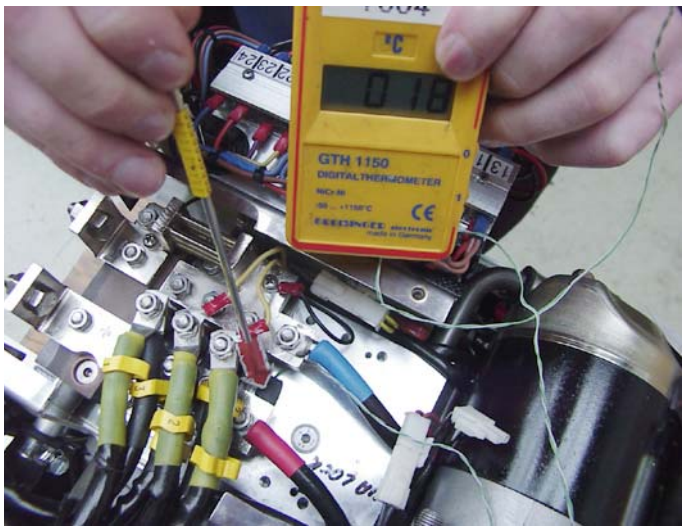
Fig. 7.18-1: Plug thermo-switch cooling plate

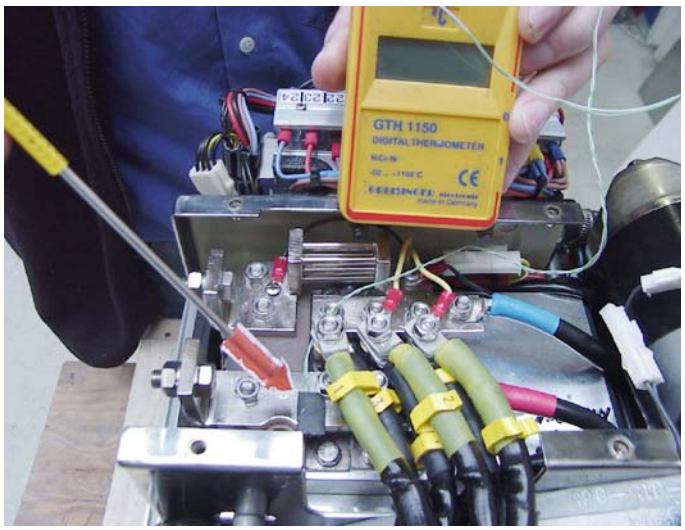


Temperatures of the rectifier and heating

- Apply a thermocouple meter to the heat sink and the copper bars and monitor the maximum temperatures of the rectifier.

Fig. 7.18-2: Measuring the temperature





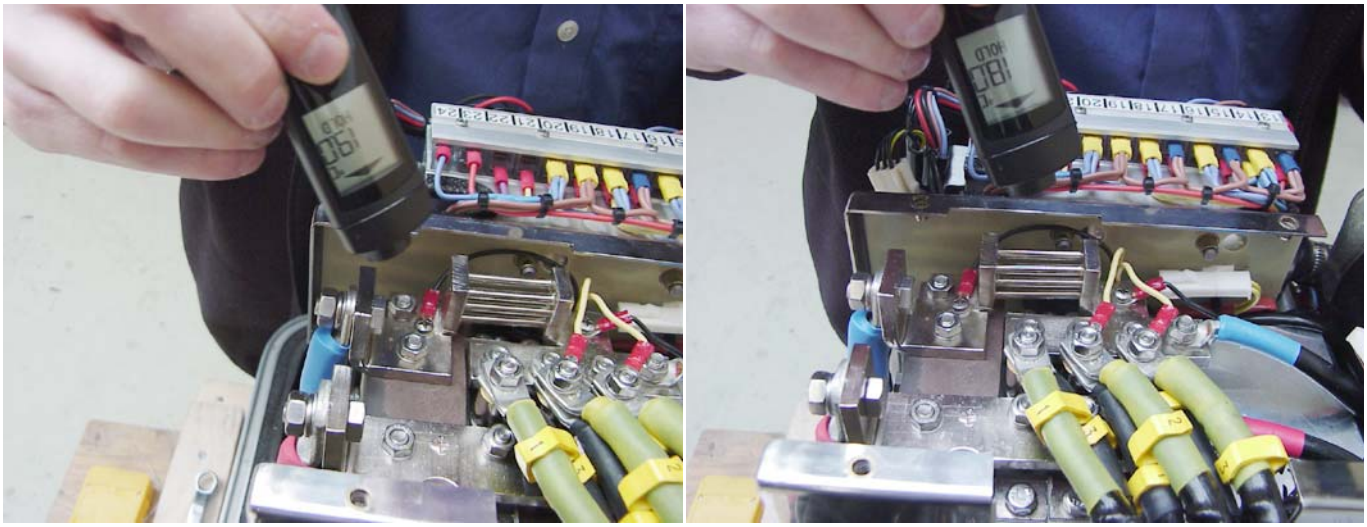
- With the help of the infrared thermometer you can check all the temperatures on the rectifier.

  Check all the cable connections of the DC- wiring.

  The temperature of the heat sink shall never exceed 95°C.

  The temperature of the copper bars shall never exceed 120°C

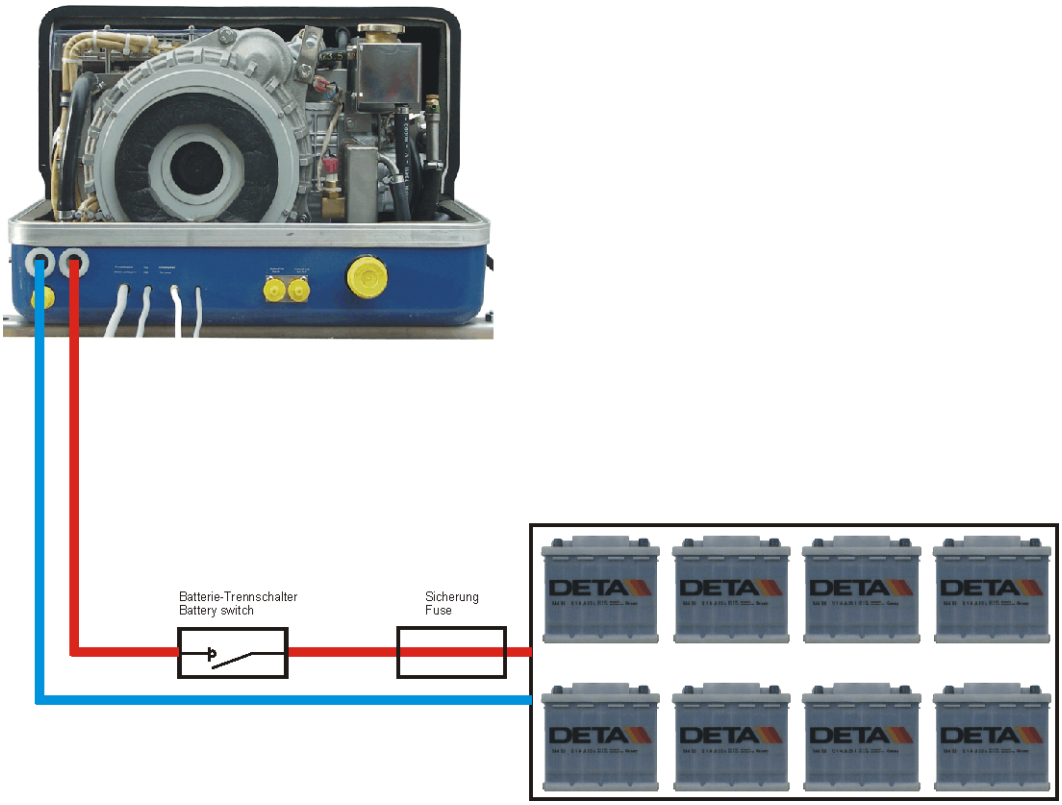
Fig. 7.18-3: Measuring the temperature



Ensure, that a fuse next to the battery is installed in the battery line for the generator output cable.

Ensure that a battery switch is installed in the battery line. Never leave the generator behind without the cover mounted over the heat sink and capsule not closed.

Fig. 7.18-4: Connection example



Remind the customer

- to run the generator only with closed capsule.
- not to run the generator unattended
- to ask for regular service

8. Generator Failure

8.1 Personal requirements

The work described here, unless otherwise indicated, are performed by the operator.

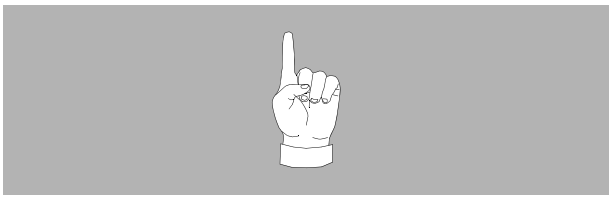
More Repair work may be performed only by specially trained personnel or by authorized repair shops (Fischer Panda service points). This is especially for working on the valve timing, fuel injection system and the engine repair.

8.2 Safety instructions for this chapter

see “Safety first!” on Page 10.

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

Notice!:



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:

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

Warning!: Risk of injury

Do not run the generator with removed sound isolation cover.

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

- 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.

Warning!: Risk of injury

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

8.3 Overloading the generator

Please you make sure that the engine is not overloaded. An overloading in the long term can harm the engine. In addition the exhaust gases are soot-blackened (environment).

The full rated output of the generator is primarily intended for brief use.

As fatigue strength should be calculated in the interest of a long life span of the engine 70% of the nominal load.

Warning!:

8.4 Starting problems

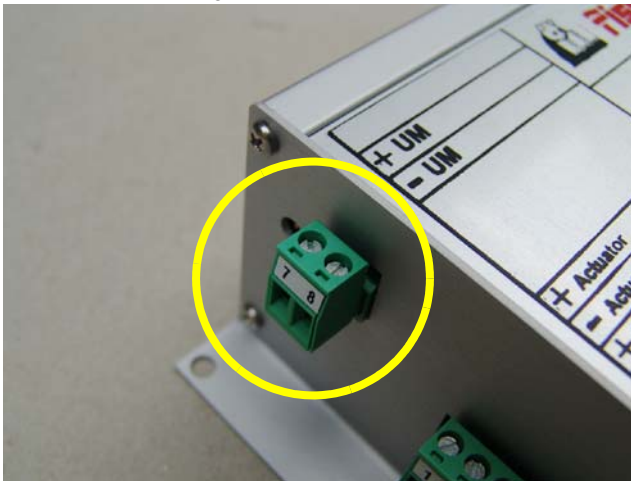
8.4.1 VCS does not work

For start problems one chief cause is that the VCS does not work. Check:

Is the voltage sense connection ok? Check polarity!

Terminal 7+8

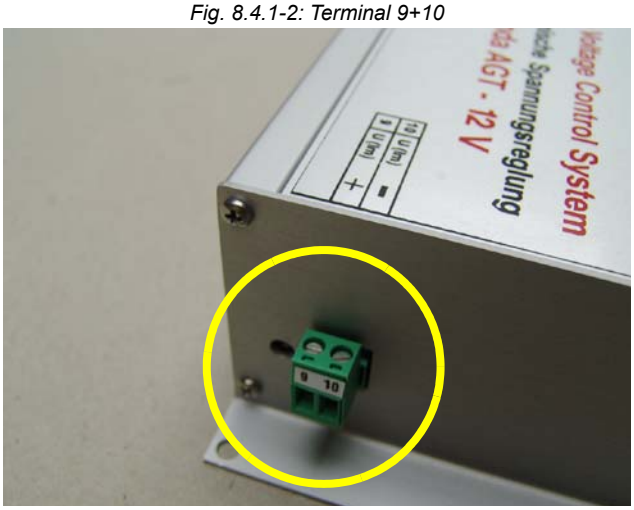
Fig. 8.4.1-1: Terminal 7+8



Is the shunt connection ok? Check polarity!

Terminal 9+10

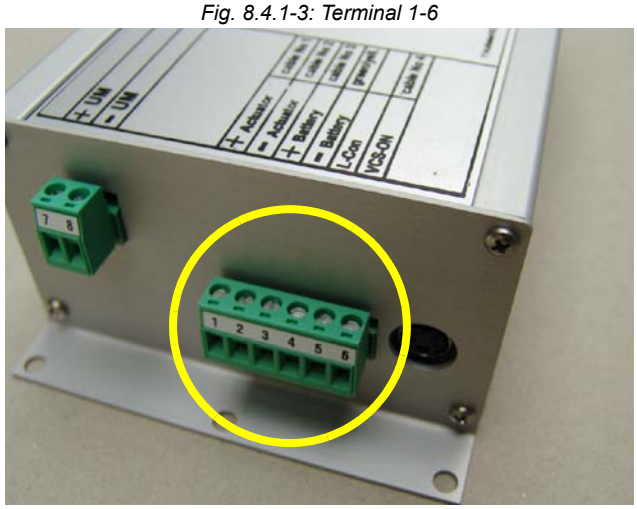
Fig. 8.4.1-2: Terminal 9+10



Is the main supply connection ok? Check polarity!

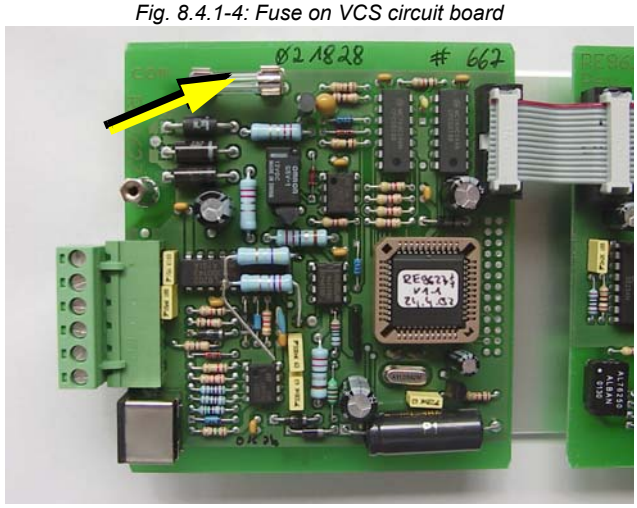
Does DP+ (VCS ON) lie on clamp 6 of the plug with 6 pins?

Fig. 8.4.1-3: Terminal 1-6



Checking the fuse on the VCS printed circuit board.

Fig. 8.4.1-4: Fuse on VCS circuit board



8.4.2 Fuel solenoid valve

For start problems the possibility of an error exists with the solenoid for engine stop or fuel solenoid valve, which both effect affect simultaneous on the fuel system.

