FischerPanda

Manual
Panda AGT-DC 6000-8000 PVMV-N

12-48V
Super silent technology

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1.1 Download

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

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

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

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Inhalt / Contens

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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-DC 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!

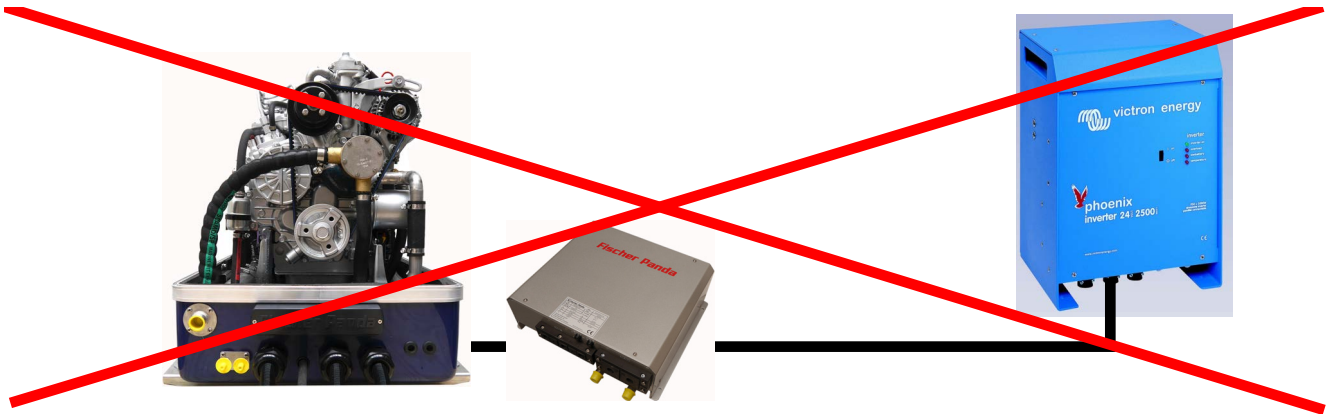
WARNING: Risk of electric shock upon contact

2.2 Sample system AGT-DC generator

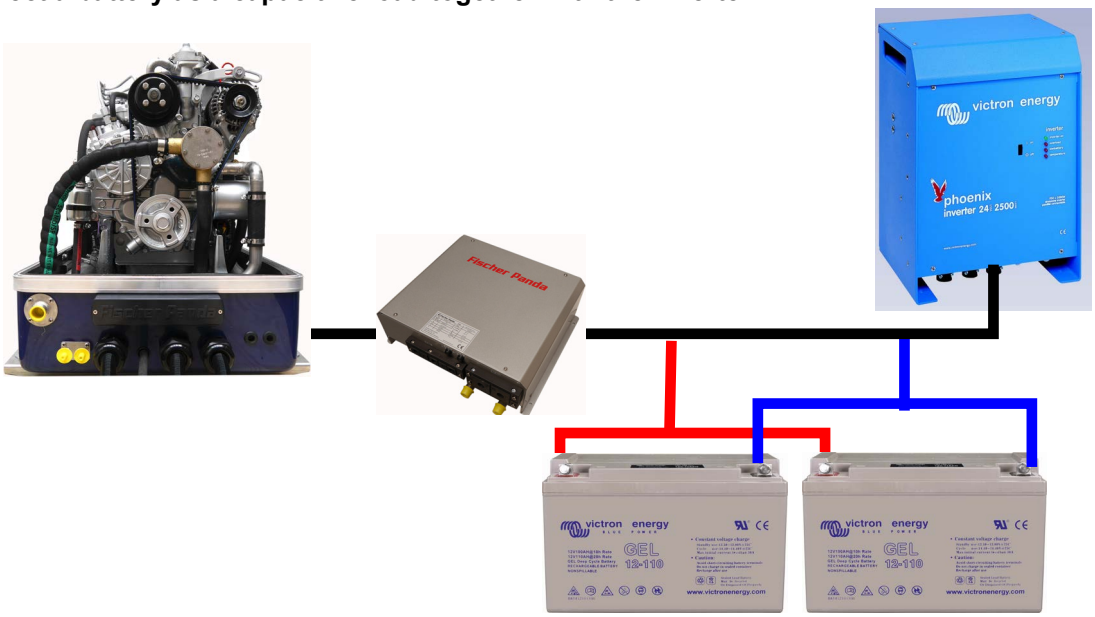
The AGT-DC generator must not be directly connected to an inverter (without the batteries)!

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

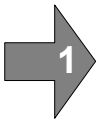
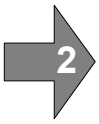
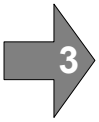
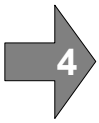
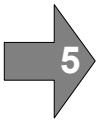
All components in the vicinity of live parts shall be protected against fire.

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.

3. In case of Emergency First Aid

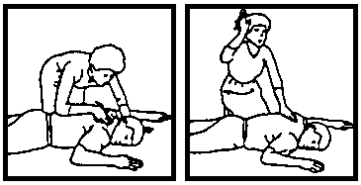
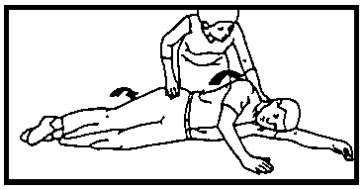
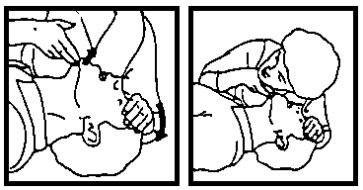
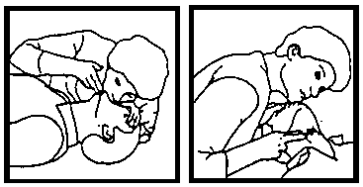


	First Aid in case of accidents by electrical shocks 5 Safety steps to follow if someone is the victim of electrical shock	
	Do not touch the injured person while the generator is running.	
	Switch off the generator immediately.	
	If you cannot switch off the generator, pull, push, or lift the person 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.	

3.3 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.

4. Basics

4.1 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.

4.2 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.

4.2.1 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.

4.2.2 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.

4.2.3 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.

4.3 Scope of delivery

The Fischer Panda PMS generator system contains following components:

4.3.1 PM generator

Fischer Panda Generator

representative picture

Fig. 4.3-1: Fischer Panda Generator

Remote control panel

representative picture

Fig. 4.3-2: Remote control panel

VCS (Voltage control system) for the voltage control

Fig. 4.3-3: 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. 4.3.1-4: 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.

4.4 Panda transport box

4.4.1 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

4.4.2 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

4.5 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. 4.5-1: Sound insulation capsule, side part

Closure locked

representative picture

Fig. 4.5-2: Closure locked

Closure open

representative picture

Fig. 4.5-3: Closure open

4.5.1 Opening the GFK sound insulation capsule

GFK sound insulation capsule with lash closures

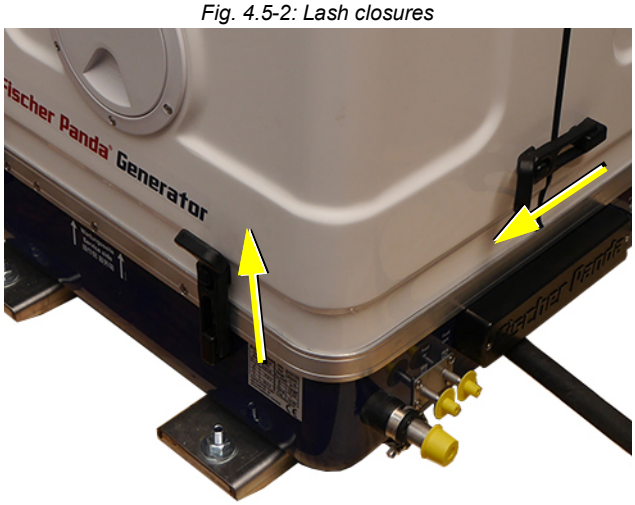
representative picture

Fig. 4.5-1: 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. 4.5-2: Lash closures



4.6 Transport and loading/unloading

4.6.1 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.

4.6.2 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. 4.6.2-1: Lifting yoke (example)

4.7 Special service instructions and measures for extended machine downtimes and decommissioning

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

Note:

Fischer Panda takes no responsibility for damage through wrong decommissioning and storage.

Downtimes are categorised in the following groups:

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

4.7.1 Instructions for the starter battery for extended downtimes

Starter batteries

Note: Information starter battery

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

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

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

Modern starter batteries are typically maintenance-free.

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

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

General limits for lead-acid batteries:

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

1.95 V / cell corresponds with empty battery - recharge.

For a 12 V battery, the following applies:

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

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

For a 24 V battery, the following applies:

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

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

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

Fischer Panda recommends:

Note: Starter battery recommendation

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

- Regularly check contacts for corrosion.

4.7.2 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).

4.7.3 Measures for medium term downtimes / hibernation

Medium term downtimes (3 to 6 months)

4.7.3.1 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!**

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

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

- Check cooling water anti-freeze level and cooling water level and refill as necessary.
- Drain engine oil. Replace oil filter and engine oil as per the specification.
- Remove preservatives from the engine with petroleum spirit.
- Degrease V-belt disks and mount V-belt according to instructions. Check V-belt tension!
- If applicable, open turbocharger oil pressure line and fill clean engine oil into channel.
- Hold engine stop lever in zero delivery position and crank engine manually several times.
- Clean air filter housing with petroleum spirit, check air filter and replace if necessary.
- Remove covers from exhaust aperture and intake apertures.
- Connect battery. Close battery main switch.
- Hold stop lever on generator motor in neutral position and crank starter for approx. 10 seconds. Then, pause for 10 seconds. Repeat this procedure 2 times.
- Perform visual check of the generator similar to initial commissioning and start up generator.

4.7.4 Measures for extended downtimes / decommissioning

Downtimes (more than 6 months)

4.7.4.1 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!

4.7.4.2 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 006000 PVMV-N 24 V G4
Part No.	0005437
Year of manufacture	2021-
Function description	The Fischer Panda diesel generator is intended solely for use as a permanently-installed power generator in (vehicles, trailers and mobile containers) (inland waterway vessels) (seagoing vessels).

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

:

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

This machine complies with the following standards and conventions:

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

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

The person authorized to compile the technical file

Christian Riemer
Fischer Panda GmbH
Otto-Hahn-Straße 40
33104 Paderborn

Paderborn, _____08.04.2021_____	
Place, date	Dipl.-Ing. Stephan Backes (Managing Director)
Paderborn, _____08.04.2021_____	
Place, date	Boris Schönberger (Quality Manager)

6. The Panda Generator

6.1 Type plate at the Generator

Fig. 6.1-1: Type plate

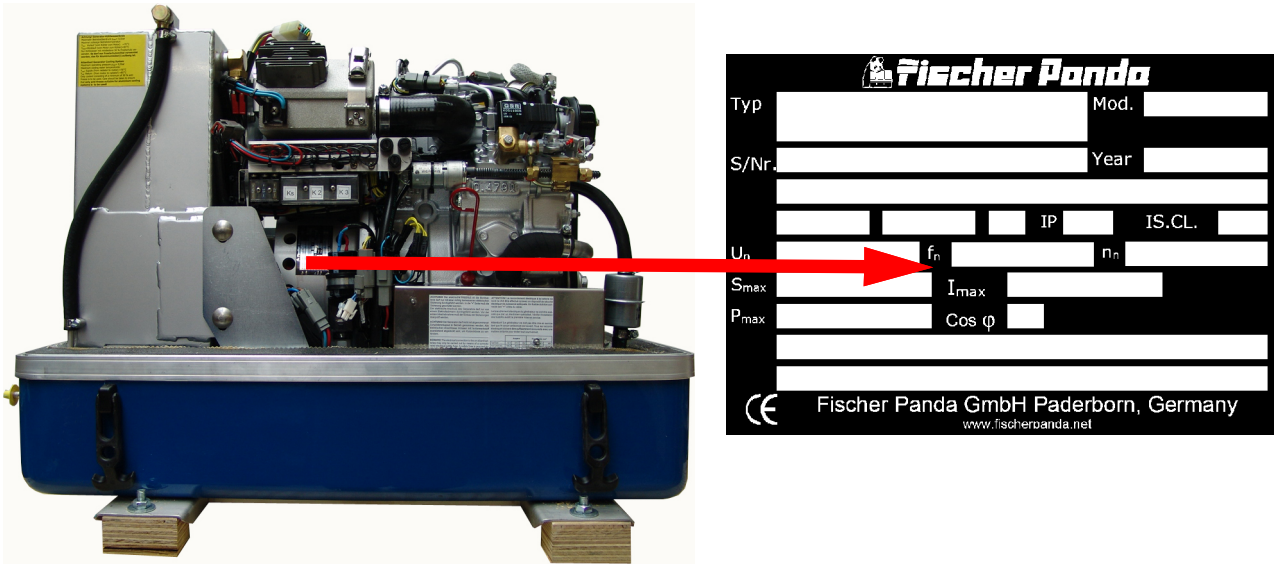
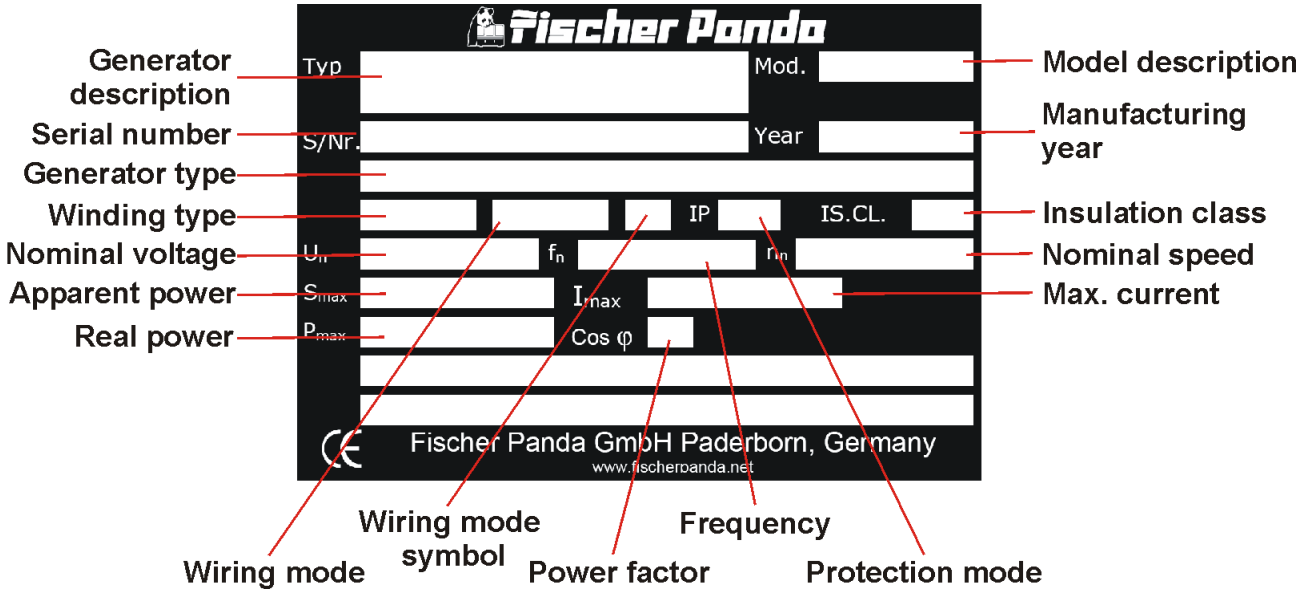


