Manual Vehicles Generator

Prototype Panda 5000i PVK-UK

120 V 60 Hz 4 kW

Fischer Panda Item No.: 0037132

Super silent technology

Current revision status

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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 information and regulations

1.1 Safety First

Warning signs are used in this manual when there is a risk of injury or death when carrying out certain maintenance or operating procedures. The instructions marked in this way must always be read carefully and followed.

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

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

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

Warning! Risk of injury

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

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

Warning! Danger of fire

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

- 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

Batteries contain diluted sulphuric acids and bases

Warning!

Incorrect use can warm up and burst the batteries. Diluted sulphuric acid / base can escape. Under unfavourable conditions there is a risk of explosion

Observe the instructions from your battery manufacturer.

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

Instruction! Personal protective equipment necessary.

- Protective clothing
- safety boots
- protective gloves
- ear defender
- goggles

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

Attention! Disconnect all load

1.2 Environmental protection

National exhaust emission regulations must be verified with engine specification.

Environmental protection!

Engine liquids/batteries are harmful for the environment.

Collect discharged engine liquids and dispose it properly.

Batteries should be disposed properly.

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.

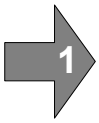
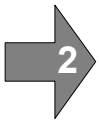
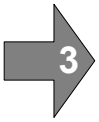
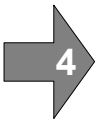
- Never charge a frozen battery.
- Avoid battery short-circuits.
- Ensure proper ventilation of the battery to vent gases that may be released.
- Battery connection terminals must be checked for proper seating before operation.

- 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.

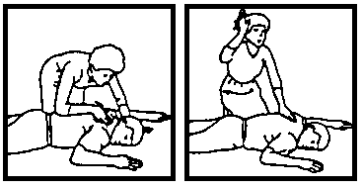
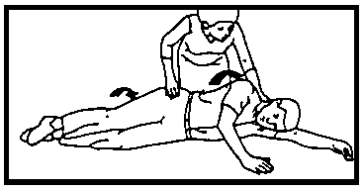
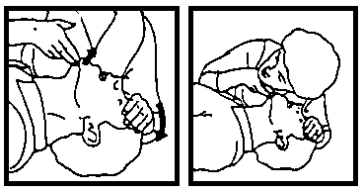
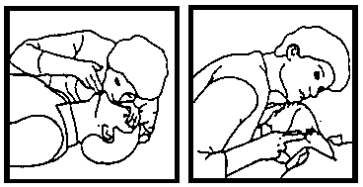
2. In case of Emergency First Aid

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

2.1 WHEN AN ADULT STOPS BREATHING

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

Warning:

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

3. 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.

3.2 Purpose of the manual and description of the definitions of the trained persons/operators/users

This manual contains the working instructions and operating guidelines 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. It 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 should be in accordance with the law as required by the country and special situation. All work has to be undertaken according to the state of the technology.

3.2.1 Trained persons

Qualified persons for the mechanical components are motor mechanics or persons with similar qualification and training.

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

After the installation the trained person has to instruct the operator/owner about the operation and maintenance of the generator. This must include the hazards of the generator use.

3.2.2 Operator/Owner

The operator is responsible for the operation of the generator.

After the installation, the operator/owner must be instructed concerning the operation and maintenance of the generator. This has to include the hazards during operation of the generator, different operating conditions, and instructions for the maintenance.

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

3.2.3 User

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

The operator/owner has to ensure that the user has read and understood the manual and that all hazard notes and

safety instructions are respected. The user must be instructed by the operator/owner regarding his activity at the generator, especially concerning the maintenance.

3.3 Scope of delivery

The Fischer Panda generator system contains following components:

Fischer Panda generator

representative picture

Fig. 3.3-1: Panda i generator

Remote control panel

representative picture

Fig. 3.3-2: iControl panel

Panda PMGi inverter AC/AC

representative picture

Fig. 3.3-3: PMGi inverter

Fischer Panda Manual

Fig. 3.3-4: Manual

The Fischer Panda Manual contains following components:

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

representative picture

Optional components f.e.:

- Fuel pump
- Installation kit

3.4 Panda transport box

3.4.1 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

3.4.2 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 at the bottom of the transport box
5. Remove the sidewalls
6. Open the generator attachment

3.5 Opening the MPL sound insulation capsule

Closure open

To open the sound insulation capsule, the closure must be pressed. Pull the sidewalls out.

Fig. 3.5-1: Closure open

3.6 Transport and loading/unloading

3.6.1 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.

3.6.2 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. 3.6.2-1: Lifting yoke (example)

3.7 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)

3.7.1 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.

3.7.2 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).

3.7.3 Measures for medium term downtimes / hibernation

Medium term downtimes (3 to 6 months)

3.7.3.1 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!**

3.7.3.2 Measures for removing surface protection after medium term downtimes (3 to 6 months).

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

- Check 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.

3.7.4 Measures for extended downtimes / decommissioning

Downtimes (more than 6 months)

3.7.4.1 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.

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

Attention!

- Clean engine as per manufacturer's instructions.
- Spray engine parts and V-belt 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!

3.7.4.2 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 inspection as per the inspection list should be performed.

Note:

4. The Panda Generator

4.1 Type plate at the Generator

Fig. 4.1-1: Type plate

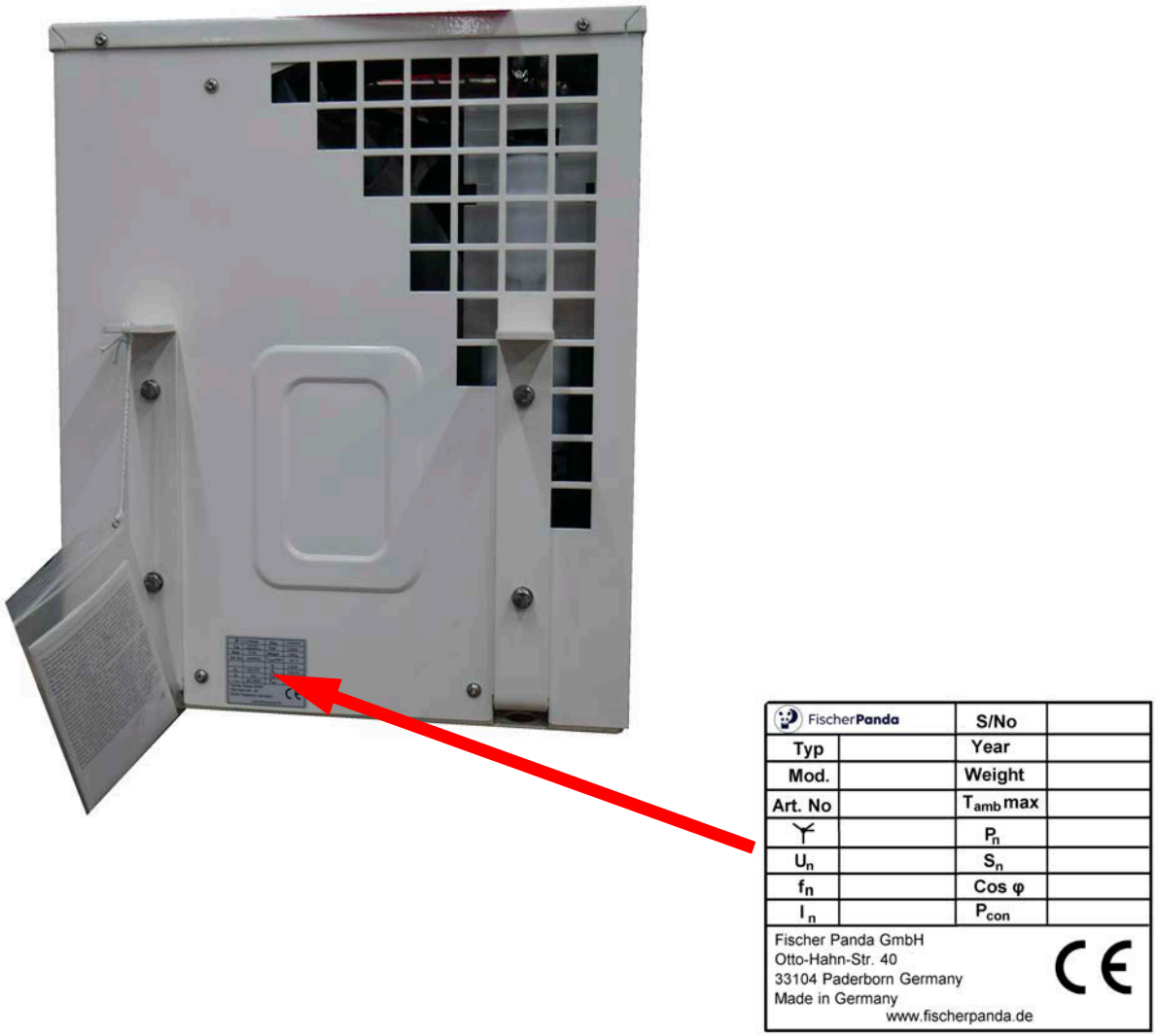
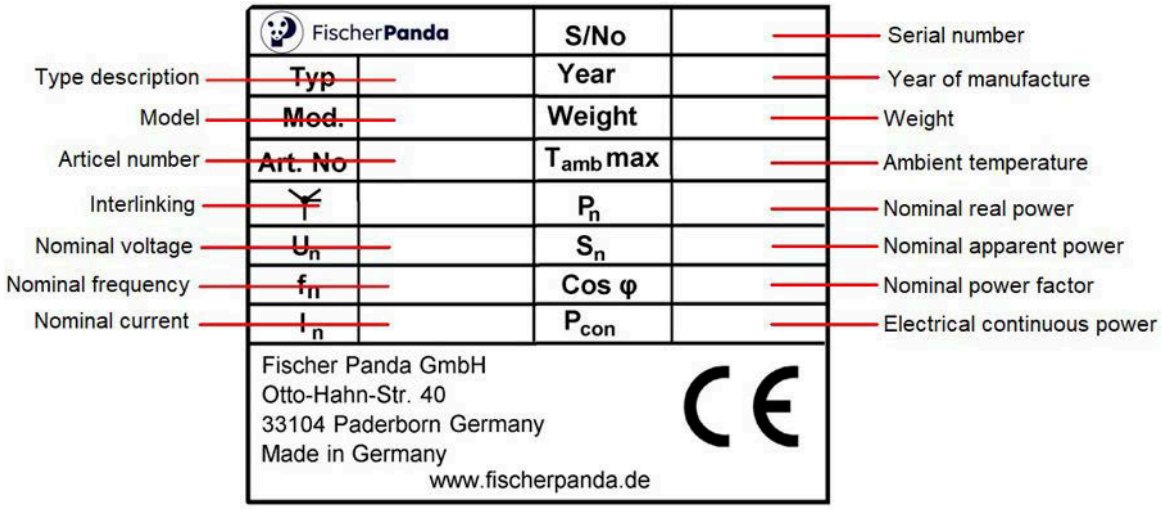