The fuel solenoid valve is located in front of the injection pump. It opens automatically, if the „START“-button is pressed on the remote control panel. The solenoid valve is CLOSED when the generator main power is switched „OFF“. For this reason, it requires a few seconds before the motor comes to a full halt.

If the generator fails to start, runs rough, does not reach the proper RPM, or does not stop properly, the first item to suspect in most cases is the fuel solenoid valve and should be inspected first.

A check of the fuel solenoid valve by removing the plug from the fuel solenoid valve for a short period whilst in operation (first remove the small retention screw) and replace it immediately. The motor should „react immediately“ by revving high.If the motor does not react sharply to the re-connection of the solenoid wire, it is a sign that the solenoid

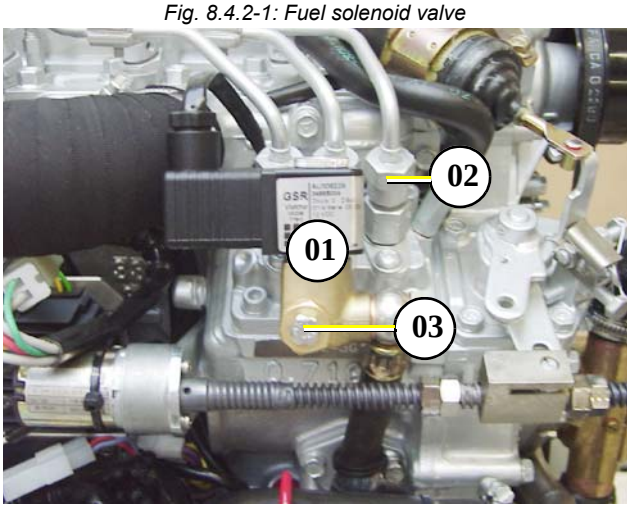
Fuel solenoid valve

01. Fuel solenoid valve

02. Fuel injector nozzles

03. Ventilation screw

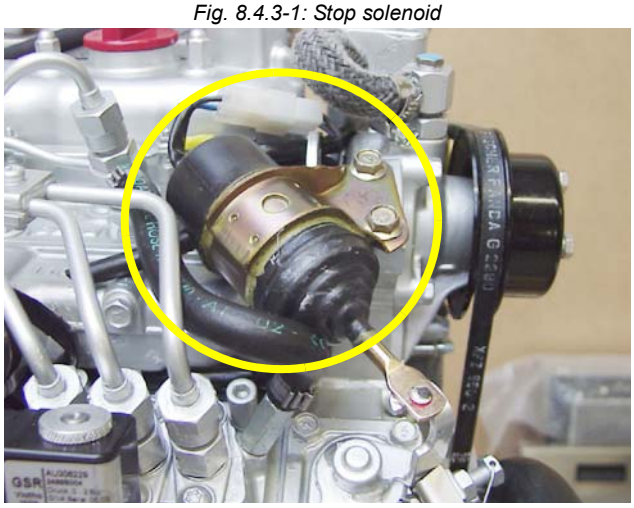
Fig. 8.4.2-1: Fuel solenoid valve



8.4.3 Stop solenoid

Stop solenoid for engine stop

Fig. 8.4.3-1: Stop solenoid

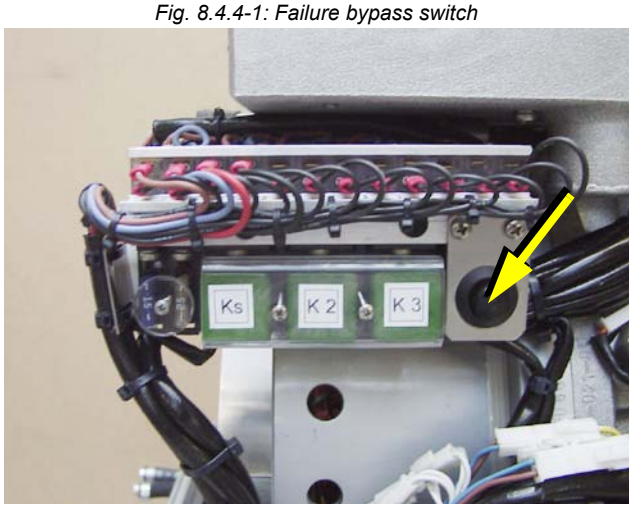


8.4.4 Failure Bypass Switch

The start-failure bypass switch enables an immediate restart facility of the generator, should it cut out, even if this was caused by over-heating. There is normally a requirement to wait until the motor has cooled down to the correct temperature. This can last for several hours in certain circumstances, since the generator is enclosed in a sound-insulated casing, which prevents heat loss.

Failure bypass switch

Fig. 8.4.4-1: Failure bypass switch

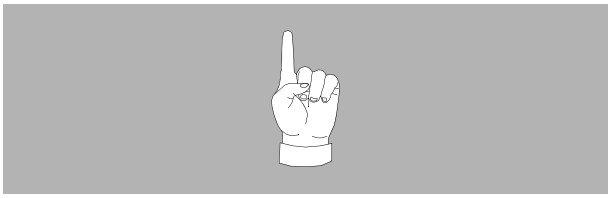


This period can be reduced by pushing the button on the front of the generator. The generator can be started by means of the remote control as long as the button is depressed. The switch/button bypasses any faults allowing the generator to run.

Before depressing the button, a manual check of the oil dip stick must be carried out to determine whether the generator has sufficient oil, as it is possible that the oil pressure switch causes the generator to cut out. If it has been ascertained that the reason for the motor cutting out is overheating and not lack of oil, the generator can be run for several minutes without load, so that the motor is cooled by the circulating coolant.

If the temperature is the reason for the generator cutting out when it is running under load, then an immediate check must be made to determine the cause. It could be a fault with the cooling system, one of the fans, the air-intake or a fault with the external cooling system.

Note:



Continual use of the starter-failure bypass switch should be avoided, while the generator cuts out during operation.

The generator must always run without load for several minutes before being switched off, so that a temperature compensation occurs. Heat accumulation can cause the generator to overheat, even after is has been switched off.

Should the overheating alarm be set off, caused by heat accumulation, after the generator has been switched off, then this can also be bypassed using the switch.

8.5 Troubleshooting Table

For Troubleshooting see Table 8.5, “Troubleshooting Table,” on Page 149.

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9. Tables

9.1 Troubleshooting

9.1.1 Generator voltage too low

If the generator delivers undervoltage, there can be various reasons for this:

Cause	Solution
Generator is overloaded.	Reduce the electrical load. (Switch off load)
Motor is not reaching the rated rpm.	Refer to „motor faults“ section.
Actuator is not in maximum position.	Check actuator resp. renew.
VCS-voltage controller defective or wrong adjusted.	Check resp. renew.

9.1.2 Generator voltage too high

The following reasons may be the cause, if the generator delivers overvoltage:

Cause	Solution
The engine is running at the wrong speed.	Check the speed of the motor with a rev or frequency counter, set the correct speed.
VCS-voltage controller defective or wrong adjusted.	Check resp. renew.
Actuator defective.	Check resp. renew.

9.1.3 Generator voltage fluctuates

Cause	Solution
1. Fault or defect on the load side. 2. A motor fault.	1. Check if the power requirement of the load fluctuates. 2. See „Motor running irregularly“.

9.1.4 Motor does not turn over when starting

Cause	Solution
Battery main switch is switched off.	Check the position of the battery main switch, if necessary switch on.
Battery voltage not sufficient.	Check that connection is firm and whether corrosion has occurred..
Starting current fault.	The voltage of full batteries fall to a maximum of 11 V. The wiring is severed if the voltage does not drop. The battery is discharged if the voltage drops further.

9.1.5 Motor turns over but does not start

Cause	Solution
Stop solenoid valve not opening.	Check wire connections and circuitry to solenoid valve. (ref. DC wiring diagram: Relay K2, Fuse)
Fuel pump does not operate.	Check fuel-filter and pump: clean if necessary.
Lack of fuel.	Check fuel supply.
Glow-plugs not working correctly.	Check glow plugs and heating time.
Too much air in fuel lines.	Test fuel system for leakage. Bleed air from fuel system (refer to section „Air-bleeding of the Fuel System“).
Fuel filter blocked.	Replace fuel filter.
Low compression pressure.	See Kubota motor-manual.

9.1.6 Motor does not turn over at normal speed during the start process

Cause	Solution
Starter battery voltage insufficient.	Check battery.
Damaged bearing(s) piston (seized).	Repairs need to be carried out by Kubota-Service. (refer to Kubota motor-manual)
Cooling water in combustion chamber.	1. Turn generator "OFF" at control panel. 2. Remove the glow plug (see Kubota-manual). 3. Rotate the motor by hand carefully. 4. Check if there is water in the oil and change both oil and filter if necessary. 5. Determine cause for excess water in the combustion chamber. The excess water can be caused by a defective air vent in the cooling water system, which should be checked and cleaned, or replaced if faulty.

9.1.7 Motor runs irregularly

Cause	Solution
Faulty centrifugal injector governor.	Have the centrifugal governor inspected by a Kubota-Service technician.
Too much air in fuel lines.	Bleed air from fuel system.

9.1.8 Motor speed drop down

Cause	Solution
Too much oil.	Drain oil.
Lack of fuel.	Check fuel supply system: - fuel filter, renew if necessary - check fuel pump - check fuel lines (bleed if necessary)
Lack of intake air.	Check air intake paths. Check and clean air filter (and intake muffler if installed).
Generator overloaded by too many load.	Reduce the electrical load (switch off load).
Generator overloaded by over-energizing.	Check that the proper capacitor type is installed and that they are connected correctly.
Defective generator (windings, bearings, or other).	Generator must be sent to manufacturer for repair of damaged bearings or winding.
Damaged engine.	Repair of bearing damage, etc., by Kubota-Service.

9.1.9 Motor switches itself off

Cause	Solution
Fuel solenoid valve or throttle shut solenoid is not switching off.	Check wire connections to solenoid. Check valve functions as in the "Inlet Fuel Solenoid Valve" or in the trottle shut off solenoid sections. Replace if necessary.

9.1.10 Motor stops by itself

Cause	Solution
Lack of fuel.	Check fuel supply system.
Excess heat in cooling system (thermo switch tripped)- lack of cooling water. Is indicated on the remote control panel.	Check cooling water system flow: water pump, inlet water filter, extra heat exchanger coolant flow.
Lack of oil (oil pressure sensor tripped).	Check oil-level and if necessary top up. Check motor's oil-pressure and have repaired by Kubota-Service if necessary.

9.1.11 Sooty black exhaust

Cause	Solution
Generator is overloaded.	Check electrical load and switch off unnecessary load.
Insufficient intake air.	Check intake air filter; clean if necessary.
Fuel injector nozzles faulty.	Replace injector nozzles.
Valve clearance incorrect.	Readjust valve clearance to correct value (refer to Kubota-manual).
Poor fuel quality.	Use better quality diesel (recommended: 2-D Diesel).
Poor combustion.	Incorrect AFR (air/fuel ratio) due to motor timing adjustment. Have motor serviced by Kubota.
Low compression pressure.	See Kubota motor manual.

9.1.12 Generator must be shut off immediately if

Cause	Solution
- motor rpm suddenly rises or drops - unusual noise comes from genset - exhaust colour suddenly becomes dark - motor overheats - oil pressure drops, oil light suddenly flashes	Refer to respective section of manual and if necessary, have repaired by Kubota-Service, or Panda representative.

9.1.13 Troubleshooting VCS system

Cause	Solution
Actuator does not move.	Check voltage supply and wire connections to actuator. Motor connected? Check connection to VCS.
Actuator sets throttle too high or too low.	Check that the wires to the actuator are connected properly (±). Check connection to VCS.
If the VCS electronics are faulty, the generator can still run by over-riding the system. To override the VCS, disconnect the plug and jumper the contacts. Loosen the connecting rods motor from the injection pump regulator and turn screw to a max. voltage of 33 V.	

9.2 Technical data engine

Model	Kubota D1105
Type	D1105
Governor	VCS
Automatic start booster	yes
Cylinder	3
Bore	78 mm
Stroke	78,4 mm
Stroke volume	1123 cm^3
Max. power (DIN 6271-NB) at 3000rpm	18,7 kW
Rated speed	3000 rpm
Idle running speed [2]	2900 rpm
Valve clearance (engine cold)	0,2 mm
Cylinder head nut torque	68 Nm
Compression ratio	22:1
Lubrication oil capacity	5,1 l
Fuel consumption [3]	approx. 1,7-4,5l
Oil consumption	max. 1% of fuel consumption
Oil specification	API CF
Cooling water requirement for seawater circuit (Marine generators only)	28-40l/min
Permissible max. permanent tilt of engine	a) 25° crosswise to the longitudinal axis b) 20° in longitudinal direction
Recommend starter battery size	12V 65Ah equivalent
Recommend cable cross size starter battery cable *Length 4 meter max.*	25mm^2
Max. exhaust back pressure	10,7 kPa 107 Millibar

9.2.1 Technical data rectifier unit

Type	AGT DC Rectifier Unit
Power $P_{cont\ out}$	12,5 kW
Output voltage U_{out}	400,0 V
Output frequency F_{out}	DC
Current max I_{max}	30 A
	Use only with AGT Generator

The AGT-DC system consists of the AGT generator in conjunction with the rectifier unit named on the type plate and is only allowed in this combination!

ATTENTION!

9.3 Engine oil

9.3.1 Engine oil classification

9.3.1.1 Operating range:

The operating range of an engine oil is determined by SAE class. „SAE“ is for the union of American auto engineers (Society of Automotives Engineers).

The SAE class of an engine oil only informs over the viscosity of the oil (larger number = more viscous, smaller number = more highly liquidly) e.g. to 0W, 10W, 15W, 20, 30, 40. The first number shows the liquid of the oil with cold weather, the second number refers to the fluidity with heat. Complete yearly oils have usually SAE classes of SAE 10W-40, SAE 15W-40 etc.

9.3.1.2 Quality of oil:

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.

API C for diesel engines

The second letter is for the quality of the oil. The more highly the letter in the alphabet, the better the quality.

