Marine Generator

Panda PMS AGT-DC 11000

12-48 V - 10,9 KVA

Super silent technology

Current revision status

	Document
Actual:	0030635_Panda_AGT-DC_11000x_PMS_eng.R01_21.3.24
Replace:	

Revision	Page

Erstellt durch / created by

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1.1 Download

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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 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.

1.3.1 Technical support

Technical Support via the Internet: info@fischerpanda.de

1.3.2 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.

1.4 Safety Instructions - Safety First!

1.4.1 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.

1.4.2 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.

1.4.3 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.

1.4.4 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.

1.4.5 Safe handling of fuels and lubricants

Keep fuels and lubricants away from naked fire.

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

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

Refuel in well-ventilated open spaces only. If fuel/lubricant 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.

1.4.6 Exhaust fumes and fire protection

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

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

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

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

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

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

1.4.7 Safety precautions against burns and battery explosions

The generator and its cooling agents and lubricants as well as the fuel can get hot while the generator is operated. 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.

1.4.8 Protect your hands and body from rotating parts!

Always keep the capsule closed while operating the generator.

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

Keep your hands and body away from 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.

1.4.9 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.

1.4.10 Implementation of safety inspections and maintenance

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

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

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

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

1.5 Warning and instruction signs

Keep warning and instruction signs clean and legible.

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

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

1.5.1 Special instructions and hazards of generators

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

The generator must not be operated with the cover removed.

If the generator is 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 50 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.

1.5.1.1 Protective conductor and potential equalisation:

Electric voltage above 50 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.

1.5.1.2 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.

1.5.1.3 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.

1.5.1.4 Potential equalisation for Panda AGT DC generators

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

1.5.1.5 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.

1.5.2 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.

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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!

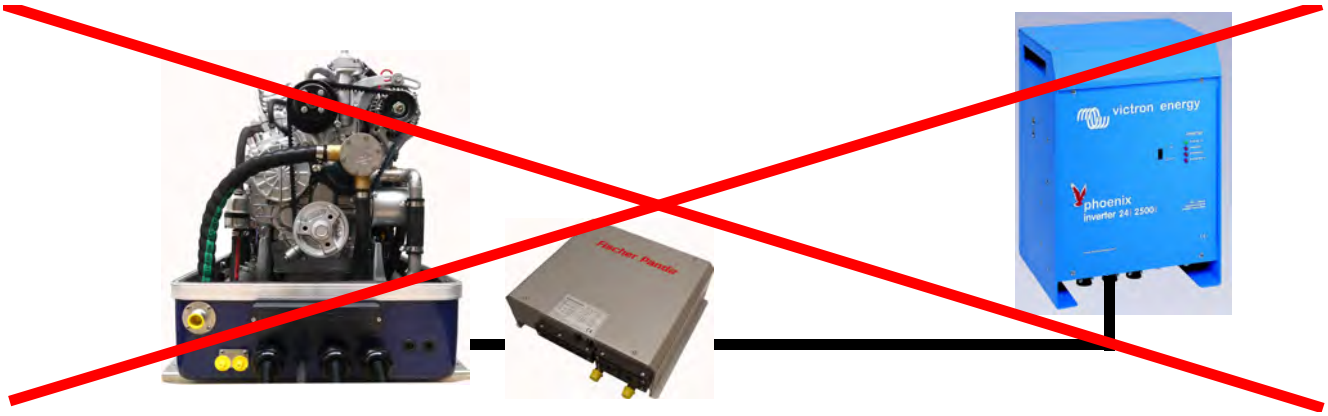
WARNING: Risk of electric shock upon contact

2.2 Sample system AGT DC generator

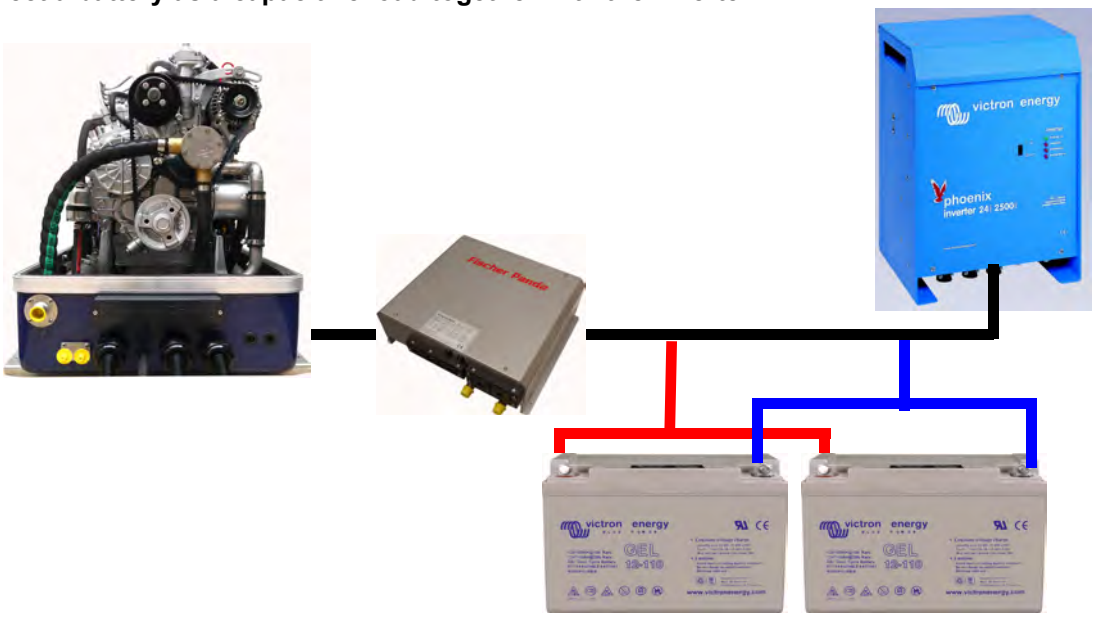
The AGT generator must not be directly connected to an inverter (without the batteries)!

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:

- Connections for the AC an DC cables at the end of the power bars 33 Nm
- mounting diode on the cooling plate 2,25-2,75 Nm
- mounting power bars on the diode 4,5-5,5 Nm

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.

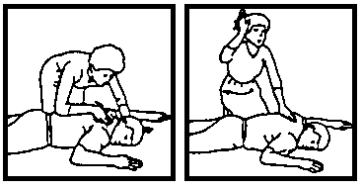
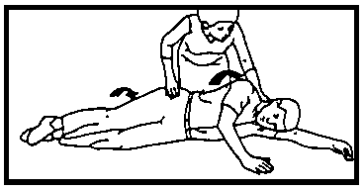
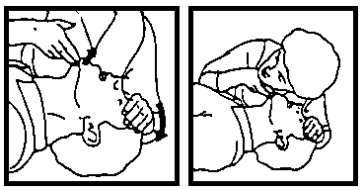
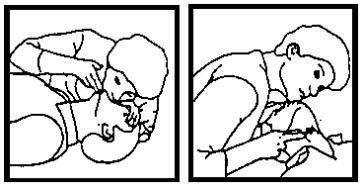
2. In case of Emergency First Aid

	First Aid in case of accidents by electrical shocks 5 Safety steps to follow if someone is the victim of electrical shock	
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.	

2.1 WHEN AN ADULT STOPS BREATHING

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

Warning:

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

3. Basics

3.1 Intended use of the machine

The machine is only for use as an fixed installed electric generator in following applications:

• motor vehicles

• trailers and mobile containers

• inland water vessels/river boats

• ocean-going vessels

The power should produced and supplied in the on-board grid for off grid use only. Other or further use is not intended.

For the intended use, the designated limits of the machine and all safety related parameter must be respected. The limits of the machine should not be exceeded.

3.1.1 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.

3.1.1.1 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.

3.1.2 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.

3.1.2.1 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.

3.2 Panda Transport Box

3.2.1 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

3.2.2 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

3.3 Transport and Loading/Unloading

3.3.1 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.

3.3.2 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. 3.3-1: Lifting yoke (example)

3.4 Scope of delivery

The Fischer Panda PMS generator system contains following components:

3.4.1 PM generator

Fischer Panda Generator

representative picture

Fig. 3.4-1: Fischer Panda Generator

Remote control panel

representative picture

Fig. 3.4-2: Remote control panel

Rectifier unit

representative picture

Fig. 3.4-3: VCS

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

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

Fig. 3.4.1-4: Fischer Panda Manual

Optional components f.e.:

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

3.5 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 responsibility for damage 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)

3.5.1 Instructions for the starter battery for extended downtimes

Starter batteries

Note: Information starter battery

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

- 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:

Note: Starter battery recommendation

- 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.

3.5.2 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).

3.5.3 Measures for medium term downtimes / hibernation

Medium term downtimes (3 to 6 months)

3.5.3.1 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!

3.5.3.2 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.

3.5.4 Measures for extended downtimes / decommissioning

Downtimes (more than 6 months)

3.5.4.1 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.
- 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!

3.5.4.2 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:

EC Declaration of conformity

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

Manufacturer	Fischer Panda GmbH Otto-Hahn-Straße 40 33104 Paderborn
Product	Fischer Panda Diesel Generator
Product Type	Panda AGT 11000 48V PMS mit fpControl incl. 0030012 Rectifier Unit
Part No.	0030635
Year of manufacture	2024-
Function description	The Fischer Panda diesel generator is intended solely for use as a permanently-installed power generator in (vehicles, trailers and mobile containers) (inland waterway vessels) (seagoing vessels).

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

:

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

This machine complies with the following standards and conventions:

DIN EN ISO 8528-13:2017-03	Alternating current generator sets driven by a reciprocating internal combustion engine - Part 13: Safety
DIN EN ISO 12100:2010	Safety of Machines - general design principles - risk assessment and risk reduction

DIN ISO 6826:2000-05	Reciprocating internal combustion engines - Fire protection
DIN EN 60034-1:2015-02	Safety of machines - electrical equipment of machines - Part 1: General requirements
DIN EN 60204-1:2014-10	Safety of machines - electrical equipment of machines - Part 1: General requirements
ISO 3046-1:2002-05	Reciprocating internal combustion engines - Performance - Part 1: Declarations of power, fuel and lubricating oil consumptions and test methods; Additional requirements for engines for general use
ISO 3046-3:2006-06	Reciprocating internal combustion engines - Performance - Part 3: Test measurements
ISO 3046-4:2009-12	Reciprocating internal combustion engines - Performance - Part 4: Governor
ISO 3046-5:2001-12	Reciprocating internal combustion engines - Performance - Part 5: Torsional vibrations
ISO 3046-6:1990-10	Reciprocating internal combustion engines - Performance - Part 6: Over-speed protection
ISO 8178-1:2017-04	Reciprocating internal combustion engines - Exhaust emission measurement - Part 1: Test-bed measurement systems of gaseous and particulate emissions
ISO 8178-4:2017-04	Reciprocating internal combustion engines - Exhaust emission measurement - Part 4: Steady-state and transient test cycles for different engine applications
DIN 6280-10:1986-10	Reciprocating internal combustion engines; generating sets with reciprocating internal combustion engines; small power generating sets; requirements and tests
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

The person authorized to compile the technical file

Christian Riemer

Fischer Panda GmbH
Otto-Hahn-Straße 40

33104 Paderborn

Paderborn, _____20.05.2020_____	
Place, date	Dipl.-Ing. Stephan Backes (Managing Director)
Paderborn, _____20.05.2020_____	
Place, date	Boris Schönberger (Quality Manager)

5. The Panda Generator

5.1 Type plate at the Generator

Fig. 5.1-1: Type plate

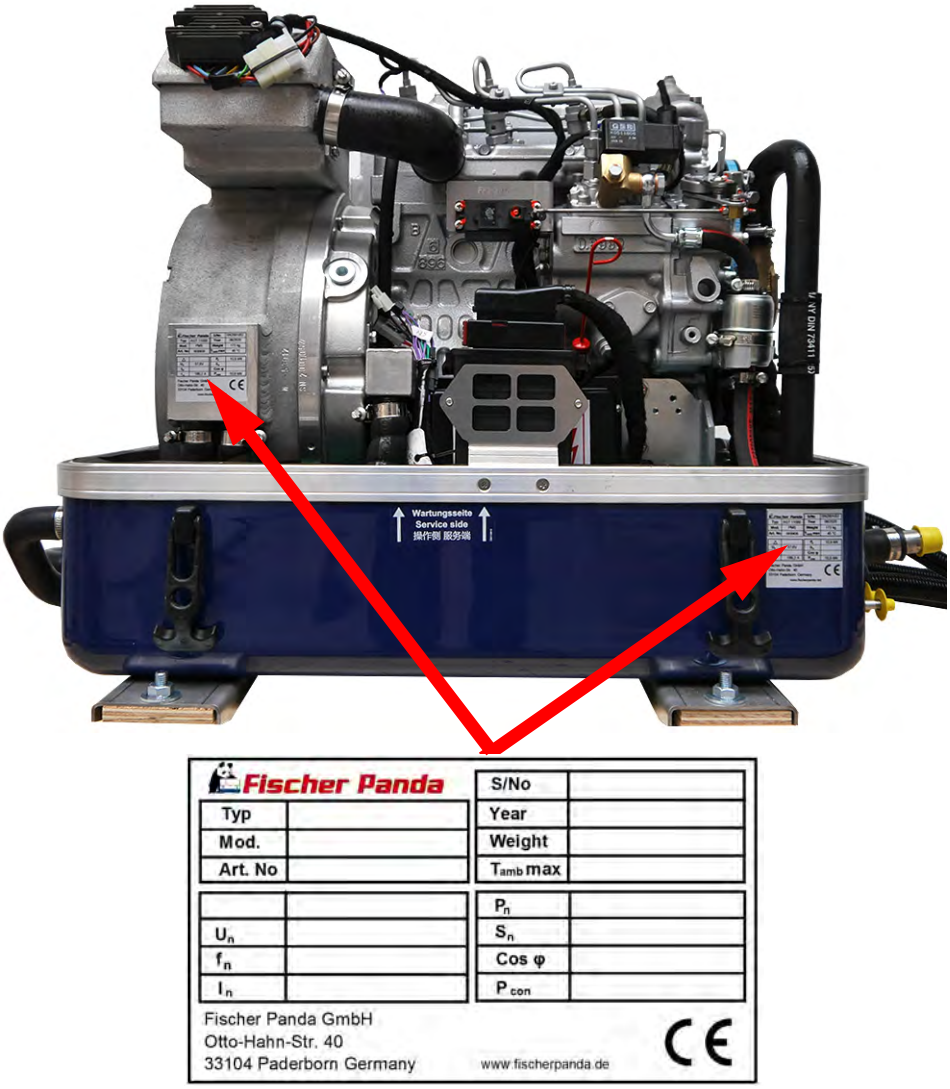
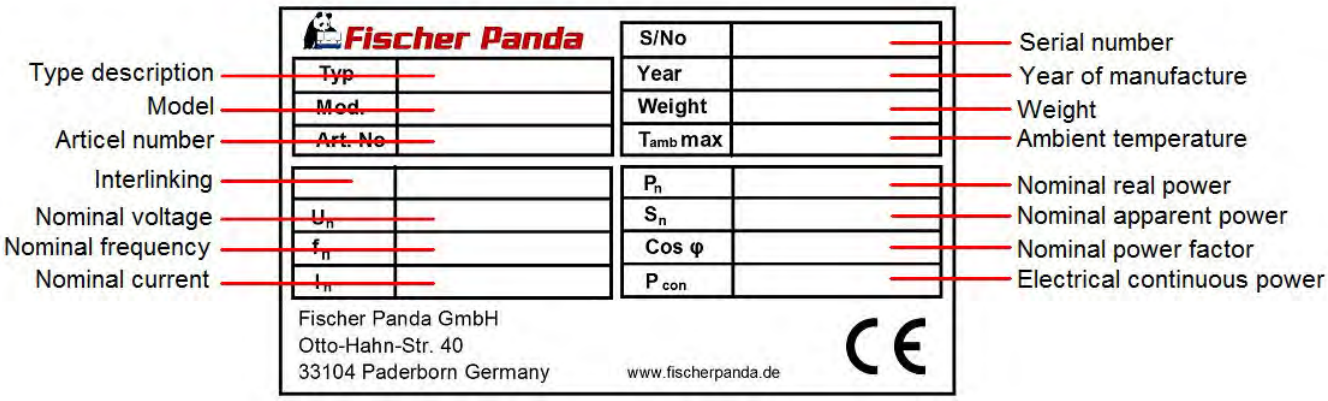


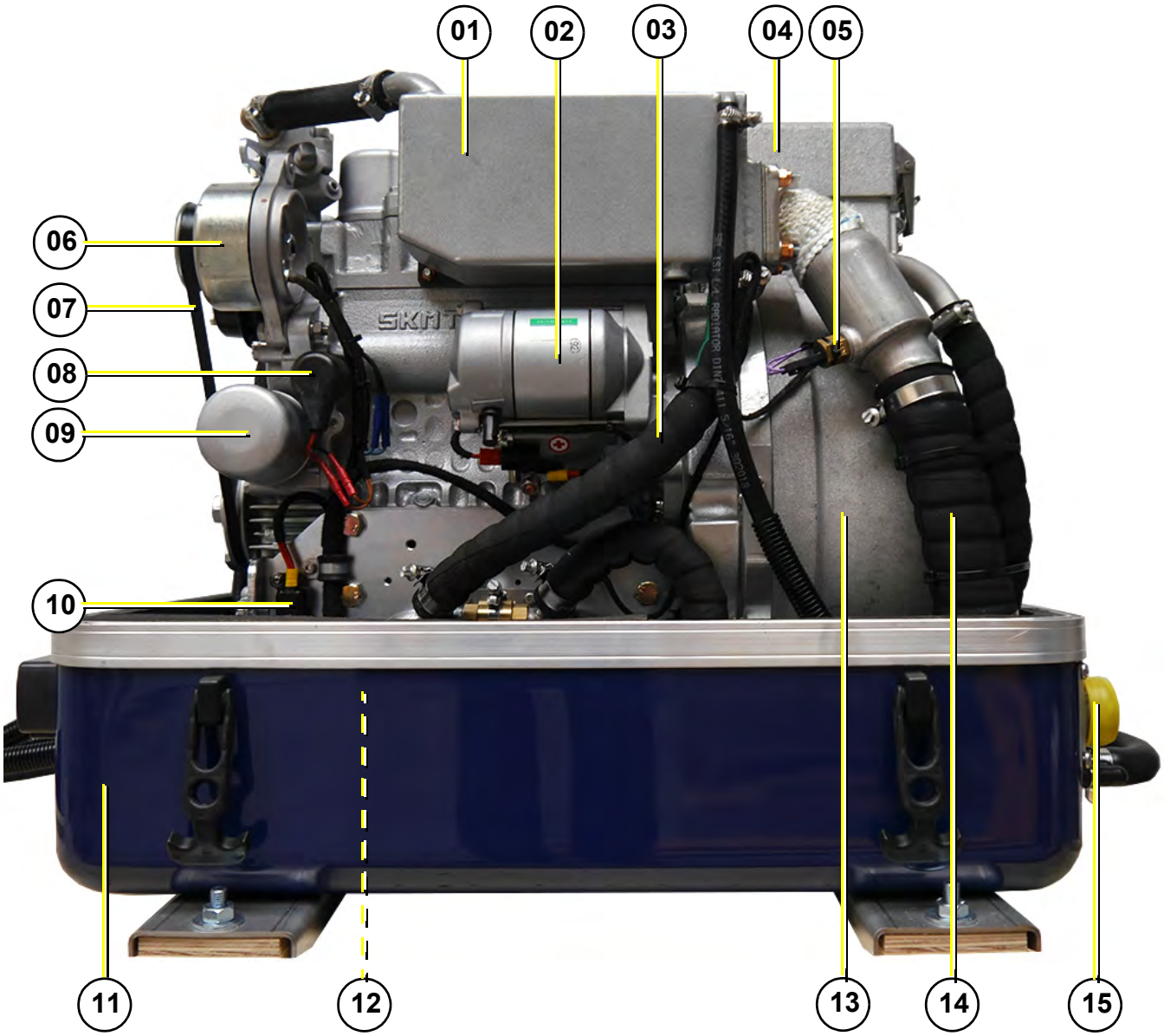
Fig. 5.1-2: Discription type plate



5.2 Description of the generator

5.2.1 Right side view

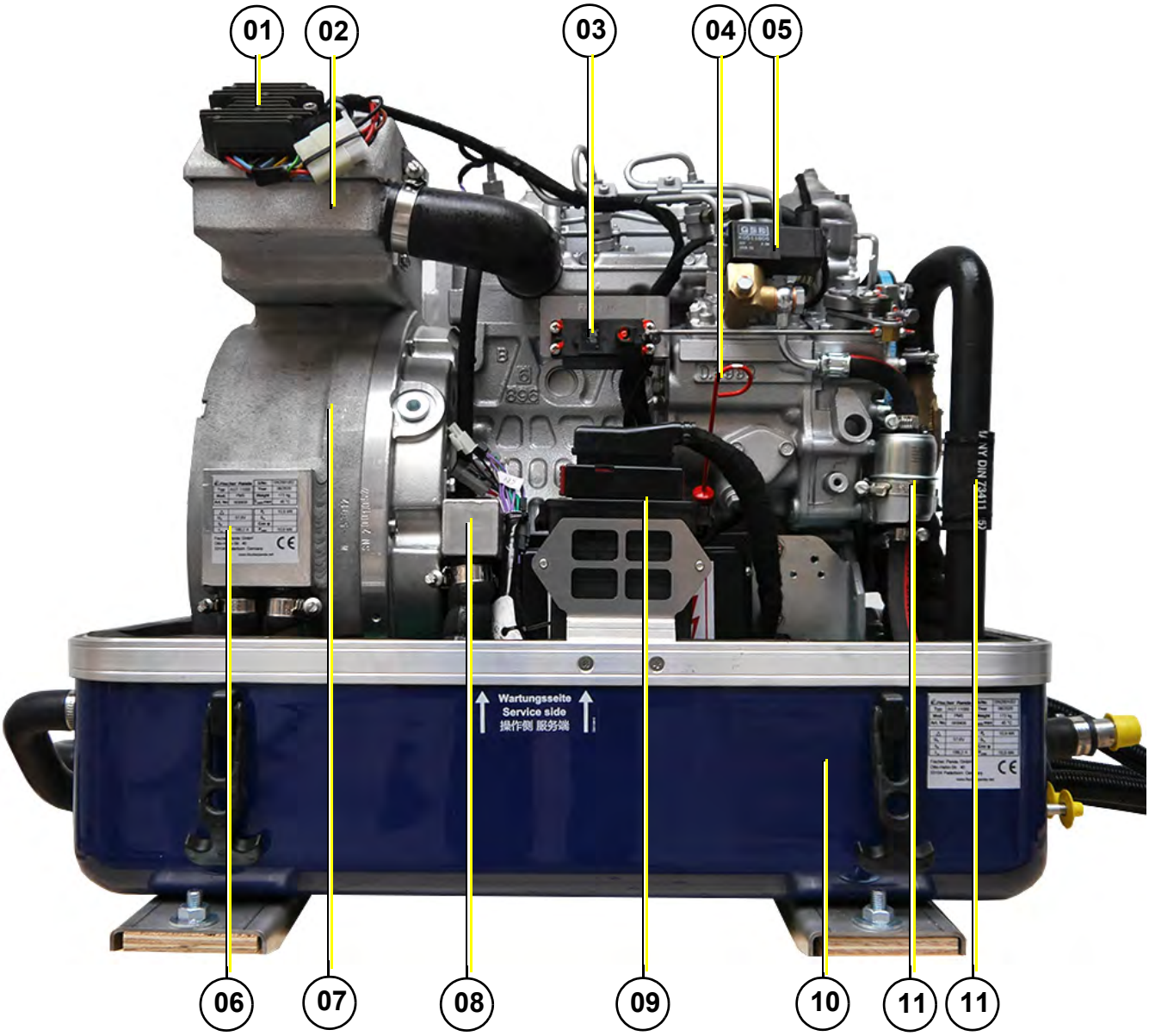
Fig. 5.2.1-1: Right side view



01) Water-cooled exhaust elbow
02) Starter motor
03) Cooling water return pipe
04) Air suction housing with air filter
05) Thermo-switch exhaust
06) DC-alternator
07) V-belt
08) Oil pressure switch
09) Oil filter
10) DC-Fuse
11) Sound cover base part
12) Heat exchanger
13) Generator housing with coil
14) Exhaust pipe
15) Exhaust output

5.2.2 Left side view

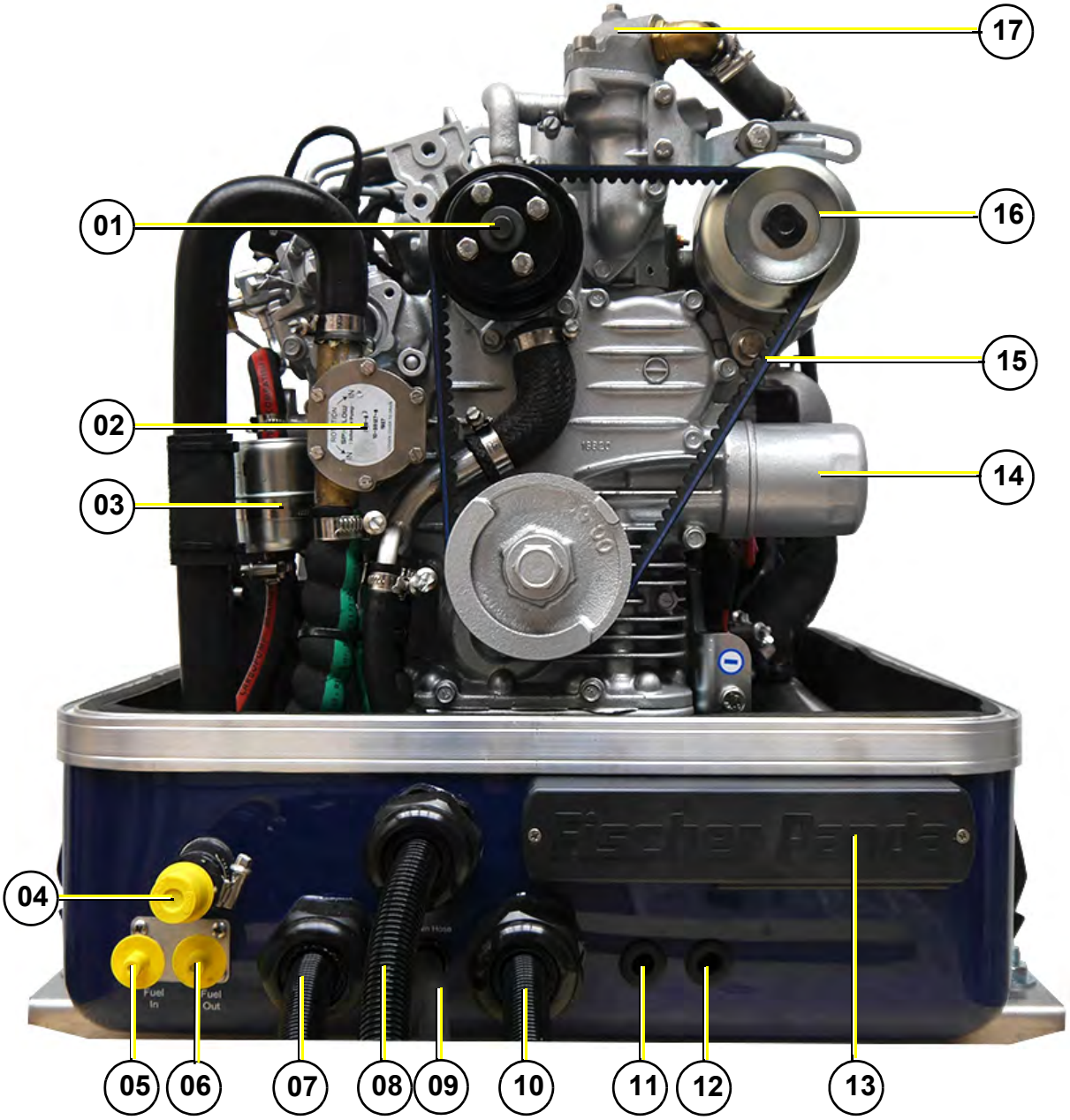
Fig. 5.2.2-1: Left side view



01) Charge regulator for DC-alternator
02) Air suction housing with air filter
04) Actuator for rpm-regulation
04) Dipstick
05) Fuel solenoid valve
06) Cooling water connection block
07) Generator housing with coil
08) Raw water filter
09) fpControl ECU
10) Sound cover base part
11) Fuel filter
12) Raw water intake hose

