FischerPanda

Manual Vehicle Generator

Panda AGT-DC 4000 PVMV-N

12V ; 24V ; 48V 4kW

Super silent technology

Current revision status

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

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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. Special Instructions and Hazards of AGT-DC Generators

2.1 General safety instructions for operating an AGT generator

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

It is mandatory to ensure that the battery is fitted with a main switch in an easily accessible area so that the main switch can be disconnected immediately in case of danger. The main switch must, however, also be installed directly on the battery. If this location is not accessible, a power relay must be used instead of a manually operated main switch, which can then be operated from different locations, as well, if necessary. The switches for the power relay shall be labelled accordingly as main switch for the DC battery with „Switch off in case of danger!“.

2.1.1 Diode block cooling

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

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

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

WARNING: General warning

Touching the electric contacts can be LETHAL!

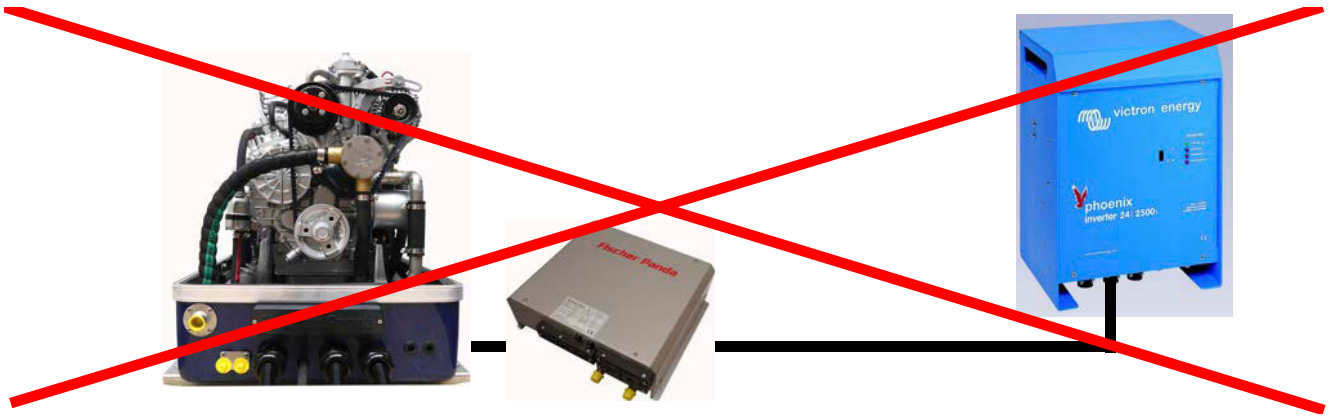
WARNING: Risk of electric shock upon contact

2.2 Sample system AGT DC generator

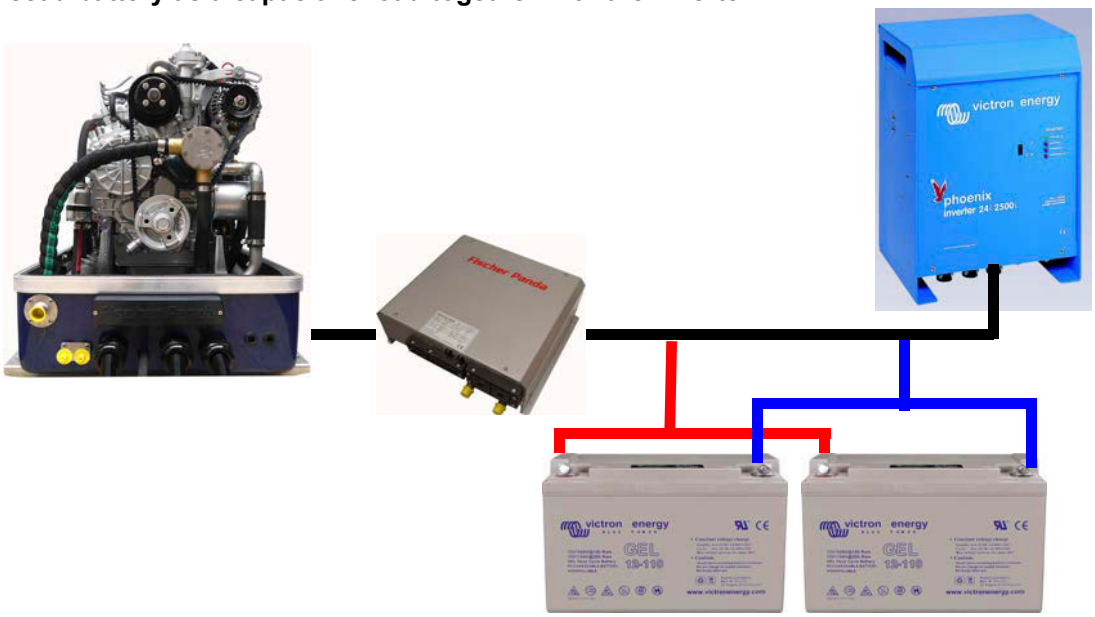
The AGT generator must not be directly connected to an inverter (without the batteries)!

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

WARNING: Important information!



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



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

Torque:

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

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

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

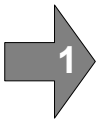
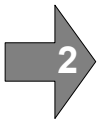
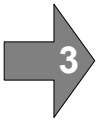
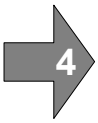
2.2.1 Fire protection measures

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

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

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

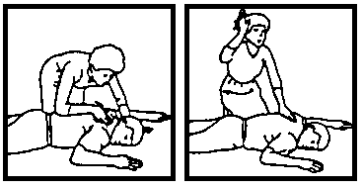
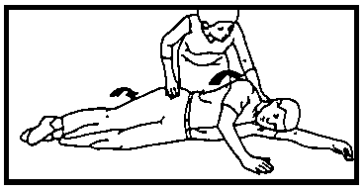
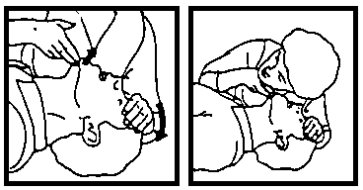
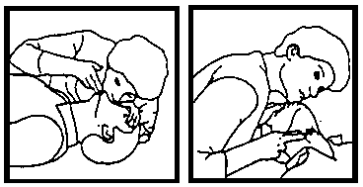
2. In case of Emergency First Aid

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

2.3 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 PMS generator system contains following components:

3.3.1 PM generator

Fischer Panda Generator

representative picture

Fig. 3.3-1: Fischer Panda Generator

Remote control panel

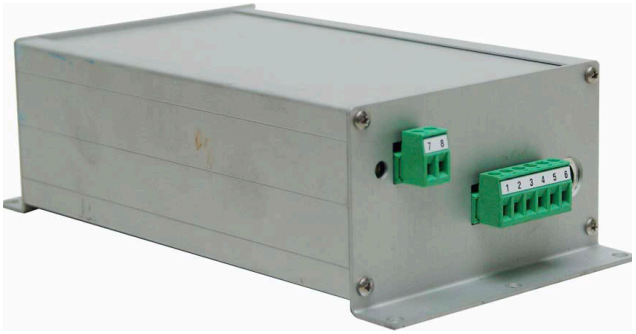
representative picture

Fig. 3.3-2: Remote control panel

VCS (Voltage control system) for the voltage control

Fig. 3.3-3: VCS

representative picture



Rectifier unit

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

Fischer Panda Manual

Fig. 3.3.1-4: Fischer Panda Manual

The Fischer Panda Manual contains following components:

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

representative picture

Optional components f.e.:

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

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

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

representative picture

Fig. 3.5-1: Sound insulation capsule, side part

Closure locked

representative picture

Fig. 3.5-2: Closure locked

Closure open

representative picture

Fig. 3.5-3: Closure open

3.5.1 Opening the GFK sound insulation capsule

GFK sound insulation capsule with lash closures

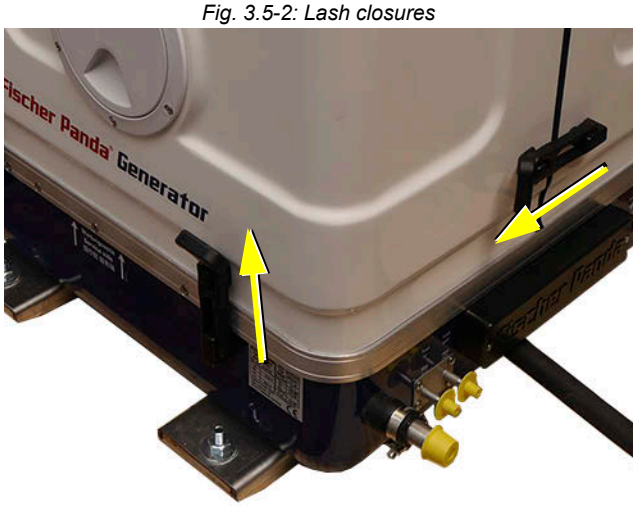
representative picture

Fig. 3.5-1: Lash closures

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

representative picture

Fig. 3.5-2: Lash closures



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 down-times 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 dis-connected

- 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 distil-led 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 manufactu-rer.

Fischer Panda recommends:

Note: Starter battery recommendation

- Install battery circuit breaker and switch to OFF on the ma-chine. (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 150 h inspection as per the inspection list should be performed.

Note:

EC Declaration of conformity

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

Manufacturer	Fischer Panda GmbH Otto-Hahn-Straße 40 33104 Paderborn
Product	Fischer Panda Diesel Generator
Product Type	G AGT-DC 004000 PVMV-N 24V M4
Part No.	0013499
Year of manufacture	2023-
Function description	The Fischer Panda diesel generator is intended solely for use as a permanently-installed power generator in (vehicles, trailers and mobile containers) (inland waterway vessels) (seagoing vessels).

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

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

This machine complies with the following standards and conventions:

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

ISO 8178-1:2017-04	Reciprocating internal combustion engines - Exhaust emission measurement - Part 1: Test-bed measurement systems of gaseous and particulate emissions
ISO 8178-4:2017-04	Reciprocating internal combustion engines - Exhaust emission measurement - Part 4: Steady-state and transient test cycles for different engine applications
DIN 6280-10:1986-10	Reciprocating internal combustion engines; generating sets with reciprocating internal combustion engines; small power generating sets; requirements and tests
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Emission

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

Immunity

DIN EN 61000-4-2:2009-12; VDE 0847-4-2:2009-12	Electromagnetic Compatibility (EMC) - Testing and measurement techniques – Electrostatic discharge immunity test
DIN EN 61000-4-3:2011-04; VDE 0847-4-3:2011-04	Electromagnetic Compatibility (EMC) - Immunity test in respect of high-frequency electromagnetic fields
DIN EN 61000-4-4:2013-04; VDE 04/04/0847:2013-04	Electromagnetic Compatibility (EMC) - Testing and measurement techniques - Immunity test in respect of electrical fast transients
DIN EN 61000-4-6:2014-08; VDE 06/04/0847:2014-08	Electromagnetic Compatibility (EMC) - Testing and measurement techniques - Immunity test in respect of conducted interference induced by high-frequency fields

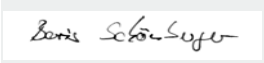
The person authorized to compile the technical file

Sören Hupe

Fischer Panda GmbH

Otto-Hahn-Straße 40

33104 Paderborn

Paderborn, _____06.06.2024_____	
Place, date	Dipl.-Ing. Stephan Backes (Managing Director)
Paderborn, _____06.06.2024_____	
Place, date	Boris Schönberger (Authorised signatory)

1. The Panda Generator

1.1 Type plate at the Generator

Fig. 1.1-1: Type plate

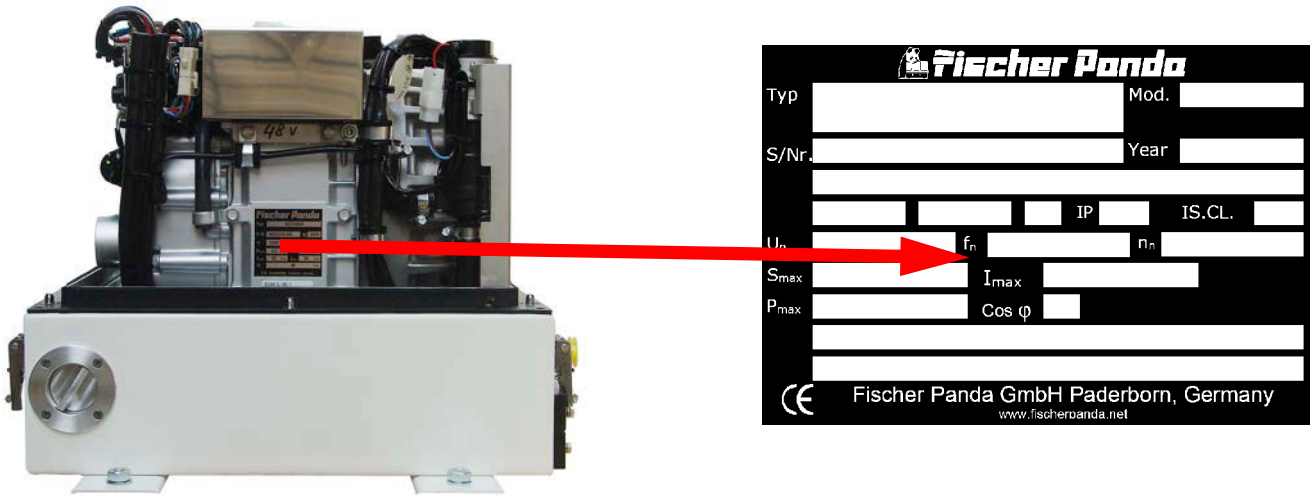
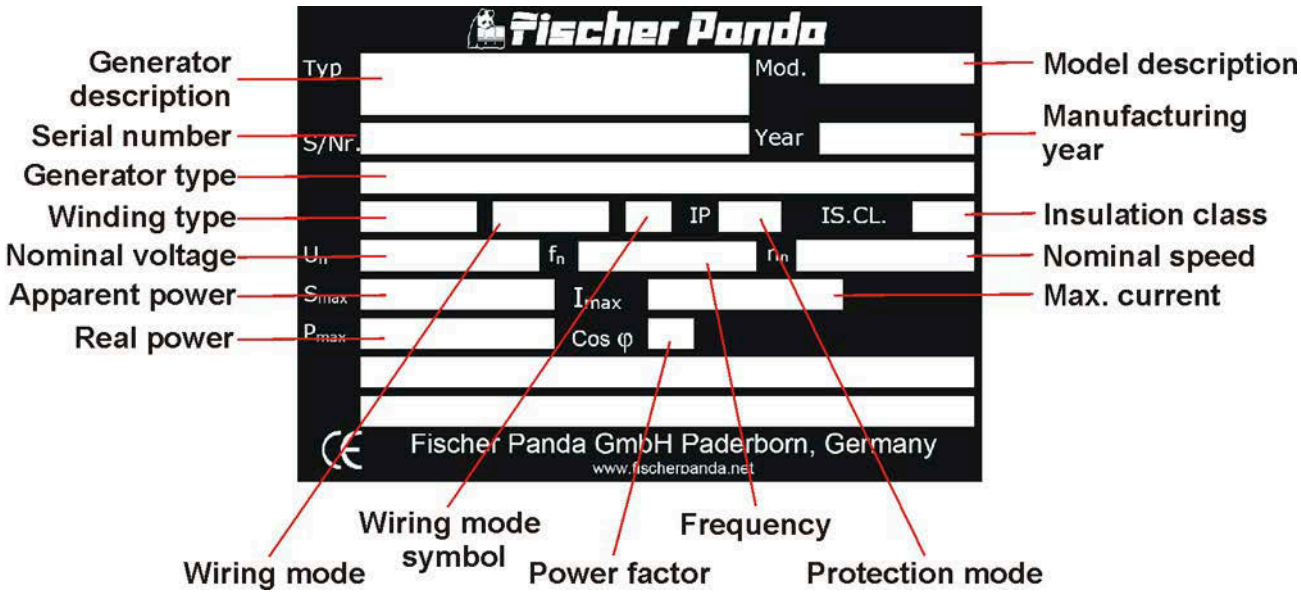


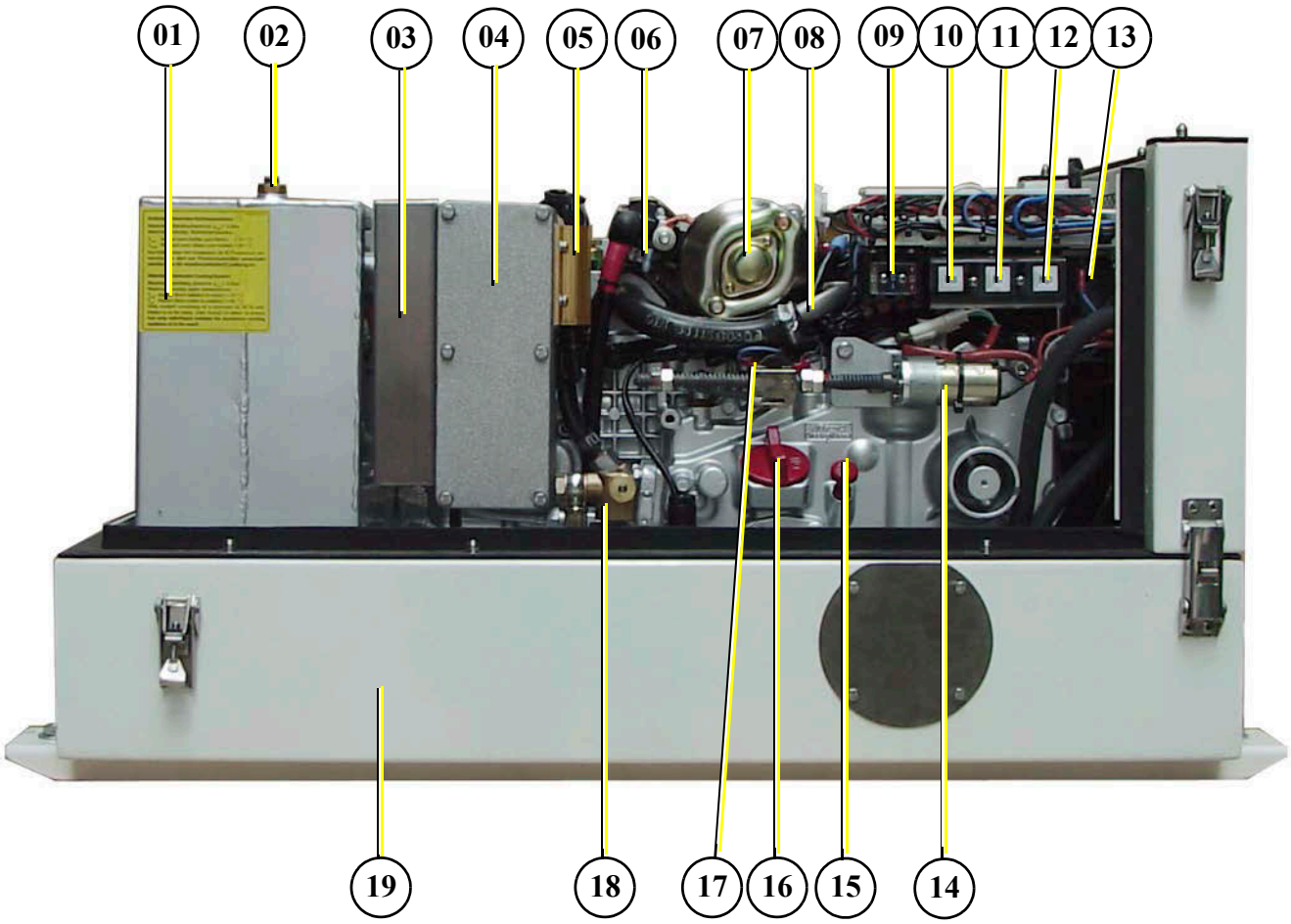
Fig. 1.1-2: Discription type plate



1.2 Desciption of the Generator

1.2.1 Front View

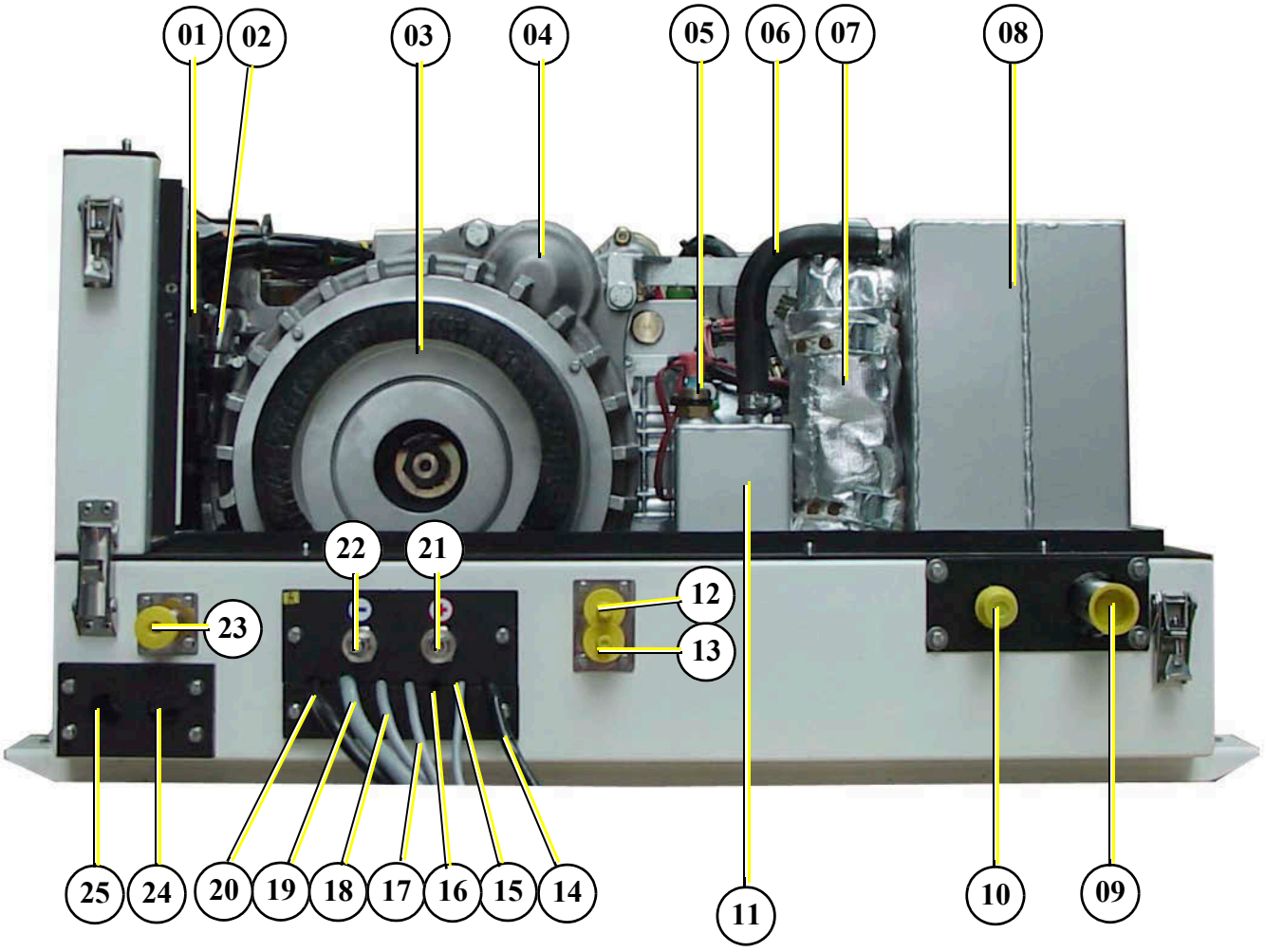
Fig. 1.2.1-1: Front View



01. Water-cooled pre-silencer
02. Ventilation screw pre-silencer
03. Suction port at air suction housing
04. Air suction housing with air filter insert
05. Protection resistor for thermo-switch 75°C/70°C
06. Solenoid for starter motor
07. Starter motor
08. Cooling water pipe, rectifier block - engine
09. Electrical fuses (white=25A; blue=15A; red=10A)
10. K1 Starter relay
11. K2 Pre-glow relay
12. K3 Fuel pump relay
13. K4 DC/DC converter relay (only at 24V-version)
14. Actuator
15. Engine oil dipstick
16. Engine oil filler neck with cap
17. Oil pressure switch
18. Fuel solenoid valve
19. Sound cover base part

1.2.2 Back View

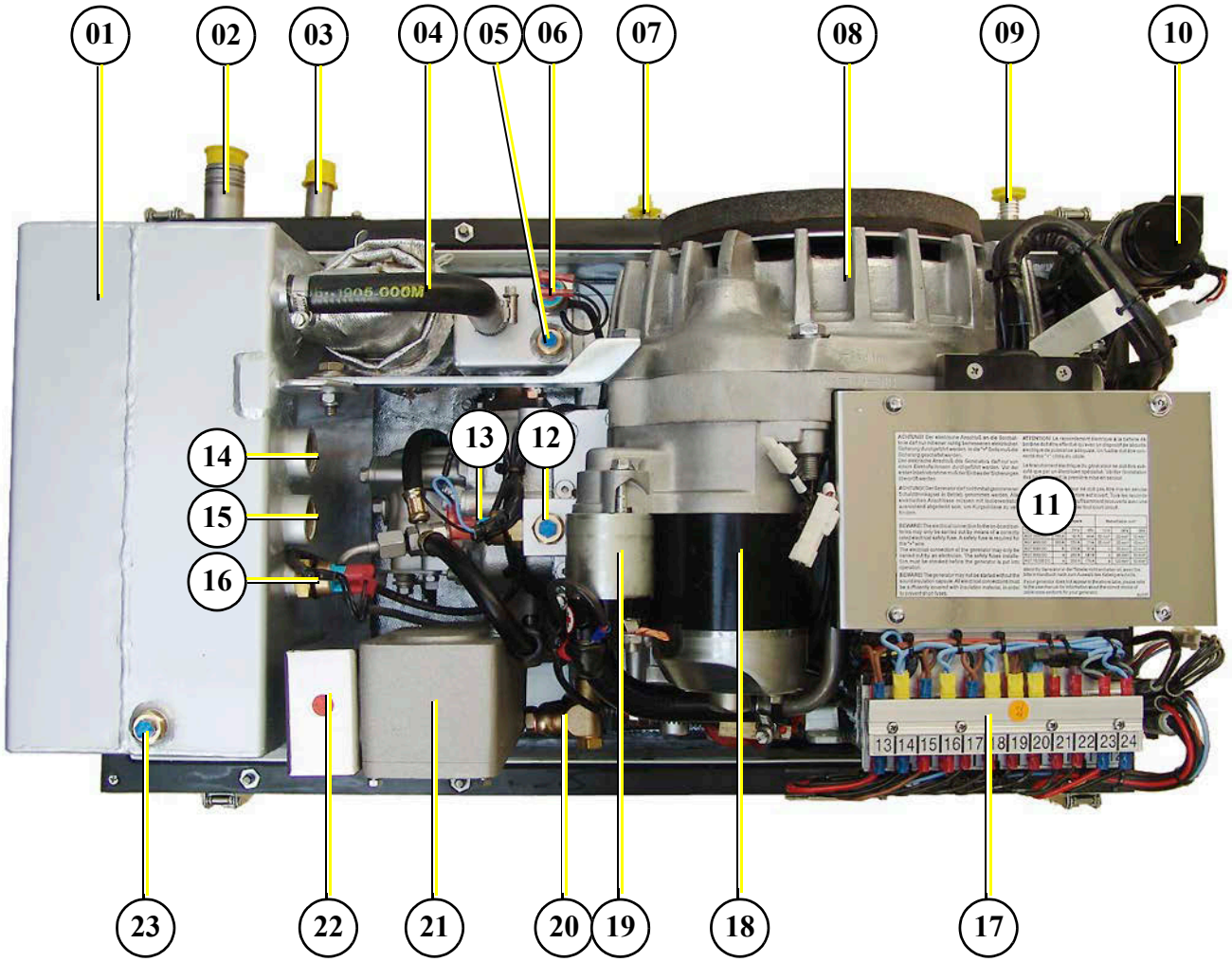
Fig. 1.2.2-1: Back View



01. Cooling water pump
02. Cooling water input rectifier block
03. Generator front cover
04. Starter motor
05. Thermo-switch exhaust elbow 98°C/83°C
06. Cooling water pipe, Exhaust elbow - pre-silencer
07. Compensator under heat isolation
08. Water-cooled pre-silencer
09. Exhaust output
10. Cooling water output
11. Water-cooled exhaust elbow
12. Fuel IN
13. Fuel OUT
14. Cable for DC/DC converter (only at 24V-version)
15. Cable for measuring shunt (VCS, Kl. 9, 10)
16. Cable for VCS
17. Cable for fuel pump
18. Cable for voltage sense (VCS, Kl. 7,8)
19. Cable for remote control panel
20. Cable for fan
21. Connection starter battery plus (+)
22. Connection starter battery minus (-)
23. Cooling water inlet
24. Passage for plus cable of the battery bank
25. Passage for minus cable of the battery bank

1.2.3 View from Above

Fig. 1.2.3-1: View from Above



01. Water-cooled pre-silencer
02. Exhaust output
03. Cooling water output
04. Cooling water hose, exhaust elbow - pre-silencer
05. Ventilation screw at exhaust elbow
06. Thermo-switch at exhaust elbow 98°C/83°C
07. Fuel connections (IN/OUT)
08. Generator housing with coil
09. Cooling water inlet
10. Cooling water pump
11. Rectidier under protection cover
12. Ventilation screw at engine
13. Thermo-switch at engine 98°C/83°C
14. Thermo-switch 75°C/70°C
15. Thermo-switch 82°C/77°C
16. Thermo-switch 98°C/83°C
17. Terminal block for remote control panel, fuses and relays
18. Starter motor
19. Solenoid for starter motor
20. Fuel solenoid valve
21. Air suction housing with air filter insert
22. Suction port at air suction housing
23. Ventilation screw pre-silencer

1.2.4 Side View Right

Fig. 1.2.4-1: Side View Right

01. Terminal block for remote control panel, fuses and relays
02. Engine Kubota EA300
03. Rectifier under protection cover
04. Cooling water pump
05. Passage for oil drain hose
06. Sound cover base part

1.3 Details of functional units

1.3.1 Components of Cooling System

Cooling water inlet

This connection is connected with the external radiator. The cold cooling water flows from here first to the cooling water pump.

The connection diameter is 16mm.

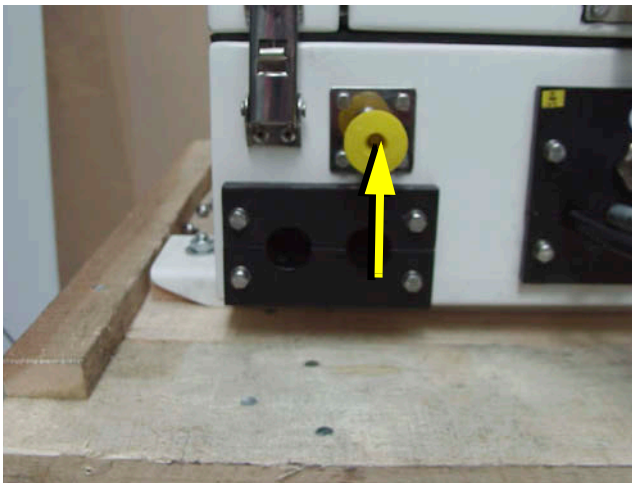


Fig. 1.3.1-1: Cooling water inlet

Internal cooling water pump

The cooling water pump is for the circulation of the cooling water circuit. The pump delivers the cooling water to the rectifier block.

Fig. 1.3.1-2: Internal cooling water pump

Water-cooled rectifier block

The rectifier block is cooled with cooling water.

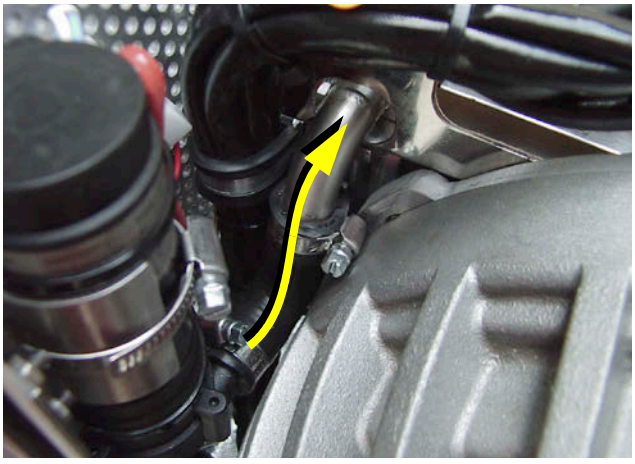


Fig. 1.3.1-3: Water-cooled rectifier block

Cooling water pipe

The cooling water flows through the rectifier block and is then delivered to the engine.

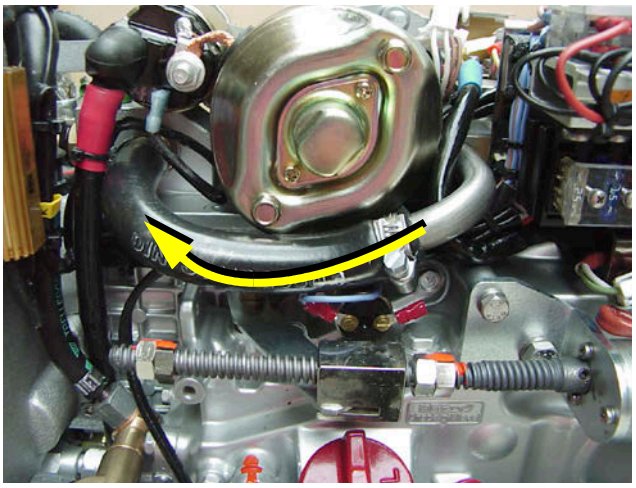


Fig. 1.3.1-4: Cooling water pipe

Cooling water inlet engine

The cooling water gets here into the engine.