API C for diesel engine

Examples for diesel engine oil:

API CC Engine oil for small demands

API CD Engine oil for suction- and turbo diesel engine

API CF Replace the specification API CD since 1994

API CG Engine oil for highest demands, turbo-tested

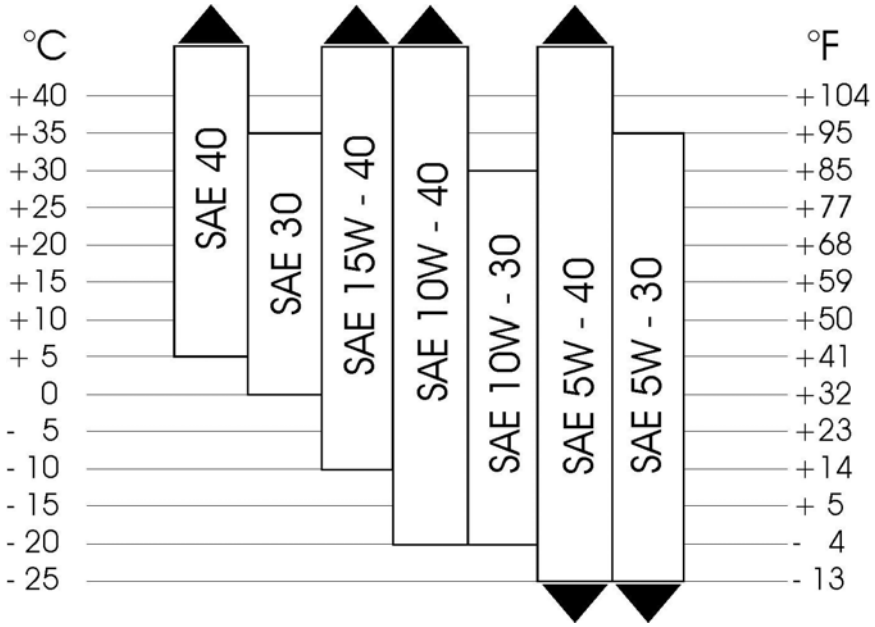
See technical data for the specificated engine oil

Notice!:

Fig. 9.3.1.2-1: Engine oil type.

Engine oil type	
over 25 °C	SAE30 or SAE10W-30; SAE10W-40
0 °C to 25 °C	SAE20 or SAE10W-30; SAE10W-40
below 0 °C	SAE10W or SAE10W-30; SAE10W-40

Fig. 9.3.1-2: Temp. range of the SAE classes



9.4 Coolant specifications

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

9.4.1 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

9.5 Fuel

Use a clean No. 2 Diesel fuel oil (SAE J313 JUN87) according to ASTM D975 and EN 590.

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.

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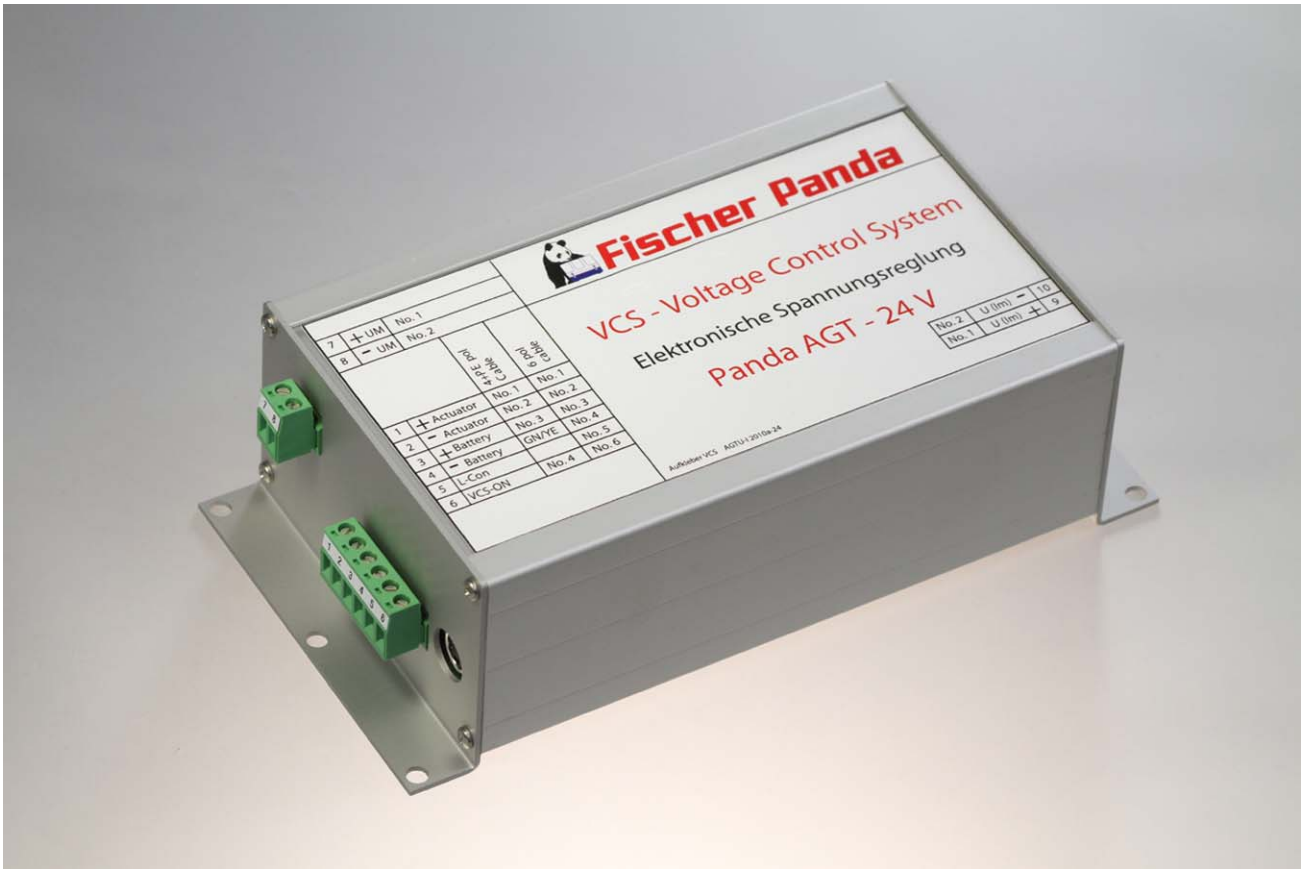
10. VCS-AGT-U/I

Art No.	see table
Des.	see table

Ausführung:

	Dokument	Hardware	Software
Actual:	Rev. 6	----------	----------
Replaced:	----------	----------	
Replaced with:	----------	----------	----------

Fig. 10.0-1: VCS AGT U/I

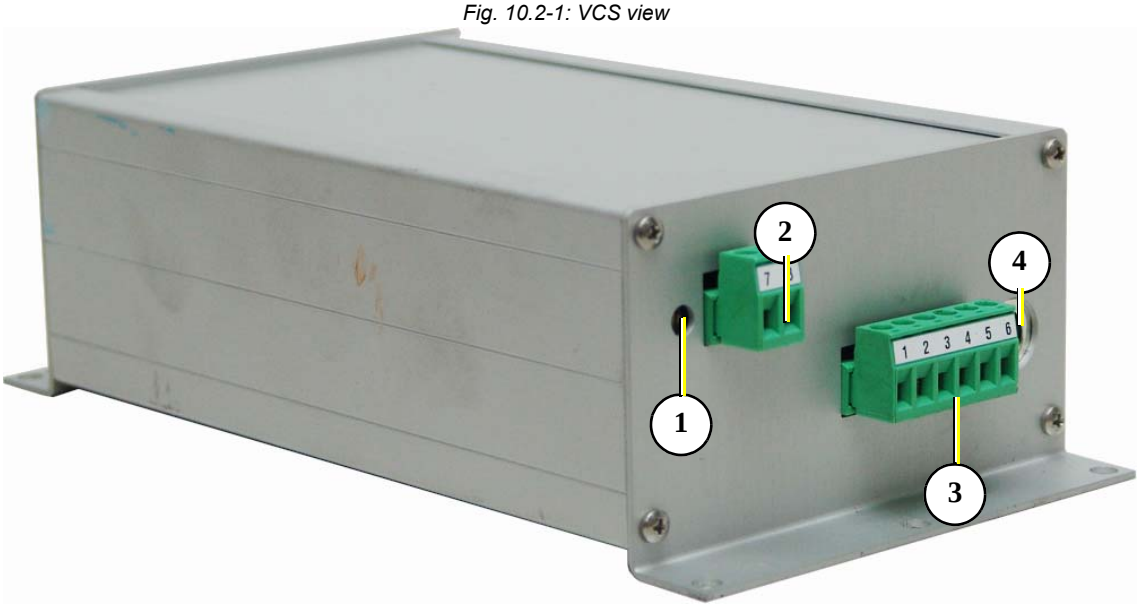


10.1 Delivery versions

Art. No.	Art. type
21.02.01.066H	VCS-AGT-U/I 12 V= @60 mV
21.02.01.070H	VCS-AGT-U/I 24 V= @60 mV
21.02.01.071H	VCS-AGT-U/I 36 V= @60 mV
21.02.01.072H	VCS-AGT-U/I 48 V= @60 mV
21.02.01.073H	VCS-AGT-U/I 72 V= @60 mV
21.02.01.074H	VCS-AGT-U/I 80 V= @60 mV
auf Anfrage / on request	VCS-AGT-U/I 96 V= @60 mV
21.02.01.075H	VCS-AGT-U/I 120 V= @60 mV
21.02.01.076H	VCS-AGT-U/I 144 V= @60 mV
auf Anfrage / on request	145 - 350V

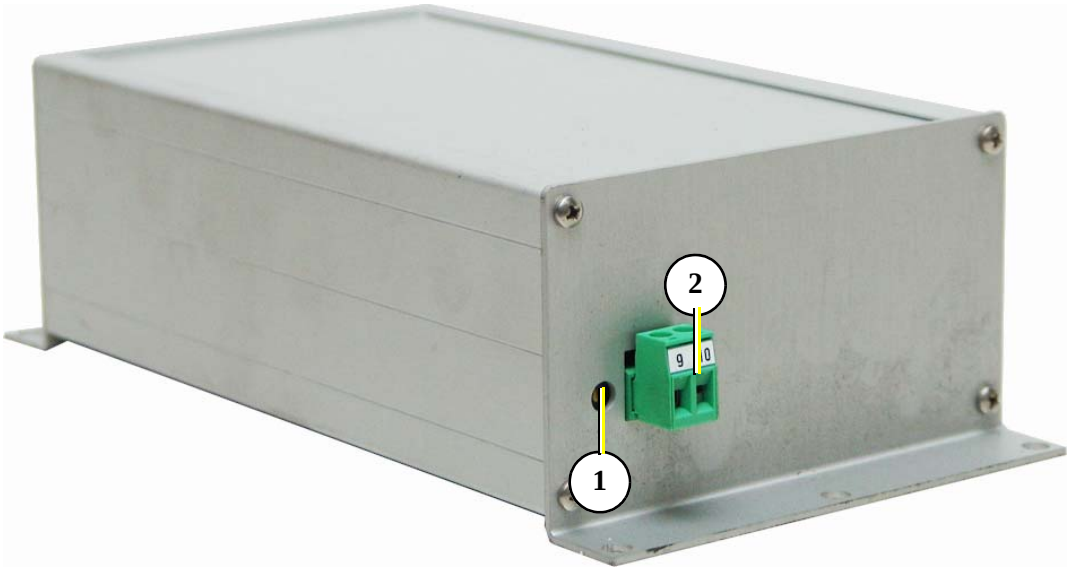
10.2 Voltage control system

Fig. 10.2-1: VCS view



1. Terminals 7+8
2. Potentiometer for the charging voltage
3. Terminals 1-6
4. Programming

Fig. 10.2-2: Electronic Voltage Control



1. Terminals 9+10
2. Potentiometer for the charging current

The VCS control is used for the adjustment of the number of revolutions of the engine and thus the voltage of the generator. It belongs to the accessories and is externally attached.

No.	Short mane	IN/OUT	Function
1	+ Actuator	O	Out (+) for actuator
2	- Actuator	O	Out (-) for actuator
3	+12V	I	Operation voltage(+); 12V-Automotive
4	0V	I	Operation voltage(-); 12V-Automotive
5	AC Control lamp	O	to 0V - Optional
6	VCS on	I	12V: VCS is on / open: VCS is off
7	Measurement voltage +	I	Measurement voltage (+) from the rectifier unit
8	Measurement voltage -	I	Measurement voltage (-) from the rectifier unit
9	Measurement current +	I	Measurement current (+) from the rectifier unit
10	Measurement current -	I	Measurement current (-) from the rectifier unit

The potentiometer next to clamp 7/8 is needed for adjustment of the measurement voltage and should be done by an service technician only.

The potentiometer next to clamp 9/10 is needed for adjustment of the measurement current and should be done by an service technician only.

At Systems with more than 144V DC an external voltage divider is build into the measurement line from the rectifier unit to the VCS.

NOTE!: Systems with more than 144V DC

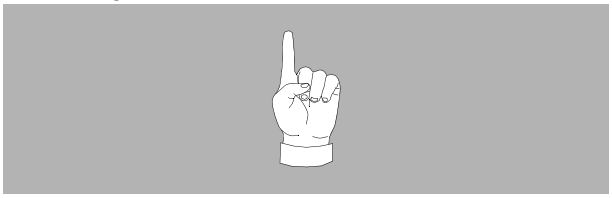
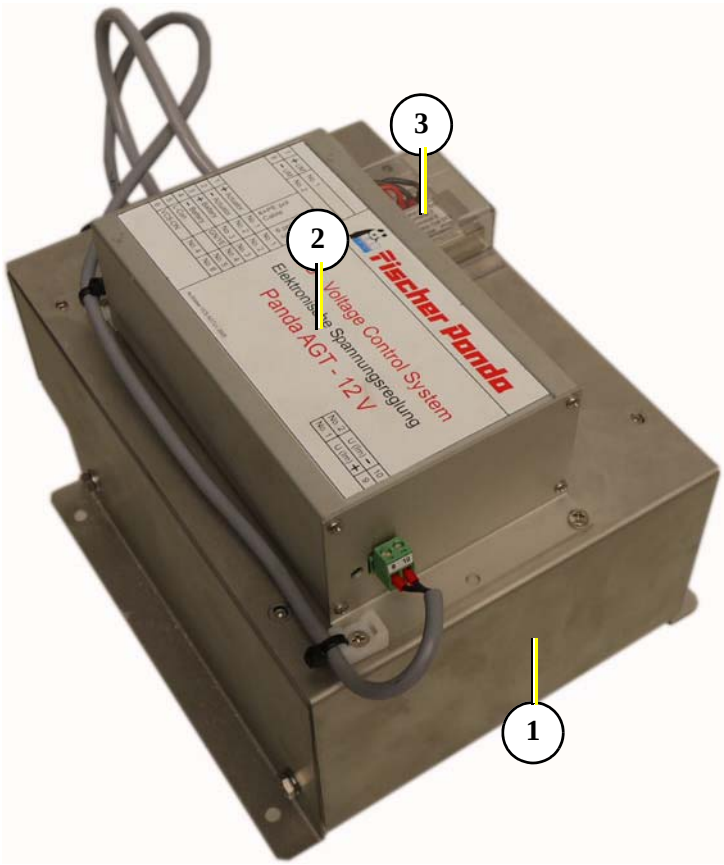


Fig. 10.2-3: Electronic Voltage Control



1. External rectifier unit
2. VCS
3. External voltage divider

10.3 General working of the VCS

When the VCS is active (+12 V on clamp 6) the VCS controls the actuator to reach the exact voltage.