5.2.3 Front view

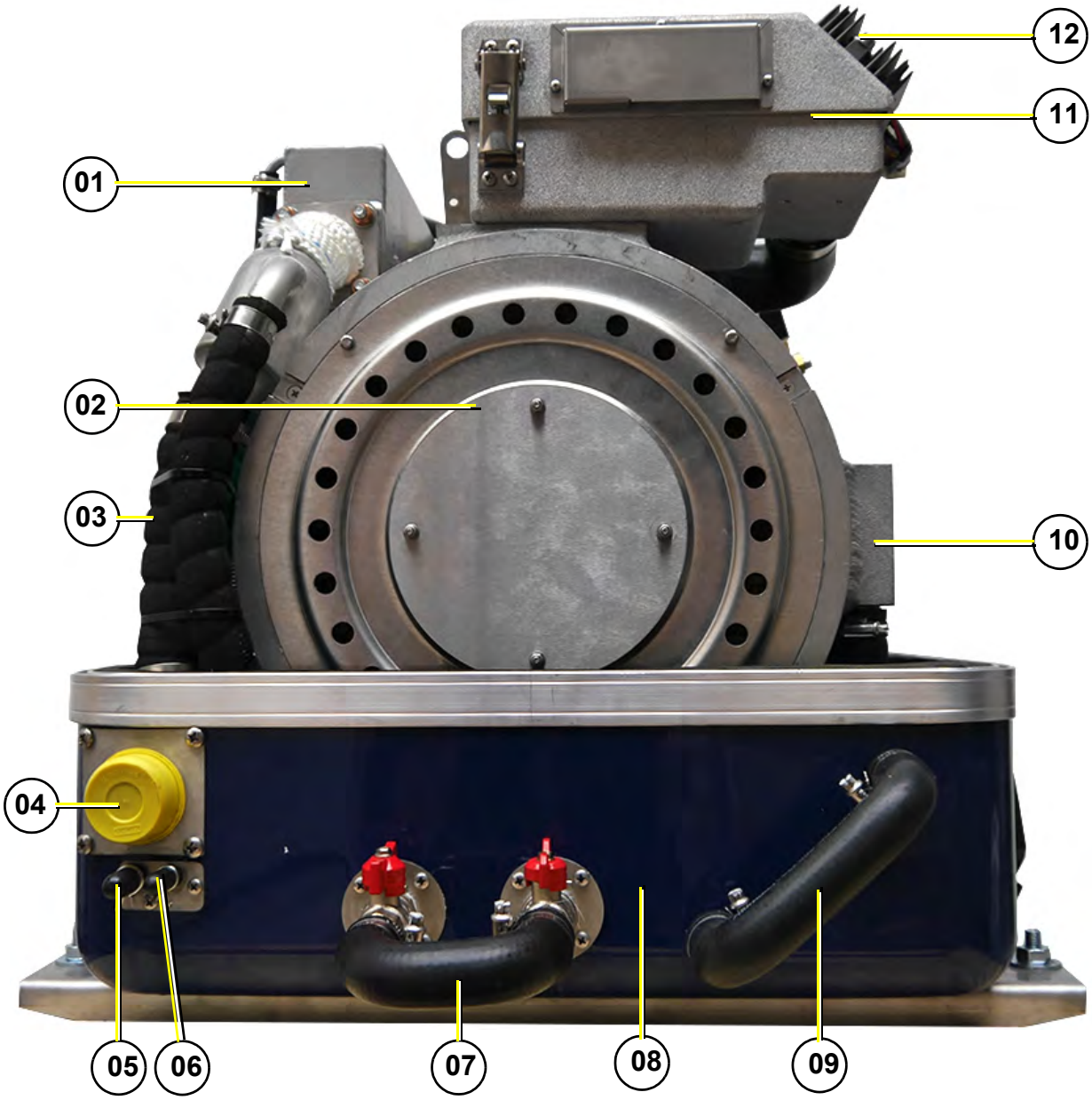
Fig. 5.2.3-1: Front view



01) Pulley for internal cooling water pump
02) Raw water pump
03) Fuel filter
04) Raw water intake
05) Connection fuel in
06) Connection fuel out
07) Cable to rectifier unit L1
08) Cable to rectifier unit L3
09) Oil drain hose
10) Cable to rectifier unit L2
11) Cable passage for Starter battery plus (-)
12) Cable passage for Starter battery plus (+)
13) External terminal block for the fpControl
14) Oil filter
15) V-belt
16) DC-alternator
17) Thermostat housing

5.2.4 Back view

Fig. 5.2.4-1: Back view



01) Water-cooled exhaust elbow
02) Generator front cover
03) Exhaust pipe
04) Exhaust output
05) In-flow from external cooling water expansion tank
06) Return to external cooling water expansion tank
07) Connection external heat exchanger
08) Sound cover base part
09) Connection external ventilation valve
10) Cooling water connection block
11) Air suction housing with air filter
12) Charge regulator for DC-alternator

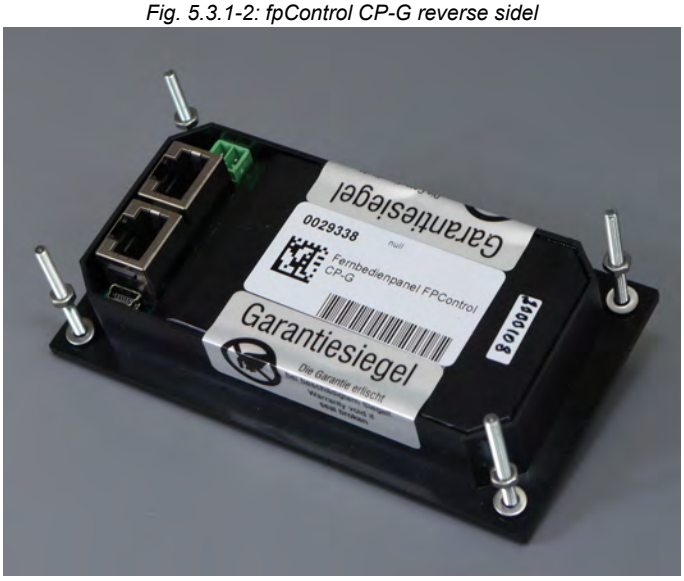
5.3 Details of functional units

5.3.1 fpControl 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: fpControl CP-G front side

Fig. 5.3.1-2: fpControl CP-G reverse sidel

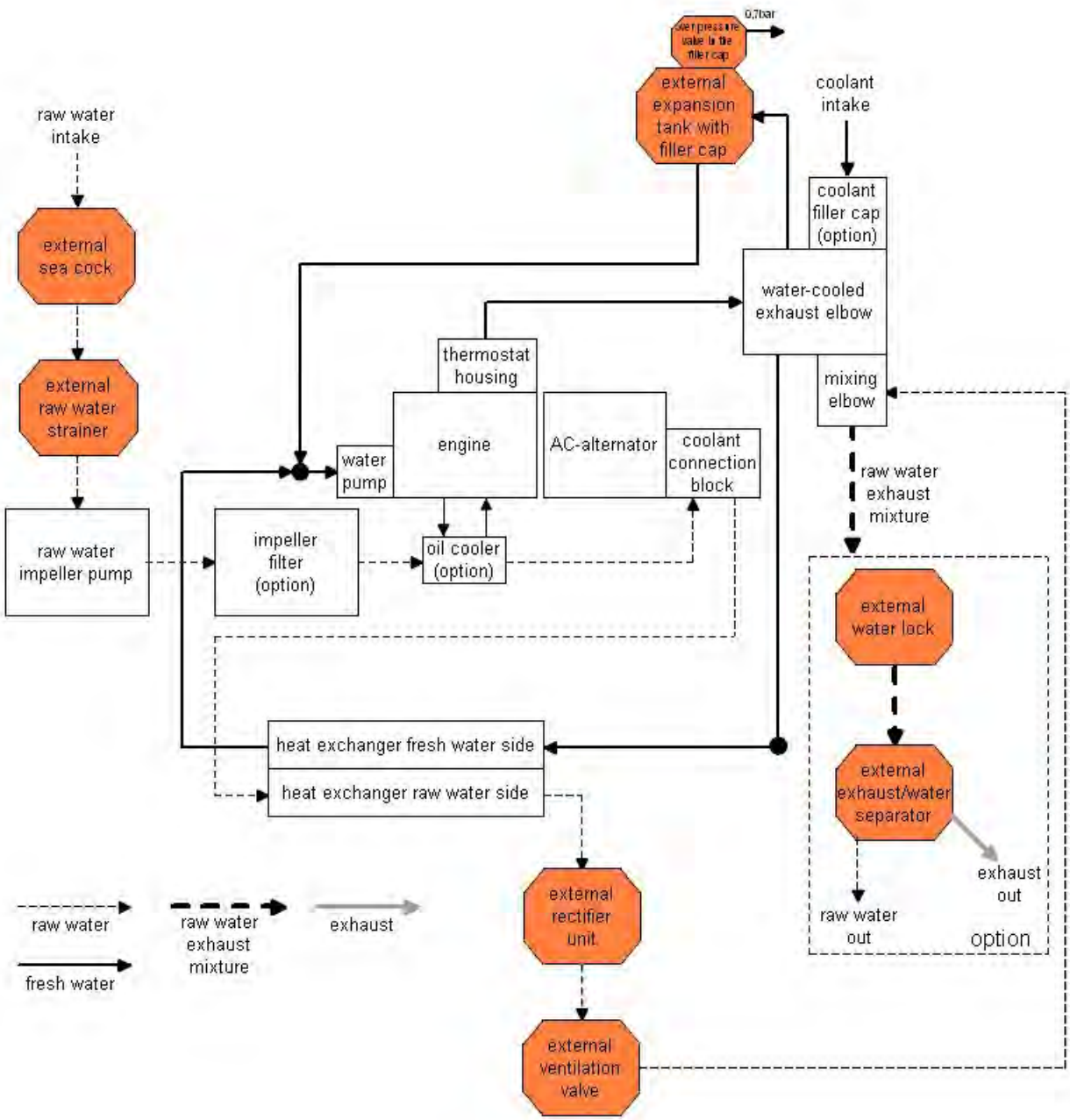


See fpControl manual for details!

Notice!

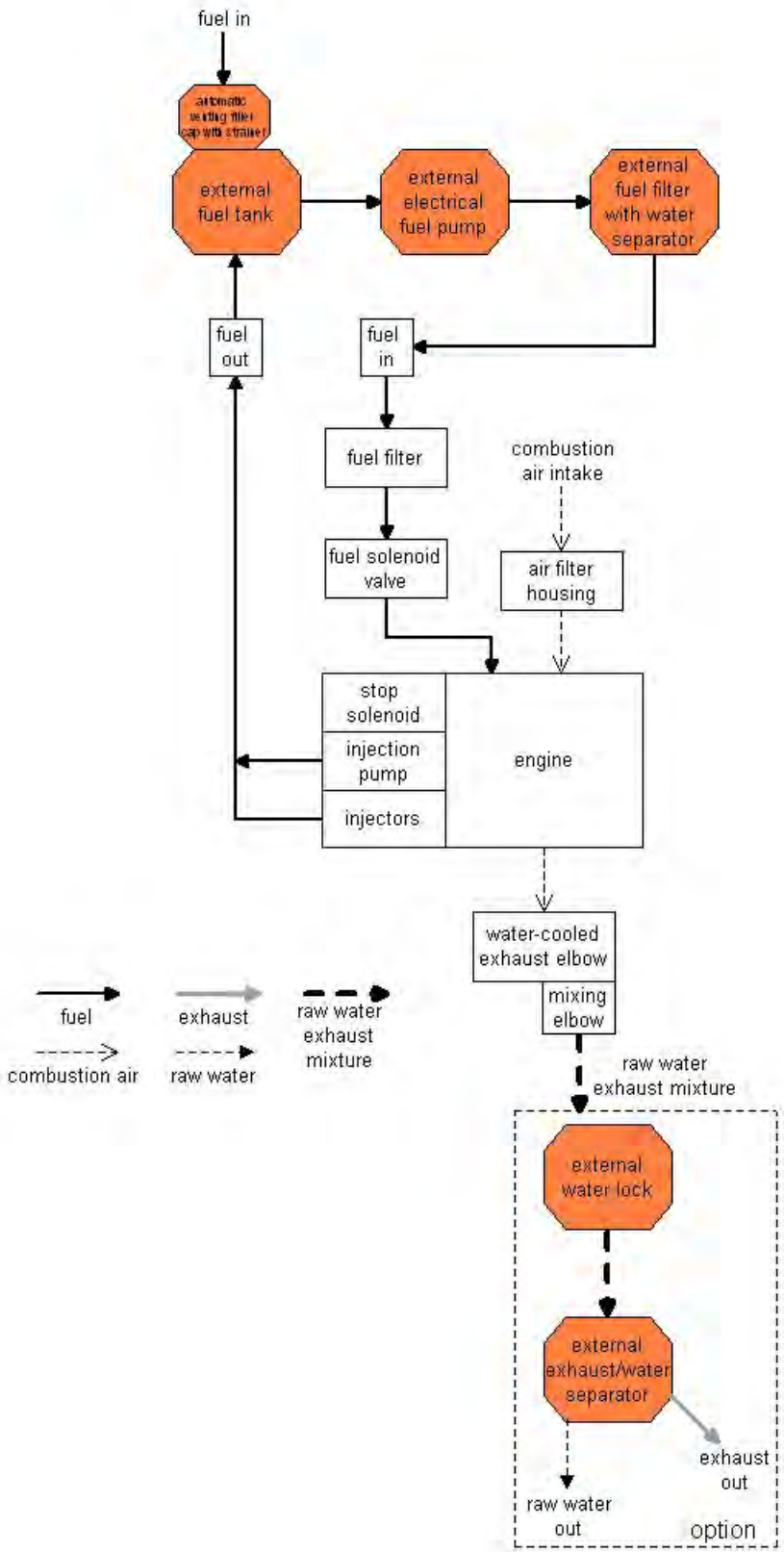
5.3.2 The cooling system

Fig. 5.3.2-1: Cooling system raw water



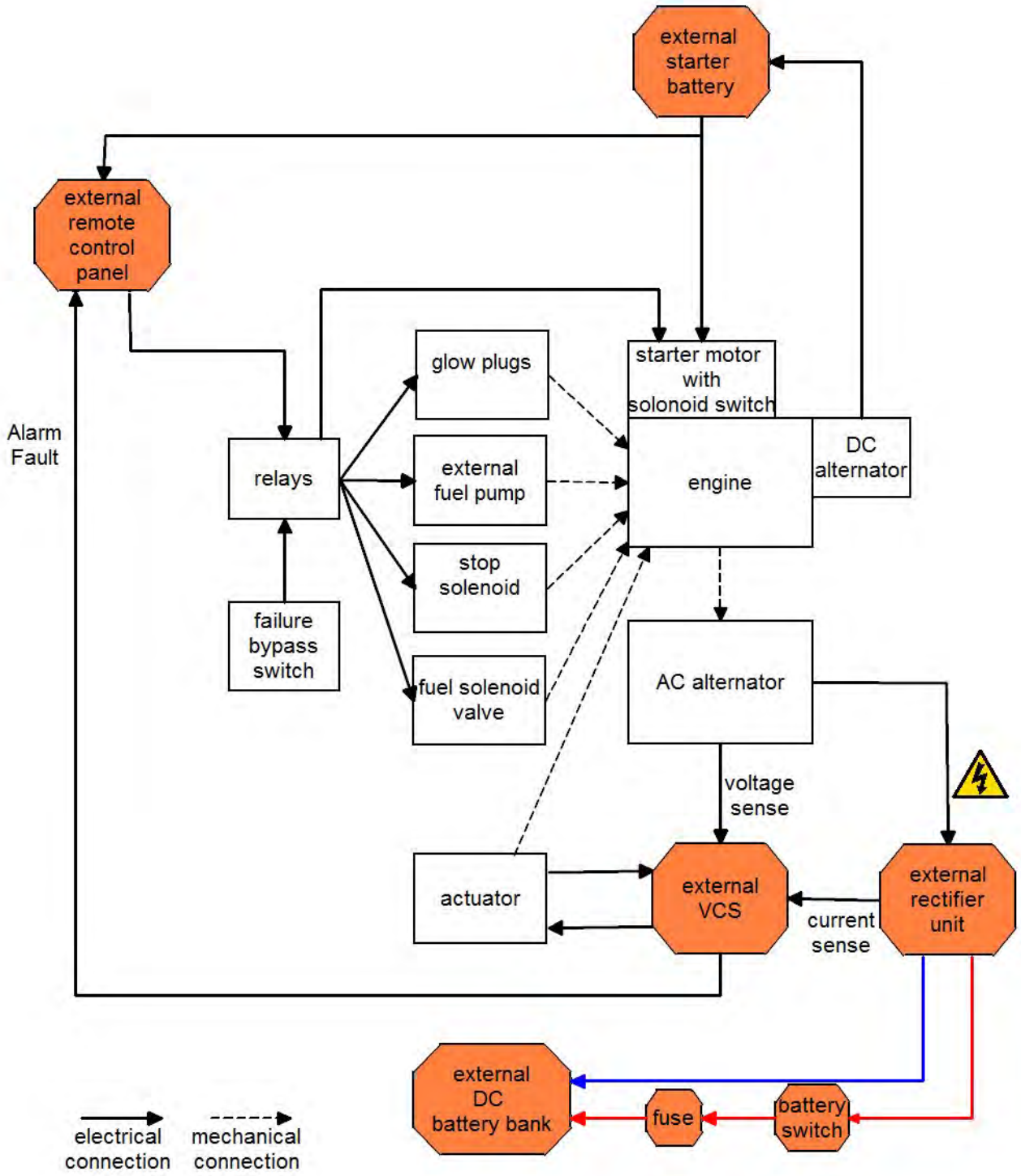
5.3.3 Components of the fuel/air system

Fig. 5.3.3-1: Fuel/air system



5.3.4 Components of the electrical system

Fig. 5.3.4-1: Electrical system

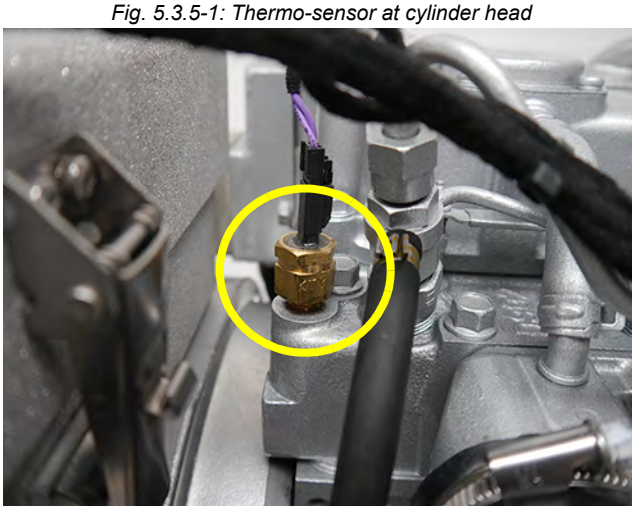


5.3.5 Sensors and switches for operating surveillance

Thermo-sensor at cylinder head

The thermo-sensor at the cylinder head serves the monitoring of the generator temperature.

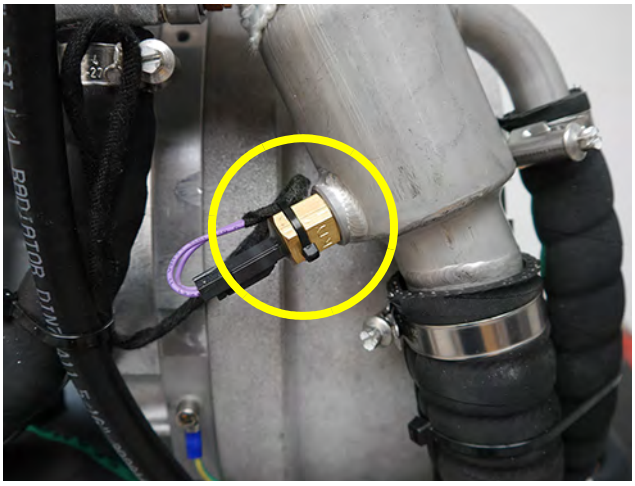
Fig. 5.3.5-1: Thermo-sensor at cylinder head



Thermo-sensor at exhaust connection

If the impeller pump drop out and deliveres no more raw water, the exhaust connection becomes extremely hot.

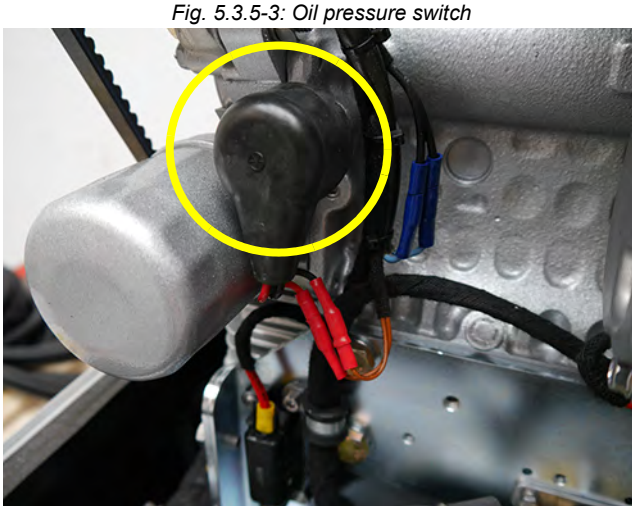
Fig. 5.3.5-2: Thermo-sensor at exhaust connection



Oil pressure switch

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

Fig. 5.3.5-3: Oil pressure switch



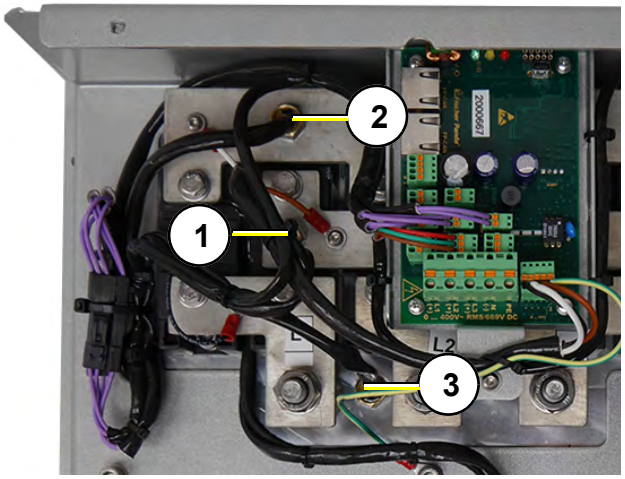
Thermo-sensors on the rectifier

1. Thermo sensor rectifier (-) rail

2. Thermo sensor rectifier (+) rail

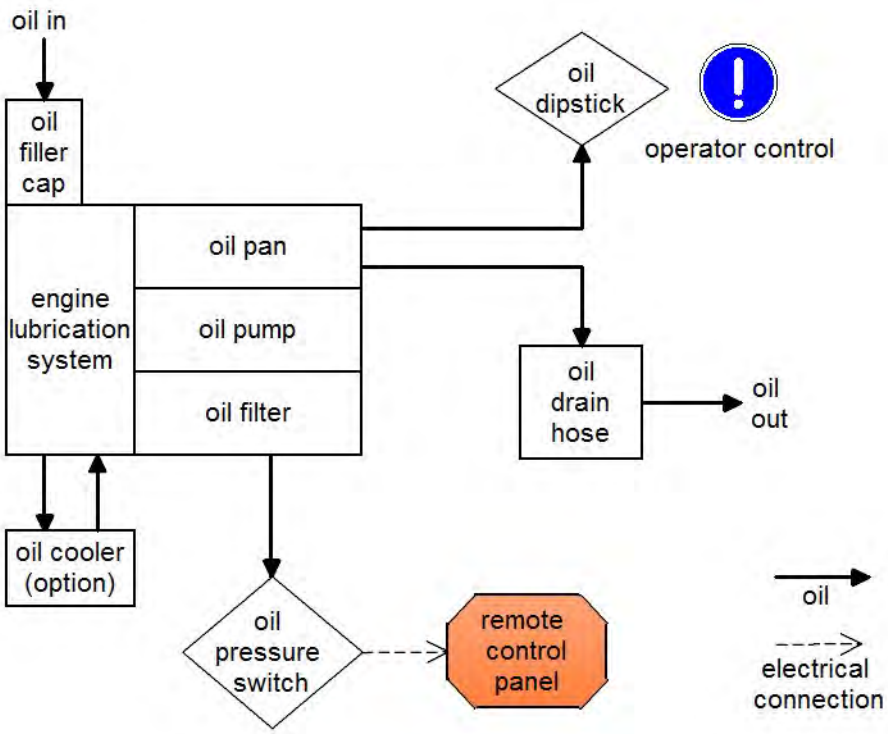
3. Thermo sensor at cooling plate

Fig. 5.3.5-4: Thermo-switches on rectifier



5.3.6 Components of the oil circuit

Fig. 5.3.6-1: Lubrication system



5.3.7 Starting generator- see remote control panel datasheet

5.3.8 Stopping the generator- see remote control panel datasheet

6. Generator operation instruction

6.1 Personal requirements

Only instructed persons are allowed to run the generator. Instructed Persons has read the manual of the generator and all ancillary components and external equipment. He must be acquaint with the specific risks and safety instructions.

Only persons who are expected to perform their tasks reliably are permitted as personnel. Persons whose reaction capability is impaired, e.g. through drugs, alcohol or medication are not permitted.

When selecting the personnel, the stipulations regarding age and occupation applying at the location must be observed.

6.1.1 Hazard notes for the operation

Please note the safety first instructions in 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

Rotating parts inside of the generator

Do not run the generator with removed sound cover. If it is necessary to test the generator without sound cover, pay special attention. Never do this work alone. Do all service, maintenance and repair with engine stopped.

Attention! Danger to life

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

6.2 General operating instruction

6.2.1 Operation at low temperatures

The Generator can be started at temperatures down to - 20 °C, therefor the operation fluids like fuel, cooling water, lubricant oil ect. must be suitable for this temperatures. These should be checked before start. Cold start spray ect. are not allowed to use, or the warranty will be lost.

6.2.1.1 Pre-heating the diesel motor

Pre-champer diesel engines are equipped with a quick glow plug. The maximum pre glow time should not exceed 20 sec. At 20 °C or more the pre glow time should be about 5-6 sec. Below 20 °C the pre glow time should be increased.

If the operation fluids have been drained and then filled with cold weather fluids, always run the generator for 10 minutes to ensure the new fuel is present throughout the system.

Note!

6.2.1.2 Tips regarding starter battery

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

6.2.2 Light load operation and engine idle

If an engine is operated on a load less than 25-30 % of its rated output, the soot of the generator will be observed which may give cause for concern. The usual results of this operation are heavier than normal lubricating oil consumption, and oil leaks from the air and exhaust manifolds. This condition is particularly evident on standby generator set applications.

6.2.2.1 The soot of the generator is due to the fact that:

The cylinder temperatures are too low to ensure complete burning of all the fuel delivered.

A further result is that of abnormal carbon build-up on the valves, piston crowns and exhaust ports. Fuel dilution of the lubricating oil will also occur.

6.2.2.2 To prevent the soot of the generator following steps should be observed:

Running on light load should be avoided or reduced to the minimum period.

In a period of 50 operation hours the engine or generator set should be run on full load for four hours, to burn off accumulations of carbon in the engine and exhaust system. This may require the use of a 'dummy load'. The load should be built up gradually from 30 % to 100 % within 3 hours and hold at 100 % for one hour.

6.2.3 Generator load for a longer period and overload

Ensure the generator is not overloaded. Overloading occurs when the electrical load is higher than the generator can provide. If this occur for a longer period, the engine may be damaged. Overloading may cause rough running, high oil and fuel consumption, increased emissions.

For a long engine life, the long therm load should not exceed 80 % of the nominal load. Long therm load is the load over several hours. It is harmless for the generator to deliver full nominal power for 2-3 hours.

The hole conception of the Fischer Panda generator make sure, that the full power operation at extreme condition will not increase the engine temperatures over. Please note that the emissions of the generator also increase at full power operation.

6.2.4 Operating control system on the Fischer Panda generator

Fischer Panda generators are equipped with various sensors/temperatures switches. The combustion engine is further equipped with a oil pressure control switch, which switches the motor off, if the oil pressure sinks to a particular level.

6.3 Checks before start, starting and stopping the generator

See remote control panel data sheet/manual!

The instructions and regulations of the remote control panel data sheet/manual must be respected.

Note!

Respect the safety instruction in front of this manual.

Leere Seite / Intentionally blank

7. Installation Instructions

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

Attention!

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.

7.1 Personal requirements

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

7.1.1 Hazard notes for the installation

see “Safety first!” on Page 12.

Notice!

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

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

Warning! Risk of injury

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

Do not run the generator with removed sound isolation cover.

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

Warning! Risk of injury

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

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

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

Warning! Danger of fire

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

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

Danger! Danger of poisoning

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

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

ATTENTION! Danger to Life - High voltage

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

Warning! Hot surface/material

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

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

Instruction! Personal protective equipment necessary.

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

Attention! Disconnect all load

7.2 Place of installation

7.2.1 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.

7.2.2 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 heavy sheet material, 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 sheet material 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.

The Power out of the generator based on the following data:

Ambient temperature: 20 °C

Air pressure: 1000 mbar (100 m above normal Zero)

Raw water temperature: 20 °C

Rel. áir moisture: 30 % reg. the ambient temperature

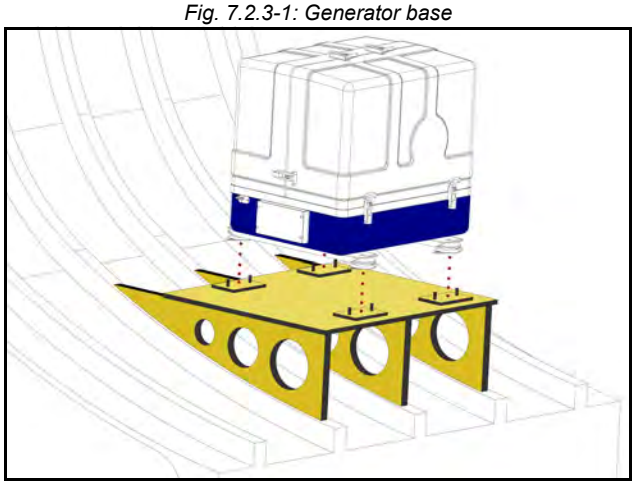
Fuel temperature: bis zu 20 °C

Any differents to this data, for example an ambient temperature of 40 °C because of the build inside a maschine room/vehicle with a bad ventilation, will cause in a lower Power out (Derating).

7.2.3 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. 7.2.3-1: Generator base



7.3 Generator Connections

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!