Fig. 1.3.1-5: Cooling water inlet engine

Ventilation screw engine

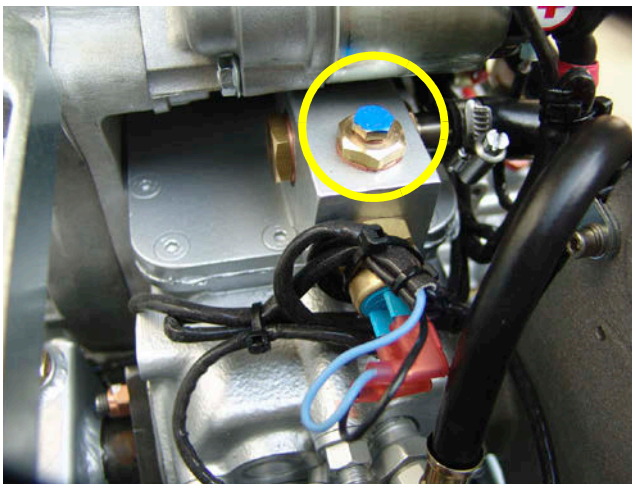


Fig. 1.3.1-6: Ventilation screw engine

Cooling water output engine

The cooling water leaks the engine at the bottom and flows to the exhaust elbow.

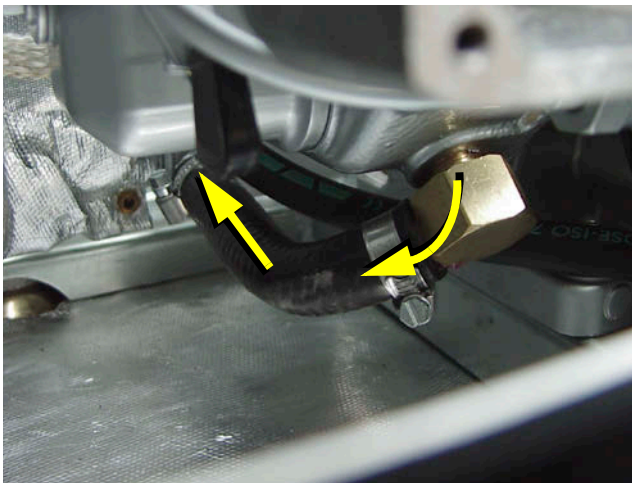


Fig. 1.3.1-7: Cooling water output engine

Water-cooled exhaust elbow

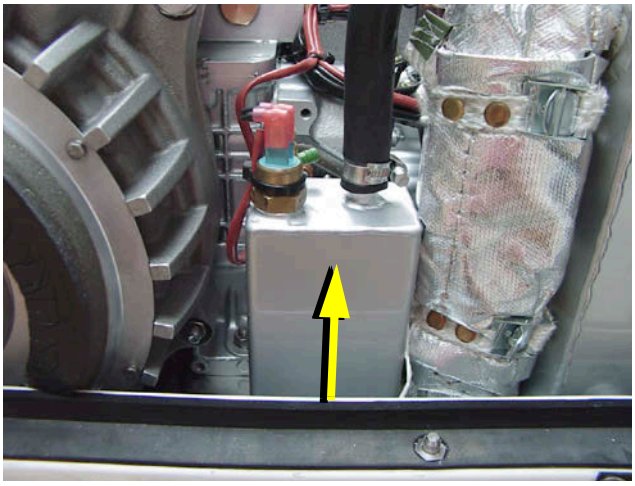


Fig. 1.3.1-8: Water-cooled exhaust elbow

Ventilation screw exhaust elbow

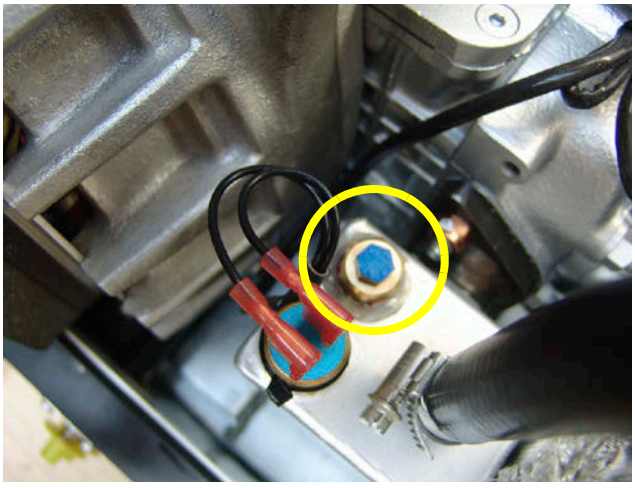


Fig. 1.3.1-9: Ventilation screw exhaust elbow

Cooling water hose

Cooling water hose from the water-cooled exhaust elbow to the water-cooled pre-silencer.

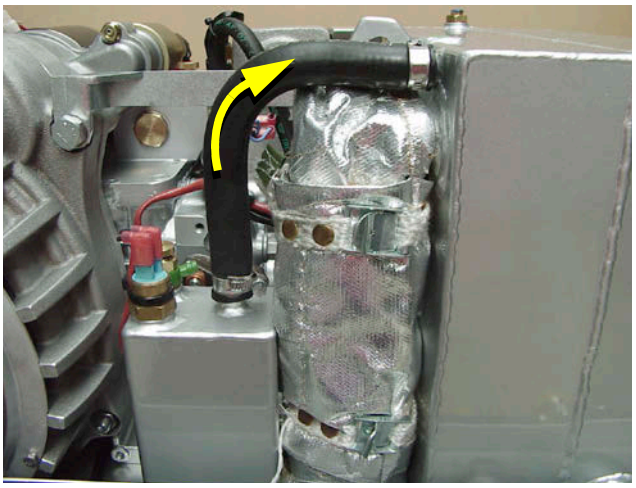


Fig. 1.3.1-10: Cooling water hose

Water-cooled pre-silencer

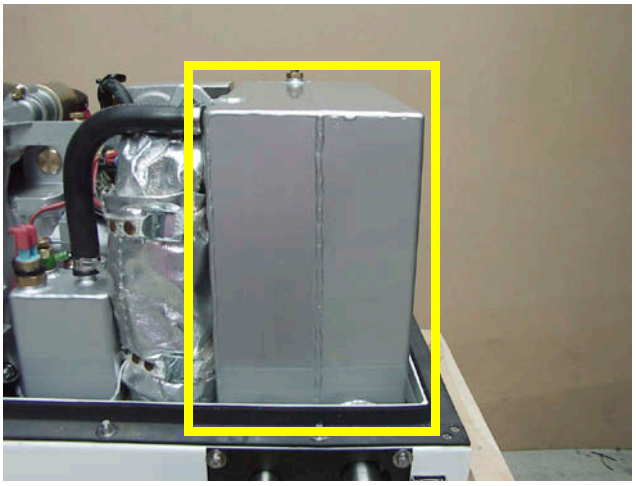


Fig. 1.3.1-11: Water-cooled pre-silencer

Ventilation screw pre-silencer

The ventilation screw at the pre-silencer is used at first filling or at repair works.

Fig. 1.3.1-12: Ventilation screw pre-silencer

Cooling water output

The hot cooling flows from here to the external radiator.

The connection diameter is 20mm.

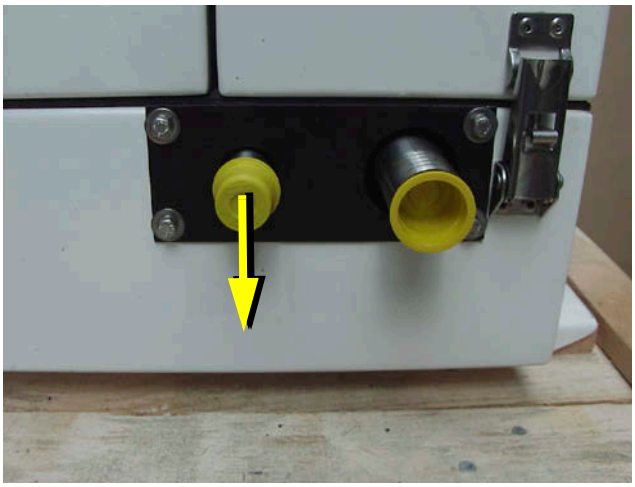


Fig. 1.3.1-13: Cooling water output

1.3.2 Components of the Fuel System

Electrical fuel pump

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

Fig. 1.3.2-1: Electrical fuel pump

Fuel connections

01. Fuel IN

02. Fuel OUT

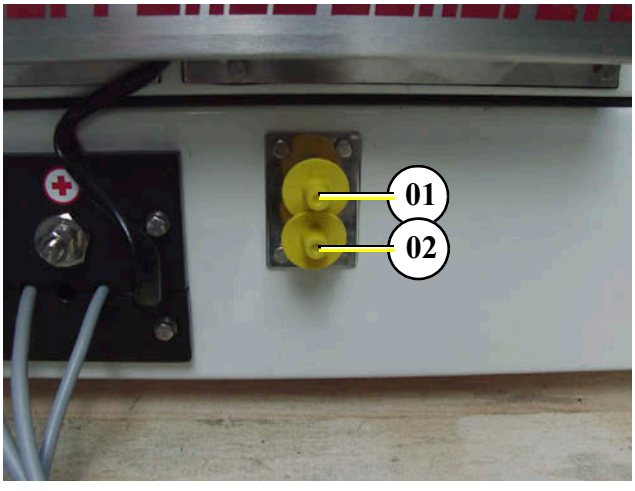


Fig. 1.3.2-2: Fuel connections

Fuel solenoid valve

The fuel solenoid valve opens automatically if „START“ is pressed on the remote control panel“. The solenoid closes, if the generator is switched to „OFF“ position.

It takes a few seconds before the generator stops. If the generator does not start or does not run smoothly (i.e. stutters), or does not attain full speed, then the cause is fore-mostly the solenoid.

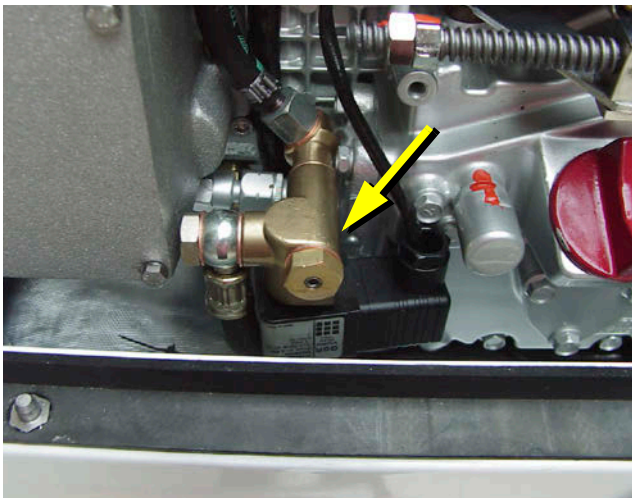


Fig. 1.3.2-3: Fuel solenoid valve

Injection nozzle

If the engine does not start after the ventilation, the fuel injection line must be deaerated.

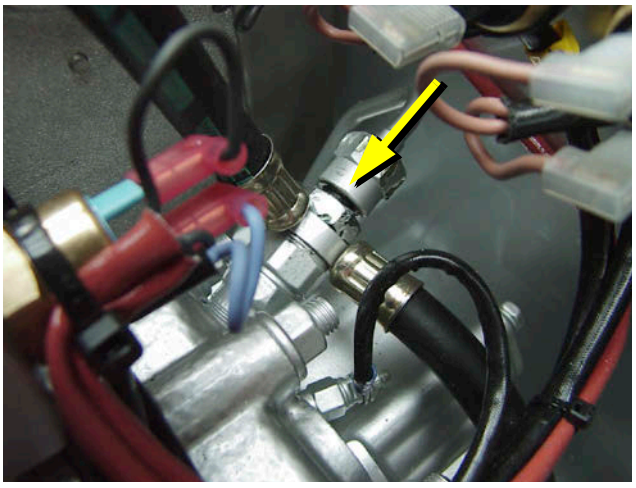


Fig. 1.3.2-4: Injection nozzle

Glow plug

The glow plug serve the pre-chamber for the heating with cold start. The heat-treat fixture must be operated, if the temperature of the generator is under 16°C. This is practically with each start the case. The heat-treat fixture may be held down also during start and favoured the starting procedure.

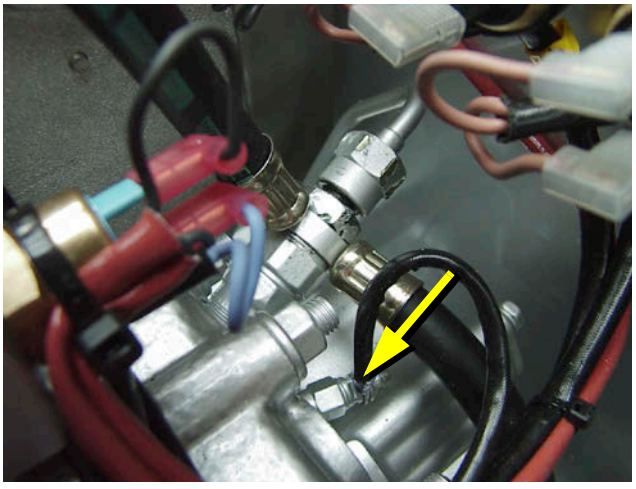


Fig. 1.3.2-5: Glow plug

1.3.3 Components of Combustion Air

Air suction input at sound cover

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

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

Fig. 1.3.3-1: Air suction input at sound cover

Air suction housing

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

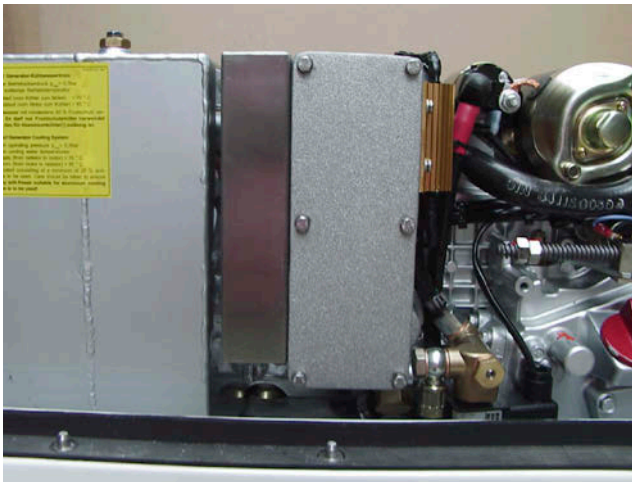


Fig. 1.3.3-2: Air suction housing

Air suction housing with air filter insert

The figure shows the air filter element in the air suction housing. A check is advisable regularly.

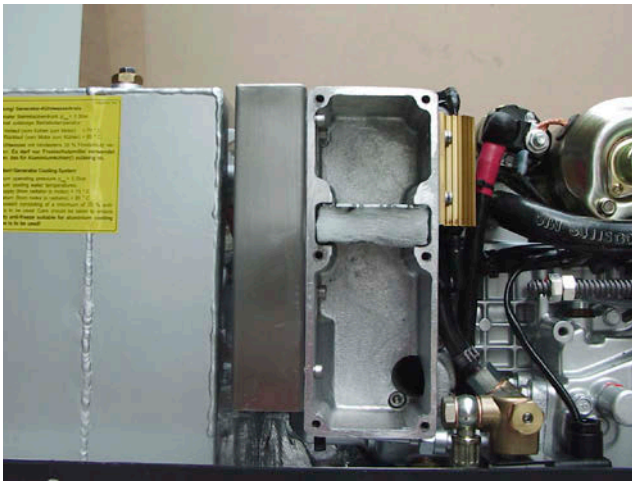


Fig. 1.3.3-3: Air suction housing with air filter insert

Water-cooled exhaust elbow

After the combustion air was led through the engine it occurs into the water-cooled exhaust elbow.

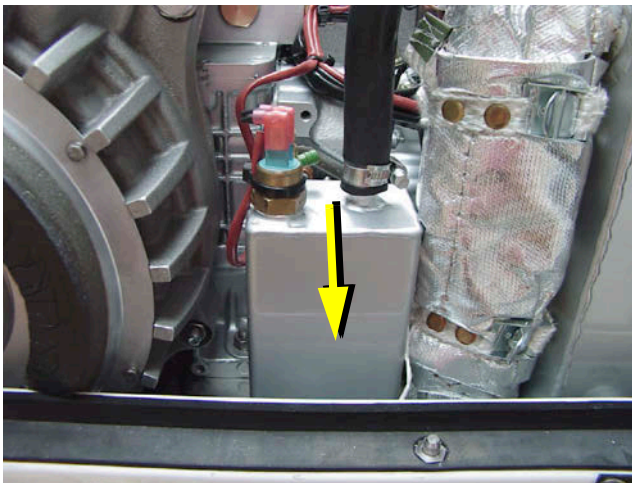


Fig. 1.3.3-4: Water-cooled exhaust elbow

Compensator under heat isolation

This part is because of the internal construction elastic and compensates vibrations.

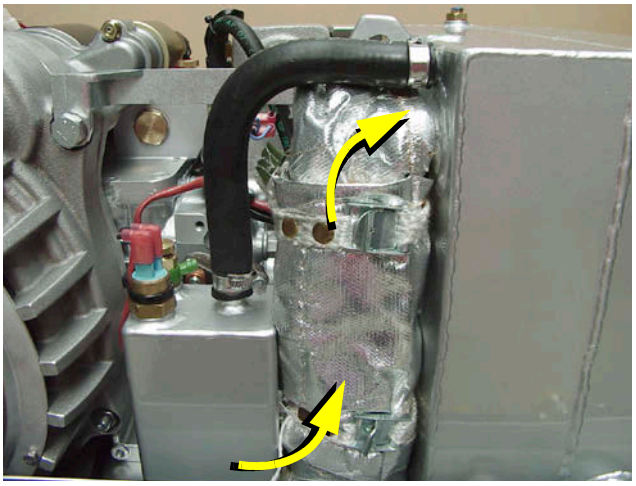


Fig. 1.3.3-5: Compensator under heat isolation

Exhaust output

Connect the exhaust pipe with the silencer.

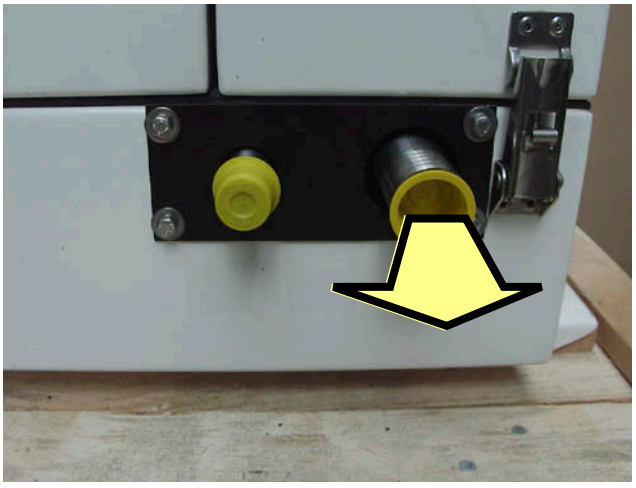


Fig. 1.3.3-6: Exhaust output

1.3.4 Components of the Electrical System

Connections starter battery (only at 24V-version)

Connect here the cables for the starter battery.

01. Cable starter battery minus (-)

02. Cable starter battery plus (+)

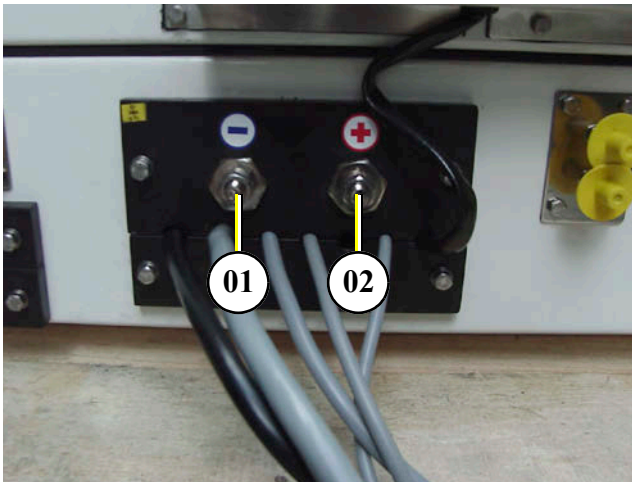


Fig. 1.3.4-1: Connections starter battery

Passages for battery cables

The battery cables of the battery bank must be laid through this passage to the clamps at the rectifier block.

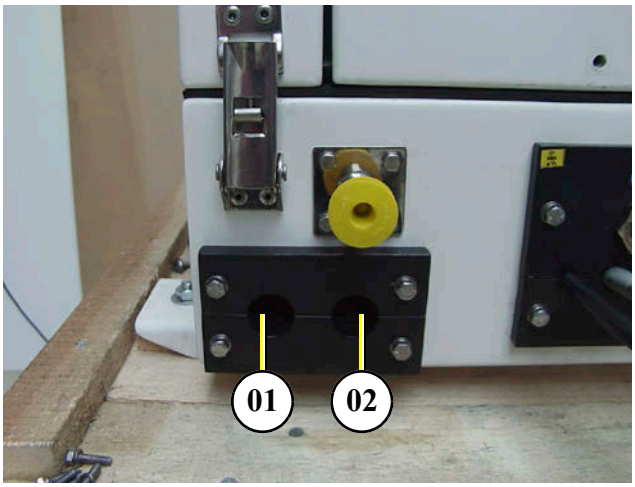


Fig. 1.3.4-2: Passages for battery cables

Connection clamps for battery cable

01. Clamp (-) for battery cable (-)

02. Clamp (+) for battery cable (+)

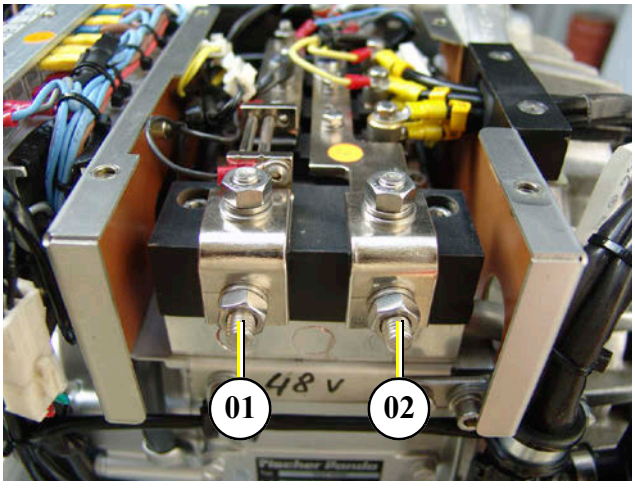


Fig. 1.3.4-3: Connection clamps for battery cable

Electrical connections for control

01. Cable for fan

02. Cable for remote control panel

03. Cable for voltage sense (clamp 7+8 on VCS)

04. Cable for fuel pump

05. Cable for VCS

06. Cable for shunt (clamp 9+10 on VCS)

07. Cable for DC/DC converter (only at 24V-version)

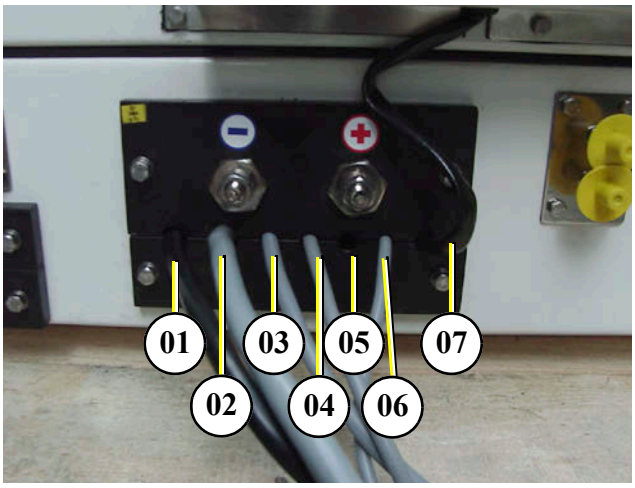


Fig. 1.3.4-4: Electrical connections for control

Starter motor

01. Starter motor and

02. Solenoid switch

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

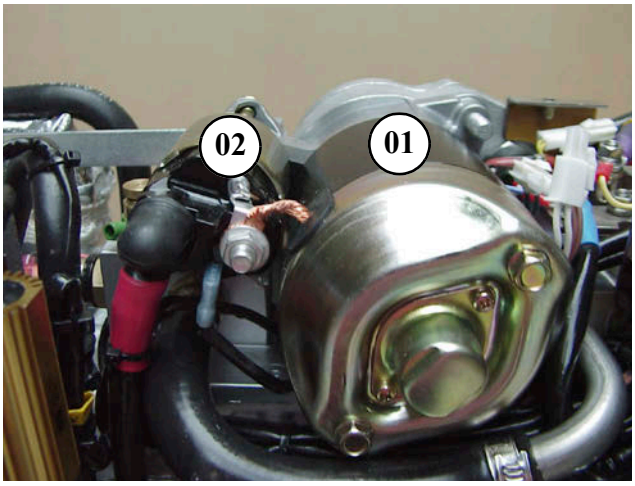


Fig. 1.3.4-5: Starter motor

Actuator for speed regualtion

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

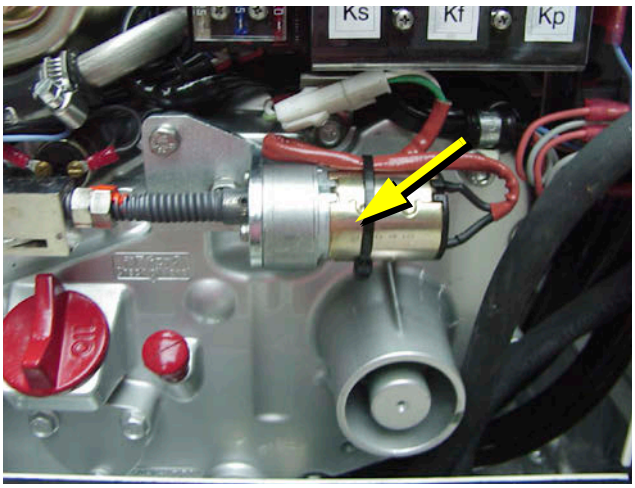


Fig. 1.3.4-6: Actuator

Rectifier block

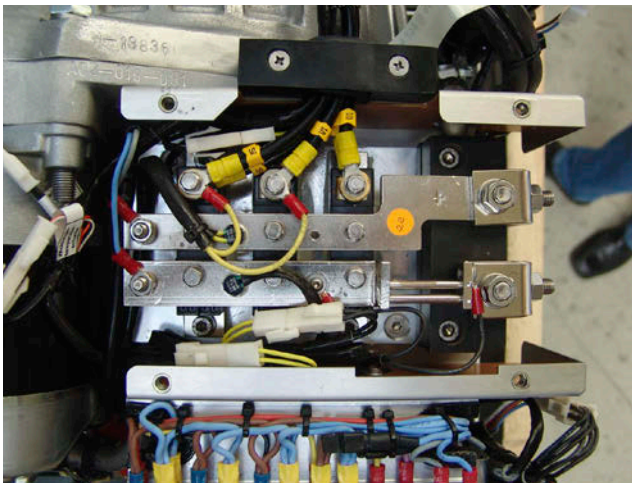


Fig. 1.3.4-7: Rectifier block

Terminal block for remote control panel, fuses and relays

See wiring diagram of the different versions!

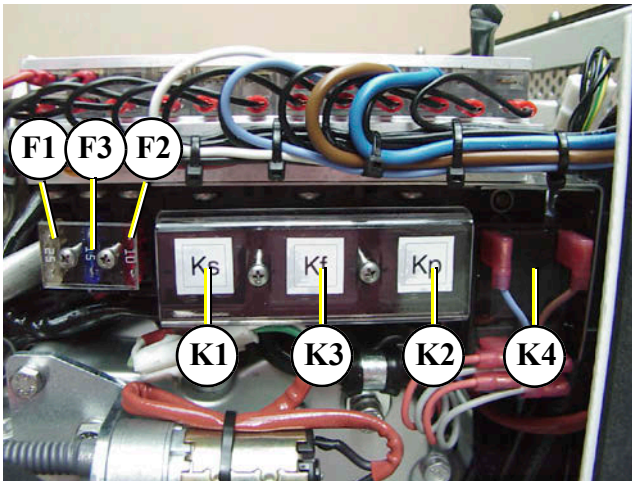


Fig. 1.3.4-8: Terminal block

DC/DC converter (only at 24V-version)

24/12V

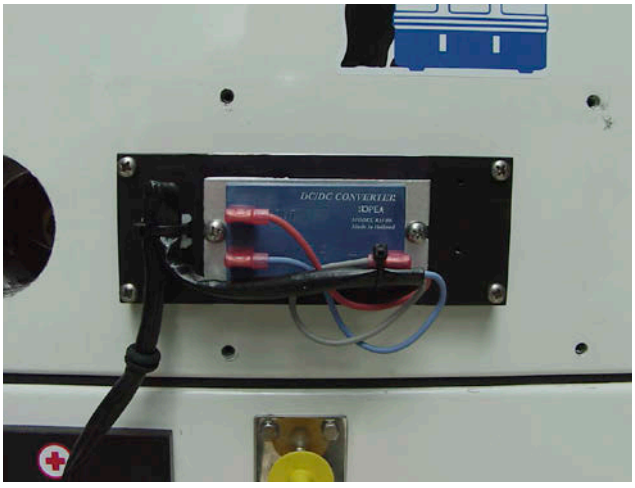


Fig. 1.3.4-9: DC/DC converter

1.3.5 Sensors and switches for operating surveillance

Thermo-switch at engine

The thermo-switch at the engine is used for monitoring the engine temperature.

98°C/83°C

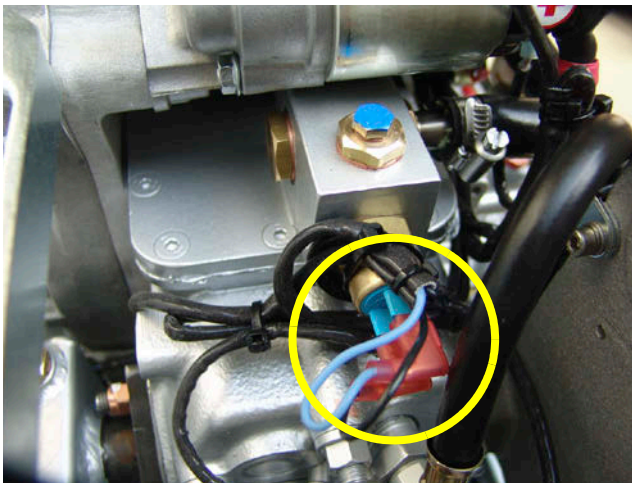


Fig. 1.3.5-1: Thermo-switch at engine

Thermo-switch at exhaust elbow

98°C/83°C

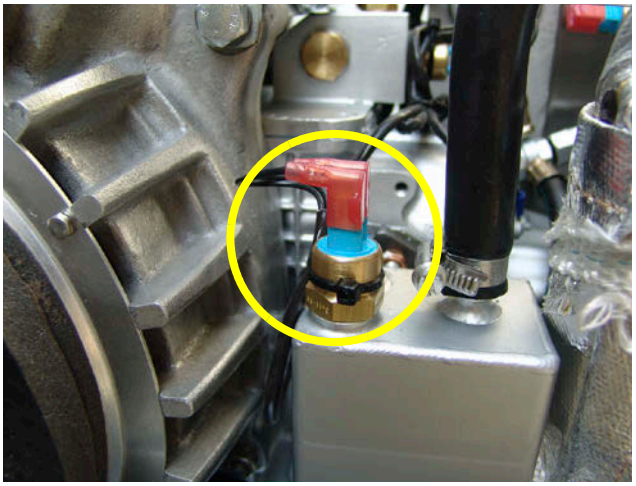


Fig. 1.3.5-2: Thermo-switch at exhaust elbow

Thermo-switch at silencer

The cooling water have here the hotest value. The cooling water flows from here back to the radiator.

01. 98°C/83°C

02. 82°C/77°C (fan fast)

03. 75°C/70°C (fan slow)

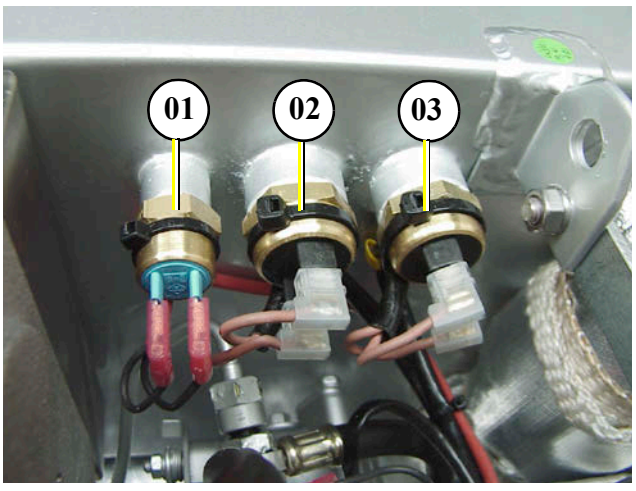


Fig. 1.3.5-3: Thermo-witch at silencer

Protection resistor

This protection resistor is connected in series with the thermo-switch 75°C/70°C.