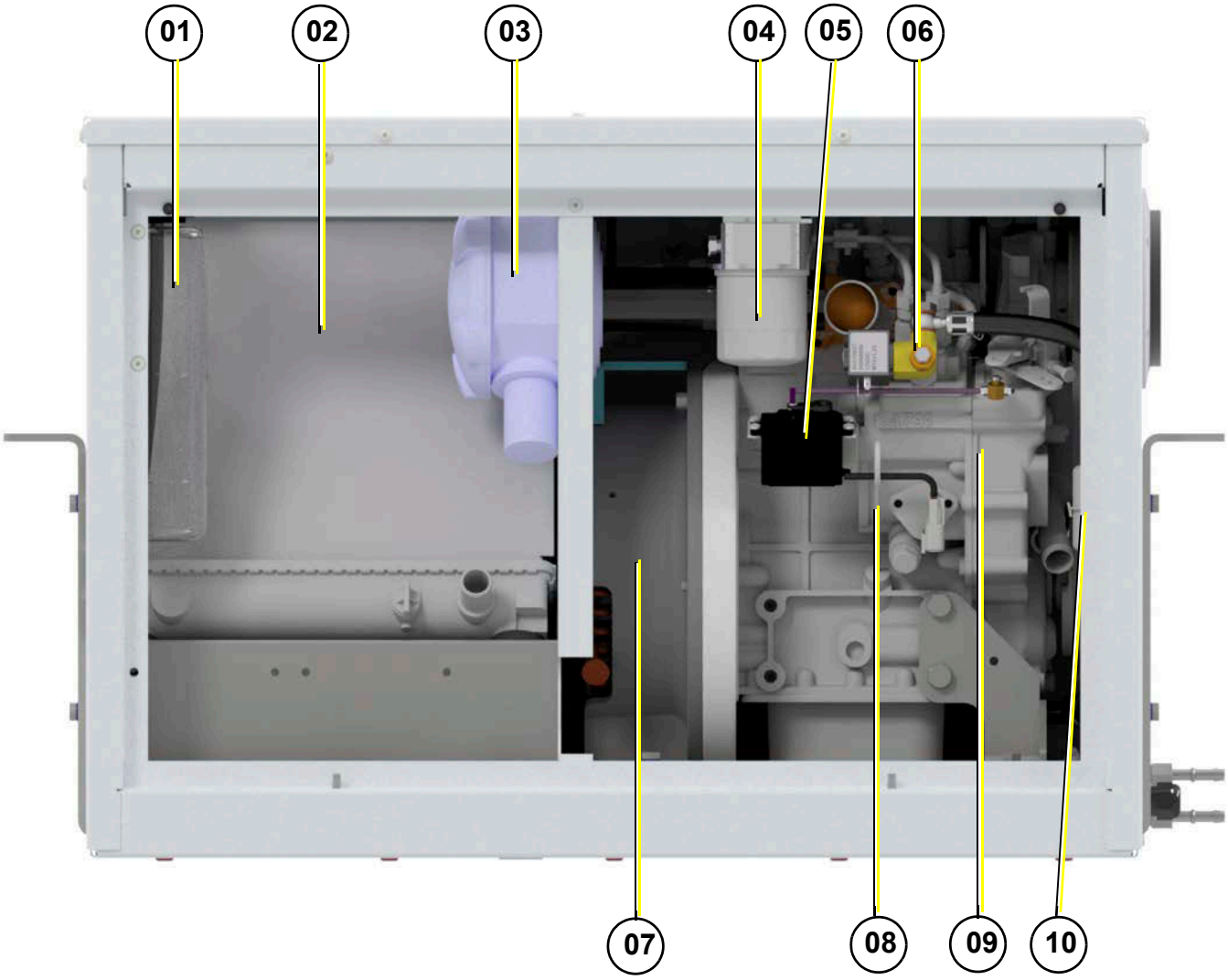
Fig. 4.1-2: Description type plate



4.2 Description of the generator

4.2.1 Front view

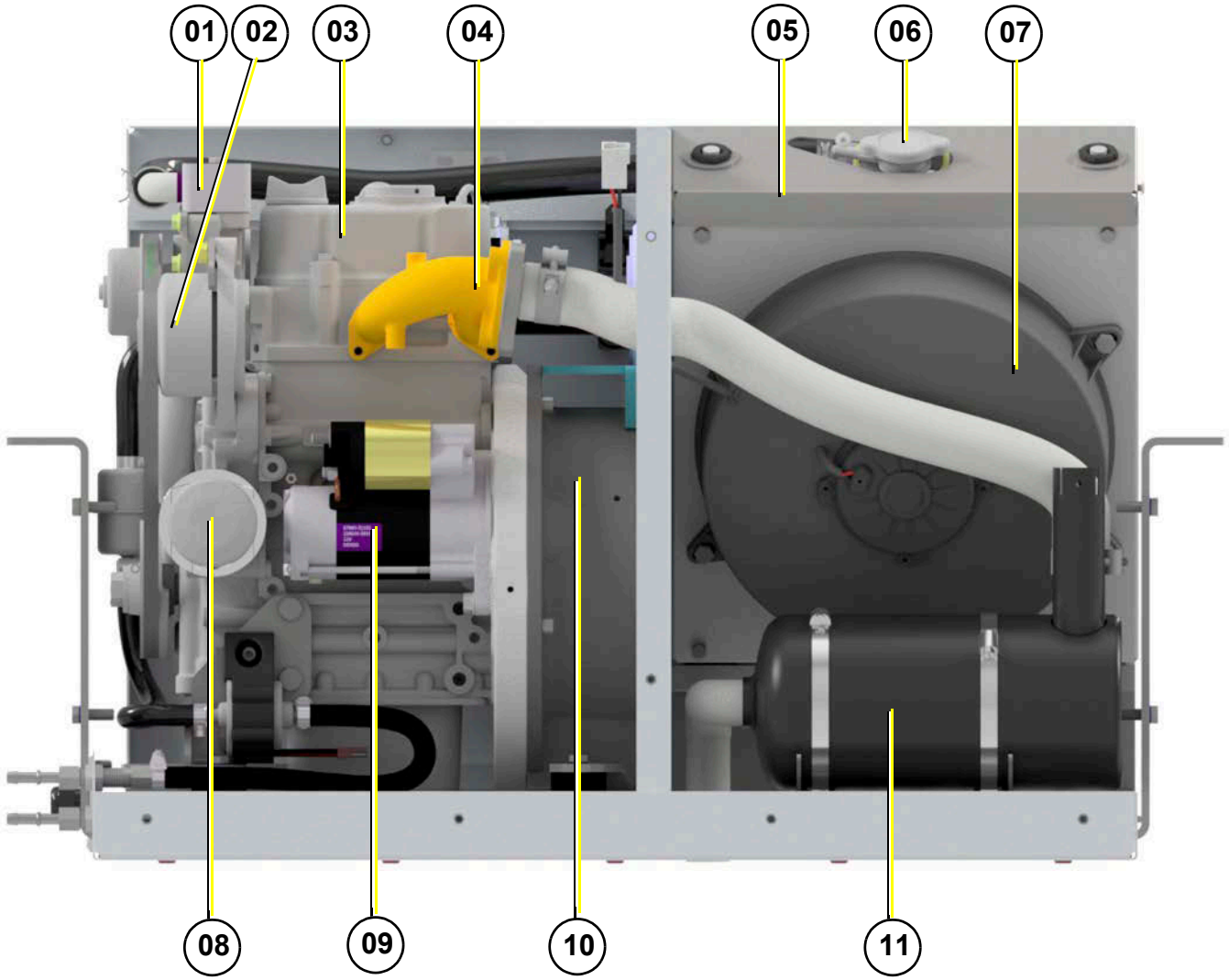
Fig. 4.2.1-1: Front view



01. Cooling water expansion tank
02. Radiator
03. Air filter
04. Oil filter
05. Actuator
06. Fuel solenoid valve
07. Generator winding
08. Dipstick
09. Engine
10. Fuel filter