7.4 Cooling system installation - raw water

7.4.1 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:

7.5 Installation of the cooling system - raw water

7.5.1 General information

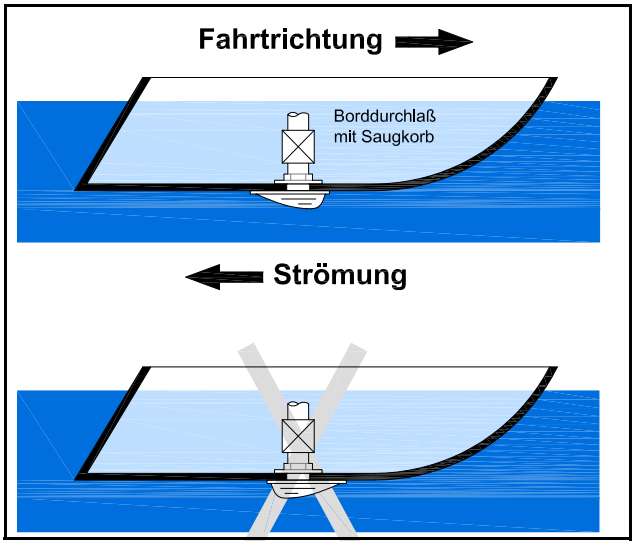
The genset should have its own raw water (coolant water) inlet and should not be connected to any other engine systems. Ensure that the following installation instructions are complied with:

7.5.2 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. 7.5.2-1: Position of the through hull fitting



7.5.3 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 a minimum inner diameter of the raw water intake connection. This applies also to installation components such as through-hull fitting, sea cock, raw water filter etc.

The intake suction line should be kept as short as possible. Install the raw water inlet in close proximity to the

genset.

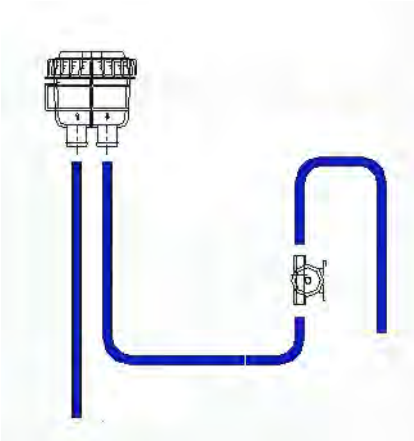
After start-up the cooling water quantity must be measured (e.g. by catching at the exhaust). For the needed flow rate see chapter tables.

7.5.4 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.

Fig. 7.5.4-1: Cooling water hose loop



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.

Replacement impeller and also a spare pump should always be on board.

NOTE:

7.5.5 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. 7.5.5-1: Vent valve

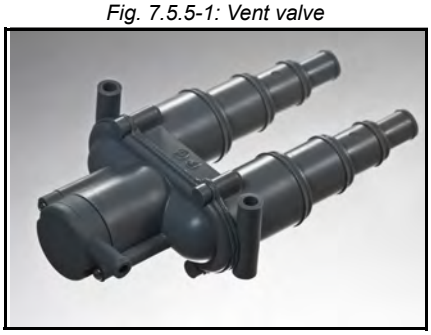
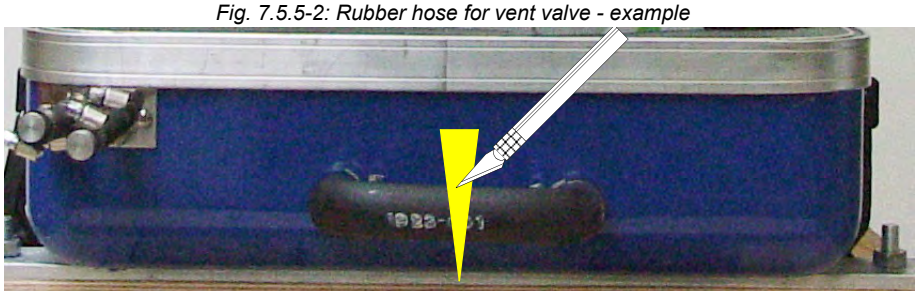


Fig. 7.5.5-2: Rubber hose for vent valve - example



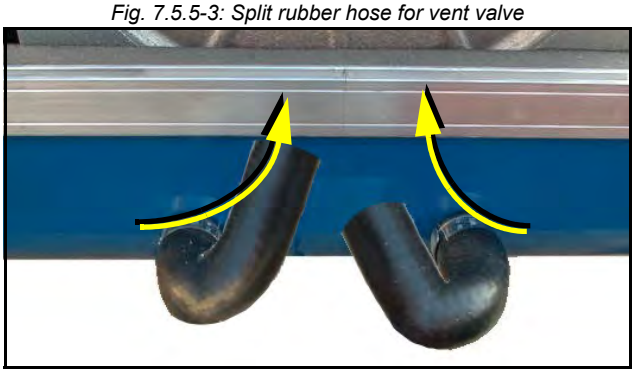
The rubber hose for the external vent valve will be cut...

...and bend upwards.

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

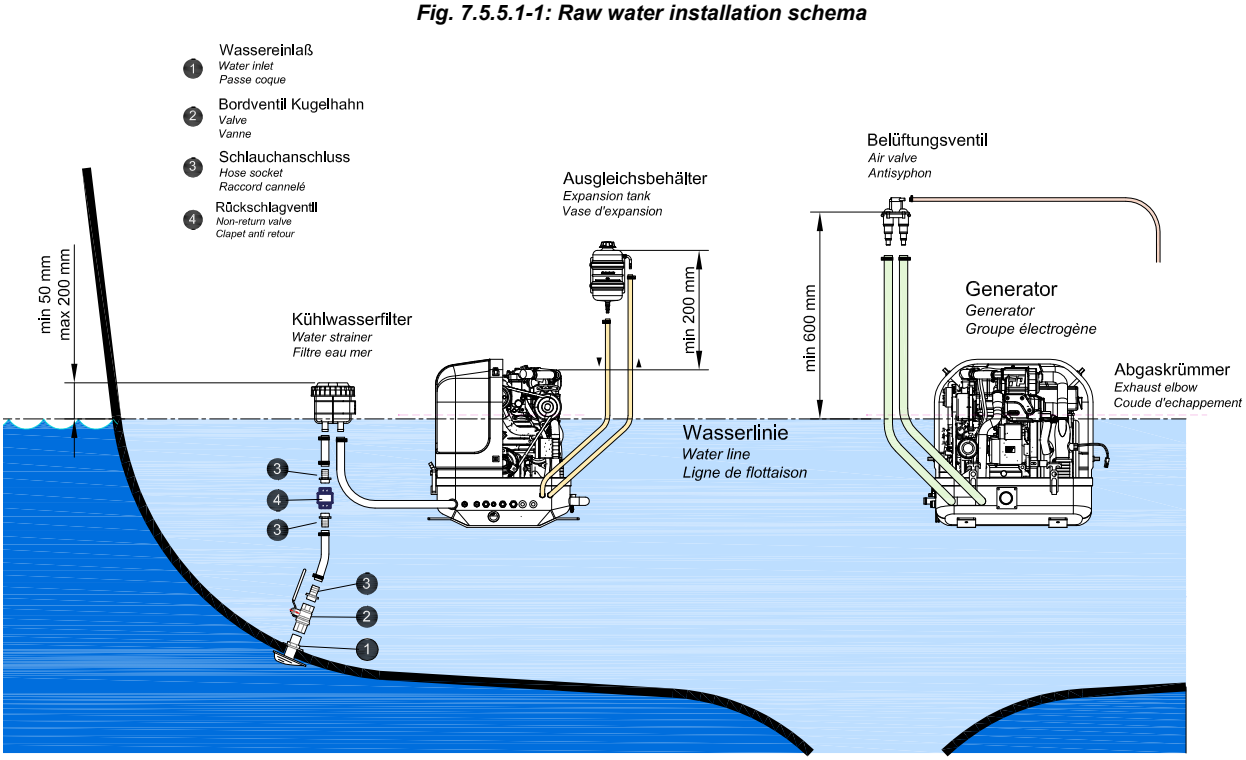
Example

Fig. 7.5.5-3: Split rubber hose for vent valve



7.5.5.1 Raw water installation scheme

Fig. 7.5.5.1-1: Raw water installation schema



7.6 Installation of the cooling system - fresh water

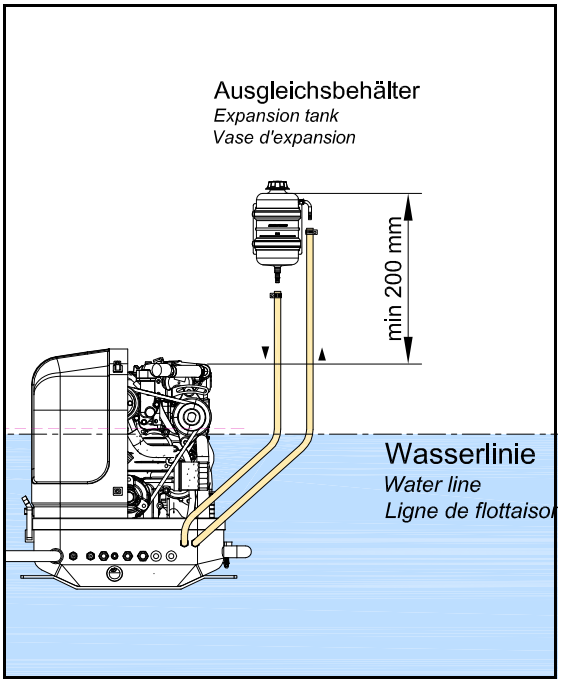
7.6.1 Position of the external cooling water expansion tank

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 200 mm more highly arranged than the highest point of the Generator.

If this 200 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. 7.6.1-1: Position of the external cooling water expansion tank



The external cooling water expansion tank may be filled only up to the “max” mark in cold condition.

ATTENTION!

Generators with internal cooling water expansion tank may not have connection points for an external expansion tank. (f.e. Generators with EA300 engine). An external expansion tank is not needed at these generators.

Note

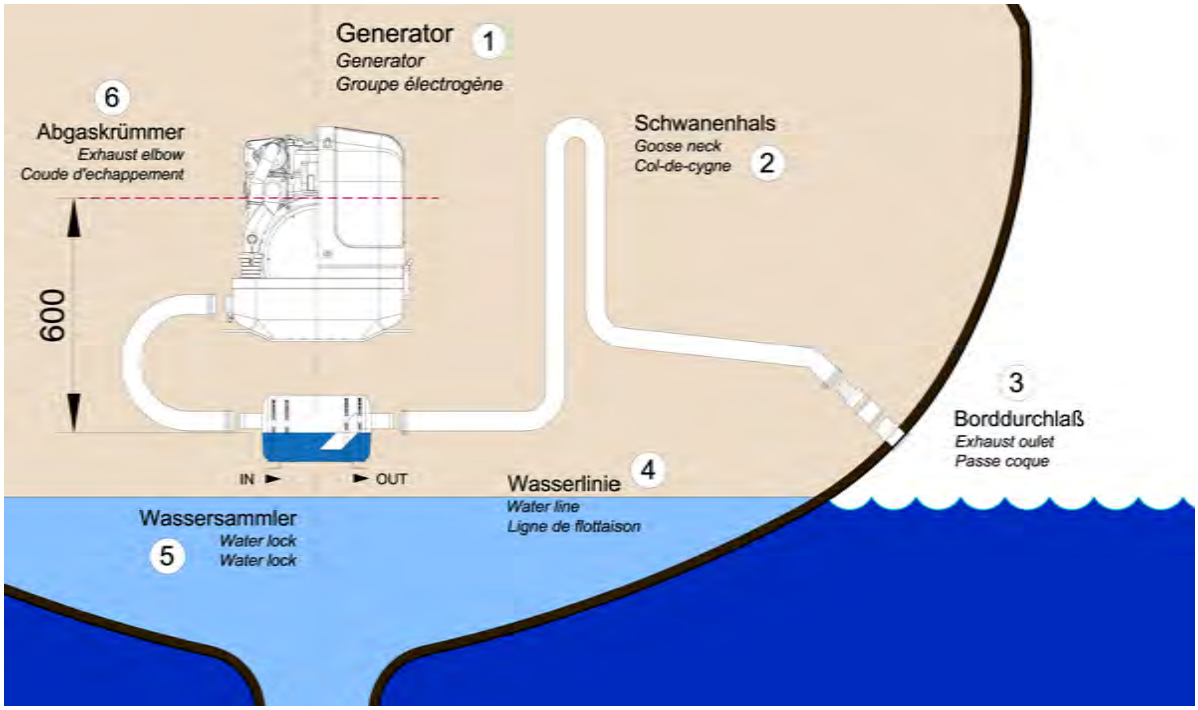
7.7 Installation of the water cooled exhaust system

7.7.1 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.

Fig. 7.7.1-1: Installation scheme standard exhaust system



7.8 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.

7.8.1 Possible cause for water in the exhaust hose

7.8.1.1 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.

7.8.1.2 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:

7.8.2 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.

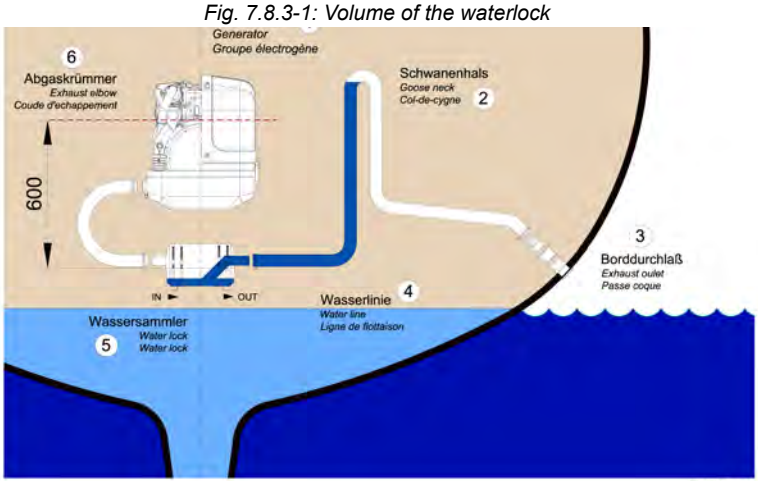
The picture below shows that the distance between the critical point at the exhaust elbow and the maximum permissible water level in the exhaust hose is stated with 600 mm. This distance should be understood as a minimum distance.

7.8.3 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.

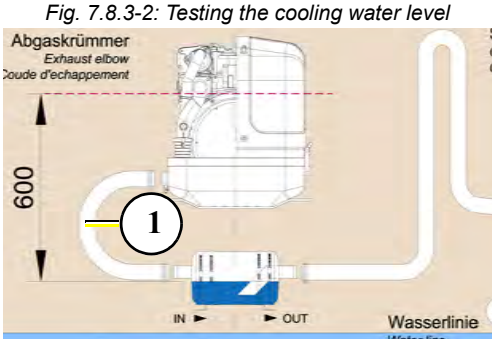
The waterlock must necessarily be measured large enough that it can take the entire amount of cooling water and, at the same time, does not exceed the prescribed vertical height of 600 mm up to the critical point at the exhaust elbow.

Fig. 7.8.3-1: 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. 7.8.3-2: Testing the cooling water level



7.8.3.1 Ideal position of the waterlock

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.

Important Note!

The following drawings apply only to the switched-off generator.

After heeling, allow the raw water to flow back before the generator is startet.

Attention!

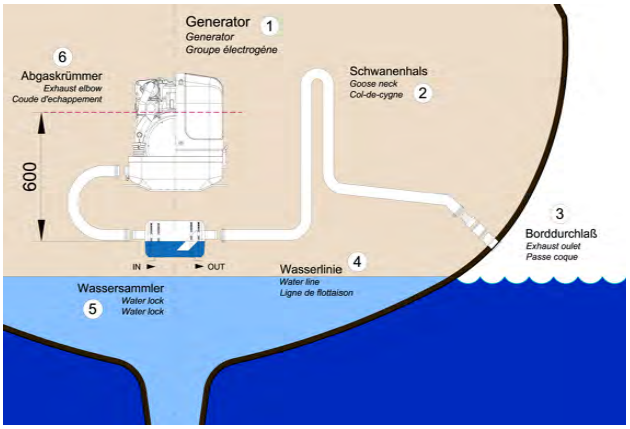
Maximum continuously heeling for running the generator is 20°. Short time (10 min) 30°.

See the following pictures:

In Fig. 7.8.3.1-1, 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.

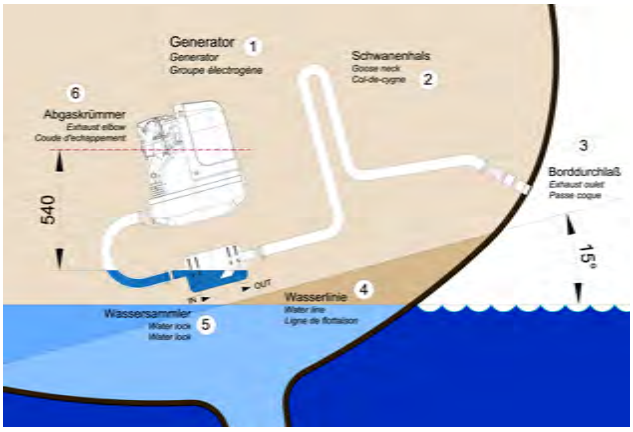
Fig. 7.8.3.1-1: Ideal position of the waterlock



Tilted position 15 degrees - Fig. 7.8.3.1-2

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

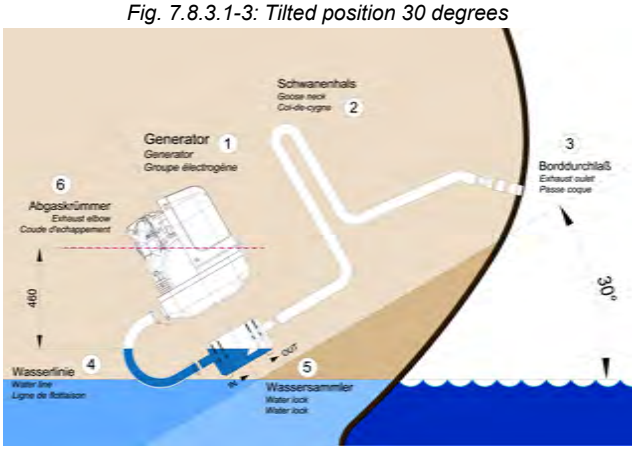
Fig. 7.8.3.1-2: Tilted position 15 degrees



Tilted position 30 degrees - Fig. 7.8.3.1-3

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. 7.8.3.1-3: Tilted position 30 degrees

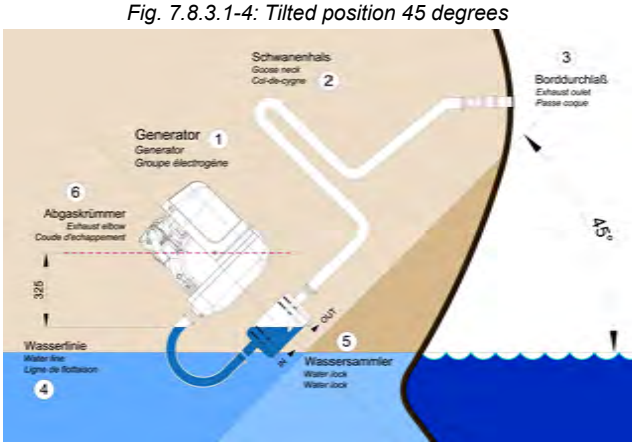


Tilted position 45 degrees - Fig. 7.8.3.1-4

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.

Fig. 7.8.3.1-4: Tilted position 45 degrees



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.

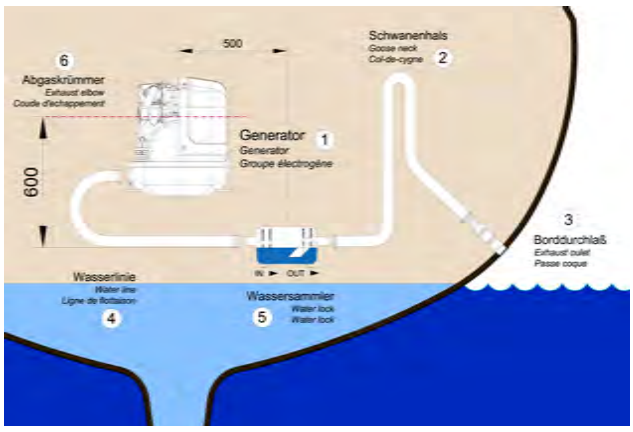
7.8.3.2 Example of the installation of the waterlock off-center and possible effects:

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:

Installation of the waterlock 500 mm next to the generator’s center line

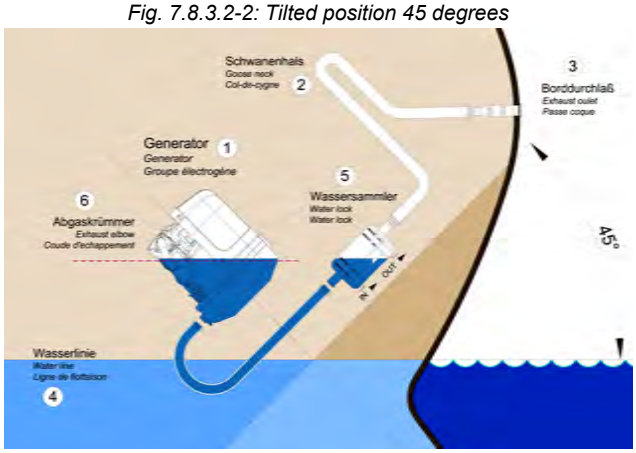
Fig. 7.8.3.2-1: waterlock, 500 mm next to the center line



Tilted position 45 degrees - Fig. 7.8.3.2-2

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.

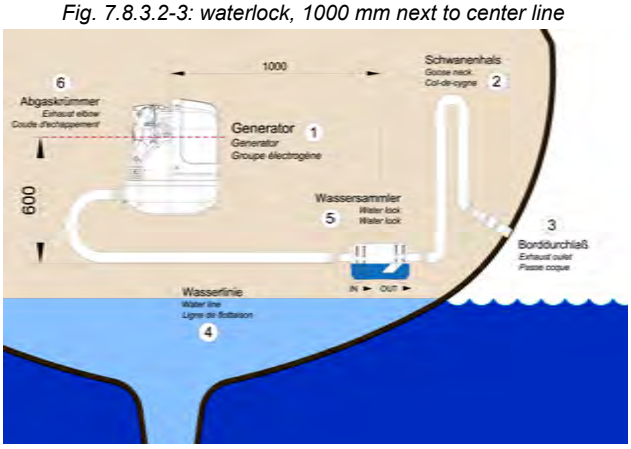
Fig. 7.8.3.2-2: Tilted position 45 degrees



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

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

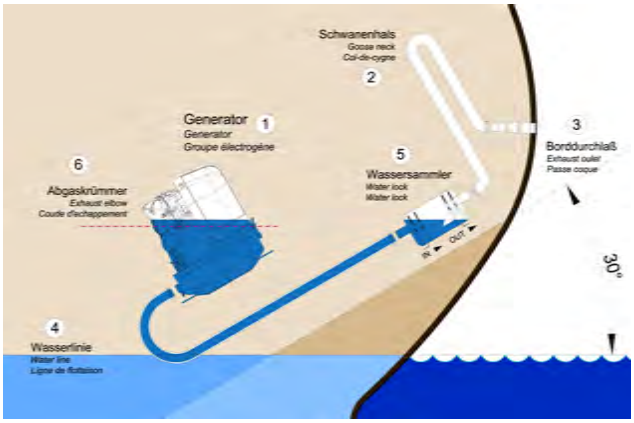
Fig. 7.8.3.2-3: waterlock, 1000 mm next to center line



Tilted position 30 degrees - Fig. 7.8.3.2-4

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.

Fig. 7.8.3.2-4: Tilted position 30 degrees



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.

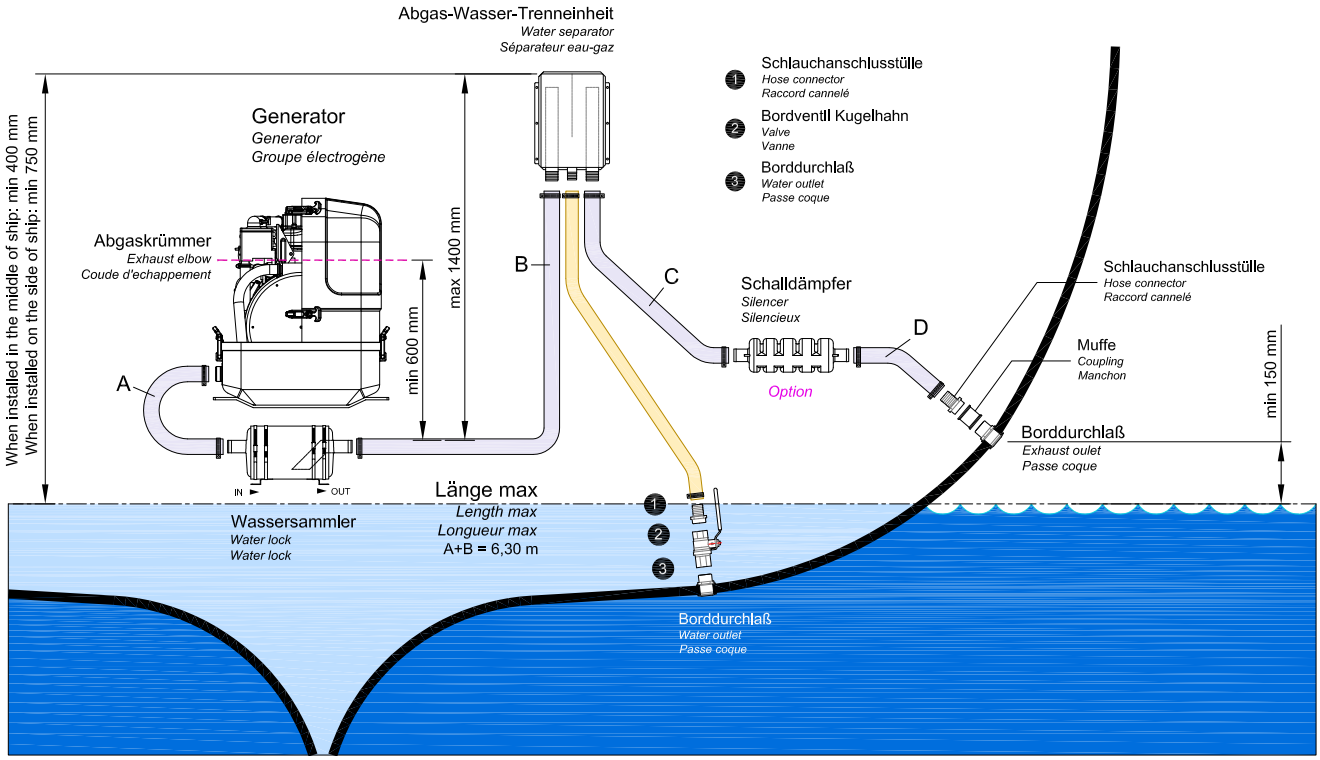
The „leaking" of the waterlock leads to a rise of the water level which then gets too close to the exhaust elbow's critical point.

7.9 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. 7.9-1: Installation Scheme exhaust / water separator



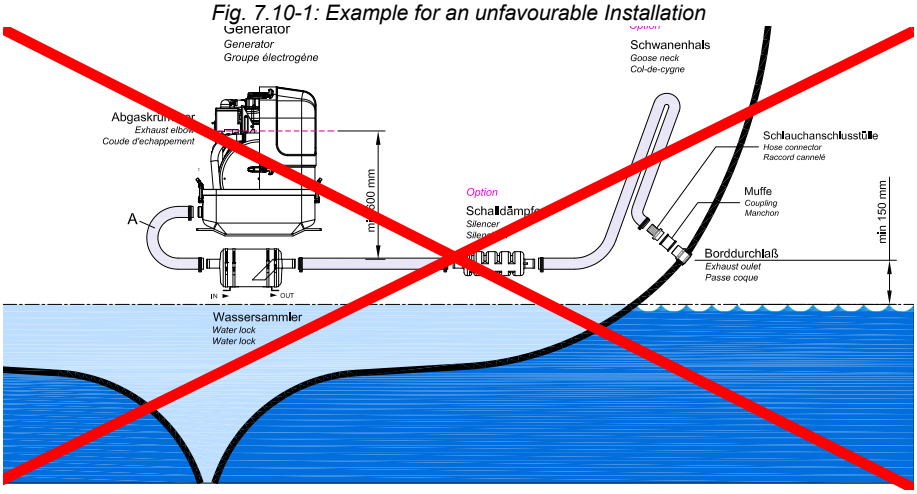
7.10 Installation exhaust water separator

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. 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. 7.10-1: 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 gooseneck too large

7.11 Fuel system installation

7.11.1 The following items need to be installed:

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

The external Fuel pump should be installed near the tank.