Fig. 1.3.5-4: Protection resistor

Thermo-switch coil

01. Thermo-switch 2x125°C

02. Generator housing

03. Thermo- sensor NTC 981S (for measuring)

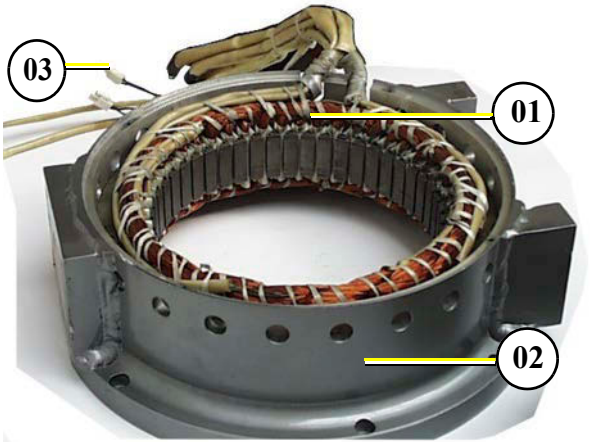


Fig. 1.3.5-5: Thermo-switch coil

Oil pressure switch

In order to be able to monitore the lubricating oil system, an oil pressure switch is built into the system.

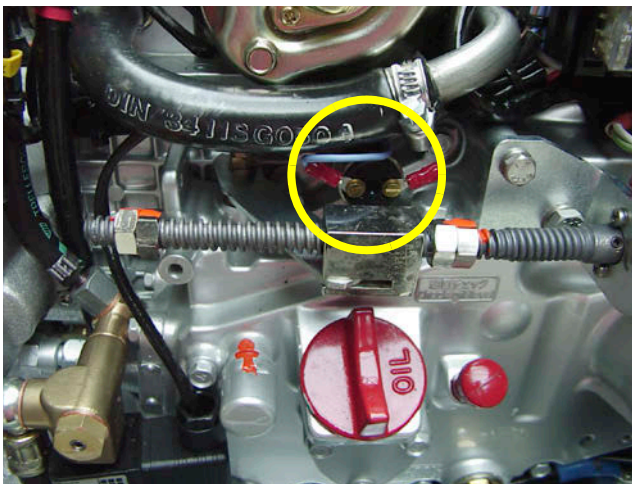


Fig. 1.3.5-6: Oil pressure switch

Thermo-switch rectifier block

01. on the (+)-bar

02. on the (-)-bar

There is also a thermo-switch at the cooling plate

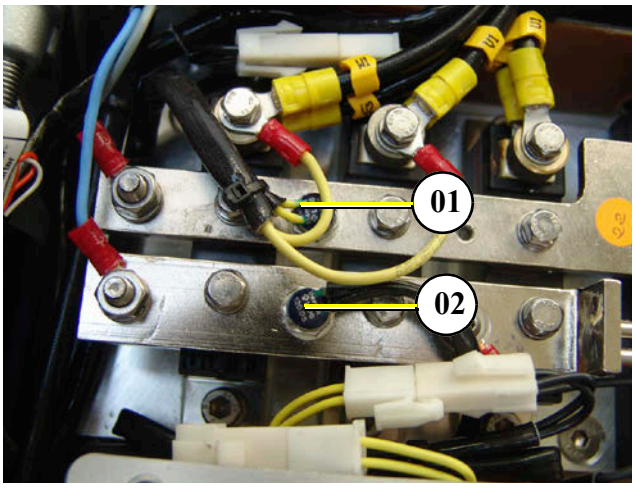


Fig. 1.3.5-7: Thermo-switch rectifier block

1.3.6 Components of the Oil System

Oil filler neck with cap

Please pay attention tht the filler necks are always well locked after filling in engine oil.

Consider also the references to the engine oil specification.

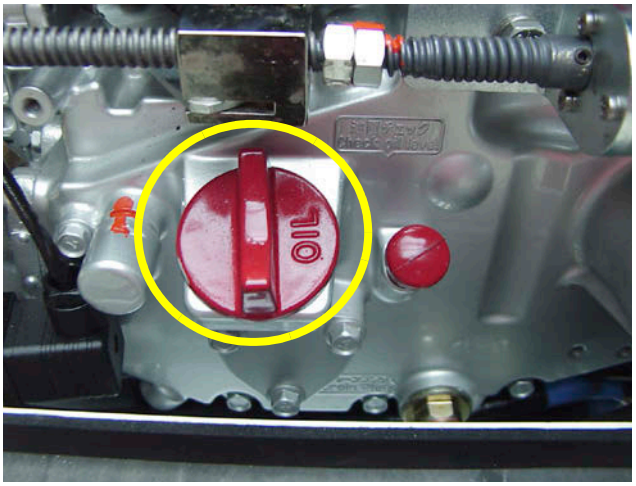


Fig. 1.3.6-1: Oil filler neck

Oil dipstick

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

Fischer Panda recommends 2/3 oil level.

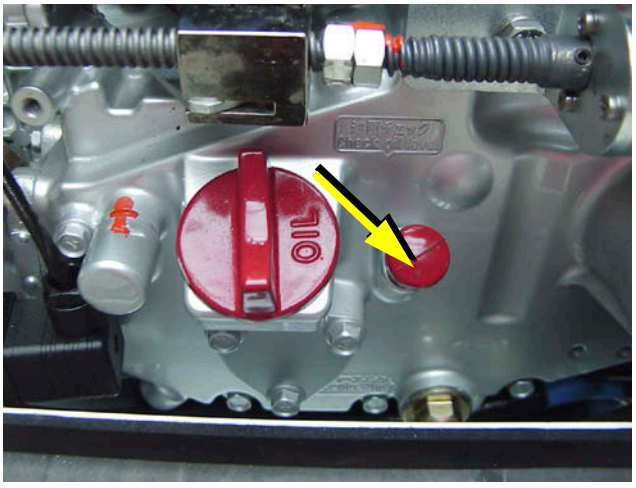


Fig. 1.3.6-2: Oil dipstick

Oil strainer

The oil strainer should be cleaned every 500 operating hours.

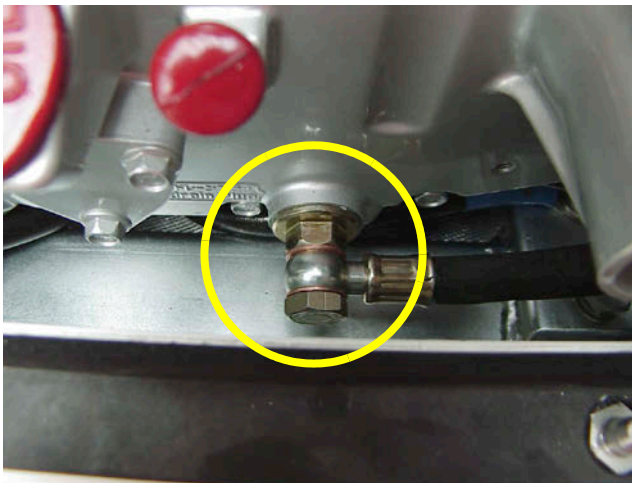


Fig. 1.3.6-3: Oil d´strainer

Oil drain hose

The Panda generator is equipped that the engine oil can be drained over an drain hose. The generator should be always installed therefore that a collecting basin can be set up deeply enough. If this is not possible, an electrical oil drain pump must be installed.

Note: Lubricating oil should be drained in the warm condition!

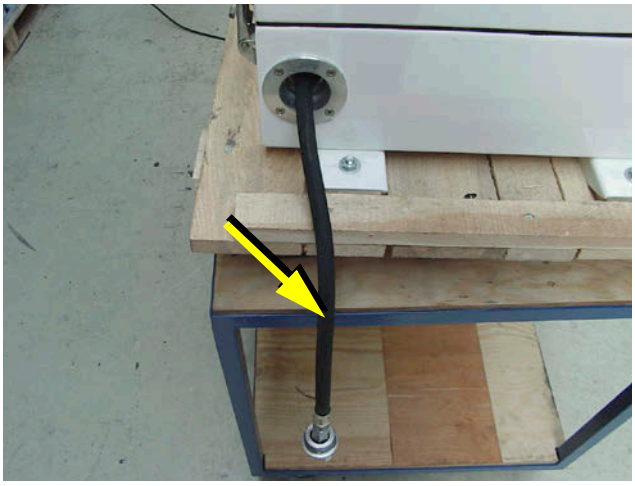


Fig. 1.3.6-4: Oil drain hose

1.3.7 External Components

Voltage control VCS

The figure shows the control printed board for the VCS voltage regulation. Over this control printed board the control signals are given for the actuator for speed regulation. On the VCS board are also adjustment possibilities for the control parameters.

The VCS is build for an nominal Voltage. You need an VCS with the same nominal Voltage as the generator nominal output.

Fig. 1.3.7-1: VCS

Remote control panel

Fig. 1.3.7-2: Remote control panel

Radiator

Fig. 1.3.7-3: Radiator

Battery monitor

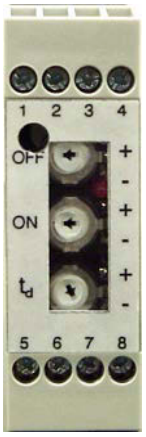


Fig. 1.3.7-4: Battery monitor

2. Installation Instructions

All connections (hoses, wires ect.) 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.

2.1 Personal requirements

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

2.1.1 Hazard notes for the installation

see “Safety first!” on Page 8.

Notice!:

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

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

Warning!: Automatic start

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

Warning!: Risk of injury

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

Do not run the generator with removed sound isolation cover

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

Warning!: Risk of injury

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

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

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

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

Warning!: Danger of fire

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

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

Danger!: Danger of poisoning

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

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

ATTENTION!: Danger to Life - High voltage

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

Warning!: Hot surface/material

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

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

Instruction!: Personal protective equipment necessary.

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

Attention!: disconnect all load

2.2 Generator connections

2.2.1 General instructions

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

2.2.2 Connections

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

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

The electrical connections MUST be carried out according to the respective valid regulations. This also concerns used cable materials. The cable supplied is meant for laying „protected f.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!

2.3 Fuel system installation

A fuel filter with water separator is already installed at the generator. Generally fuel intake and fuel return must be attached with its own fuel intake at the Diesel tank.

If the generator is installed more highly than the tank, the return pipe should be led to the tank up to the same submergence into the tank as the sucking in line, in order to avoid that after the shut-off the generator the fuel can run back into the tank, which leads to substantial initial problems after longer shut-off the generator.

If the return pipe cannot put as immersion tube into the tank, it should be absolutely ensured by a non-return valve in the sucking in line that the fuel cannot flow back after shut-off the generator.

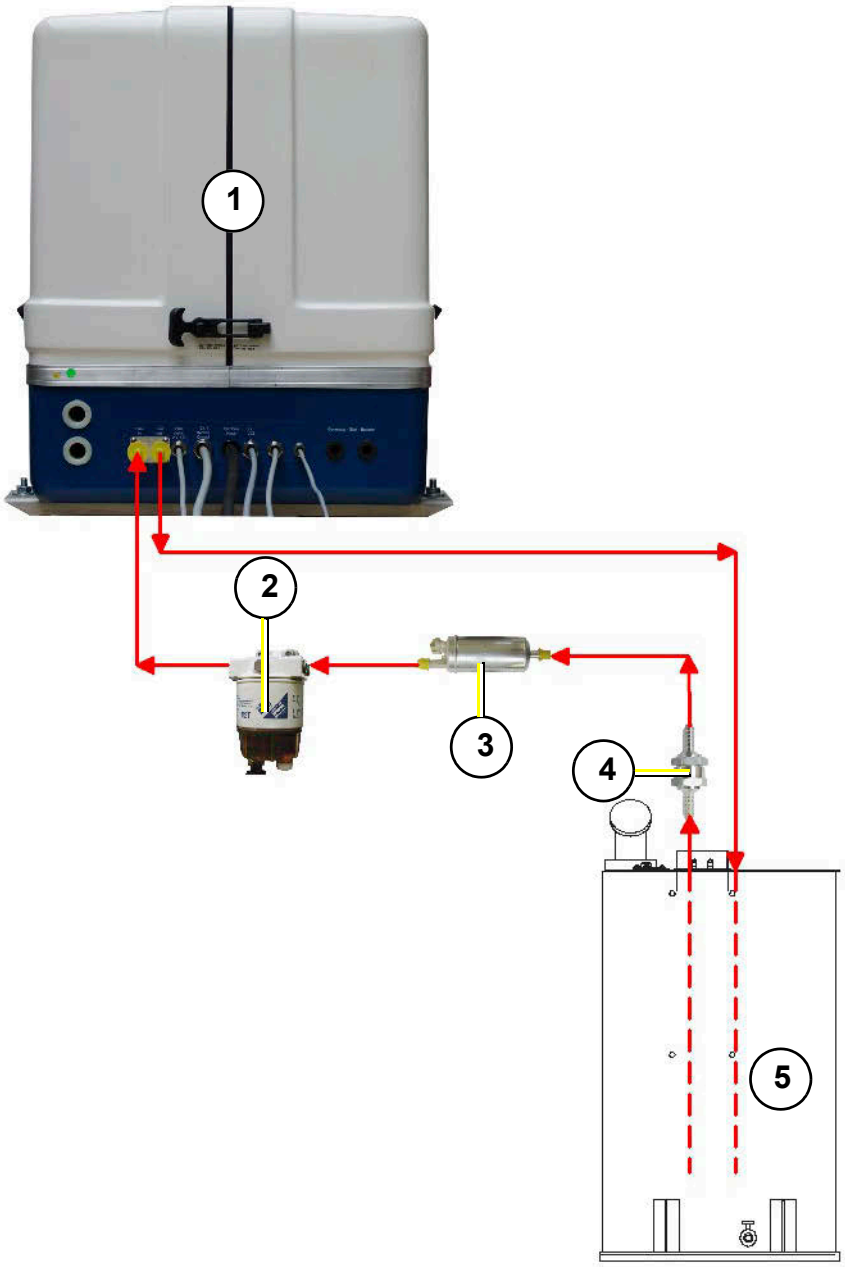
Basically the Panda is airing out. After the first line-up or after longer downtime the notes „Ventilation of the Fuel System“ should be considered.

2.3.1 The following components must be installed:

1. Fuel pre-filter
2. external fuel pump
3. non-return valve

The external electrical fuel pump is to be installed in the proximity of the tank.

Fig. 2.3.1-1: Fuel system installation - scheme



1. Generator
2. External fuel filter
3. External fuel pump
4. Non-return valve
5. Fuel tank

2.4 Generator DC system installation

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

ATTENTION!

2.4.1 Connection to battery block

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:

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

ATTENTION!: Consider correct connection sequence

Battery Bank Connection

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

ATTENTION! Right connection of the battery bank.

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

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

f.e. 24 V starter battery for a 24 V start system (2x 12 V batteries in a row)

ATTENTION!

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

NOTE:

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-played and fire-protected cables, which are appropriate for temperatures up to 90 °C, 195 °F.

The batteries must be laid 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.

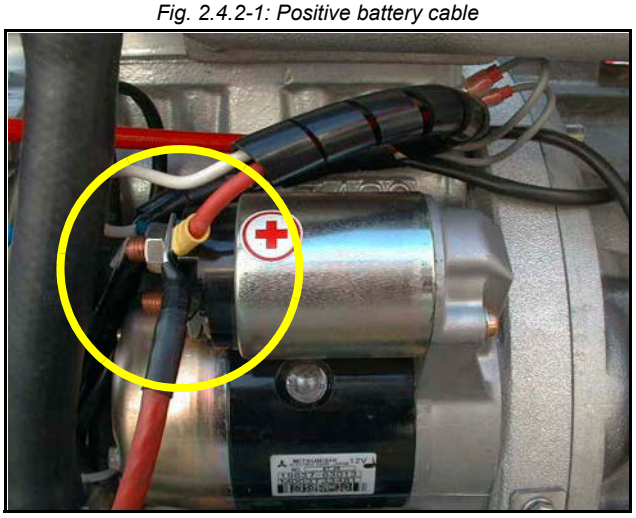
2.4.2 Connection of the starter battery

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

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

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

Fig. 2.4.2-1: Positive battery cable



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

Fig. 2.4.2-2: Negative battery cable

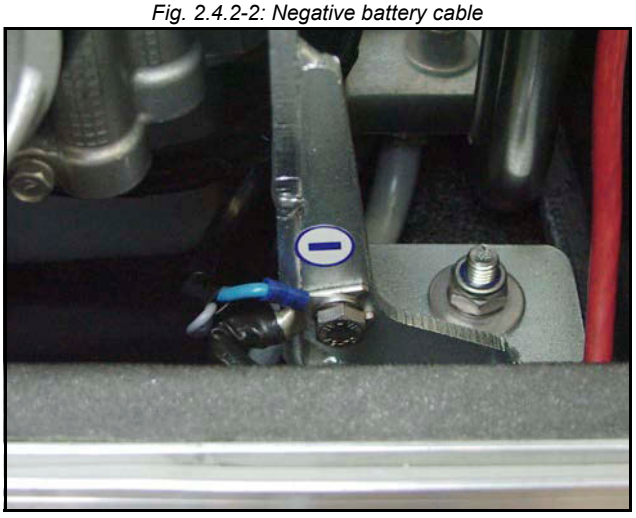
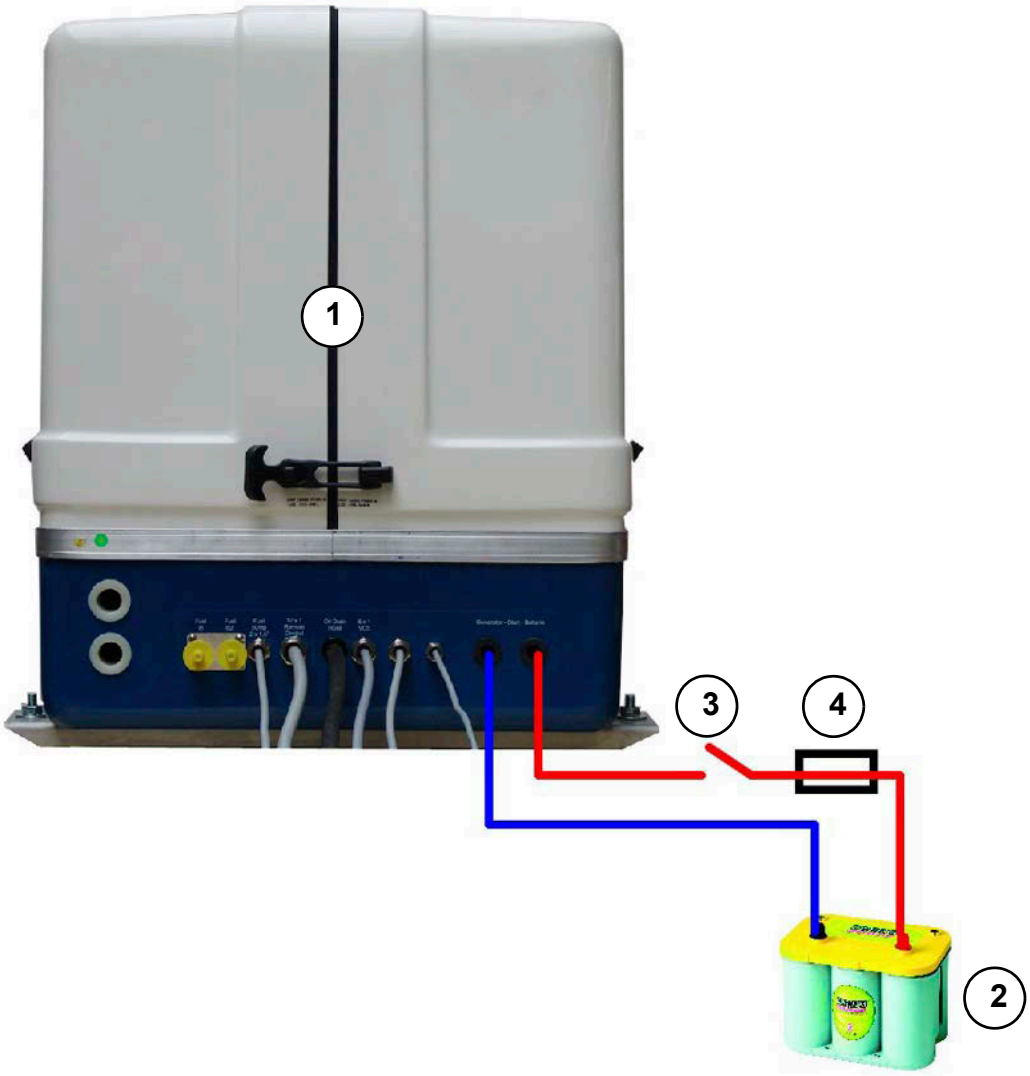


Fig. 2.4.2-3: Battery installation - scheme



1. Generator
2. Battery block, depending on starter system
3. Battery main switch
4. Fuse

2.4.2.1 Installation direction of the starter batteries in a 24 V DC starter system

The starter batteries have to be connected in series:

1. (+) cable of first battery

Fig. 2.4.2.1-1: Installation starter battery

2. (-) cable of second battery

Fig. 2.4.2.1-2: Installation starter battery

3. (+) cable of second battery

Fig. 2.4.2.1-3: Installation starter battery

4. (-) cable of first battery

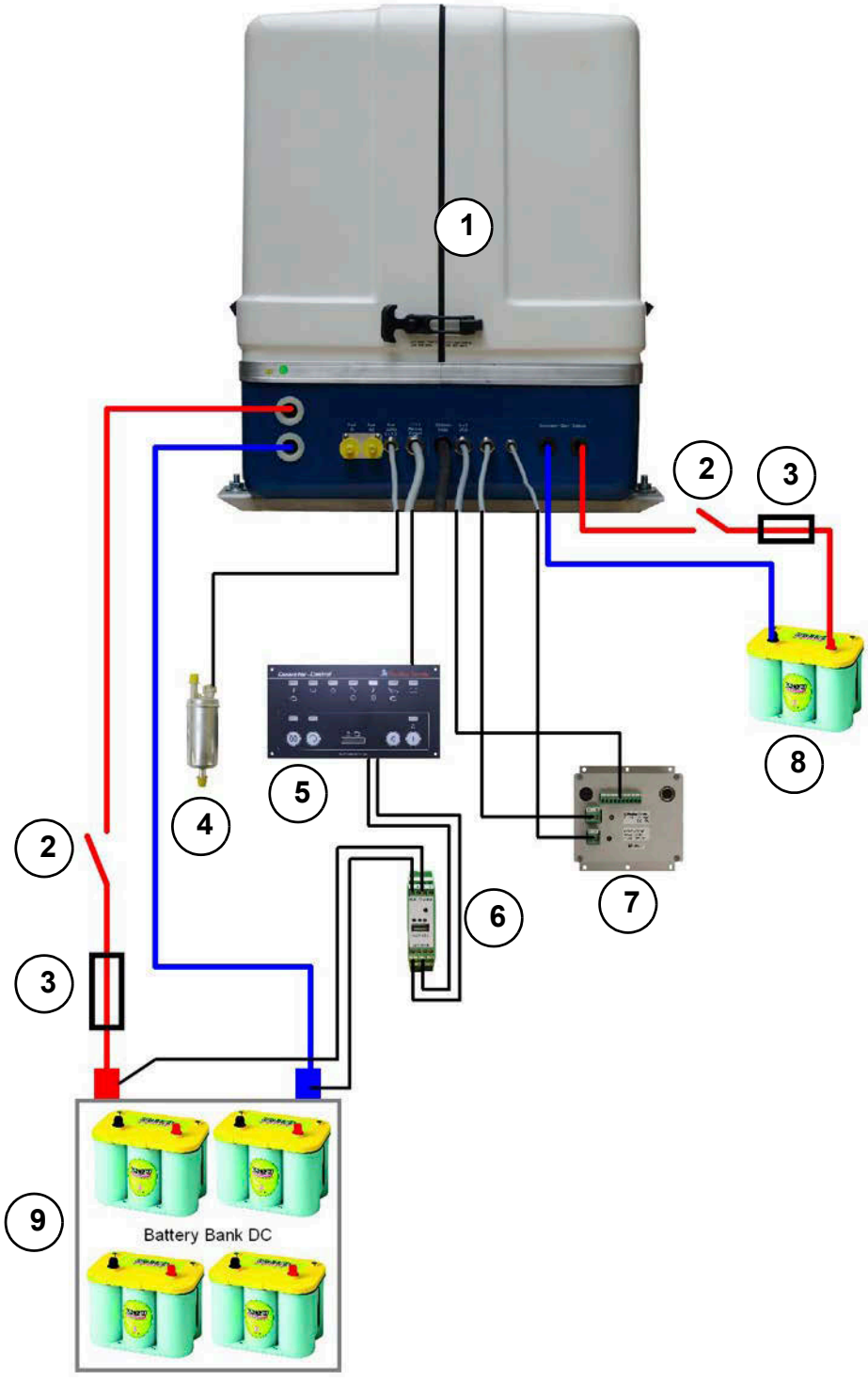
Fig. 2.4.2.1-4: Installation starter battery

5. Disconnect the batteries in reverse procedure.

2.4.3 Installation Panda AGT with internal rectifier unit - sample scheme

Sample schema for a standard installation.

Fig. 2.4.3-1: Panda AGT with internal rectifier unit



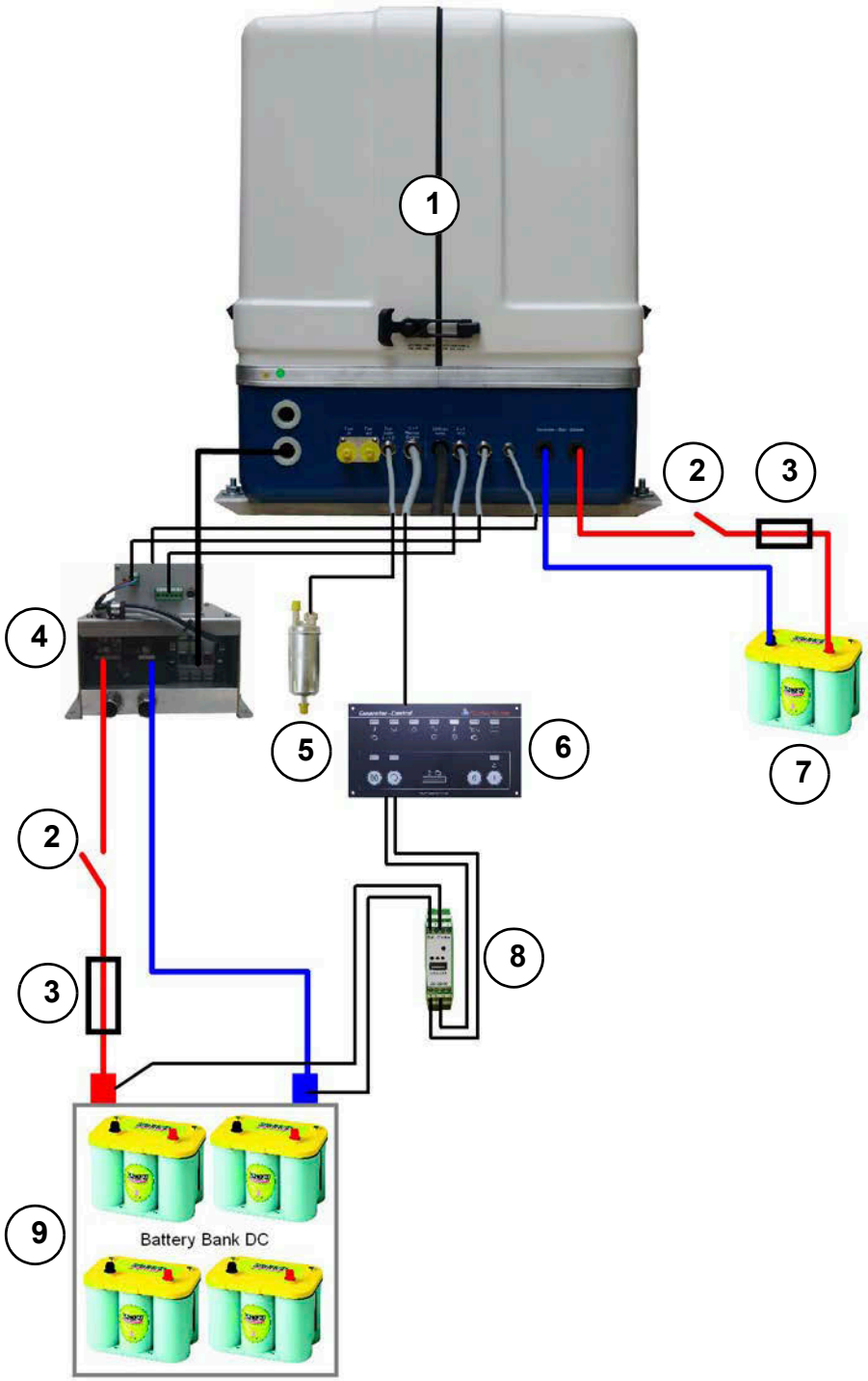
1. Generator
2. Battery switch
3. Fuse
4. Fuel pump
5. Remote control panel
6. Battery monitor (optional unit)
7. Voltage control VCS
8. Starter battery, depending on system
9. Battery block, depending on system

All electrical safety installations have to be made on board.

2.4.4 Installation Panda AGT with external rectifier unit - sample scheme

Sample schema for a standard installation.

Fig. 2.4.4-1: Panda AGT with external rectifier



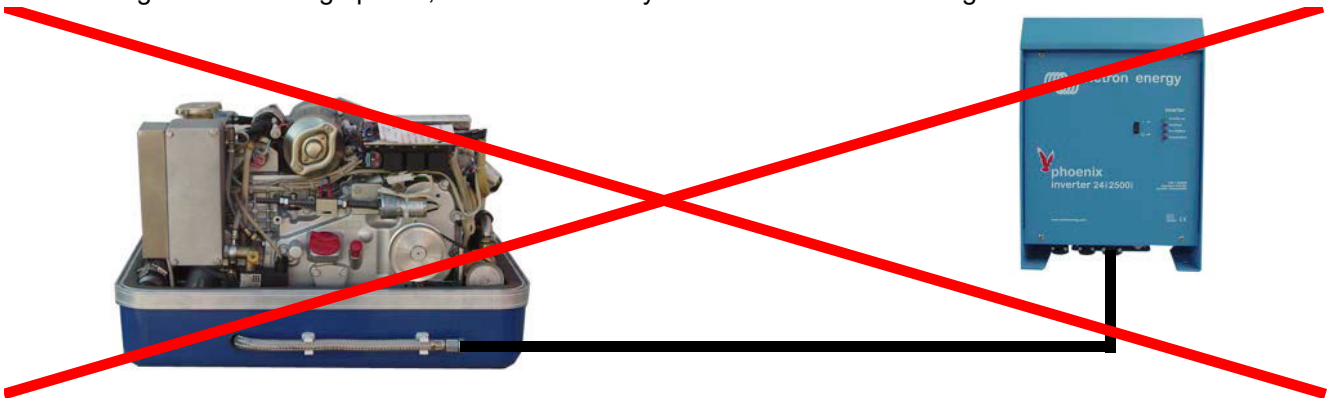
1. Generator
2. Battery switch
3. Fuse
4. External rectifier unit with voltage control system VCS
5. Fuel pump
6. Remote control panel
7. Starter battery, depending on system
8. Battery monitor (optional unit)
9. Battery block, depending on system

All electrical safety installations have to be made on board.

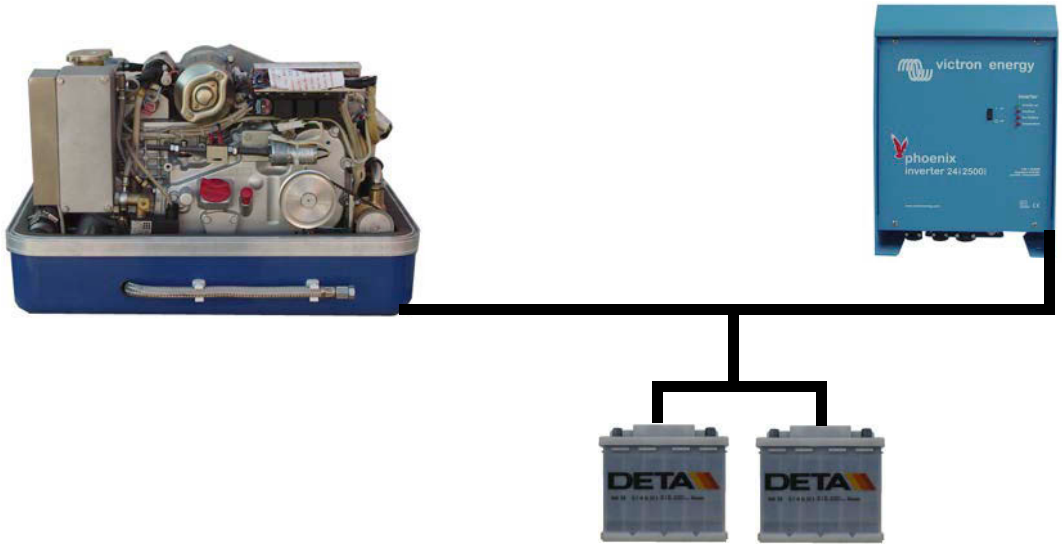
The AGT-generator is not allowed to be connected to an inverter (without batteries)!

CAUTION!

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



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



Required cable cross-sections

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

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

All electrical safety installations have to be made on board.