The output current of the generator is seized over a shunt, with an output voltage of 60 mV rated current. (The output voltage is linear to the output current).

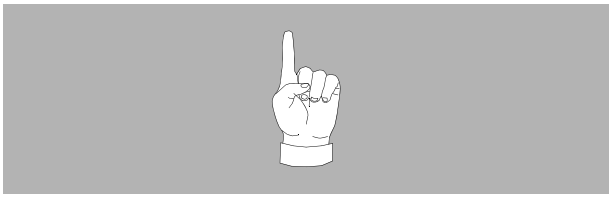
10.4 Personal requirements

The described installation must be done by a technical trained person or a Fischer Panda service point.

10.4.1 Safety References concerning current

A broken cable in the measurement line will be notice by the VCS and the generator will slow down and stop.

NOTE!: Broken cable in the measurement line



A short-circuit in the measuring line or a wrong pole connection is not recognized by the VCS and is handled as “no voltage“.

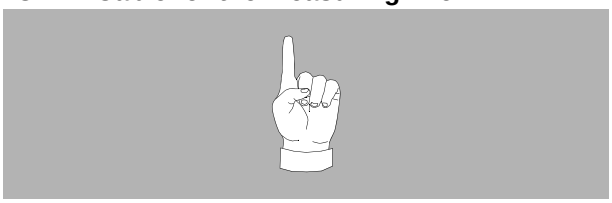
In this case the VCS is out of function. Therefore, it is necessary to check the right working of the VCS at the installation. Also a second overvoltage protection must be installed.

Warning!: Short circuit in the measurement line

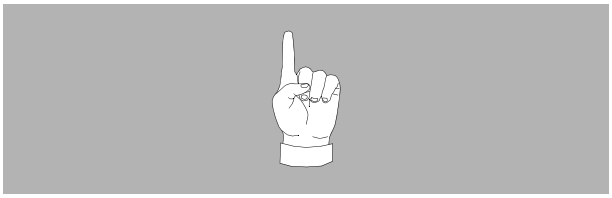
A shielded cable is needed for the measurement voltage.

The cable should not be longer than 5 meters. The shield should be connected to ground at one side.

NOTE!: Cable for the measuring line



Note the safety instruction in the generator manual!.



10.4.2 Checking of the VCS voltage control when the generator is not running

Requirements:

1. VCS-cable connected?
2. Cable for measuring voltage connected to the VCS?
3. Cable for current measuring input connected to the VCS?
4. Actuator spindle lubricated with anti-seize?

Checking the actuator

1. Disconnect clamp 50 at the starter
2. Switch the remote control panel on and press the start button.

As long as the relay of the starter is controlled, the VCS regulates the accelerator in the maximum position (over the starter motor). When the start relay is not active, the accelerator goes to zero (over the actuator).

Check the right working of the actuator.

Fig. 10.4.2-1: Clamp 50

10.4.3 Function of the VCS

The current regulation barrier can be finely adjusted over a potentiometer, which is accessible at the back of the VCS (+5 % / -24 %).

10.4.4 Checking the VCS voltage regulation

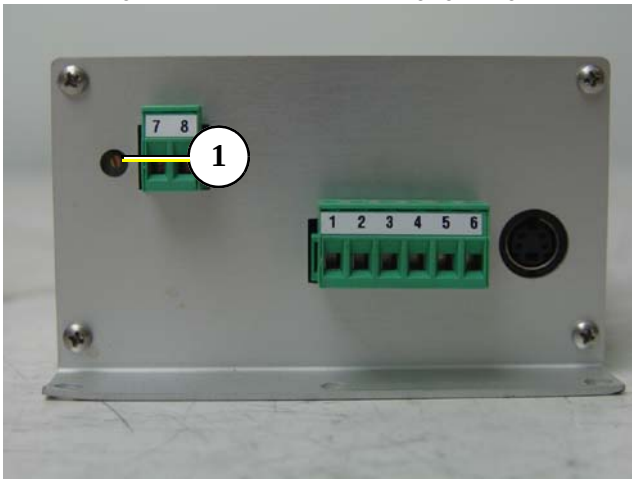
Connect clamp 50 to the starter motor again and start the generator. Control the battery voltage and check if the generator regulates the voltage. Check, if the generator regulates the voltage exactly by switching on and off load.

Readout potentiometer for the charging voltage

1. Potentiometer for setting the charging voltage

Turn to the right for increasing the charging voltage.

Fig. 10.4.4-1: Potentiometer charging voltage



10.4.5 Checking the current limiting

For this test an ampere pliers is needed (DC or a multimeter mV/V) in order to control the generator output current, as well as a multimeter with a DC millivolt range. The batteries must be unloaded (avoid deep discharge of the batteries) to make sure, that the generator is able to supply the maximum output capacity. Keep the generator running and control the DC output current. Measure the voltage signal at the clamps 9 and 10 of the VCS cover by means of a multimeter, which measures millivolt. Check the polarity of this signal. With generators older than 2003, the maximum DC voltage is 60 millivolt. With generators from 2003 upwards the DC voltage is 48 millivolt - this is 80 % of the maximum permanent current. If this signal is exceeded, check the correct connection of the shunt signal cable and the polarity of the shunt signal to the VCS cover.

For setting the charging current resp. the voltage, load should be switched on with a nominal capacity of the generator. Now, the charging current must be measured and set to 100 amps by the potentiometer, in order to operate the engine in its nominal capacity range.estrom

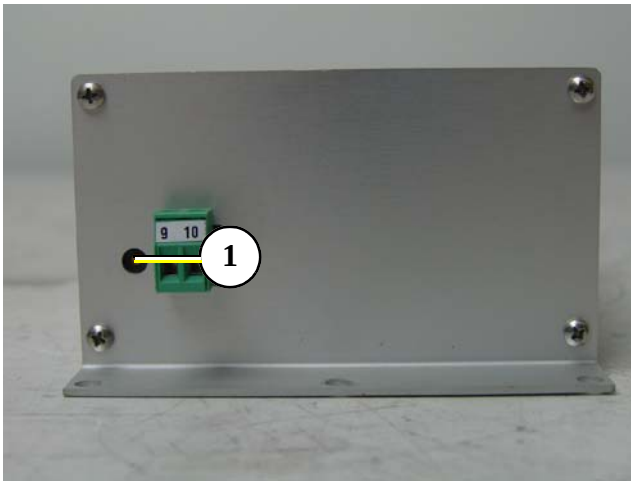
Readout potentiometer for the charging voltage

1. Potentiometer for setting the charging voltage

Turn to the right for increasing the charging voltage.

The factory setting is only to be changed by a technician.

Fig. 10.4-1: Potentiometer charging current



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Generator Control Panel P6+ Handbuch

12V Version - 21.02.02.046P

24V Sonderversion - 21.02.02.047P

Option Automatikaufsatz - 21.02.02.016P

Option Master-Slave-Adapter - 21.02.02.015P

Fischer Panda GmbH

Aktueller Revisionsstand

	Dokument
Aktuell:	Panel Generator Control P6+ RE0703_Kunde.R07_9.12.14
Ersetzt:	Panel Generator Control P6+ RE0703_Kunde.R06_24.11.11

Revision	Seite
Artikelnummern geändert	

Hardware

Generator	Revision	Modifikation Strike Plate	Datum	Upgrade

Erstellt durch / created by

Fischer Panda GmbH - Leiter Technische Dokumentation

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web: www.fischerpanda.de

11. Sicherheitshinweise Generator Control P6+

11.1 Personal

Die hier beschriebenen Einstellungen können, soweit nicht anders gekennzeichnet, durch den Bediener ausgeführt werden.

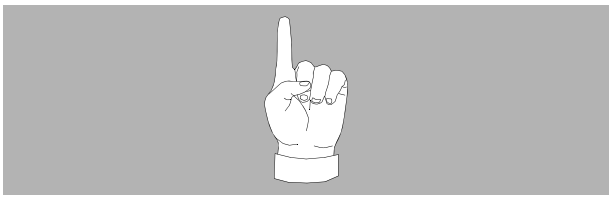
Der Einbau sollte nur von speziell ausgebildetem Fachpersonal oder durch Vertragswerkstätten (Fischer Panda Service Points) ausgeführt werden.

11.2 Sicherheitshinweise

Beachten Sie die Sicherheitshinweise im Fischer PandaGenerator Handbuch.

Sollten diese nicht vorliegen können sie bei Fischer Panda GmbH 33104 Paderborn angefordert werden.

Hinweis!



Durch ein externes Signal kann ein automatischer Start eingeleitet werden.

Warnung! Automatikstart

Der Generator darf nicht mit abgenommener Abdeckhaube in Betrieb genommen werden.

Warnung!

Sofern der Generator ohne Schalldämmkapsel montiert werden soll, müssen die rotierenden Teile (Riemenscheibe, Keilriemen etc.) so abgedeckt und geschützt werden, dass eine Verletzungsgefahr ausgeschlossen wird.

Falls vor Ort ein Schalldämmkapsel angefertigt wird, muss durch gut sichtbar angebrachte Schilder darauf hingewiesen werden, dass der Generator nur mit geschlossenem Schalldämmkapsel eingeschaltet werden darf.

Alle Service-, Wartungs- oder Reparaturarbeiten am Aggregat dürfen nur bei stehendem Motor vorgenommen werden.

Elektrische Spannung - Lebensgefahr!

Warnung! Elektrische Spannung

Die elektrischen Spannungen von über 48 V sind immer lebensgefährlich. Bei der Installation und Wartung sind deshalb unbedingt die Vorschriften der jeweils regional zuständigen Behörde zu beachten.

Die Installation der elektrischen Anschlüsse des Generators darf aus Sicherheitsgründen nur durch einen Elektrofachmann durchgeführt werden.

Batterie abklemmen bei Arbeiten am Generator

Es muss immer die Batterie abgeklemmt werden (zuerst Minus- dann Pluspol), wenn Arbeiten am Generator oder am elektrischen System des Generators vorgenommen werden, damit der Generator nicht unbeabsichtigt gestartet werden kann.

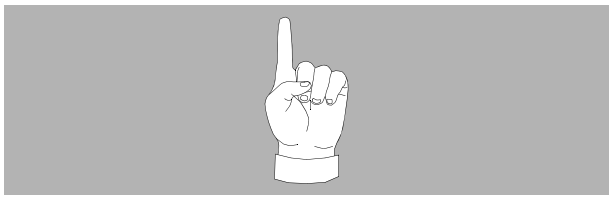
Diese gilt besonders bei Systemen mit einer Automatikstart-Funktion. Die Automatikstart-Funktion ist vor Beginn der Arbeiten zu deaktivieren.

Das Seeventil muss geschlossen werden. (nur PMS Version)

Achtung!

Beachten Sie auch die Sicherheitshinweise der anderen Komponenten Ihres Systems.

Hinweis!