Electrical fuel pump

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

Fig. 7.11.1-1: electrical fuel pump

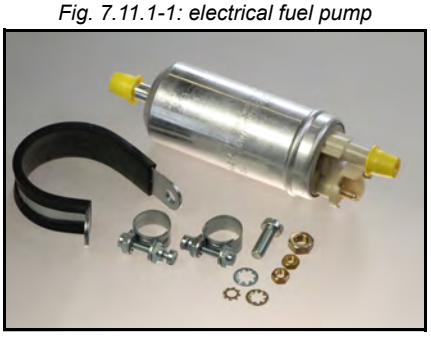
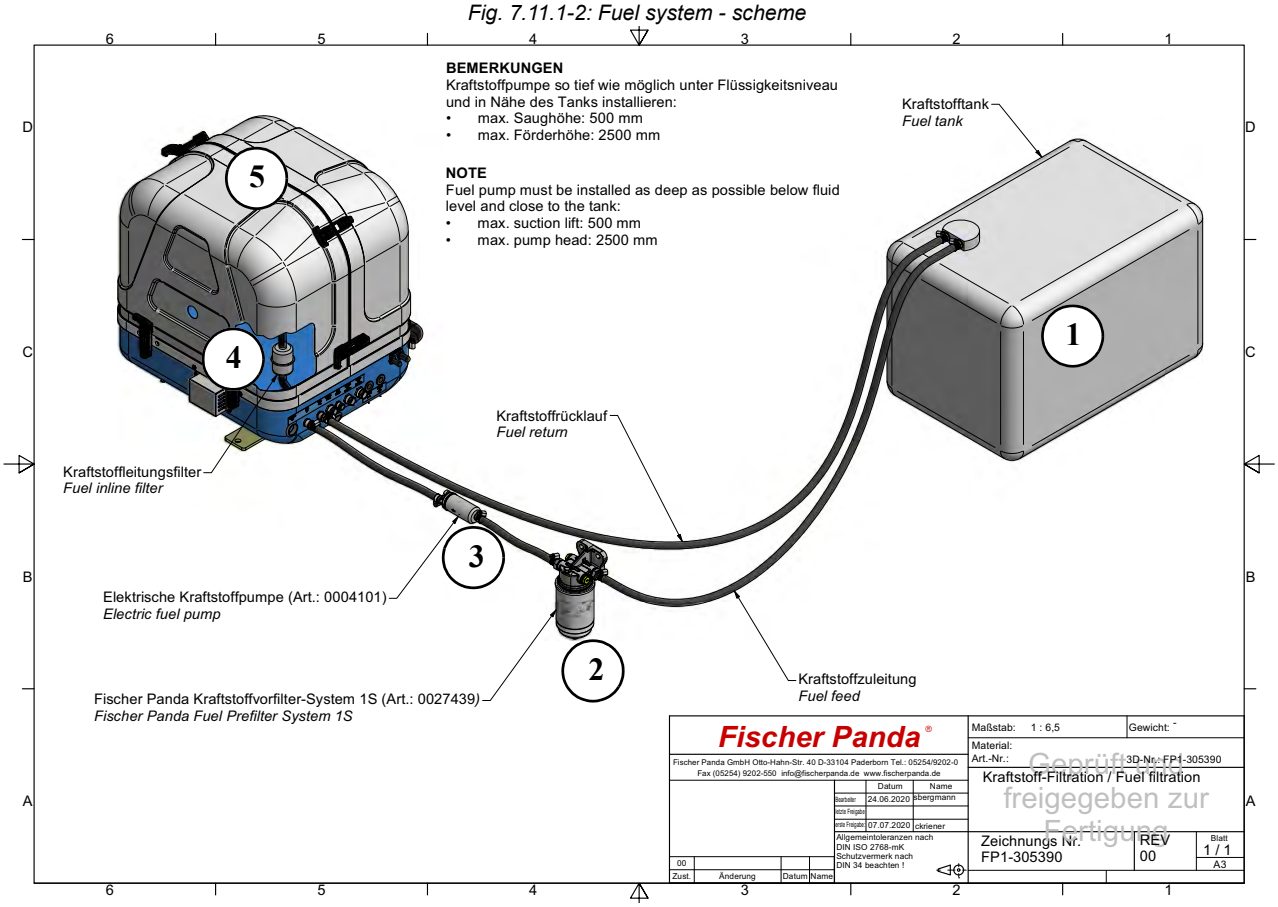


Fig. 7.11.1-2: Fuel system - scheme



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

7.11.2 Connection of the fuel lines at the tank

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

Note:

Connection of the return pipe to the tank

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

Non-return valve in the suction pipe

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

Non-return valve for the fuel return pipe

Attention!

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

7.11.3 Position of the pre-filter with water separator

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

Fig. 7.11.3-1: Fischer panda fuel pre-filter S1 with water separator

7.12 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!

7.12.1 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.

7.13 Generator DC system installation

The Panda generators from 6000 upwards have their own dynamo/DC alternator 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.

7.13.1 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.

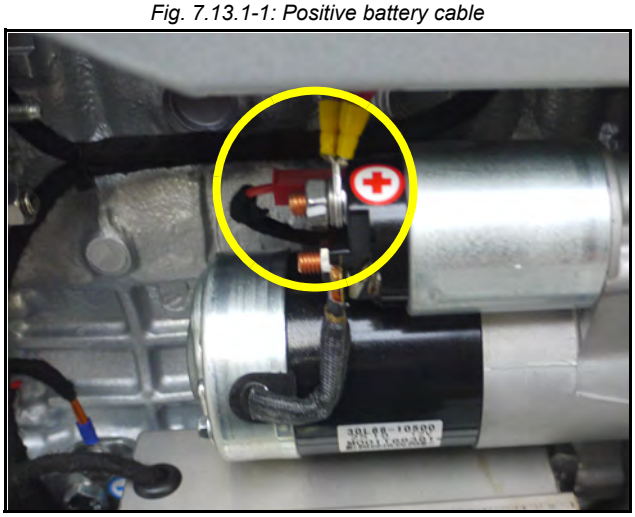
Make a test run after the installation and check the laying of the batteries during the test run and afterwards. If necessary, correct the laying.

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. 7.13.1-1: Positive battery cable

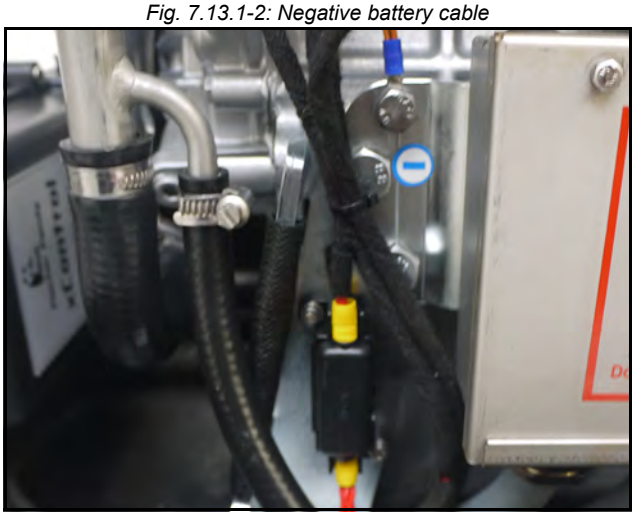


Negative battery cable

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

Note! The battery negative pole may not be connected with the boat/vehicle ground or with the protective grounding of the DC installation!

Fig. 7.13.1-2: Negative battery cable



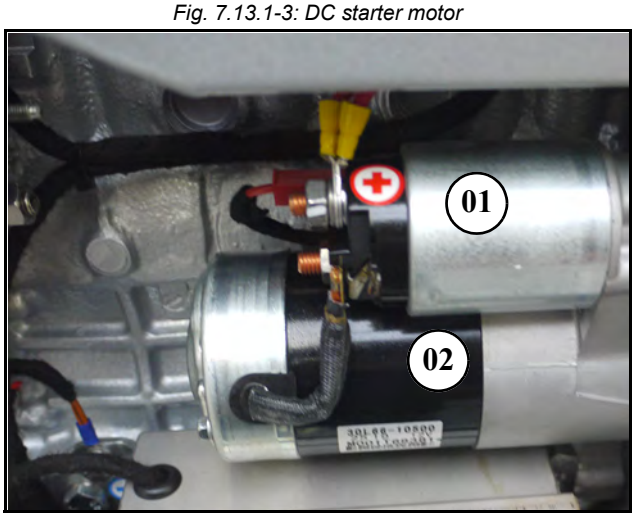
DC starter motor

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

1. Solenoid switch for starter motor

2. Starter motor

Fig. 7.13.1-3: DC starter motor



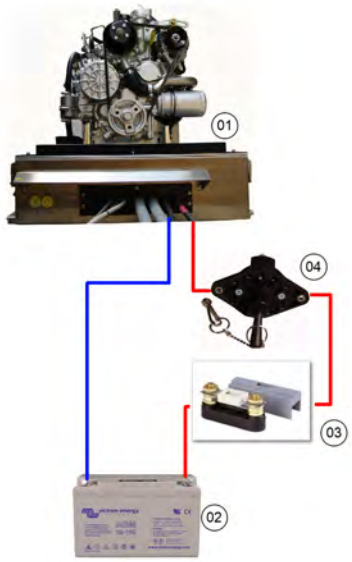
1. Generator

2. Battery block

3. Fuse

4. Battery main switch

Fig. 7.13.1-4: Connection starter battery 12 V - scheme



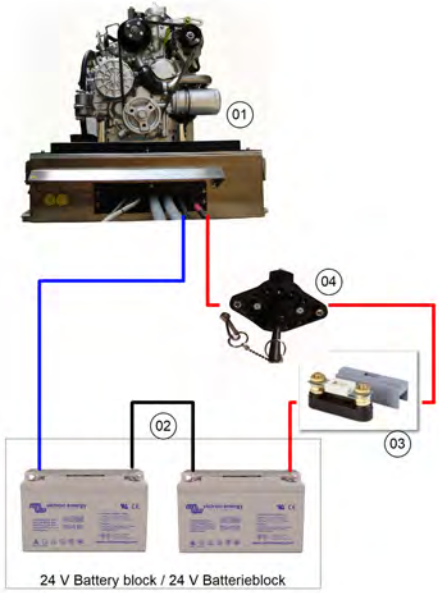
1. Generator

2. Battery block

3. Fuse

4. Battery main switch

Fig. 7.13.1-5: Connection starter battery 24 V - scheme



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

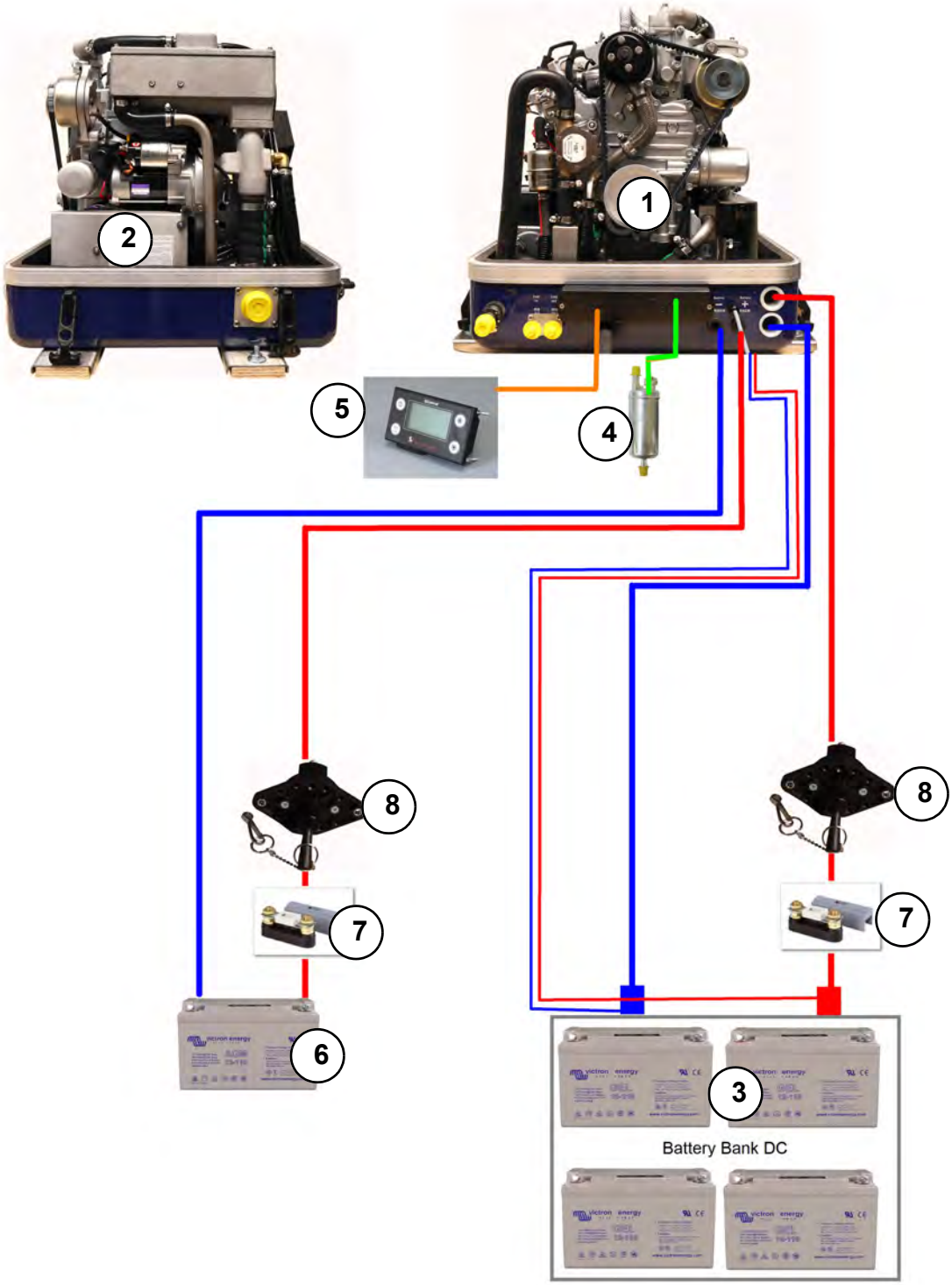
The remote control panel must be conected to the fp-Bus.

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

7.13.3 Installation Panda AGT 12 V starter system and internal rectifier unit - sample scheme

Sample scheme for a standard installation

Fig. 7.13.3-1: AGT 24 V DC output 12 V starter system internal recrifier unit and P6+ control panel



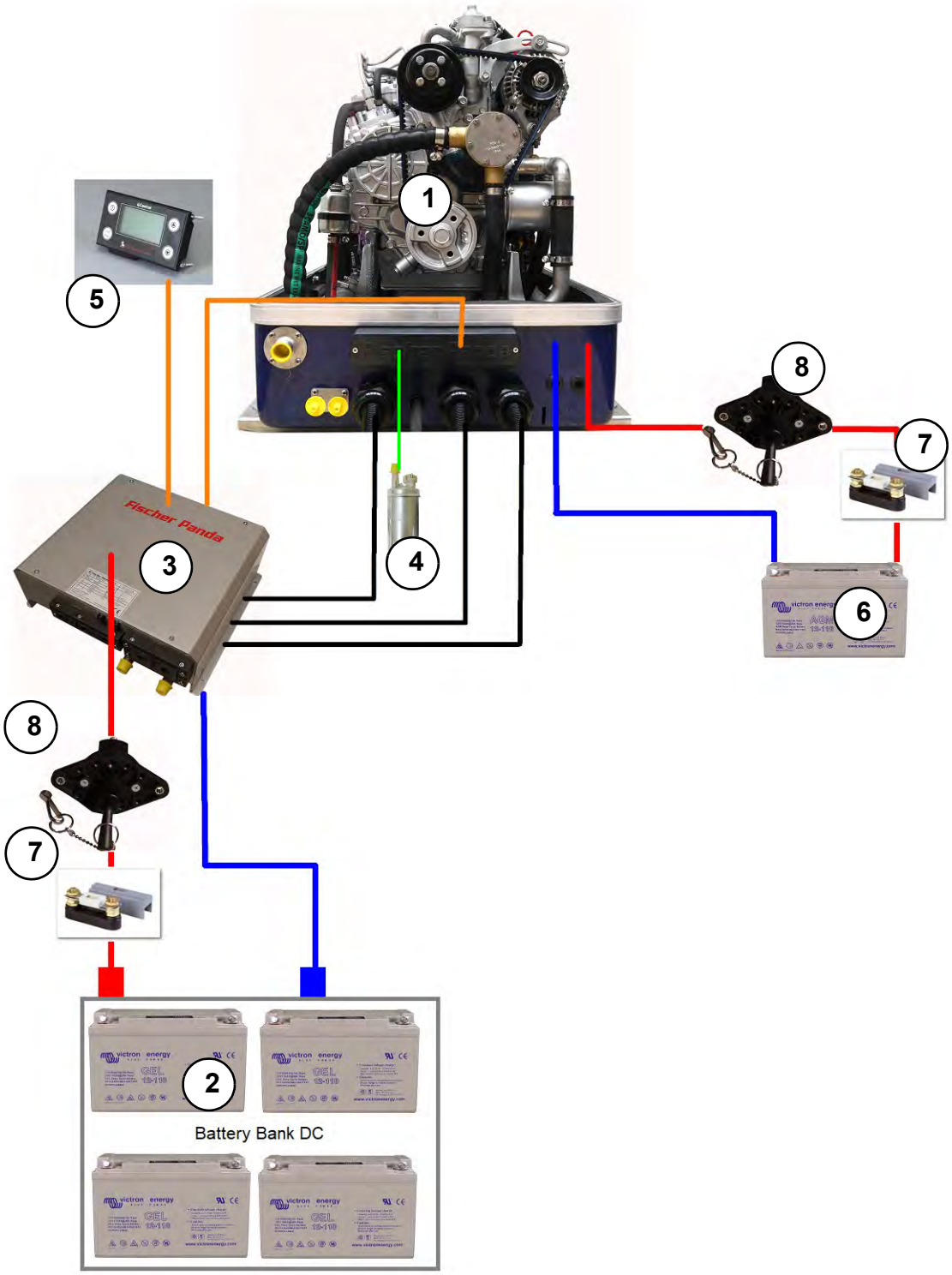
1. Generator
2. Rectifier unit at Generator
3. Battery bank
4. Fuel pump
5. Remote control panel
6. Starter battery
7. Fuse
8. Battery main switch

All electrical safety installations have to be made on board.

7.13.4 Installation Panda AGT 12 V start system and external rectifier unit - sample scheme

Sample scheme for a standard installation

Fig. 7.13.4-1: AGT 48 V DC output 12 V starter system external rectifier unit

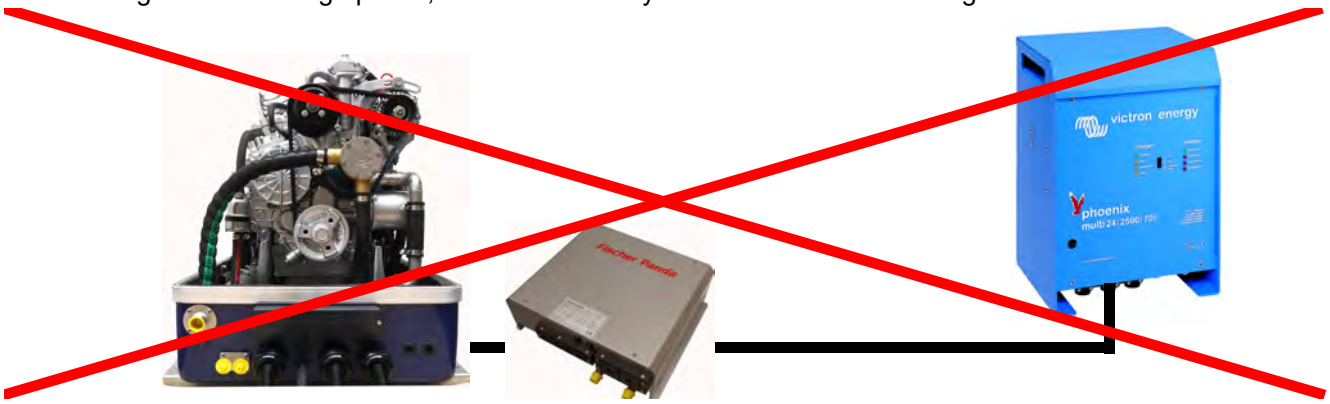


1. Generator
2. Battery bank
3. external rectifier unit
4. Fuel pump
5. Remote control panel
6. Starter battery
7. Fuse
8. Battery main switch

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!

The screws on the rectifier shall only be tightened with a torque wrench.

Torque:

- Connections for the AC an DC cables at the end of the power bars 33 Nm
- mounting diode on the cooling plate 2,25-2,75 Nm
- mounting power bars on the diode 4,5-5,5 Nm

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).

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
25 mm²	112 A	100 A	88 A	75 A	63 A

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

All electrical safety installations have to be made on board.

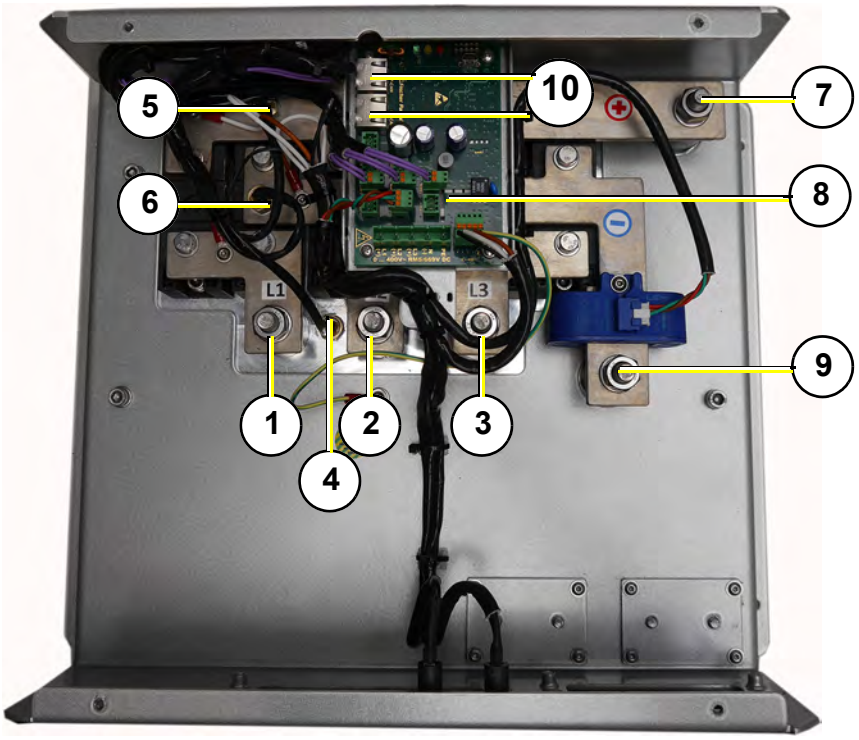
7.13.4.1 Electrical fuses - Dipole switch at battery bank

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.

7.13.5 Generators with external rectifier unit

Fig. 7.13.5-1: External rectifier unit - example



1. Connection L1
2. Connection L2
3. Connection L3
4. Thermo-sensor heat sink
5. Thermo-sensor (+) rail
6. Thermo-sensor (-) rail
7. Connection batery bank (+)
8. DC measurement board
9. Connection battery bank (-)
10. FPbus (for Generator/Panel)

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

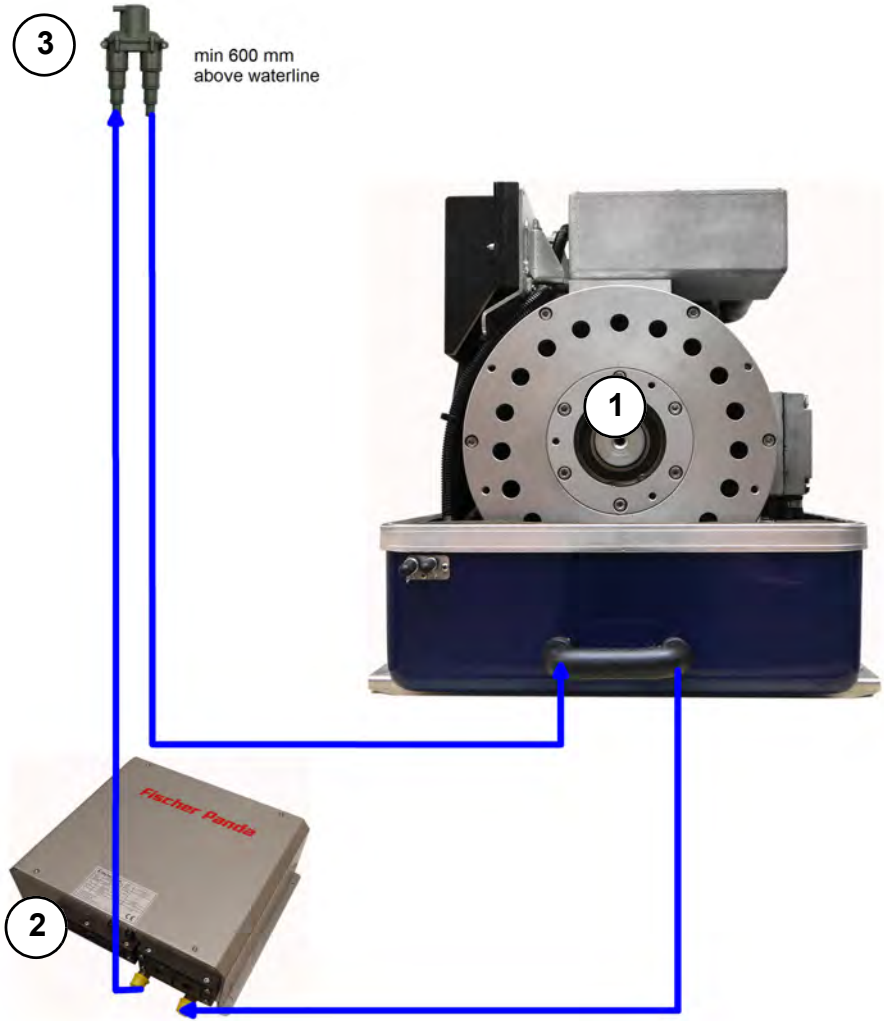
ATTENTION!

7.13.5.1 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).

Fig. 7.13.5.1-1: Installtion external rectifier unit - example



1. Generator
2. External rectifier unit
3. External ventilation valve

7.14 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!:

8. Maintenance Instructions

8.1 Personal requirements

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

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

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

Attention!

8.1.1 Hazard notes for the maintenance

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

Note!

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

Warning! Automatic start

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

Warning! Risk of injury

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

Do not run the generator with removed sound isolation cover

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

Warning! Risk of injury

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

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

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

Warning! Danger of fire

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

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

Danger! Danger of poisoning

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

Electrical voltages above 60 volts are always dangerous to life). The rules of the respective regional authority must be adhered to. Only an electrician may carry out installation of the electrical connections for safety reasons.

Attention! Danger to Life - High voltage

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

Warning! Hot surface/material

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

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

Instruction! Personal protective equipment necessary.

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

Attention! Disconnect all load

Batteries contains acid or alkalis.

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

See the operation and safety instruction from your battery manufacturer.

Batteries contain corrosive acids and lyes.

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

Warning!

Observe the instructions from your battery manufacturer.

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

Warning! System may be pressurised!

8.2 Environmental protection

Danger to the environment due to mishandling!

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

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

The disposal must be performed by a specialist disposal company.

Environmental protection!

8.3 Maintenance interval

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

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

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

Note:

8.4 General maintenance instructions

8.4.1 Checks before each start

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

Once a month

- Grease/oil the servo motor - Trapezoid thread-spindle

Maintenance intervals - see separate data sheet

8.4.2 Check of Hoses and rubber parts in the sound insulated capsule

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to environmental

influences. They wear out quickly in an environment of dry air, oil and fuel vapours, and high temperatures. The hoses must be checked regularly for elasticity. There are operating situations, when hoses must be renewed once a year.

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

8.5 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 10.2, “Technical data,” on page 112.

8.6 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.

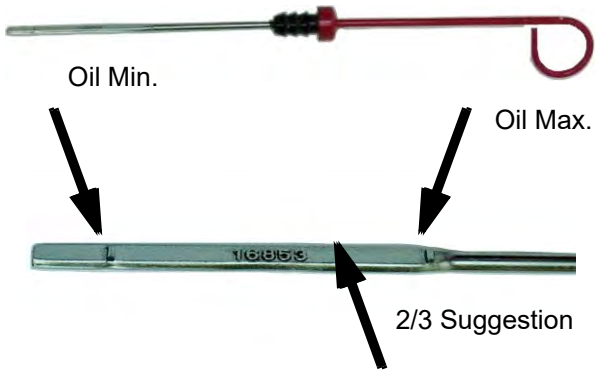
Oil dipstick

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. 8.6-1: Oil dipstick - Sample



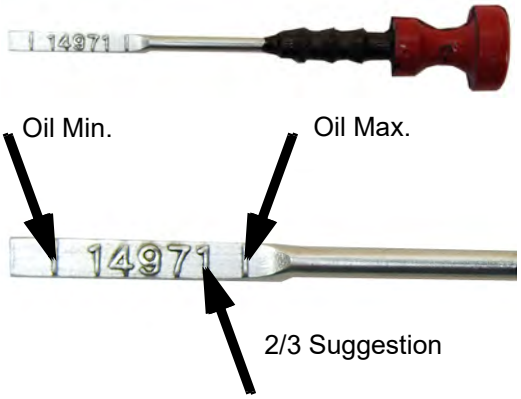
Oil dipstick EA 300 Engine

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. 8.6-2: Oil dipstick



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.

8.6.1 Refilling oil

You require:

Engine oil

1. Check oil-level as described under section 8.6, “Checking oil-level,” on page 82.
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 8.6, “Checking oil-level,” on page 82.

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

8.6.2 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.