2.4.4.1 Electrical fuses - Dipole switch at battery bank

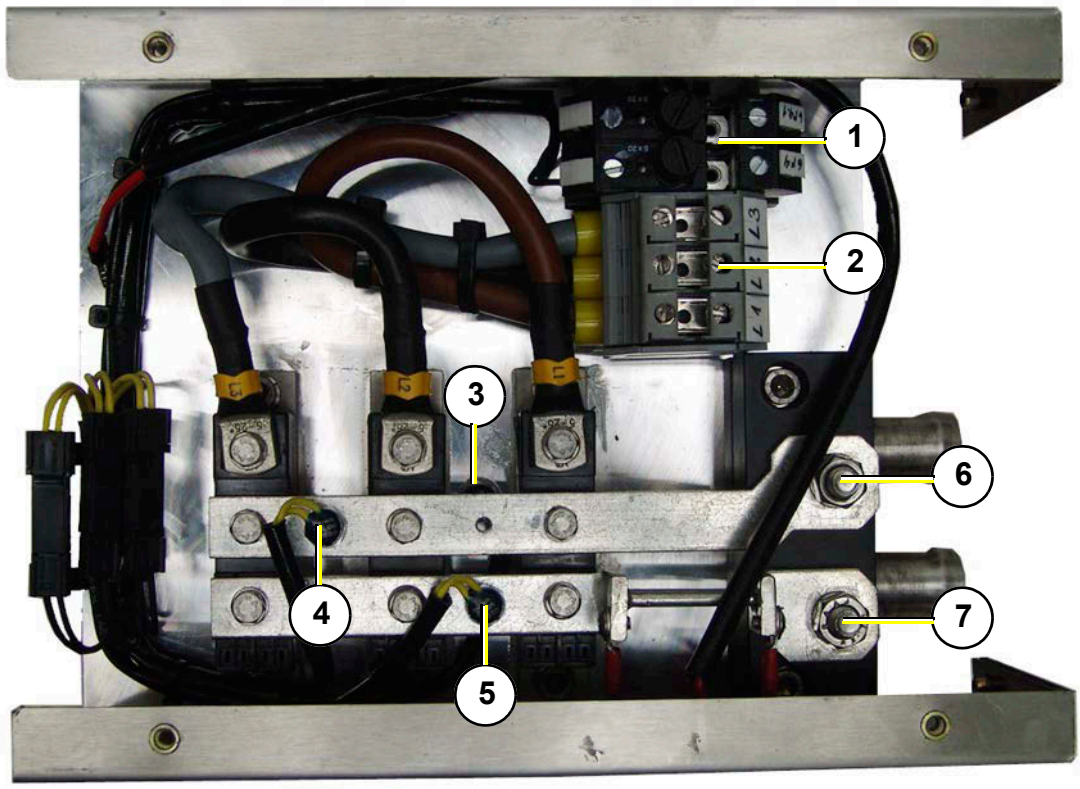
It is absolutely essential that the electrical system installation is inspected by a qualified electrical technician. The generator should have its own DC fuse and battery switch in the connection line rectifier unit to battery bank. The

fuses should be sized such that the rated current of the generator is not exceeded by more than 25 %.

The fuses must be of the slow type.

2.5 Generators with external rectifier unit

Fig. 2.5.0-1: External rectifier unit



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

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

ATTENTION!

2.5.1 Installation of the rectifier unit

Cooling water connection.

If the generator has no special connection points, the external rectifier unit can be installed in line from the external radiator to the generator (cold site).

See section 2.8, “Installation of the cooling system,” on page 71.

2.6 Voltage Control System - see VCS data sheet

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

NOTE:

2.7 Installation of the Remote Control Panel - see remote control panel data sheet

As standard a 12 core connection-cable, 7m long, is included in the supply. Cores are numbered from 1 to 11 and the 12th core is coloured (yellow/green). The control cables are securely connected to the genset. On the back of the control panel there are terminals numbered from 1 - 12. Connect the cores of the control-cable in respective order.

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

2.8 Installation of the cooling system

2.8.1 The cooling system / general instructions

The Fischer Panda vehicle generator is delivered without a radiator, with the exception of generators with permanently installed radiators such as the PVK-UK or the PSC series.

Depending on the purpose and installation situation, a wide variety of Fischer Panda radiators are available for the optimum customization of the system. Operation with a commercially available vehicle radiator is possible. The corresponding dimensioning must be implemented by the installer.

For generators with a permanently installed radiator (e.g. PVK-UK series), the radiator dimensioning and the installation are not necessary.

Note:

2.9 Radiator baseplate

The radiator baseplate shall be dimensioned in accordance with the purpose. The corresponding checks and entries in the vehicle papers shall be implemented by the operator.

2.9.1 Determining the size of the radiator

The size of the radiator must be dimensioned in accordance with the total thermal load, the operating conditions, and the installation situation.

In principle, the thermal load of the generator equals 1.8 times the electrical rated power (1.8 times with a water-cooled silencer, 1.2 times with a dry silencer) in kW. This means that e.g. a Panda 12000 PVMV-N generator with a rated power of 10 kW has a thermal load of 18 kW.

Note:

The radiator must always be dimensioned taking into account a safety margin adjusted for the operating conditions. Undersized radiators will result in an emergency shut-down. This may damage other equipment that is connected to them.

Warning: Include safety margin in the calculation.

2.9.2 Radiator design

The radiator consists in 3 main components:

1. Radiator. Depending on the version, includes an integrated expansion tank or an external expansion tank.
2. Fan. Depending on the generator, as a DC fan (e.g. 12 V-24 V) or as an AC fan (e.g. 230 V 50 Hz) with respective input voltage.
3. Cover (optional).

2.9.3 Radiator types

In principle, the following radiator types are differentiated.

1. Flange-mounted radiator for installation on top of, on the side of, or under the vehicle - see “Installation location for radiators for roof, side, or underfloor mounting on the vehicle” on page 73.
2. Built-in radiator for installation in the vehicle wall or cabin wall - see “Installation location for radiator in the vehicle wall or cabin wall” on page 77.
3. Permanently installed radiators for the PVK-UK series
4. Permanently installed radiators for the PSC series for operation inside containers or for tunnel installation - see “Installation location for radiator in a tunnel” on page 78.

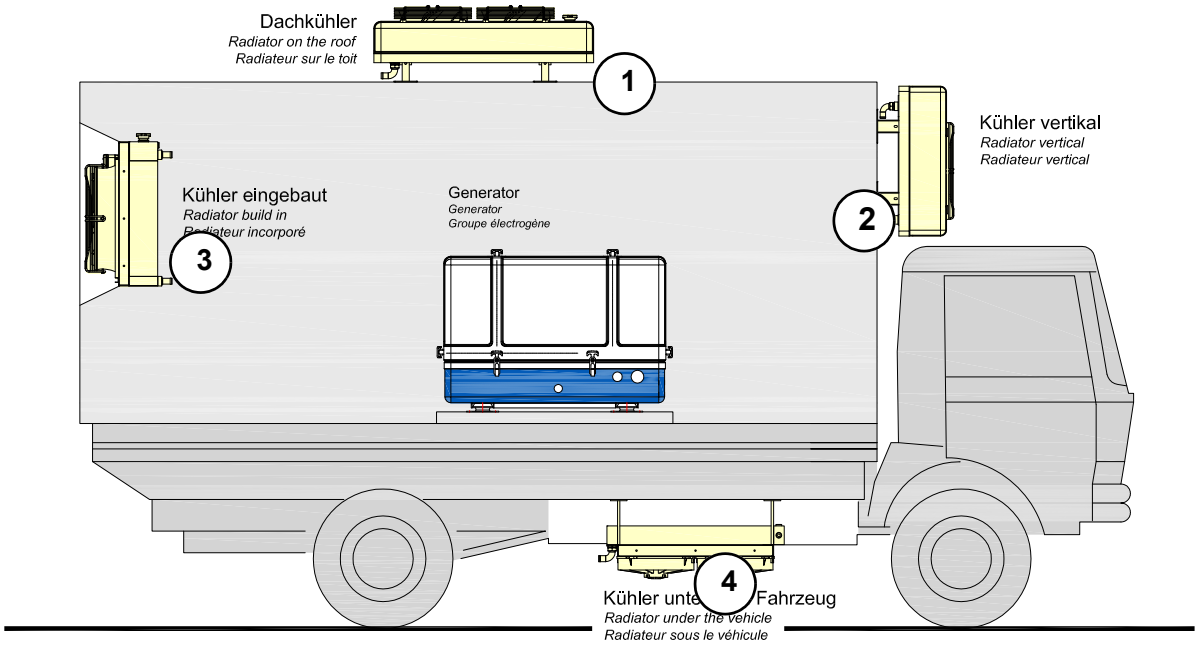
The radiator must be installed away from the generator in a well ventilated area. In doing so, it must be ensured that the air outflow of the radiator is completely uninhibited. Turbulence and thermal short-circuiting must be avoided.

The radiator can be installed in a vertical or a horizontal position. It must be taken into account that the air intake is located above the fan motor.

The best results will be achieved if the radiator can be mounted horizontally on the vehicle roof.

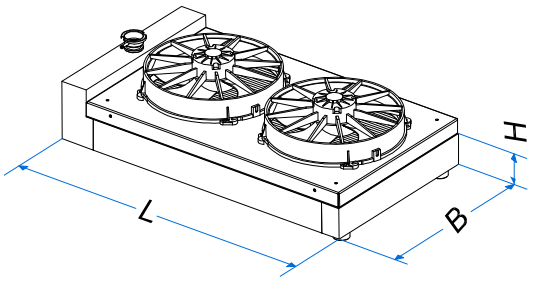
2.9.3.1 Installation location for radiators for roof, side, or underfloor mounting on the vehicle

Fig. 2.9.3-1: Radiator installation - example



1. Radiator mounted on the roof
2. Radiator mounted in vertical position
3. Radiator build into the vehicle wall
4. Radiator mounted under the vehicle

Fig. 2.9.3.1-2: Radiator dimensions



2.9.3.2 Roof installation

Please note:

- Minimum distance to vehicle roof: 100 mm.
- Minimum distance to next vertical wall: 1/2 radiator width.
- Min. distance to gas exhaust (heat and dirt source): 500 mm.
- The max. permissible vehicle height must not be exceeded.
- Install warnings stating new vehicle height inside driver's cab.
- During operation, the exhaust flow must be uninhibited for at least 3 meters.

Fig. 2.9.3.2-1: Schematic: radiator, roof installation

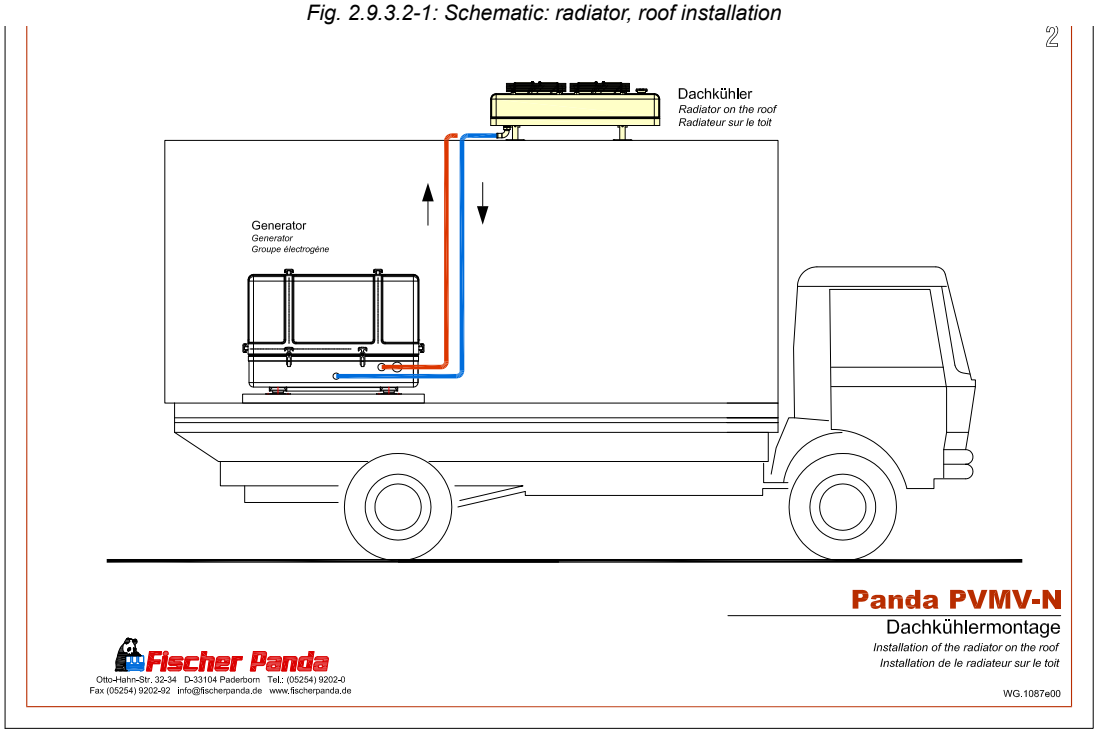
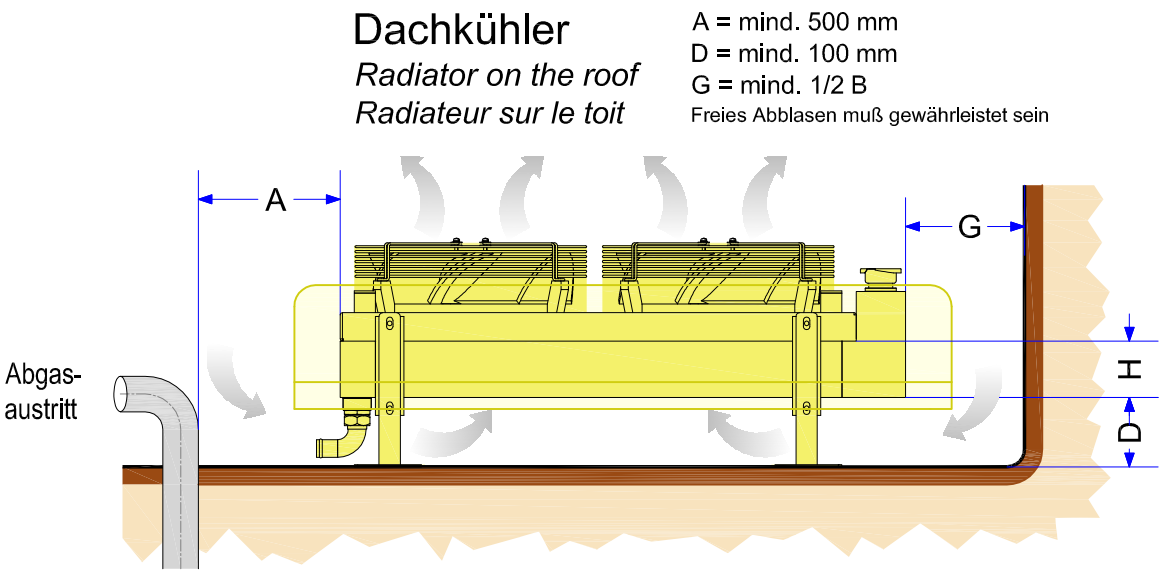


Fig. 2.9.3.2-2: Schematic: radiator, roof installation



2.9.3.3 Installation on the vehicle wall

Please note:

- Minimum distance to vehicle wall: 100 mm.
- Min. distance to gas exhaust (heat and dirt source): 500 mm.
- The max. permissible vehicle length or width must not be exceeded.
- During operation, the exhaust flow must be uninhibited for at least 3 meters.

Fig. 2.9.3.3-1: Schematic: radiator, vehicle wall installation

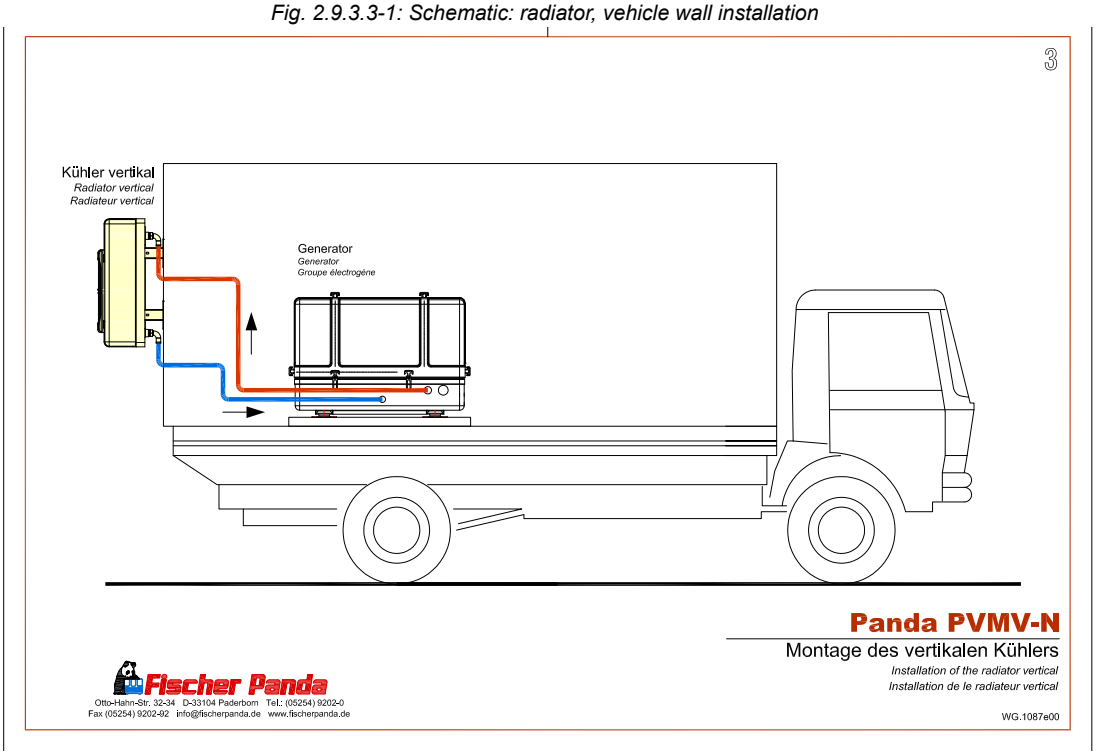
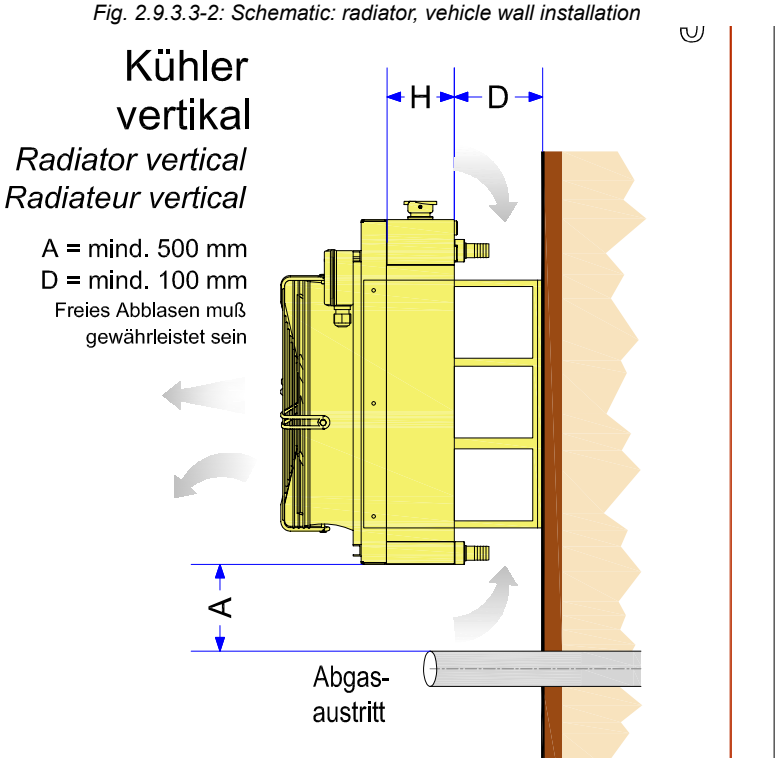


Fig. 2.9.3.3-2: Schematic: radiator, vehicle wall installation



2.9.3.4 Underfloor installation of radiator

Please note:

- Minimum distance to vehicle floor: 100 mm.
- Minimum distance to ground: 1/2 radiator width
- Min. distance to gas exhaust (heat and dirt source): 500 mm.
- The max. permissible vehicle height must not be exceeded.

Fischer Panda does not recommend underfloor installation. The radiator can quickly become dirty. Rock impacts can result in damage to the radiator. The efficiency of the radiator will drop due to thermal short-circuiting. The radiator may have to be dimensioned larger to compensate.

Note:

The installation position of the radiator (upside down or not) depends on the airflow direction of the fan. The airflow must be always from the vehicle side through the radiator to the ground.

Attention:

Fig. 2.9.3.4-1: ***Underfloor installation of radiator***

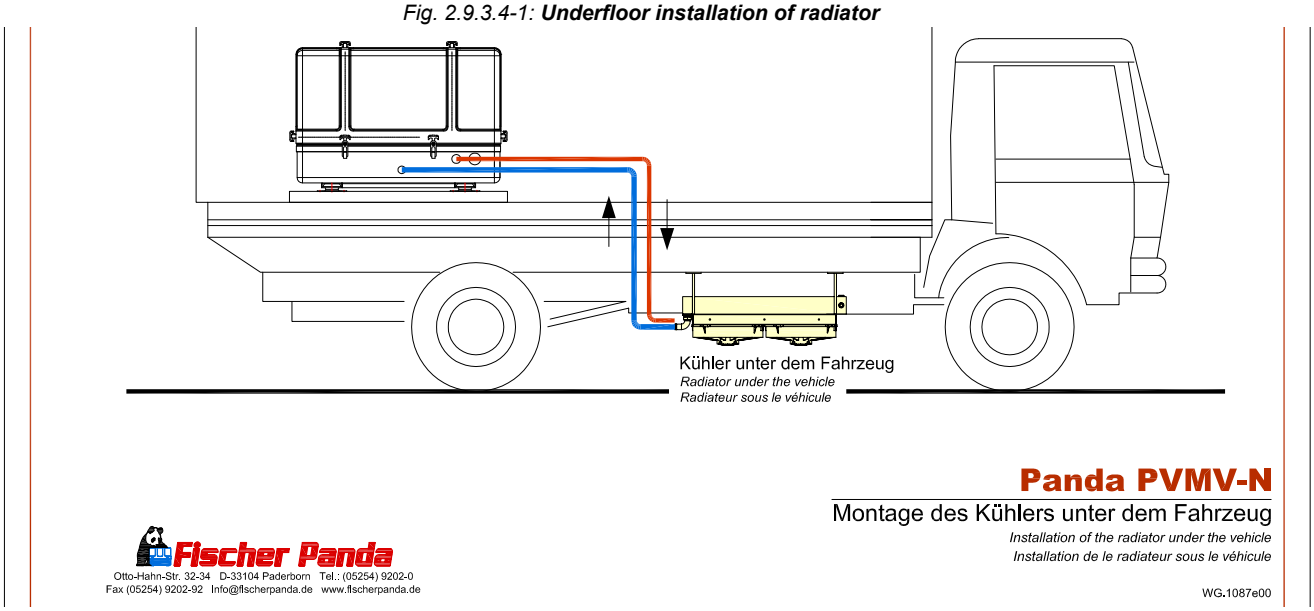
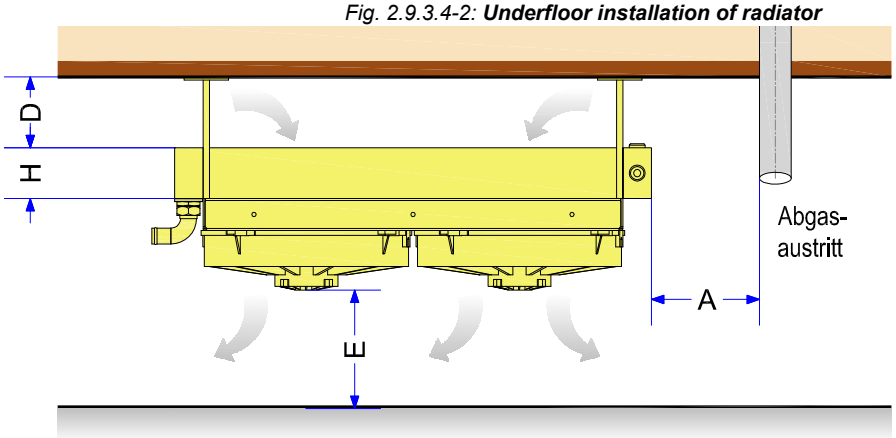


Fig. 2.9.3.4-2: ***Underfloor installation of radiator***



Kühler unter dem Fahrzeug
Radiator under the vehicle
Radiateur sous le véhicule

Von FP nicht empfohlen wegen Verschmutzung, Steinschlag und Effektivität (thermischer Kurzschluss) Kühler muß evtl. größer ausgelegt werden.

A = mind. 500 mm
D = mind. 100 mm (abhängig von L x B)
E = mind. 1/2 B
Freies Abblasen muß gewährleistet sein

2.9.3.5 Installation location for radiator in the vehicle wall or cabin wall

A cabin installation is achieved if the set-up location is freely accessible during operation and serves as a working space, if applicable.

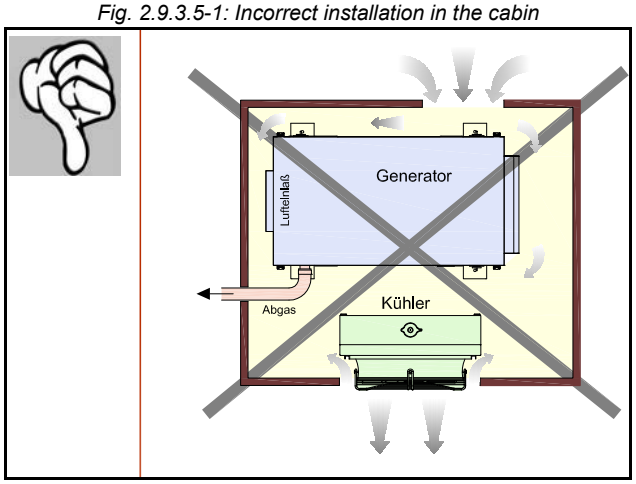
Please note:

- If persons are present in the set-up space during operation, a safety circuit must ensure that the air intake is opened.

Incorrect installation in the cabin

- Air intake too narrow
- Generator air intake too close to the wall
- Hot air can be taken in next to the radiator
- Exhaust gas line not insulated, heats up combustion air

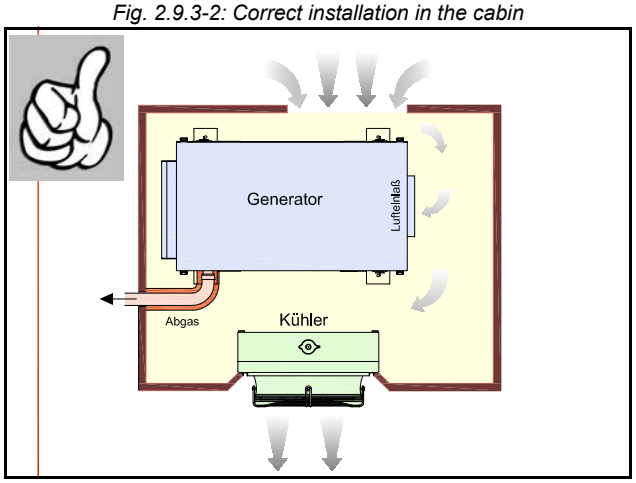
Fig. 2.9.3.5-1: Incorrect installation in the cabin



Correct installation in the cabin

- Air intake is min. radiator size (safety grating and decorative grille must be taken into account)
- Uninhibited air intake for generator
- Exhaust flow direction of radiator is shielded and air exhaust enlarged (safety grating and decorative grille were taken into account)
- Exhaust line insulated

Fig. 2.9.3-2: Correct installation in the cabin



2.9.3.6 Installation location for radiator in a tunnel

A tunnel installation is implemented if the set-up location is separated from the vehicle cab by constructive measures.

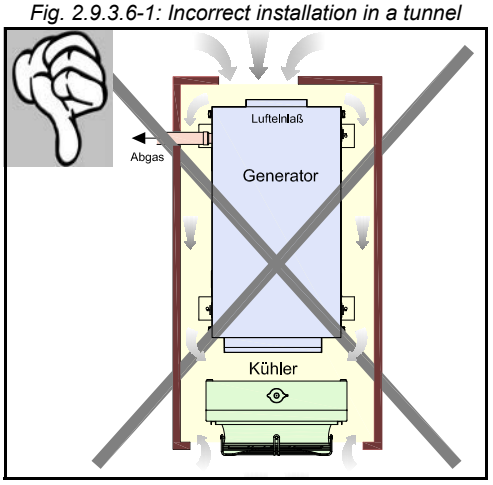
Please note:

- The total of the air intakes must be at least equal to the radiator width (
- The total of the cross-sections of the air ducts incl. lateral air intake must be at least equal to the radiator width
- The distance between generator and radiator must equal at least 1/2 the radiator width
- Lateral air supply between generator and radiator can be designed on the side, above, or below

Incorrect installation in a tunnel

- Air intake too narrow
- Generator air intake too close to the wall
- Hot air can be taken in next to the radiator
- Exhaust gas line not insulated, heats up combustion air

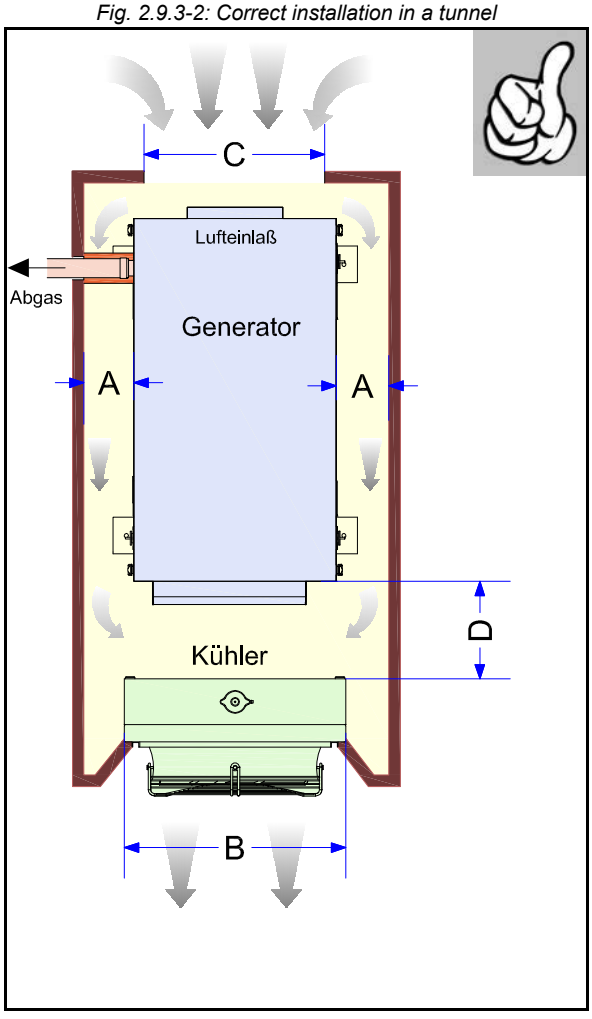
Fig. 2.9.3.6-1: Incorrect installation in a tunnel



Correct installation in a tunnel

- Air intake (C) is min. radiator size (B) (safety grating and decorative grille must be taken into account)
- Total of air intakes (A) equals min. the radiator size (B)
- Uninhibited air intake for generator
- Exhaust flow direction of radiator is shielded and air exhaust enlarged (safety grating and decorative grille were taken into account)
- Exhaust line insulated

Fig. 2.9.3-2: Correct installation in a tunnel



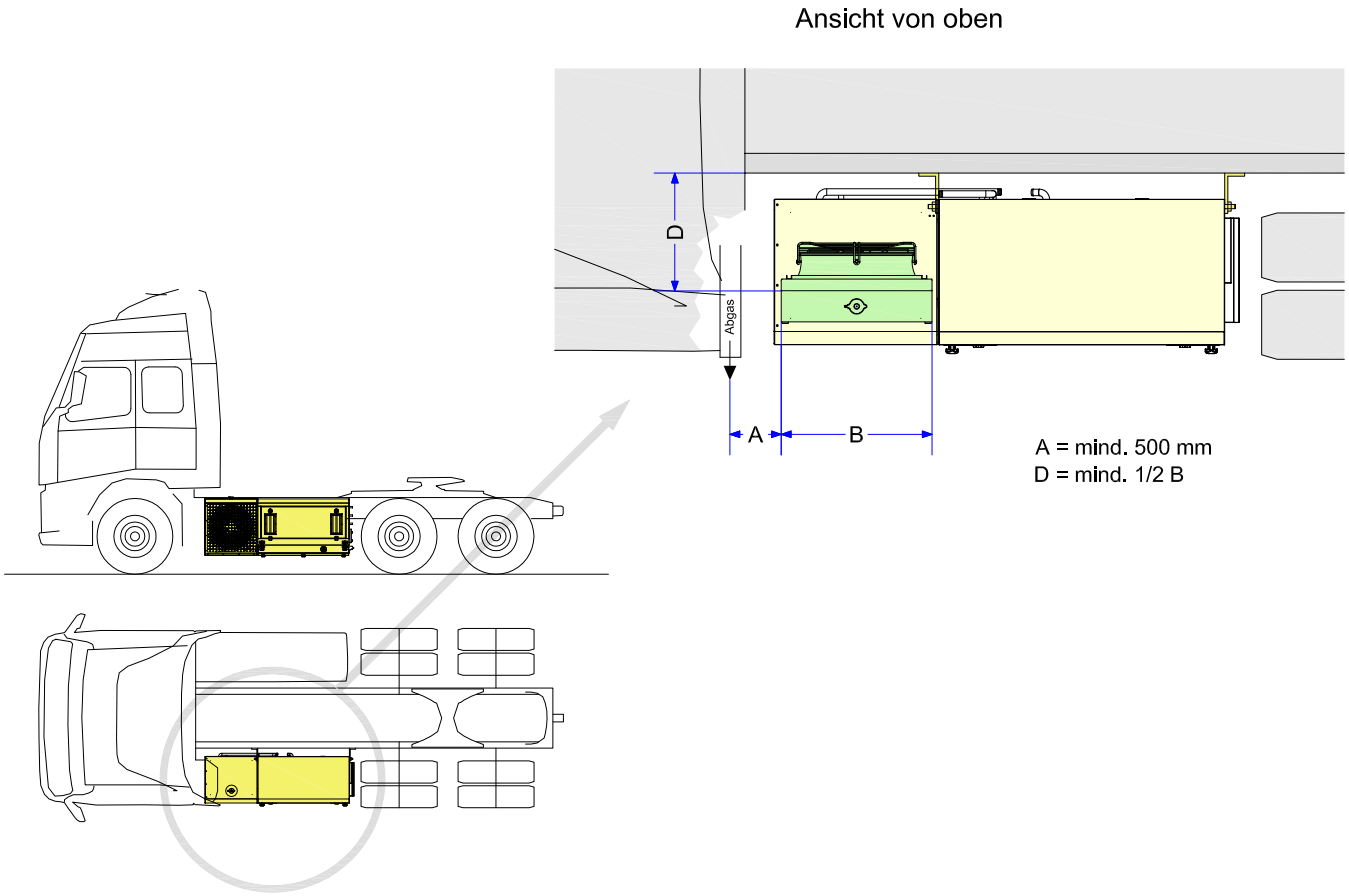
2.9.3.7 Installation location for generators of the PVK-UK series

Generators of the PVK-UK series are designed for lateral installation on the vehicle chassis

Please note:

- Min. distance between radiator and vehicle chassis must be 1/2 B.
- Min. distance to gas exhaust (heat and dirt source): 500 mm.
- The exhaust flow area must be unobstructed. No impairment to the vehicle chassis or installations.