4.2.2 Back view

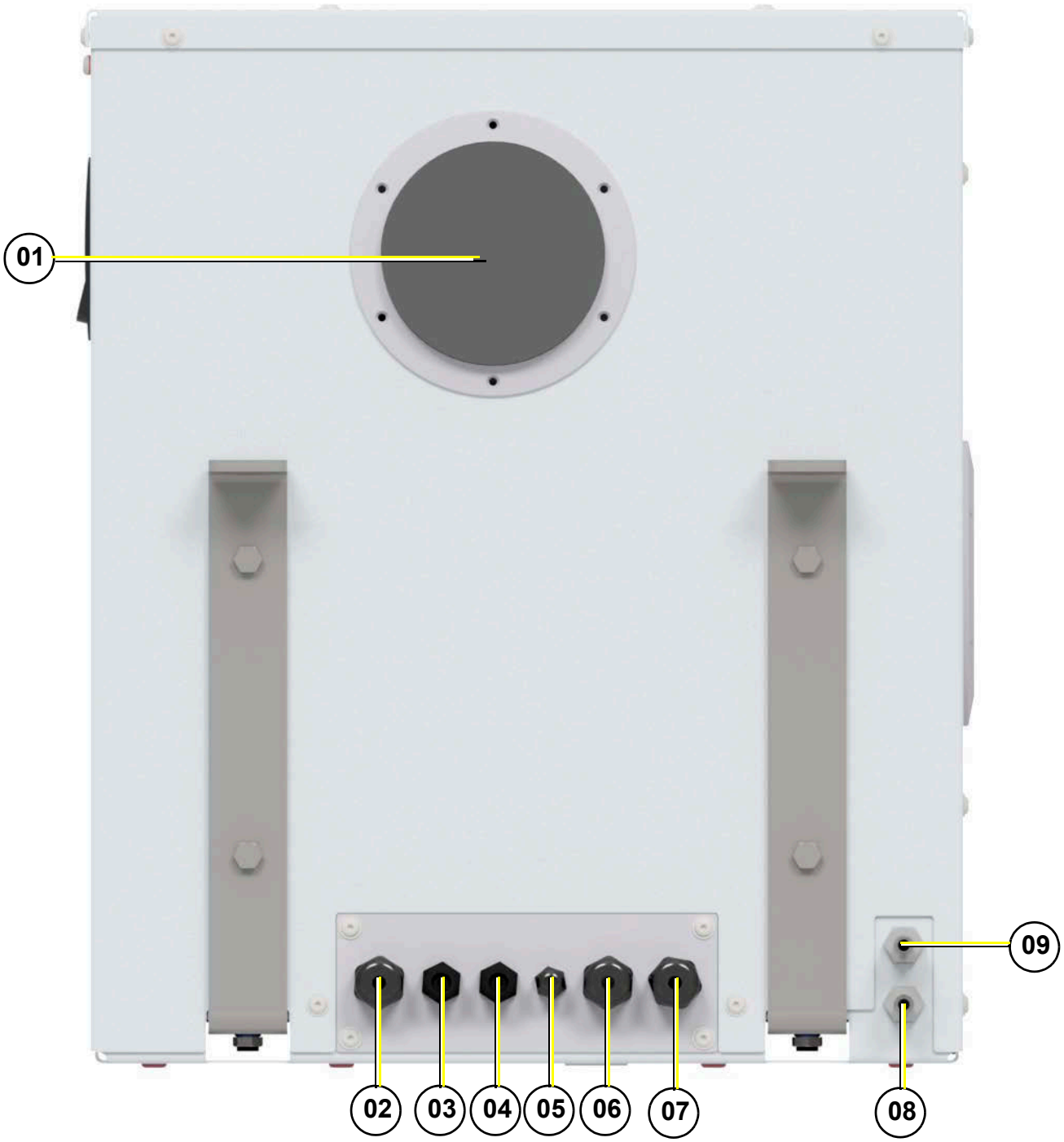
Fig. 4.2.2-1: Back view



01. Thermostat housing with ventilation screw
02. DC-alternator
03. Valve cover
04. Exhaust elbow
05. Radiator
06. Cooling water filler neck
07. Fan
08. Oil filter replacement kit
09. Starter motor
10. Generator housing
11. Muffler

4.2.3 Right side view

Fig. 4.2.3-1: Right side view



01. Inspection chamber V-belt
02. Passage for load cable
03. Passage for remote panel cable
04. Passage for inverter control cable
05. Passage for external fuel pump
06. Passage for starter battery (-) cable
07. Passage for starter battery (+) cable
08. Connection fuel out
09. Connection fuel in

5. 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 vehicle specifications, maximum vehicle 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.

5.1 Personal requirements

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

5.1.1 Hazard notes for the installation

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

Notice!

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

Danger! Automatic start-up

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.

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

Batteries contain diluted sulphuric acids and bases

Incorrect use can warm up and burst the batteries. Diluted sulphuric acid / base can escape. Under unfavourable conditions there is a risk of explosion

Observe the instructions from your battery manufacturer.

Warning!

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.

Attenion! Disconnect all load

5.2 Environmental protection

National exhaust emission regulations must be verified with engine specification.

Engine liquids/batteries are harmful for the environment.

Collect discharged engine liquids and dispose it properly.

Batteries should be disposed properly.

Environmental protection!

5.3 Placement

5.3.1 General instructions

- It is important to pay attention to the fresh air intake.
- Sufficient space must be available below/next to the generator, in order to allow flow of cooling air. (Underside and side: Underneath is not sufficient!)
- The air inlet and outlet openings may not be covered.
- Untrained personnel should never open the generator.

5.3.2 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.). This acts as an amplifier of airborne sounds in the most unreasonable case. An improvement can be achieved by reinforcing these surfaces with ribs. In addition, the breakthroughs, which interrupt these surfaces, should be sawed off. The lining of the surrounding walls with a heavy layer (i.e heavy sheet material) and foam additionally improve the conditions.

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)

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

Fuel temperature: up to 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).

5.3.3 Advice for optimal sound insulation

The convenient base consists of a stable framework, on which the generator is fastened by means of shockmounts. The combustion air can be sucked in unhindered.

Fischer Panda recommend captive shock mount!

Shock mount

representative picture

Fig. 5.3.3-1: Shock mount

Captive shock mount

representative picture

Fig. 5.3.3-2: Captive shock mount

5.4 Generator connections

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!

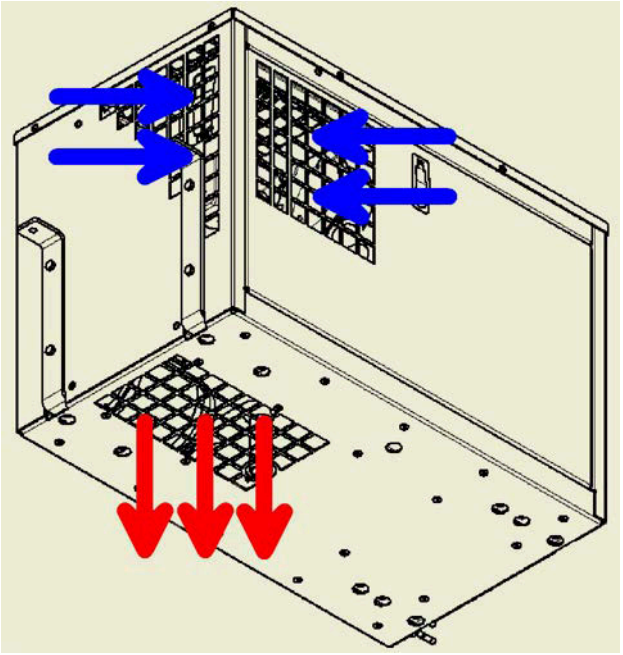
5.5 Air circulation

Unrestricted airflow for cooling, ventilation and combustion is essential for proper generator performance and life-span. The generator has a side air inlet and a bottom hot air outlet.

Make sure that frame cross members, exhaust pipes, cables and other components do not cross under the hot air outlet openings.

Do not block the air inlet and outlet openings with screens, expanded metal or similar, as these will restrict the air flow and cause the generator to overheat.

Fig. 5.5-1: Air circulation



5.6 Exhaust installation

Engine exhaust gases can be hazardous to health if they collect. Make sure that the generator exhaust gases are drained accordingly (tight system) and that enough fresh air is supplied to the generator and the operator (forced ventilation). Check the system regularly for leaks and eliminate them if necessary.

Exhaust gases and exhaust gas bearing parts are very hot, they can cause burns. Always keep the generator and exhaust system free of combustible parts.

The muffler is installed insede the generator capsule.

The exhaust outlet is led out of the generator capsule below. Additional rear silencers can be installed here.

ATTENTION!

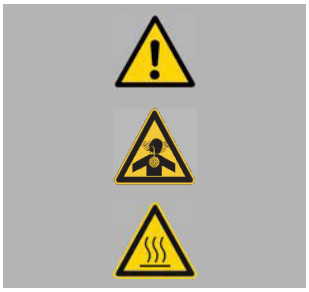
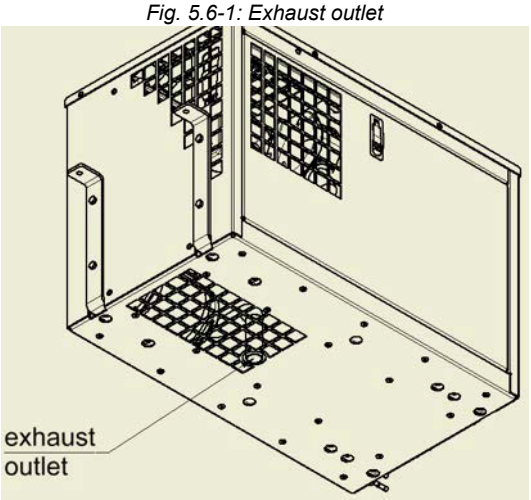


Fig. 5.6-1: Exhaust outlet



5.7 Fuel system installation

Diesel fuel is a combustible and can cause severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment, electrical switch or other ignition source around fuel abd fuel components, or in areas sharing ventilation. Keep a type ABC fire extinguisher handy.

ATTENTION!

5.7.1 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. 5.7.1-1: Electrical fuel pump

Fuel connections

Connect here the fuel lines for the external fuel tank.