8.7 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)

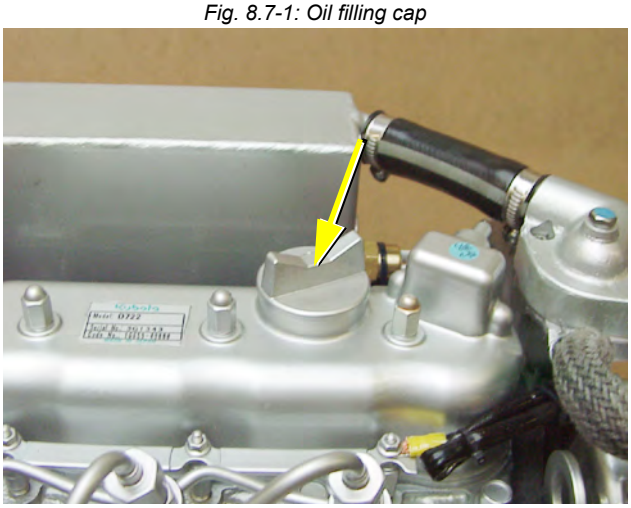
1. Prepare generator.
   - Assure generator against accidental start.
   - Open the generator casing.
   - with generators that have an external oil drain hose: Release the oil drain hose from the mounting.
   - with generators that have an internal oil drain hose: Open the lead-through for the oil drain 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. 8.7-1: 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. 8.7-2: Oil drain hose

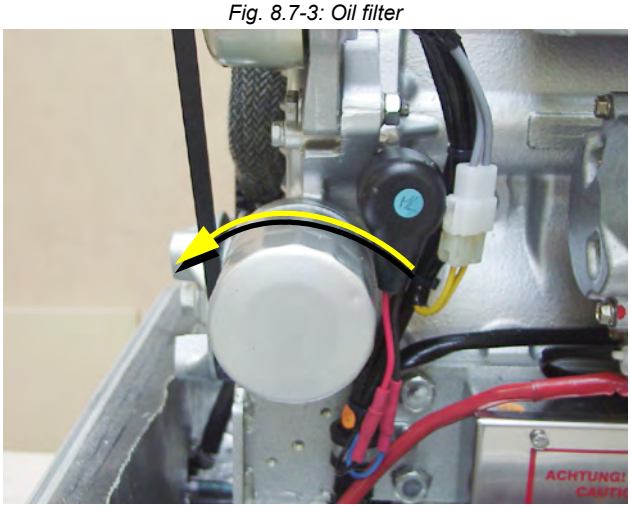
4. Discharge used oil.

   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. 8.7-3: Oil filter



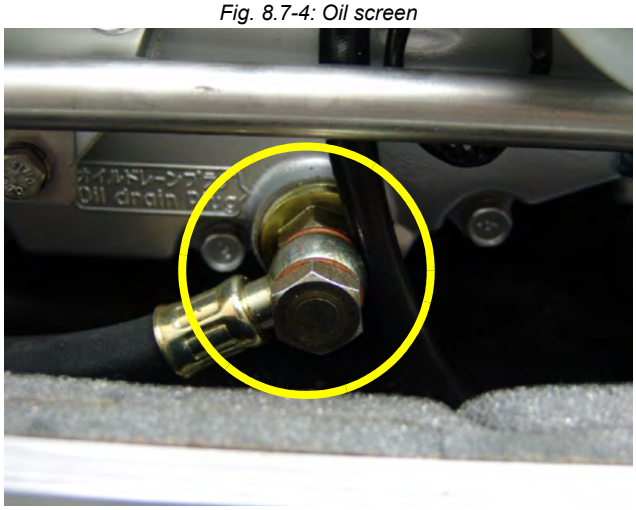
Oil screen with generators with EA300 engines

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. 8.7-4: 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. 8.7-5: 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 8.6, "Checking oil-level," on page 82.

   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.

8.7.1 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).

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

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

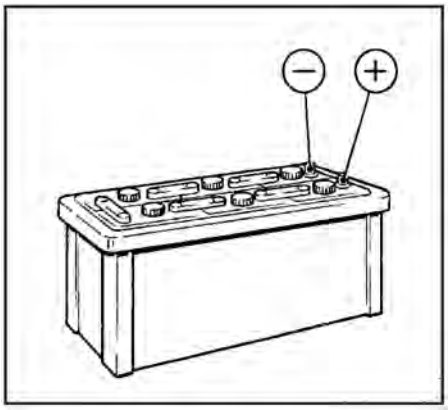
If from the battery manufacturer not otherwise mentioned.

8.8.1 Battery

8.8.1.1 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. 8.8.1.1-1: Battery

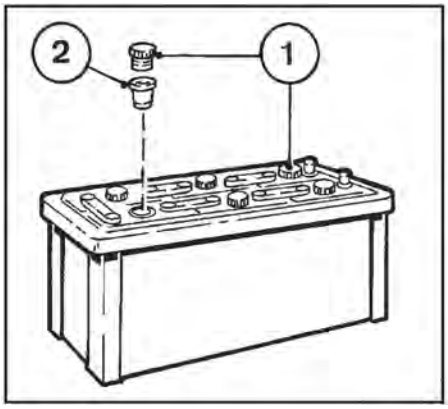


8.8.1.2 Check electrolyte level

- 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.

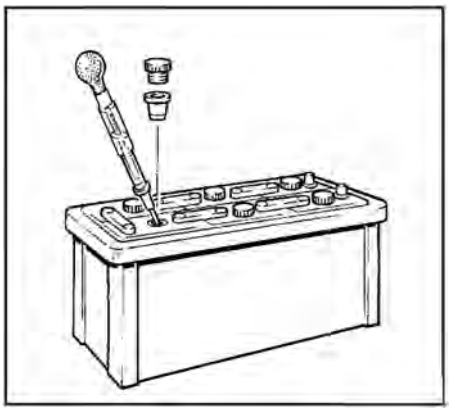
Fig. 8.8.1.2-1: Battery



8.8.1.3 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. 8.8.1.3-1: 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!

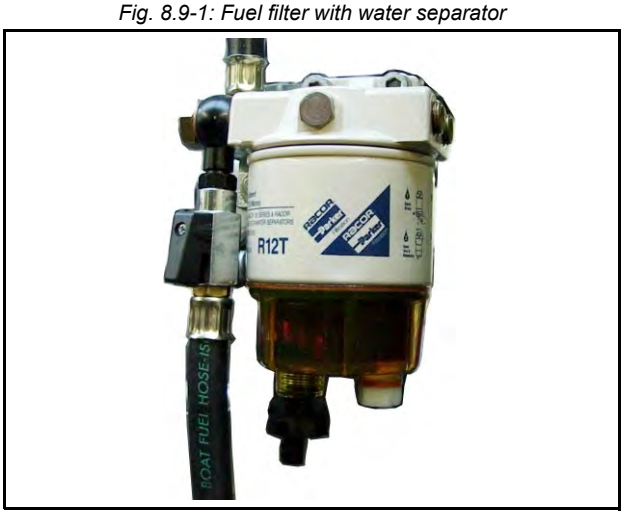
Do not rest tools on the battery!

8.9 Fuel circuit maintenance

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. 8.9-1: Fuel filter with water separator



8.10 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):

Start the fuel pump

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

Note:

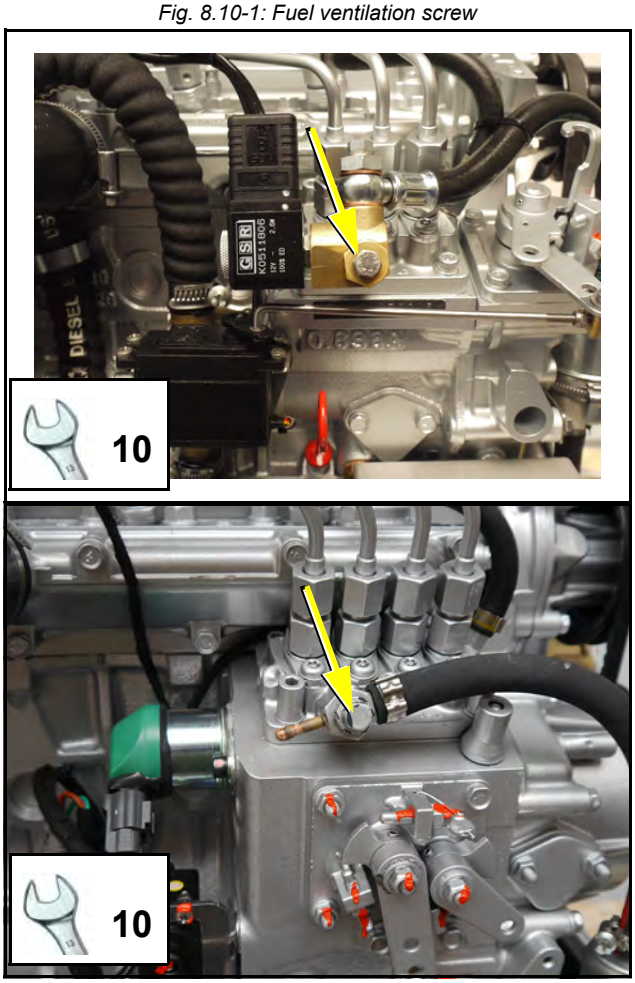
Ventilation Screw

1. Open the ventilation screw located at the fuel solenoid valve.

Generators without fuel solenoid has the ventilation screw directly at the high pressure fuel pump inlet.

Set the fuel pump in the fpConrol menue to „1“. Open the ventilation screw. A large cloth or paper tissue must be laid beneath the connection to prevent escaping fuel running into the capsule. If the fuel runs out without air bubbles, then the ventilation screw can be closed.

Fig. 8.10-1: Fuel ventilation screw



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

Note:

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

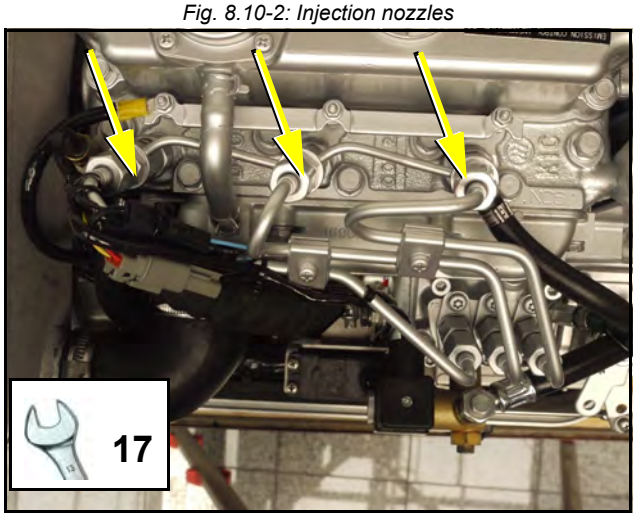
2. Switch the panel „OFF“.

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

Injection nozzles

3. Pressing the starter button can now start the machine. The machine should start after a short period.
4. 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.
5. Switch main switch "OFF".

Fig. 8.10-2: Injection nozzles



8.11 Replacement of the fuel filter

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. 8.11-1: Fuel Filter

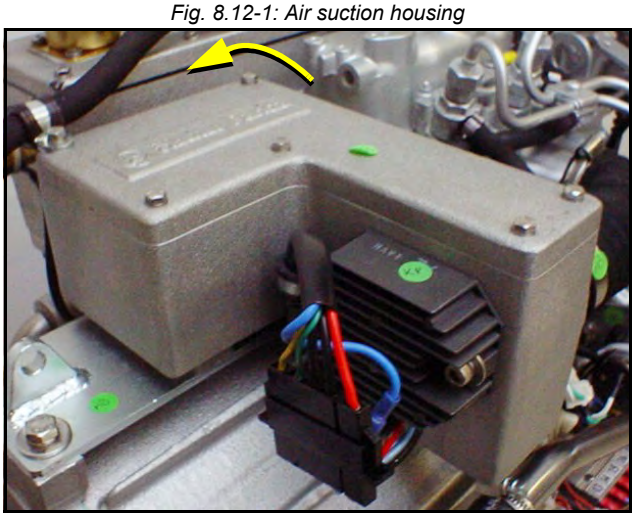
8.12 Air circuit maintenance

8.12.1 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. 8.12-1: Air suction housing



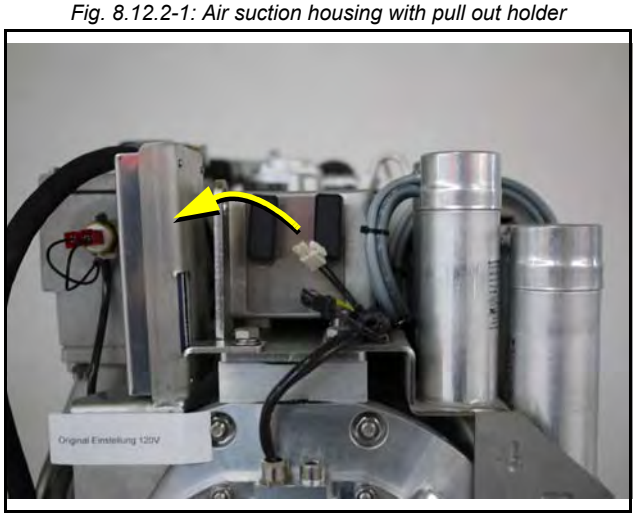
2. Change the air filter mat.
3. Close the suction air housing.

Fig. 8.12-2: Opened air suction housing

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

1. Air filter housing with pull out holder.

Fig. 8.12.2-1: Air suction housing with pull out holder

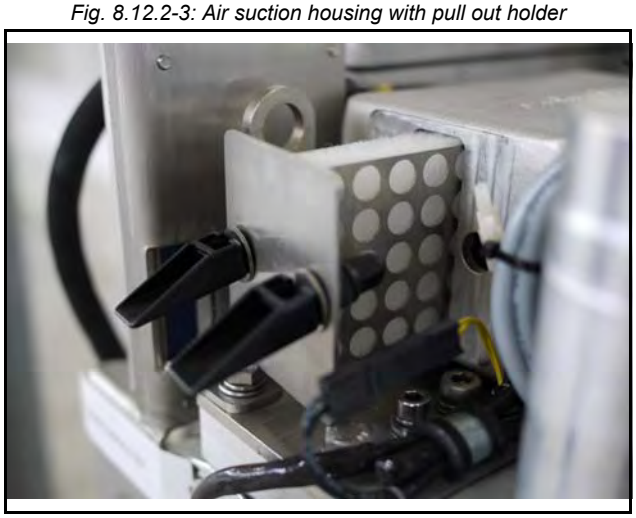


2. Tip the two fasteners 90°.

Fig. 8.12.2-2: Air suction housing with pull out holder

3. Pull the filter mat holder out.

Fig. 8.12.2-3: Air suction housing with pull out holder



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

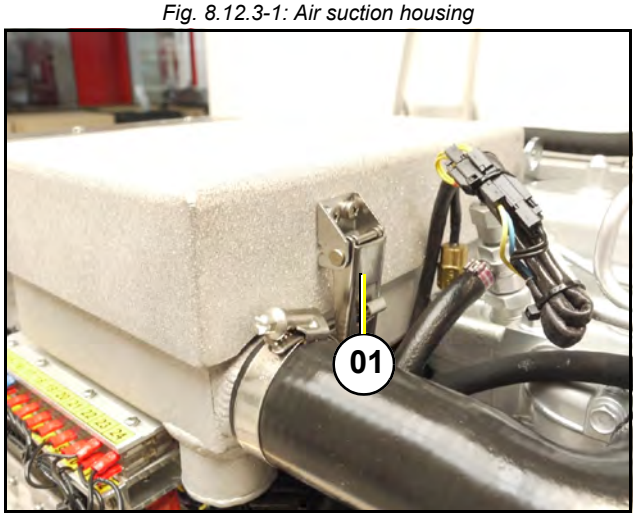
Fig. 8.12.2-4: Air suction housing with pull out holder

8.12.3 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

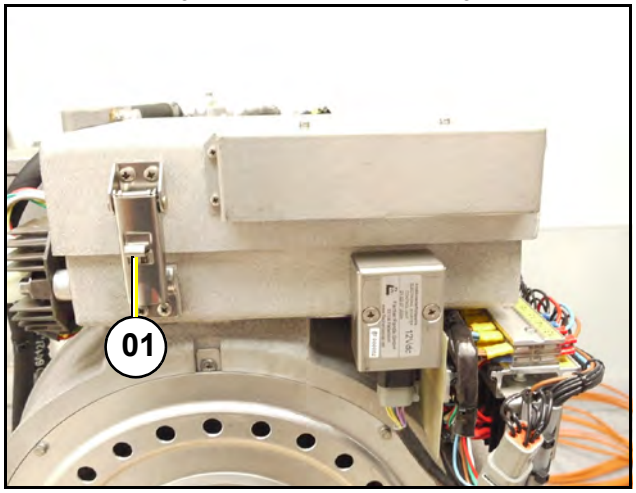
Fig. 8.12.3-1: Air suction housing



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

   01. Closure

Fig. 8.12.3-2: Air suction housing



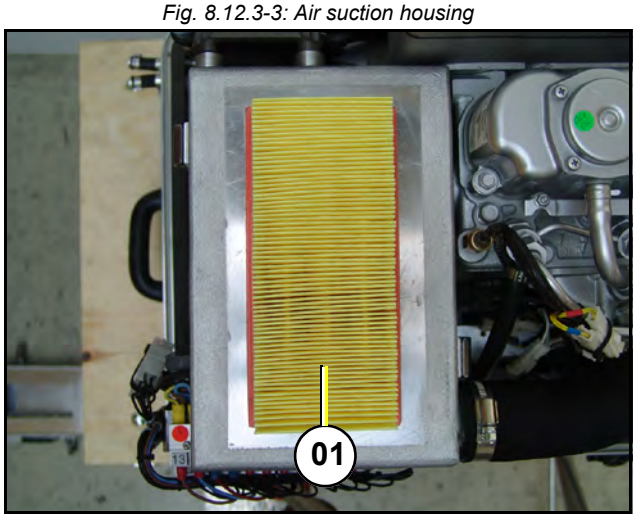
3. Open the air housing by pulling the cover.
4. Lift out the air filter element of the cover of the air filter housing.

   01. Air filter

5. Replace cover in reverse procedure.

Sample picture

Fig. 8.12.3-3: Air suction housing



8.13 Coolant circuit maintenance

8.13.1 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!

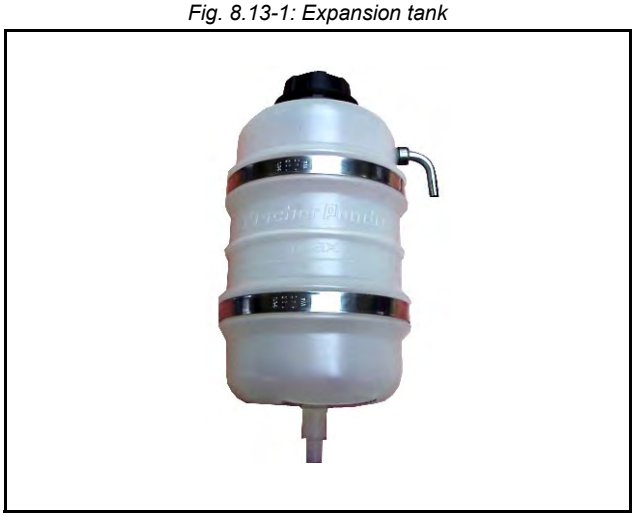
Pay attention that the external coolant expansion tank is connected with the generator by the intended connection point.

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

Attention

Expansion tank

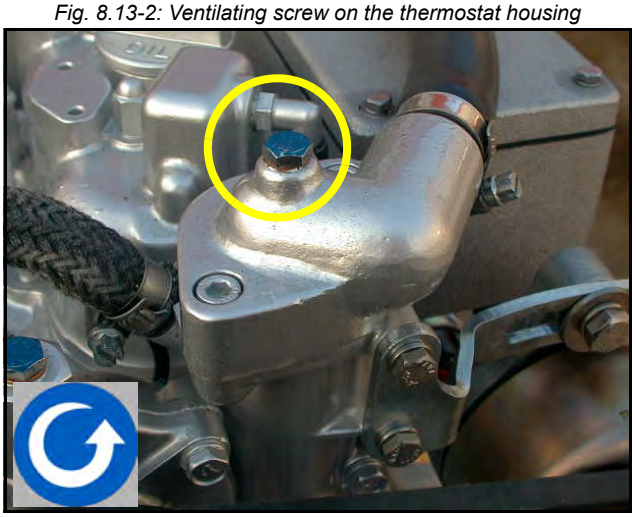
Fig. 8.13-1: Expansion tank



6. Open the ventilating screw on the thermostat housing
   Use spanner size 10 mm.

7. Pour cooling water into the external expansion tank
8. 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.
9. Run the generator for approx. 60 Seconds, then switch off
10. Refill cooling water via the expansion tank.
11. The expansion tank is connected to the generator by two hoses.

Fig. 8.13-2: Ventilating screw on the thermostat housing



The external expansion 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.

12.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.

8.14 V-belt replacement for the internal cooling water pump

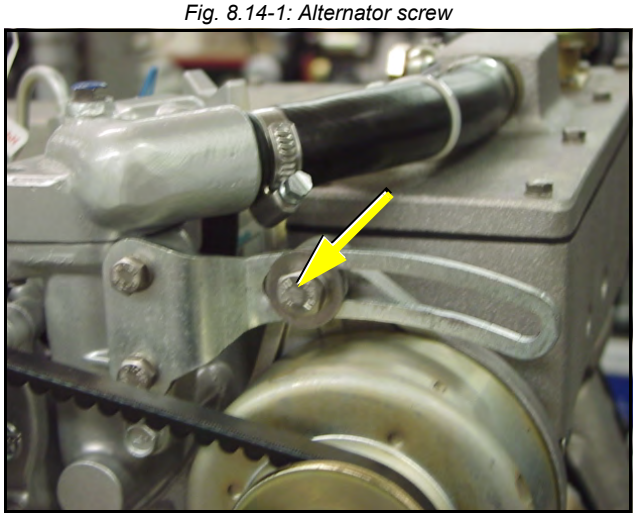
The V-belt wears in a short time due to high ambient temperature within the closed capsule (approx. 85 °C). The air in the generator capsule is not only warm but also very dry. Therefore it is possible, that the „softener“ in the rubber composers wear after a very short time of operation.

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

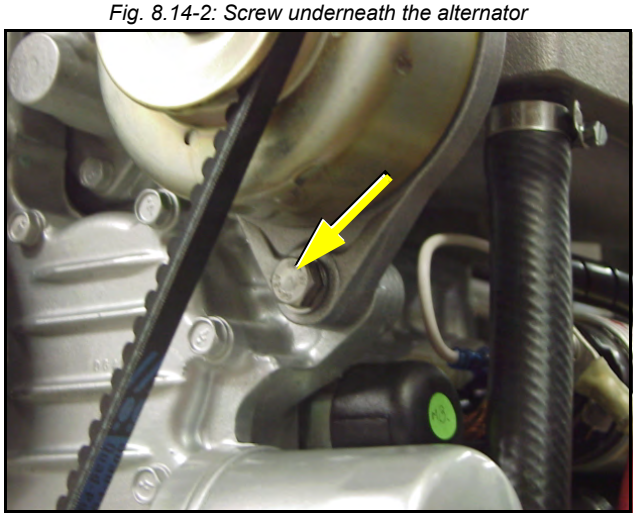
Fig. 8.14-1: Alternator screw



2. Loose the screw underneath the alternator.

Sample picture

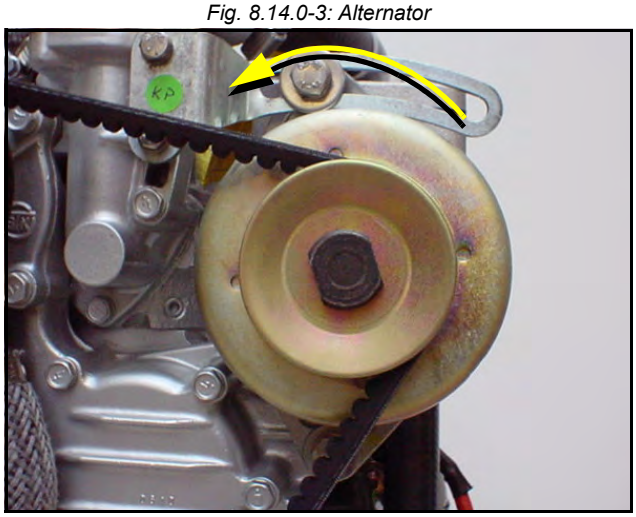
Fig. 8.14-2: Screw underneath the alternator



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

Sample Picture

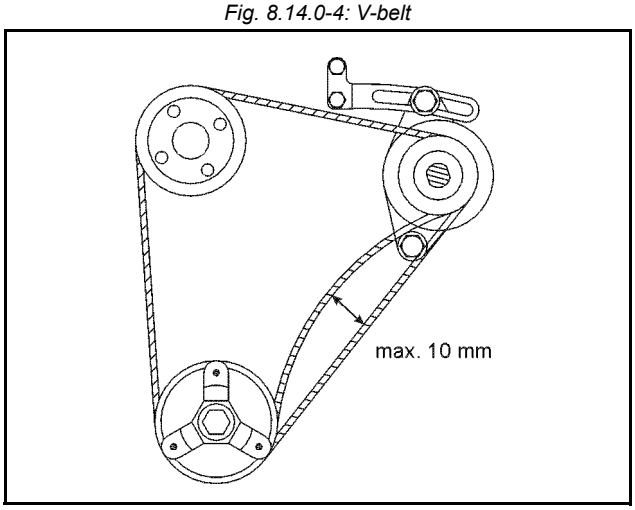
Fig. 8.14.0-3: Alternator



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. 8.14.0-4: V-belt



8.15 The raw water circuit

8.15.1 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. 8.15.1-1: Raw water filter

8.16 Causes with frequent impeller waste

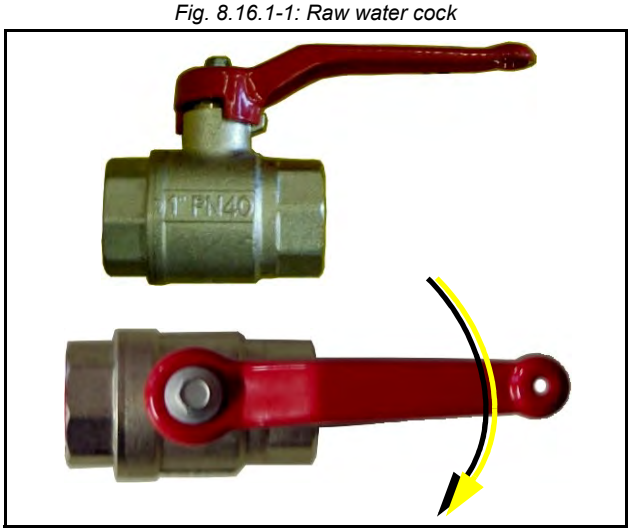
The impeller of the cooling water pump must be regarded as wearing part. The life span of the impeller can be extremely different and exclusively depends on the operating conditions. The cooling water pumps of the PANDA generators are laid out in such a way that the number of revolutions of the pump 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")

8.16.1 Replacement of the impeller

Close the raw water stop cock.

Representative picture

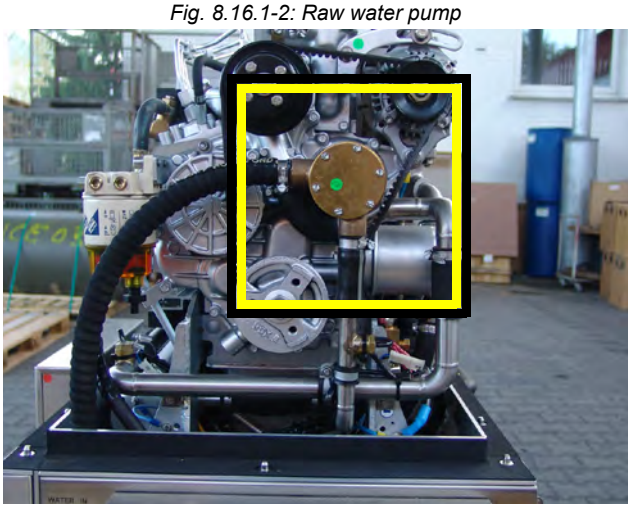
Fig. 8.16.1-1: Raw water cock



Raw water pump on the front side of the genset.

Representative picture

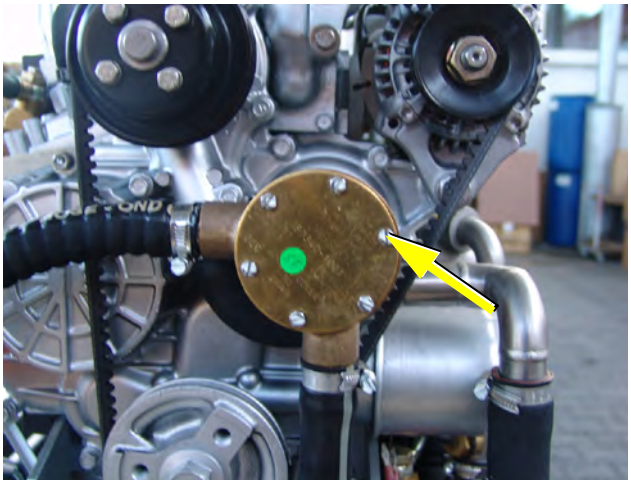
Fig. 8.16.1-2: Raw water pump



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

Representative picture

Fig. 8.16.1-3: Cover raw water pump

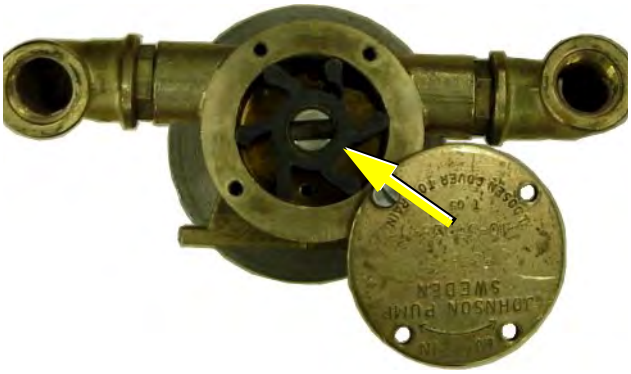


Pull to the impeller with a multigrip pliers of the wave.

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

Representative picture

Fig. 8.16.1-4: Impeller pump



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. 8.16.1-5: Impeller

Fastening the cover and use a new seal.