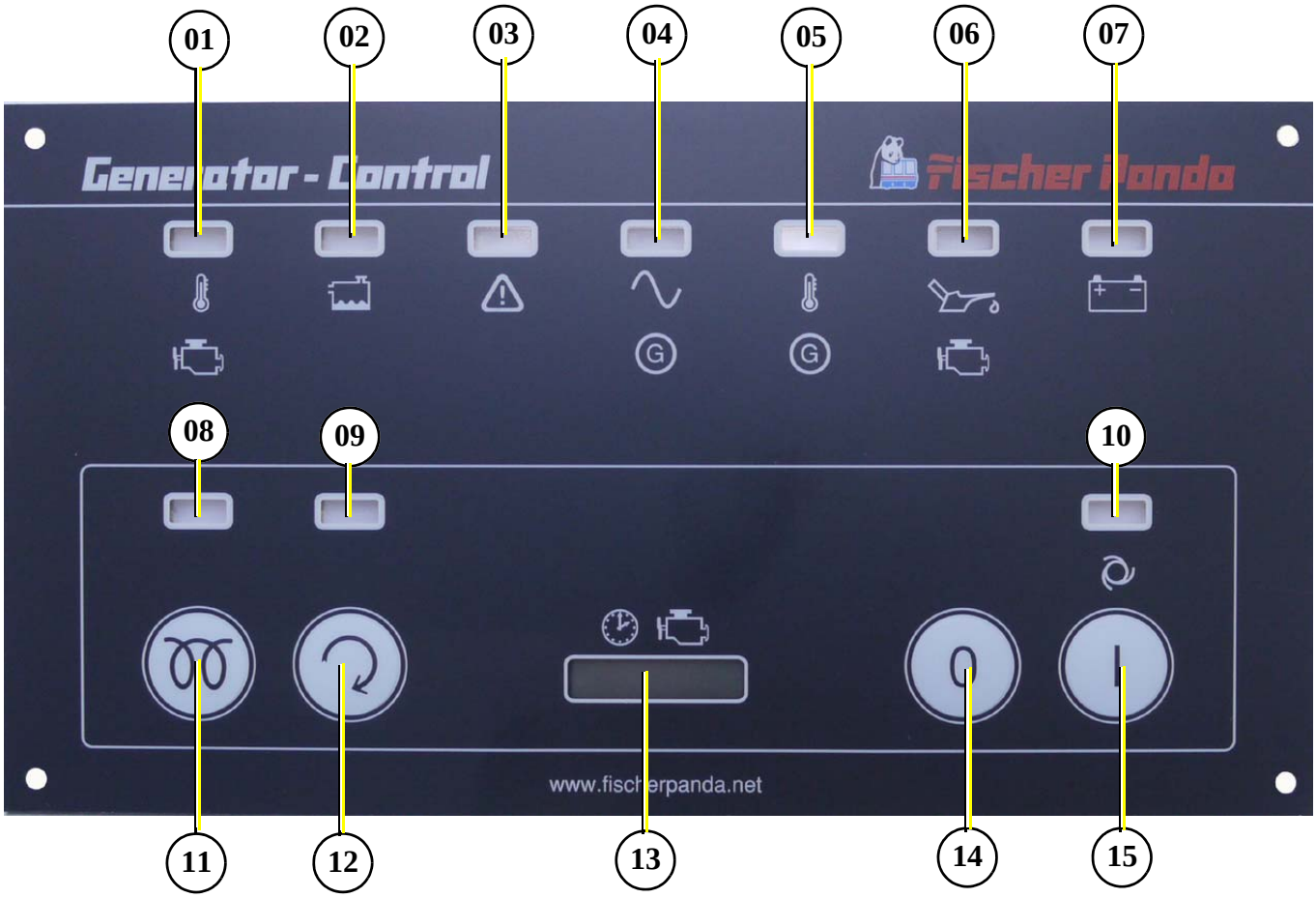


12. Generelle Bedienung

12.1 Generator Fernbedienpanel P6+

Fischer Panda Art. Nr. 21.02.02.009P

Fig. 12.1-1: Panel Frontseite



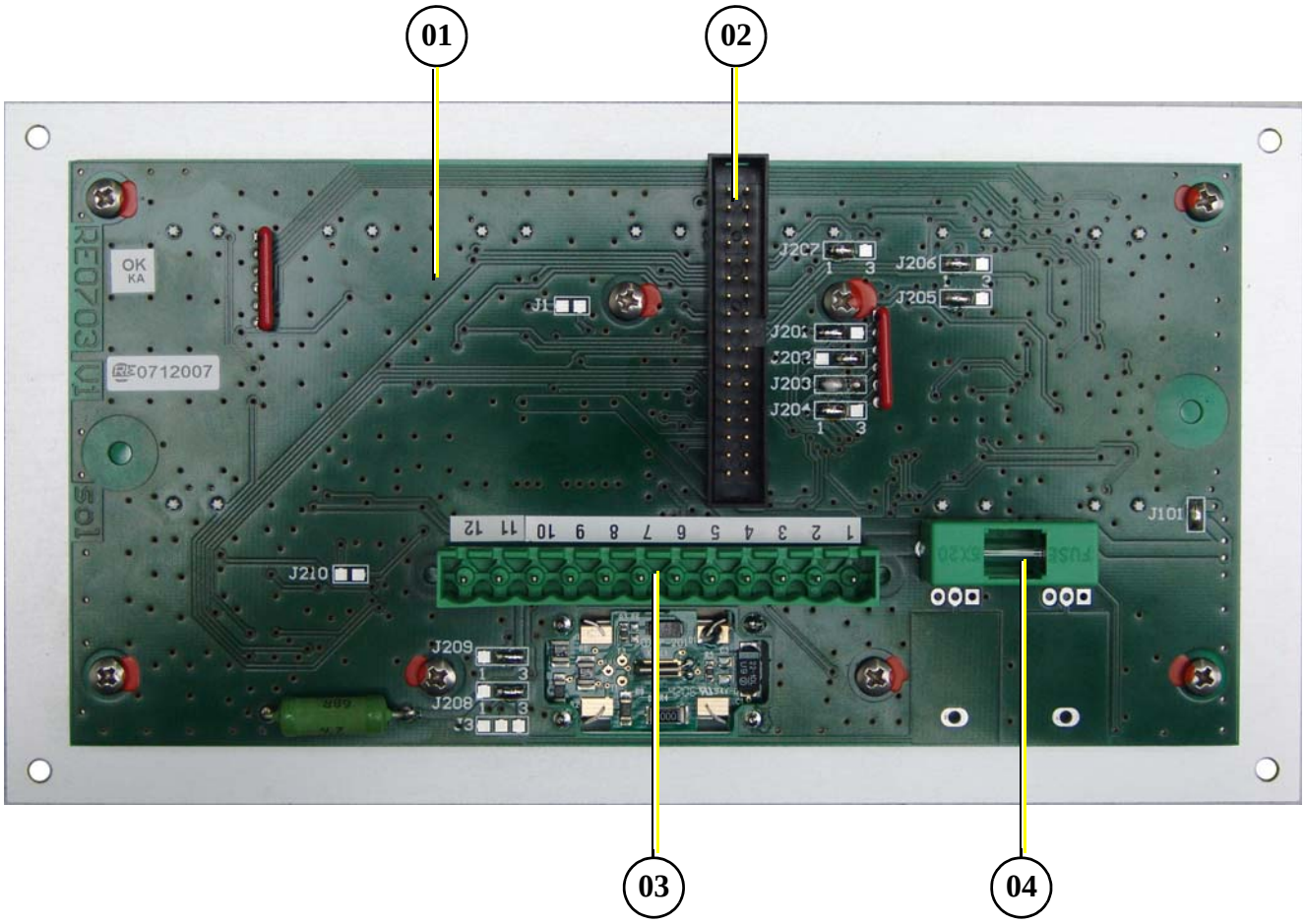
01. LED für Kühlwassertemperatur rot[1]
02. LED für Wasserleckage rot/gelb[1] (Sensor optional)
03. LED für AC-Spannungsfehler rot/gelb[1]
04. LED für AC-Spannung ok grün[1]
05. LED für Wicklungstemperatur rot[1]
06. LED für Öldruck rot[1]
07. LED für Fehler Batterieladespannung grün/rot[1]
08. LED für Vorglühen „heat“ orange[1]
09. LED für Generator „start“ grün[1]
10. LED für Generator „stand-by“ grün[1]
11. Drucktaste für Vorglühen „heat“
12. Drucktaste für Generator „start“
13. Betriebsstundenzähler
14. Drucktaste Panel „off“
15. Drucktaste Panel „on“

[1] LED grün: normal Betriebsmodus, LED rot: Fehler, LED gelb: Warnung, LED orange: aktiv je nach Jumper

12.2 Rückseite 12 V-Version

Fischer Panda Art. Nr. 21.02.02.009P

Fig. 12.2-1: Panel Rückseite 12 V-Version

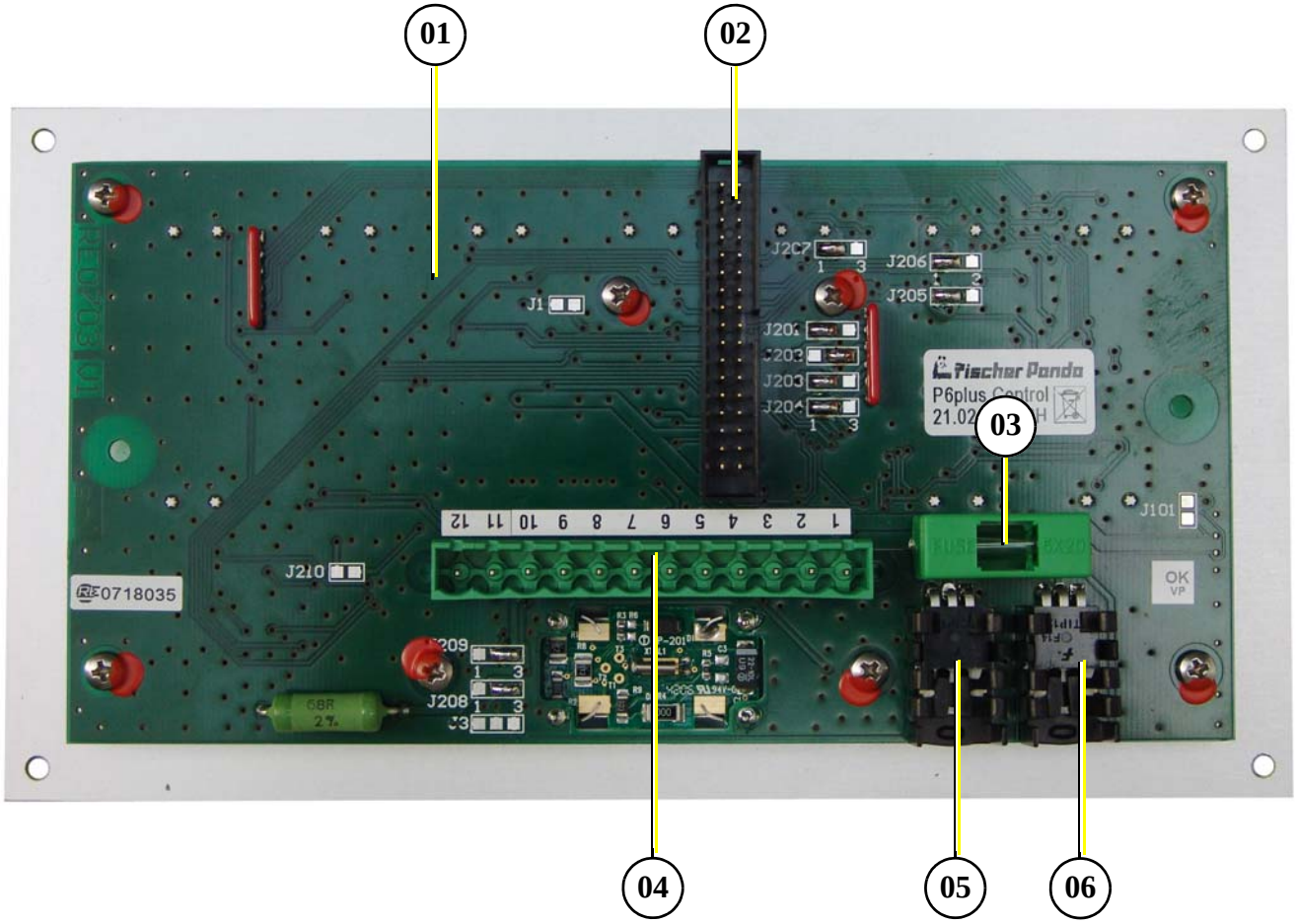


01. Steuerplatine
02. Klemmleiste (Master-Slave Adapter: linke Pinreihe; Automatikaufsatz: rechte Pinreihe)
03. Klemme 1-12 (siehe Kapitel 12.4.2, “Klemmenbelegung,” auf Seite 174)
04. Sicherung 630 mA träge

12.3 Rückseite 24 V-Version

Fischer Panda Art. Nr. 21.02.02.012P

Fig. 12.3-1: Panel Rückseite 24 V-Version



01. Steuerplatine
02. Klemmleiste (Master-Slave Adapter: linke Pinreihe; Automatikaufsatz: rechte Pinreihe)
03. Sicherung 630 mA träge
04. Klemme 1-12 (siehe Kapitel 12.4.2, “Klemmenbelegung,” auf Seite 174)
05. Linearregler 24 V-Version
06. Linearregler 24 V-Version

12.4 Installtion des Bedienpanels

12.4.1 Einbauort

Das Bedienpanel muss an einem trockenen, gut erreichbaren und schattigen Platz installiert werden.

Das Bedienpanel muss das standard 12 -adrigem Kabel angeschlossen werde (1:1).

12.4.2 Klemmenbelegung

Standard für NC Temperaturschalter konfiguriert, d.h. im Fehlerfall offen.

KL.-Nr.	KL.-Name	E / A	Beschreibung
1	Vbat	E	Stromversorgung + 12 V (oder optional 24 V, muss per Löt-Jumper eingestellt werden)
2	GND	E	Stromversorgung -
3	T-Engine	E	Fehler „Kühlwassertemperatur“. Eingang für Temperaturschalter nach GND. Der Eingang ist einstellbar für NC (= kein Fehler) **/** NO (= kein Fehler) (muss per Löt-Jumper eingestellt werden). Der Eingang belastet den Schalter mit ≥ 22 mA nach +12 V (wird bei 24 V-Betrieb intern erzeugt). Das Auftreten eines Fehlers wird - für Auswertung und Anzeige - um 100 ms verzögert. Der Wegfall nicht. Der Eingangsstatus wird mit roter LED angezeigt.
4	Waterleak (Replace Airfilter)	E	Fehler „Wassereinbruch“. Eingang für Sensorschalter nach GND. Der Eingang ist einstellbar für NC (= kein Fehler) **/** NO (= kein Fehler) (muss per Löt-Jumper eingestellt werden). Der Eingang belastet den Schalter mit ≥10 mA nach +12 V (wird bei 24 V-Betrieb intern erzeugt). Das Auftreten eines Fehlers wird - für Auswertung und Anzeige - um 100 ms verzögert. Der Wegfall nicht. Der Eingangsstatus wird mit roter LED angezeigt. Der Eingang kann alternativ für das Signal „Replace Airfilter“ verwendet werden (muss per Löt-Jumper eingestellt werden). Das Signal führt dann nicht zum Abschalten, und wird mit gelber LED angezeigt.
5	Oil-Press	E	Fehler Öldruck. Eingang für Öldruckschalter nach GND. Der Eingang ist einstellbar für NC (=kein Fehler) **/** NO (= kein Fehler) (muss per Löt-Jumper eingestellt werden). Der Eingang belastet den Schalter mit ≥ 22 mA nach +12 V (wird bei 24 V-Betrieb intern erzeugt). Das Auftreten eines Fehlers wird - für Auswertung und Anzeige - um 1 s verzögert. Der Wegfall nicht. Der Eingangsstatus wird mit roter LED angezeigt.
6	DC-Control	E / A	Ladekontrollanzeige. Eingang für Signal von der Lichtmaschine. Der Eingang ist einstellbar für GND = OK oder 12 V/24 V = OK (muss per Löt-Jumper eingestellt werden). Der Eingang belastet das Signal mit 5 mA bei 12 V und 10 mA bei 24 V. Der Eingangsstatus wird mit roter und grüner LED angezeigt. Der Anschluss kann für die Lichtmaschine einen Erregerstrom über einen Fest-Widerstand mit 68R liefern. Entweder mit dem Bedienpanel eingeschaltet oder mit „Fuel-Pump“ eingeschaltet (muss per Löt-Jumper eingestellt werden). Diese Funktion ist nur für 12 V-Betrieb verwendbar.
7	AC-Control	E	AC-Kontrollanzeige. Eingang für NC-Open-Collector-Sensorschalter nach GND (= OK). Der Eingang belastet den Schalter mit ≥ 2,5 mA nach +12 V (wird bei 24 V-Betrieb intern erzeugt). Der Eingangsstatus wird mit roter und grüner LED angezeigt.
8	Heat	A	Ausgang für Vorglüh-Relais. Der Ausgang ist so lange aktiv, wie der Taster „Heat“ gedrückt wird. Der Ausgang liefert, wenn aktiv, die Spannung von Klemme 1. Zusätzlich kann der Ausgang über den Taster „Start“ mitbetätigt werden (muss per Löt-Jumper eingestellt werden) (Fußnoten 1-4 berücksichtigen).
9	Fuel-Pump	A	Ausgang für Treibstoffpumpen-Relais. Der Ausgang ist aktiv, wenn keine Fehler vorliegt (Eingänge 3, 4, 5, 11 und 12, wenn entsprechend konfiguriert). Der Taster „Start“ unterdrückt die Fehlerauswertung, und der Ausgang ist dann auch bei vorliegendem Fehler so lange aktiv, wie der Taster „Start“ gedrückt wird. Der Ausgang liefert, wenn aktiv, die Spannung von Klemme 1 (Fußnoten 1-4 berücksichtigen).
10	Start	A	Ausgang für Start-Relais. Der Ausgang ist so lange aktiv, wie der Taster „Start“ gedrückt wird. Der Ausgang liefert, wenn aktiv, die Spannung von Klemme 1 (Fußnoten 1-4 berücksichtigen).