Fig. 5.7.1-2: Fuel connections

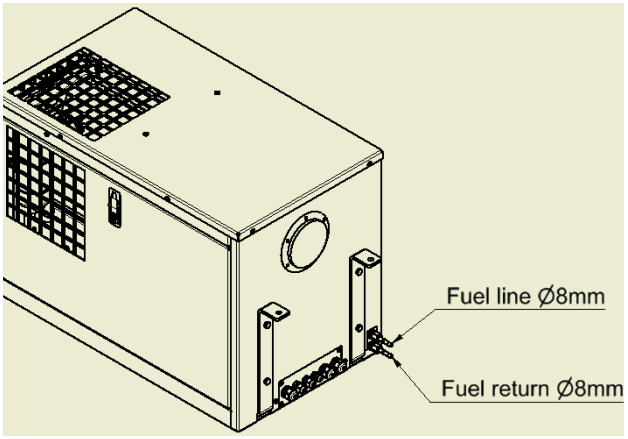
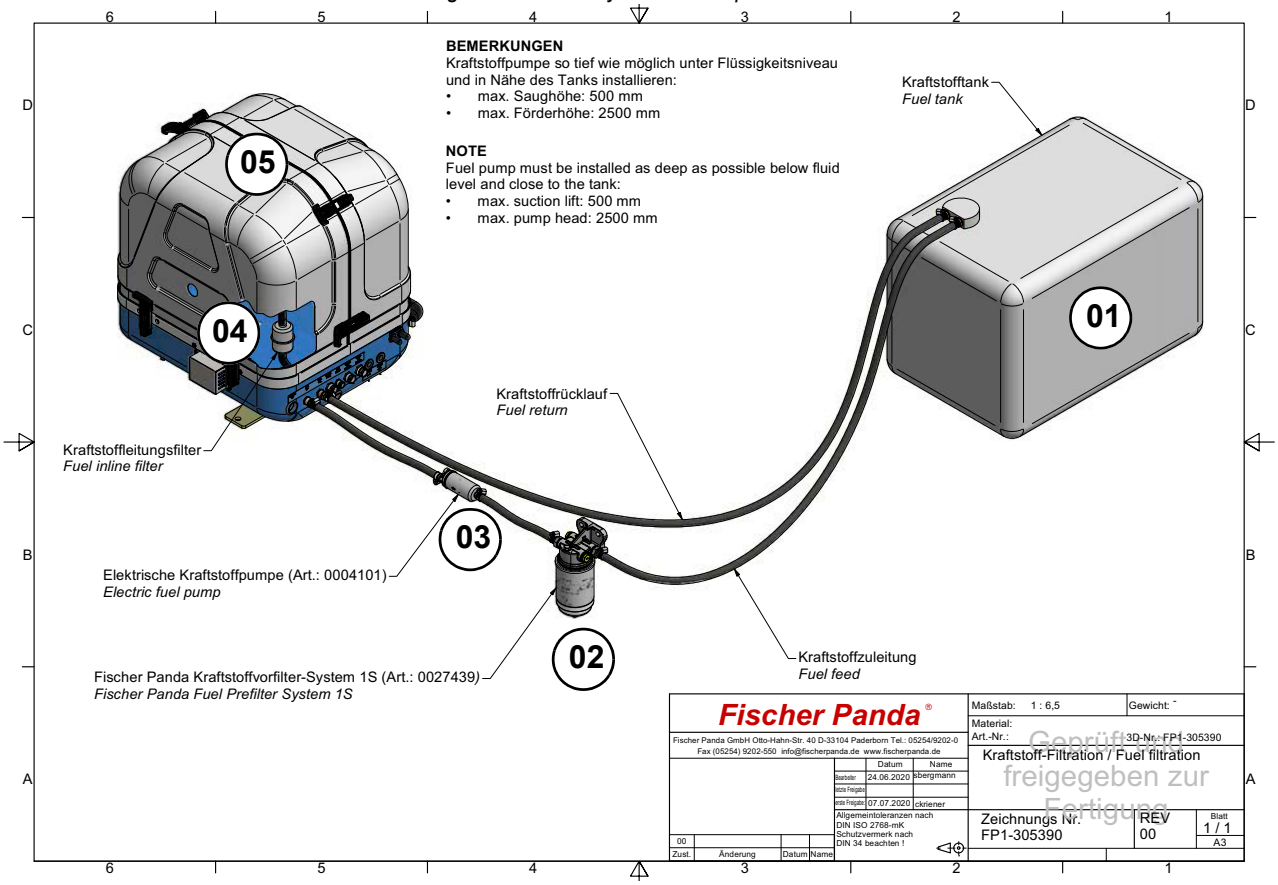


Fig. 5.7.1-3: Fuel system - example scheme



01. Fuel tank
02. external fuel prefilter with water separator
03. external fuel pump
04. Fuel inline filter
05. Generator

5.7.2 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.

5.7.3 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. 5.7.3-1: Fischer Panda fuel pre-filter S1 with water separator

5.8 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 etc.

ATTENTION!

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

5.8.2 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. The negative cable (-) of the battery is attached underneath the starter motor at the engine mount.

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

ATTENTION!

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)

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.

DC starter motor

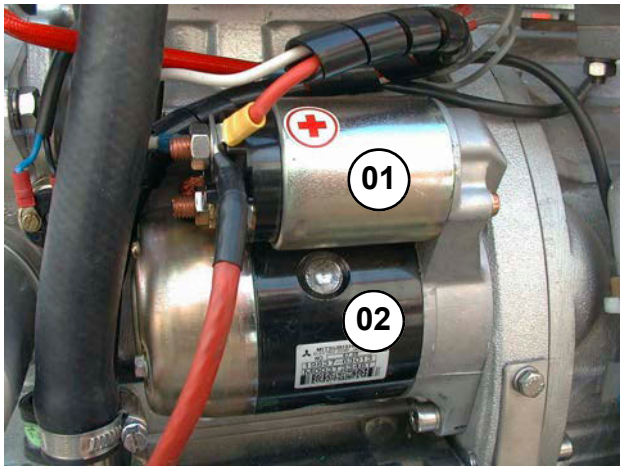
All Panda generators are equipped with an independent DC starter motor.

01. Solenoid switch for starter motor

02. Starter motor

Sample picture

Fig. 5.8.2-1: DC starter motor

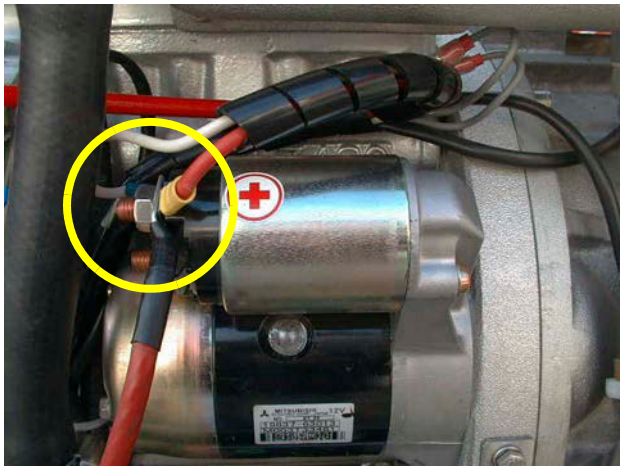


Positive battery cable

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

Sample picture

Fig. 5.8.2-2: Positive battery cable



Negative battery cable

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

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

Sample picture

Fig. 5.8.2-3: Negative battery cable

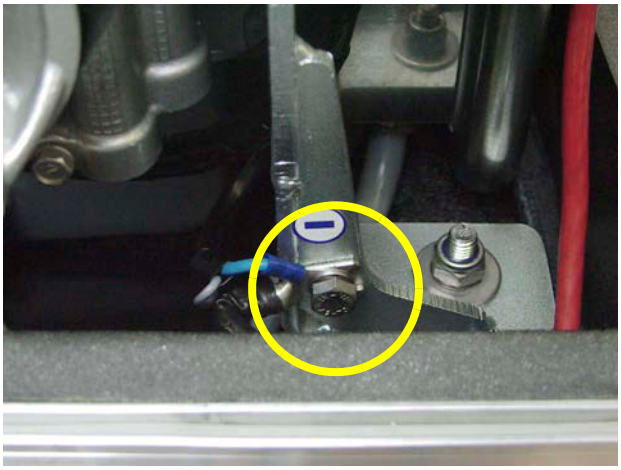
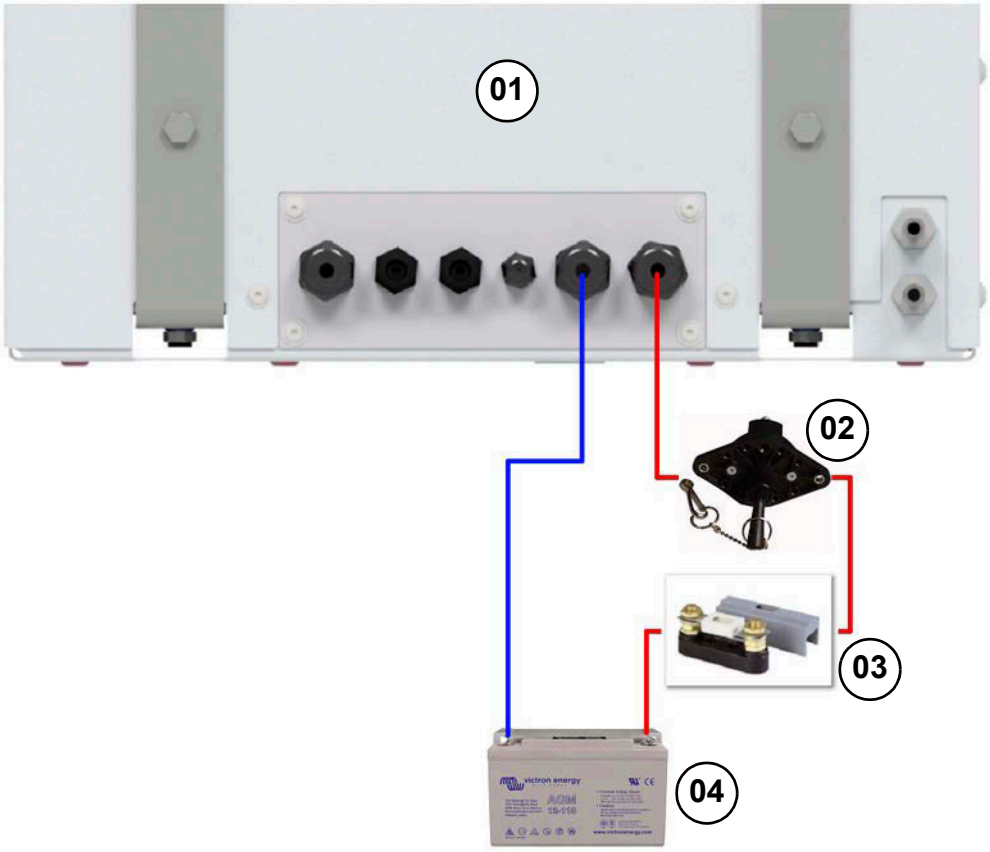


Fig. 5.8.2-4: Connection starter battery 12 V - example schema



01. Generator
02. Battery main switch
03. Fuse
04. Starter battery 12 V

All protections and electrical protection measures must be placed on board.

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.