Representative picture

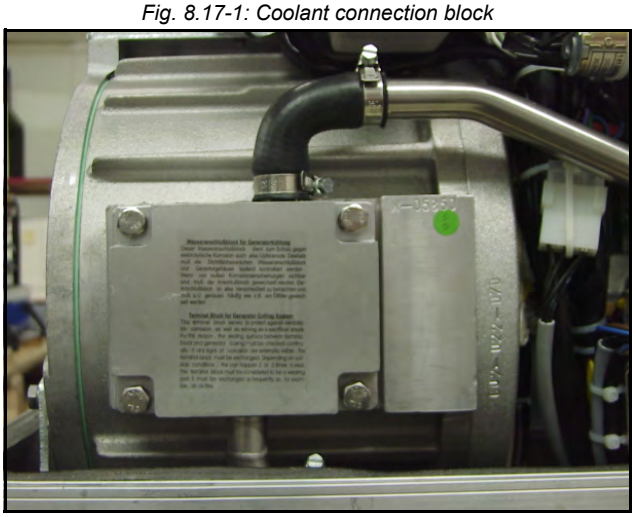
Fig. 8.16.1-6: Gasket

8.17 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. 8.17-1: Coolant connection block



9. Generator Failure

9.1 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.

9.2 Safety instructions for this chapter

see “Safety Instructions - Safety First!” on Page 16.

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:

Warning!: Risk of injury

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

Do not run the generator with removed sound isolation cover.

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

Warning!: Risk of injury

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

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

Warning!: Danger of fire

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

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

9.3 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 80% of the nominal load.

Warning!:

9.4 Starting problems

9.4.1 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

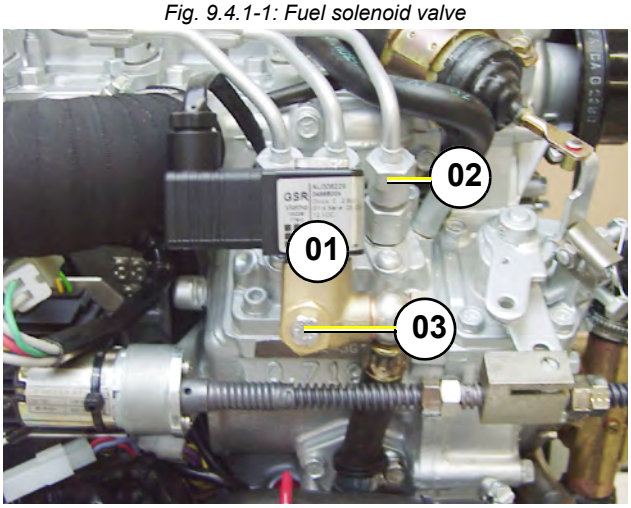
Example

01. Fuel solenoid valve

02. Fuel injector nozzles

03. Ventilation screw

Fig. 9.4.1-1: Fuel solenoid valve

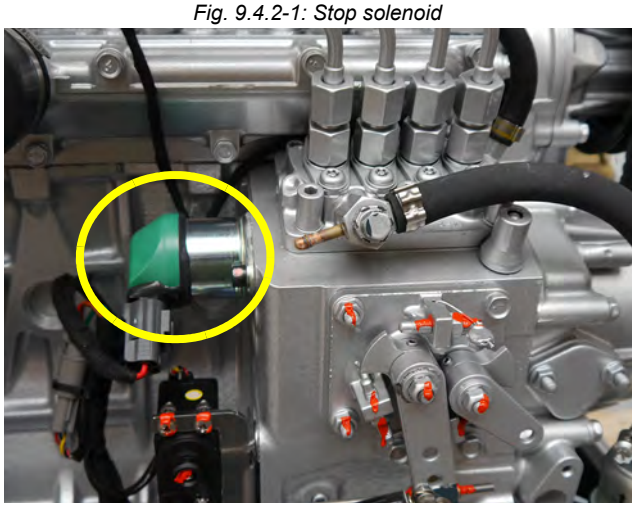


9.4.2 Stop solenoid

Stop solenoid for engine stop

Example

Fig. 9.4.2-1: Stop solenoid



9.4.3 Clogged fuel filter

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

Replace the filter element, please refer to section 8.11, “Replacement of the fuel filter,” on page 91

01. Filter element

02. Pre filter S1 filter element

Fig. 9.4.3-1: Fuel filter

10. Tables

10.1 Technical data

Fig. 10.1-1: Technical data

	AGT 4000	AGT 6000	AGT 8000	AGT 10000	AGT 11000
Model	EA300	Z482	D722	D722	D902
Type	Vertical, water-cooled, 4-cycle diesel engine				
Number of cylinder	1	2	3	3	3
Bore	75 mm	67 mm	67 mm	67 mm	72 mm
Stroke	70 mm	68 mm	68 mm	68 mm	73,6 mm
Total displacement	309 cm³	479 cm³	719 cm³	719 cm³	898 cm³
Combustion chamber	Spherical Type (ETVCS)				
SAE NET Intermittent (SAEJ1349)	5,1 kW	9,3 kW / 3600 rpm	14,0 kW / 3600 rpm	14,0 kW / 3600 rpm	17,5 kW / 3600 rpm
SAE NET Continuous (SAEJ1349)		8,1 kW / 3600 rpm	12,2 kW / 3600 rpm	12,2 kW / 3600 rpm	15,2 kW / 3600 rpm
Maximum bare speed	2800 rpm	3800 rpm	3800 rpm	3800 rpm	3850 rpm
Minimum bare idlingspeed	0,16 - 0,20 mm	900 to 1000 rpm			
Order of firing	58,8 - 63,7 Nm	1-2	1-2-3		
Compression ratio	--	23,5:1			24:1
Fuel	Diesel Fuel No. 2-D				
Lubrication (API classification)	above CF				
Lubiration capacity	1,3 l	2,5 l	3,8 l	3,8 l	3,7 l
Fuel consumption [1]	aprox. 0,42-1,12 l	approx. 0,6-1,7l	approx. 0,8-2,2 l	approx. 1,1-2,8 l	approx. 1,2-3,1 l
Oil consumption	max. 1 % of fuel consumption				
Dimensions (length x width x height)	423mm	341x389x520 mm	426x389x520 mm	426x389x520 mm	467x521x544 mm
Cooling water requirement for seawater circuit (Marine generators only)	16-28 l/min	16-28 l/min	16-28 l/min	16-28 l/min	16-28 l/min
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction				
Recommend starter battery size	12 V 55 Ah equivalent	12 V, 28 Ah equivalent	12 V, 36 Ah equivalent	12 V, 36 Ah equivalent	12 V, 52 Ah equivalent
Recommend cable cross size starter battery cable *Length 4 meter max.*	25 mm²	25 mm²	25 mm²	25 mm²	25 mm²
Max. exhaust back pressure	10,2 kPa 102 Millibar	9,3 kPa 93 Millibar	9,3 kPa 93 Millibar	9,3 kPa 93 Millibar	9,3 kPa 93 Millibar
Min. distance capsule bottem to waterlock	423mm	239mm	240mm	240mm	225mm

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

	AGT 13000	AGT 15000	AGT 18000	AGT 22000	AGT 25000
Model	D1105	D1305	V1505	V1505T	V2403
Type	Vertical, water-cooled, 4-cycle diesel engine				
Number of cylinder	3	3	4	4	4
Bore	78 mm	78 mm	78 mm	78 mm	87 mm
Stroke	78,4 mm	8 mm	78,4 mm	78,4 mm	102,4 mm
Total displacement	1123 cm³	1261 cm³	1498 cm³	1498 cm³	2434 cm³
Combustion chamber	Spherical Type (ETVCS)				
SAE NET Intermittent (SAEJ1349)	18,7 kW / 3000 rpm	21,0 kW / 3000 rpm	25,0 kW / 3000 rpm	31,3 kW / 3000 rpm	33,9 kW / 2700 rpm

	AGT 13000	AGT 15000	AGT 18000	AGT 22000	AGT 25000
SAE NET Continuous (SAEJ1349)	16,4 kW / 3000 rpm	18,2 kW / 3000 rpm	21,6 kW / 3000 rpm	27,2 kW / 3000 rpm	29,4 kW / 3700 rpm
Maximum bare speed	3200 rpm	3200 rpm	3200 rpm	3200 rpm	2900 rpm
Minimum bare idlingspeed	850 to 900 rpm	850 to 950 rpm	800 to 900 rpm		750 to 850 rpm
Order of firing	1-2-3		1-3-4-2		
Direction of rotation	Counter-clockwise (viewed from flywheel side)				
Injection pump	Bosch MD Type mini pump				
Injection pressure	13,73 MPa, 1991 psi (140 kgf/cm²)				
Injection timing (Before T.D.C.)	18°	19°	18°	18°	0,16 rad (9,25°)
Compression ratio		24:1	24:1	23,5:1	22:5
Fuel	Diesel Fuel No. 2-D				
Lubrication (API classification)	above CD	above CF	above CD	above CD	above CF
Lubiration capacity	5,1 l	5,7 l	6,0 l	6,7 l	9,5 l
Fuel consumption [1]	approx. 1,4-3,6 l	approx. 1,6-4,2l	approx. 1,9-5,0 l	approx. 2,3-6,2 l	approx. 2,6-7,0 l
Oil consumption	max. 1 % of fuel consumption				
Dimensions (length x width x height)	497,8x396x608,7 mm	497,6x396,0x590,1 mm	591,3x396,0x613,7 mm	591,3x439,2x613,7 mm	670,9x499,0x684,0 mm
Dry weight	93,0 kg	95,0 kg	110,0 kg	114,0 kg	184,0 kg
Cooling water requirement for seawater circuit (Marine generators only)	28-40 l/min	28-40 l/min	28-40 l/min	40-50 l/min	
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction				
Recommend starter battery size	12 V, 65 Ah equivalent	12 V, 70 Ah equivalent	12 V, 70 Ah equivalent	12 V, 70 Ah equivalent	12 V, 100 to 120 Ah equivalent
Recommend cable cross size starter battery cable *Length 4 meter max.*	25 mm²	25 mm²	25 mm²	25 mm²	70 mm²
Max. exhaust back pressure	10,7 kPa 107 Millibar	10,7 kPa 107 Millibar	10,7 kPa 107 Millibar	10,7 kPa 107 Millibar	10,7 kPa 107 Millibar
Min. distance capsule bottem to waterlock			170mm	170mm	170mm

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

The technical data of the generator and the rectifier unit can be read at the appropriate type plates.

ATTENTION!

10.2 Engine oil

10.2.1 Engine oil classification

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

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

See technical data for the specificated engine oil

Notice!

Fig. 10.2.1-1: Engine oil type.

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

10.3 Coolant specification

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

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

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

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

10.3.1 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

10.4 Fuel

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

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

10.5 CO_2 balance derived from the emission measuring cycle for engines in accordance with 2016/1628 EC

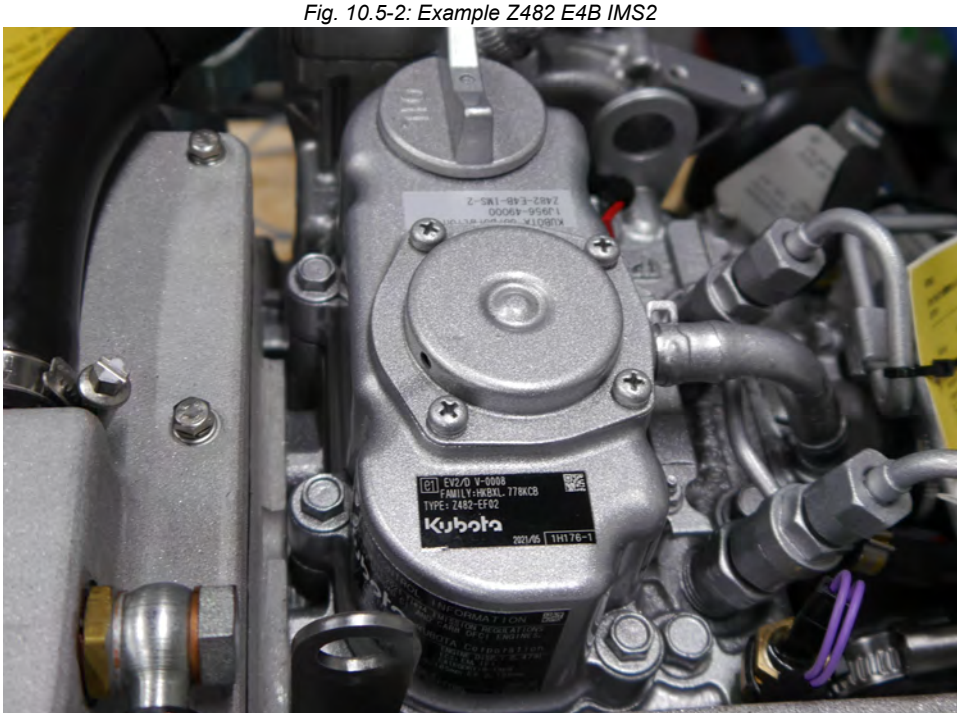
The following CO_2 balance derived from the emission measuring cycle is applicable, with regard to the engine, to generators that are approved in accordance with 2016/1628 EC:

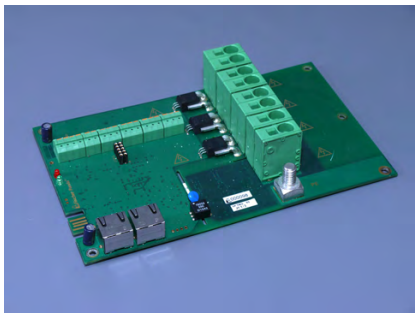
Fig. 10.5-1: CO_2 balance derived from the emission measuring cycle for engines in accordance with 2016/1628 EC

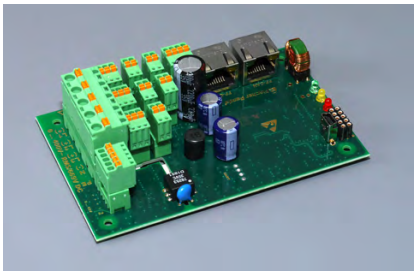
CO_2 balance derived from the emission measuring cycle				
Engine	Engine Category	Engine family type	Type approval	CO_2 balance - Test cycle [g/kwh]
Z482	NRE-v-2	HKBXL.778KCB	e1*2016/1628*2016/1628EV2/D*0008*00	1019.8
D722	NRE-v-2	HKBXL.778KCB	e1*2016/1628*2016/1628EV2/D*0008*00	
Z602	NRE-v-2	HKBXL.898KCB	e1*2016/1628*2016/1628EV2/D*0009*00	1047.4
D902	NRE-v-2	HKBXL.898KCB	e1*2016/1628*2016/1628EV2/D*0009*00	
D1105	NRE-v-2	HKBXL01.5BCB	e1*2016/1628*2016/1628EV2/D*0010*04	1018.0

The emission decal on the valve cover indicates the emission homologation to which the engine belongs.

Fig. 10.5-2: Example Z482 E4B IMS2







Panda fpControl Manual

Current revision status

	Document
Current:	Panda_fpControl_eng.R01_21.3.24
Replaces:	

Revision	Page

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11.1 Download

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

Other available languages of this manual can be downloaded under the link below.

Vous trouvez d’autres langues disponibles de ce manuel en suivant le lien ci-dessous:

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http://www.fischerpanda.de/gensetdocs_eng.htm

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12. Panda fpControl Safety Instructions

12.1 Personnel

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

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

12.2 Safety instructions

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

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

Note!

An external signal may trigger an automatic start-up.

Warning! Automatic start-up

The generator must not be operated with the cover removed.

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

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

Warning!

Electric voltage - Deadly Danger!

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

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

Warning! Electrical voltage

Disconnect battery before working on the generator

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

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

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

Attention!

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

Note!

12.3 Function description

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

12.4 Proper use

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

13. Panda fpControl

13.1 Components of the fpControl

13.1.1 fpControl - CP-G

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

Display and Control Element of the fpControl

The fpControl CP-G is the display and control element

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

Fig. 13.1.1-1: Control Panel - Generator

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

Storage temperature	-10 °C – +60 °C
Operating temperature	-20 °C – +50 °C
Supply voltage	12 V or 24 V, automotive (12–13.5 V or 24–28 V)
Rated current consumption	< 21 mA @ 12 V (without display heating) < 18 mA @ 24 V (without display heating)
Max. current consumption	120 mA (with display heating)
Current consumption in Standby mode / Off	0 A
Housing	ABS plastic
Protection class	IP30 (RJ45 plug plugged in)
Overall dimensions	120 x 65 x 35 mm (L x B x H), Cutout: 109,2 x 54,5 mm
Weight	0.11 kg
FP part number	0029338
Circuit board	FP1403

13.1.2 fpControl - GC-S

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

Main module of the fpControl.

Fig. 13.1.2-1: Generator Control - Servo

The module contains the control electronics.

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

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

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

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

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

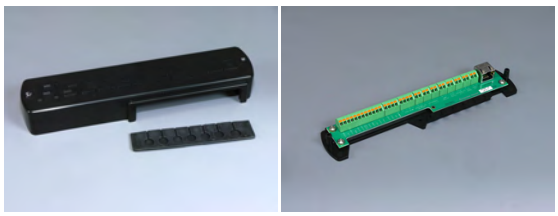
Ambient temperature	-40 °C – +125 °C (max.)
Operating temperature	90 °C
Supply voltage	12 V or 24 V, automotive (12–13.5 V or 24–28 V)
Rated current consumption	< 66 mA @ 12 V < 77 mA @ 24 V
Housing	Automotive, PBT GF30
Protection class	IP65
Overall dimensions	117 mm x 136 mm (inkl. Stecker)
Weight	0.25 kg
FP part number	0029554
Circuit board	FP1704

13.1.3 fpControl - CB-G

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

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

Fig. 13.1.3-1: Connection Box - Generator



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

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

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

Note:

13.1.3.1 fpControl CB-G connections

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

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

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

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

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

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

Fig. 13.1.4-1: fpControl CAN Interface - SAE J1939

13.1.4.1 fpControl CI-SAE J1939 connections

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

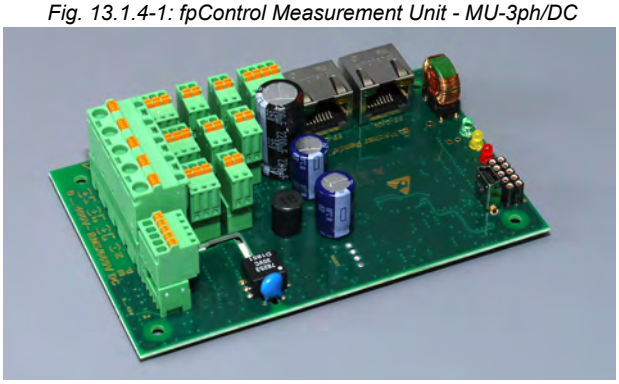
13.1.4.2 Environmental specifications, physical data of the fpControl CI-SAE J1939

Storage temperature	-30 °C – +60 °C
Operating temperature	-20 °C – +50 °C
Supply voltage	12 V or 24 V, automotive (12–13.5 V or 24–28 V)
Rated current consumption	< 32 mA @ 12 V < 17 mA @ 24 V
Housing	ABS plastic
Protection class	IP30
Overall dimensions	151 x 80 x 60 mm (L x B x H)
Weight	0.25 kg
FP part number	0006107
Circuit board	FP1409

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

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

Fig. 13.1.4-1: fpControl Measurement Unit - MU-3ph/DC



13.1.4.4 fpControl MU-3ph/DC connections

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

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

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

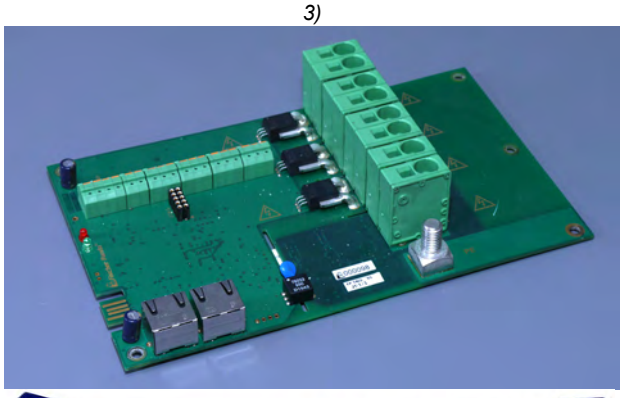
13.1.5 fpControl Measurement Unit - MM-3 (fpControl MM-3)

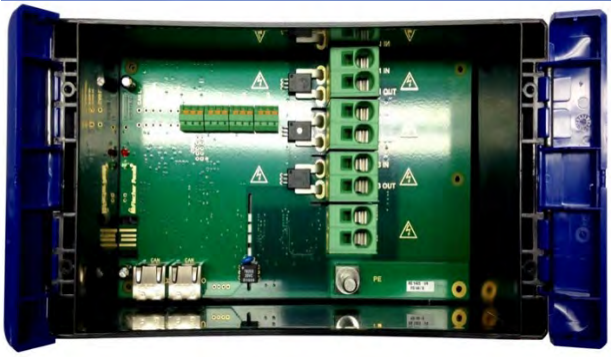
The »fpControl Measurement Unit - MU-MM-3/DC« is used for AC generators. The module measures the 3-phase AC voltage and three times the AC current. Current measurement is performed by the module directly by means of three internal current sensors. The measuring range is 65 A per phase. Higher currents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

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

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

Fig. 13.1.5-1: fpControl Measurement Unit - MM-3 (fpControl MM-3)





fpControl MM-3 connections

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

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

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

13.2 Installation

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

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

13.2.2 Installation of the Connection Box fpControl - CB-G

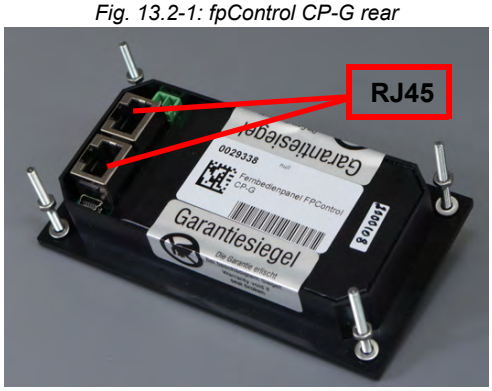
The connection box is pre-installed. External components are connected in accordance with the installation manual and the circuit diagram of the fpControl generator.

13.2.3 Installation of the fpControl - CP-G

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

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

Fig. 13.2-1: fpControl CP-G rear



13.3 Operation

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

Fig. 13.3-1: fpControl CP-G front with buttons

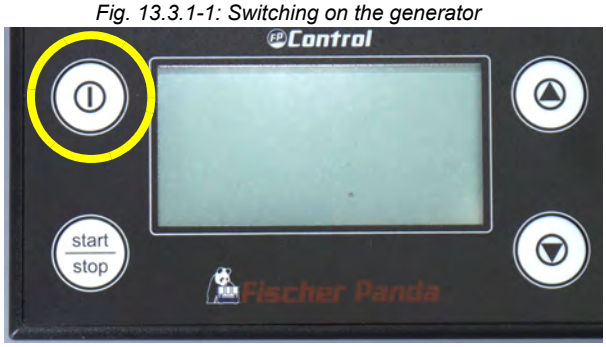
13.3.1 Switching on the generator

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

The fpControl Generator thereby switches to "Standby Mode".

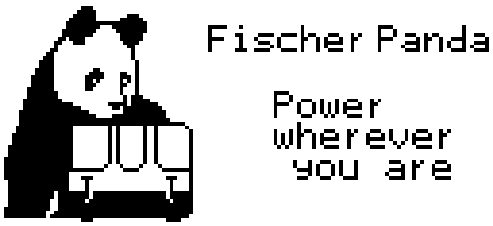
If automatic starting is activated at the menu, the generator can henceforth be started by means of an external signal.

Fig. 13.3.1-1: Switching on the generator



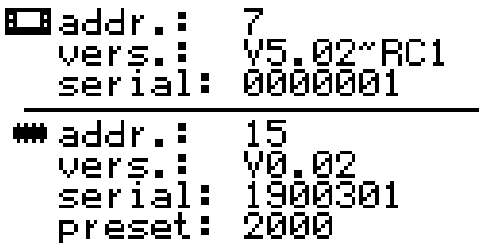
The CP-G Panel displays the home page for two seconds.

Fig. 13.3.1-2: Home Page



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

Fig. 13.3.1-3: Address Page

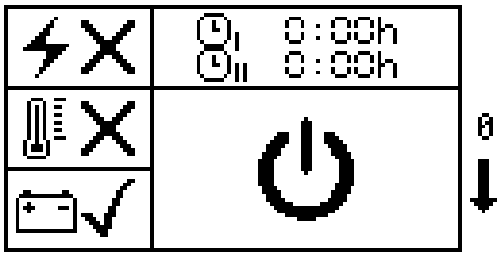


At the end of the power-on routine, the CP-G displays the first overview page.

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

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

Fig. 13.3.1-4: Overview Page 1



13.3.1.1 Overview page with Autostart activated

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

Warning! Autostart

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

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

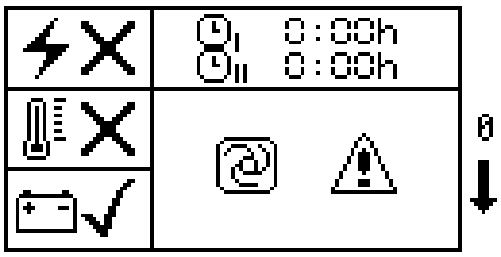
If the generator is operated by Autostart and is stopped manually, the Autostart is set to "off".

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

The first overview page shows if the Autostart is active.

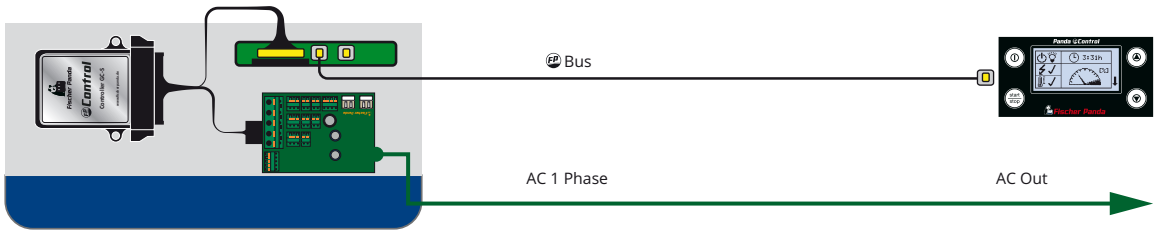
Overview Page 1 with Autostart function activated.

Fig. 13.3.1-1: Overview Page 1 with Autostart

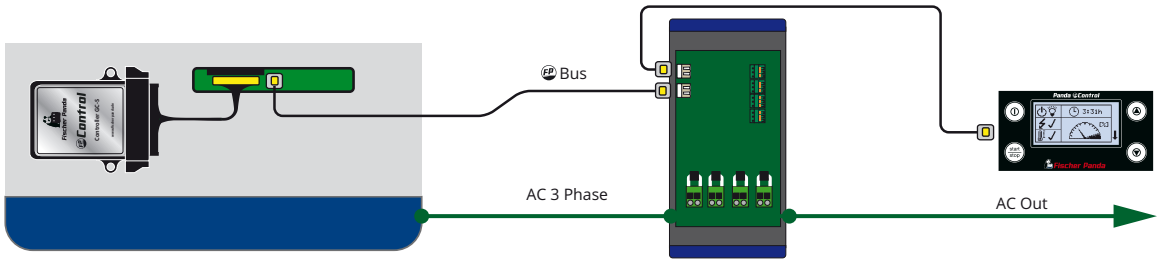


13.3.2 The fpControl VCS overview pages

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



Fischer Panda Asynchronous Generator



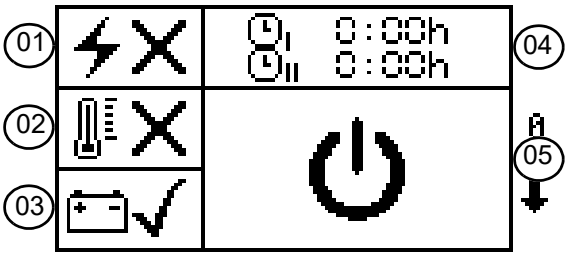
Fischer Panda Generator

Overview Page 1:

01. Generator Status (on/off)
02. AC OK
03. Temperature of the generator (OK/Error)
04. Operating hours of the generator
05. Info screen

Overview Page 1 is the same in all languages.