KL.-Nr.	KL.-Name	E / A	Beschreibung
11	AC-Fault (Fuel Level) [früher T-Oil]	E	Fehler Generator AC-Eingang für NC-Open-Collector-Sensorschalter nach GND (=kein Fehler). Der Eingang belastet den Schalter mit ≥ 2,5 mA nach +12 V. (wird bei 24 V-Betrieb intern erzeugt). Das Auftreten eines Fehlers wird, für Auswertung und Anzeige, um 100 ms verzögert. Der Wegfall nicht. Der Eingangsstatus wird mit roter LED angezeigt. Der Eingang kann alternativ für das Signal „Fuel Level“ verwendet werden (muss per Löt-Jumper eingestellt werden). Das Signal führt dann nicht zum Abschalten und wird mit gelber LED angezeigt. Der Eingang kann alternativ für das Signal „Fehler Öl-Temperatur“ verwendet werden. Der ist Eingang einstellbar für NC (= kein Fehler) **/** NO (= kein Fehler) (muss per Löt-Jumper eingestellt werden). Die Belastung des Sensorschalters ist auf ≥ 10 mA nach +12 V einstellbar (muss per Löt-Jumper eingestellt werden).
12	T-Winding	E	Fehler „Wicklungstemperatur“. Eingang für Temperaturschalter nach GND. Der Eingang ist einstellbar für NC (=kein Fehler) **/** NO (= kein Fehler) (muss per Löt-Jumper eingestellt werden). Der Eingang belastet den Schalter mit ≥22 mA nach +12 V (wird bei 24 V-Betrieb intern erzeugt). Das Auftreten eines Fehlers wird - für Auswertung und Anzeige - um 100 ms verzögert. Der Wegfall nicht. Der Eingangsstatus wird mit roter LED angezeigt.

Belastbarkeit des Ausganges: maximal 0,5 A im Dauerbetrieb und kurzzeitig 1,0 A.
Die Summe aller Ausgangsströme darf (abzüglich 0,2 A Eigenverbrauch) den Nennstrom der Sicherung des Bedienpanels nicht überschreiten.
Der Ausgang verfügt über eine Freilaufdiode, die negative Spannungen (bezogen auf GND) kurzschließt.
Der Ausgang verfügt über eine Rückspeise-Schutzdiode, die das Einspeisen von positiven Spannungen (bezogen auf GND) in den Ausgang verhindert.

12.4.3 Funktion der Lötjumper

Jumper	Status	Beschreibung
J1	zu	beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	Funktion deaktiviert
J3	1-2	LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3	LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	LIMA-Erregerwiderstand ist deaktiviert
J101	zu	12 V - Betrieb
	offen	24 V - Betrieb (optional)
J201	1-2	T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2	Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2	Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2	AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2	T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	Eingang Waterleak hat rote LED und schaltet ab
	2-3	Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	Eingang AC-Fault hat rote LED und schaltet ab
	2-3	Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu	Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.)

(1): Ersatzwiderstand für Ladekontrolleuchte z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.
(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

12.4.4 Konfiguration und Einstellung

12.4.4.1 Konfigurations- und Einstellungsblatt KE01

Standard-Jumperung für Generatoren mit Drehstromlichtmaschine (Kubota Super 5 Serie).

Panel nur für 12 V-Betrieb.

Die Sicherung ist mit dem Wert 0,63 AT montiert.

Die Schaltungsteile für 24 V-Betrieb sind nicht bestückt.

Jumper	Status	Konf.	Beschreibung
J1	zu		beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	X	Funktion deaktiviert
J3	1-2		LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3		LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	X	LIMA-Erregerwiderstand ist deaktiviert
J101	zu	X	12 V - Betrieb
	offen		~~24 V - Betrieb~~ (nicht möglich)
J201	1-2	X	T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2		Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	X	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2	X	Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2	X	AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2	X	T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	X	Eingang Waterleak hat rote LED und schaltet ab
	2-3		Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	X	Eingang AC-Fault hat rote LED und schaltet ab
	2-3		Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2		DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	X	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2		DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	X	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu		Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	X	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.).

(1): Ersatzwiderstand für Ladekontrollleuchte, z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.

(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

12.4.4.2 Konfigurations- und Einstellungsblatt KE02

Standard-Jumperung für Generatoren mit Drehstromlichtmaschine.

Panel für 24 V-Betrieb. (Über Einstellung von Lötjumper J101 ist alternativ 12 V-Betrieb möglich)

Die Sicherung ist mit dem Wert 0,63 AT montiert.

Die Schaltungsteile für 24 V-Betrieb sind bestückt.

Jumper	Status	Konf.	Beschreibung
J1	zu		beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	X	Funktion deaktiviert
J3	1-2		LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3		LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	X	LIMA-Erregerwiderstand ist deaktiviert
J101	zu		12 V - Betrieb
	offen	X	24 V - Betrieb
J201	1-2	X	T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2		Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	X	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2	X	Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2	X	AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2	X	T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	X	Eingang Waterleak hat rote LED und schaltet ab
	2-3		Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	X	Eingang AC-Fault hat rote LED und schaltet ab
	2-3		Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2		DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	X	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2		DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	X	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu		Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	X	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.).

(1): Ersatzwiderstand für Ladekontrollleuchte z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.

(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

12.4.4.3 Konfigurations- und Einstellungsblatt KE03

Standard-Jumperung für Generatoren mit AC-Dynamo.

Panel nur für 12 V-Betrieb.

Die Sicherung ist mit dem Wert 0,63 AT montiert.

Die Schaltungsteile für 24 V-Betrieb sind nicht bestückt.

Jumper	Status	Konf.	Beschreibung
J1	zu		beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	X	Funktion deaktiviert
J3	1-2		LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3		LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	X	LIMA-Erregerwiderstand ist deaktiviert
J101	zu	X	12 V - Betrieb
	offen		~~24 V - Betrieb~~ (nicht möglich)
J201	1-2	X	T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2		Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	X	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2	X	Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2	X	AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2	X	T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	X	Eingang Waterleak hat rote LED und schaltet ab
	2-3		Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	X	Eingang AC-Fault hat rote LED und schaltet ab
	2-3		Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2	X	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3		DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2	X	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3		DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu		Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	X	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.).

(1): Ersatzwiderstand für Ladekontrollleuchte, z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.

(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

12.4.4.4 Konfigurations- und Einstellungsblatt KE04

Standard-Jumperung für Generatoren mit AC-Dynamo.

Panel für 24 V-Betrieb. (Über Einstellung von Lötjumper J101 ist alternativ 12 V-Betrieb möglich)

Die Sicherung ist mit dem Wert 0,63 AT montiert.

Die Schaltungsteile für 24 V-Betrieb sind bestückt.

Jumper	Status	Konf.	Beschreibung
J1	zu		beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	X	Funktion deaktiviert
J3	1-2		LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3		LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	X	LIMA-Erregerwiderstand ist deaktiviert
J101	zu		12 V - Betrieb
	offen	X	24 V - Betrieb
J201	1-2	X	T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2		Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	X	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2	X	Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2	X	AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2	X	T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3		T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	X	Eingang Waterleak hat rote LED und schaltet ab
	2-3		Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	X	Eingang AC-Fault hat rote LED und schaltet ab
	2-3		Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2	X	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3		DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2	X	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3		DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu		Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	X	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.).

(1): Ersatzwiderstand für Ladekontrolleuchte z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.

(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

12.5 Startvorbereitungen / Kontrolltätigkeiten (täglich)

12.5.1 Marine Version

1. Ölstandskontrolle (Sollwert 2/3 Max.).

   Der Füllstand sollte bei kaltem Motor etwa 2/3 des Maximums betragen.

   Desweitern, wenn vorhanden, muss vor jedem Start der Ölstand des ölgekühlten Lagers kontrolliert werden - siehe Schauglas am Generator Stirndeckel!

2. Kontrolle Kühlwasserstand.

   Das externe Ausgleichsgefäß sollte im kaltem Zustand 1/3 gefüllt sein. Es ist wichtig das genügend Platz zum Ausdehnen vorhanden ist.

3. Prüfen, ob Seeventil geöffnet ist.

   Nach dem Abschalten des Generators muss aus Sicherheitsgründen das Seeventil geschlossen werden. Es ist vor dem Start des Generators wieder zu öffnen.

4. Seewasserfilter prüfen.

   Der Seewasserfilter muss regelmäßig kontrolliert und gereinigt werden. Wenn durch abgesetzte Rückstände die Seewasserzufuhr beeinträchtigt wird, erhöht dies den Impellerverschleiß.

5. Sichtprüfung

   Befestigungsschrauben kontrollieren, Schlauchverbindungen auf Undichtigkeiten überprüfen, elektrische Anschlüsse kontrollieren. Elektrische Leitungen auf Beschädigungen/Scheuerstellen kontrollieren.

6. Schalten Sie die Verbraucher ab.

   Der Generator sollte ohne Last gestartet werden.

7. Gegebenenfalls Kraftstoffventil öffnen.
8. Gegebenenfalls Batteriehauptschalter schließen (einschalten).

12.5.2 Fahrzeug Version

1. Ölstandskontrolle (Sollwert 2/3 Max.).

   Der Füllstand sollte bei kaltem Motor etwa 2/3 des Maximums betragen.

   Desweitern, wenn vorhanden, muss vor jedem Start der Ölstand des ölgekühlten Lagers kontrolliert werden - siehe Schauglas am Generator Stirndeckel!

2. Kontrolle Kühlwasserstand.

   Das externe Ausgleichsgefäß sollte im kaltem Zustand 1/3 gefüllt sein. Es ist wichtig das genügend Platz zum Ausdehnen vorhanden ist.

3. Sichtprüfung

   Befestigungsschrauben kontrollieren, Schlauchverbindungen auf Undichtigkeiten überprüfen, elektrische Anschlüsse kontrollieren. Elektrische Leitungen auf Beschädigungen/Scheuerstellen kontrollieren.

4. Schalten Sie die Verbraucher ab.

   Der Generator sollte ohne Last gestartet werden.

5. Gegebenenfalls Kraftstoffventil öffnen.
6. Gegebenenfalls Batteriehauptschalter schließen (einschalten).

12.6 Starten und Stoppen des Generators

12.6.1 Start des Generators

Taste „on“ drücken (einschalten).

LED für „on“ = grün

Fig. 12.6.1-1: Einschalten

Taste „heat“ drücken (Motor vorglühen).

LED für „heat“ = orange

Je nach Motortyp und Ausführung kann ein Vorglühen erforderlich sein. Vorglühen ist bei einer Betriebstemperatur <20°C erforderlich.

Fig. 12.6.1-2: Vorheizen

Taste „start“ drücken (Motor starten).

LED für „start“ = grün

Der elektrische Starter darf nur für maximal 20 Sekunden zusammenhängend eingeschaltet sein. Danach muss eine Pause von mindestens 60 Sekunden eingehalten werden. Wenn das Aggregat nicht sofort anspringt, sollte grundsätzlich immer zunächst geprüft werden, ob die Kraftstoffversorgung einwandfrei arbeitet. (Bei Temperaturen unter minus 8 °C prüfen, ob Winterkraftstoff eingefüllt ist.)

Fig. 12.6.1-3: starten

Verbraucher Einschalten.

Die Verbrauchen sollen erst eingeschaltet werden, wenn die Generatorspannung im zulässigen Bereich liegt. Dabei sollte das Einschalten von mehreren Verbrauchern parallel vermieden werden. Dies ist insbesondere dann einzuhalten, wenn Verbraucher mit elektrischen Motoren wie zum Beispiel Klimaanlage usw. im System enthalten sind. In diesem Falle sind die Verbraucher unbedingt stufenweise einzuschalten.

Seeventil zudrehen im Falle von Startschwierigkeiten. (Nur Panda Marine Generatoren)

ACHTUNG:

Wenn der Generator-Motor nach dem Betätigen der „Start“ Taste nicht sofort anspringt und weitere Startversuche erforderlich sind (z.B. zum Entlüften der Kraftstoffleitungen usw.), muss während der Startversuche unbedingt das Seeventil geschlossen werden. Während des Startvorganges dreht sich die Kühlwasser-Impellerpumpe mit und fördert Kühlwasser. Solange der Motor nicht angesprungen ist, reicht der Abgasdruck nicht aus, um das eingebrachte Kühlwasser wegzubefördern. Durch diesen länger andauernden Startvorgang würde sich Abgassystem mit Kühlwasser füllen. Dieses kann den Generator/Motor schädigen/zerstören.

Öffnen Sie das Seeventil wieder, sobald der Generator gestartet hat.

12.6.2 Stoppen des Generators

Verbraucher abgeschaltet.

Empfehlung: Bei Turbomotoren und bei Belastung höher als 70 % der Nennleistung, mindestens 5 Minuten mit abgeschalteter Last Generatortemperatur stabilisieren.

Bei einer höheren Umgebungstemperatur (mehr als 25 °C) sollte der Generator immer ohne Belastung für mindestens 5 Minuten laufen, bevor er abschaltet wird, unabhängig davon, welche Belastung aufgeschaltet war.

Taste „off“ drücken (ausschalten).