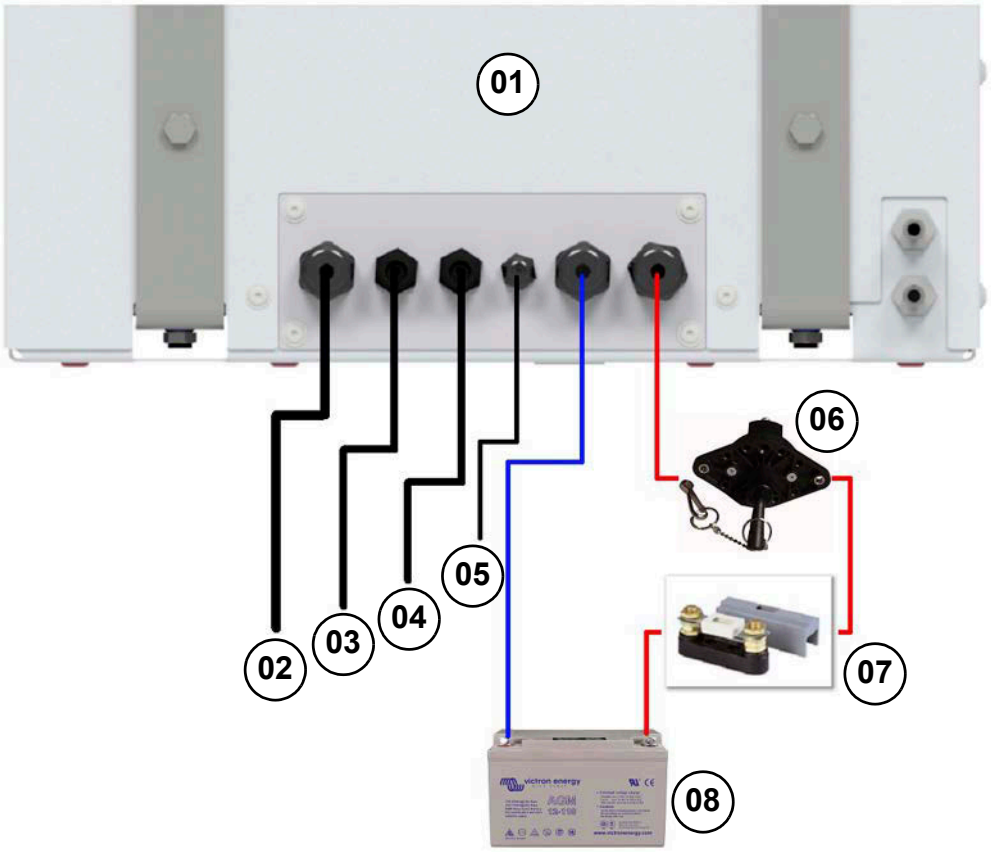
ATTENTION!

5.9 Generator AC 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 etc.

ATTENTION! Danger to Life - High voltage

Fig. 5.9-1: Connection of electrical components - example scheme



01. Generator
02. Generator output / load
03. Remote panel
04. Inverter control
05. External fuel pump (option)
06. Battery main switch
07. Fuse
08. Starter battery 12 V

5.9.1 Installation PMGi inverter - See separate PMGi inverter manual

5.10 Isolation test

After installation, but before the generator is set into normal operation and handed to the customer, an isolation test must be performed as followed:

ATTENTION!

1. Disconnect all load.
2. Start the generator.
3. Measure with a iosolation tester the voltage between:
   a. Generator housing and PMGi housing.
   b. Generator housing and ground of the vehicle.
   c. The measured voltage must be lower than 50 mV.
4. Test the installed protective devices (like RCD). If a RCD is installed, a functional test must be done. Check all terminals for right connections. Measure all phases against each other and against the neutral wire.
5. If the generator is Protected by PME, make sure that all components has the same ground at the housing.

The protective devices must match the national regulation.

5.11 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!

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.

Warning! Automatic start

To avoid an unexpected starting of the generator, the starter battery must be disconnected before start working at the generator.

Rotating parts inside of the generator

Attention! Danger to life

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.

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

Attention! Danger to Life - High voltage

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.

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 Protection conductor: (AC Generators only)

The standard Panda generator is grounded. The 3-phase connection (delta) centre point is bridged to earth in the AC output terminal box (mounted on the generator). This is the initial earth safety point and is sufficient to ensure safe operation however only as long as no other system is installed. This system is adapted to enable test running of the generator before delivery.

The bridge to ground (PEN) is only effective when all components in the electrical system share a common ground. The bridge to ground can be removed and reconnected to another ground system if required for other safety standards.

Full voltage connections are mounted in the electrical cabinet. It must be ensured that the electrical cabinet is secured and closed while the generator is running.

The starter battery cable should be disconnected when work is being done on either the generator or the electrical system in order to prevent accidental starting of the generator.

6.2.5 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.

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7. Maintenance Instructions

Due to immission control laws, the engine maintenance must be carried out according to the instructions of the engine manufacturer.

In addition to this maintenance, the following maintenance work must be carried out on the generator.

7.1 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!

7.1.1 Hazard notes for the maintenance

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

NOTE!

Danger for life! - Improper operation can lead to health problems and death.

Always disconnect the battery bank (first negative pole then positive pole) when working on the generator or made on the electrical system of the generator so that the generator does not start unintentionally.

WARNING! Automatic start

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

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

WARNING! Risk of injury

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

- No open flames during work on the generator.

WARNING! Danger of fire

- 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 operation can lead to health problems and death.

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

WARNING! Danger to Life - High voltage

Generator and cooling water can be hot during and after operation.

During operation, overpressure may build up in the cooling system.

WARNING! Hot surface/material

For maintenance work, personal protective equipment is compulsory. This includes:

- Tightly fitting protective clothing
- Safety shoes
- Safety gloves
- Safety goggles if applicable

ATTNETION! Personal protective equipment necessary.

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

ATTENTION! Disconnect all load

Batteries contain corrosive acids and lyes.

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

Observe the instructions from your battery manufacturer.

WARNING!

7.1.2 Disposal of engine fluids

Engine fluids are harmful to the environment.

Collect and properly dispose of drained engine fluids!

Environmental protection.

7.2 Maintenance requirements

The maintenance intervals can be found in the "General information for vehicle / marine generators" enclosed with this manual.

NOTE! Maintenance intervals

Check before every start (or once a day)

- Oil level
- Leaks in the cooling system
- Visual inspection for changes, leaks, oil hose, V-belt, cable connections, hose clamps, air filters

Once a month

- Grease / oil the actuator trapezoidal thread spindle (if present).

7.2.1 Check hose elements and molded rubber parts in the capsule

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to environmental influences. They can be age quickly if they are used in dry air, in the environment of light oil and fuel vapors and elevated temperature. The hoses must be regularly checked for elasticity. There are operating situations in which the hoses have to be renewed once a year.

7.3 Secure generator against unintentional start

Disconnect the starter battery from the generator by disconnecting the starter battery contacts or opening the battery main switch (if installed).

7.4 Bleeding the cooilng water circuit vehicle version

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

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

ATTENTION!

Cooling system can be under pressure.

ATTENTION!

If the cooling water has been drained or if, for other reasons, air has entered the cooling system, a careful bleeding of the cooling system is required. This bleeding process must be repeated several times:

1. Place the generator on a level surface.
2. Open the capsule.

3. Open the bleed screw at the thermostat housing.

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

Sample picture

Fig. 7.4-1: Bleeding screw thermostat housing

4. Open the bleed screw at the exhaust elbow.

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

Sample picture

Fig. 7.4-2: Bleeding screw exhaust elbow

5. Open the bleed screw at the water-cooled silencer (only at vehicle version)

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

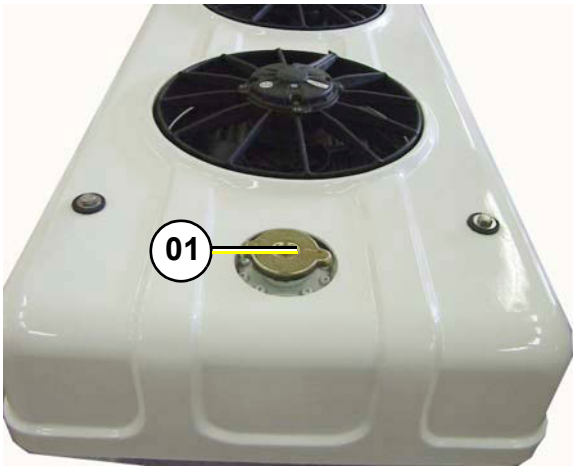
Sample picture

Fig. 7.4-3: Bleed screw silencer

6. Fill cooling water into the cooling water filler neck on the radiator (01) up to the maximum.
7. When the coolant level in the radiator is steady (at cold cooling water, the cooling water level must cover the plate in the exhaust manifold), close all the bleed valves, start the generator.
8. Let the generator run for maximal 60 seconds.
9. Switch generator OFF.

Sample picture

Fig. 7.4-4: Radiator



10. Open radiator filler cap and open bleed valves again.
11. Top up with coolant until level is steady once more.

Sample picture

Fig. 7.4-5: Cooling water filler neck

12. Repeat this procedure several times.
13. When the cooling water level ceases to change, the generator can be started and run for 5 minutes. After that, the bleeding process must be repeated two to three times.
14. It is useful to repeat the bleeding process after several days to ensure that air bubbles potentially still remaining within the system are reliably removed.
15. Remove potential coolant stains and splashes from the generator and surroundings.
16. Close the generator capsule.

7.4.1 Check the coolant hoses

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

7.5 Oil change intervals

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

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

Oil quality and oil quantity:

See section 9.1, “Engine oil,” on page 125 and section 9.6, “Technical data,” on page 128.

7.5.1 Checking and refilling oil level

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

ATTENTION!

Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!

7.5.1.1 Checking oil-level

Required tools /spare parts / material	Paper towels and rags

The generator must be placed at level.

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

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

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

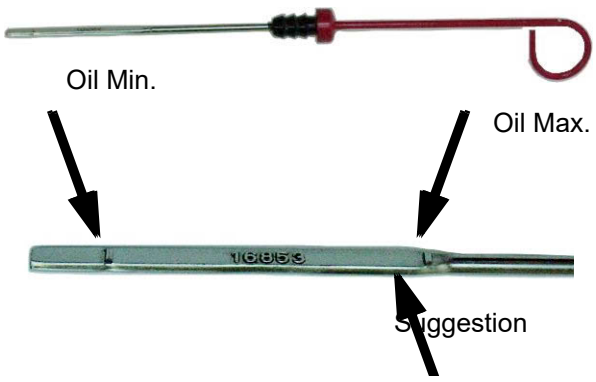
Oil dipstick

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

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

Sample picture

Fig. 7.5-1: Oil dipstick - Sample



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

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

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

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

7.5.1.2 Refilling oil

Required tools / spare parts / material	Engine oil

1. Check oil-level as described under section 7.5.1.1, “Checking oil-level,” on page 54.
2. Oil dipstick is pulled out of the check rail.
3. Open the oil filler cap.
4. Fill in oil (approx. 1/2 litre) and wait for about 2 min. so this it can flow into the oil pan.
5. Wipe off the oil dipstick and put it into the check rail.
6. Pull the oil dipstick out of the check rail and check the oil-level. See section 7.5.1.1, “Checking oil-level,” on page 54.