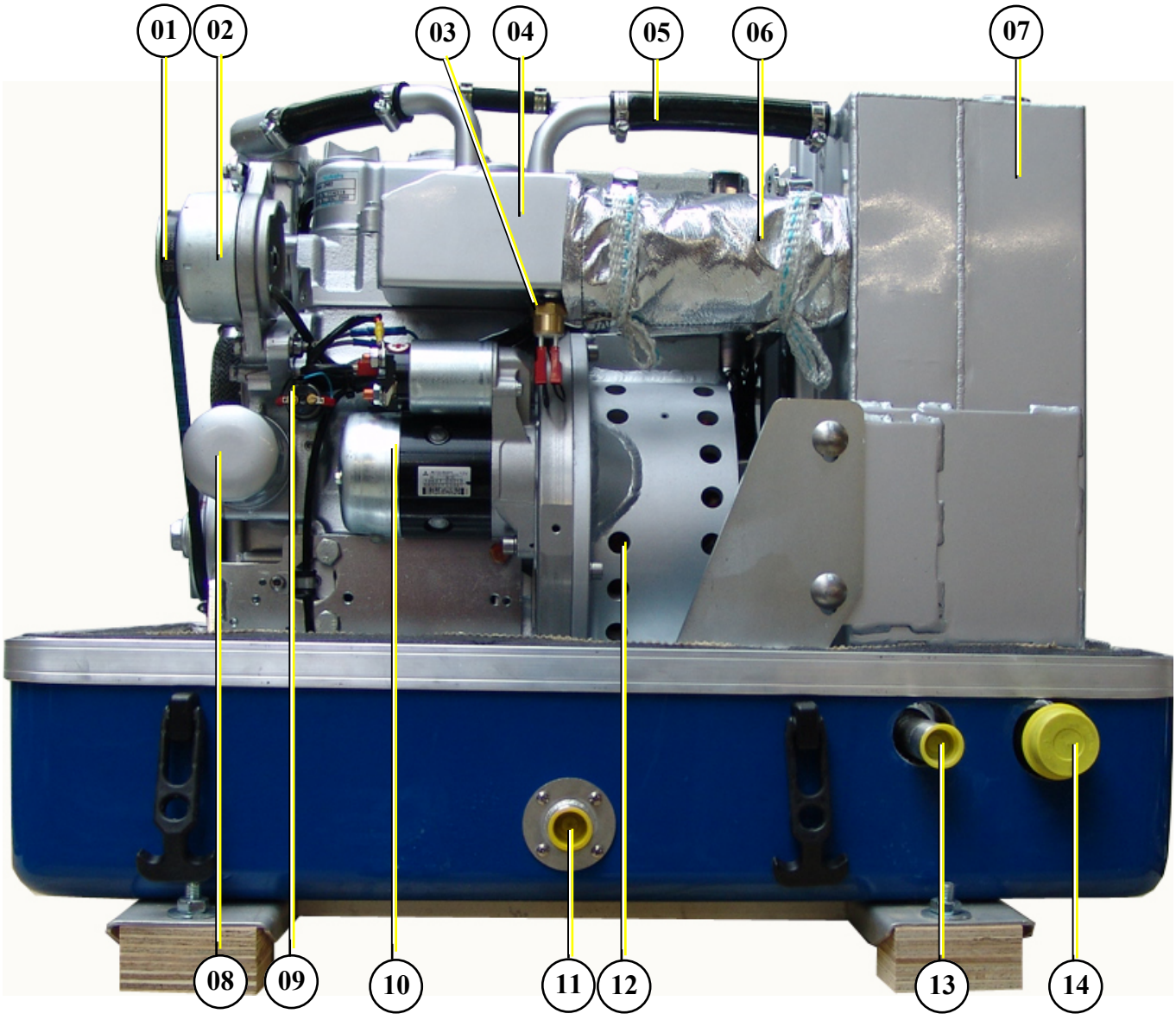
Fig. 6.1-2: Discription type plate



6.2 Description of the genset

6.2.1 Right side view

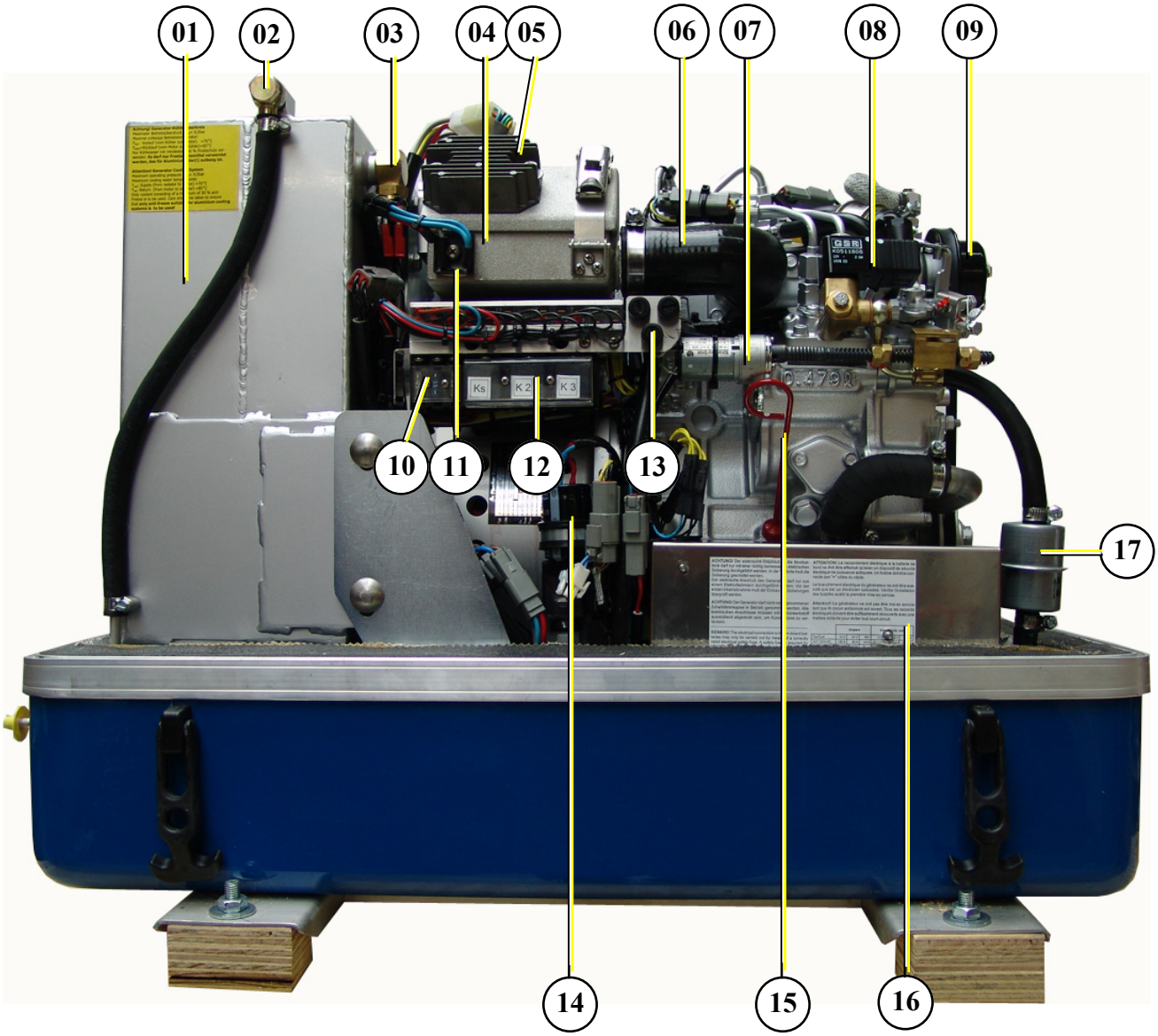
Fig. 6.2.1-1: Right side view



01. V-belt
02. DC-alternator
03. Thermoswitch at exhaust elbow
04. Water-cooled exhaust elbow
05. Cooling water pipe, exhaust elbow - silencer
06. Compensator under heat isolation
07. Water-cooled pre-silencer
08. Oil filter
09. Oil pressure switch
10. Starter motor
11. Coolant intake (from radiator - cold side)
12. Generator housing with coil
13. Coolant output (to radiator - hot side)
14. Exhaust output

6.2.2 Left side view

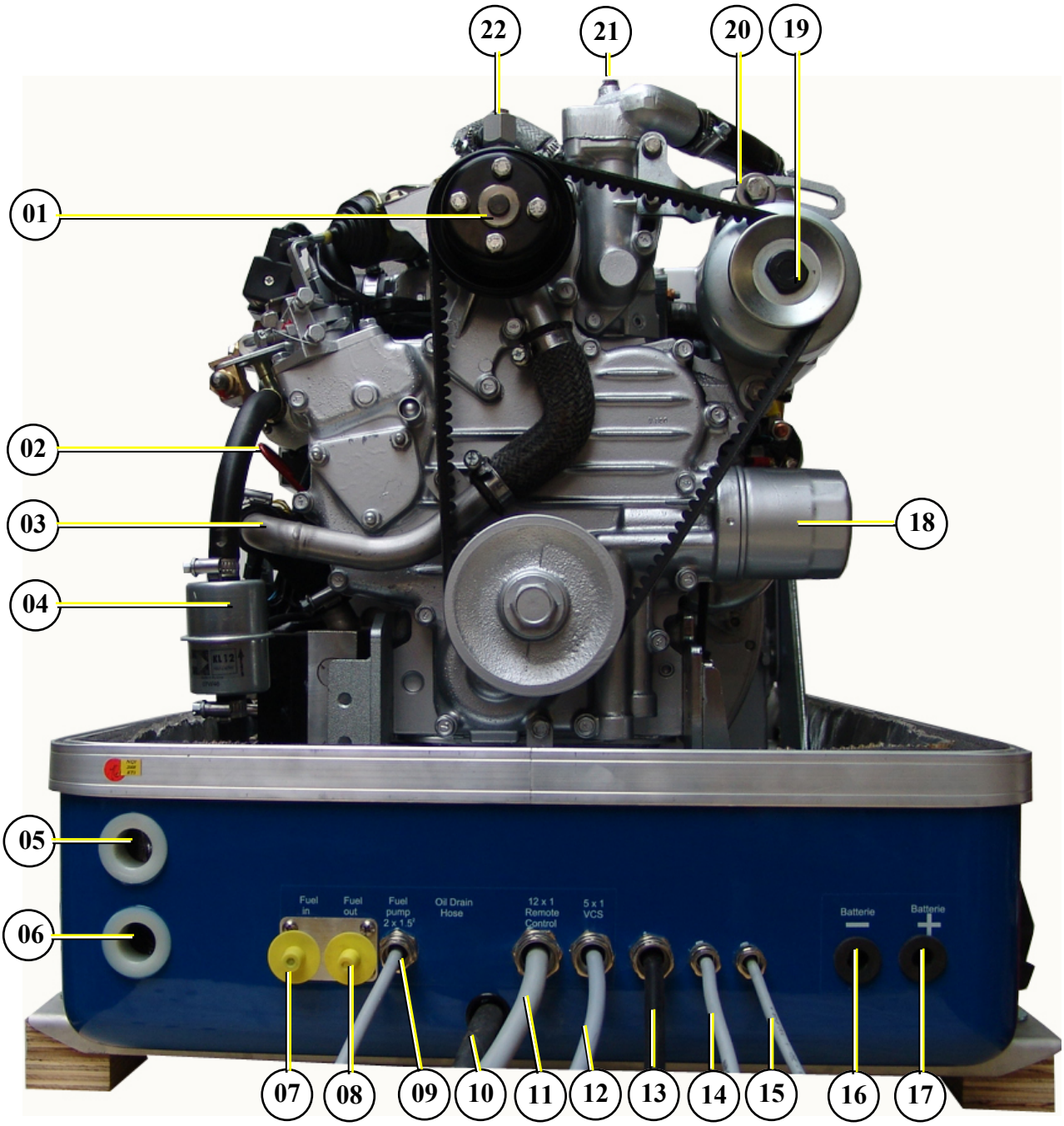
Fig. 6.2.2-1: eft side view



01. Water-cooled pre-silencer
02. Ventilation screw at silencer
03. Thermoswitch at silencer
04. Air suction housing with air filter
05. Voltage controller for alternator
06. Air suction hose to induction elbow
07. Actuator
08. Fuel solenoid valve
09. Pulley for internal cooling water pump and alternator
10. Electrical fuses
11. Bridge rectifier for the aux. winding
12. Relays
13. Electrical fuses
14. Capacitor for the aux. winding
15. Oil dipstick
16. Water-cooled diode plate (under cover)
17. Fuel filter

6.2.3 Front view

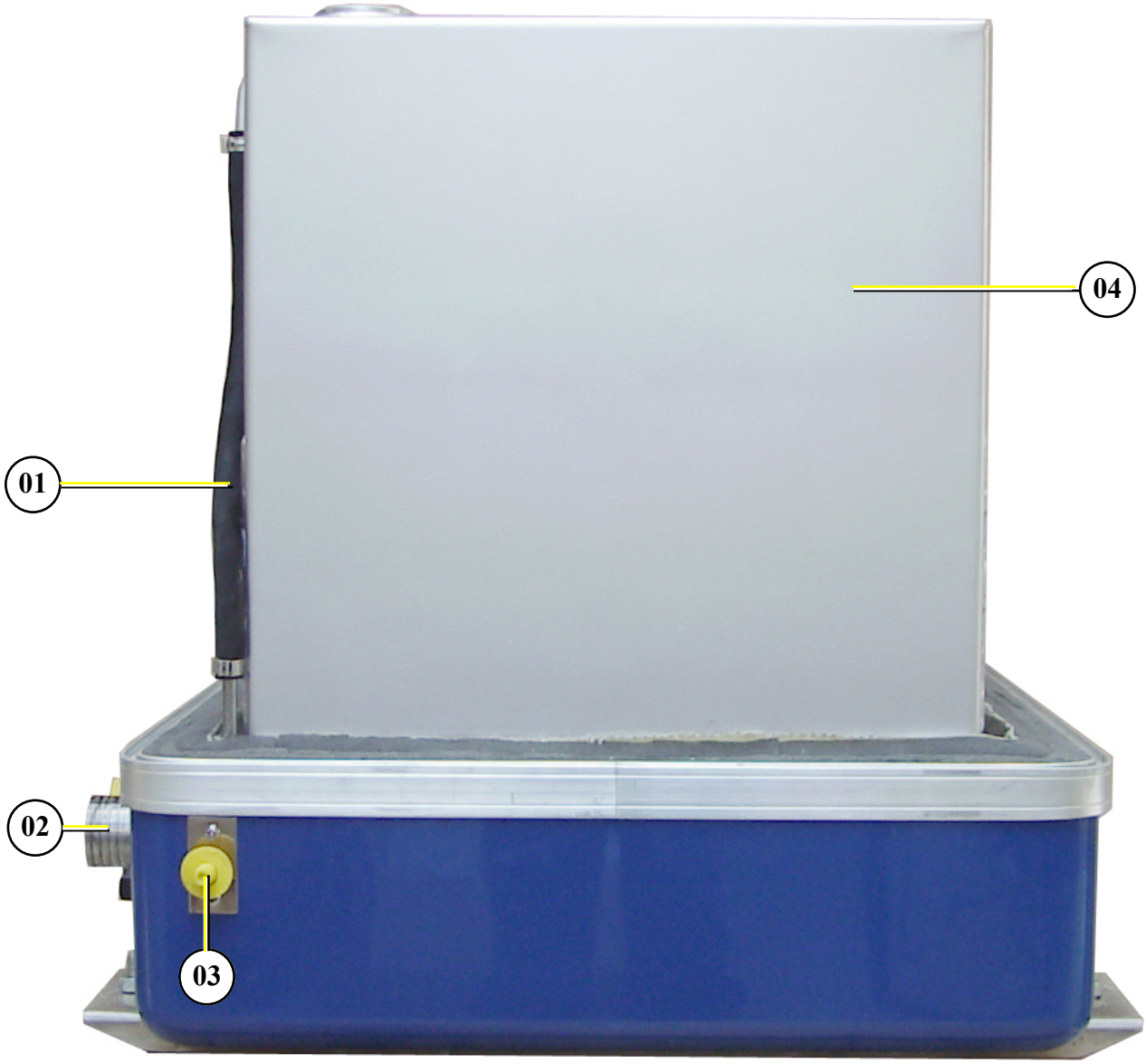
Fig. 6.2.3-1: Front view



01. Pulley for internal cooling water pump and alternator
02. Oil dipstick
03. Coolant pipe
04. Fuel filter
05. Passage for battery connection
06. Passage for battery connection
07. Fuel intake
08. Fuel output
09. Cable for fuel pump
10. Oil drain hose
11. Cable for remote control panel
12. Cable for VCS
13. Cable for radiator fan power supply
14. Cable for VCS terminator 7+8
15. Cable for VCS terminator 9+10
16. Passage for starter battery
17. Passage for starter battery
18. Oil filter
19. DC-alternator
20. Clamping device for alternator
21. Ventilation screw thermostat housing
22. Ventilation screw cooling water pump

6.2.4 View from back side

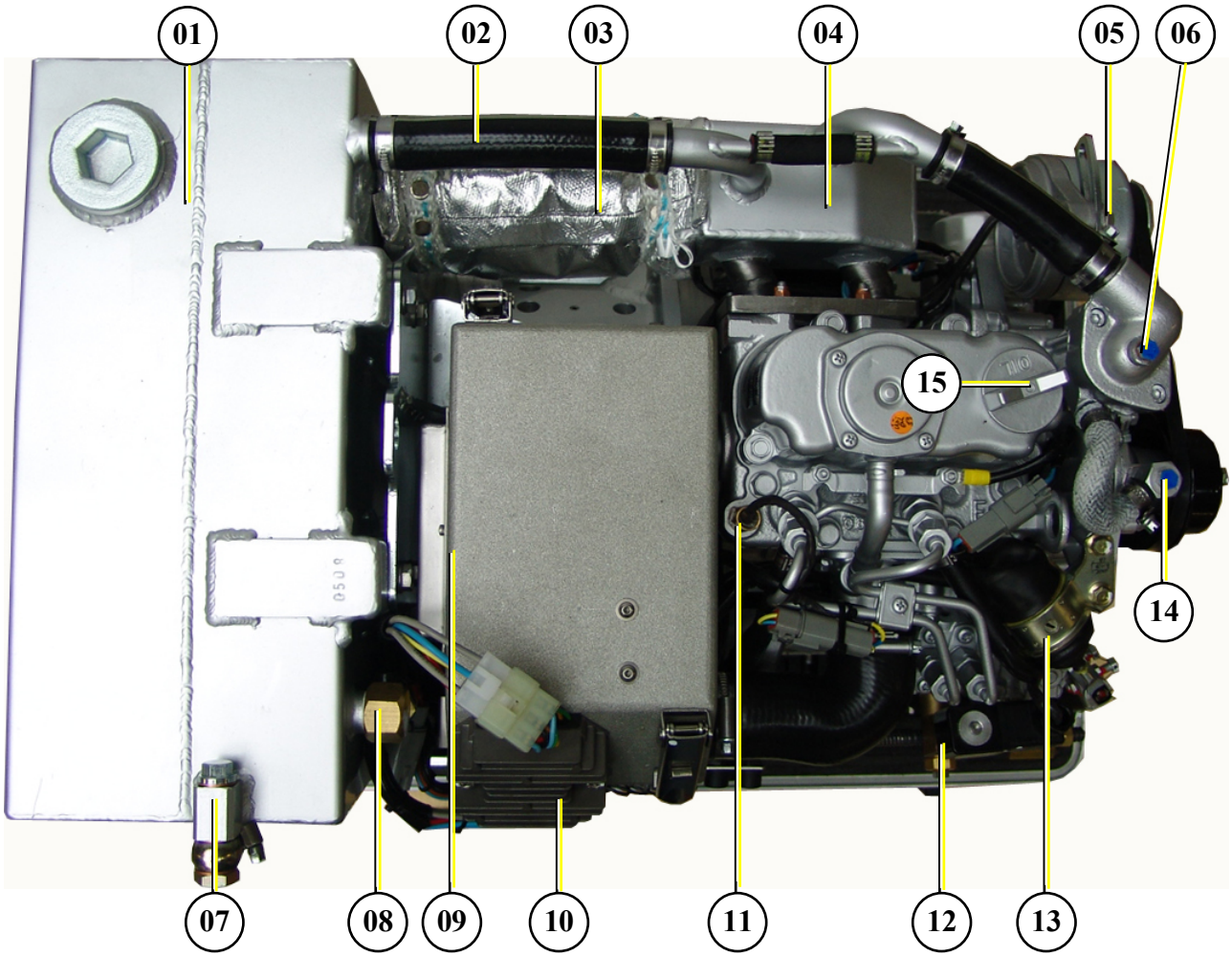
Fig. 6.2.4-1: Back side view



01. Coolant hose for external expansion tank
02. Exhaust output
03. Connection external expansion tank
04. Water-cooled pre-silencer