Fig. 2.9.3.7-1: PVK-UK installation location



2.9.4 Coolant hoses

- The diameter of the coolant hoses must be equal to or greater than the diameter of the generator connections.
- A vacuum-tight and temperature resistant hose (min. 120 °C) must be used.
- The hoses must be pressure resistant under vacuum conditions.
- Depending on the application location, the hoses must be UV resistant.
- The hoses must be weather resistant and chemical resistant (resistant to oil, etc.).
- The bending radii of the hose type shall be taken into account.
- The hoses must have a general operating permit (ABE) / approval certificate.

2.9.5 Connection of the external radiator

see Kapitel 2.11, “Installation schematics,” auf Seite 83

2.9.6 Coolant expansion tank

Coolant expansion tank for systems with a radiator below the generator.

For operation, a coolant expansion tank must be installed at least 100 mm above the level of the exhaust manifold and the radiator.

The ventilation line of the radiator and the generator shall be installed on the top connection. The bottom connection is used to refill the coolant circuit and is integrated in the coolant circuit at a low-lying location using a T-fitting.

The coolant expansion tank can be procured from the Fischer Panda accessories.

Coolant expansion tank for systems with a radiator installed above the generator.

If the radiator is installed min. 100 mm above the exhaust manifold, a radiator with integrated coolant expansion tank can be used. In this case, the ventilation line of the generator is connected to the return line to the radiator (hot side) using a T-fitting. If is refilled via the feed line (cold side) to the generator.

2.9.7 Installation of a coolant temperature indicator

Where sensitive systems are installed (e.g. in television transmission vehicles, rescue vehicles, or other vehicles with sensitive metrological installations) a remote indicator for coolant temperatures should be installed. It is, however, highly recommended to install two indicator instruments:

1. coolant feed line (cold side)
2. coolant return line (hot side)

The exact location of the measuring unit is not important, here.

Generators of the i-serie and x-serie can be monitored with the temperature displayed at the remote control panel. additional coolant temperature indicators are not necessary here.

A corresponding indicator kit can be procured from Fischer Panda.

Note:

For subsequent installation, Fischer Panda T-fittings are available for hose elements in which the temperature sensors are then installed.

2.9.8 Permissible coolant temperatures

- The radiator must be dimensioned such that the feed line to the generator (cold side) does not get hotter than 70 °C during normal operation. The coolant feed line must be connected to the coolant pump.
- The coolant volume flow must be dimensioned such that the temperature difference between engine inflow (coolant pump) and engine outflow (exhaust manifold) is no greater than 12 K under full load.

To ensure this, the coolant hoses shall be routed without kinks or sharp bends. Resistance, e.g. due to narrowed points in transition pieces or shut-off valves, shall be avoided.

Note:

2.9.9 Coolant pump

- The generator is equipped with a normally suctioning (not self-priming) coolant pump.
- The coolant pump is designed so that a max. distance of 5 m between pump and radiator is possible.

If the necessary coolant volume flow is not achieved (e.g. due to a special installation situation), an external coolant pump with the corresponding output must be installed in the coolant circuit to increase the coolant volume flow.

Note:

The pressure in the coolant circuit must not exceed 0.7 bar!

Warning:

Required coolant volume flow:

Fig. 2.9.9-1: Coolant volume flow

Generator type	Coolant volume flow
Panda 4500	min. approx. 10 L/min
Panda 8000 - 10000	approx. 16 to 22 L/min
Panda 12000 - 15000	approx. 24 to 28 L/min
Panda 18 - 24	approx. 32 to 38 L/min
Panda 30 - 32	approx. 40 to 45 L/min
Panda 42 - 65	approx. 50 to 60 L/min

2.9.10 Radiator fan

Radiator fans are wearing parts. To ensure a long service life, there must be no objects impairing or blocking the free movement of the fan during operation. Such objects include:

- Snow
- Ice
- Leaves
- Branches
- Increased air resistance due to dirty radiator

2.9.11 Anti-freeze and corrosion protection

At the factory, the coolant is adjusted to a 50% concentration of G48 anti-freeze solution (approx. -40 °C). If lower temperatures are possible during transport or storage, the coolant filling must be drained or adjusted for the lower temperatures.

After draining the coolant, the system must be blown dry with compressed air at 0.5 bar. This will ensure that the system is complete drained.

The anti-freeze agent also serves to protect the system against corrosion. The anti-freeze concentration in the coolant must not drop below 30 %.

2.9.12 Logging the temperature values during initial start-up

It is mandatory to measure the temperature values of the circulating coolant in the circuit after installing the generator for the initial start up. Two remote thermometers must be used for this purpose. One connection must be mounted to the coolant feed line to the engine, the second one on the coolant outfeed. The generator must then be loaded with min. 75 % of the rated power after a brief warm-up phase. The circulation of the coolant must be checked. The values must fall within the following limits:

1. Coolant feed line max. 70 °C in permanent operation mode at maximum load
2. Coolant return line max. 85 °C in permanent operation

mode.

3. Differential of the two values: This item is of particular importance and provides information on the circulation of the coolant. The difference should be max. 17 K for a coolant water system with an integrated water-cooled muffler. It should, however, typically be between 10 and 12 K.

If the difference is greater than 15°K, the coolant circulation is not sufficient. The water circulation must then be increased. This can be solved by e.g. improving the line routing, or by reducing the belt pulley diameter. It is absolutely necessary to measure the output of the cooling system after installing the generator. The values given above shall be considered maximum permissible values. They apply to operation in increased temperatures, as well. In permanent operation mode at external temperatures around 20 °C, the values must fall near the lower limit of the tolerance.

Each manual includes installation certificates, which must be filled in after installation and returned to the manufacturer (copy).

Returning the installation certificates and commissioning logs is an important component of the warranty conditions.

Note:

2.10 Custom installations

The effects on the warranty must be agreed on a case-by-case basis with Fischer Panda.

2.10.1 External heat exchangers

External heat exchangers shall be installed as per the specifications of the respective manufacturers.

2.10.2 External engine pre-heater

The external engine pre-heater shall be installed as per the manufacturer's instructions.

This applies to:

- electrical pre-heater systems (e.g. Defa),
- diesel-operated pre-heater systems,
- petrol-operated pre-heater systems.

2.10.3 Keel cooling

The keel cooling system shall be dimensioned and installed as per the manufacturer's instructions.

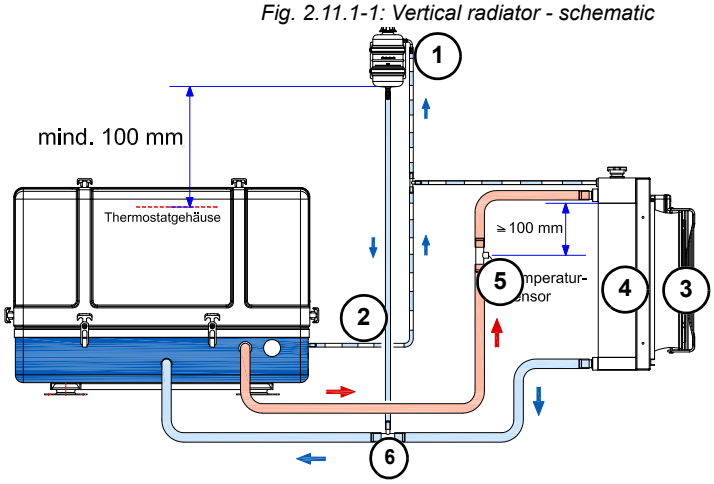
2.11 Installation schematics

At generators with xControl, the ECU measures the coolant temperature at the exhaust manifold. The external temp switch sensor in the hydraulic lines is not necessary at these generators.

Note:

2.11.1 Installation for vertical radiator installation

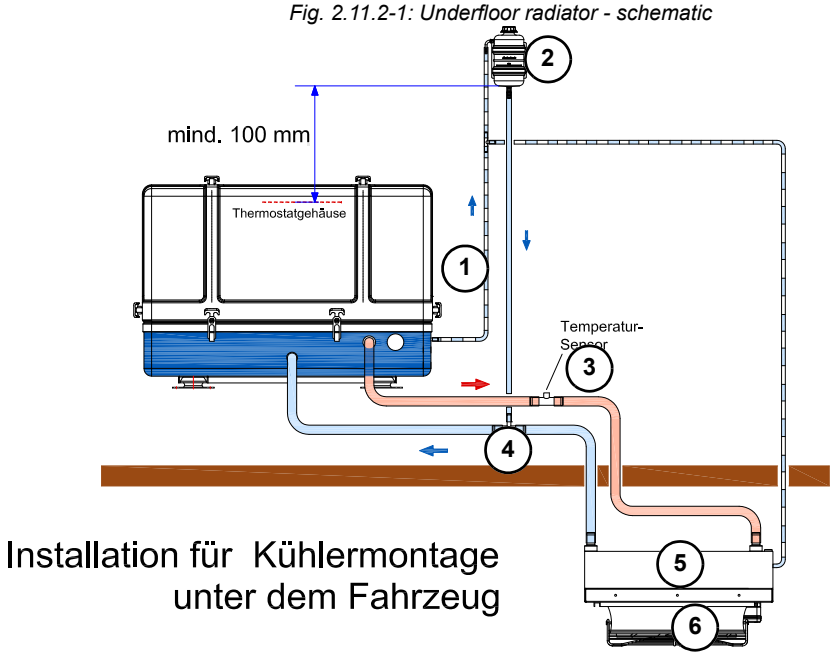
Fig. 2.11.1-1: Vertical radiator - schematic



01. Coolant expansion tank
02. Engine bleed line
03. Fan for radiator
04. Radiator
05. T-fitting with connection for thermal switch/sensor for external fan control
06. T-fitting

2.11.2 Installation for mounting the radiator under the vehicle

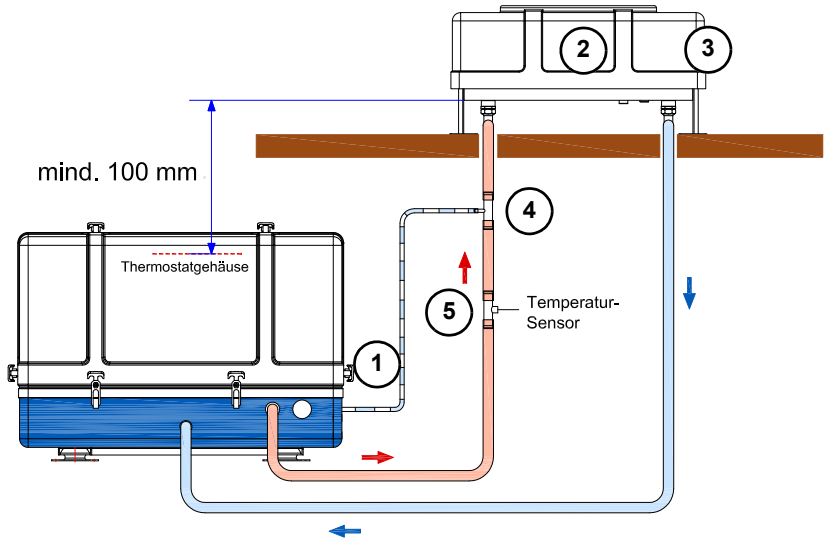
Fig. 2.11.2-1: Underfloor radiator - schematic



01. Ventilation line
02. Coolant expansion tank
03. T-fitting with connection for thermal switch/sensor for external fan control
04. T-fitting
05. Radiator
06. Fan for radiator

2.11.3 Installation schematic for roof mounted radiator with expansion tank

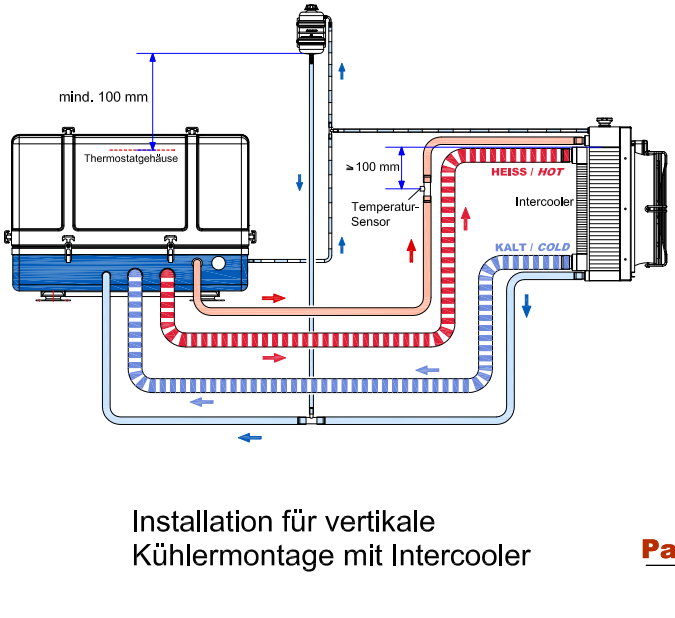
Fig. 2.11.3-1: Roof-mounted radiator - schematic



1. Engine bleed line
2. Radiator (horizontal)
3. Coolant expansion tank (integrated)
4. T-fitting for bleed line
5. T-fitting with connection for thermal switch/sensor for external fan control

2.11.4 Installation radiator with intercooler - schematic sample vertical radiator

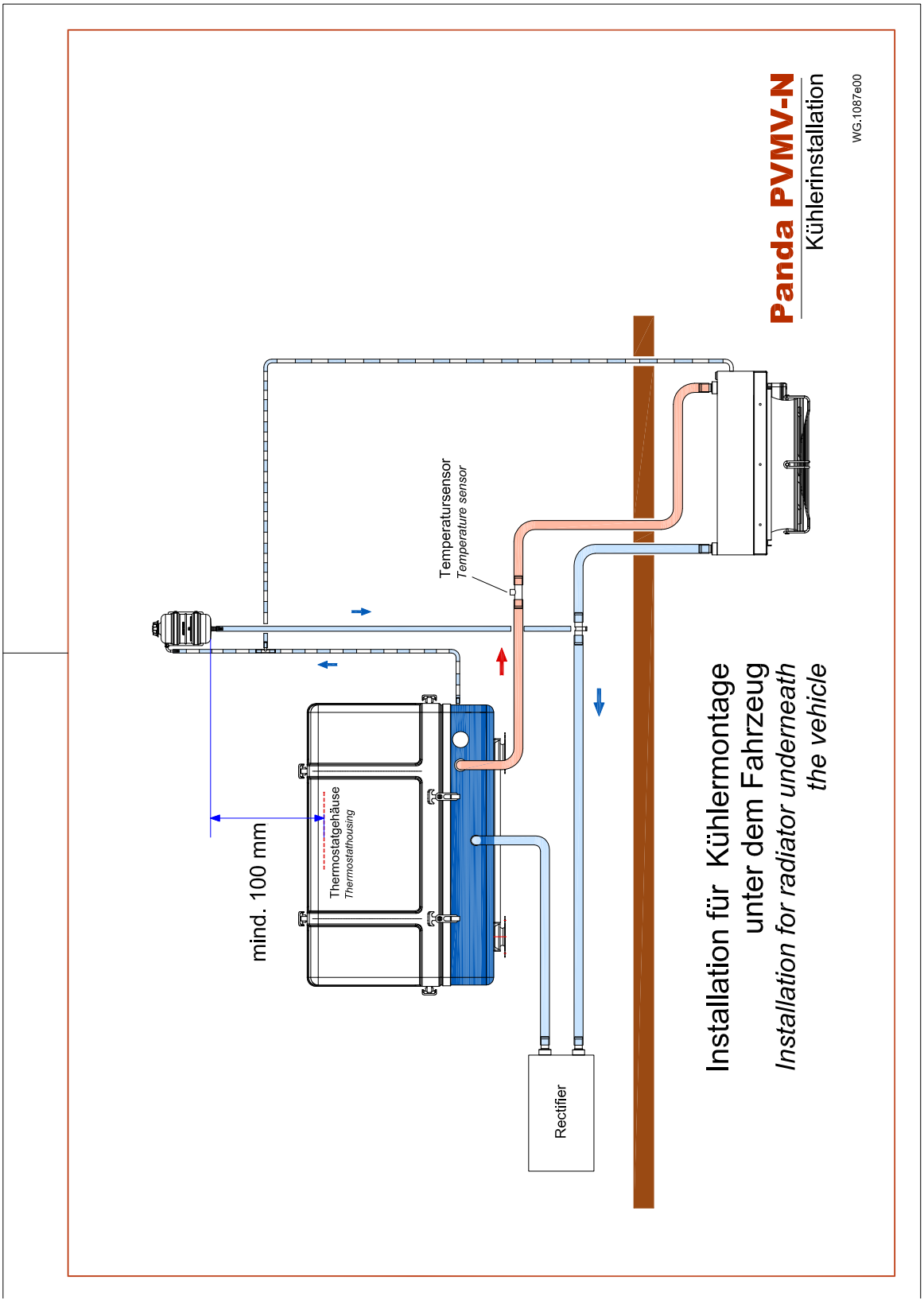
Fig. 2.11.4-1: Installation Radiator with Intercooler -Schematic sample vertical Radiator



The installation sample must be adapted to the Radiator/ System. **Note:**

2.11.5 Installation Rectifier Unit -Schematic sample cooling water

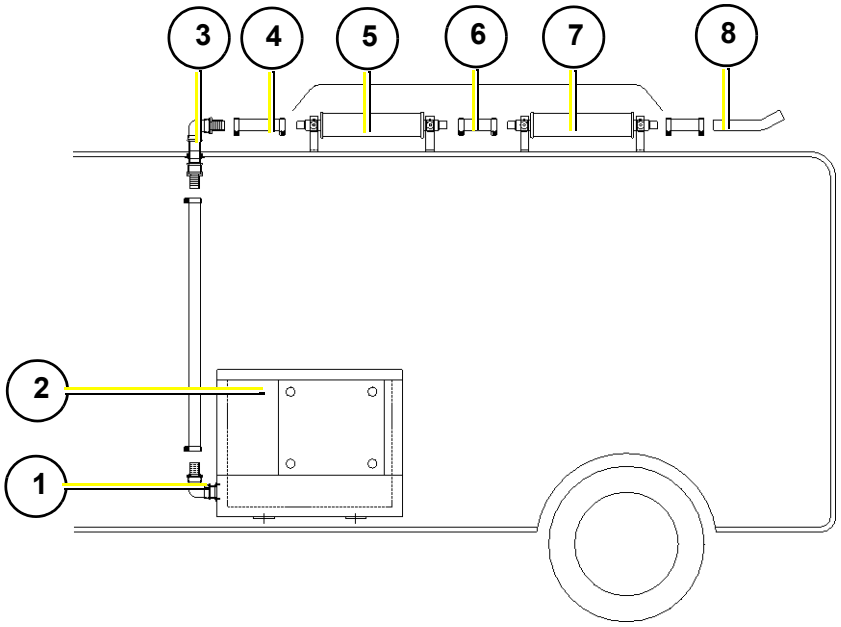
Fig. 2.11.5-1: ***Installation Rectifier Unit -Schematic sample cooling water***



The installation sample must be adapted to the Radiator/ System **Note:**

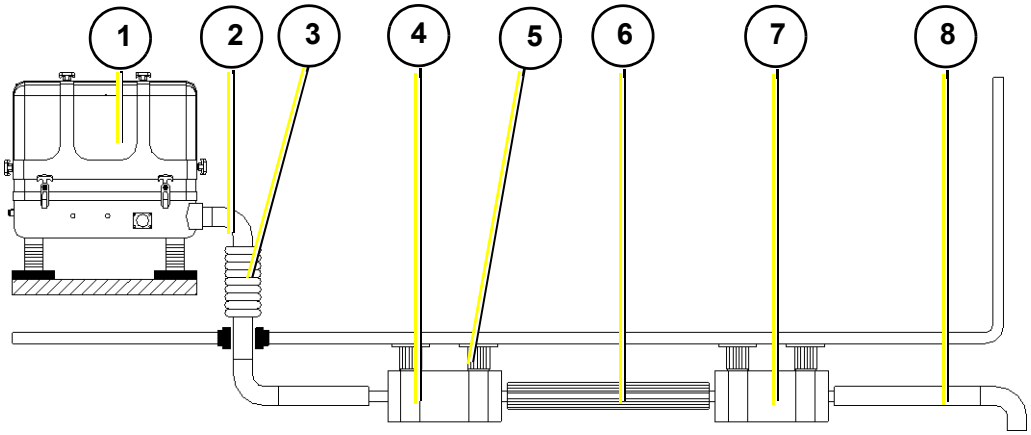
2.12 Exhaust installation

Fig. 2.12-1: Exhaust connection for roof outlet



1. Exhaust outlet
2. Generator
3. Roof passage 90°
4. Vibration damper
5. External pre-silencer
6. Exhaust pipe
7. External series silencer
8. End pipe

Fig. 2.12-2: Exhaust connection for mounting below the vehicle



1. Generator
2. Exhaust outlet
3. Compensator
4. External pre-silencer
5. Vibration damper
6. Exhaust pipe
7. External series silencer
8. End pipe

3. Maintenance Instructions

3.1 Maintenance Requirements

3.1.1 Checks before every start/daily

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

Once a month

- Lubrication of actuator-trapezoid thread spindle

3.1.2 Hose elements and rubber formed component in the sound cover

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to enviromental influences. They can season fast with dry air, in which environment of muted oil and fuel steams and increased temperature. The hoses must be checked regularly for elasticity. There are operating situations, at which the hoses must be renewed once in the year.

Additionally to usual tasks of maintenance (oil level check, oil filter control etc.) further maintenance activities are to be accomplished for marine aggregates.

3.2 Checking oil-level

You require:

paper towels / cloth for the oil dipstick

The generator must be placed at level.

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

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

Generator and coolant can be hot during and after operating.

Caution: Burn hazard!

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

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

- Pull the oil dipstick out of the check rail.
- Clean oil dipstick.
- Put the oil dipstick back into the check rail and wait for 10 seconds.
- Pull the oil dipstick out of the check rail and read off the oil-level at the lower end of the stick.

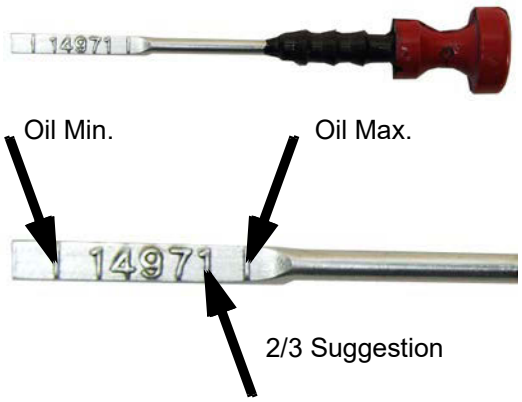
Oil dipstick EA 300 Engine

Fig. 3.2-1: Oil dipstick

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

We recommend an oil-level of 2/3.

Sample picture



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

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

3.2.1 Refilling Oil

You require:

Engine oil

1. Check oil-level as described under section 3.2, “Checking oil-level,” on Page 87.
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 3.2, “Checking oil-level,” on Page 87.

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

3.2.2 After the oil level check and refilling the oil

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

3.3 Replacement of engine oil and engine oil filter

You require:

- Engine oil. See attachment.

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

- Sealing for oil drain screw

- Personal protective gear

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

- Open-ended wrench for oil drain screw

- Paper towels and cloth

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

The generator must be placed at level.

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

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

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

Generator and coolant can be hot during and after operating.

Caution: Burn hazard!

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

1. Prepare generator.

   - Assure generator against accidental start.

   - Open the generator casing.

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

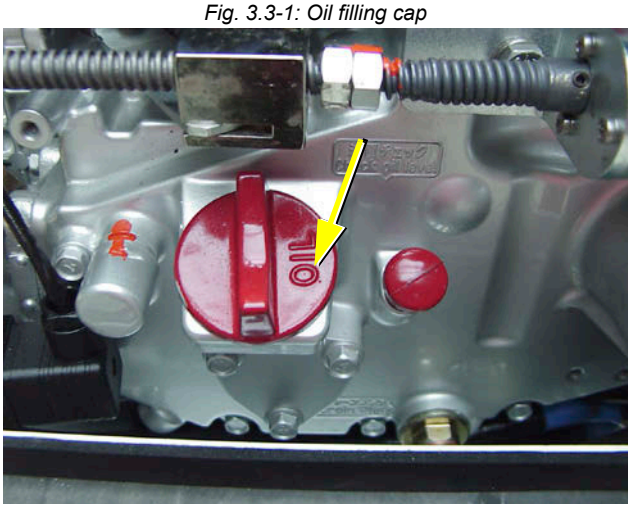
   - with generators that have an internal oil drain hose: Open the lead-through for the oil drain hose (left turn of the sealing). Pull out the sealing with the oil drain hose.

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

2. Loosen oil filling cap

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

Fig. 3.3-1: Oil filling cap



3. Open oil drain screw.

   Unscrew the oil drain screw by means of the open-ended wrench from the oil drain hose (rotating direction left). Use a second open-ended wrench to lock. Make sure to do this over the container.
   Use spanner size 17 mm.

Fig. 3.3-2: Oil drain hose

4. Discharge used oil.

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

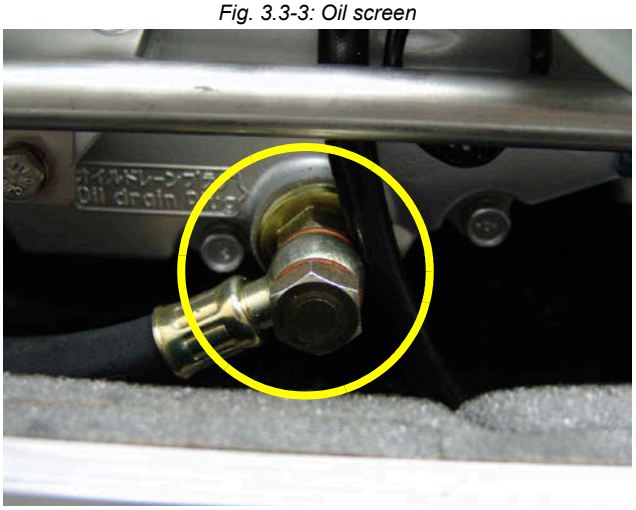
Oil screen with generators with EA300 engines

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

Use spanner size 17 mm.

Sample picture

Fig. 3.3-3: Oil screen



For an easy access to the oil screen the sound cover base has a passage.

Fig. 3.3-4: Oil screen

5. 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.

6. Check proper filling level. See section 3.2, “Checking oil-level,” on Page 87.

   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.

7. Clean up

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

3.3.1 After the oil change

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

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

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

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

3.5 Ventilating the fuel system

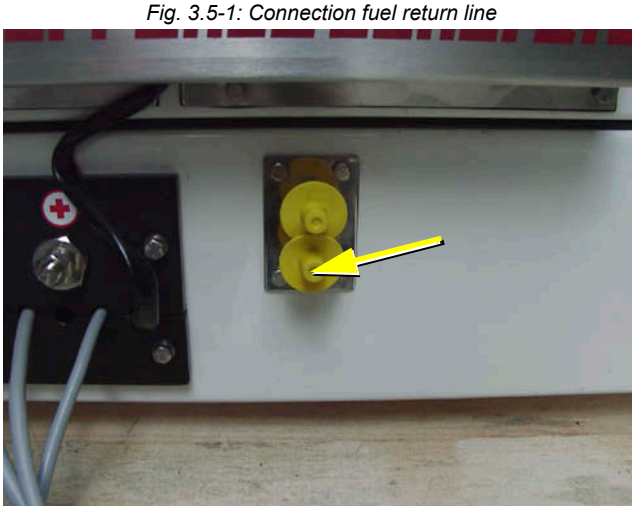
Normally, the fuel system is designed to ventilate air itself i.e. as soon as the electric starter motor starts operation the fuel pump starts working and the fuel system will be de-aerated after some time automatically. It is nevertheless essential to ventilate the system as follows prior to the first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

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

Attention:

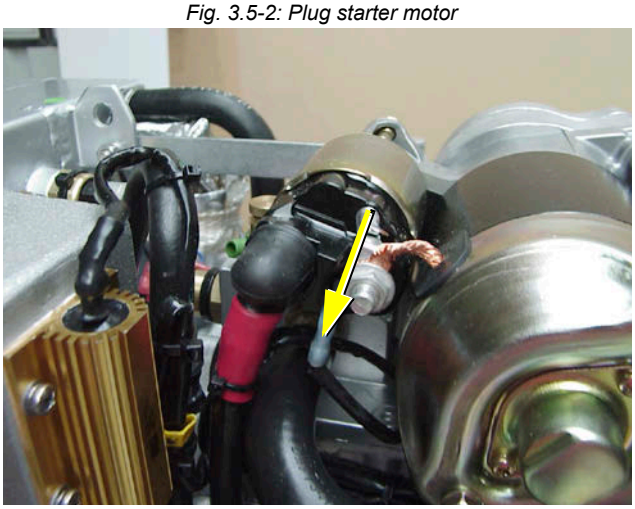
1. Main power switch „OFF“
2. Put a container under the fuel return pipe to catch running out fuel to catch.

Fig. 3.5-1: Connection fuel return line



3. Take off the plug at the solenoid of the starter motor.

Fig. 3.5-2: Plug starter motor



4. Switch the panel „ON“.
5. Press „START“-button. The fuel pump runs audible.
6. Switch the panel „OFF“.
7. Switch the panel „ON“.
8. Press again the „START“-button.

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

9. Switch the panel „OFF“.
10. Attach the plug at the solenoid of the starter motor.

3.5.1 Replacement of the fuel filter

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

Remove the hoses from the used filter and fasten them to the new filter. The arrow on the filter housing indicates the direction of the fuel flow. A clogged filter causes a decreased power output of the generator.

Fig. 3.5.1-1: Fuel Filter

3.5.1.1 Optional fuel filter with sight glass

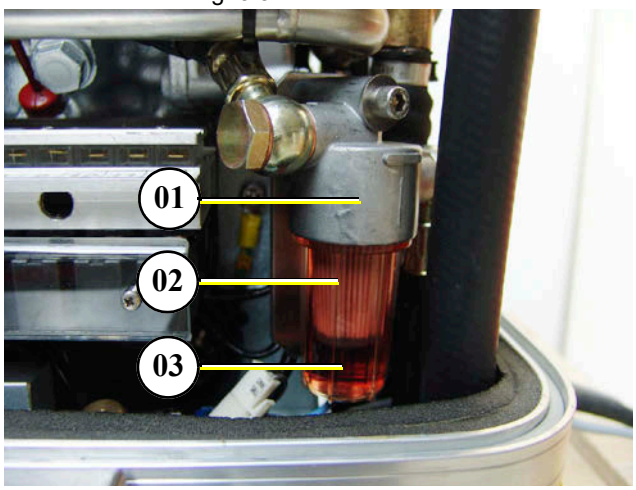
The filter change depends on the fuels' degree of pollution, but should be executed every 300 operating hours at the latest.