LED für „on“ = off

Fig. 12.6.2-1: Stoppen

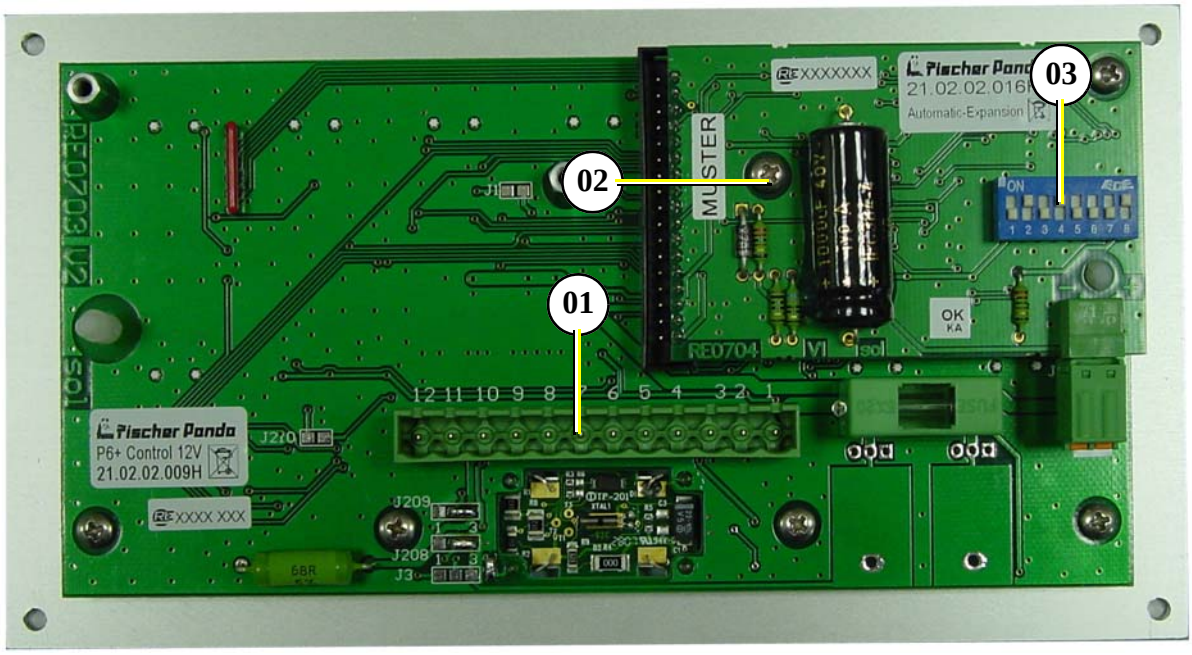
HINWEIS: Batteriehauptschalter niemals abgeschalten, bevor der Generator gestoppt wird, gegebenenfalls Kraftstoffventil schließen!

ACHTUNG:

12.7 Automatikaufsatz - optional

Fischer Panda Art. Nr. 21.02.02.016P

Fig. 12.7-1: Panel 21.02.02.009P mit Automatikaufsatz 21.02.02.016P



01. Hauptanschluss
02. Automatikaufsatz 21.02.02.016P
03. 8-fach DIL-Schalter

12.7.1 Funktion

Der Automatik-Zusatz RE0704 erweitert das Generator Control Panel P6+ um einen Automatik-Eingang. An diesen Eingang kann ein potentialfreier Kontakt angeschlossen werden. Wird dieser Kontakt geschlossen, dann wird der Generator, der an das Generator Control Panel P6+ angeschlossen ist, automatisch gestartet. Wird der Kontakt geöffnet, dann wird der Generator automatisch gestoppt.

Der automatische Startvorgang besteht aus Vorglühen (heat) und Anlasser betätigen (start). Er kann jederzeit, durch öffnen des Kontaktes am Automatik-Eingang, wieder abgebrochen werden.

Zum automatischen Stoppen (stop) wird der Ausgang „Fuel-Pump“ (Klemme 9 des Generator Control Panels P6+) ausgeschaltet. Die Zeit für den automatischen Stop-Vorgang kann nur durch Ausschalten des Generator Control Panels P6+ vorzeitig beendet werden.

Die Zeiten für „heat“, „start“ und „stop“ sind getrennt einstellbar (siehe unten).

Der Automatik-Zusatz wird zusammen mit dem Generator Control Panel P6+ über dessen Tasten „on“ und „off“ ein- und ausgeschaltet.

Ist der Kontakt am Automatik-Eingang geschlossen, während das Generator Control Panel P6+ eingeschaltet wird, so wird der automatische Startvorgang ausgeführt.

Wird die Stromversorgung des Generator Control Panels P6+ angeklemmt oder eingeschaltet, während der Kontakt am Automatik-Eingang geschlossen ist, so wird der automatische Startvorgang nicht ausgeführt, da das Generator Control Panel P6+ nach dem Anklemmen der Stromversorgung immer ausgeschaltet ist (das Generator Control Panel P6+ muss für mindestens 60 s von der Stromversorgung getrennt gewesen sein).

Ist der Kontakt am Automatik-Eingang geschlossen und wird das Panel nach einem Spannungsabfall wieder eingeschaltet, wird der Automatikstart (Glühen, Start) automatisch eingeleitet.

ACHTUNG:

12.7.2 Der Automatik-Eingang:

Der mit (-) gekennzeichnete anschluss ist mit GND verbunden.

Der mit (+) gekennzeichnete anschluss ist der eigentliche Eingang.

Der Eingang wird über einen Widerstand auf 12V gelegt (wird bei 24V-Betrieb intern erzeugt). Werden die beiden Anschlüsse über einen potentialfreien Kontakt kurzgeschlossen, so fließt der Eingangs-Strom.

Für einen elektronischen Kontakt ist der niedrige Eingangs-Strom zu wählen und die Polarität zu beachten (Optokoppler).

Für einen elektro-mechanischen Kontakt ist der hohe Eingangs-Strom zu wählen (Relaiskontakt).

Der Eingang ist entprellt (Verzögerungszeit ca. 1 s).

An den Eingang dürfen keine Fremd-Spannungen angelegt werden.

Daten:	
Parameter	**Angabe**
Betriebsspannung	Der Automatikzusatz wird über das Generator Control Panel P6+ versorgt. Es gelten die gleichen Grenzdaten wie beim Generator Control Panel P6+.
Betriebstemperatur	Es gelten die gleichen Grenzdaten wie beim Generator Control Panel P6+.
Eigenstromverbrauch	10 mA - 20 mA
Toleranz der Zeiten	± 10 %

Einstellungen über 8-fach DIL-Schalter S1 (S1.1 bis S1.8):										
		Standard	**S1.1**	**S1.2**	**S1.3**	**S1.4**	**S1.5**	**S1.6**	**S1.7**	**S1.8**
Heat-Zeit	**2,5 s**		OFF	OFF						
	5 s		ON	OFF						
	10 s	X	OFF	ON						
	20 s		ON	ON						
Anlasser-Zeit	**8 s**	X			OFF					
	16 s				ON					
Stillstands/Stopp-Zeit nachdem ein Start wieder möglich ist	**16 s**					OFF	OFF			
	32 s	X				ON	OFF			
	64 s					OFF	ON			
	128 s					ON	ON			
Betriebs-Modus	**Normal**	X						OFF		
	Test (alle Zeiten durch 16)							ON		
Eingangs-Strom	**1,25 mA**									OFF
	7 mA	X								ON

Der Automatik-Zusatz darf nur zusammen mit einer Vorrichtung verwendet werden, die das Einschalten des Anlassers nur bei stehendem Generator gestattet!

ACHTUNG:

12.7.3 Klemmenbelegung

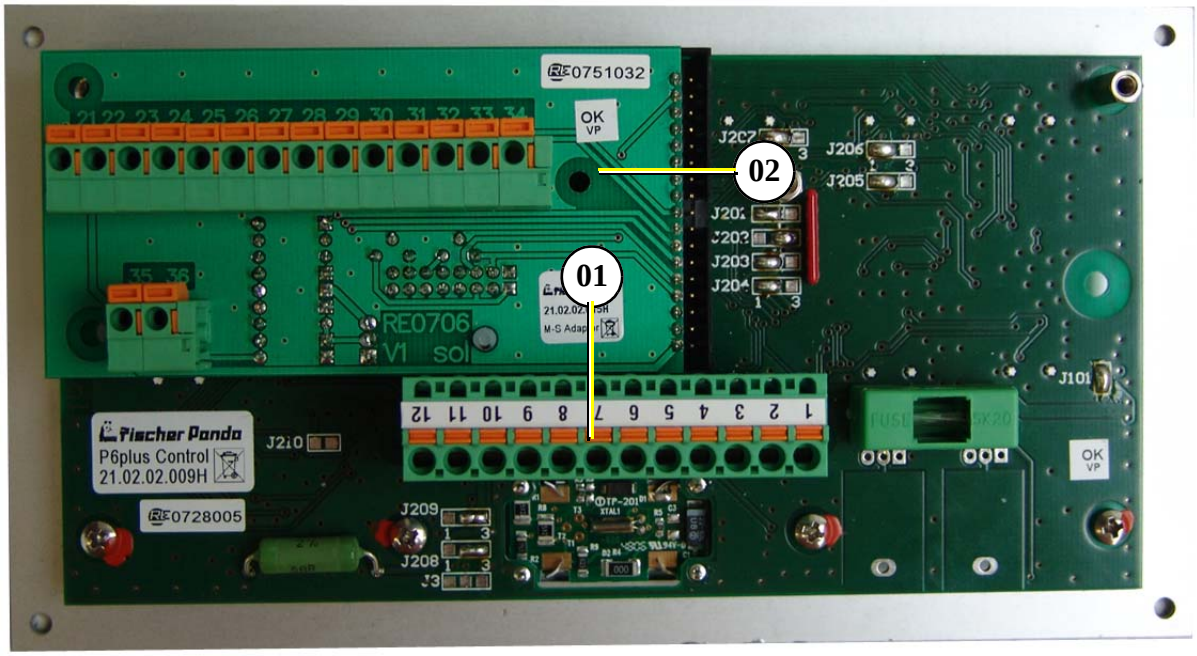
Anschluss für Automatikzusatz X2 (Reihe mit ungeraden Pin-Nummern // E / A aus Sicht des Bedien-Panel)

Pin-Nr.	Pin-Name	E / A	Beschreibung
1	VBF	A	Stromversorgung + (Betriebsspannung hinter Sicherung)
3	GND	A	Stromversorgung - (Masse)
5	VBFS	A	Stromversorgung + geschaltet (Spannung Pin 1, mit Panel geschaltet)
7	12V	A	Stromversorgung + geschaltet, bei 12 V-Betrieb über geschlossenen Lötjumper J101 mit VBFS verbunden (bei optimalen 24 V-Betrieb: VBFS über internen Spannungsregler auf 12,9 V geregelt)
9	GND	A	Stromversorgung - (Masse)
11	GND	A	Stromversorgung - (Masse)
13	/Heat-Signal	E	Heat ist aktiv, wenn der Eingang nach GND geschaltet wird
15	/Start-Signal	E	Start ist aktiv, wenn der Eingang nach GND geschaltet wird
17	GND	A	Stromversorgung - (Masse)
19	GND	A	Stromversorgung - (Masse)
21	GND	A	Stromversorgung - (Masse)
23	GND	A	Stromversorgung - (Masse)
25	GND	A	Stromversorgung - (Masse)
27	/Stop-Signal	E	Das Fuel-Pump-Signal wird, solange der Eingang nach GND geschaltet wird, abgeschaltet (auch beim Start)
29	FP-Int	A	Fuel-Pump-Signal intern, über Diode von externem Signal getrennt
31	/Fault-Signal	A	Ausgang wird nach GND geschaltet, wenn ein Fehler vorliegt (Eingänge 3, 4, 5, 11 und 12, wenn entsprechend konfiguriert und generell für 2s, nach dem Einschalten des Panels)
33	GND	A	Stromversorgung - (Masse)

12.8 Master-Slave Adapter - optional

12.8.1 Fischer Panda Art. Nr. 21.02.02.015P, 12 V-Version

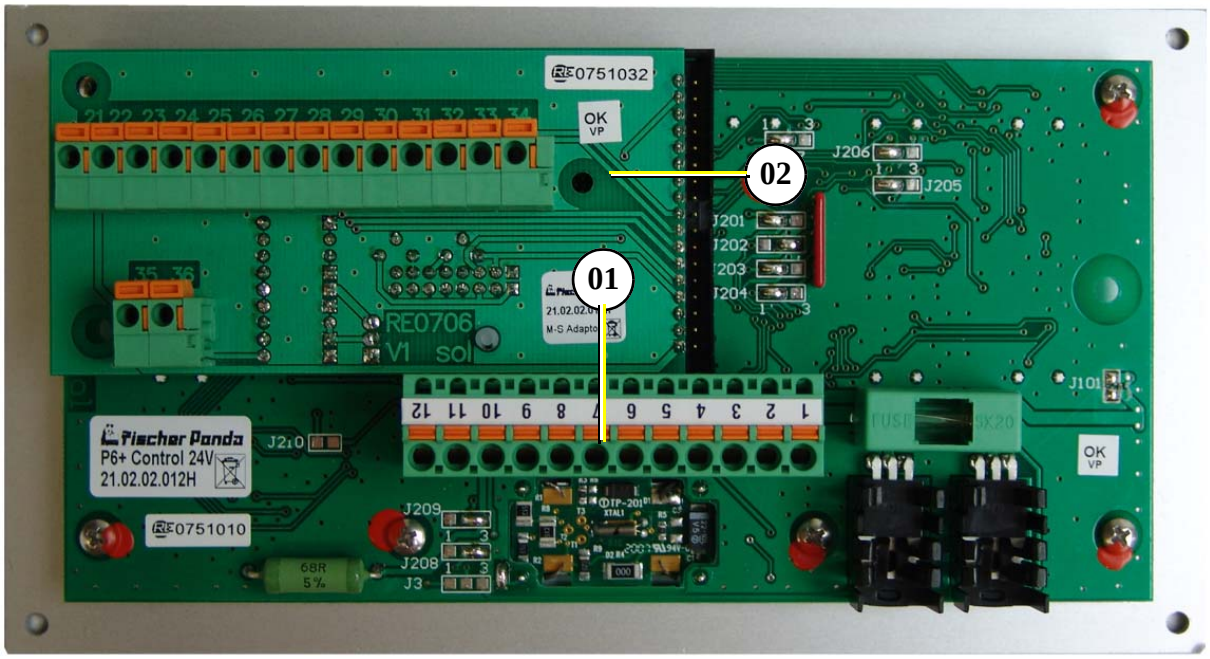
Fig. 12.8.1-1: Panel 21.02.02.009P mit Master-Slave Adapter 21.02.02.015P



01. Hauptanschluss
02. Master-Slave Adapter 21.02.02.015P

12.8.2 Fischer Panda Art. Nr. 21.02.02.015P, 24 V-Version

Fig. 12.8.2-1: Panel 21.02.02.012P mit Master-Slave Adapter 21.02.02.015P



01. Hauptanschluss
02. Master-Slave Adapter 21.02.02.015P

Mit dem Master-Slave-Adapter RE0706 können zwei Generator Control Panel P6+ RE0703 zu einer Master-Slave-Kombination verbunden werden. Dazu wird auf jedem Generator Control Panel P6+ ein Master-Slave-Adapter RE0706 montiert. Die Generator Control Panel P6+ werden über die 14poligen anschlussklemmen auf den Master-Slave-Adaptern 1:1 miteinander verbunden. Das Master-Panel ist das Panel, an dessen Hauptanschluss der Generator angeschlossen wird. An den Hauptanschluss des Slave-Panel darf nichts angeschlossen werden. Auf dem Master-Panel werden die Lötjumper genauso, wie im Betrieb ohne Slave-Panel konfiguriert. Auf dem Slave-Panel werden die Lötjumper für den Slave-Betrieb konfiguriert (Siehe auch die entsprechenden Einstellungsblätter für das Generator Control Panel P6+ RE0703).