6.2.5 View from above

Fig. 6.2.5-1: Top view



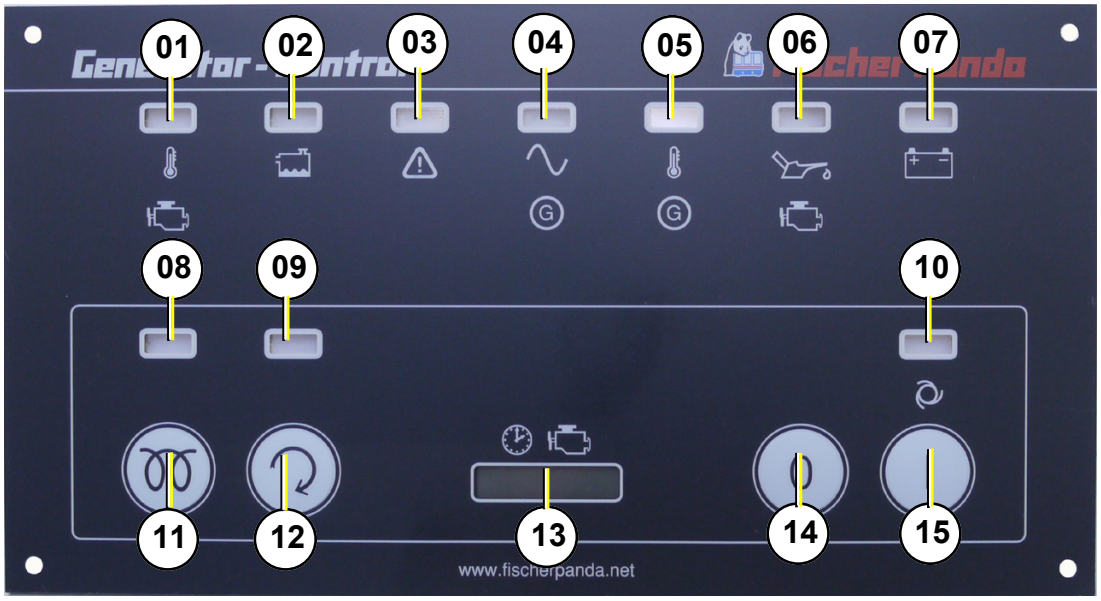
01. Water-cooled pre-silencer
02. Coolant hose, exhaust elbow - silencer
03. Compensator under heat isolation
04. Water-cooled exhaust elbow
05. DC-alternator
06. Ventilation screw thermostat housing
07. Ventilation screw pre-silencer
08. Thermoswitch at silencer
19. Air suction housing with air filter
10. Voltage controller for alternator
11. Thermoswitch at cylinder head
12. Fuel solenoid valve
13. Stop solenoid
14. Ventilation screw cooling water pump
15. Engine oil filler neck

6.3 Detailed views of the operation units

6.3.1 Control panel

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

Fig. 6.3.1-1: Control panel



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

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

See remote control panel data sheet for details!

Notice:

6.3.2

6.3.3 The cooling system - Schema

Fig. 6.3.3-1: The cooling system - Schema

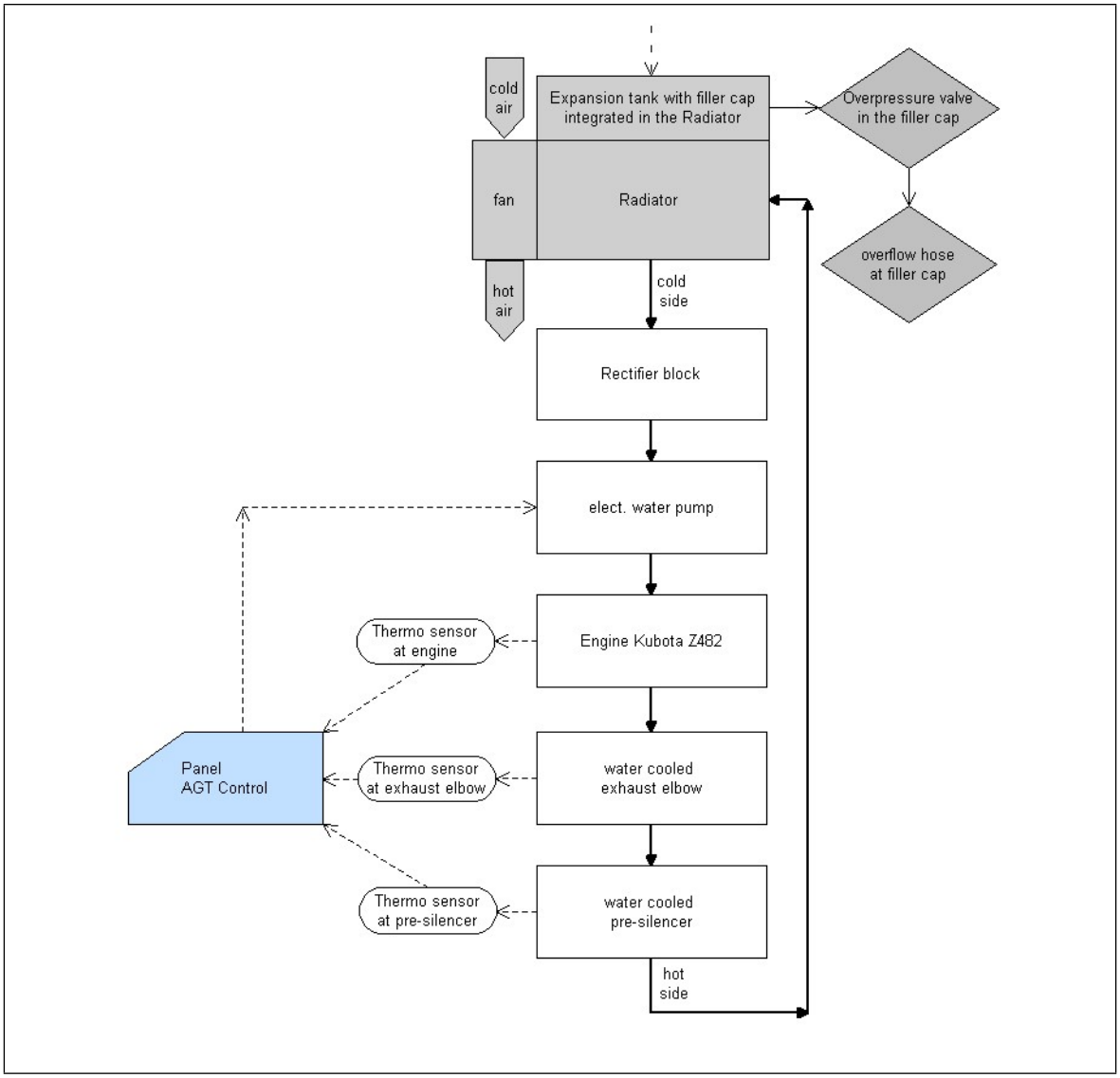


Fig. 6.3.3-2: Cooling water schema

6.3.4 The fuel system - Schema

Fig. 6.3.4-1: The fuel system - Schema

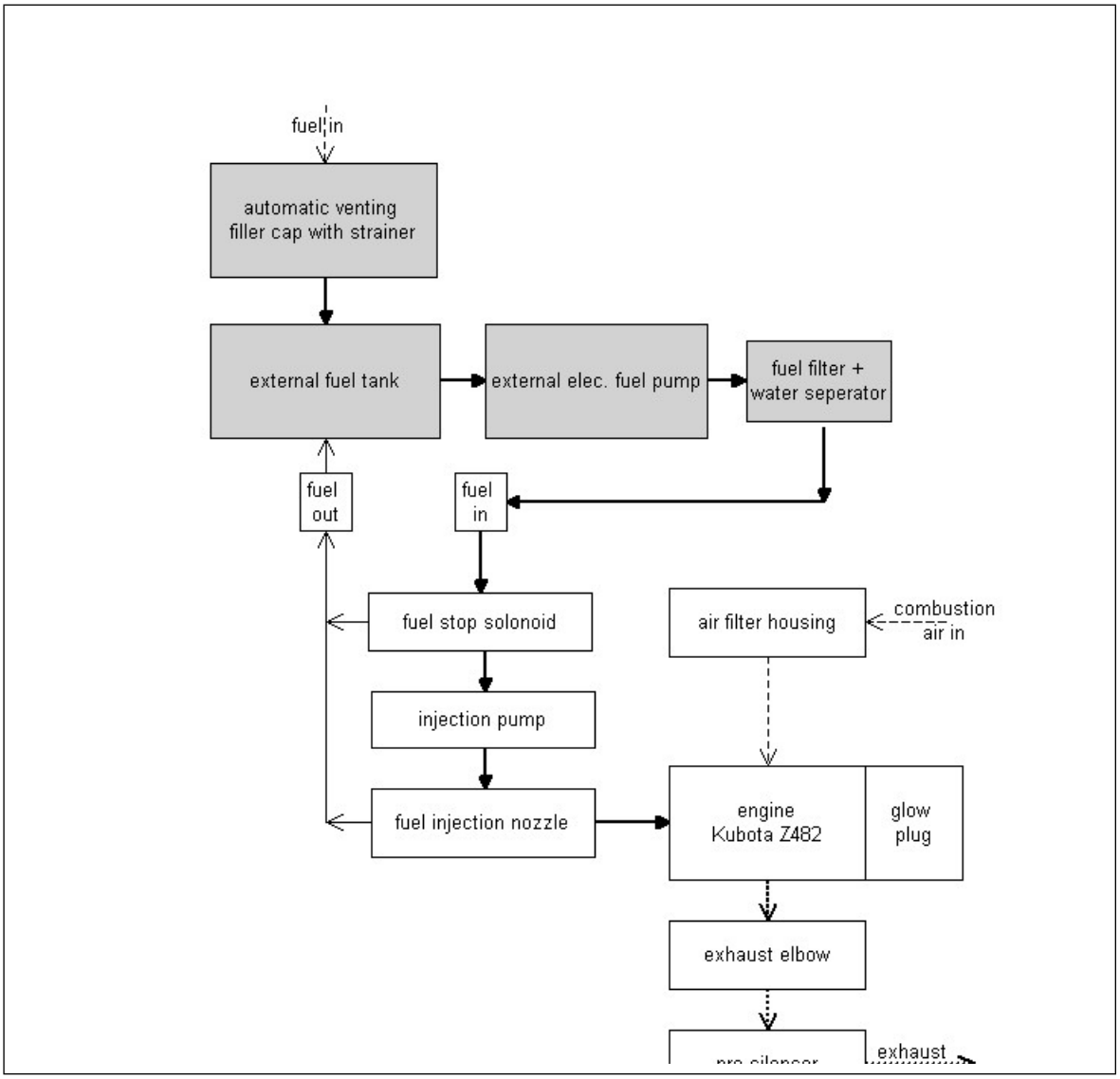


Fig. 6.3.4-2: Fuel schema

6.3.5 Components of the electrical system

Fig. 6.3.5-1: Components of the electrical system

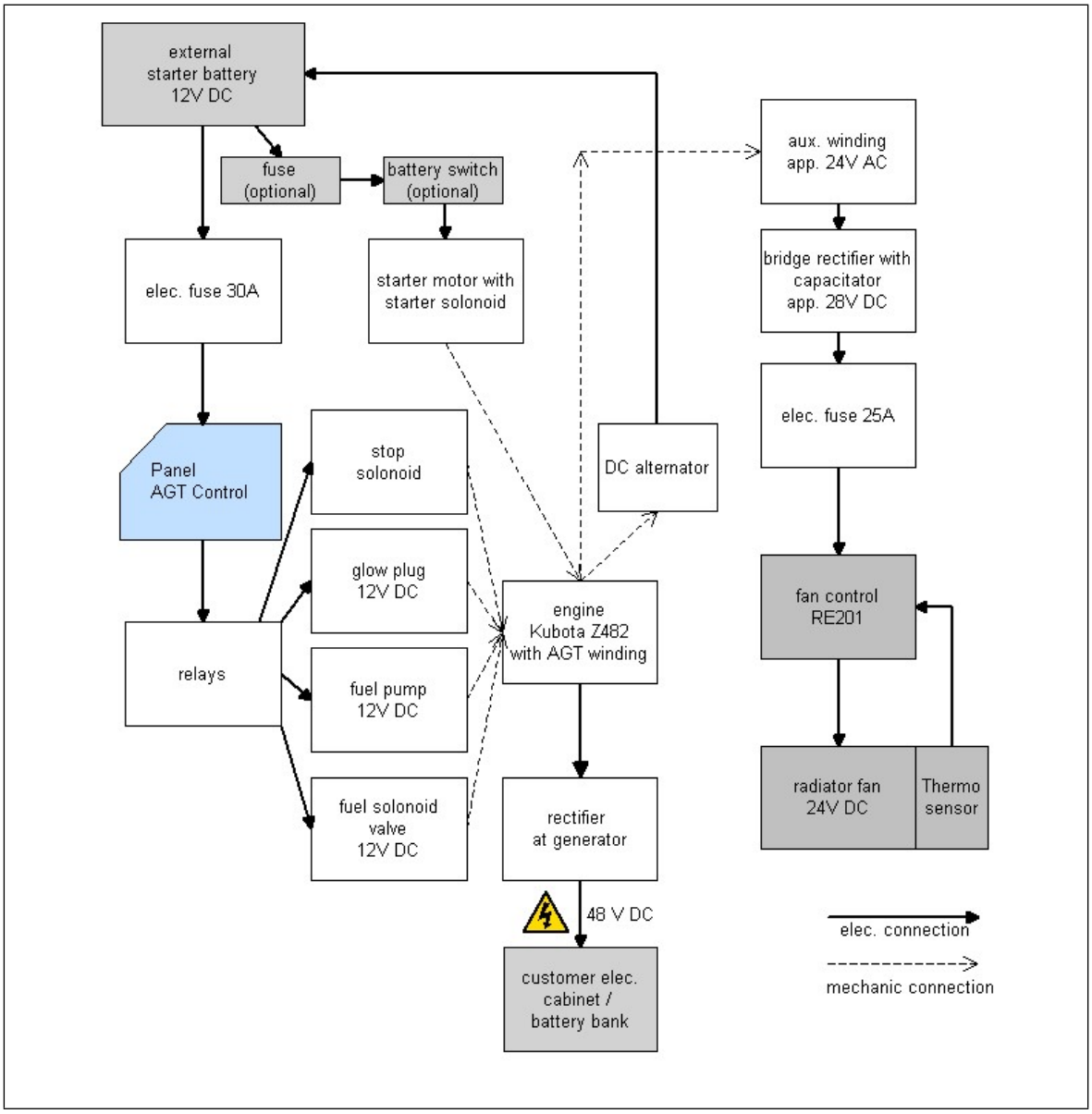


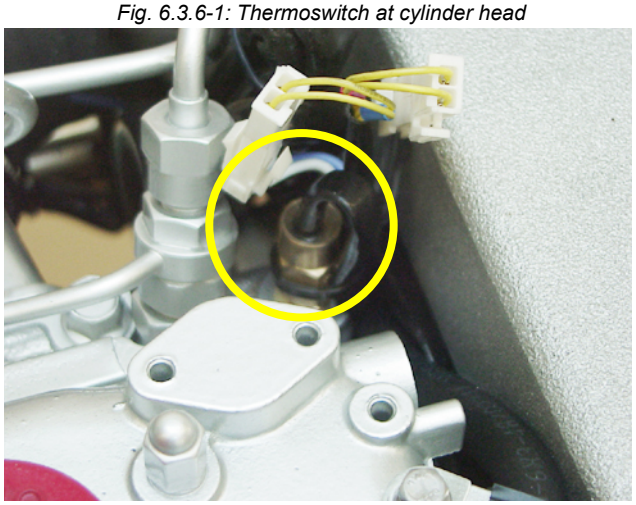
Fig. 6.3.5-2: Elect. schema

6.3.6 Sensors and switches for operating surveillance

Thermo-switch at cylinder head

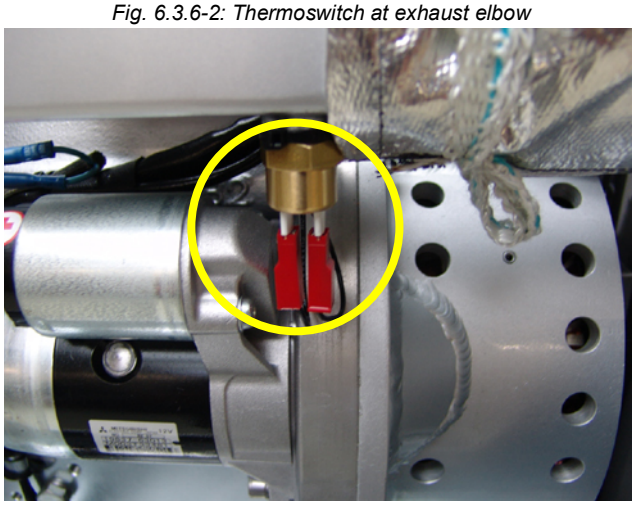
The thermo-switch at the cylinder head serves the monitoring of the generator temperature. All thermo-switches for the generators from Panda 6.000 upward are two-pole and laidout as "openers".