01. Fuel filter housing

02. Fuel filter element

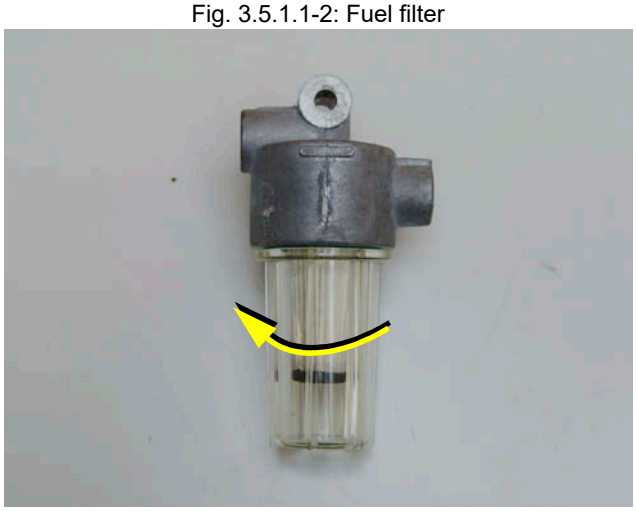
03. Sight glass

Fig. 3.5.1.1-1: Fuel filter



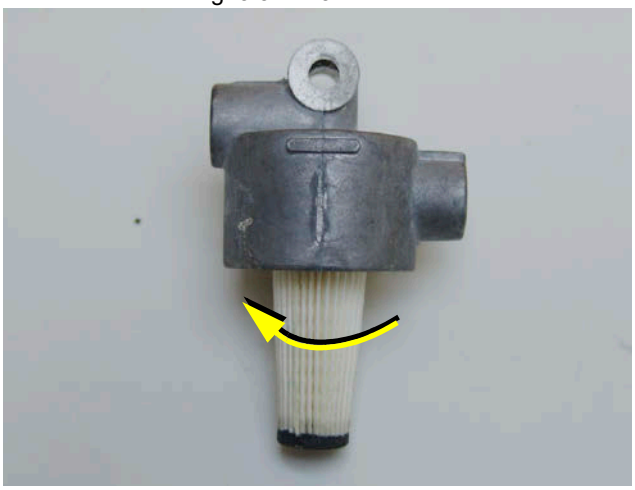
1. Unscrew the housing from its mount (left hand rotation).

Fig. 3.5.1.1-2: Fuel filter



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

Fig. 3.5.1.1-3: Fuel filter



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

Fig. 3.5.1.1-4: Fuel filter

3.5.2 Checking the water separator in the fuel supply

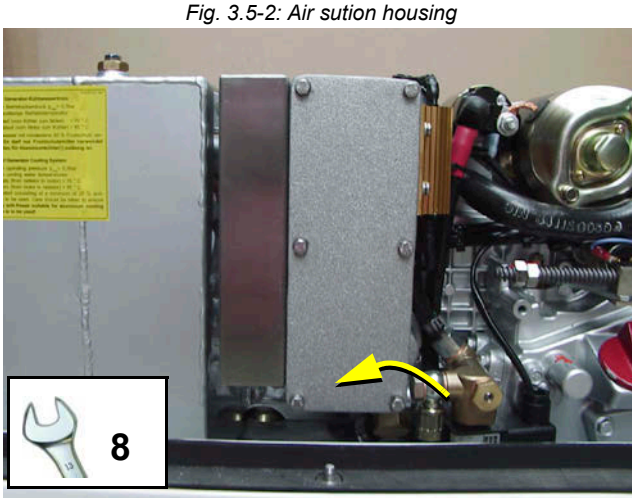
The pre-filter with water separator has a cock at its lower surface, with this cock the downward sunk water can be discharged.

This is simply possible, water is heavier due to its density than the Diesel.Replacing the Air Filter

Fig. 3.5.2-1: Fuel filter with water separator

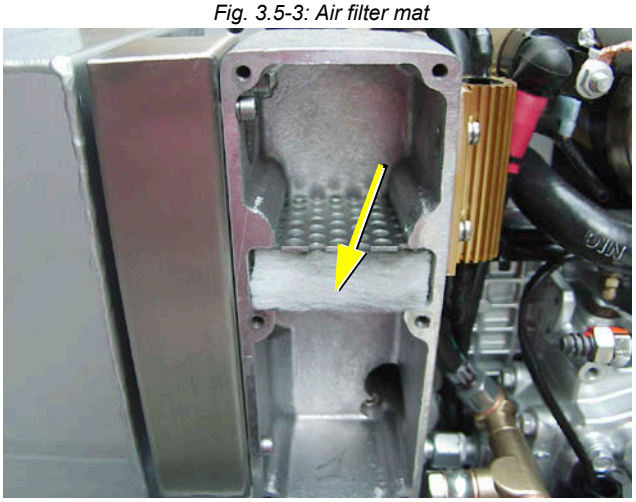
Open the air suction housing by loosen the six hexagon head screws on the frame cover.

Fig. 3.5-2: Air sution housing



Change the air filter mat and close the cover again.

Fig. 3.5-3: Air filter mat



3.6 Replacing the actuator

The described procedure is representative for Fischer Panda generators. The original location of the item must be taken from the generator description of this manual. All replacements and repairs should be done by a trained person.

NOTE:Representative procedure

Ensure that the generator cannot be started up accidentally. Remove battery main switch.

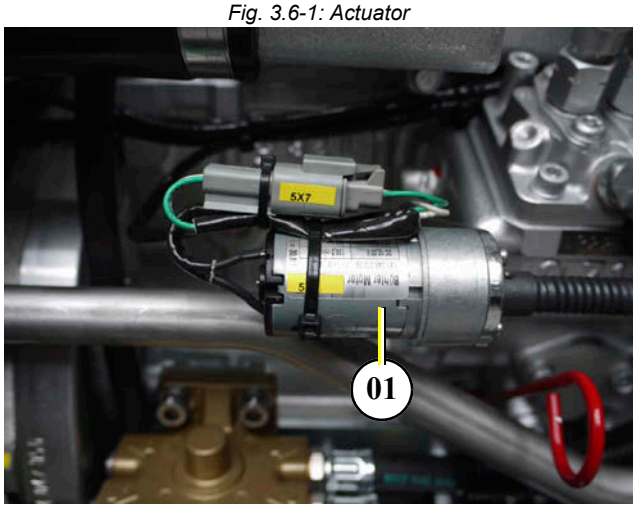
ATTENTION!

For part numbers, refer to the spare parts catalogue.

1. Open the capsule.
   01. Actuator

Representative picture

Fig. 3.6-1: Actuator

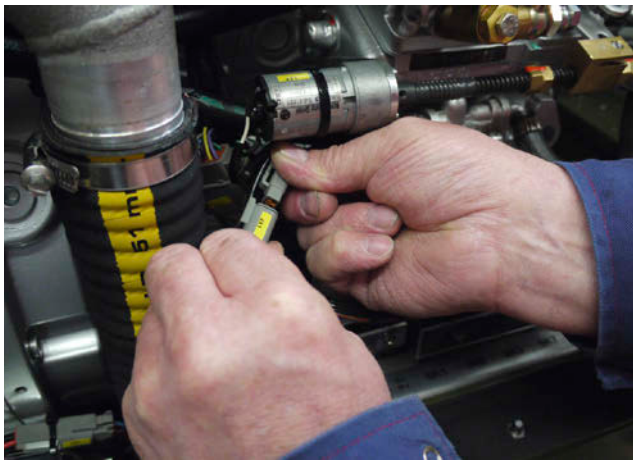


Figures similar!

2. Disconnect electric supply line from the actuator.

Representative picture

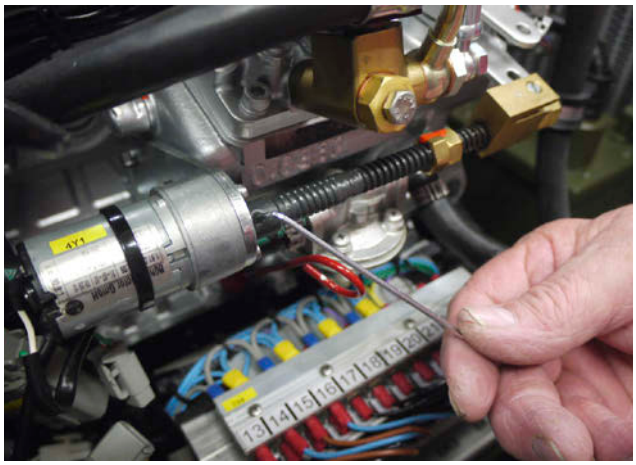
Fig. 3.6-2: Actuator



3. Unscrew the grub screw using a size 2 mm socket wrench.

Representative picture

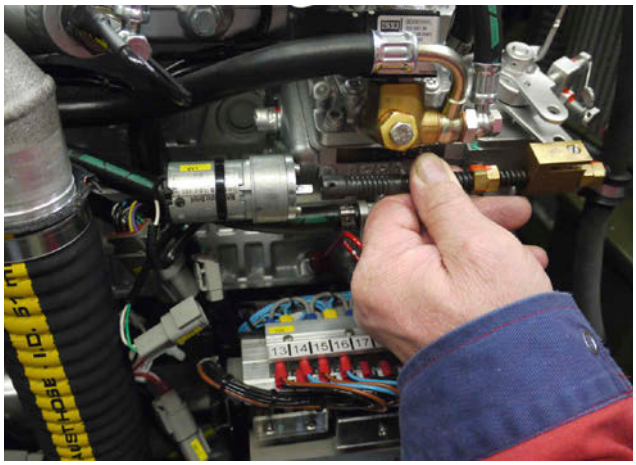
Fig. 3.6-3: Actuator



4. Slide spindle to the right.

Representative picture

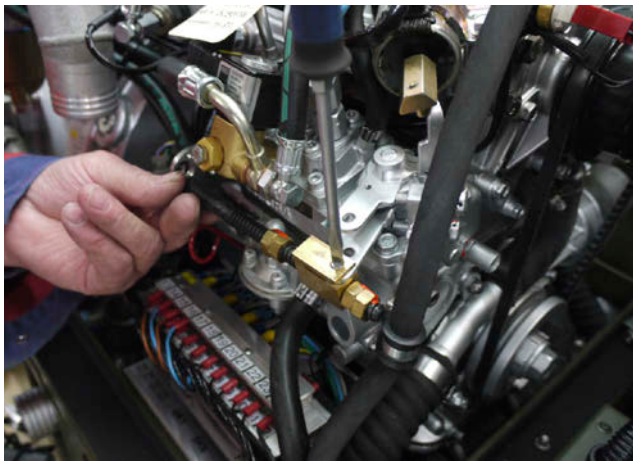
Fig. 3.6-4: Actuator



5. Remove screw with a size 0 or 1 screwdriver.

Representative picture

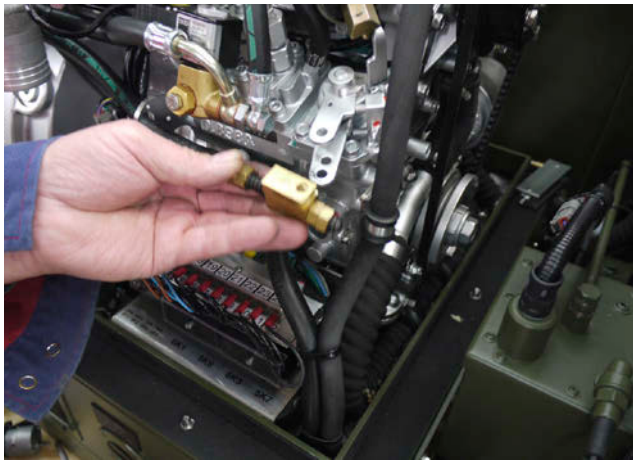
Fig. 3.6-5: Actuator



6. Remove the spindle.

Representative picture

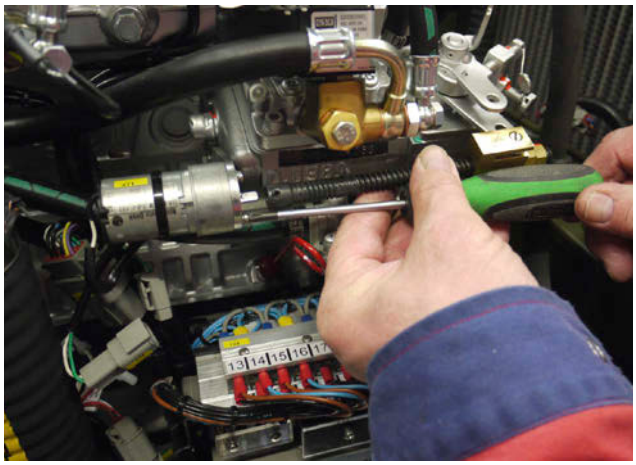
Fig. 3.6-6: Actuator



7. Unscrew three screws on the actuator with a size 0 or 1 phillips screwdriver.

Representative picture

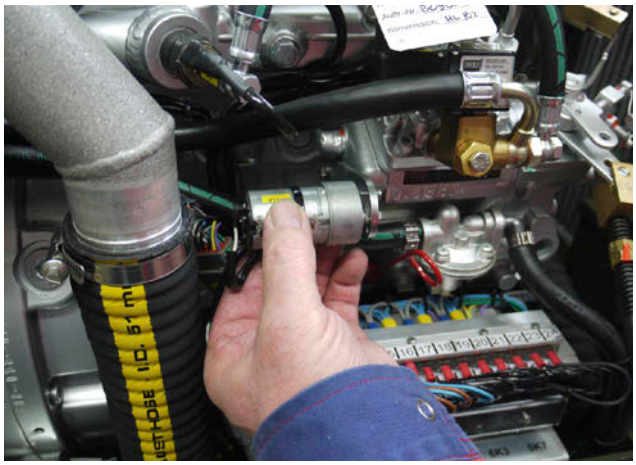
Fig. 3.6-7: Actuator



8. Remove the actuator.
9. To reinstall, reverse the order of steps.
10. Pull out electric starter.
11. To reinstall, reverse the order of steps.

Representative picture

Fig. 3.6-8: Actuator



3.7 Lubrication of the spiral thread spindle

The spiral thread spindle must be lubricated carefully and regularly. Please only use a temperature independence

lubricant (up to 100°C) witch is also equipped with „emergency run qualities“.

Spread also lubricant to the end of the nuts.

It is possible that the spindle could clamp if the spindle is not enough lubricated. Then the generator can be switched off by over- or undervoltage.

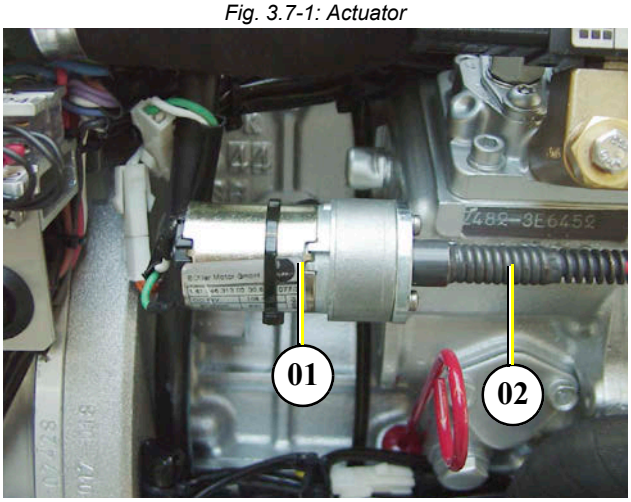
All screws at the actuator and the spindle must be ensured „solvable“ with a screw safety grease.

01. Rev actuator

02. Spiral thread spindle

Representative picture

Fig. 3.7-1: Actuator



3.7.1 Ventilation of the coolant circuit / freshwater

Special notes for the ventilation of the cooling system

If the cooling water is drained, or if other air has entered the cooling system, it is necessary to ventilate the cooling system.

This ventilating procedure must be repeated several times:

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

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

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

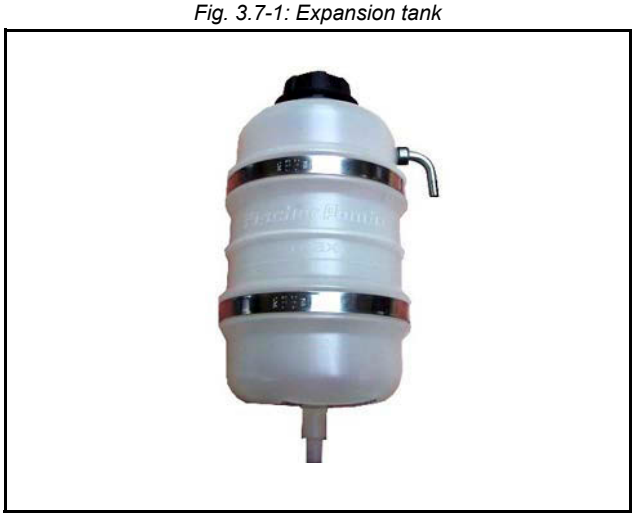
Attention

Expansion tank

Open the Expansion tank cap

The Expansion tank is may integrated into the Radiator

Fig. 3.7-1: Expansion tank



Open the ventilation screw on the water-cooled silencer.

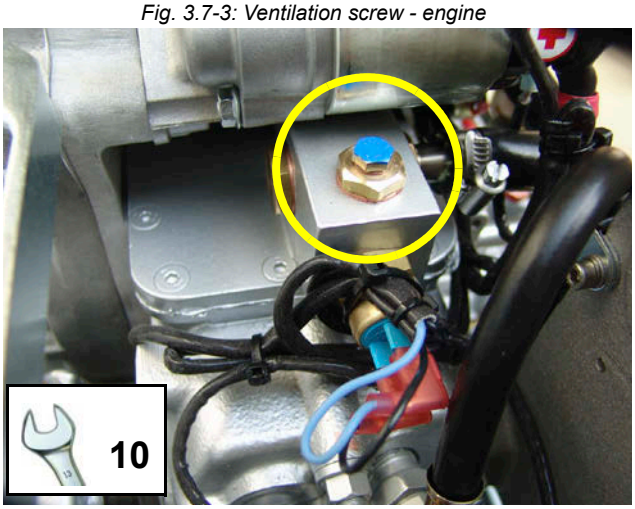
Close the bleeding srew as soon as cooling water rins out without air bubbles

Fig. 3.7-2: Ventilation screw - silencer

Open the ventilation screw at the engine.

Close the bleeding srew as soon as cooling water rins out without air bubbles

Fig. 3.7-3: Ventilation screw - engine



Pour in coolant through the cooling water filler cap. The coolant flows in very slow.

If it is to be recognized that the cooling water level does not sag any longer (with cold cooling water the cooling water level must cover the sheet metal in the exhaust elbow union), close the ventilation screws and start the generator.

Run the generator to maximally 60.

Switch off generator.

Fig. 3.7.1-4: Cooling water filler neck at Radiator

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

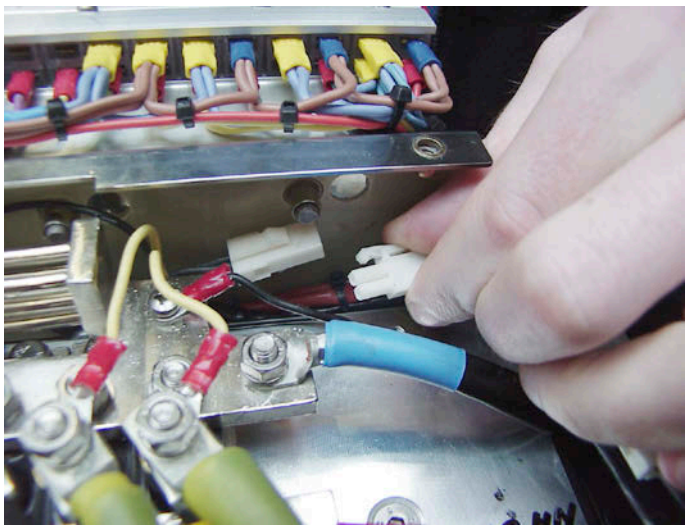
3.8 Rectifier maintenance

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

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

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

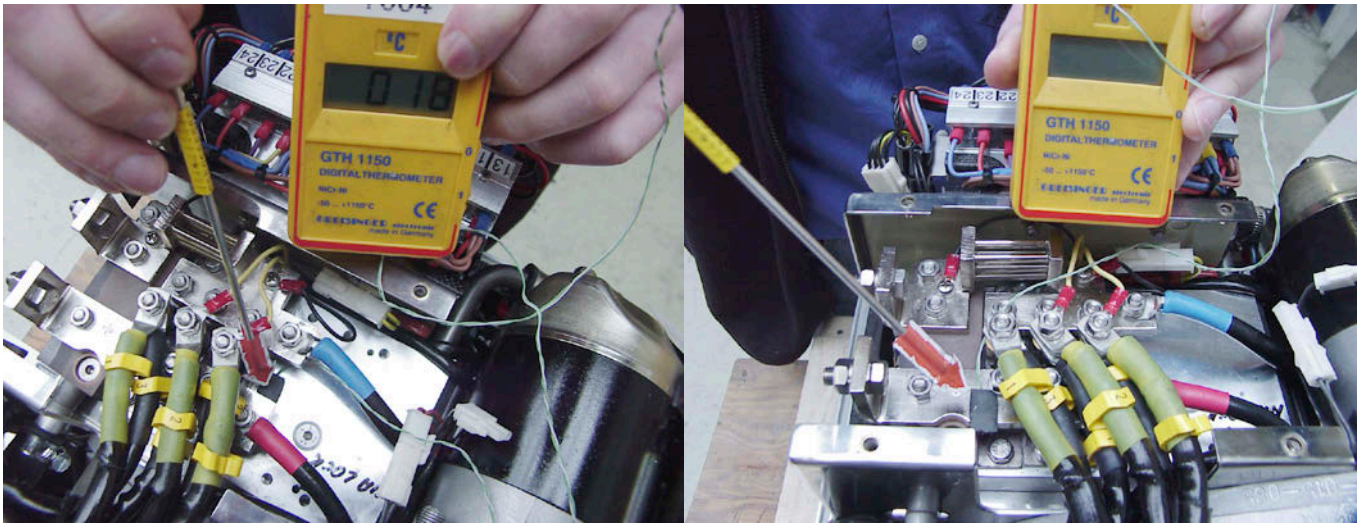
Fig. 3.8-1: Plug thermo-switch cooling plate



Temperatures of the rectifier and heating

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

Fig. 3.8-2: Measuring the temperature



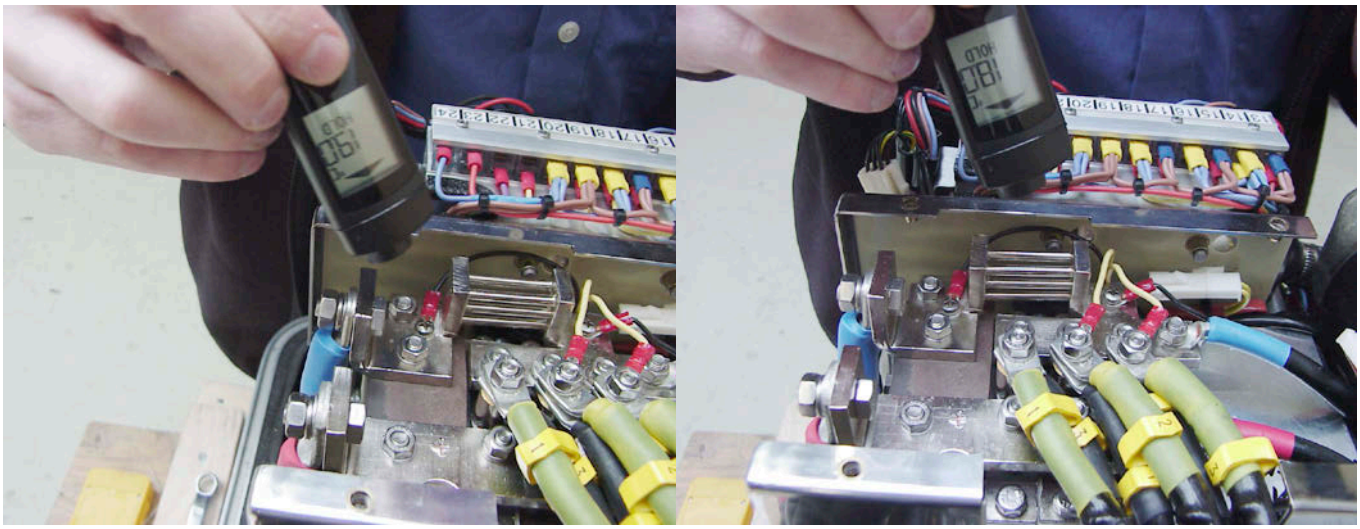
- With the help of the infrared thermometer you can check all the temperatures on the rectifier.

  Check all the cable connections of the DC- wiring.

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

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

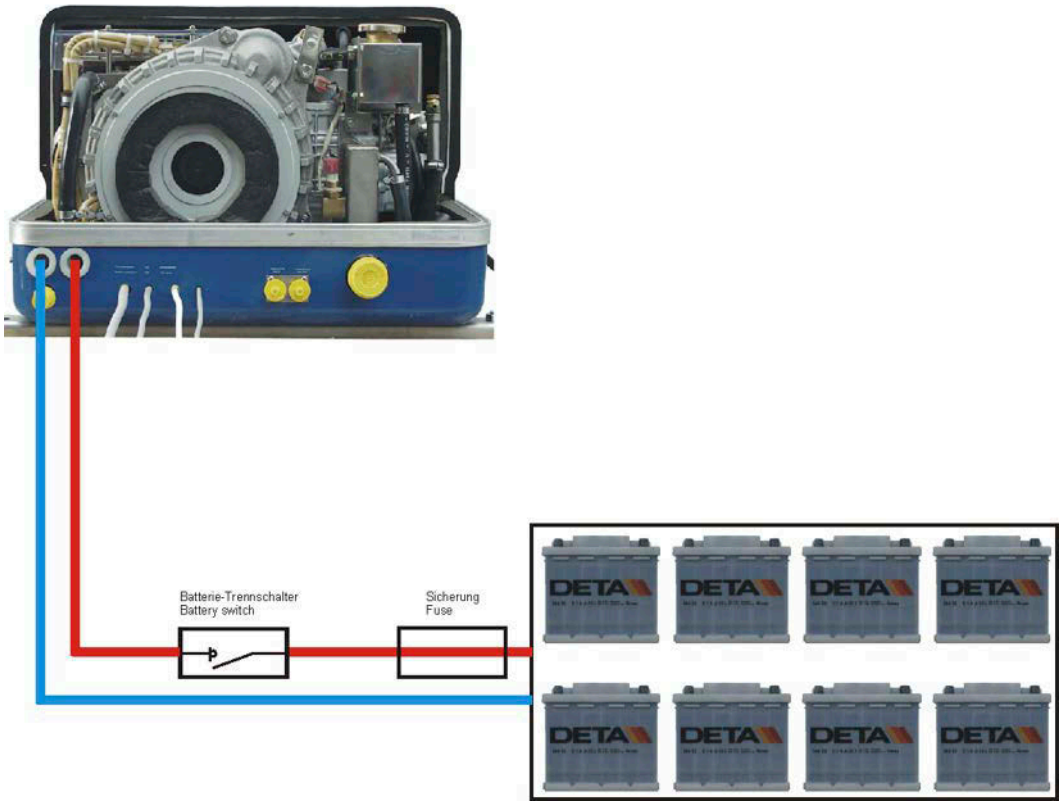
Fig. 3.8-3: Measuring the temperature



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

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

Fig. 3.8-4: Connection example



Remind the customer

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

3.9 Replacing the DC/DC converter

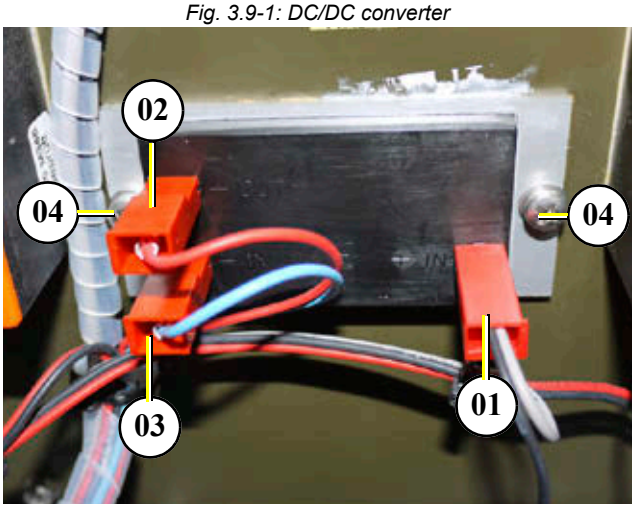
The described procedure is representative for Fischer Panda generators. The original location of the item must be taken from the generator description of this manual. All replacements and repairs should be done by a trained person.

NOTE:Representative procedure

12. Disconnect the starter battery (first GND (-), then (+)).
13. Disconnect the three cable terminals.
14. Loosen the two filister head screws and dismount the DC/DC converter.
15. Proceed in the reverse order to reassemble.

01. 24 V ...28.8 V +
02. 12 V ...14.4 V +
03. GND -
04. Filister head screw with cross slot

Fig. 3.9-1: DC/DC converter



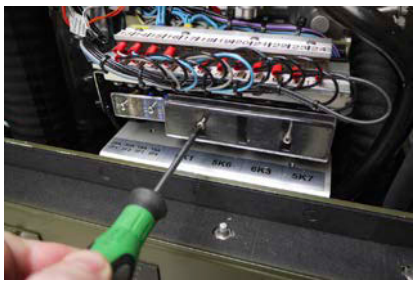
3.10 Replacing the operating current relays

The described procedure is representative for Fischer Panda generators. The original location of the item must be taken from the generator description of this manual. All replacements and repairs can be done by the user.

NOTE:Representative procedure

1. Remove the two fixing screws of the plastic cover using a size 0 or 1 phillips screwdriver.

Fig. 3.10-1: Relay

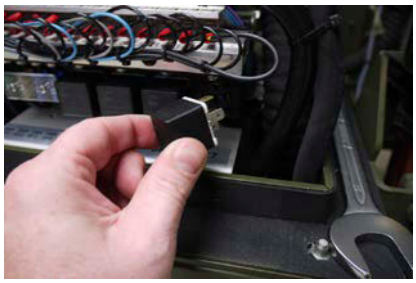


2. Remove the plastic cover.

Fig. 3.10-2: Relay

3. Pull relay from the socket and replace with new relay.
4. To reinstall, reverse the order of steps.

Fig. 3.10-3: Relay



3.11 Replacing the fuses

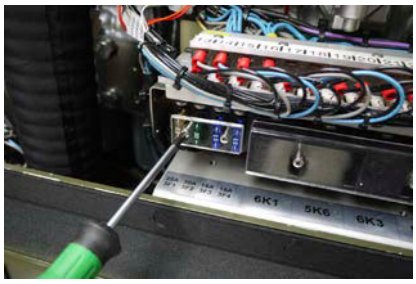
The described procedure is representative for Fischer Panda generators. The original location of the item must be taken from the generator description of this manual. This replacement can be done by the user.

NOTE:Representative procedure

The fuses should be replaced every 2000 operating hours.

Figures similar!

Fig. 3.11-1: Fuse

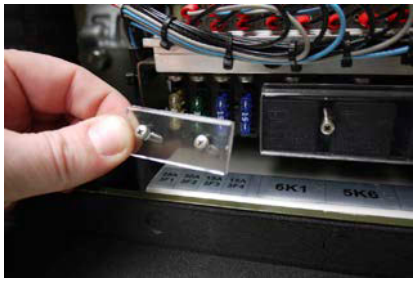


1. Remove the two fixing screws of the plastic cover using a size 0 or 1 phillips screwdriver.

Reprasentative picture

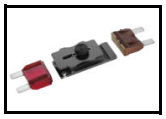
2. Remove the plastic cover.

Fig. 3.11-2: Fuse



Reprasentative picture

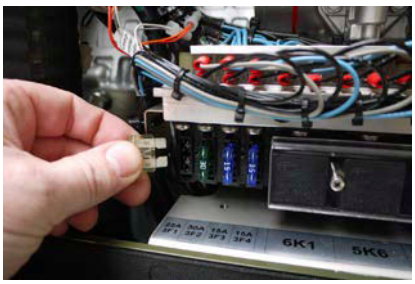
3. Using the fuse extraction tool, remove the fuse and replace it with a new one.



4. To reinstall, reverse the order of steps.

Reprasentative picture

Fig. 3.11-3: Fuse



3.12 Replacing a Thermoswitch

Ensure that the generator cannot be started up accidentally. Remove battery main switch.

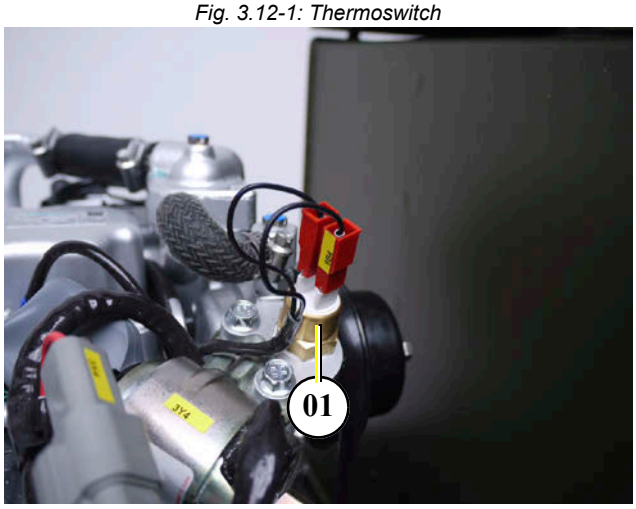
ATTENTION!

For part numbers, refer to the spare parts catalogue.