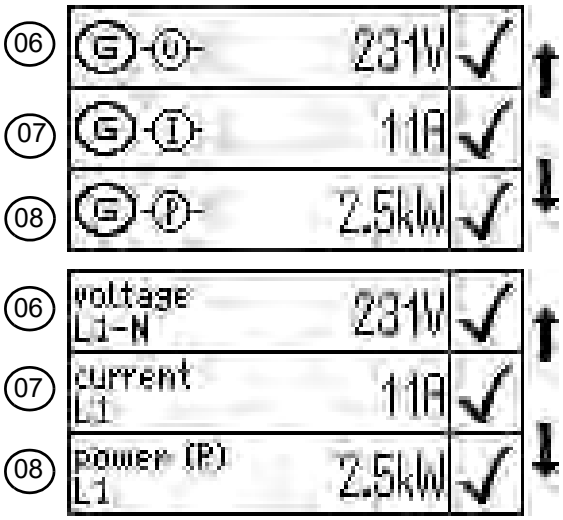
Fig. 13.3.2-1: Symbols used - Overview Page 1



Overview Page 2 (Generator):

06. Output voltage [V]
07. Generator current [A]
08. Generator active power [kW]

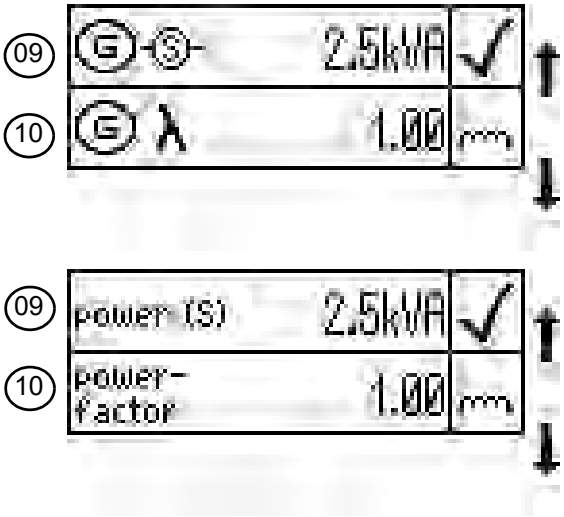
Fig. 13.3.2-2: Overview Page 2 Symbols/English



Overview Page 3 (Generator):

09. Generator apparent power [kVA]
10. Power Factor

Fig. 13.3.2-3: Overview Page 2 Symbols/English

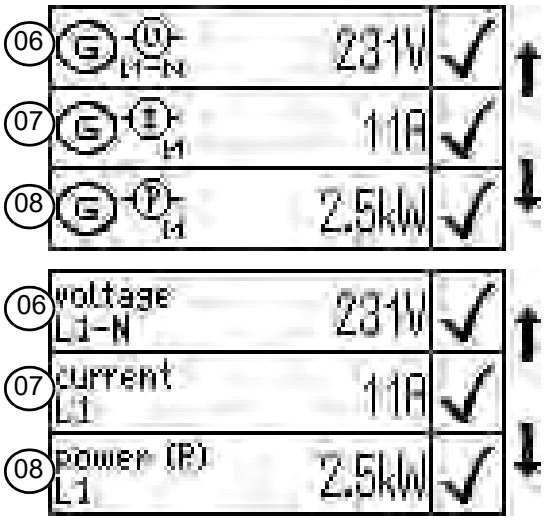


In the case of 3-phase generators, the voltage, the current and the electrical power are shown on separate pages. Each page shows the value of one of the three phases one below the other.

Note:

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

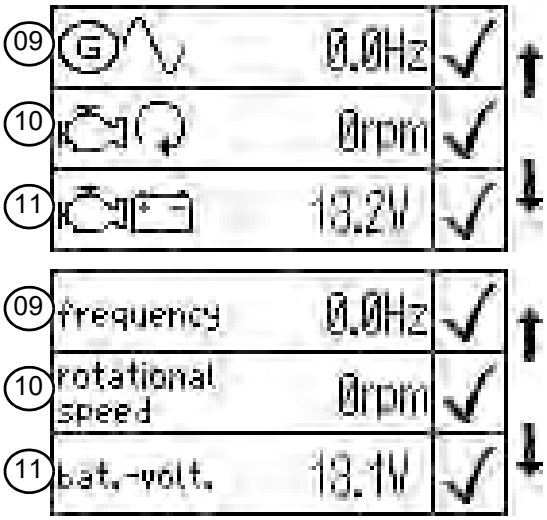
Fig. 13.3.2-4: Voltage display 3-P Symbols/English/



Overview Page 4:

09. Frequency of the generator [Hz]
10. Generator speed (r.p.m.)
11. Voltage of the starter battery [V]

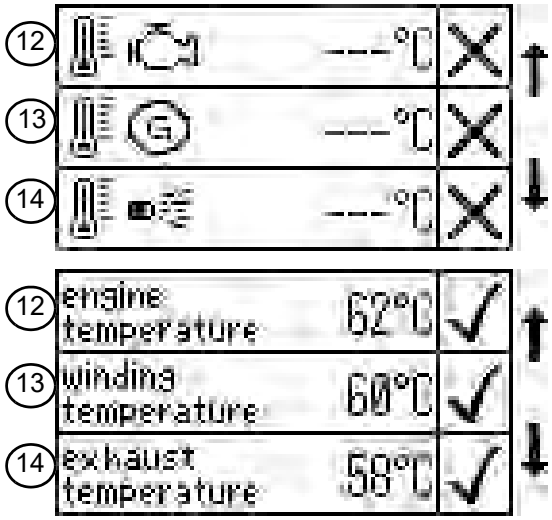
Fig. 13.3.2-5: Overview Page 3 Symbols/English



Overview Page 4:

12. Temperature of the cylinder head
13. Temperature of the generator winding
14. Temperature at exhaust manifold

Fig. 13.3.2-6: Overview Page 4 Symbols/English



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

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

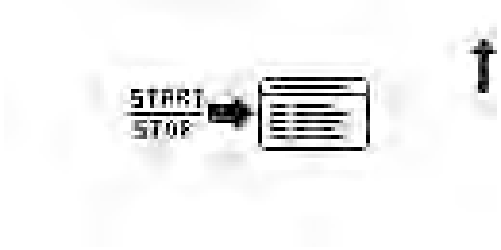
Note:

Final Overview Page:

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

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

Fig. 13.3.2-7: Final overview page



13.3.3 The fpControl AGT overview pages

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

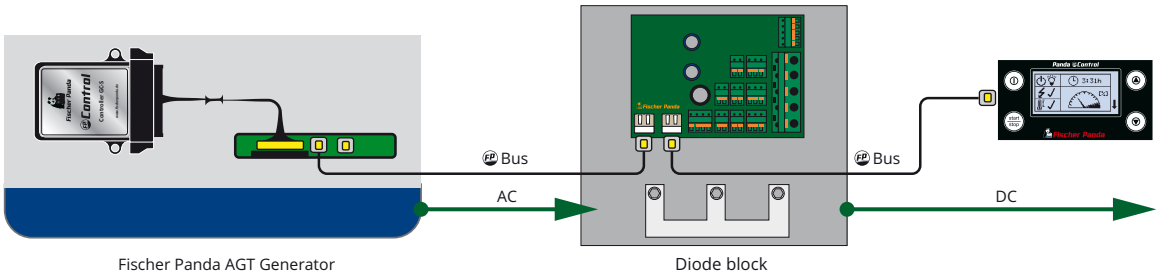
The battery-specific charging parameters are set by the Fischer Panda Service Point.

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

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

Warning:

.

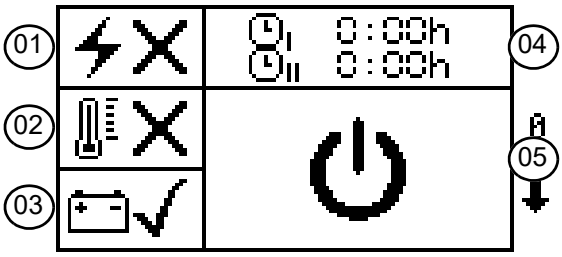


Overview Page 1:

01. Generator Status (on/off)
02. AC OK
03. Temperature of the generator (OK/Error)
04. Operating hours of the generator
05. Info screen

Overview Page 1 is the same in all languages.

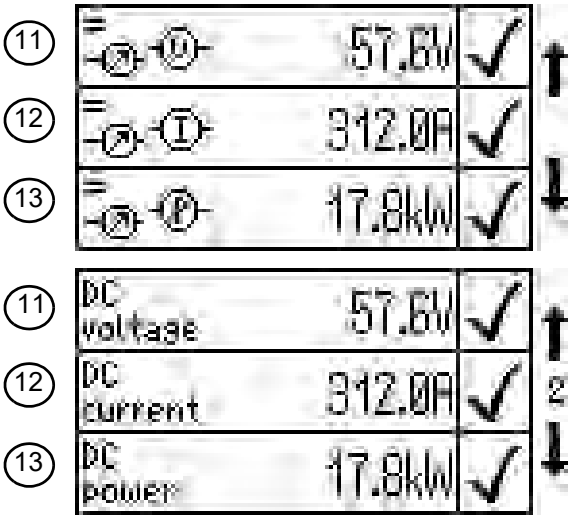
Fig. 13.3-1: Symbols used - Overview Page 1



Overview Page 2:

11. DC voltage [V]
12. DC current [A]
13. DC output [kW]

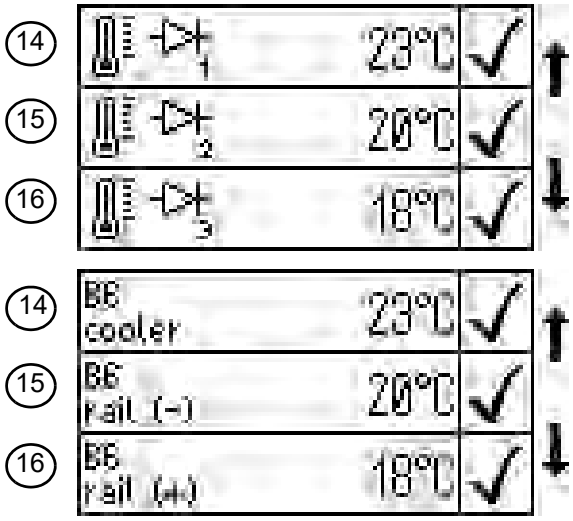
Fig. 13.3.3-2: Overview Page 2 Symbols/English



Overview Page 3:

14. Temperature of the diode plate fan
15. Temperature of the diode plate busbar (-)
16. Temperature of the diode plate busbar (+)

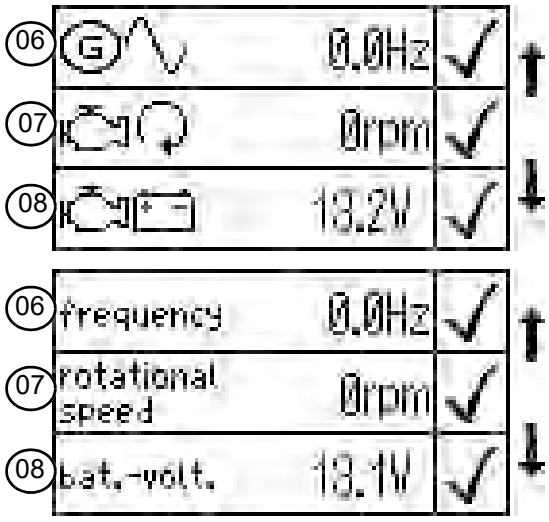
Fig. 13.3.3-3: Overview Page 3 Symbols/English



Overview Page 4:

06. Frequency of the generator [Hz]
07. Generator speed (r.p.m.)
08. Voltage of the starter battery [V]

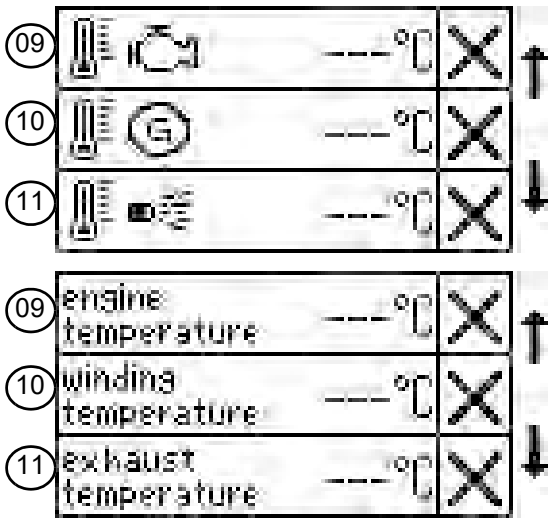
Fig. 13.3.3-4: Overview Page 4 Symbols/English



Overview Page 5:

09. Temperature of the cylinder head
10. Temperature of the generator winding
11. Temperature at exhaust manifold

Fig. 13.3.3-5: Overview Page 5 Symbols/English



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

Whether these pages are displayed automatically, always or

Note:

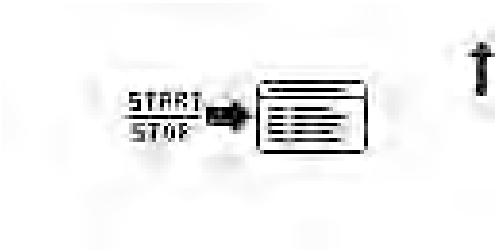
not at all can be set in the Panel menu.

Final Overview Page:

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

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

Fig. 13.3.3-6: Final overview page



13.3.3.1 Battery guard

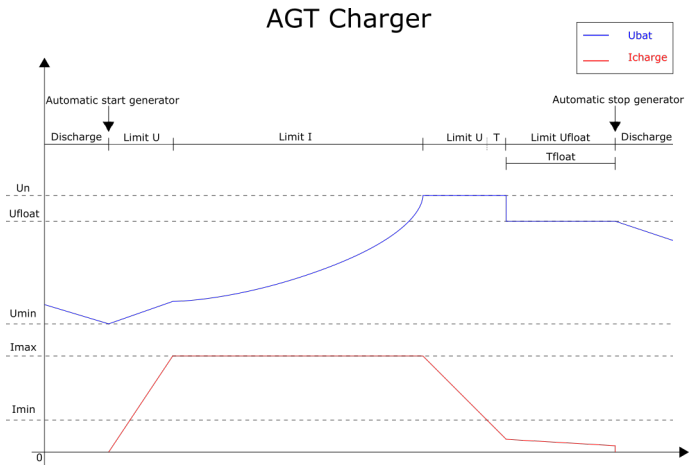
Generator must be in Standby mode (remote control panel switched on; generator off)

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

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

13.3.3.2 Functional description of the UIU charging process

Fig. 13.3.3.2-1: UIU charging curve of AGT-DC generator with FP Control



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

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

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

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

Parameters of the charging curve

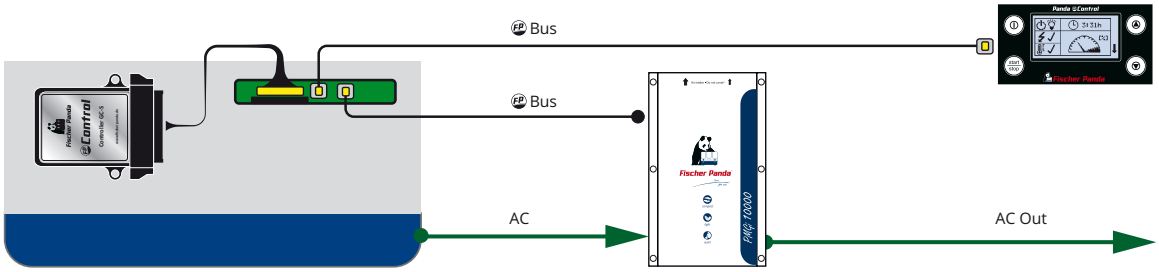
Parameter	Meaning	Corresponding menu item in "battery charger"
U_{min}	Battery voltage at which the battery charging generator is started automatically.	**min. voltage [V]**
U_n	Constant charging voltage (absorption voltage), until the charging current has dropped to the minimum value I_{min}.	**absorption-voltage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

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

NOTE:

13.3.4 The fpControl Inverter overview pages

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



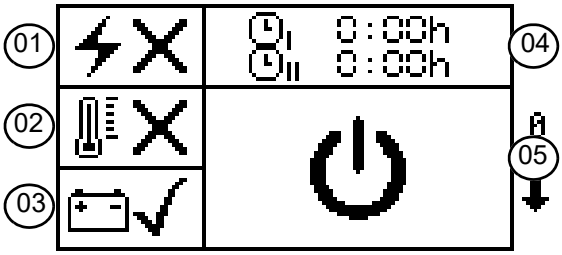
Fischer Panda Inverter Generator

Overview Page 1:

01. Generator Status (on/off)
02. AC OK
03. Temperature of the generator (OK/Error)
04. Operating hours of the generator (I. Operating hours total, II. Operating hours since last service)
05. Info screen

Overview Page 1 is the same in all languages.

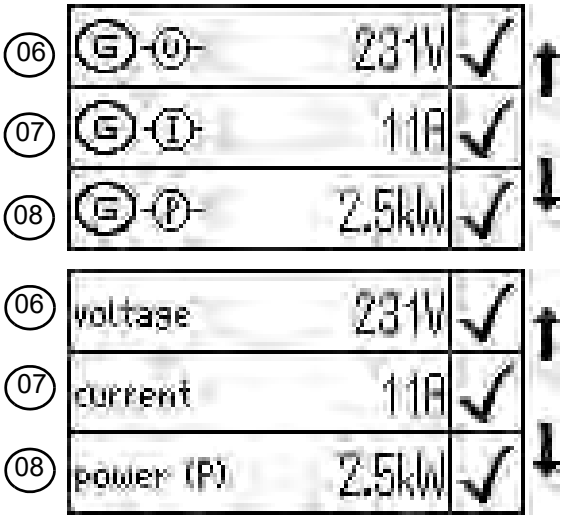
Fig. 13.3.4-1: Symbols used in Overview Page 1



Overview Page 2 (Generator):

06. Output voltage [V]
07. Generator current [A]
08. Generator active power [kW]

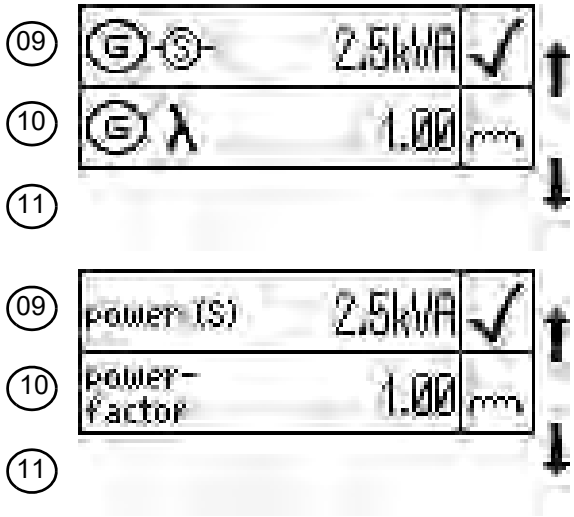
Fig. 13.3.4-2: Overview Page 2 Symbols/English



Overview Page 3:

09. Generator apparent power [kVA]
10. Power Factor

Fig. 13.3.4-3: Overview Page 3 Symbols/English

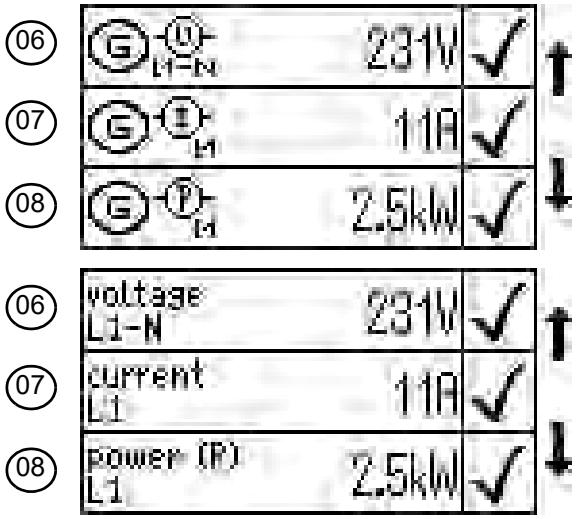


In the case of 3-phase generators, the voltage, the current and the electrical power are shown on separate pages. Each page shows the value of one of the three phases one below the other.

Note:

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

Fig. 13.3.4-4: Voltage display 3-P Symbols/English/



Overview Page 3:

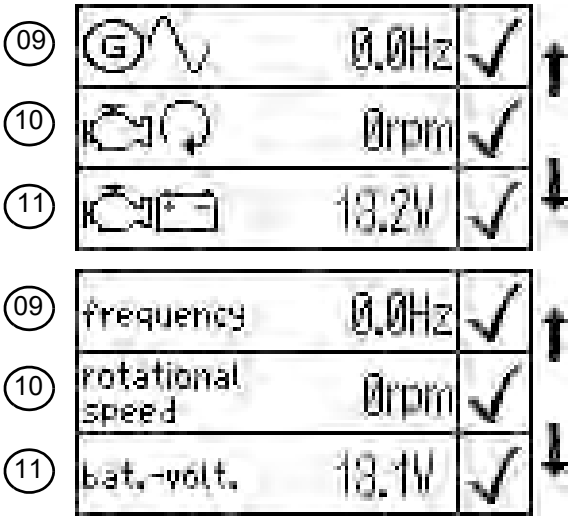
09. Phase/Phase voltage
10. Generator apparent power [kVA]
11. Power Factor

Fig. 13.3.4-5: Overview Page 3 Symbols/English

Overview Page 4:

09. Frequency of the generator [Hz]
10. Generator speed (r.p.m.)
11. Voltage of the starter battery [V]

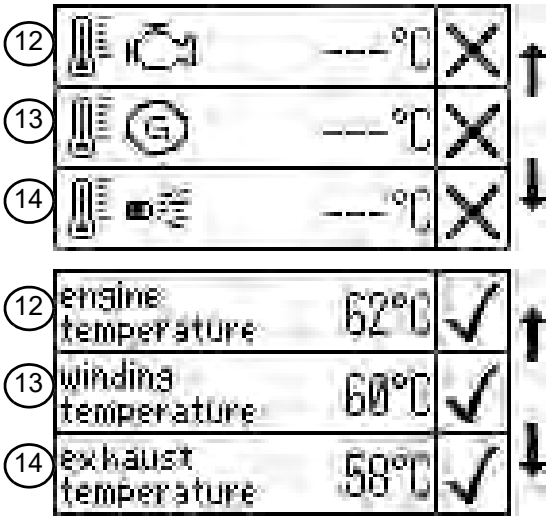
Fig. 13.3.4-6: Overview Page 4 Symbols/English



Overview Page 5:

12. Temperature of the cylinder head
13. Temperature of the generator winding
14. Temperature at exhaust manifold

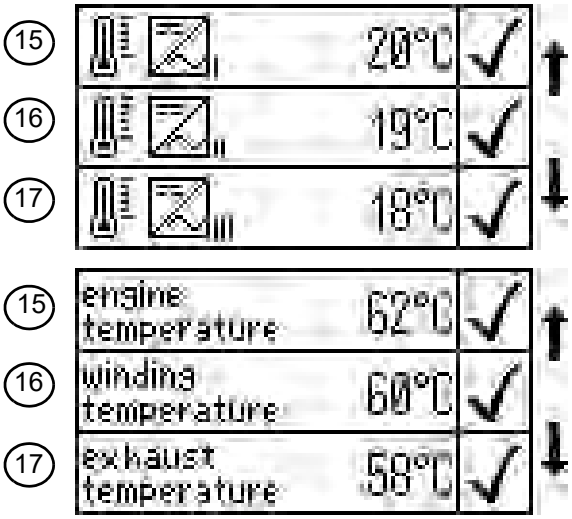
Fig. 13.3.4-7: Overview Page 5 Symbols/English



Overview Page 6:

15. Inverter Temperature L1
16. Inverter Temperature L2
17. Inverter Temperature L3

Fig. 13.3.4-8: Overview Page 6 Symbols/English



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

Whether these pages are displayed automatically, always or

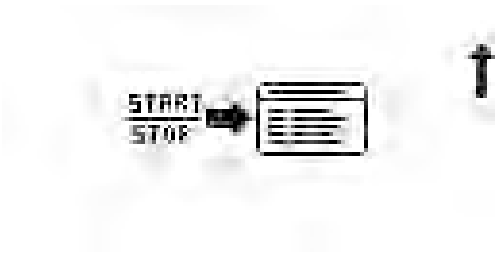
Note:

not at all can be set in the Panel menu.

Final Overview Page:

Proceed to this menu by pressing the Start/Stop - Enter key
Overview Page 5 is the same in all display modes/languages.

Fig. 13.3.4-9: Final overview page



13.4 Starting up the generator.

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

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

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

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

2. Check cooling water level.

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

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

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

4. Check raw water filter.

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

5. Visual inspection

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

6. Switch off loads.

   The generator should only be started without a load.

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

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

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

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

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

2. Check cooling water level.

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

3. Visual inspection

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

4. Switch off loads.

   The generator should only be started without a load.

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

13.4.3 Starting up the generator

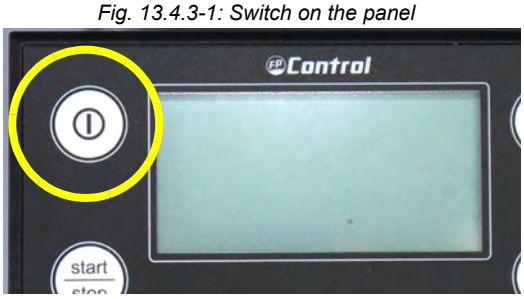
Deadly danger! - The generator can be equipped with an Autostart function. This means that the generator is started by an external signal. In order to prevent an inadvertent start-up, the starter battery must be disconnected before work on the generator may commence.

Warning! Automatic start-up

1. Switch on the fpControl CP-G

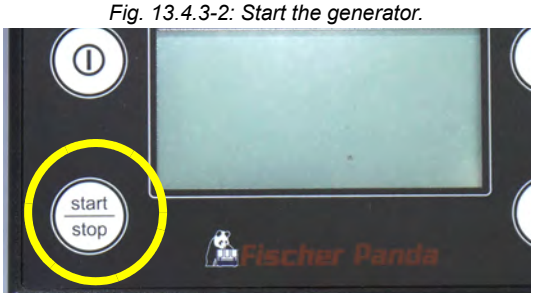
   The remote control panel is started by pressing the On/Off button. The On/Off button must be pressed until the Home page is displayed.

Fig. 13.4.3-1: Switch on the panel



2. Press the Start/Stop - Enter key

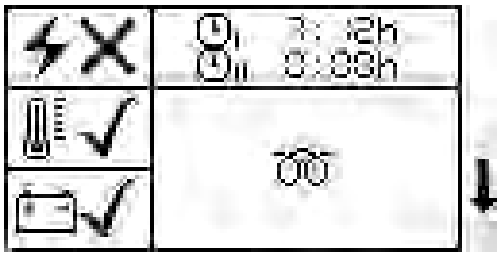
Fig. 13.4.3-2: Start the generator.



3. The fpControl preheats the diesel engine.

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

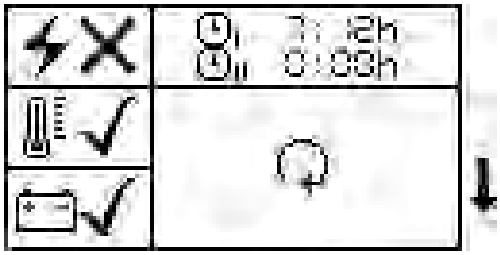
Fig. 13.4.3-3: Preheating



4. Starter on.

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

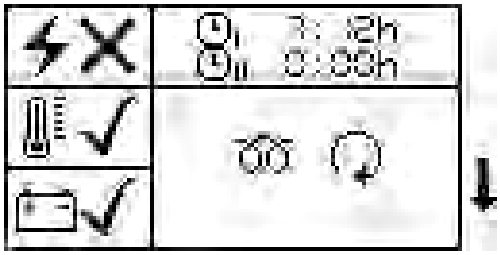
Fig. 13.4.3-4: Electric starter



5. Starter and preheater

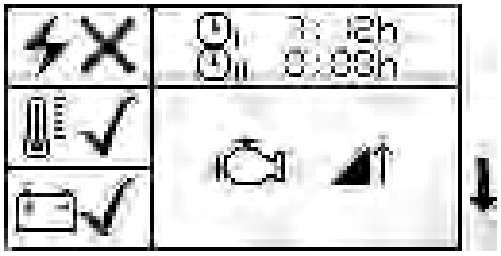
As soon as the high inrush current of the starter has dropped, preheating is switched on again.

Fig. 13.4.3-5: Preheating



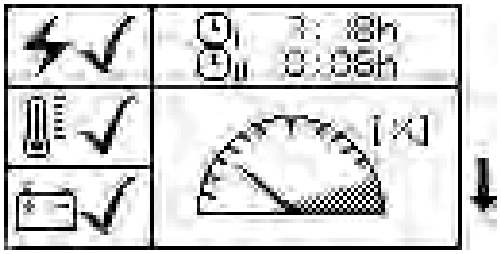
The engine idles for the first few seconds. Thereafter, the fpControl increases the speed to the operating speed and indicates this in the display.

Fig. 13.4.3-6: Increase revolutions



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

Fig. 13.4.3-7: AC OK



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

ATTENTION:

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

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

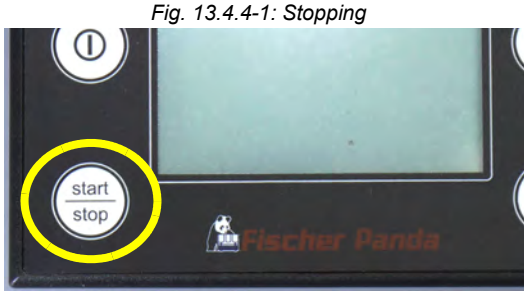
13.4.4 Stopping the generator

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

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

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

Fig. 13.4.4-1: Stopping



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

ATTENTION:

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

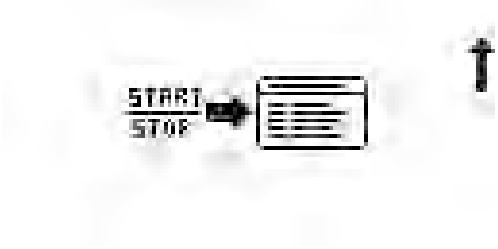
13.5 The Menu

The menu can be accessed from the final overview page.

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

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

Fig. 13.5-1: Menu entry symbols



13.5.1 Main Menu

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

Fig. 13.5.1-1: Main Menu

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

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

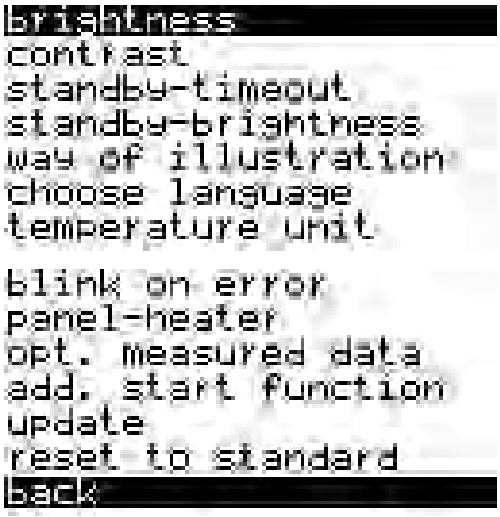
3. The "Service" sub-menu is blocked and can only be accessed by trained personnel and Fischer Panda employees.