Fig. 6.3.6-1: Thermoswitch at cylinder head



Thermoswitch at exhaust elbow

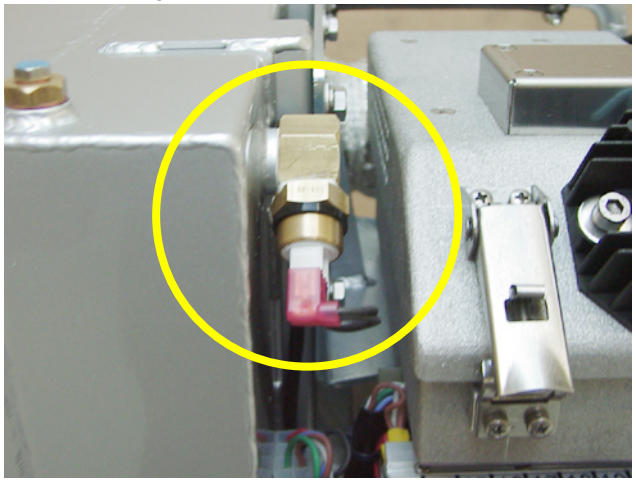
Fig. 6.3.6-2: Thermoswitch at exhaust elbow



Thermoswitch at silencer

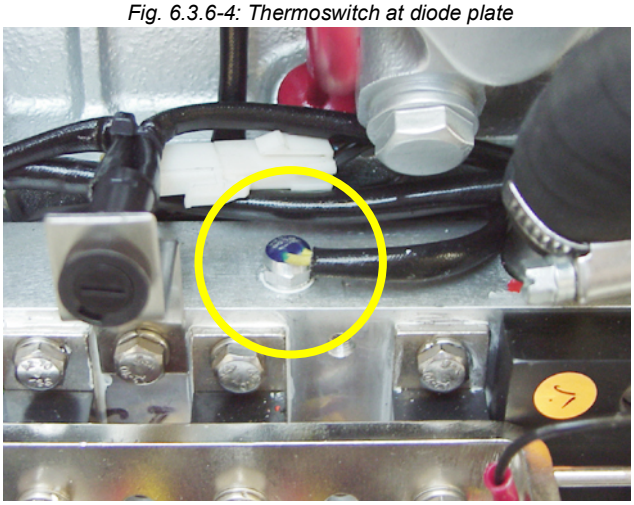
The coolant gets here the highest value.

Fig. 6.3.6-3: TThermoswitch at silencer



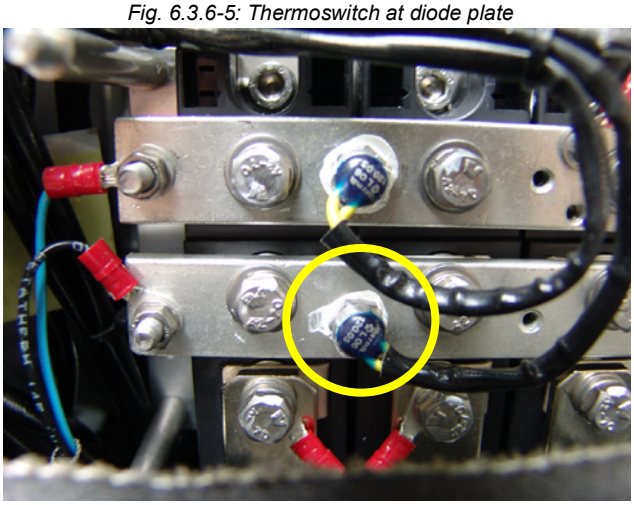
Thermoswitch at diode plate

Fig. 6.3.6-4: Thermoswitch at diode plate



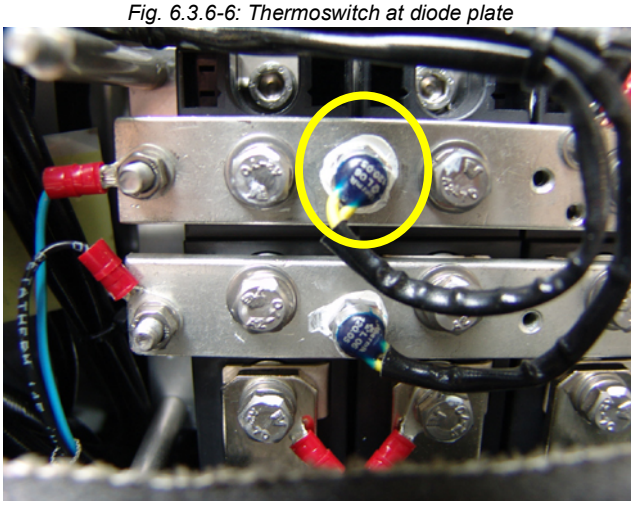
Thermoswitch at diode plate positive bar

Fig. 6.3.6-5: Thermoswitch at diode plate



Thermoswitch at diode plate negative bar

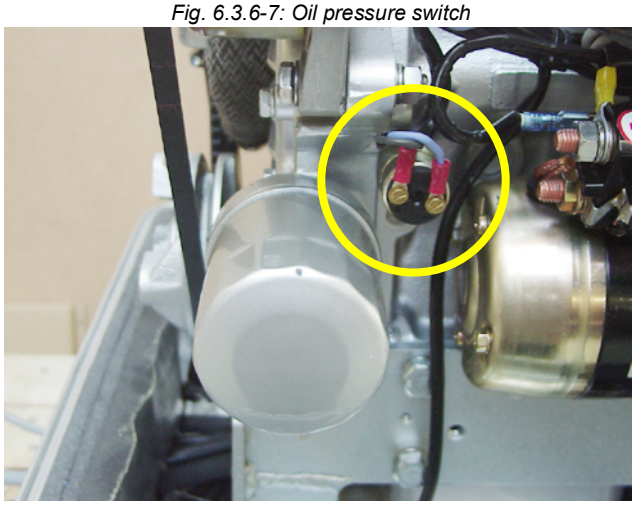
Fig. 6.3.6-6: Thermoswitch at diode plate



Oil pressure switch

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

Fig. 6.3.6-7: Oil pressure switch



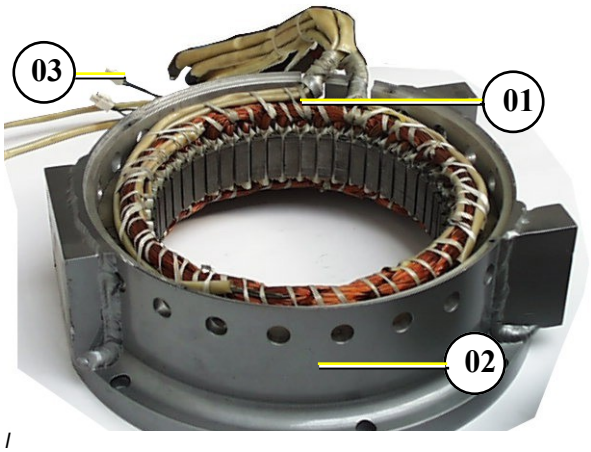
Thermoswitch in the generator coil

01. Thermo-switch

02. Housing

03. Temperatuesensor NTC 981S (für Meßzwecke)

For the protection of the generator coil there are two thermo-switches inside the coil, which are for inserted parallel and safety's sake independently from each other.



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6.3.7 Components of the oil circuit

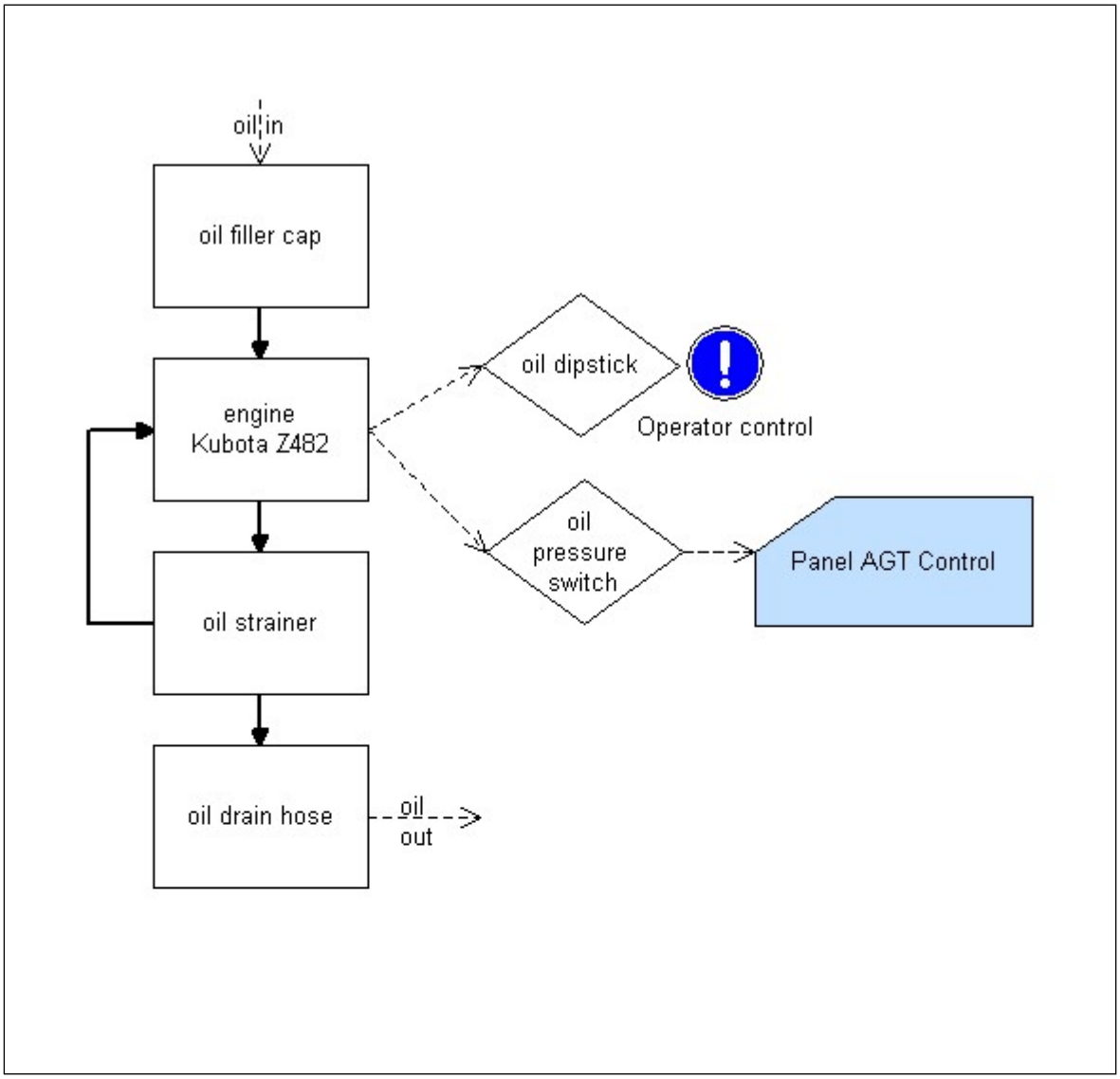


Fig. 6.3.7-1: Oil schema

7. 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.

7.1 Personal requirements

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

7.1.1 Hazard notes for the installation

see „Safety first!“

Notice!:s

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

7.2 Generator connections

7.2.1 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.

7.2.2 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!

7.3 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.

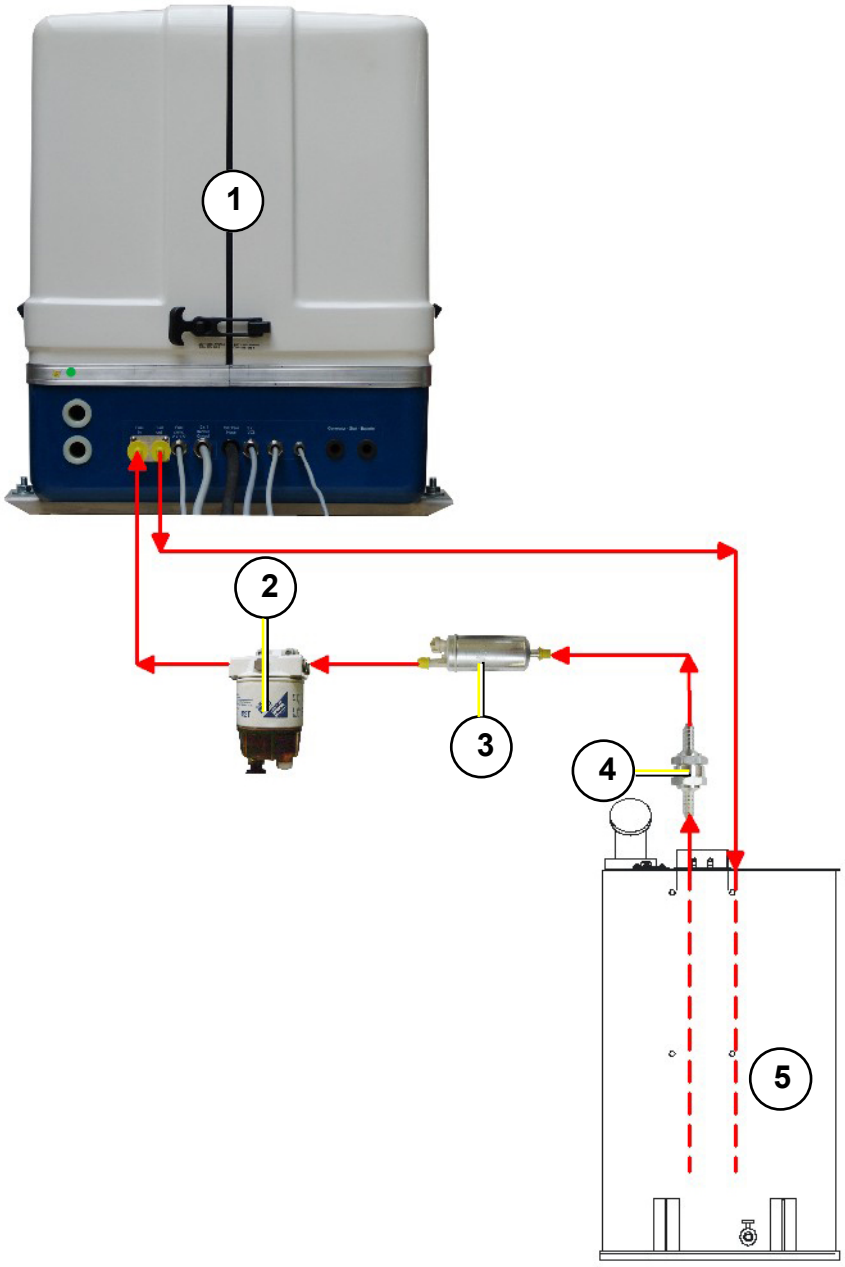
Basically the Panda is airing out. After the first line-up or after longer downtime the notes „Ventilation of the Fuel System“ should be considered.

7.3.1 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. 7.3.1-1: Fuel system installation - scheme



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

7.4 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!

7.4.1 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.