Bis auf die Einstellung der Lötjumper sind Master-Panel und Slave-Panel identisch. Die beiden Master-Slave-Adapter sind ebenfalls identisch.

12.8.3 Anschlussklemmen:

X2: (14polig, 21 - 34)	Master-Slave-Verbindung (1:1 verdrahten)
X3: (2polig, 35 - 36)	35: Panel-ON-Signal vom Generator Control Panel P6+ RE0703
	36: Fehler-Signal vom Generator Control Panel P6+ RE0703

Das Panel-ON-Signal ist solange eingeschaltet, wie das Panel eingeschaltet ist. Das Fehler-Signal ist solange eingeschaltet, wie das Panel einen Fehler erkennt, der zum Abschalten des Generators führen muss. Die Ausgangsspannung entspricht der Betriebsspannung des Generator Control Panels P6+ abzüglich 0,7 V - 1,4 V. Jeder Ausgang hat eine Freilaufdiode, die Fremdspannungen unter 0V kurzschließt und eine Entkoppelungsdiode, die das Einspeisen von Fremdspannungen in den Ausgang verhindert.

12.8.4 Sicherung:

Auf dem Master-Panel muss eine Sicherung mit 0,8 AT montiert werden.

12.8.5 Klemmenbelegung

12.8.5.1 Klemme X2 (E / A aus Sicht des Master-Bedien-Panel)

Pin-Nr.	Pin-Name	E / A	Beschreibung
21	VBF	A	Stromversorgung + (Betriebsspannung hinter Sicherung 12 Vdc oder 24 Vdc je nach System)
22	GND	A	Stromversorgung - (Masse)
23	ON-Signal	E / A	Panel´s werden eingeschaltet, wenn der Anschluss über einen Taster (auf Master oder Slave) nach VBF geschaltet wird
24	OFF-Signal	E / A	Panel´s werden ausgeschaltet, wenn der Anschluss über einen Taster (auf Master oder Slave) nach VBF geschaltet wird
25	/Heat-Signal	E / A	Heat ist aktiv, wenn der Anschluss über einen Taster (auf Master oder Slave) nach GND geschaltet wird
26	/Start-Signal	E / A	Start ist aktiv, wenn der Anschluss über einen Taster (auf Master oder Slave) nach GND geschaltet wird
27	LED-T-Engine	A	Ausgang für LED T-Engine auf dem Slave-Panel, wird nach GND geschaltet, wenn die LED leuchten soll
28	LED-Waterleak (Replace Airfilter)	A	Ausgang für LED Waterleak auf dem Slave-Panel, wird nach GND geschaltet, wenn die LED leuchten soll
29	LED-Oil-Press	A	Ausgang für LED Oil-Press auf dem Slave-Panel, wird nach GND geschaltet, wenn die LED leuchten soll
30	LED-AC-Fault (Fuel Level)	A	Ausgang für LED AC-Fault auf dem Slave-Panel, wird nach GND geschaltet, wenn die LED leuchten soll
31	LED-T-Winding	A	Ausgang für LED T-Winding auf dem Slave-Panel, wird nach GND geschaltet, wenn die LED leuchten soll
32	DC-Control	A	Ausgang für DC-Control-Anzeige auf dem Slave-Panel. Das DC-Control-Signal wird 1:1 durchgeschleift.
33	AC-Control		Ausgang für AC-Control-Anzeige auf dem Slave-Panel. Das AC-Control-Signal wird 1:1 durchgeschleift.
34	VBFS	A	Stromversorgung + geschaltet (sonst wie 21, VBF)

Die Verwendung dieser Anschlüssen für andere Zwecke, als die Master-Slave-Verbindung zweier Generator Control Panels P6+, ist generell nicht zulässig. In Einzelfällen kann, nach Rücksprache und Klärung der technischen Details, eine Freigabe für eine andere Verwendung, wenn technisch möglich, erfolgen.

12.8.5.2 Klemme X3

Pin-Nr.	Pin-Name	E / A	Beschreibung
35	Panel ON	A	Mit Panel (ON / OFF) geschaltete Spannung von Klemme X2.21 (VBF). (Fußnoten 1-4 berücksichtigen)
36	Fehler	A	Ausgang wird eingeschaltet, wenn ein kritischer Fehler vorliegt. (Fußnoten 1-4 berücksichtigen)

Belastbarkeit des Ausganges: maximal 0,5 A im Dauerbetrieb und kurzzeitig 1,0 A.
Die Summe aller Ausgangsströme darf (abzüglich 0,2 A Eigenverbrauch) den Nennstrom der Sicherung des Bedien-Panels nicht überschreiten.
Der Ausgang verfügt über eine Freilaufdiode, die negative Spannungen (bezogen auf GND) kurzschließt.
Der Ausgang verfügt über eine Schutzdiode, die das Einspeisen von positiven Spannungen (bezogen auf GND) in den Ausgang verhindert.

12.8.6 Konfiguration und Einstellung

12.8.6.1 Konfigurations- und Einstellungsblatt KE05

Standard-Jumperung für Verwendung als Slave-Panel in Verbindung mit **zwei** Master-Slave-Adapter RE0706 und einem P6+ Bedienpanel RE0703 als Master-Panel. Panel nur für 12 V-Betrieb.

Die Sicherung ist mit dem Wert 0,63 AT montiert.

Die Schaltungsteile für 24 V-Betrieb sind nicht bestückt.

Jumper	Status	Konf.	Beschreibung
J1	zu		beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	XM	Funktion deaktiviert
J3	1-2		LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3		LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	XM	LIMA-Erregerwiderstand ist deaktiviert
J101	zu	X	12 V - Betrieb
	offen		~~24 V - Betrieb~~ (nicht möglich)
J201	1-2		T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2		Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2		Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2		AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2		T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	M	Eingang Waterleak hat rote LED und schaltet ab
	2-3	M	Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	M	Eingang AC-Fault hat rote LED und schaltet ab
	2-3	M	Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2	M	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	M	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2	M	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	M	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu		Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	XM	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.).

X = Jumper muss so gesetzt sein

XM= Jumper muss so gesetzt sein, Funktion wird auf dem Master-Panel gewählt

M = Jumper muss genauso, wie auf dem Master-Panel, gesetzt sein

(1): Ersatzwiderstand für Ladekontrolleuchte z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.

(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

12.8.6.2 Konfigurations- und Einstellungsblatt KE06

Standard-Jumperung für Verwendung als Slave-Panel in Verbindung mit **zwei** Master-Slave-Adapter RE0706 und einem Generator Control Panel P6+ RE0703 als Master-Panel. Panel für 24 V-Betrieb. (Über Einstellung von Lötjumper J101 ist alternativ 12V-Betrieb möglich)

Die Sicherung ist mit dem Wert 0,63 AT montiert.

Die Schaltungsteile für 24 V-Betrieb sind bestückt.

Jumper	Status	Konf.	Beschreibung
J1	zu		beim Betätigen des Start-Tasters wird Heat mit betätigt
	offen	XM	Funktion deaktiviert
J3	1-2		LIMA-Erregerwiderstand 68R wird mit Fuel-Pump eingeschaltet (1)
	2-3		LIMA-Erregerwiderstand 68R wird mit Panel-ON eingeschaltet (1)
	offen	XM	LIMA-Erregerwiderstand ist deaktiviert
J101	zu	M	12 V - Betrieb
	offen	M	24 V - Betrieb
J201	1-2		T-Engine-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	T-Engine-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J202	1-2		Waterleak-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	Waterleak-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J203	1-2		Oil-Press-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	Oil-Press-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J204	1-2		AC-Fault-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	AC-Fault-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J205	1-2		T-Winding-Eingang, für Kontakt, der im Fehlerfall öffnet (2)
	2-3	XM	T-Winding-Eingang, für Kontakt, der im Fehlerfall schließt (2)
J206	1-2	M	Eingang Waterleak hat rote LED und schaltet ab
	2-3	M	Eingang Waterleak hat gelbe LED und schaltet nicht ab
J207	1-2	M	Eingang AC-Fault hat rote LED und schaltet ab
	2-3	M	Eingang AC-Fault hat gelbe LED und schaltet nicht ab
J208	1-2	M	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	M	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J209	1-2	M	DC-Control-Signal (-) = OK (mit AC-Dynamo 12 V bei Kubota Z 482 / D 722 Motoren)
	2-3	M	DC-Control-Signal (+) = OK (mit Drehstromlichtmaschine)
J210	zu		Eingang AC-Fault hat Pull-Up-Strom ≥ 10 mA
	offen	XM	Eingang AC-Fault hat Pull-Up-Strom ≥ 2,5 mA

Die Lötjumper sind auf der Leiterplatte beschriftet (mit Jumper-Nr. und bei dreiteiligen Lötjumpern mit Lötflächen-Nr.).

X = Jumper muss so gesetzt sein

XM= Jumper muss so gesetzt sein, Funktion wird auf dem Master-Panel gewählt

M = Jumper muss genauso, wie auf dem Master-Panel, gesetzt sein

(1): Ersatzwiderstand für Ladekontrolleuchte z. B. für Verwendung mit Drehstromlichtmaschine mit integriertem Regler von Bosch. Der Widerstandswert ist 68 Ω 3 W, d. h. nur für 12 V geeignet.

(2): Ein geschlossener Kontakt schaltet den entsprechenden Eingang auf GND.

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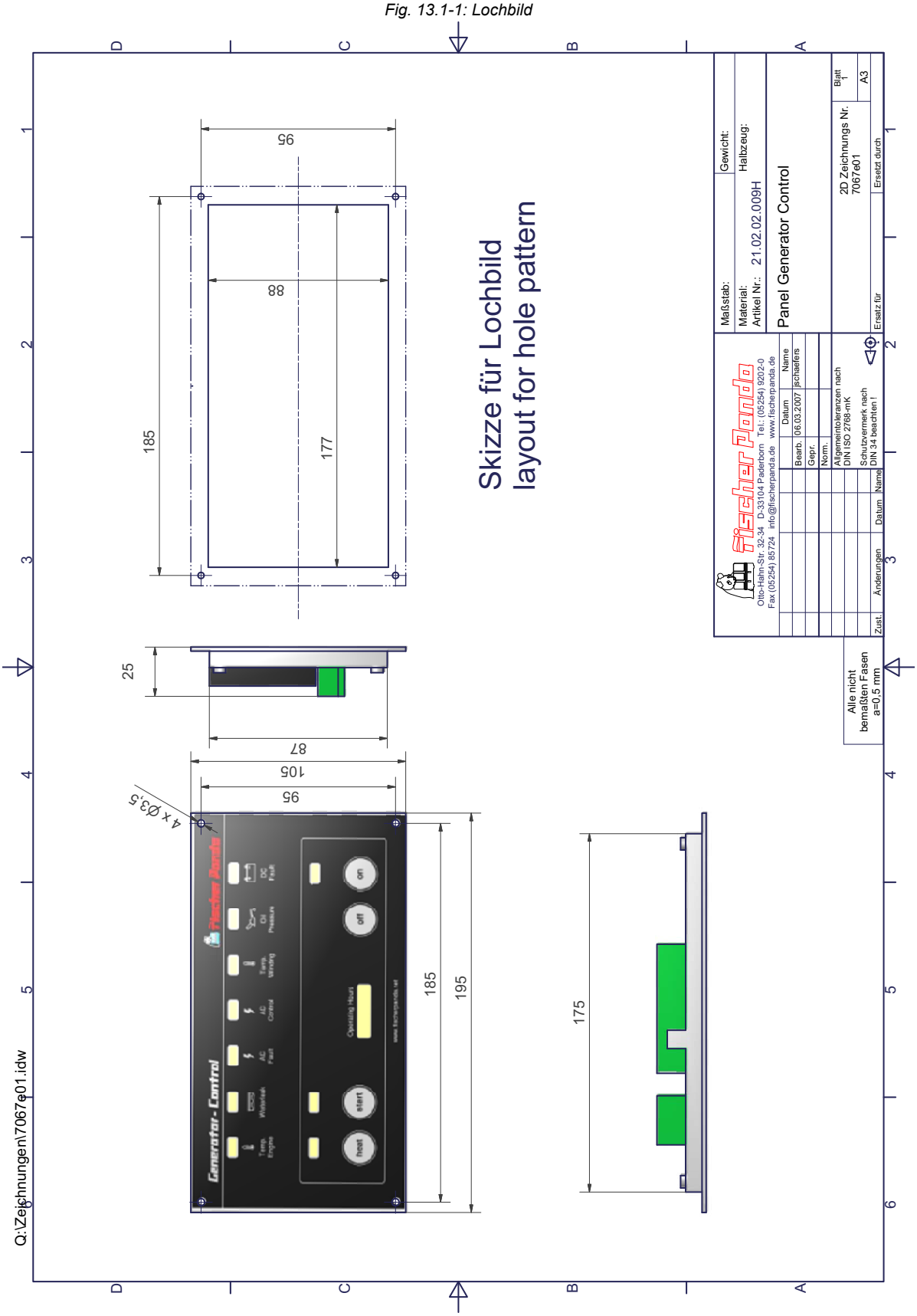
13. Abmessungen

13.1 Lochbild

Fig. 13.1-1: Lochbild



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