4. Back - back to the overview pages

13.5.2 Sub-menu: "Panel"

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

Fig. 13.5.2-1: Sub-menu: Panel



1. Lighting
   - changes the brightness of the display in Normal mode.
2. Contrast
   - *changes the contrast of the display.*
3. Standby Time
   - *to set the time until the panel switches to Standby mode.*
4. Standby Lighting
   - *changes the brightness of the display in Standby mode.*
5. Display Mode
   - *changes the display mode of the overview pages.*
6. Language selection
   - *changes the language of the panel*
7. Temperature Unit

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

8. Audible alarm

   - *to activate the audible alarm in the event of faults*

9. Flashing when faulty

   - *to activate panel flashing in the event of faults*

10. Panel heating

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

11. Optional measurement data

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

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

    - *Start without inverter/Inverter Softstart*

13. Update

    - *Software update for the panel*

14. Reset to standard

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

15. back

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

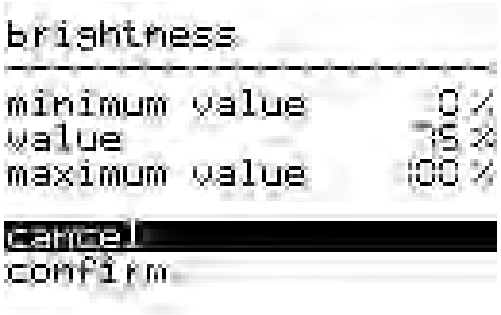
13.5.2.1 Setting the illumination of the CP-G

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

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

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

Fig. 13.5.2.1-1: Sub-menu: Illumination



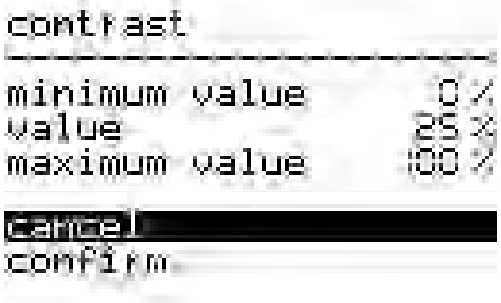
13.5.2.2 Setting the contrast of the CP-G

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

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

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

Fig. 13.5.2.2-1: Sub-menu: Contrast



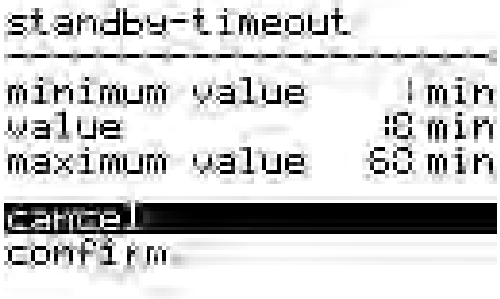
13.5.2.3 Setting the standby time of the CP-G

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

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

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

Fig. 13.5.2.3-1: Sub-menu: Standby Time



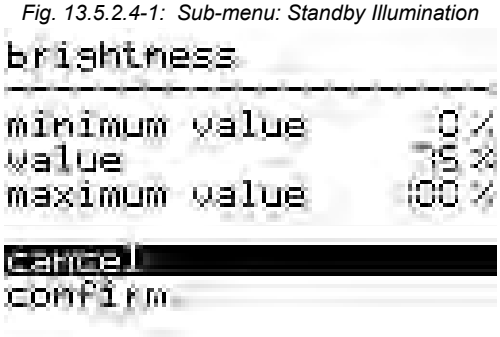
13.5.2.4 Setting the standby illumination of the CP-G

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

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

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

Fig. 13.5.2.4-1: Sub-menu: Standby Illumination



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

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

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

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

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

Fig. 13.5.2.5-1: Sub-menu: Display Mode

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

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

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

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

Fig. 13.5.2.6-1: Sub-menu: Language Selection

13.5.2.7 Setting the Temperature Unit

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

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

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

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

Fig. 13.5.2.7-1: Sub-menu: Temperature Unit

13.5.2.8 Setting the Aural Alarm

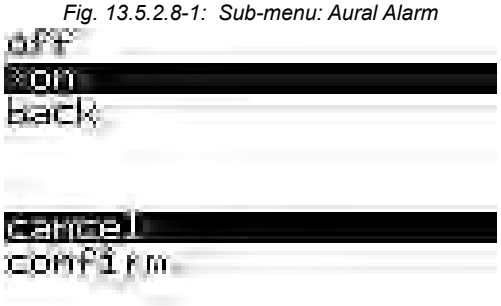
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

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

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

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

Fig. 13.5.2.8-1: Sub-menu: Aural Alarm



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

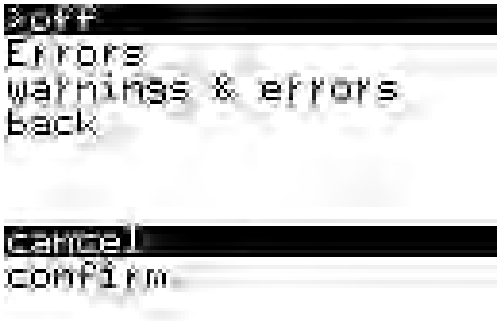
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

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

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

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

Fig. 13.5.2.9-1: Sub-menu: Flashing when Faulty



13.5.2.10 Setting the Panel Heating

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

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

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

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

Fig. 13.5.2.10-1: Sub-menu: Panel Heating

13.5.2.11 Setting the display of the optional measurement data

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

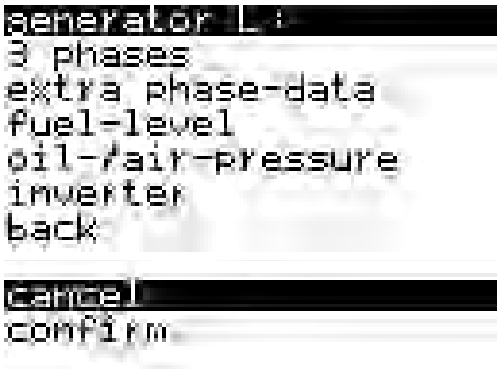
The desired optional measurement data is changed by using the "Step-up"/"Step-down" keys and the setting is confirmed with the "Start/Stop-Enter“ key.

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

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

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

Fig. 13.5.2.11-1: Sub-menu: Optional Measurement Data



13.5.2.12 Supplementary Start-up functions

This menu item is only available in the case of inverter generators

Fig. 13.5.2.12-1: Note

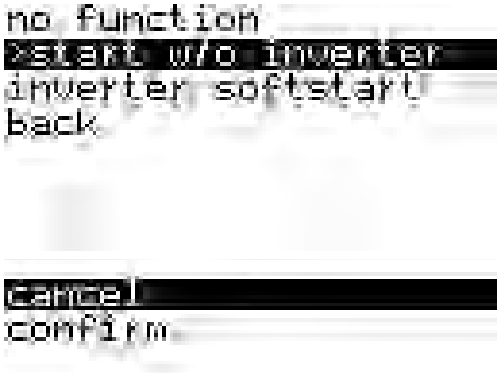
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

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

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

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

Fig. 13.5.2.12-2: Sub-menu: Supplementary Start-up functions



13.5.2.13 Resetting all values of the Panel sub-menu to default values

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

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

Fig. 13.5.2.13-1: Resetting all values

13.5.2.14 Return to Main Menu

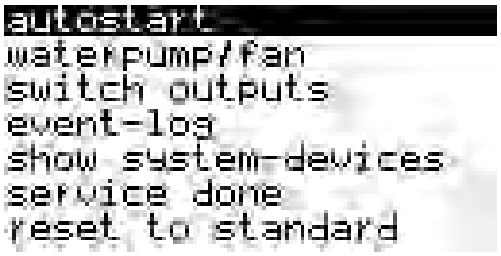
The menu item is selected by using the "Step-up"/"Step-down" keys and confirmed with the "Start/Stop-Enter“ key. The respective menu item opens.

13.5.3 Sub-menu: "Generator"

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

1. Autostart
   - configuring the Autostart function
2. Water pump/Fan
   - setting the optional DC outputs
3. Switch Outputs
   - manual switching of the individual digital outputs
4. Event Memory
   - displaying the event memory
5. Display System Devices
   - displaying the detected system devices
6. Service performed
   - resets the service interval
7. Reset to standard
   - all parameters of the "Generator" sub-menu are reset to the factory settings
8. back
   - Switching from the "Generator" sub-menu to the Main Menu

Fig. 13.5.3-1: Generator Sub-Menu



13.5.3.1 Setting the Autostart of the CP-G

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

A choice can be made between "Switch on/off" and "Number of start-up attempts" in in the "Autostart" sub-menu.

Fig. 13.5.3.1-1: Autostart

Switching On / Off

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

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

Fig. 13.5.3.1-2: Autostart

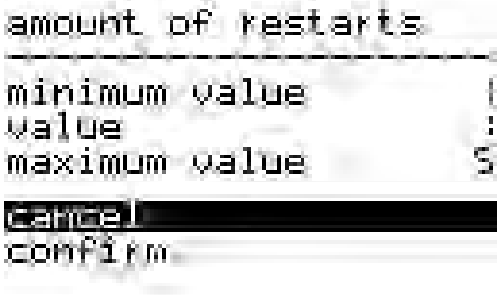
Number of start-up attempts

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

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

For safety reasons, the number of start-up attempts is limited to one in the case of marine (PMS) generators.

Fig. 13.5.3.1-3: Autostart



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

Warning! Automatic start-up.

The "Autostart" also remains active if the fpControl CP-G is switched off and then on again.

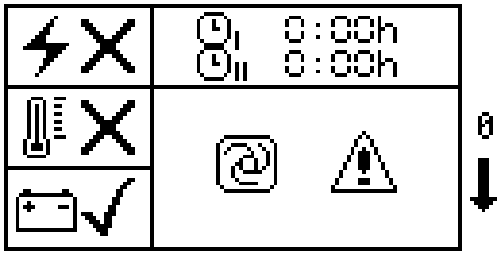
If a fault should arise when the generator is started or is already operating, it is stopped and the Autostart is set to "off".

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

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

The first overview page shows if the Autostart is active.

Fig. 13.5.3-4: Overview Page 1 with Autostart



13.5.3.2 Setting the optional water pump/fan DC output of the CP-G

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

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

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

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

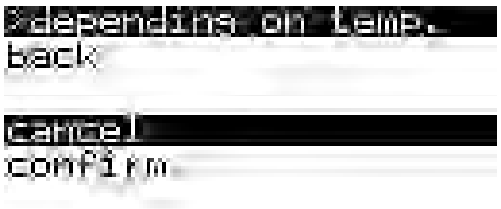
Fig. 13.5.3.2-1: Sub-menu: Optional DC Output

Setting the “Operating mode” for the optional DC output (DP) of the CP-G

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

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

Fig. 13.5.3.2-2: Sub-menu: Operating Mode

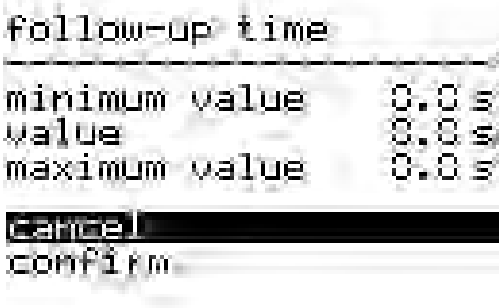


Setting the follow-up time of the optional DP Output of the CP-G

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

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

Fig. 13.5.3.2-3: Sub-menu: Follow-up Time



13.5.3.3 Switching the switching outputs of the CP-G

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

Select "Fuel Pump" or "Opt. DC Outputs" by using the "Step-up"/"Step-down" keys and then confirm with the "Start/Stop-Enter“ key.

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

The value of the output can be set to "0" for deactivated or "1" for activated by using the "Step-up"/"Step-down" keys. Confirm with the "Start/Stop-Enter“ key.

Fig. 13.5.3.3-1: Sub-menu: Switching Outputs

13.5.3.4 Reading out the Event Memory of the CP-G

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

Siehe “Table of Faults” auf Seite 149. Siehe “Description of the symbols” auf Seite 151.

Fig. 13.5.3.4-1: Event Memory

One can scroll through the event memory by using the "Step-up"/"Step-down" keys and then return to the Generator menu with the "Start/Stop-Enter“ key.

By using the QR Code, the relevant fault page of the knowledgebase.fischerpanda.de can be called up via the Internet.

To do so, simply scan the QR Code with a smartphone (Internet connection required).

Note

13.5.3.5 Resetting all values of the Generator sub-menu to the default values

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

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

Fig. 13.5.3.5-1: Resetting all values

13.5.3.6 Returning the Main Menu

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

13.5.4 Resetting the panel language to the default (English)

1. Press and hold the "Step down" key with the panel switched off.
2. Switch on the panel and hold down the "Step down" key until the first overview screen is displayed.
3. The panel language has now been reset. All other settings are retained.

13.5.4.1 How to set the panel language after a reset.

1. Switch on the fpControl Panel CP-G
2. Wait until the first overview screen appears.
3. Scroll to the last overview screen.
4. Press the "Start/Stop-Enter" key to access the menu.
5. Scroll down to the "Panel" menu item.
6. Press the "Start/Stop-Enter" key to access the "Panel" sub-menu.
7. Scroll down to the "Choose language" menu item.
8. Press the Start/Stop-Enter key to access the "Language Selection" sub-menu.
9. Scroll to the desired language and confirm with the "Start/Stop-Enter" key.
10. Scroll down to the "confirm" menu item and press the "Start/Stop-Enter" key.

The menu text is now set to the selected language.

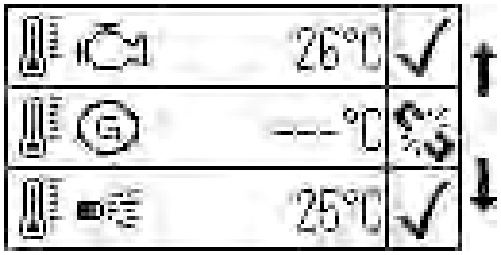
13.6 Faults

13.6.1 Symbols and messages on the display

13.6.1.1 Example of message - "Sensor defective"

A soon as a defective sensor is detected, the fpControl reports this on the display.

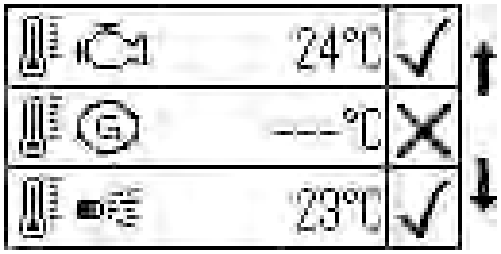
Fig. 13.6.1.1-1: Sensor defective



13.6.1.2 Example of message - "Sensor/Cable break"

If the sensor has failed or the cable is broken, the following report is displayed:

Fig. 13.6.1.2-1: Sensor/Cable break



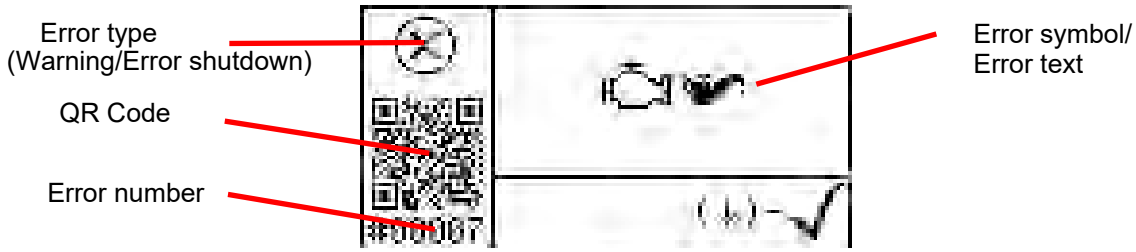
13.6.2 Error code

An error code is displayed if a parameter lies beyond its operating limits.

Siehe “Table of Faults” auf Seite 149. Siehe “Description of the symbols” auf Seite 151.

Example: Error No. 7 - Oil pressure too low -Fault led to emergency shutdown

Fig. 13.6.2.0-1: Sub-menu: "Event Memory"



By using the QR Code, the relevant fault page of the knowledgebase.fischerpanda.de can be called up via the Internet.

To do so, simply scan the QR Code with a smartphone (Internet connection required).

Note

13.6.2.1 Table of Faults

See also the "Faults" chapter in the manual of the generator.

The relevant fault page of the knowledgebase.fischerpanda.de can be called up via the Internet.

(Internet connection required).

Note

Fig. 13.6-1: Table of faults

No.	Description	Basic
1	AC Voltage L1	AC Voltage L1 is below its lower limit
2	AC Frequency L1	AC Frequency L1 is below its lower limit
5	Emergency-Off	Emergency-off switch is active/has been pressed
7	Oil pressure	Engine oil pressure is below its lower limit
8	Cylinder head temperature	Cylinder head temperature sensor not available/Contact open/Cable break
9	Winding temperature	Winding temperature sensor not available/Contact open/Cable break
10	Exhaust temperature	Exhaust temperature sensor not available/Contact open/Cable break
11	Electronics temperature	Temperature sensor for the electronic system (sensor on the fpControl circuit board) not available/defective
13	Starter motor current	Starter motor not connected/Starter motor defective
14	Glow plug circuit	One or more glow plugs not connected or defective
16	Fuel supply	Fuel valve/fuel pump not connected or defective
17	ETR Stop Solenoid hold	Current at output of the ETR hold coil is below the lower limit
18	ETR Stop Solenoid pull	Current at output of the ETR pull coil is below the lower limit
19	Water pump/Fan	Fan/water pump not connected or defective
20	Current sensor	Current sensor not available/Contact open/Cable break
21	Boost relay current	Boost relay not connected or defective
25	Starter battery voltage	Starter battery voltage too low
26	Engine speed error	Engine speed (r.p.m.) too low
30	AC Voltage L2	AC Voltage L2 is below its lower limit
31	AC Frequency L2	AC Frequency L2 is below its lower limit
34	AC Voltage L3	AC Voltage L3 is below its lower limit
35	AC Frequency L3	AC Frequency L3 is below its lower limit
38	Inverter DC supply	Current at output of the DC supply voltage of the inverter is below the lower limit
39	Universal output 1 (1A)	Electrical load on Universal output 1 is defective/no consumer connected
40	Universal output 2 (5A)	Electrical load on Universal output 2 is defective/no consumer connected
41	AGT DC voltage 1	Battery voltage too low
42	AGT DC current 1	Battery current too low
43	AGT DC voltage 2	Total voltage compared to battery voltage too low
44	AGT DC current 2	Sum of battery and load current too low
45	AGT B6 radiator	Temperature sensor not available/Contact open/Cable break
46	AGT B6 busbar (-)	Temperature sensor not available/Contact open/Cable break
47	AGT B6 busbar (+)	Temperature sensor not available/Contact open/Cable break
62	Fuel temperature	Temperature sensor not available/Contact open/Cable break
63	Fuel level	The fuel level has reached its lower limit
65	AC Voltage L1	AC Voltage L1 is above upper limit
66	AC Frequency L1	AC Frequency L1 is above upper limit
67	AC Current L1	AC Current L1 is above upper limit
68	AC Output L1	AC Output L1 is above upper limit
70	Servomotor current	Servomotor current is above upper limit

No.	Description	Basic
71	Oil pressure	Oil pressure is above upper limit
72	Cylinder head temperature	Temperature of the diesel engine / Cylinder head is above upper limit
73	Winding temperature	Winding temperature is above upper limit
74	Exhaust temperature	Exhaust temperature is above upper limit
75	Electronics temperature	Temperature of electronic system above upper limit
77	Starter motor output	Current at output of starter motor is above upper limit
78	Glow plug circuit	Current at output of the glow plugs is above upper limit
79	Flame-start system	Current at output of flame-start system is above upper limit
80	Fuel supply	Current at output of the fuel valve / fuel pump / DC generator exciter is above upper limit
81	Stop Solenoid hold	Current at output of the hold coil of the stop solenoid is above upper limit
82	Stop Solenoid pull	Current at output of the pull coil of the stop solenoid is above upper limit
83	Water pump/Fan	Current at output of the water pump/fan is above upper limit
84	Current sensor supply	Current at output of the current sensor is above upper limit
85	Boost relay	Boost relay fault
86	Bus current	Current at the CAN bus is above upper limit
89	Starter battery voltage	Starter battery voltage is above upper limit
93	Power output relay	Current at output of load-breaking relay is above upper limit
94	AC Voltage L2	AC Voltage L2 is above upper limit
95	AC Frequency L2	AC Frequency L2 is above upper limit
96	AC Current L2	AC Current L2 is above upper limit
97	AC Output L2	AC Output L2 is above upper limit
98	AC Voltage L3	AC Voltage L3 is above upper limit
99	AC Frequency L3	AC Frequency L3 is above upper limit
100	AC Current L3	AC Current L3 is above upper limit
101	AC Output L3	AC Output L3 is above upper limit
102	Inverter DC supply	Current at output of the DC supply of the inverter is above the upper limit
103	Universal Output 1 (1A)	Current at Universal Output 1 is above upper limit
104	Universal Output 2 (5A)	Current at Universal Output 2 is above upper limit
105	AGT DC Voltage 1	Battery voltage too high
106	AGT DC Current 1	Battery current too high
107	AGT DC Voltage 2	Total voltage compared to battery voltage too high
108	AGT DC Current 2	Sum of battery and load current too high
109	AGT B6 Radiator	Temperature at heat sink of the B6 bridge too high/Sensor error: Short circuit on temperature sensor
110	AGT B6 Busbar (-)	Temperature at busbar (-) of the B6 bridge too high/Sensor error: Short circuit on temperature sensor
111	AGT B6 Busbar (+)	Temperature at busbar (+) of the B6 bridge too high/Sensor error: Short circuit on temperature sensor
126	Fuel temperature	Fuel temperature too high/Sensor error Short circuit on temperature sensor
130	CAN communication interrupted	The panel has lost contact with the control system
131	CAN communication interrupted	The control system has lost contact with the panel
132	Service interval	Service due
133	BUS Module lost (3ph measurement)	Communication with the 3-ph Module interrupted
134	BUS Module lost (DC measurement)	Communication with the AGT Module interrupted
135	Synchronisation error	Problem with synchronisation of the output voltages of generators switched in parallel.
136	External motor controller communication	Communication with the external motor controller (ECU) has been interrupted
137	Air filter	Air filter has generated an error message
138	Diagnostic message (ECU)	Control device of the diesel engine has transmitted a diagnostic warning

No.	Description	Basic
139	Synchronisation module communication	Communication with the synchronisation module has been interrupted
140	Load distribution	Load balancing error
141	Synchronisation deactivated	Synchronisation module deactivated
142	Error message from engine control unit	The diesel engine control unit has generated a Red Stop Lamp Error
148	Rotary field error	The phases are connected in the incorrect sequence
149	Fuel level sensor error	Communication with the fuel level sensor has been interrupted
151	"Watchdog", control system restart	Control system is restarted after a malfunction
152	Temperature Inverter L1	Temperature of L1 of the inverter above upper limit
153	Temperature Inverter L2	Temperature of L2 of the inverter above upper limit
154	Temperature Inverter L3	Temperature of L3 of the inverter above upper limit
155	Temperature Inverter DC intermediate circuit	Temperature of the DC intermediate circuit of the inverter is above upper limit
157	Inverter communication	Communication with the inverter has been interrupted
163	Inverter DC intermediate circuit load	DC intermediate circuit current is above upper limit
164	Inverter DC intermediate circuit voltage	Inverter DC intermediate circuit voltage too high
167	No rev analysis/Monitoring	Simulation of the engine speed for start-up without inverter
245	Factory setting changed	User input in Factory menu
251	Parameter changed in Admin Level	User input in Admin menu

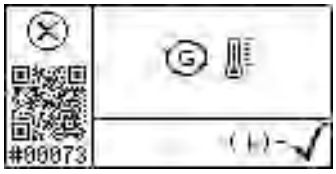
13.6.2.2 Description of the symbols

Fig. 13.6-1: Description of the symbols

Symbol	Description			Symbol	Description	
	WARNING				Current	Generator output
	Error shutdown				Frequency	Generator output
	Faults	No contact			Voltage	Generator output
	Broken	Short circuit			(%)/Load	
	OK				Generator runs	
	AC Voltage				Generator off	
	Run-up phase/Over-ride	Generator start-up			Temperature	
	Standby				Engine	
	Automatic start-up.				Exhaust system	
	Starter battery				Winding	

Symbol	Description			Symbol	Description	
	Operating hours				Preheating	
	Oil pressure				Speed/RPM	
	Self test				Tank gauge %	
	Apparent power				Starter turns	

Example:



Error73: Error shutdown due to winding temperature

13.7 Accessories:

FP Bus Cable (15 m): 34.02.02.131H

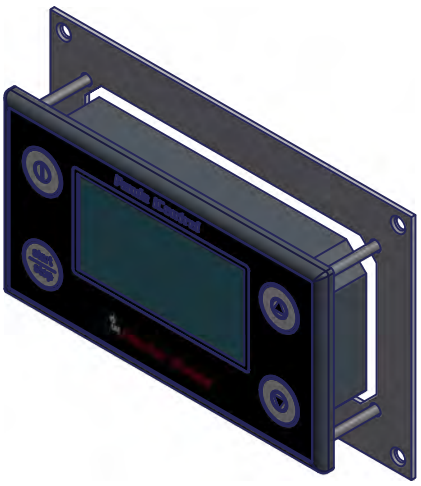
Fig. 13.7-1: FP Bus Cable (15 m): 34.02.02.131H

Terminating resistor:34.02.02.133H

Fig. 13.7-2: Terminating resistor:34.02.02.133H

Adapter Frame: 31.03.20.263H

Fig. 13.7-3: Adapter Frame: 31.03.20.263H



xContol CP-G in a Generator Control (P6+) section

13.7.1 Dimensional drawing

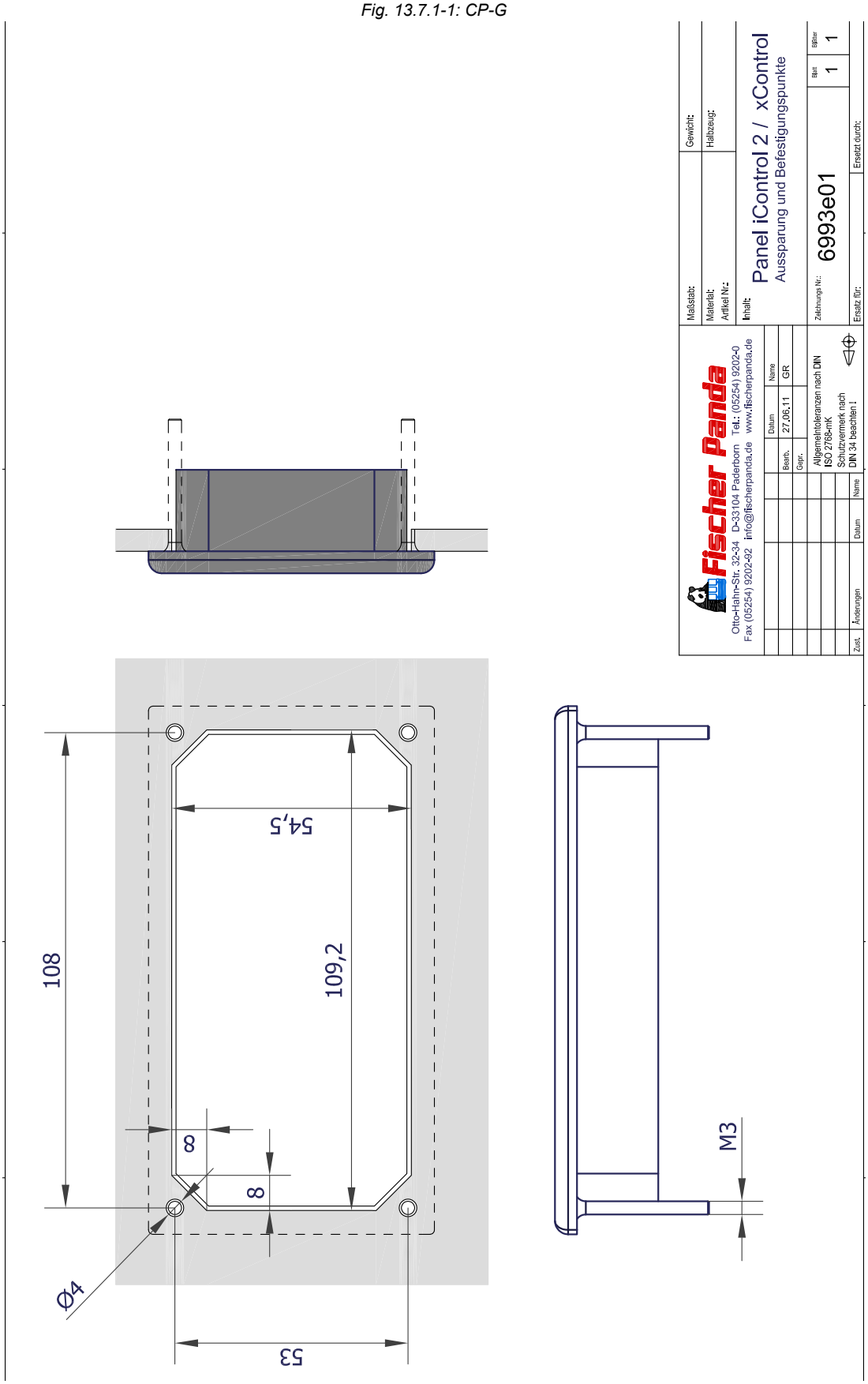



Fig. 13.7.1-1: CP-G