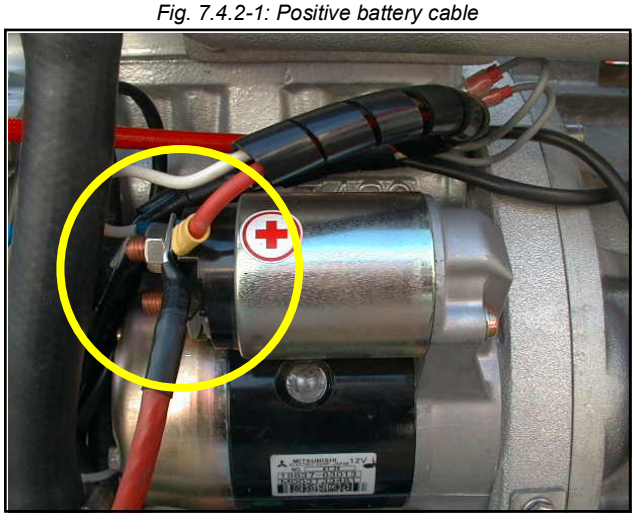
7.4.2 Connection of the starter battery

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. 7.4.2-1: Positive battery cable



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

Fig. 7.4.2-2: Negative battery cable

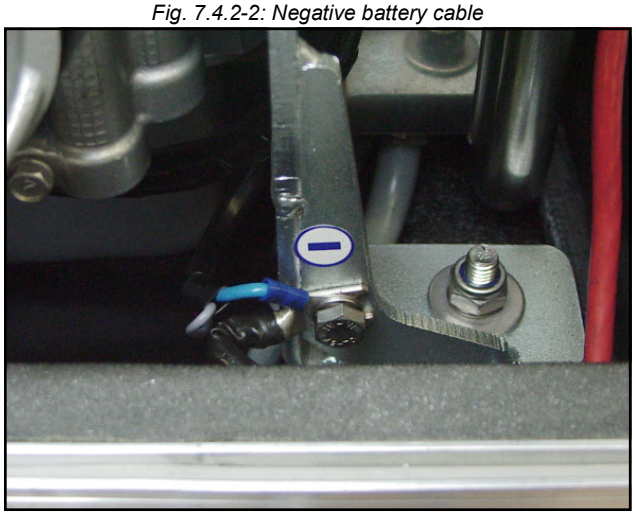
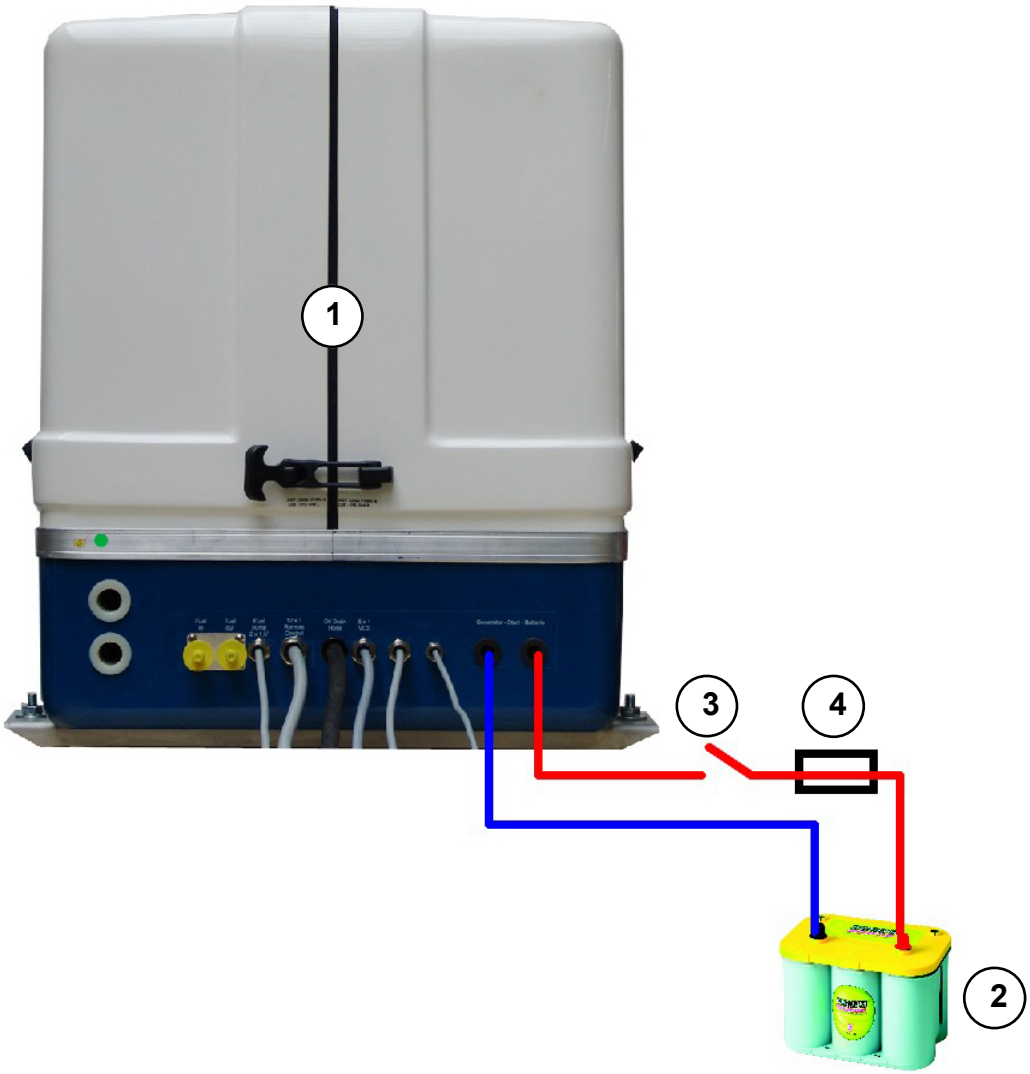


Fig. 7.4.2-3: Battery installation - scheme



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

7.4.2.1 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. 7.4.2.1-1: Installation starter battery

2. (-) cable of second battery

Fig. 7.4.2.1-2: Installation starter battery

3. (+) cable of second battery

Fig. 7.4.2.1-3: Installation starter battery

4. (-) cable of first battery

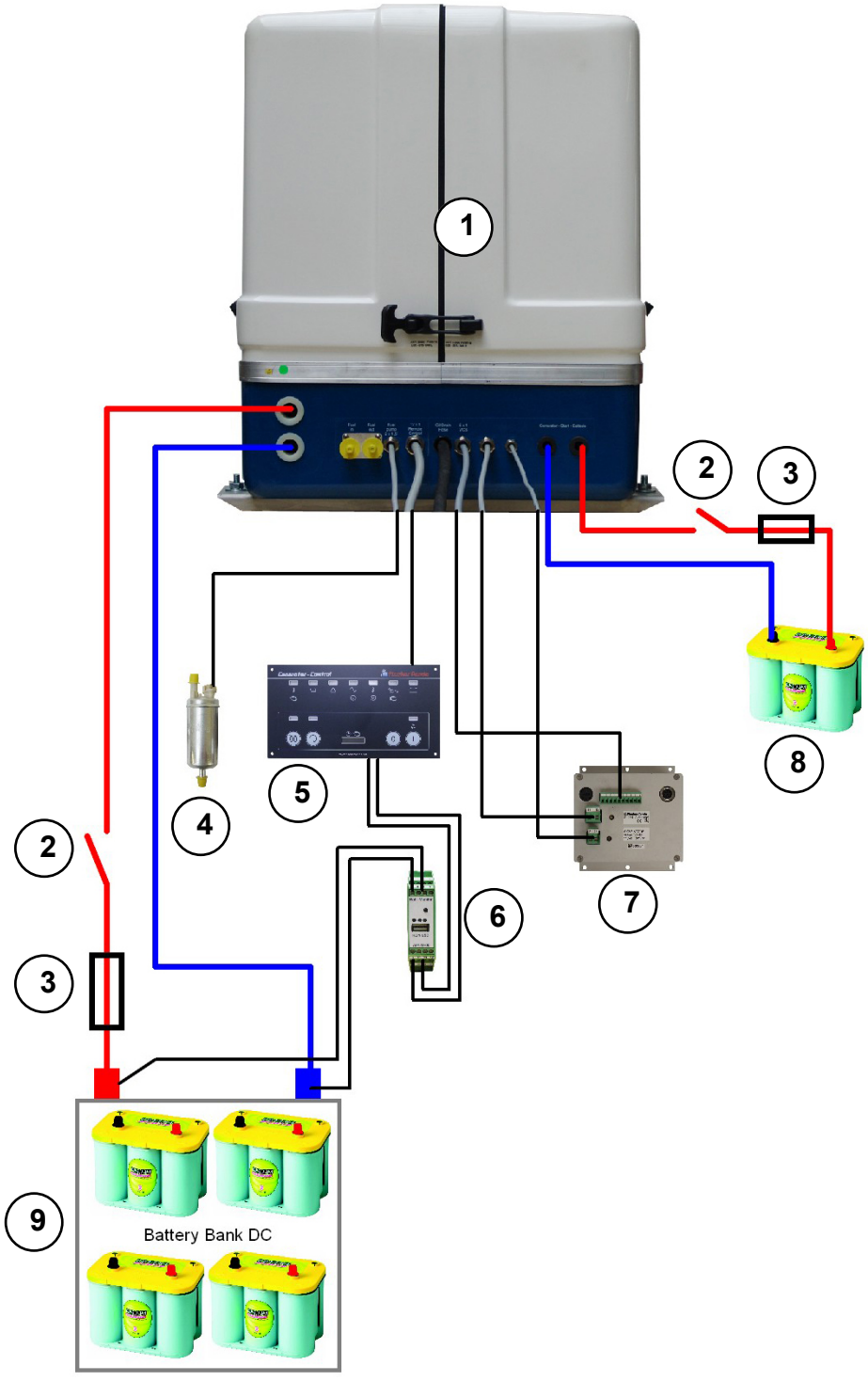
Fig. 7.4.2.1-4: Installation starter battery

5. Disconnect the batteries in reverse procedure.

7.4.3 Installation Panda AGT with internal rectifier unit - sample scheme

Sample schema for a standard installation.

Fig. 7.4.3-1: Panda AGT with internal rectifier unit



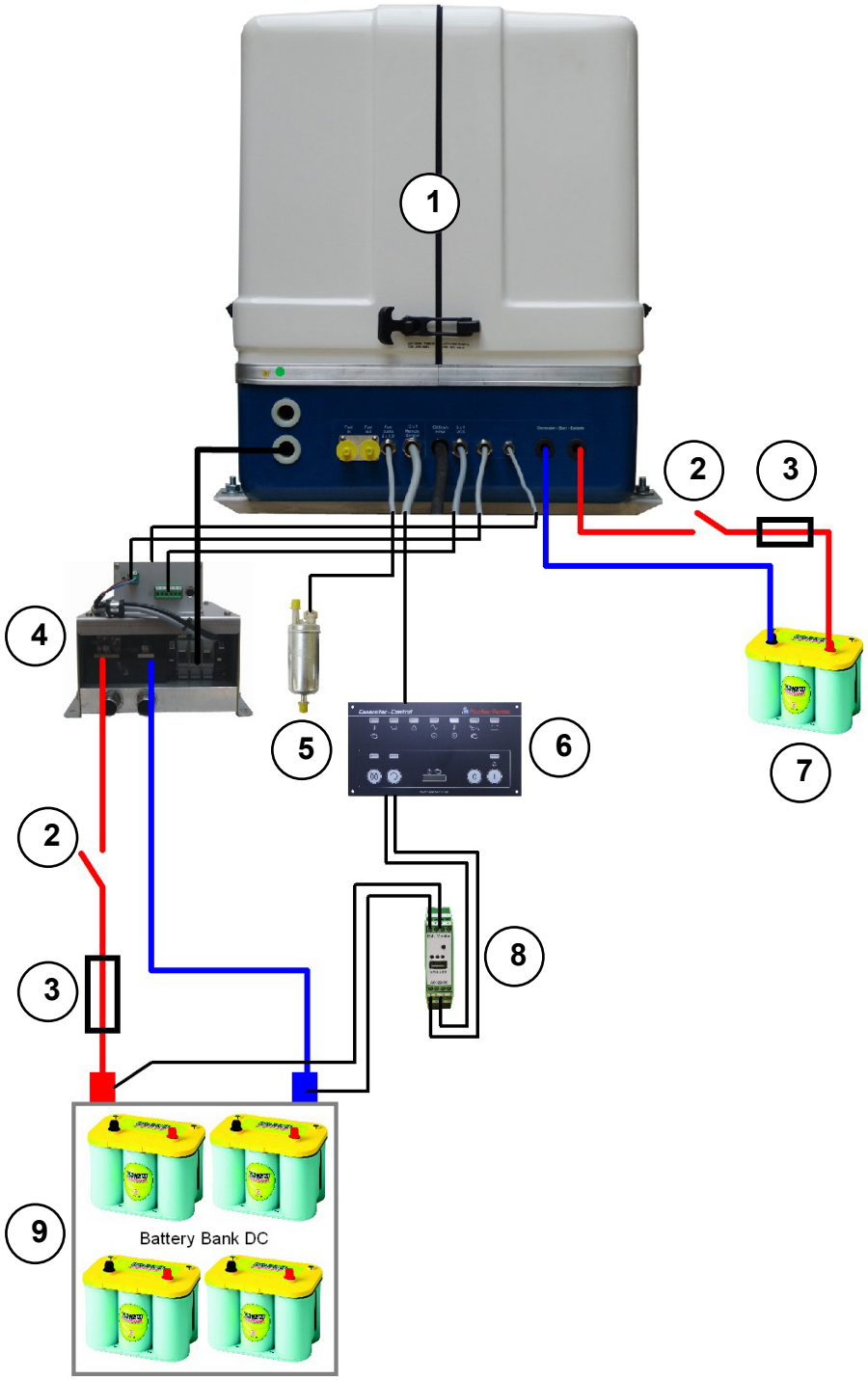
1. Generator
2. Battery switch
3. Fuse
4. Fuel pump
5. Remote control panel
6. Battery monitor (optional unit)
7. Voltage control VCS
8. Starter battery, depending on system
9. Battery block, depending on system

All electrical safety installations have to be made on board.

7.4.4 Installation Panda AGT with external rectifier unit - sample scheme

Sample schema for a standard installation.

Fig. 7.4.4-1: Panda AGT with external rectifier



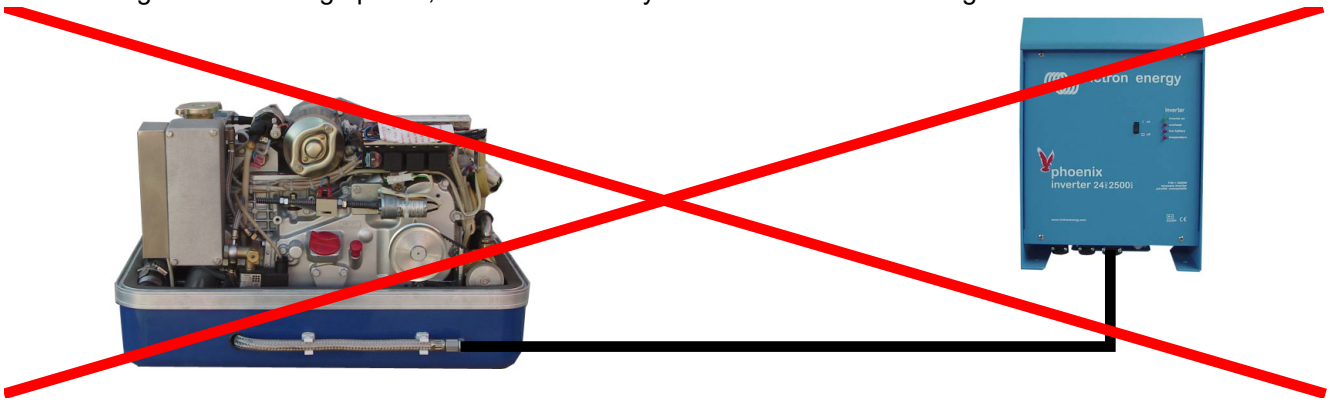
1. Generator
2. Battery switch
3. Fuse
4. External rectifier unit with voltage control system VCS
5. Fuel pump
6. Remote control panel
7. Starter battery, depending on system
8. Battery monitor (optional unit)
9. Battery block, depending on system

All electrical safety installations have to be made on board.

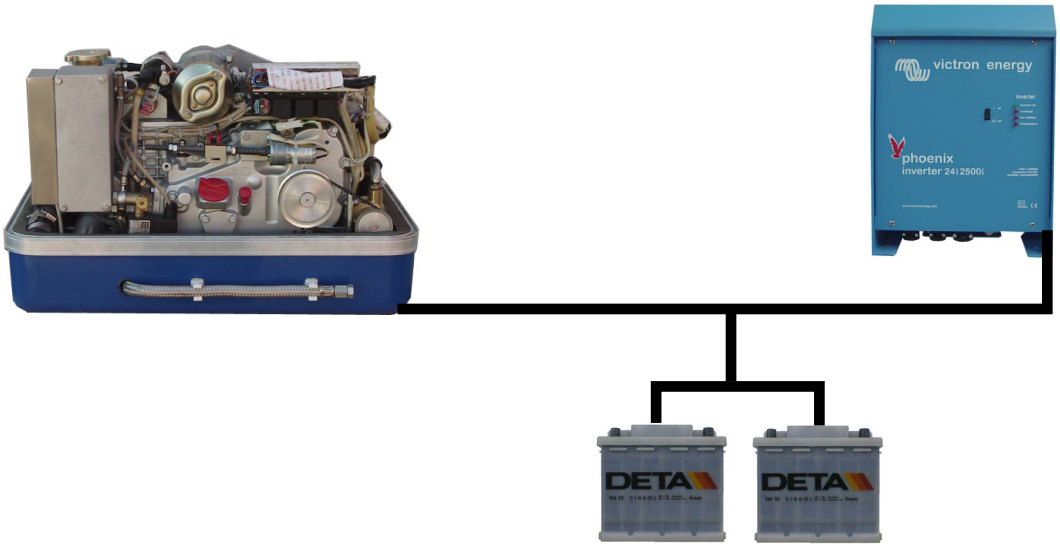
The AGT-generator is not allowed to be connected to an inverter (without batteries)!

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.