1. Open the capsule.
   01. Thermoswitch

Reprasentative picture

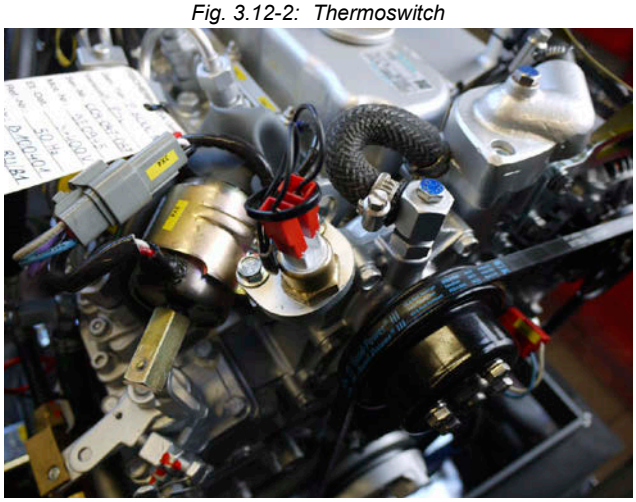
Fig. 3.12-1: Thermoswitch



2. Remove cable ties.

Reprasentative picture

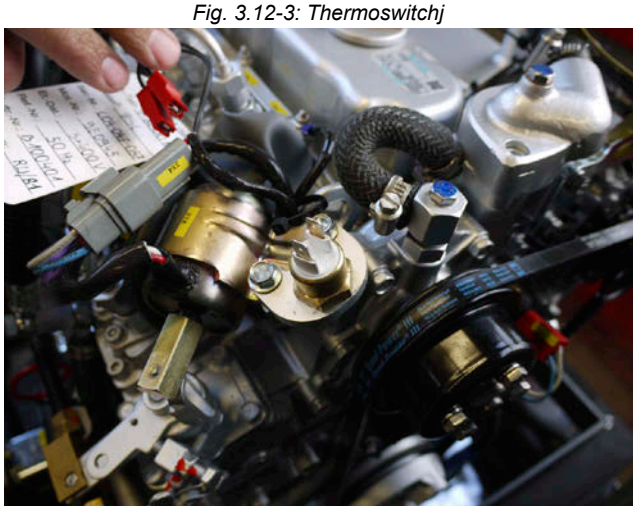
Fig. 3.12-2: Thermoswitch



3. Disconnect electric supply line of the thermoswitch

Reprasentative picture

Fig. 3.12-3: Thermoswitchj



4. Loosen thermoswitch with a wrench with W.A.F. 22 mm.

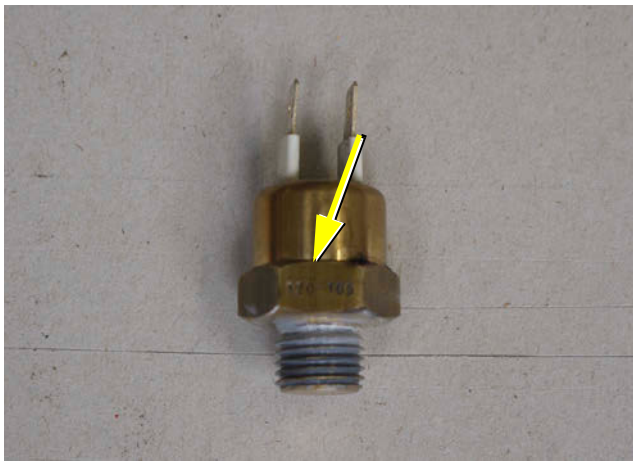
Reprasentative picture

Fig. 3.12-4: Thermoswitch

5. Before installing the new thermoswitch, check the label for correct item.
6. To reinstall, reverse the order of steps.

Reprasentative picture

Fig. 3.12-5: Thermoswitch

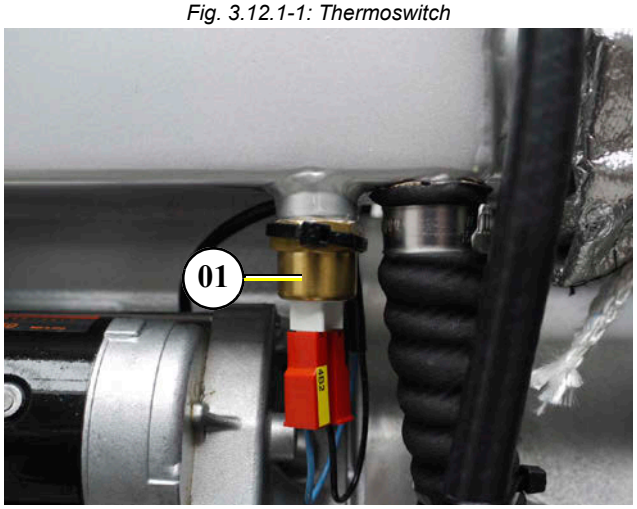


3.12.1 Replacing a Thermoswitch at the Exhaust Elbow

1. Open the capsule.
   01. Thermo switch

Reprasentative picture

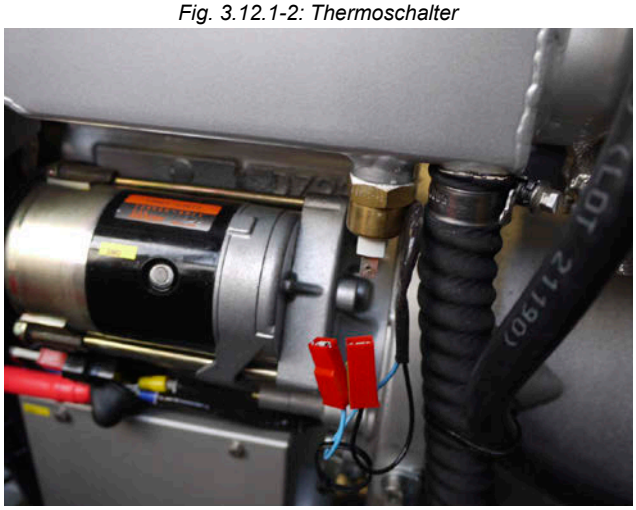
Fig. 3.12.1-1: Thermoswitch



2. Remove cable ties.
3. Disconnect electric supply line of the thermoswitch

Reprasentative picture

Fig. 3.12.1-2: Thermoschalter



4. Loosen thermoswitch with a wrench with W.A.F. 22 mm.

5. Before installing the new thermoswitch, check the label for correct item.
6. To reinstall, reverse the order of steps.

Reprasentative picture

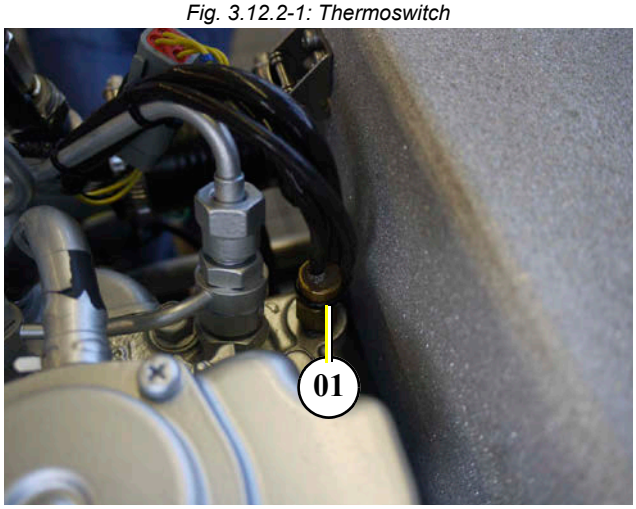
Fig. 3.12.1-3: Thermoschalter

3.12.2 Replacing the Thermoswitch at the Cylinder Head

1. Open the capsule.
   01. Thermo switch

Reprasentative picture

Fig. 3.12.2-1: Thermoswitch

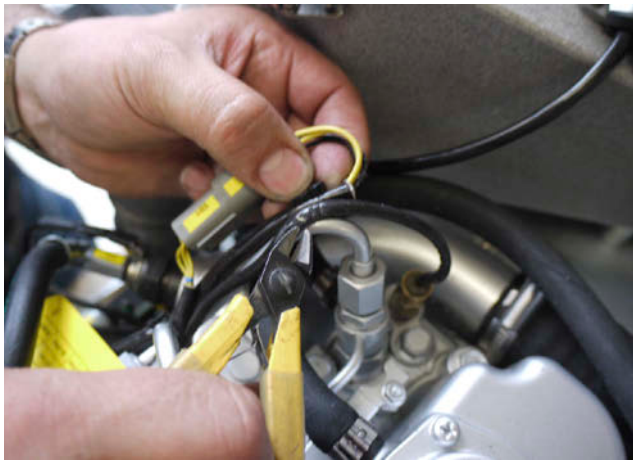


Sample picture!

2. Remove cable ties.

Reprasentative picture

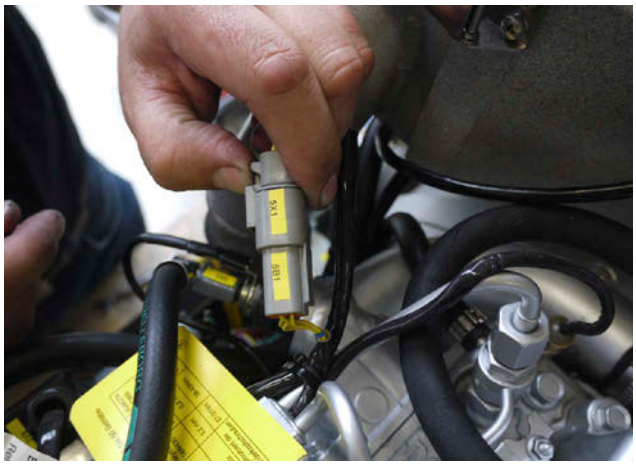
Fig. 3.12.2-2: Thermo switch



3. Disconnect electric supply line 4X1 of the thermoswitch

Reprasentative picture

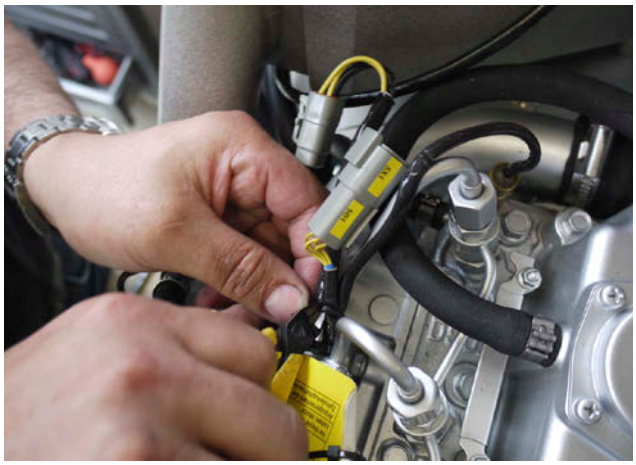
Fig. 3.12.2-3: Thermo switch



4. Remove cable ties.

Reprasentative picture

Fig. 3.12-4: Thermo switchr



5. Loosen thermoswitch with a wrench with W.A.F. 14 mm.

6. To reinstall, reverse the order of steps.

Reprasentative picture

Fig. 3.12-5: Thermo switch

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4. Generator Failure

4.1 Overloading the Generator

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

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

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

4.2 Starting Problems

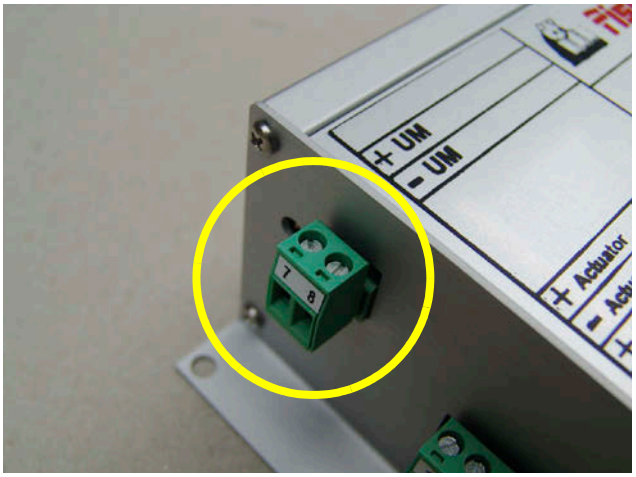
4.2.1 VCS does not work

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

Is the voltage sense connecttion ok? Check polatrity!

Terminal 7+8

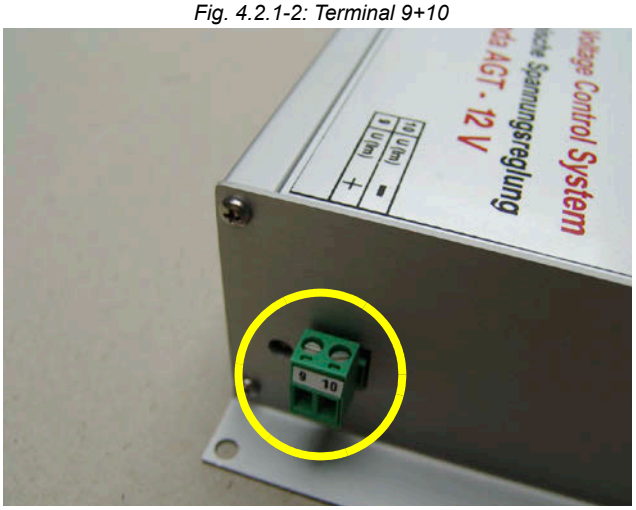
Fig. 4.2.1-1: Terminal 7+8



Is the shunt connection ok? Check polatrity!

Terminal 9+10

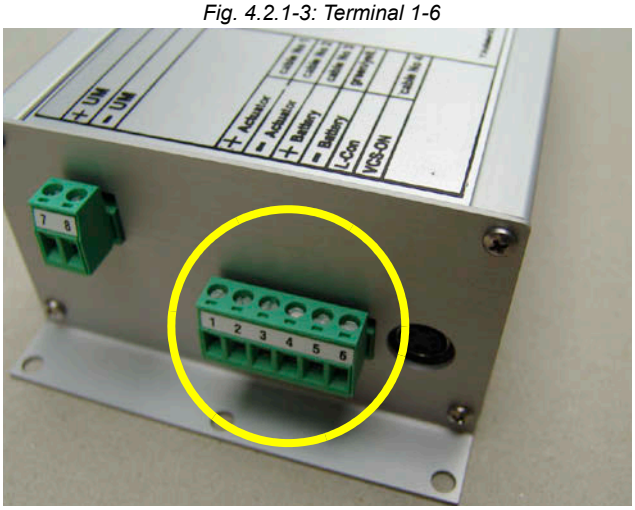
Fig. 4.2.1-2: Terminal 9+10



Is the main supply connection ok? Check polatrity!

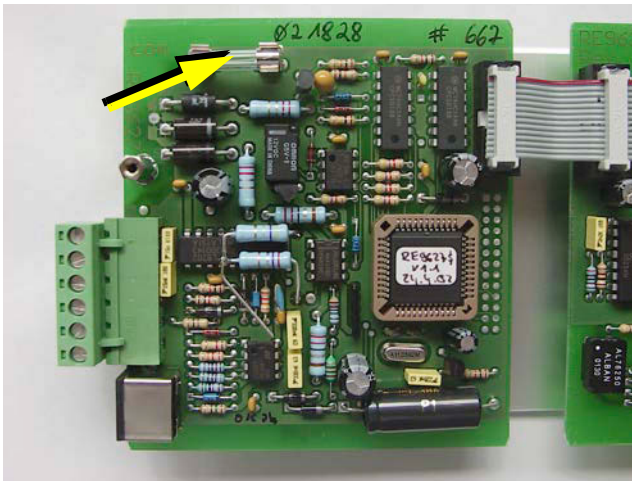
Does DP+ (VCS ON) lie on clamp 6 of the plug with 6 pins?

Fig. 4.2.1-3: Terminal 1-6



Checking the fuse on the VCS printed circuit board.

Fig. 4.2.1-4: Fuse on VCS circuit board



4.2.2 Fuel Solenoid Valve

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

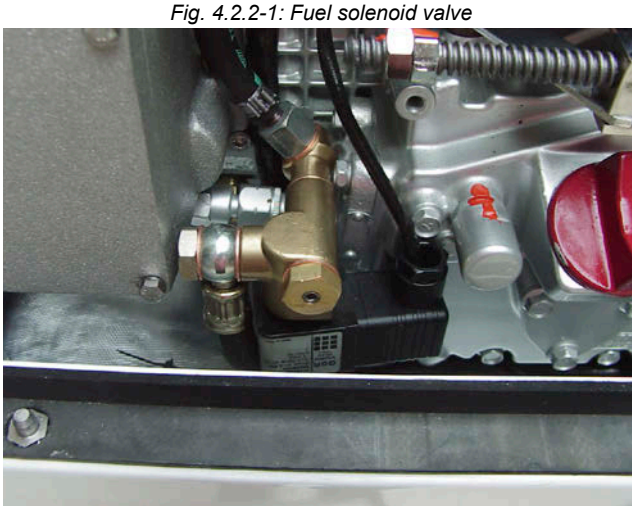
The fuel solenoid valve is located in front of the injection pump. It opens automatically, if the "START"-button is pressed on the remote control panel. The solenoid valve is CLOSED when the generator main power is switched "OFF". For this reason, it requires a few seconds before the motor comes to a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

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

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

Fuel solenoid valve

Fig. 4.2.2-1: Fuel solenoid valve



4.3 Troubleshooting Table

For troubleshooting see section 5.2, “Troubleshooting,” on Page 118.

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5. Appendix

5.1 Technical data

	Panda AGT-DC 4000 PVMV-N
Type	EA 300
Govenour	VCS
Cylinder	1
Bore	75mm
Stroke	70mm
Stroke volume	309cm^3
max. Power (DIN 6270-NB) at 3000rpm	5,1kW
Rated speed 50 Hz	3000rpm
Idle speed running [a]	2900rpm
Valve clearance (engine cold)	0,16 - 0,20mm
Cylinder head torque	58,8 - 63,7Nm
Lubrication oil capacity	1,3l
Fuel consumption [b]	approx. 0,42 - 1,12 l

Table 1: Technical data engine

a. progressive speed by VCS
b. 0,35l/kW electrical power, the randomized values between 30% and 80% of the nominal power

Generator type	Ø Cooling water pipe		Ø Exhaust hose [mm]	Ø Fuel hose	
	Supply [mm]	Return [mm]		Supply [mm]	Return [mm]
Panda PVMV-N AGT 4000	16	20	30	8	8

Table 2: Diameter of conduits

Type	Nominal power [kW]	Continuous power [kW]	Nominal voltage[VDC]	Continuous charging current [A]
AGT 4000-12	4	3,2	12	220
AGT 4000-24	4	3,2	24	110
AGT 4000-24	4	3,2	48	56

Table 3: Technical Data

If differently indicated does not apply: Continuous charging current (A) = continuous power(W) / (rated voltage(VDC) x 1,2)

Wiring for vehicle. single phase, not tin-plated, PVC-isolated.		
nominal wire cross-section [mm²]	**allowed conrinuous current (reference point) [a]**	
	at +30°C [A]	**at +50°C [A]**
1	19	13,5
1,5	24	17,0
2,5	32	22,7
4	42	29,8
6	54	38,3
10	73	51,8
16	98	69,6
25	129	91,6
35	158	112
50	198	140
70	245	174
95	292	207
120	344	244

Table 4: Cable cross-section

a. DIN VDE 0298, part 4.

5.2 Troubleshooting

GENERATOR OUTPUT VOLTAGE TOO LOW If the generator delivers less than 12V (12V-version) and 24V (24V-version) ("undervoltage"), there can be various reasons for this:	
Cause	Solution
Generator is overloaded.	Reduce the electrical load.
Motor is not reaching the rated rpm.	Refer motor faults (following pages).
Actuator is not in maximum position.	Check actuator resp. renew.
VCS-voltage controler defective or wrong adjusted.	Check resp. renew.

GENERATOR VOLTAGE TOO HIGH The following reasons may be the cause, if the generator delivers more than 12V (12V-version) and 24V (24V-version) ("overvoltage"):	
Cause	Solution
The engine is running at the wrong speed.	Check the speed of the motor with a rev or frequency counter, set the correct speed.
VCS-voltage controler defective or wrong adjusted.	Check resp. renew.
Actuator defective.	Check resp. renew.

GENERATOR VOLTAGE FLUCTUATES	
Cause	Solution
Fault or defect on the consumer side. A motor fault.	Check if the power requirement of the consumer fluctuates. See "Motor running irregularly".

MOTOR DOES NOT TURN OVER WHEN STARTING	
Cause	Solution
Battery main switch is switched off.	Check the position of the battery main switch, if necessary switch on..
Battery voltage not sufficient.	Check that connection is firm and whether corrosion has occurred..
Starting current fault.	The voltage of full batteries fall to a maximum of 11V (22V). The wiring is severed if the voltage does not drop. The battery is discharged if the voltage drops further.

MOTOR TURNS OVER BUT DOES NOT START	
Cause	Solution
Fuel solenoid valve not opening.	Check wire connections and circuitry to solenoid valve. (ref. DC wiring diagram: Relay K2, Fuse)
Fuel pump does not operate.	Check fuel-filter and pump: clean if necessary.
Lack of fuel.	Check fuel supply.
Glow-plugs not working correctly.	Check glow plugs and heating time.
Too much air in fuel lines.	Test fuel system for leakage. Ventilate air from fuel system (refer to section "Air-bleeding of the Fuel System").
Fuel filter blocked.	Replace fuel filter.

Low compression pressure.	See engine-manual.

MOTOR DOES NOT TURN OVER AT THE NORMAL SPEED DURING THE STARTING PROCESS	
Cause	Solution
Starter battery voltage insufficient.	Check battery.
Damaged bearing(s) piston (seized).	Repairs need to be carried out by engine-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.

MOTOR RUNS IRREGULARLY	
Cause	Solution
Faulty centrifugal injector governor.	Have the centrifugal governor inspected by a engine-service technician.
Too much air in fuel lines.	Ventilate air from fuel system.

DROP IN THE SPEED OF THE MOTOR	
Cause	Solution
Too much oil.	Drain oil.
Lack of fuel.	Check fuel supply system: - fuel filter, renew if necessary - check fuel pump - check fuel lines (ventilate 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.
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 engine-service.

MOTOR SWITCHES ITSELF OFF	
Cause	Solution
Fuel solenoid valve or throttle shut solenoid is not switching off.	Check wire connections to solenoid. Check valve functions as in the "Fuel Solenoid Valve". Replace if necessary.

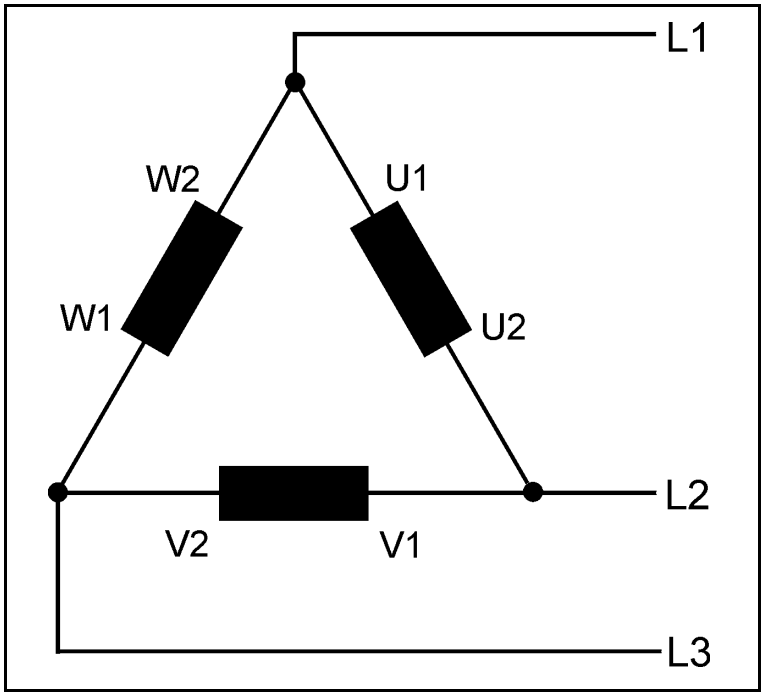
MOTOR STOPS BY ITSELF	
Cause	Solution
Lack of fuel.	Check fuel supply system.
Excess heat in cooling system (thermo switch tripped)-lack of cooling water. Is indicated on the remote control panel.	Check cooling water system flow: water pump, coolant level.
Lack of oil (oil pressure sensor tripped).	Check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

SOOTY, BLACK EXHAUST	
Cause	Solution
Generator is overloaded.	Check electrical load and switch off unnecessary consumers.
Insufficient intake air.	Check intake air filter; clean if necessary.
Fuel injector nozzles faulty.	Replace injector nozzles.
Valve clearance incorrect.	Readjust valve clearance to correct value (refer to 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 engine-service.
Low compression pressure.	See engine-manual.

GENERATOR MUST BE SHUT OFF IMMEDIATELY IF:	
Cause	Solution
• motor rpm suddenly rises or drops • unusual noise comes from genset • exhaust colour suddenly becomes dark • motor overheats • oil pressure drops, oil light suddenly flashes	Refer to respective section of manual and if necessary, have repaired by engine-service, or Fischer Panda representative.

TROUBLESHOOTING VCS SYSTEM	
Cause	Solution
Actuator does not move.	Check voltage supply and wire connections to actuator. Motor connected? Check connection to VCS?
Actuator sets throttle too high or too low.	Check that the wires to the actuator are connected properly (±). Check connection to VCS.
If the VCS electronics are faulty, the generator can still run by over-riding the system. To override the VCS, disconnect the plug and jumper the contacts.	

5.3 Types of coil



HP3 delta connection

Fig. 5.3-1: HP3 delts connection

HP3 star connection

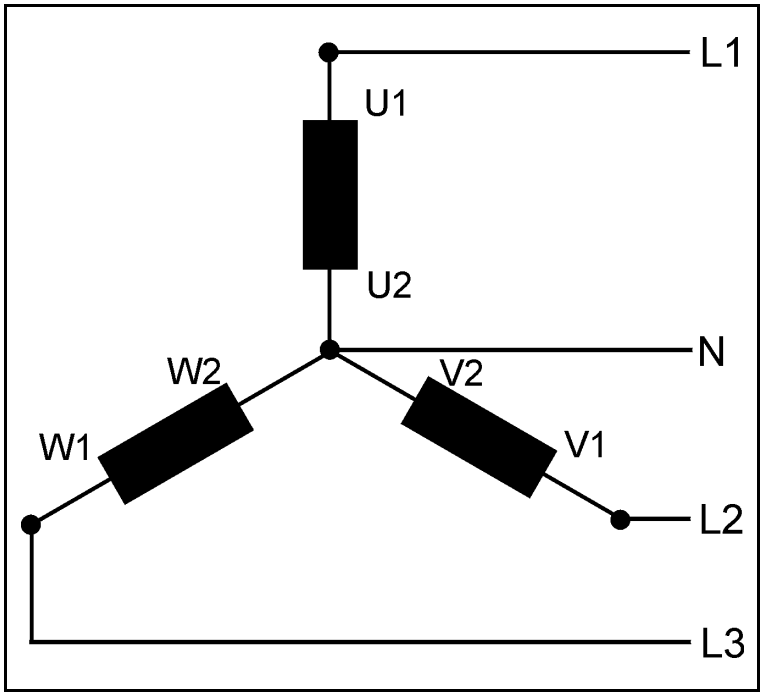


Fig. 5.3-2: HP3 star connection

5.4 Engine oil

5.4.1 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. 5.4.1-1: 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

5.5 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.

5.6 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

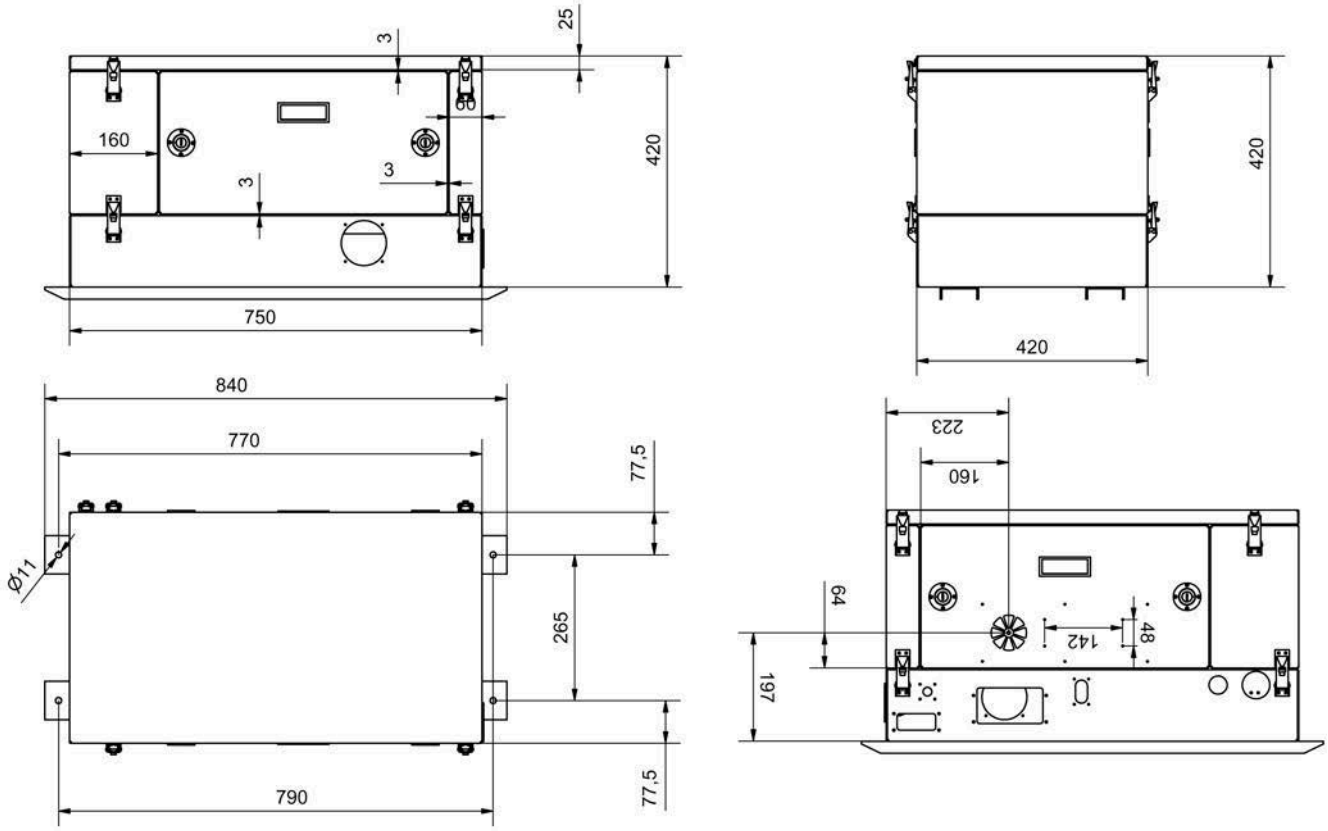
Chemical and physical properties		
Reserve alkalinity of 10ml	ASTM D 1121	13 – 15 ml HCl 01 mol/l
Density, 20 °C	DIN 51 757 procedure 4	1,121 – 1,123 g/cm^3
Water content	DIN 51 777 part 1	max. 3,5 %
pH-value undiluted		7,1 – 7,3

5.6.1 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

5.7 Measurments

Fig. 5.7-1: Mearurements



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

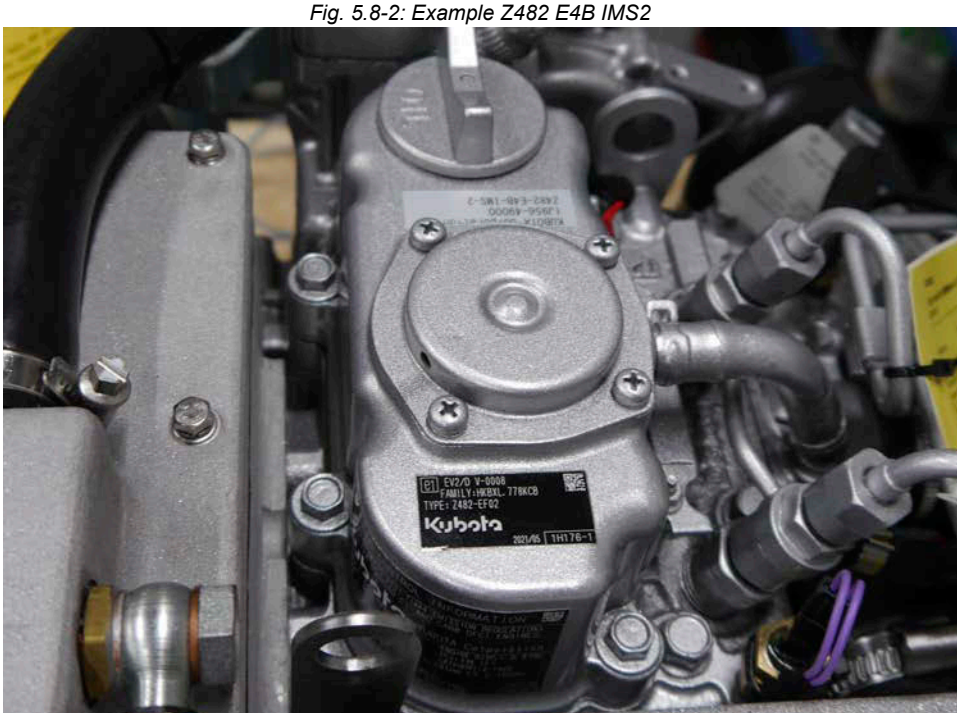
The following CO_2 balance derived from the emission measuring cycle is applicable, with regard to the engine, to generators that are approved in accordance with 2016/1628 EC:

Fig. 5.8-1: 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. 5.8-2: Example Z482 E4B IMS2



6. Control panel for AGT 2500/4000 V6

Fischer Panda	**Art Nr.**	**21.02.02.014P**
Fischer Panda	**Bez.**	**Remote control panel AGT 2500/4000** Typ RE9513 Rev6

	Document	**Hardware**	**Software**
Actual:	R07	Rev.6	----------
Replace:	R06.1	Rev.6	

Fig. 6.0-1: RE9513 Rev.6

6.1 Safety instructions

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

Danger for life! - The generator can be equipped with a automatic start device. This means the generator can be started by an external signal.