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

7.5.1.3 After the oil level check and refilling the oil

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

7.5.2 Replacement of engine oil and engine oil filter

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

The generator must be placed at level.

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

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

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

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

- with generators that have an external oil drain hose: Release the oil drain hose from the mounting.

Sample picture

Fig. 7.5.2-1: Oil drain hose

- with generators that have an internal oil drain hose: Remove the sound cover side wall. The oil drain hose lies in the bottom of the capsule. Guide the hose outside.

Sample picture

Fig. 7.5.2-2: Oil drain hose

- Optional with generators that have an internal oil drain hose: Open the lead-through for the oil drain hose (left turn of the closure). Pull out the closureg with the oil drain hose.
- Place an oil resistant mat under the oil drain hose area and prepare the container.

Sample picture

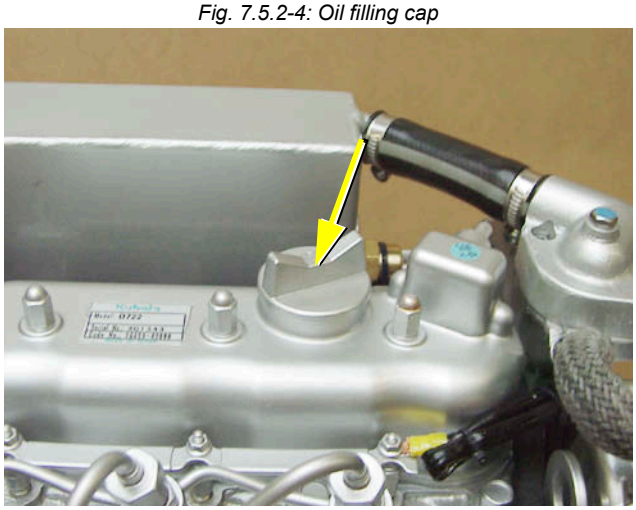
Fig. 7.5.2-3: Lead-through

2. Loosen oil filling cap

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

Sample picture

Fig. 7.5.2-4: Oil filling cap



3. Open oil drain screw.

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

Fig. 7.5.2-5: Oil drain screw

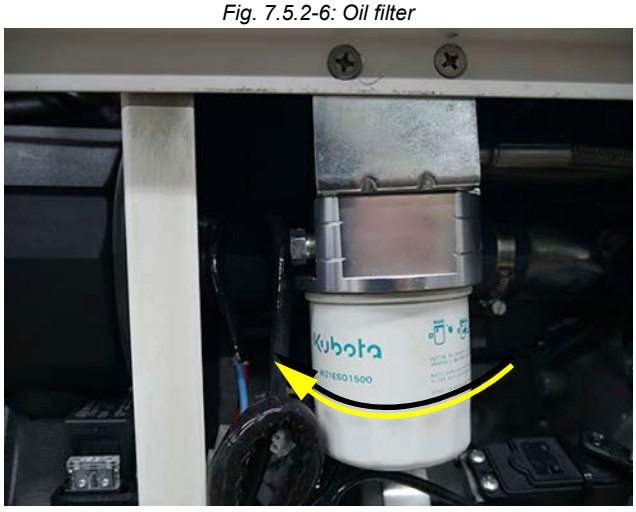
4. Discharge used oil.

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

5. Remove used oil filter / clean oil screen

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

Fig. 7.5.2-6: Oil filter



6. Preparing a new filter

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

Fig. 7.5-7: Oil screen sealing ring

7. Mounting the new filter

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

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

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

9. Check proper filling level. See section 7.5.1.1, "Checking oil-level," on page 54.

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

10. Clean up

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

7.5.3 After the oil change

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

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

ATTENTION!

7.6 Bleeding the fuel system

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

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

ATTENTION!

Normally, the fuel system is designed to bleed 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 bleed the system as follows prior to the first operation (as all hoses are empty):

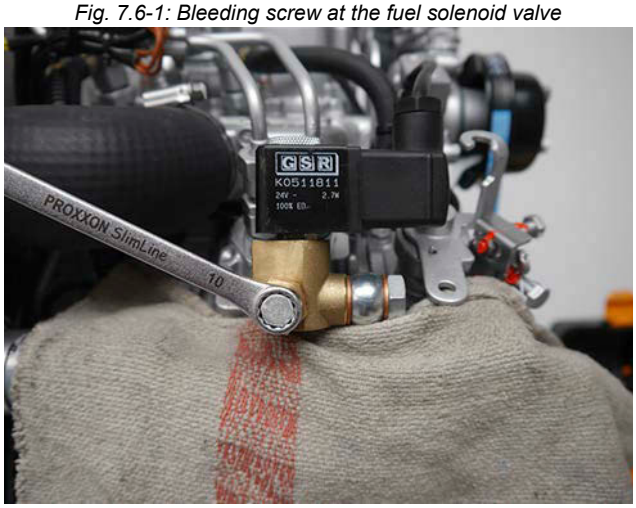
Generators with iControl/xControl/fpControl system do not need a failure bypass switch. At these generators the fuel pump can be activated by an option of the control panel. See iControl/xControl/fpControl panel manual.

ATTENTION!

1. Place the generator on a level surface.
2. Open the capsule.
3. Set the main switch of the control panel to "ON". Function elements must light up.
4. When the fuel pump has been used by pressing the failure bypass switch for approx. 3 - 4 minutes, the bleeding screw on the fuel solenoid valve is released (see picture). While opening the screw the failure bypass switch must be continued to pressed. To avoid fuel getting in the sound cover a piece of cloth or absorbent paper should be put under the connection. As soon as fuel is running out without bubbles the air bleeding screw can be screwed in again. Only then may the failure baypass switch be released.

Sample picture

Fig. 7.6-1: Bleeding screw at the fuel solenoid valve



5. Press the 'start' key (start the engine).

   The electric starter may only be switched on continuously for a maximum of 60 seconds. After that a pause of at least 60 seconds must be kept. Repeat this process. The fuel pump is working now. Check that there are no leaks on the bleed screw on the fuel filter and at the injection pump.

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

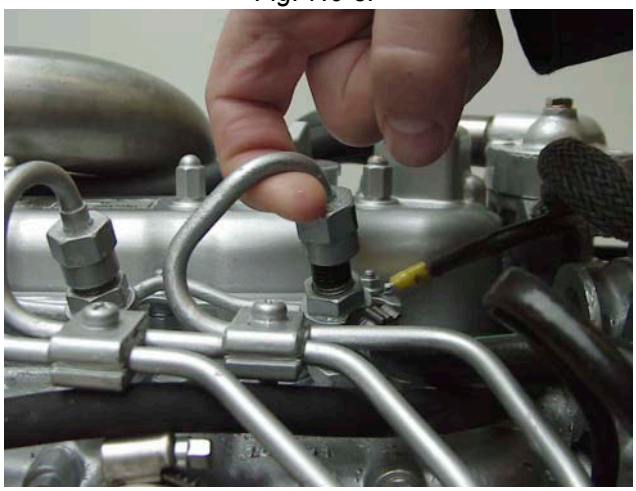
Sample picture

Fig. 7.6-2: Injection nozzles

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

Sample picture

Fig. 7.6-3:



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

7.6.1 Replacement of the fuel filter

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

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

ATTENTION!

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

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

5. Remove all cable tie.

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

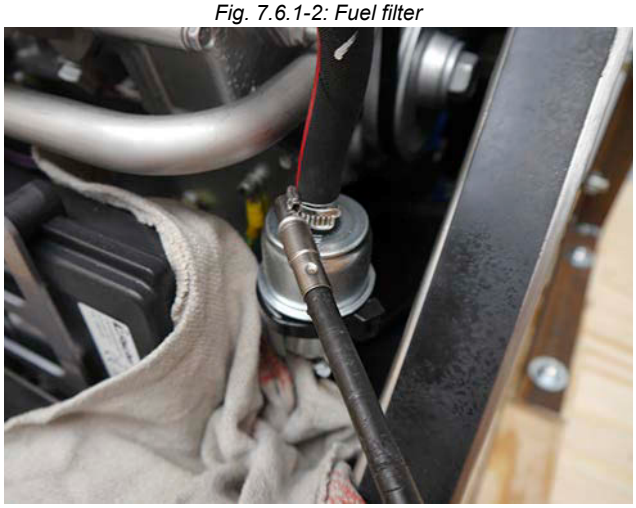
Sample picture

Fig. 7.6.1-1: Fuel filter

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

Sample picture

Fig. 7.6.1-2: Fuel filter



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

Sample picture

Fig. 7.6.1-3: Fuel filter

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

Sample picture

9. Remove the hose clamp.
10. Remove potential fuel stains and splashes from the generator and surroundings.
11. Remove lock against unintentional start of the generator.
12. Bleed the fuel system, see section 7.6, “Bleeding the fuel system,” on page 59.
13. Close the generator capsule.

Fig. 7.6.1-4: Fuel filter

7.7 Replacement of the air filter

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

Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!

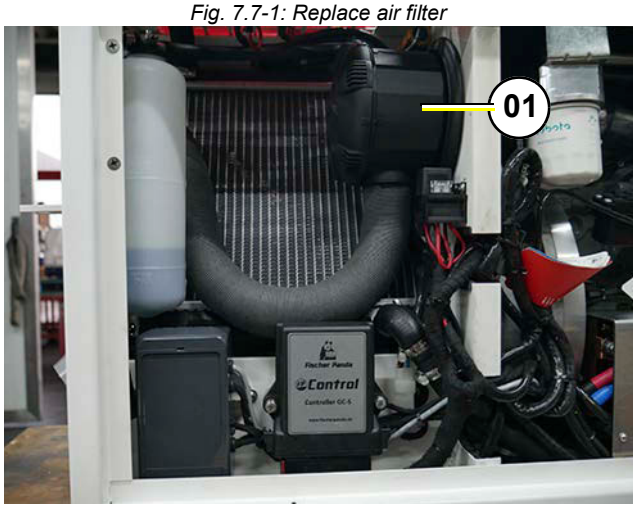
Wear personal protective equipment. (Gloves, protective goggles, protective clothing and safety shoes).

ATTENTION!

1. Place the generator on a level surface.
2. Secure the generator against unintentional start.
3. Open the generator capsule.
4. Open the cover of the air filter housing by turning counter-clockwiese and pull the cover.

   01. Air filter housing
5. Pull out the filter element.
6. Clean the filter element by blowing it out with dry compressed air (max. 5 bar) or replace the filter element at latest after 2 years.
7. Installtion in reverse order.
8. Close the generator capsule.
9. Remove lock against unintentional start of the generator.