7.4.4.1 Electrical fuses - Dipole switch at battery bank

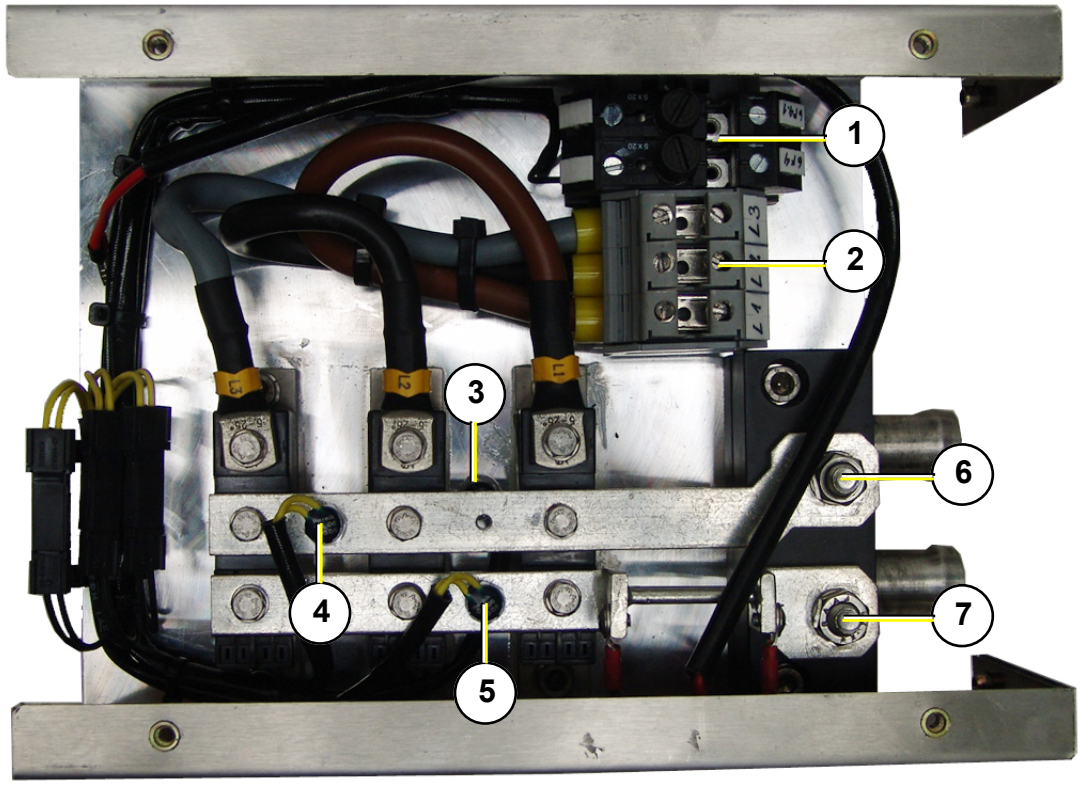
It is absolutely essential that the electrical system installation is inspected by a qualified electrical technician. The generator should have its own DC fuse and battery switch in the connection line rectifier unit to battery bank. The

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.

7.5 Generators with external rectifier unit

Fig. 7.5.0-1: 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!

7.5.1 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 7.8, “Installation of the cooling system,” on page 63.

7.6 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:

7.7 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.

7.8 Installation of the cooling system

7.8.1 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:

7.9 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.

7.9.1 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.

7.9.2 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).

7.9.3 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 65.
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 69.
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 70.

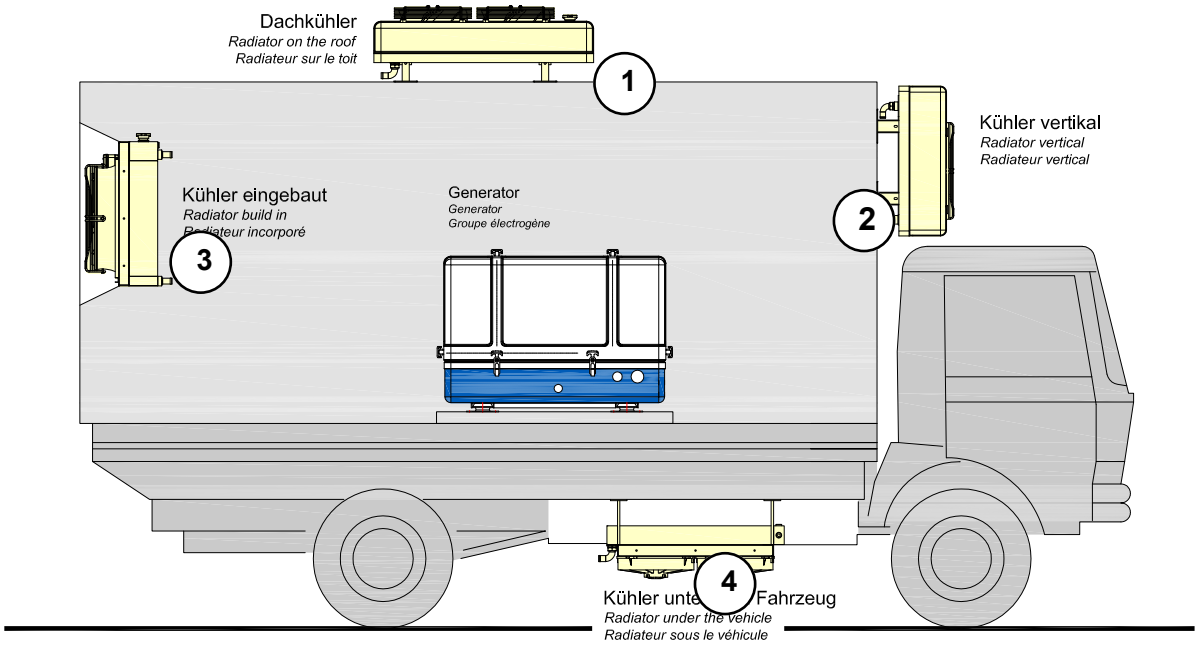
The radiator must be installed away from the generator in a well ventilated area. In doing so, it must be ensured that the air outflow of the radiator is completely uninhibited. Turbulence and thermal short-circuiting must be avoided.

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.

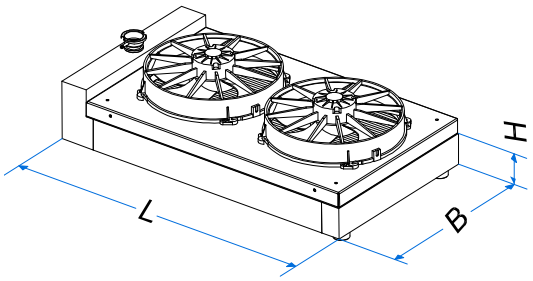
7.9.3.1 Installation location for radiators for roof, side, or underfloor mounting on the vehicle

Fig. 7.9.3-1: 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. 7.9.3.1-2: Radiator dimensions



7.9.3.2 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. 7.9.3.2-1: Schematic: radiator, roof installation

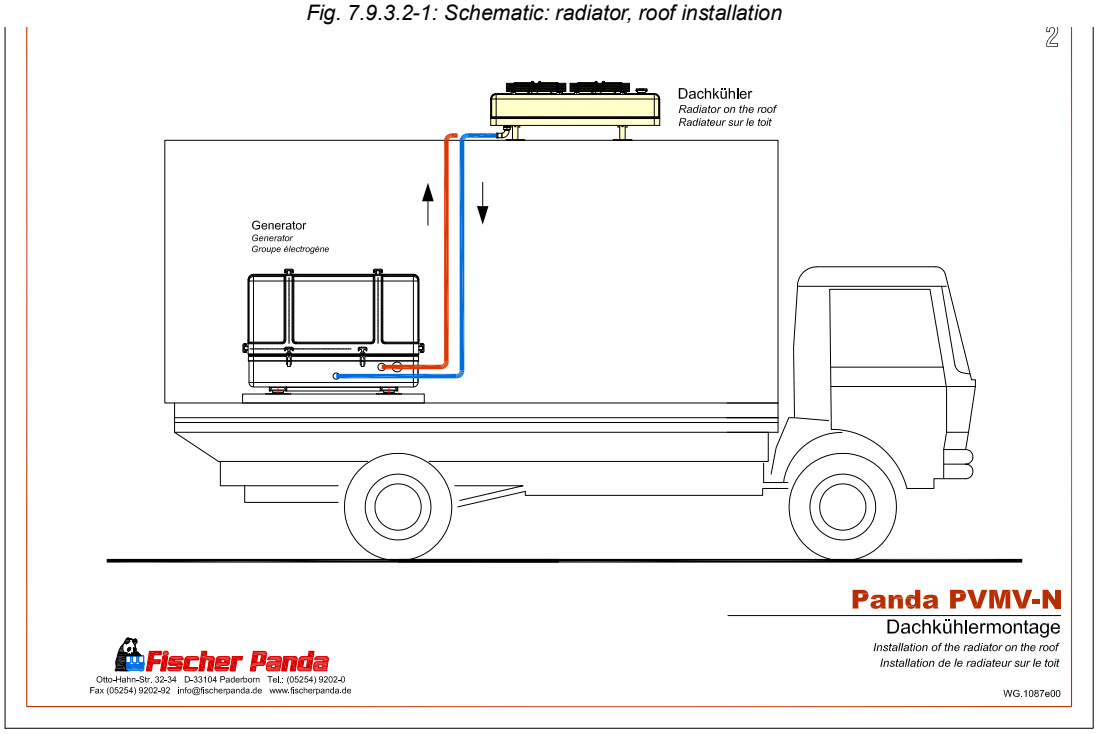
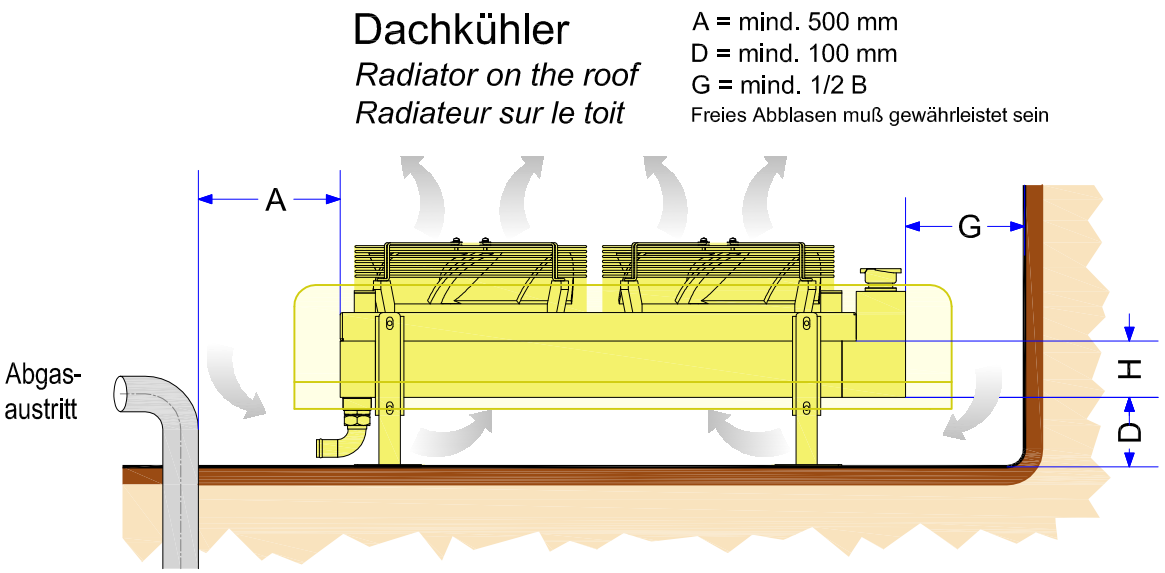


Fig. 7.9.3.2-2: Schematic: radiator, roof installation



7.9.3.3 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. 7.9.3.3-1: Schematic: radiator, vehicle wall installation

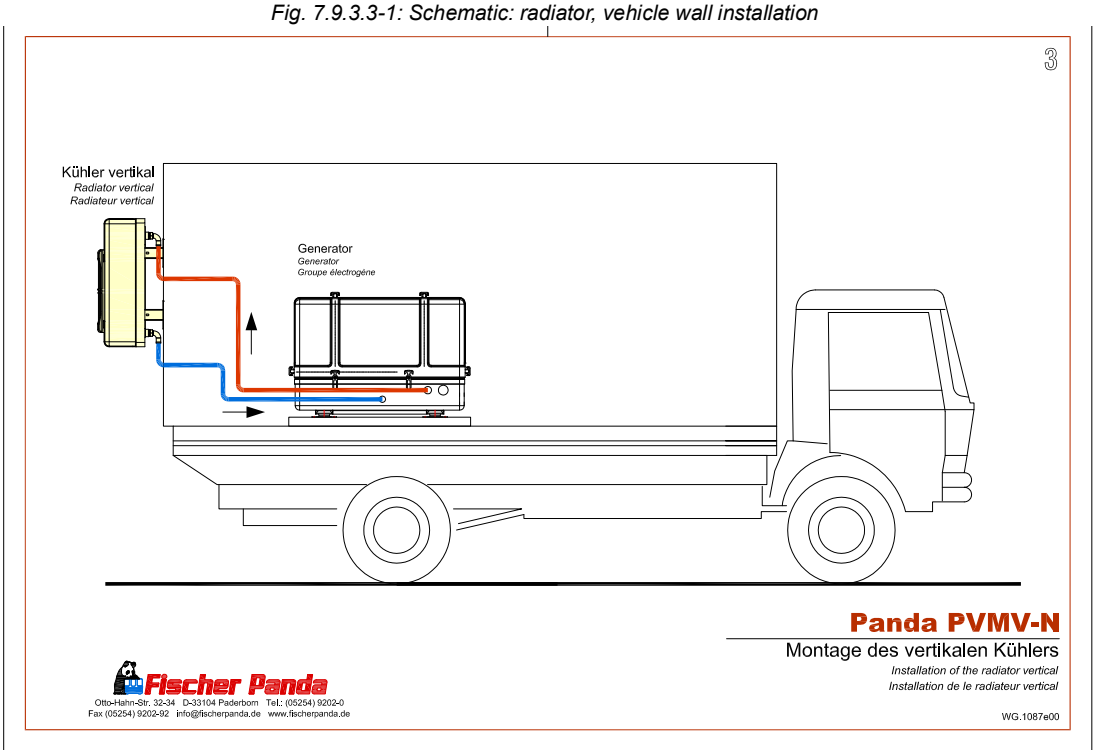
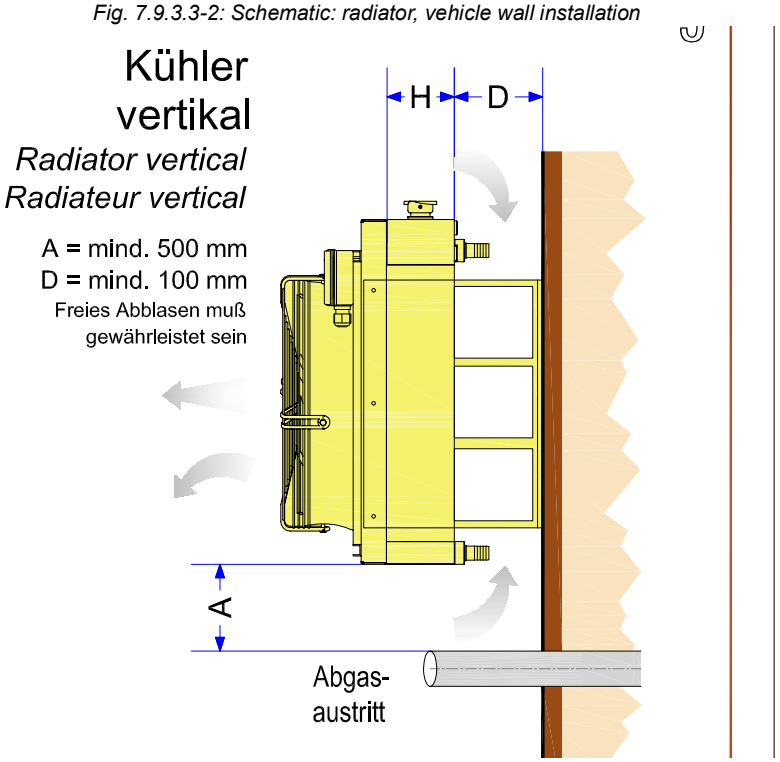


Fig. 7.9.3.3-2: Schematic: radiator, vehicle wall installation



7.9.3.4 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. 7.9.3.4-1: ***Underfloor installation of radiator***

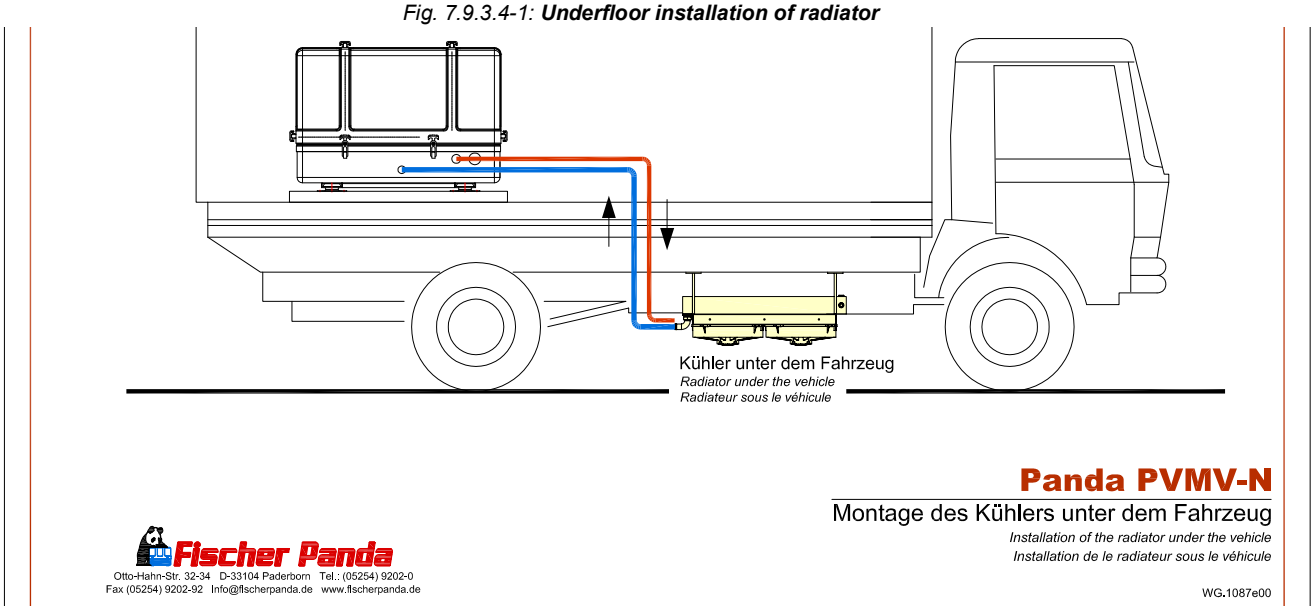
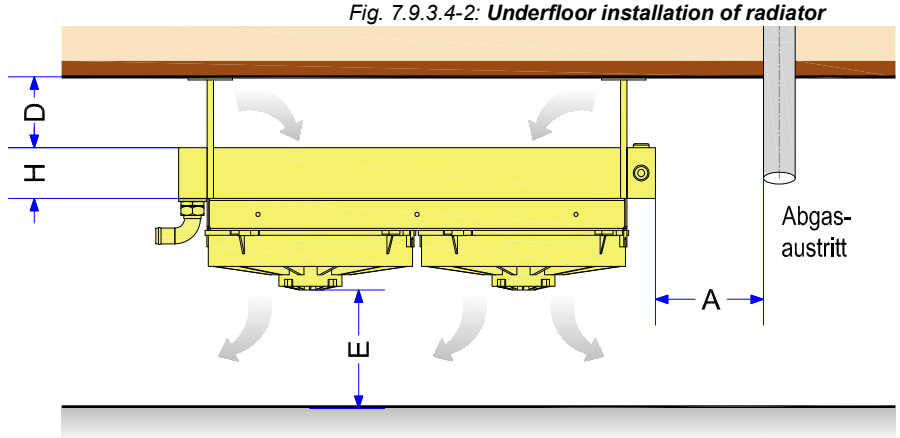


Fig. 7.9.3.4-2: ***Underfloor installation of radiator***



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

7.9.3.5 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.