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

Warning!: Automatic start

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

Attention!: disconnect all load

6.2 Connection of the remote control panel

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

Connection regarding to the generator wiring plan

6.3 Remote control panel for AGT-Generator for Battery systems 12/24/36/48 V

Fig. 6.3-1: Remote control panel front side

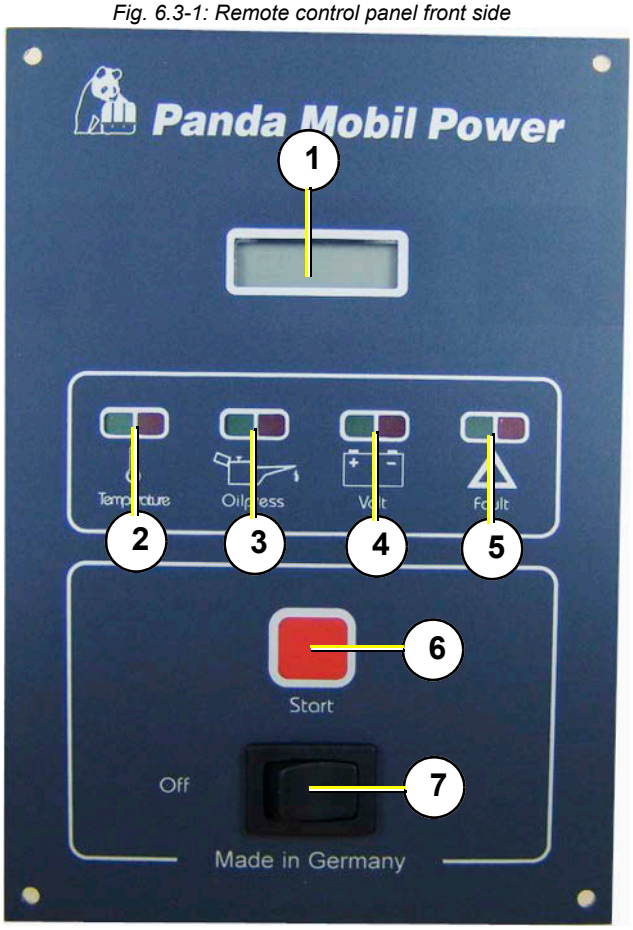
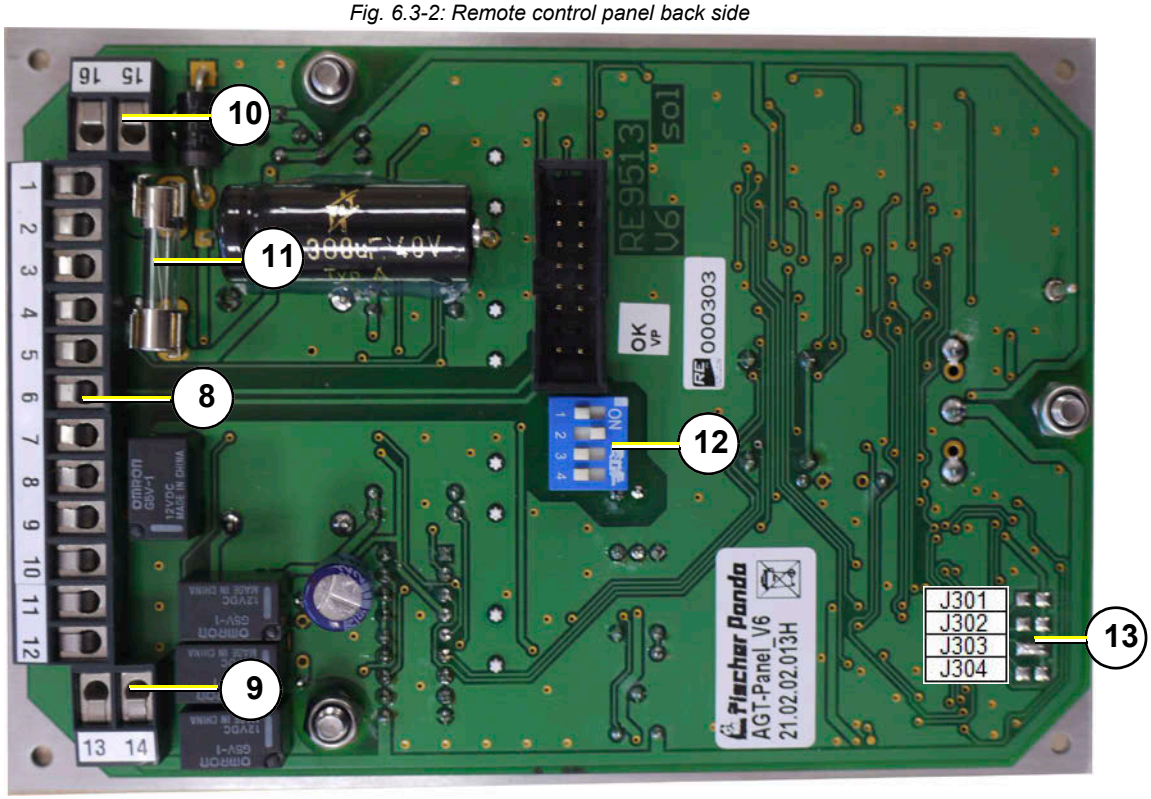


Fig. 6.3-2: Remote control panel back side



1. Display operating hours
2. Control light - temperature
3. Control light - oil pressure
4. Control light - charge control
5. Control light - operating status

- red glowing - Generator is in „Stand-by“-mode
- red blinking - Generator is started manually
- red blinking for more than 20 seconds - Generator did not start when activated manually
- green blinking - Generator runs in manual mode
- green glowing - Generator runs in automatic mode

6. Switch for Manual Start:

- Switch pressure in sleeping mode: Generator is started and the panel switches to manual mode, i.e. automatic cut off requirements are not carried out.
- Switch pressure in manual mode: If the generator starts automatically, the generator continues to run and the panel switches to automatic mode, i.e. when the last automatic start cuts out, the generator stops and the panel goes into sleeping mode; If the generator is not started automatically, the generator stops and the panel goes into sleeping mode.
- Switch pressure in automatic mode: The generator continues to run and the panel switches to manual mode.

7. Main switch:

- If it is already in automatic mode when it is switches on, the generator starts and the panel switches to automatic mode; If it is not in automatic mode, the panel switches to sleeping mode; If the generator is switched off, the generator will stop in every case.

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.

8. Main terminal clamp

allocation:

Terminal 1: Battery plus (+)

Terminal 2: Battery minus (-)

Terminal 3: Input temperature failure

Terminal 4: Input charge control

Terminal 5: Input oil pressure failure

Terminal 6: Input generator voltage 1

Terminal 7: Input generator voltage 2

Terminal 8: Output pre-glow

Terminal 9: Output fuel pump

Terminal 10: Output starter motor

Terminal 11: Output VCS-ON (voltage control for VCS)

Terminal 12: Output operating voltage, maximum permissible load: 0,2A

9. Terminal clamp for battery monitor - allocation:

Terminal 13: Battery minus (-)

Terminal 14: Input for battery monitor

The potential-free contact of a battery monitor can be connected to these two terminals, the starting sequence occurs automatically if the contact closes.

10. Terminal clamp for external automatic start - allocation:

Terminal *15: Battery minus (-)*

Terminal *16: Input for external start demand*

The potential-free contact can be connected to these two terminal. The starting sequence occurs automatically if the contact closes.

11. Fuse 1,6A slow to blow

12. Switch for the starter motor cut-off voltage:

if the generator out reach the voltage, the generator is startet and the starter motor switch off

Switch 1: 12 V - generator

Switch 2: 24 V - generator

Switch 3: 36 V - generator

Switch 4: 48 V - generator

Only one switch may remain switched „ON“, all others must be switched „OFF“, otherwise the complete generator could break down! An external voltage-cut-off-switch is neccessary for voltages exceeding 48 Volts.

Attention!

13. Soldering bridge for choice of pre-glow time

X= Soldering bridge closed

Fig. 6.3-3: Preglowtimet

Jumper	Preglowtime 5 s	Preglowtime 1 s	Preglowtime 20 s	Preglowtime40 s
J301		X		X
J302			X	X

Never change the set up of the Soldering Bridge J303 and J304. Changes may destroy the generator

Attention!

The panel must be mounted, that the voltage carrying points can not touched. This is also the case during testing.

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.

6.4 Engine monitoring

1. Operating and starting the Generator will works with the Control Panel. This implementing the Main Switch (7) is effected for. By switching 'On' the Main Switch the Generator will be at first in operaton modus. After pressing the button 'Start' (7) the Generator (Motor) will be aglow and starting. Pay attention, the button (7) will only be hold down for a second to ignitiate the start procedure.
2. Therefore with the panel it is possible, monitoring the operation modus. Hereto are beeing placed four diodes (LED), which are connected as a pair each other, so they have the possibility to light up in green or red.

   These are:

   (3) for exhaust, cooling water temperature

   (4) Control unit meter - oil pressure

   (5) Control unit meter - operating status

   (6) Control unit meter - charge control

   If (2), (3) or (4) is been illuminated red, this lights will indicate the precise cause. Illuminate constant green the genset is in operation modus.

   In the starting sequence, (2) is been illuminte green, (3, 4, 5) red, is there no fault all diodes becomes green or green flashing when the generator runs.

If the external battery monitor is inbuilt to monitoring a battery-group, it will be advisable to switch it with an accessory (On/Off) switch. This battery monitor ensures that he will be activ while the voltage of the batteries is on the pre-set level. Therefore there is a time delay available the genset will run until he reached the upper level. More information see battery monitor.

6.5 Operation instruction

6.5.1 Daily routine checks before starting the Generator

1. Check engine oil level and top up to MAX.

   LOW OIL PRESSURE WARNING LIGHT!

   The generator switches off automatically in the case of insufficient oil-pressure. Do not run the generator with the oil at the lowest level in the crankcase. (A smaller volume of oil will become contaminated considerably quicker than a larger volume and there is the possibility that small air bubbles will get in the oil.) Therefore daily oil-checks are required. The oil-level should always be refilled to MAX. Check oil level prior to starting motor or at least 5 minutes after the motor has stopped.

   Engine oil should have properties of API classification CF grade or higher. Change the type of engine oil according to the ambient temperature. See corresponding section in the manual. For Oil-Quantities see corresponding section in the manual.
2. Check engine cooling system: coolant level in radiator, all hoses and hose connections for leaks or deterioration.
3. Check thermal switches and all cables and terminal connections

   a. Thermo-switch pre-silencer

   b. Thermo-switch engine

   c. Thermo-switch exhaust

   d. Oil pressure switch
4. Check tightness of all retaining and connection bolts on the engine & generator and generator base mount bolts.

5. Switch main battery switch "ON" (if installed).
6. Open fuel inlet valve (if installed).

6.5.2 Starting - Preliminary remarks

Pre-heating the diesel motor

The motor can be started for temperatures up to minus 20 °C, as long as running conditions are suitable. The fuel must be suitable for such conditions, as conventional diesel fuel can produce a paraffin coating at temperatures lower than minus 8°C. so blocking all filters and pipes. It is normal in Europe to use an additive, obtainable from gas stations to ensure use at temperatures as low as minus 15 °C. If a generator is to be used for temperatures below minus 8°C, then it must be ensured the fuel is suitable for winter. By use of extra additive, the fuel can also be used at lower temperatures. The appropriate regulations can be obtained from the fuel suppliers. The mineral oil trade have stocks of fuel, which are suitable for use for temperatures below minus 20 °C.

Starter Battery

Adequate batteries are installed for extreme winter conditions. Unless the generator is being run frequently for extended (over 1 hour) periods, it is recommended that the starter battery is regularly charged by a suitable external battery-charging device, at least every 2 months. A correctly charged battery is essential for low temperature starts.

Motor Oil Quality during extreme Winter Conditions

Motor oil of the correct grade for the temperatures anticipated should be used. There is advice elsewhere in this handbook on the grades which are suitable for various environmental conditions.

6.5.3 Overloading of engine during longer operation

Please ensure that the genset is not overloaded. Overloading occurs when the electrical load (demand) induces a load torque in the generator which is higher than that which the diesel drive motor can provide. Overloading causes the engine to run rough, burn oil, creates excessive exhaust (environmentally unfriendly) and even to stall. Extra caution should be practised with multi-power units (single and 3-phase current generation) to avoid overloading the diesel drive engine.

The generator should only be loaded at the peak rated power for short periods only! A high peak current is required to start many electrical devices, especially electric motors and compressors (from a still stand state).

The height of the rated output (P) can taken from the identification plate attached on the engine.

In order to guarantee a long life span, the continuous load should not exceed 80 % of the nominal load. By continuous output we understand the continuous operation of the generator over many hours. It is harmless for the engine to supply for 2-3 hours the full rated output.

The total conception of the Panda generator guarantees that the continuous load operation does not release superelevated temperatures of the engine also with extreme conditions. It is to be considered that the exhaust gas values in the full load operation become more unfavorable (soot formation).

6.5.4 Starting the Generator (in this respect, the battery bank is no load)

1. If necessary, open the fuel valve.
2. If necessary, close the main battery switch.
3. Check if all the load have been switched off.

   The load is switched off, before the generator is switched off. The generator is not to be started with load connected. If necessary, the main switch or fuse should be switched off or the load should be individually switched off.
4. Press „ON“ button.

   If an automatic start is requested during the switching on process, the generator is started and the panel switches to automatic mode; if there is no automatic start request, the panel switches to delay mode.

5. Press „START“ button.

   Press the "START"-button for a short period. The generator is started automatically. As soon as the motor turns over, the starter switches off automatically. It must be monitored every time it is started. The generator must be immediately switched off if the starter is still audible after the engine revs up.

   The "START"-button fulfills several functions in the different operation modes of the panel:

   If the panel is in **delay mode,** the generator is started and the panel switches to manual mode, that means the automatic stop functions are not carried out. If the "AGT"-generator is started manually, it must be stoped manually, too. In this case there is **no** automatic stop!

   In the **manual mode**, the generator continues to run and the panel switches to automatic mode, that means if the last automatic start programm is dispensed with, the generator is stopped and the panel switches to delay mode; if there is no automatic start programm, the generator is stopped and the panel switches to delay mode.

6. Check coolant flow.

   Immediately after starting it must be checked whether sufficient coolant flows out at the exhaust.

7. Check with voltmeter if electrical voltage is in the range of tolerance.
8. Switch on load.

If the generator engine does not start immediately and further start attempts are necessary, then the sea valve MUST be closed (i.e. for ventilating the fuel lines etc.) The cooling water impeller pump turns automatically and draws cooling water as long as the motor is turning. If the diesel motor is running, the cooling water is blown out by the exhaust system gases. The cooling water cannot be pressed through the exhaust as long as the diesel motor does not run at sufficient speed. This leads to severe motor damage.

ATTENTION: If there is difficulty in starting - close the seacock (Panda Marine Generators only)

Open the sea valve as soon as the generator is started.

6.5.5 Stopping the Generator (in this respect, the battery bank is no load)

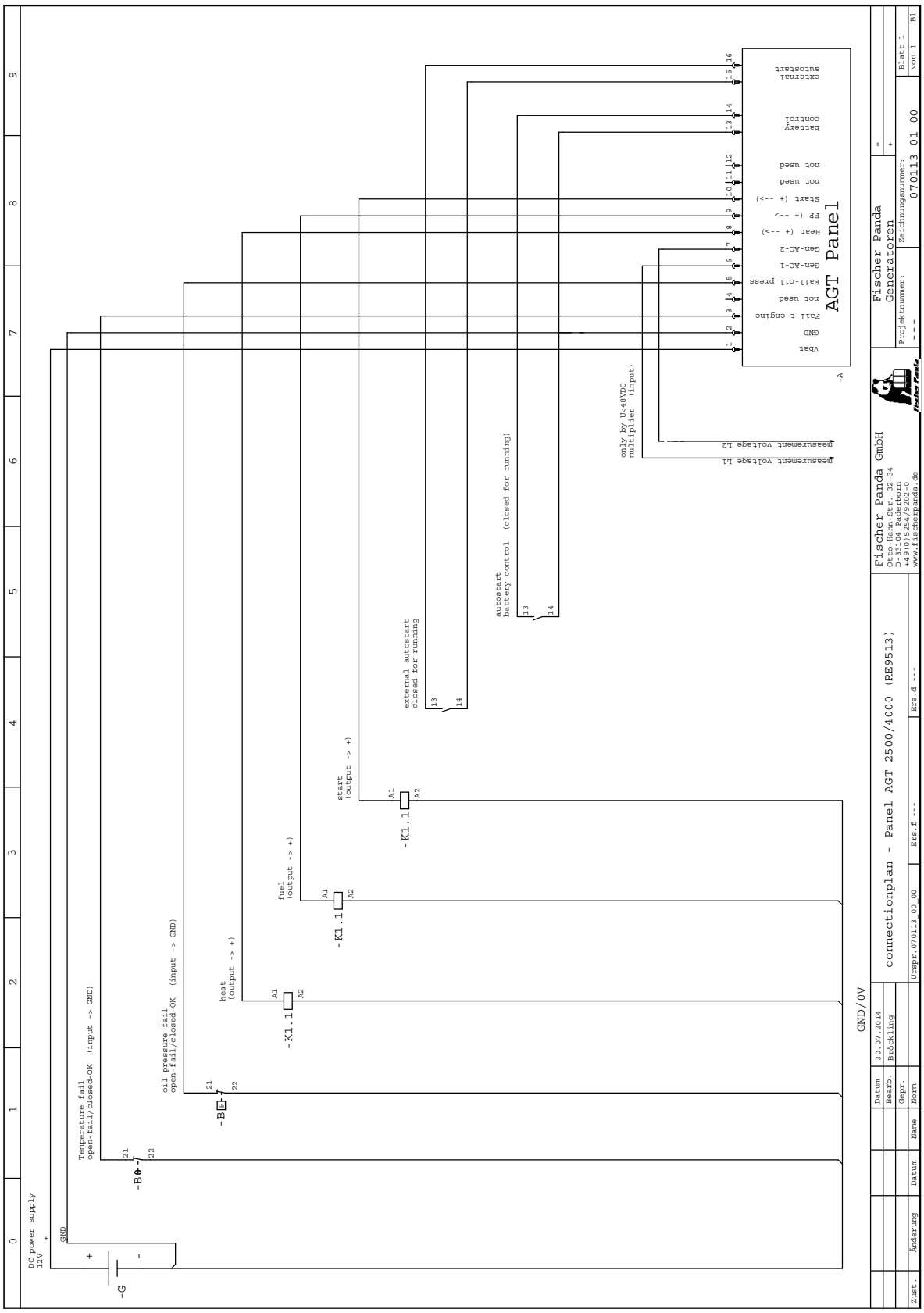
1. Switch off load.
2. If the running load has been higher than 70 % of the nominal load, then generator temperature should be stabilised by running the generator for at least 5 minutes after switching off the load.

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

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

6.5.6 Wiring diagram

Fig. 6.5.6-1: Wiring diagram



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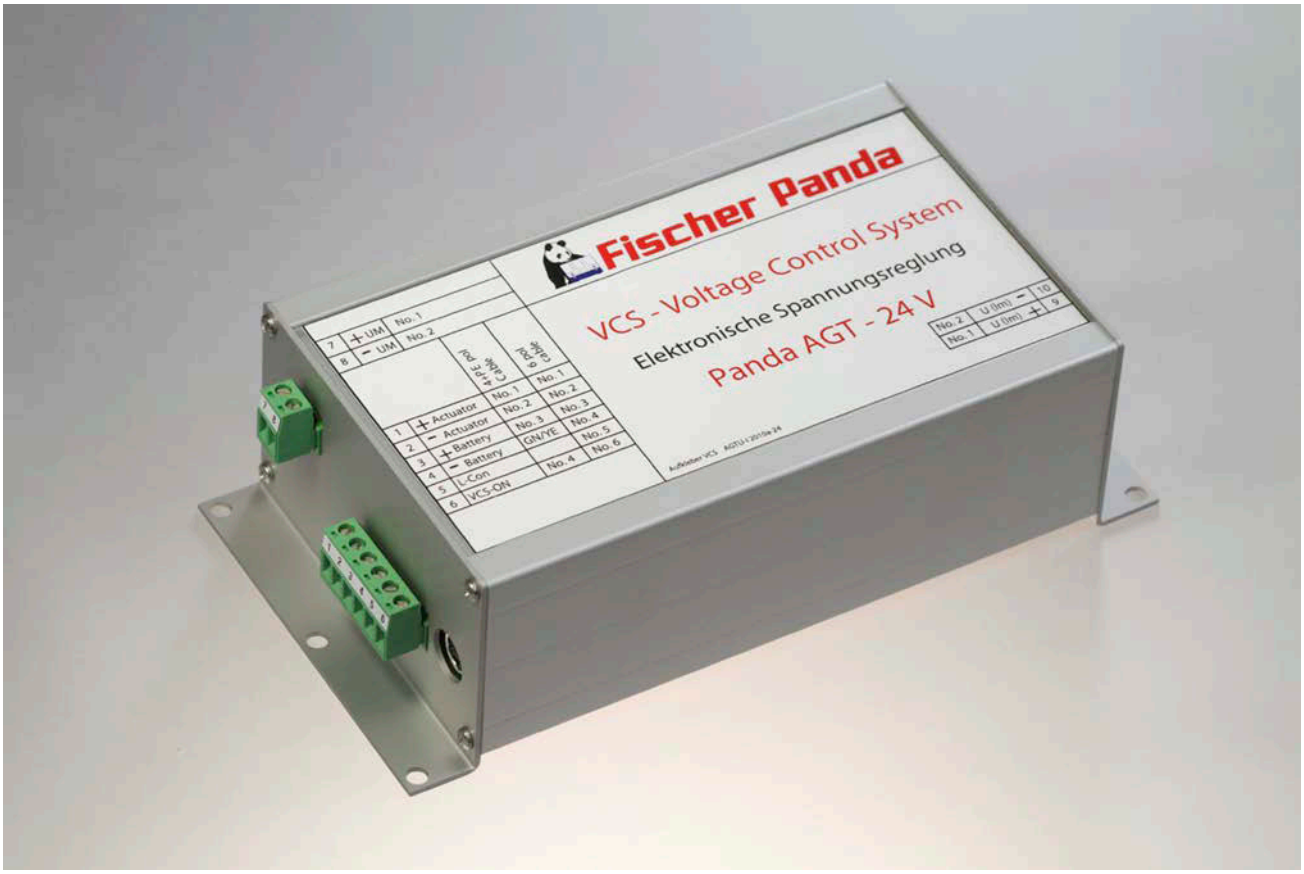
7. VCS-AGT-U/I

Fischer Panda **Art No.**	see table
Fischer Panda **Desc.**	see table

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

Fig. 7.0-1: VCS AGT U/I

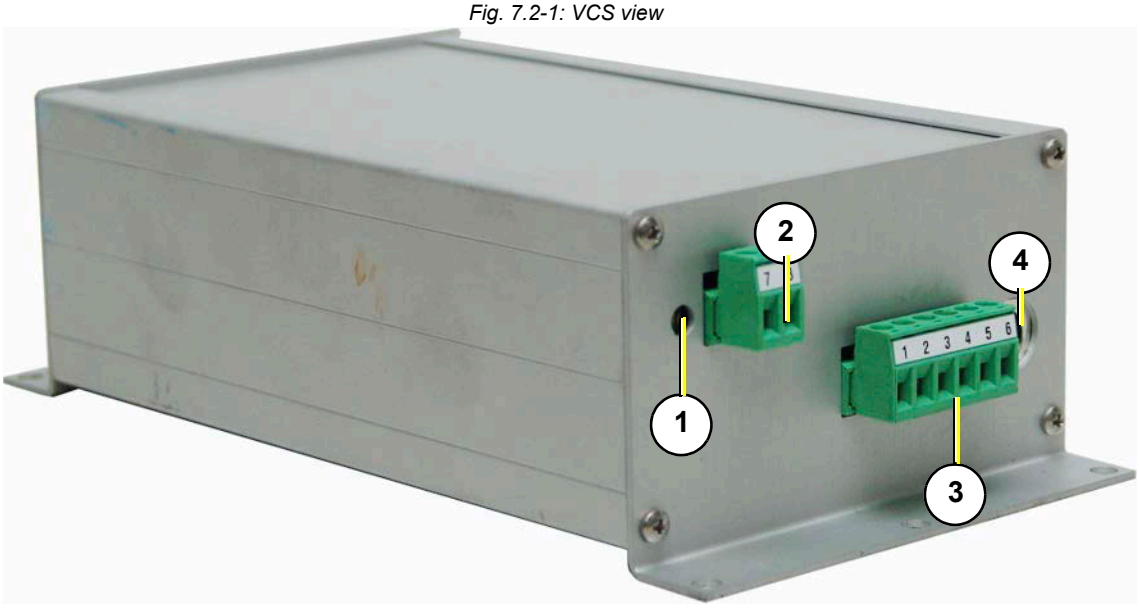


7.1 Delivery versions

Art. No.	Art. type
0021245	VCS-AGT-U/I 12 V= @60 mV
0021247	VCS-AGT-U/I 24 V= @60 mV
0005910	VCS-AGT-U/I 36 V= @60 mV
0021249	VCS-AGT-U/I 48 V= @60 mV
0000505	VCS-AGT-U/I 72 V= @60 mV
0005911	VCS-AGT-U/I 80 V= @60 mV
0005887	VCS-AGT-U/I 96 V= @60 mV
0021252	VCS-AGT-U/I 120 V= @60 mV
0000506	VCS-AGT-U/I 144 V= @60 mV
auf Anfrage / on request	145 - 350 V

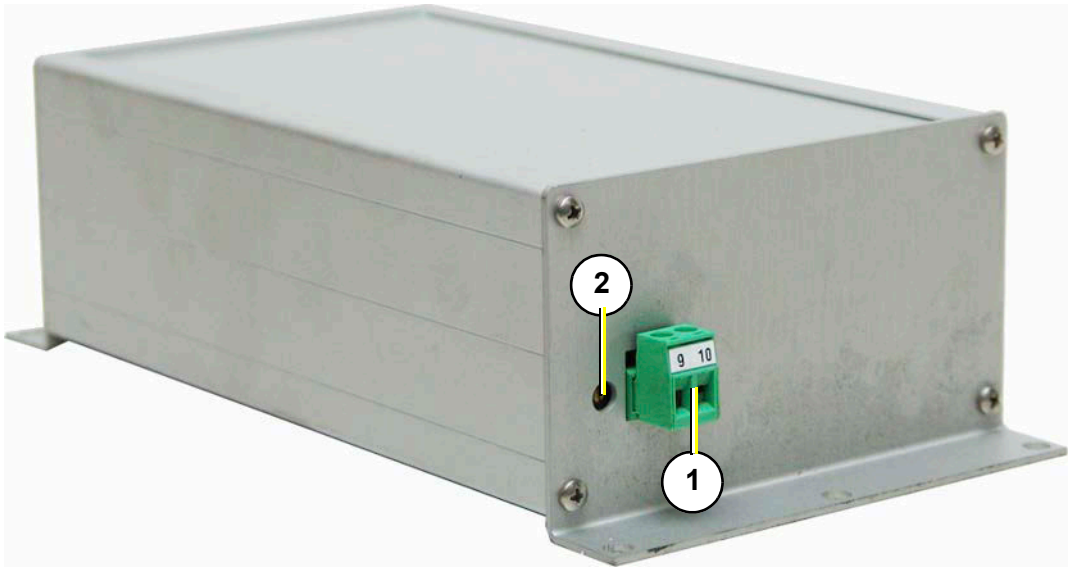
7.2 Voltage control system

Fig. 7.2-1: VCS view



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

Fig. 7.2-2: Electronic Voltage Control



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

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

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

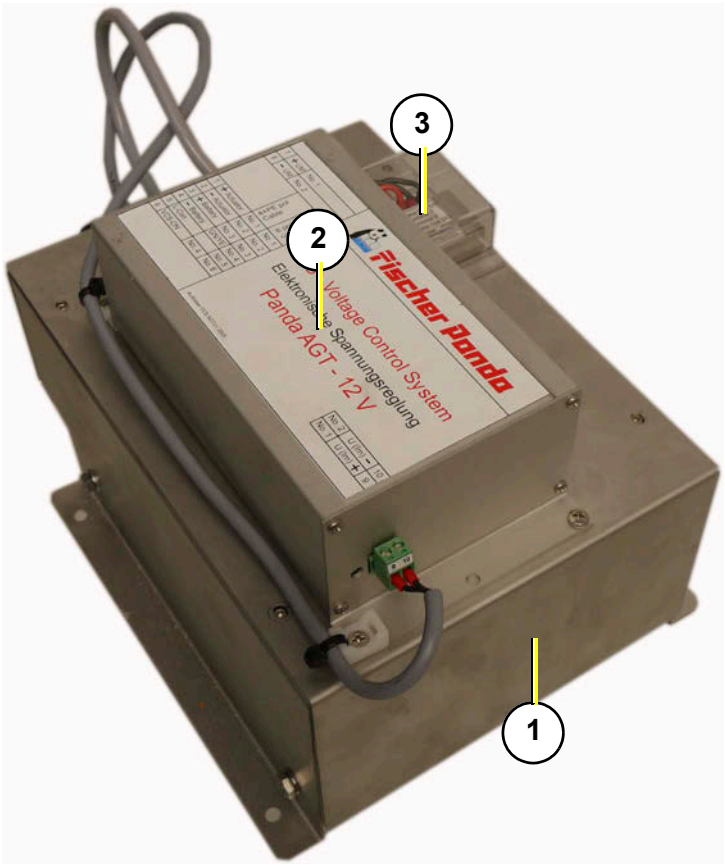
The potentiometer next to clamp 7/8 is needed for adjustment of the measurement voltage and should be done by an service technician only.

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

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

NOTE! Systems with more than 144 V DC

Fig. 7.2-3: Electronic Voltage Control



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

7.3 General working of the VCS

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

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

7.4 Personal requirements

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

7.4.1 Safety References concerning current

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

NOTE! Broken cable in the measurement line

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

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

Warning! Short circuit in the measurement line

A shielded cable is needed for the measurement voltage.

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

NOTE! Cable for the measuring line

Note the safety instruction in the generator manual!

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

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

Requirements:

Checking the actuator

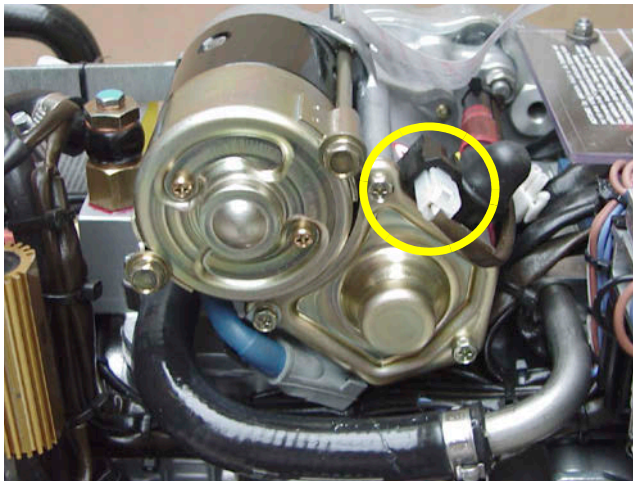
Sample picture

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

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

Check the right working of the actuator.

Fig. 7.4.2-1: Clamp 50



7.4.3 Function of the VCS

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

7.4.4 Checking the VCS voltage regulation

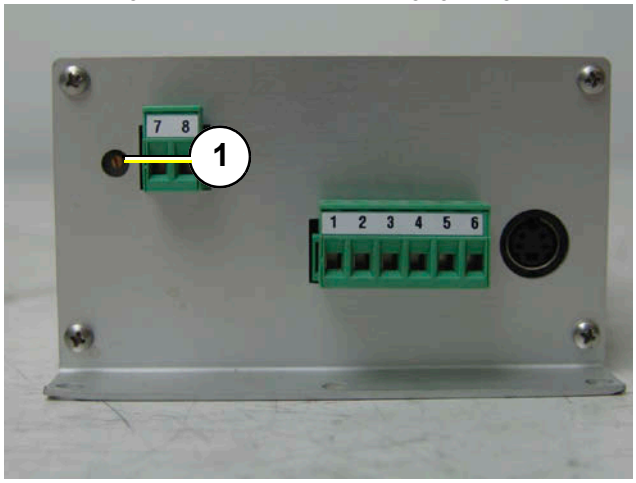
Connect clamp 50 to the starter motor again and start the generator. Control the battery voltage and check if the generator regulates the voltage. Check, if the generator regulates the voltage exactly by switching on and off load.

Readout potentiometer for the charging voltage

1. Potentiometer for setting the charging voltage

Turn to the right for increasing the charging voltage.

Fig. 7.4.4-1: Potentiometer charging voltage



7.4.5 Checking the current limiting

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

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

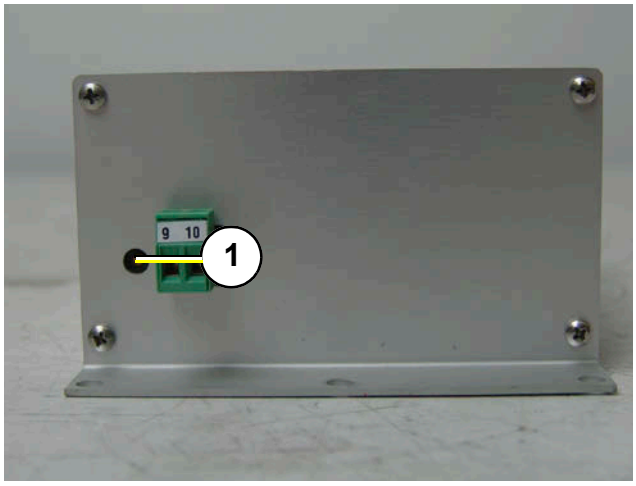
Readout potentiometer for the charging voltage

1. Potentiometer for setting the charging voltage

Turn to the right for increasing the charging voltage.

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

Fig. 7.4.5-1: Potentiometer charging current



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