Fig. 7.7-1: Replace air filter



7.8 Replacement of the V-belt

Required tools / spare parts / material	Set of spanner, set of screwdriver / v-belt / paper towels and rags

Generator and engine can be hot during and after operating.

ATTENTION! Burn hazard!

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

ATTENTION!

1. Place the generator on a level surface.
2. Secure the generator to prevent it from being started unintentionally.
3. Open the generator capsule.

Due to the relatively high ambient temperature (approx. 85 °C) inside the closed sound insulation capsule, a reduction in the useful life of the V-belt is to be expected. It is possible that the plasticisers in the rubber compounds may partially lose their effectiveness even after a brief period of operation because the air in the sound insulated capsule can be relatively warm and dry.

The V-belt must therefore be checked at very short time intervals. It may be necessary to replace the V-belt after several weeks because of unfavourable conditions. It is mandatory that an inspection be performed before every start-up and that the V-belt be exchanged at intervals of 150 hours of operation. The V-belt must be considered a wearing part. There should therefore be sufficient spare V-belts on board. We recommend that you have the appropriate service kit available.

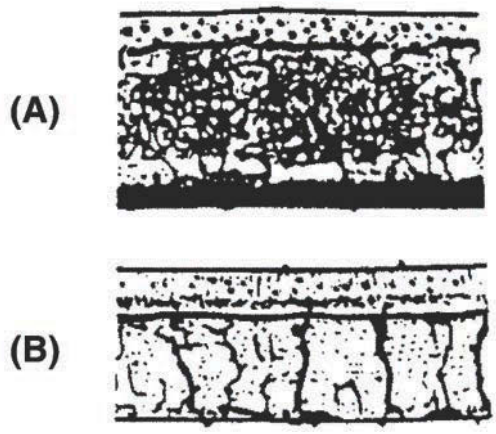
Inspection of and damage to the V-belt

4. Inspect the V-belt for damage.
5. In the event of damage, renew the V-belt.
6. Check whether the V-belt is worn and has sunk into the pulley groove.
7. Renew a V-belt if it is significantly damaged or worn and has sunk into the pulley groove.

(A) Good

(B) Bad

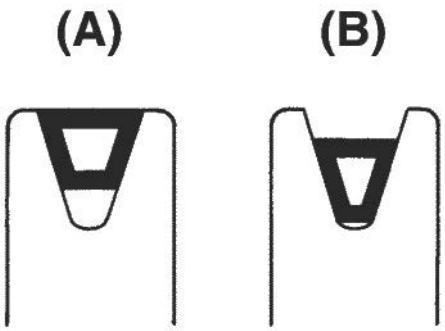
Fig. 7.8-1: V-belt



(A) Good

(B) Bad

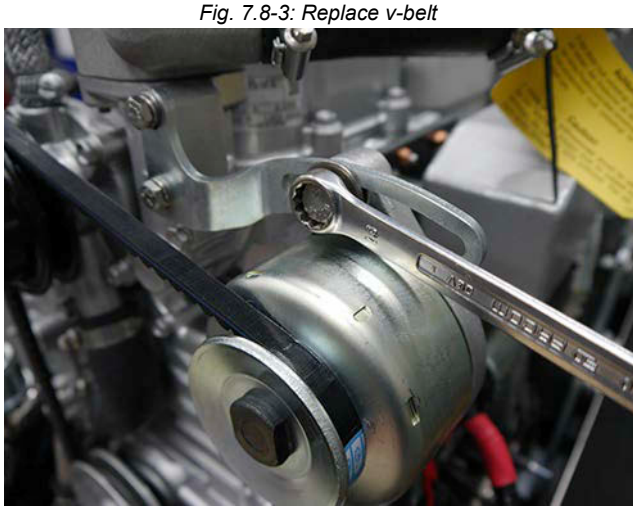
Fig. 7.8-2: V-belt



8. Loosen the fixing screw above the DC-alternator.
   Spanner size 13 mm.

Sample picture

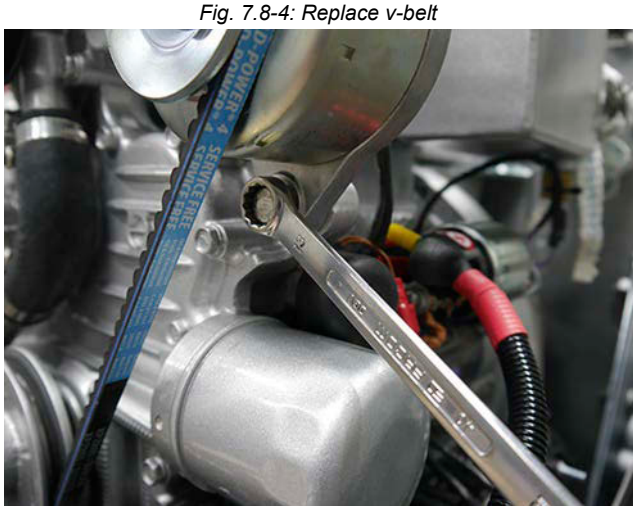
Fig. 7.8-3: Replace v-belt



9. Loosen the fixing screw below th DC-alternator.
   Spanner size 13 mm.

Sample picture

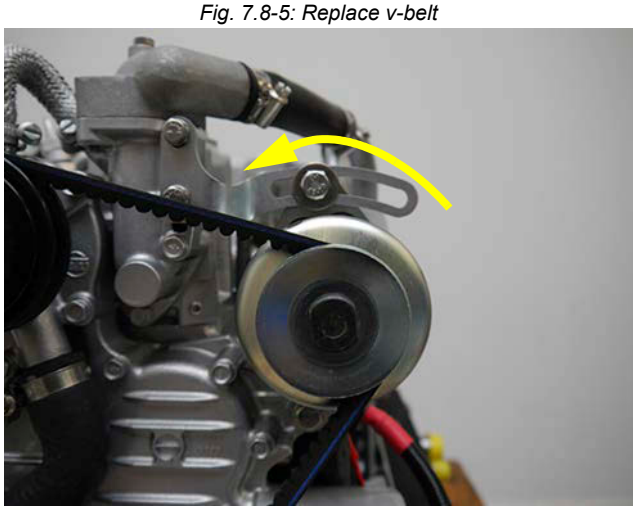
Fig. 7.8-4: Replace v-belt



10. Press the DC-alternator in the direction of the arrow to relax the V-belt.
11. Remove the v-belt and replace it with a new one.
12. The V-belt is tensioned by pulling the DC-alternator back. The V-belt should be able to be pushed in about 10 mm with the thumb.
13. Retighten the screws above and below the DC-alternator.

Sample picture

Fig. 7.8-5: Replace v-belt



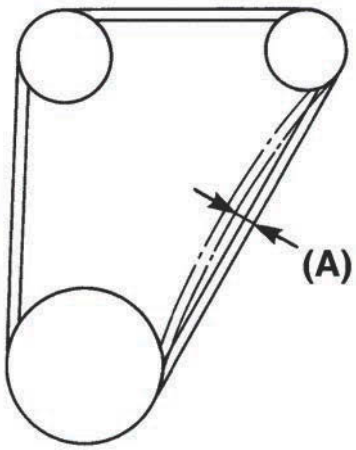
V-belt tension

14. Measure the deflection (A), depressing the belt halfway between the fan drive pulley and alternator pulley at specified force 98 N (10 kgf, 22 lbs).
15. If the measurement is not within the factory specifications, loosen the alternator mounting screws and relocate the alternator to adjust.

Deflection (A)	Factory spec.	7.0 to 10.0 mm 0.28 to 0.35 in.

(A) Deflection

Fig. 7.8-6: V-belt



16. Close the capsule.
17. Remove lock against unintentional start of the generator.

8. Generator Failure

8.1 Personal requirements

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

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

8.2 Hazard notes for the troubleshooting

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

Notice!

Danger for life! - The generator can be equipped with an 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. Therefore:

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

Danger! Danger of poisoning

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

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

Attention! Danger to Life - High voltage

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

Warning! Hot surface/material

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

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

Instruction! Personal protective equipment necessary.

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

Attention! Disconnect all load

8.3 Troubleshooting table

8.3.1 Generator output to low

Cause	Solution
Generator is overloaded.	Reduce the electrical load. (Switch off load)
Motor is not reaching the rated rpm.	Refer to „motor faults“ section.
Actuator not in max. position.	Check/relpace actuator.

8.3.2 Generator voltage to high

Cause	Solution
Engine runs with wrong rpm.	Check engine speed with rev counter or frequency meter, set correct speed.
Actuaror damaged.	Check/relpace actuator.

8.3.3 Generator voltage fluctuates

Cause	Solution
1. Disturbances on the electrical system/user side.	1. Check if electrical load is fluctuating.
2. Motor disturbances.	2. Refer to section: „Motor runs irregular“.

8.3.4 Diesel motor fails to start

Cause	Solution
Starter battery switched „OFF“.	Check position of battery switch and switch „ON“ (if installed).
Starter battery voltage insufficient (battery too weak).	Inspect battery terminals and cables for a good electrical connection (Inspect against corrosion, tattered wires, etc.).
Starting current disrupted.	During the normal starting process, the battery voltage drops to 11 V with a fully charged battery. If the voltage does not drop during starting, the electrical connection is faulty. If the battery voltage drops lower than 11 V, then the battery has been discharged.

8.3.5 Starter motor is turning the engine, but generator fails to start

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

8.3.6 Motor does not achieves enough speed during starting process

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

8.3.7 Motor runs irregular

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

8.3.8 Motor speed drops

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

8.3.9 Motor runs in off position

Cause	Solution
Fuel inlet solenoid valve or throttle shut solenoid is not switching off.	Check wire connections to solenoid. Check valve functions, replace if necessary. See „Fuel solenoid valve“.

8.3.10 Motor stops by itself

Cause	Solution
Lack of fuel.	Check fuel supply system.
Excess heat in cooling system (thermo switch tripped)-lack of cooling water. Is indicated on the remote control panel.	Check cooling water system flow: water pump, inlet water filter, extra heat exchanger coolant flow.

Cause	Solution
Lack of ill pressure sensor tripped). Is indicated on the remote control panel.	Check oil-level and if necessary top up. Check eingine's oil-pressure and have repaired by motor manufacturer-service if necessary.