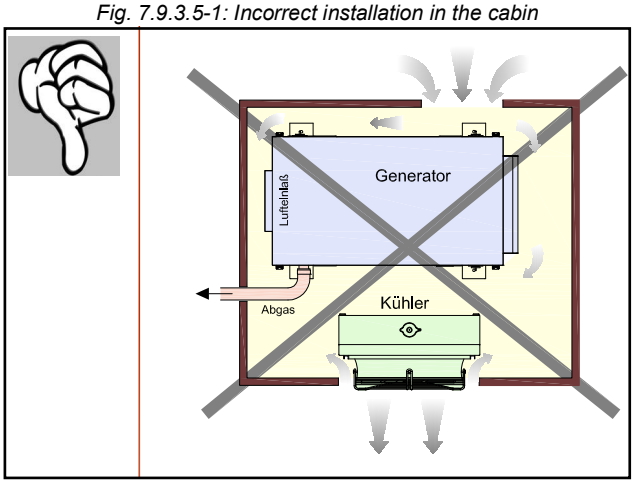
Please note:

- 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

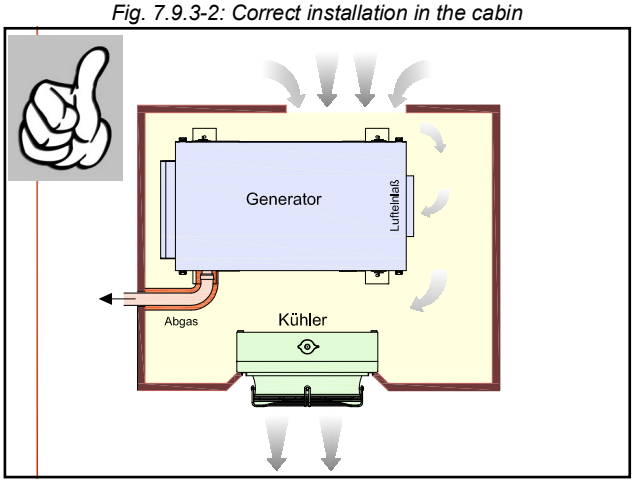
Fig. 7.9.3.5-1: Incorrect installation in the cabin



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. 7.9.3-2: Correct installation in the cabin



7.9.3.6 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.

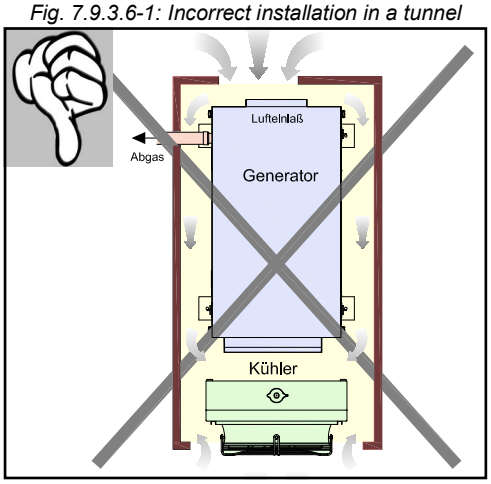
Please note:

- 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

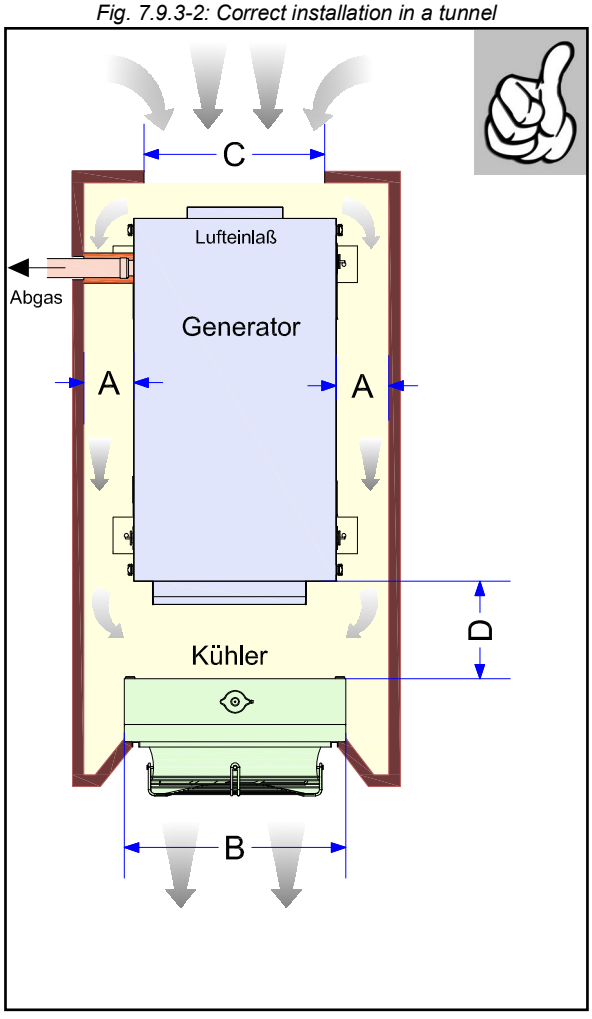
Fig. 7.9.3.6-1: Incorrect installation in a tunnel



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. 7.9.3-2: Correct installation in a tunnel



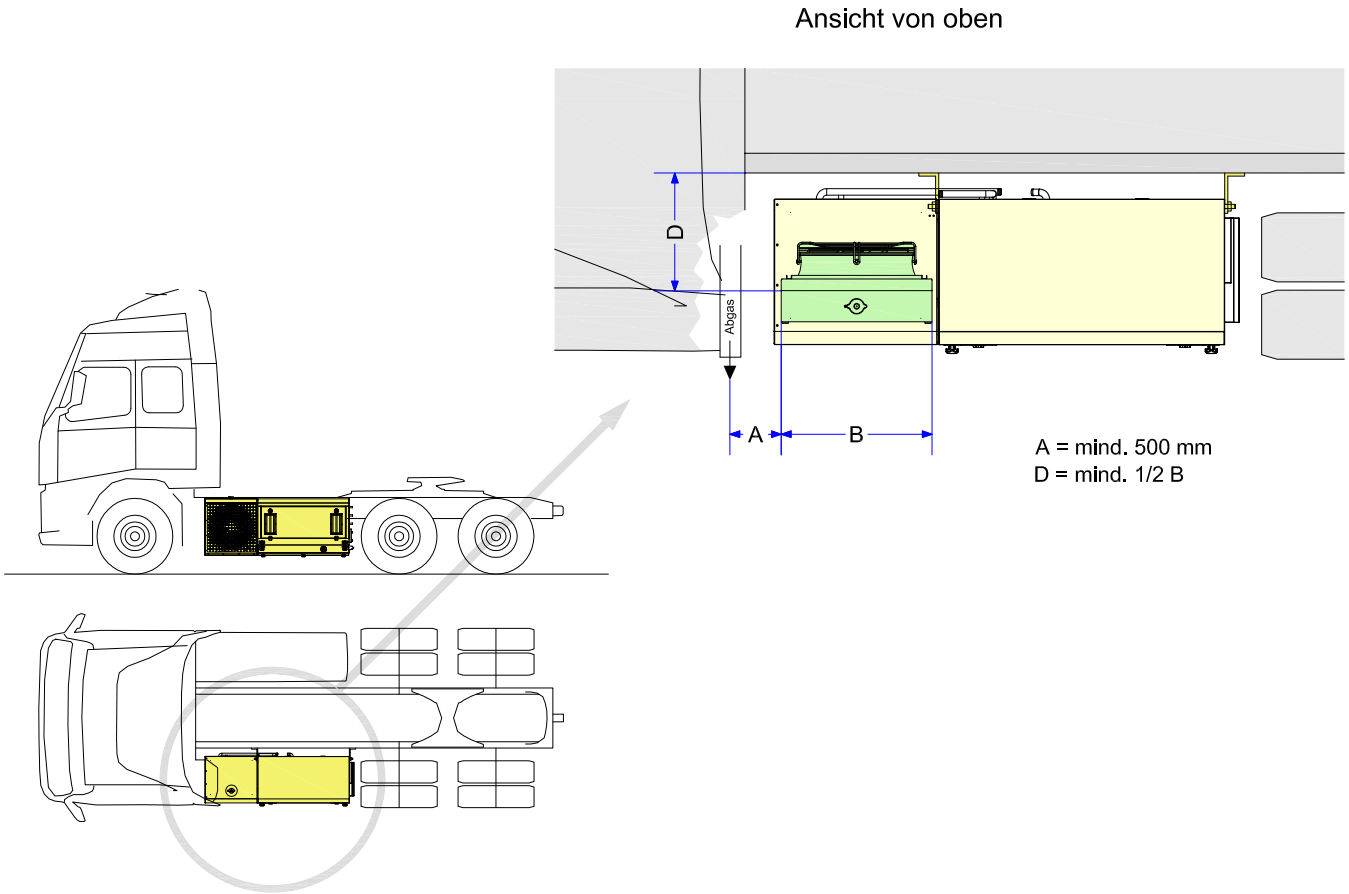
7.9.3.7 Installation location for generators of the PVK-UK series

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. 7.9.3.7-1: PVK-UK installation location



7.9.4 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.

7.9.5 Connection of the external radiator

See section 7.11, “Installation schematics,” on page 75.

7.9.6 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.

7.9.7 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.

7.9.8 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:

7.9.9 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. 7.9.9-1: 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

7.9.10 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

7.9.11 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 %.

7.9.12 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:

7.10 Custom installations

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

7.10.1 External heat exchangers

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

7.10.2 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.

7.10.3 Keel cooling

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

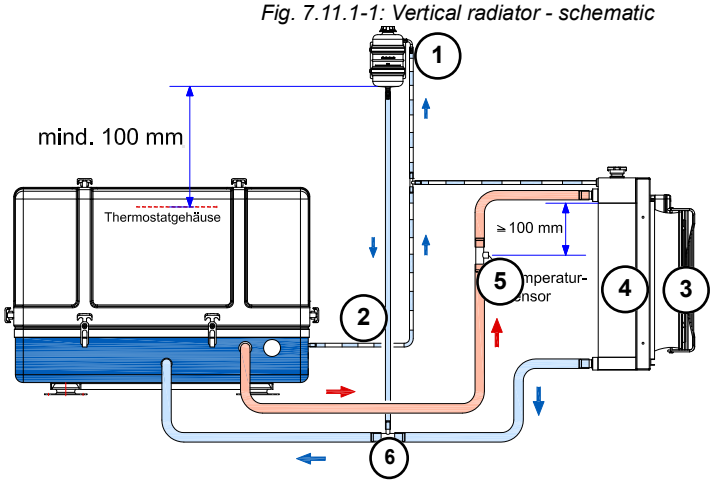
7.11 Installation schematics

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:

7.11.1 Installation for vertical radiator installation

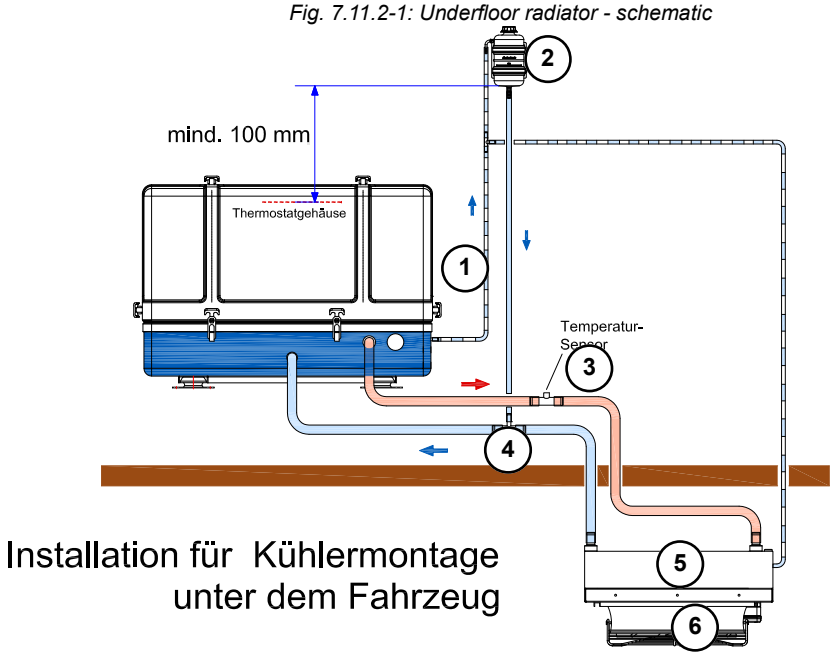
Fig. 7.11.1-1: Vertical radiator - schematic



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

7.11.2 Installation for mounting the radiator under the vehicle

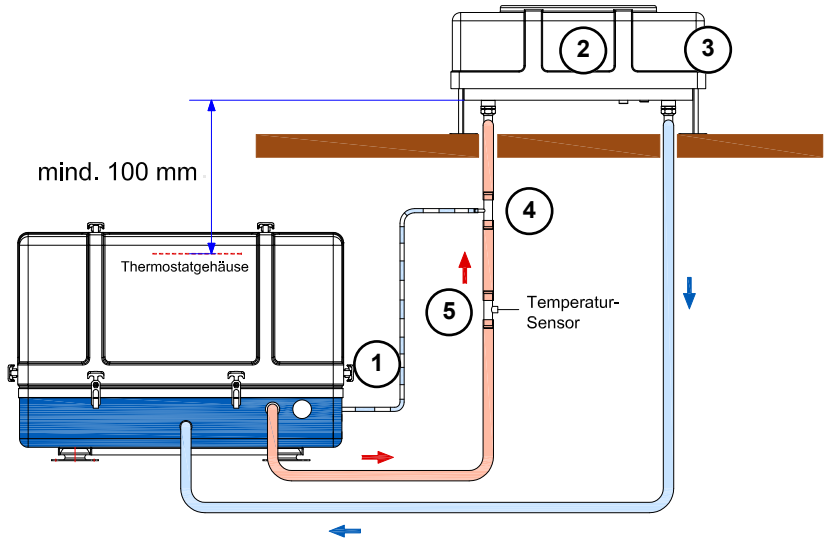
Fig. 7.11.2-1: Underfloor radiator - schematic



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

7.11.3 Installation schematic for roof mounted radiator with expansion tank

Fig. 7.11.3-1: Roof-mounted radiator - schematic

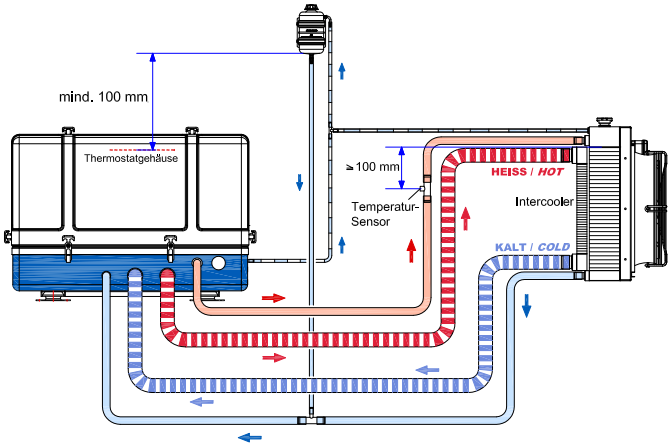


Installation für Dachkühlermontage
mit integriertem Ausgleichsbehälter

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

7.11.4 Installation radiator with intercooler - schematic sample vertical radiator

Fig. 7.11.4-1: Installation Radiator with Intercooler -Schematic sample vertical Radiator