8.3.11 Sooty black exhaust

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

8.3.12 Generator must be shut off immediately if:

Cause	Solution
- motor rpm suddenly rises or drops - unusual noise comes from genset - exhaust colour suddenly becomes dark - leakage in the cooling water system.	Refer to respective section of manual and if necessary, have repaired by motor manufacturer-service, or Panda representative.

8.4 Starting problems

8.4.1 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.

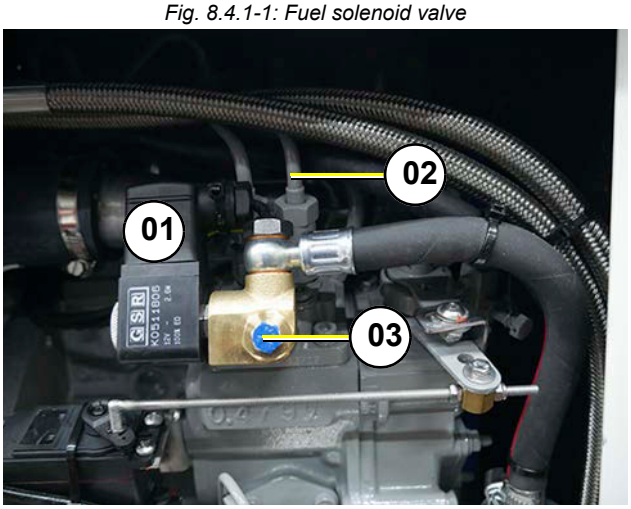
A check of the fuel solenoid valve by removing the plug from the fuel solenoid valve for a short period whilst in operation (first remove the small retention screw) and replace it immediately. The motor should „react immediately“ by revving high.If the motor does not react sharply to the re-connection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

01. Fuel solenoid valve

02. Fuel injector nozzles

03. Ventilation screw

Fig. 8.4.1-1: Fuel solenoid valve



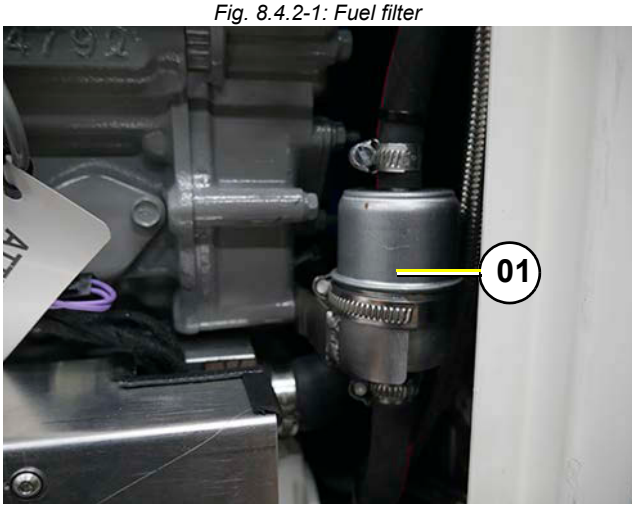
8.4.2 Clogged fuel filter

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

Replace the filter element, please refer to see “Replacement of the fuel filter” on page 101.

01. Filter element

Fig. 8.4.2-1: Fuel filter



9. Appendix

9.1 Technical data

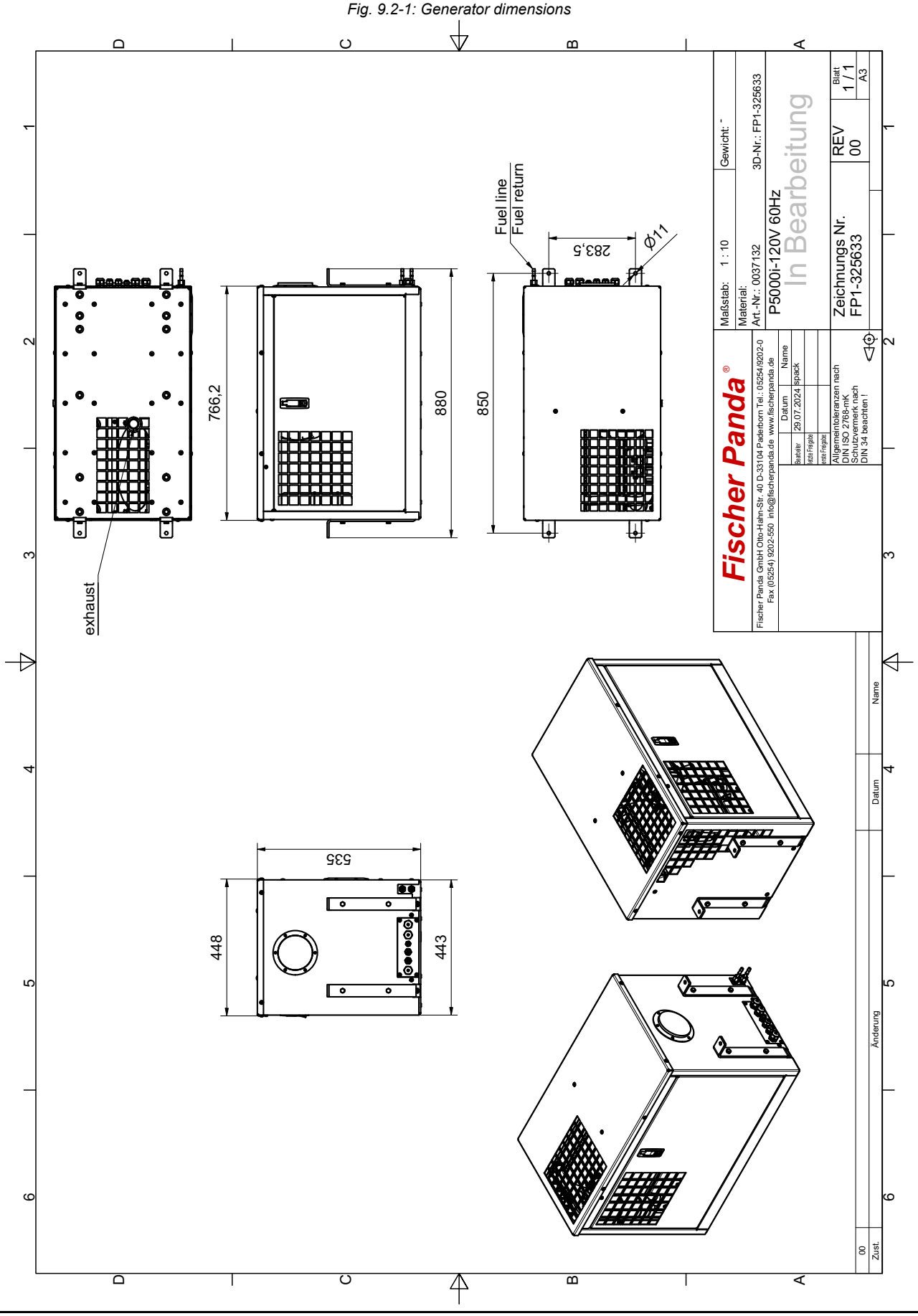
Panda 5000i		
Generator		
Generator type	Perfect power	
Generator famlily	iSeries RV	
Generator version	RV (Recreation Vehicle)	
Area of application	Vehicle	
Frequency [Hz]	60 Hz or 50 Hz Version	
Generator manufacturer	Fischer Panda GmbH	
Electrical information		
	60 Hz Version	50 Hz Version
Output power	4 kW	4 kW
Voltage	120 V AC	230 V AC
Current	33.3 A	17.4 A
Frequency	60 Hz	50 Hz
Engine		
Manufacturer	Kubota	
Engine type	Z482	
Number of cylinders	2	
Displacement	479 ccm	
Emission Compliance	EU: Stage 5	
	US: EPA Tier 4 final	
	CN: China IV	

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

ATTENTION!

9.2 Generator dimensions

Fig. 9.2-1: Generator dimensions



9.3 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

9.3.1 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

9.4 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.

9.5 Engine oil

9.5.1 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. 9.5.1-1: 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

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

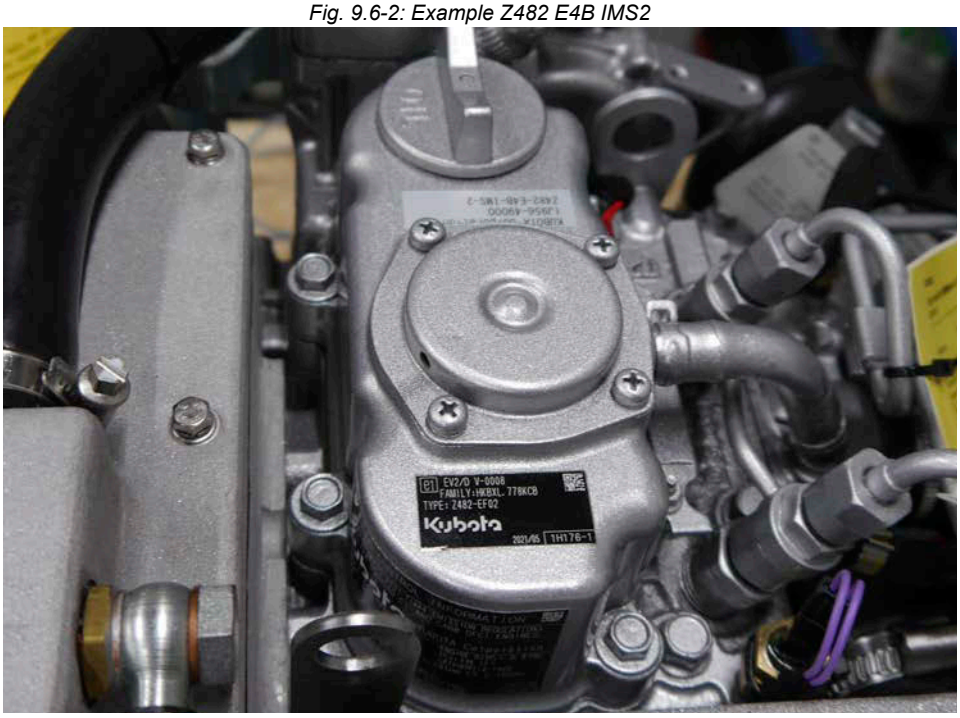
The following CO_2 balance derived from the emission measuring cycle is applicable, with regard to the engine, to generators that are approved in accordance with 2016/1628 EC:

Fig. 9.6-1: 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. 9.6-2: Example Z482 E4B IMS2



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