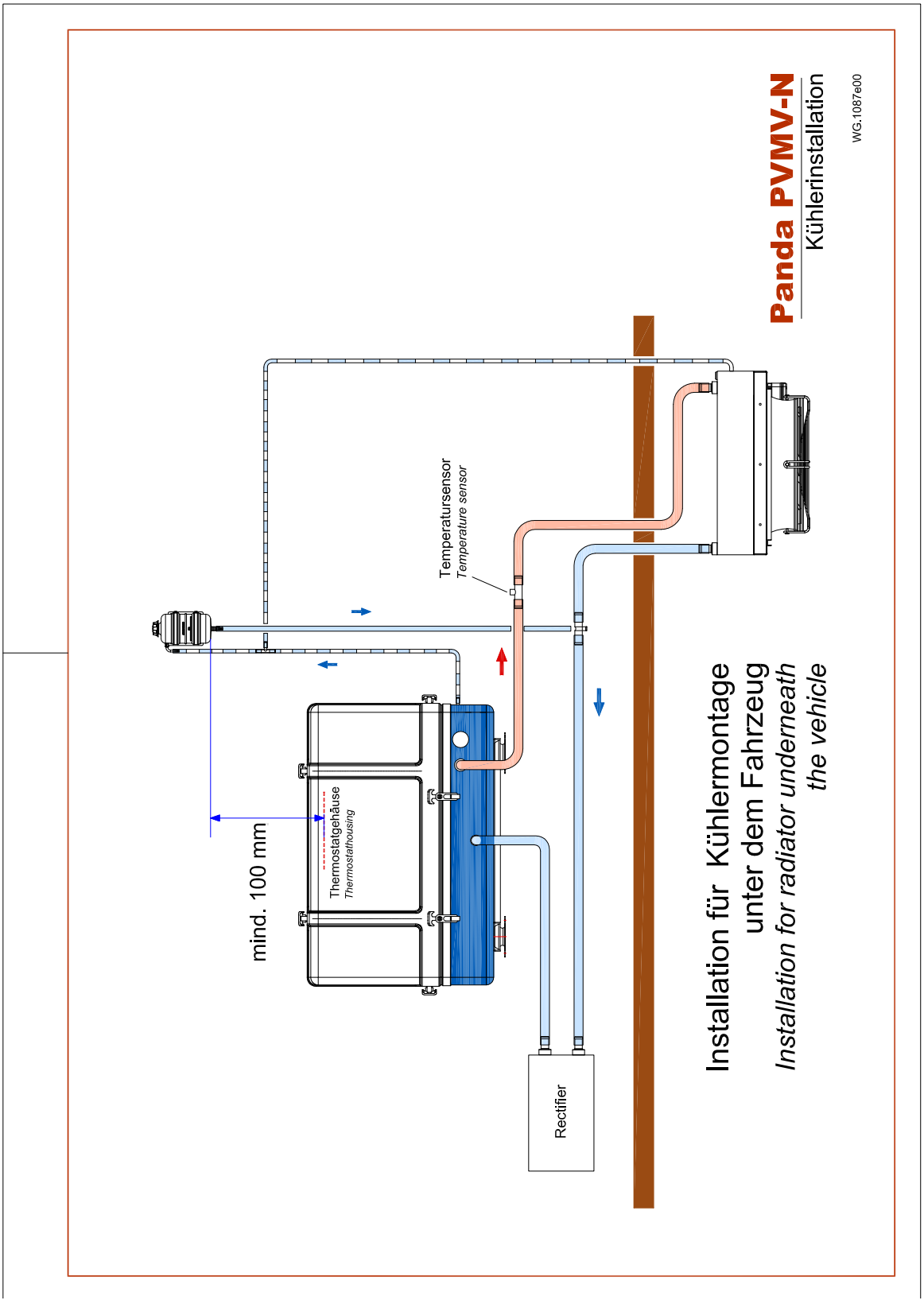
Installation für vertikale
Kühlermontage mit Intercooler

Panda PVMV-N
Kühlerinstallation
WG.1087e00

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

7.11.5 Installation Rectifier Unit -Schematic sample cooling water

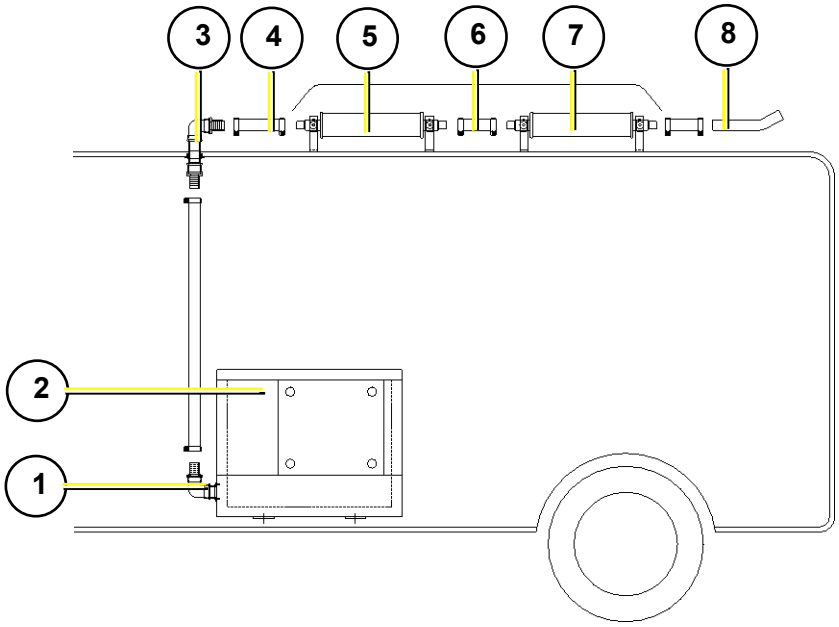
Fig. 7.11.5-1: ***Installation Rectifier Unit -Schematic sample cooling water***



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

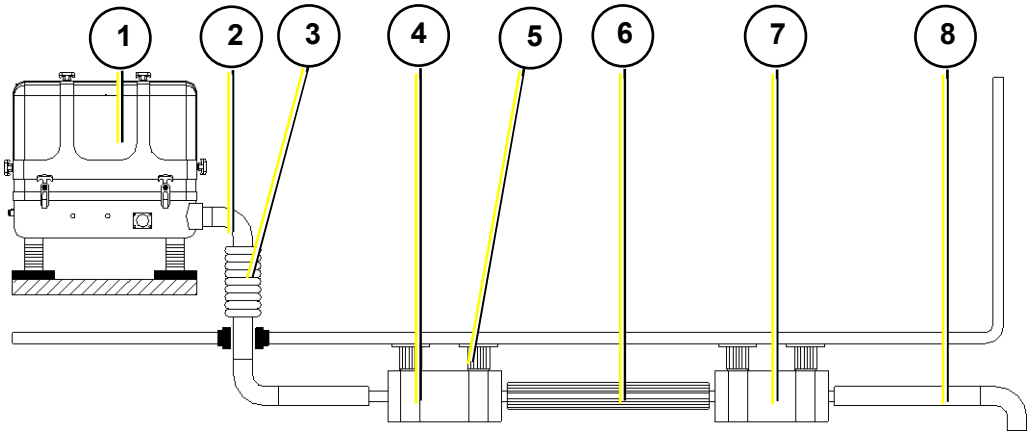
7.12 Exhaust installation

Fig. 7.12-1: 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. 7.12-2: 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

8. Maintenance Instructions

8.1 Personal requirements

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

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

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

Attention!

8.1.1 Hazard notes for the maintenance

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

Note!

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

Warning! Automatic start

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

Warning! Risk of injury

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

Do not run the generator with removed sound isolation cover

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

Warning! Risk of injury

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

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

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

Warning! Danger of fire

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

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

Danger! Danger of poisoning

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

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

Attention! Danger to Life - High voltage

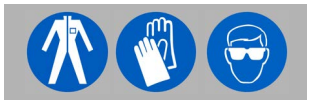
Generator, oil and antifreeze can be hot during/after operation. Risk of severe burns.

Warning! Hot surface/material

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

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

Instruction! Personal protective equipment necessary.



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

Attention! Disconnect all load

Batteries contains acid or alkalis.

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

See the operation and safety instruction from your battery manufacturer.

Batteries contain corrosive acids and lyes.

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

Warning!

Observe the instructions from your battery manufacturer.

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

Warning! System may be pressurised!

8.2 Environmental protection

Danger to the environment due to mishandling!

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

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

The disposal must be performed by a specialist disposal company.

Environmental protection!

8.3 Maintenance requirements

Control before starting

- 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 week

- Lubrication of actuator-trapezoid thread spindle

8.4 Maintenance interval

For the maintenance intervals, see the „General information for vehicles generators“ which are attached to this manual.

For generators with dynamic maintenance interval (for example generators with iControl2). Further informations are in the remote control panel manual/data sheet.

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

Note:

8.5 De-aerating of the coolant circuit

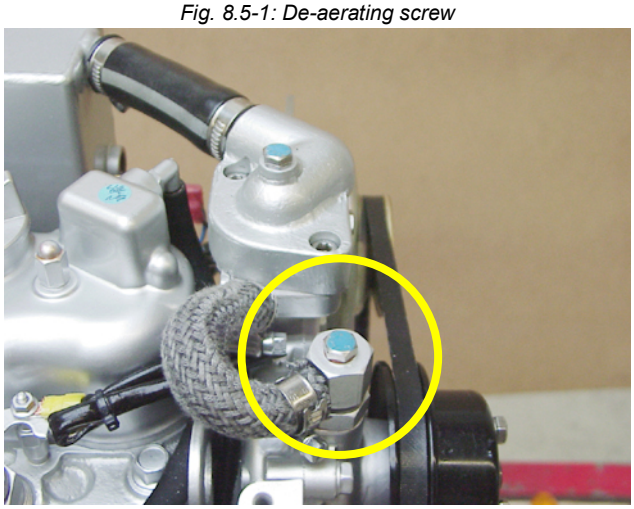
Particular hints for the de-aerating of the cooling system

If the coolant has been drained or if air has permeated into the cooling system by other reasons, a careful ventilation of the cooling system is necessary. The de-aerating process has to be rerunned several times.

Open de-aerating screw at the cooling water pump.

representative picture

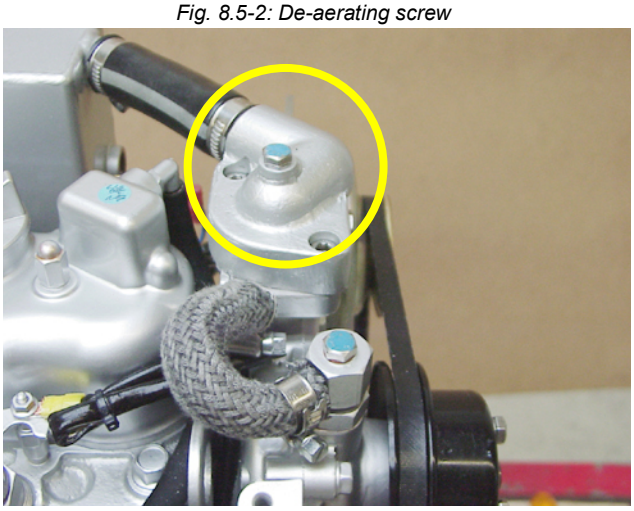
Fig. 8.5-1: De-aerating screw



Open de-aerating screw at the thermostat-housing

representative picture

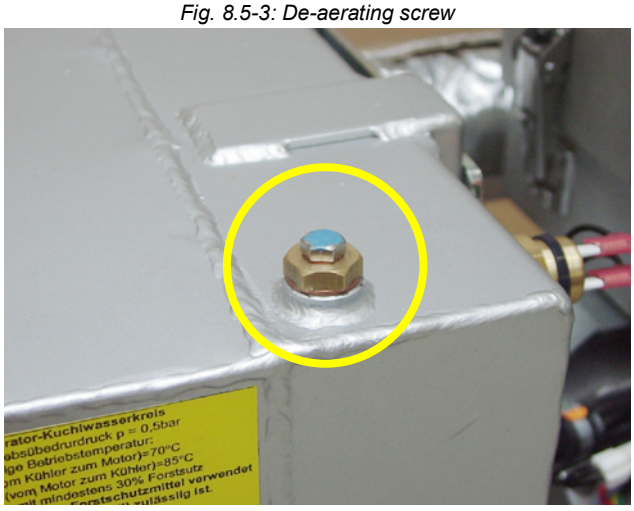
Fig. 8.5-2: De-aerating screw



Open de-aerating screw at the water-cooled silencer.

representative picture

Fig. 8.5-3: De-aerating screw



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

representative picture

Fig. 8.5-4: Cooling water filler cap

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 de-aerating screws and start the generator. Run the generator to maximally 60. Switch off generator.

Open the cooling water filler neck again and also the de-aerating screws at the same time.

Fill in again cooling water.

representative picture

Fig. 8.5-5: Cooling water filler cap

Repeat this procedure several times.

The generator can be started for 5 minutes, if there is no change. De-aerating must be then repeated two or three times.

To be sure that the coolant circulates it is very important that the hose pipe away from the genset also gets warm. After a short time the radiator and the reverse-flow pipe from the radiator to the genset also get warm.

Please wait until the temperatures raise more and check if the fan will activate.

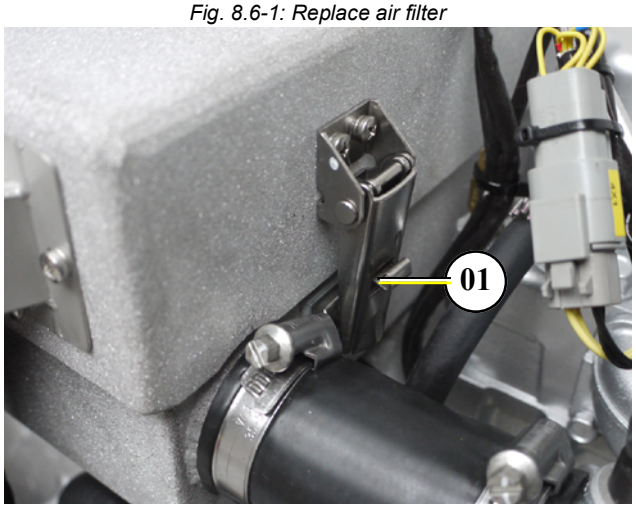
It makes sense to, once again, repeat the de-aerating procedure after a few days, in order to ensure that remaining air bubbles have been finally removed.

8.6 Replacing the air filter

1. Open the closure on the right-hand side of the air intake housing

   01. Closure

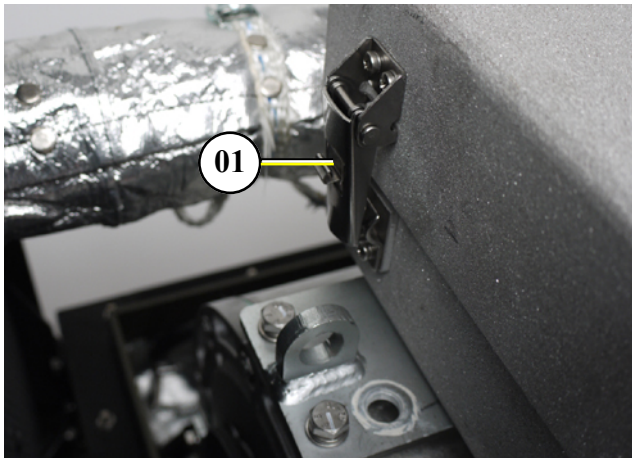
Fig. 8.6-1: Replace air filter



2. Open the closure on the left-hand side of the air intake housing.

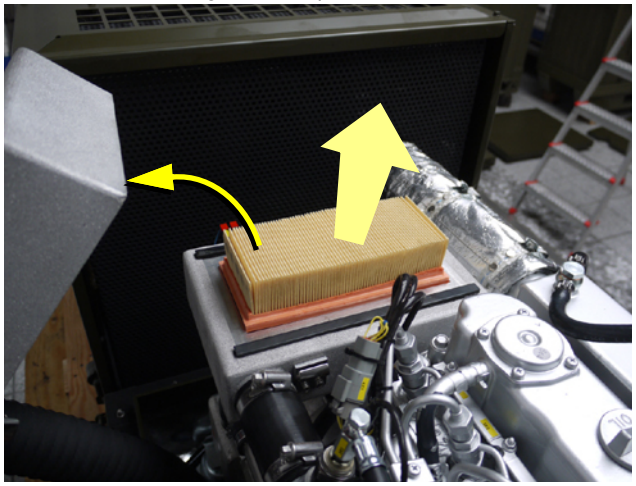
   01. Closure

Fig. 8.6-2: Replace air filter



3. Lift up the housing cover and pull it backwards.
4. Replace the air filter.
5. To reinstall, reverse the order of steps.

Fig. 8.6-3: Replace air filter



8.7 Replacing the air filter underpressure switch (optional component)

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

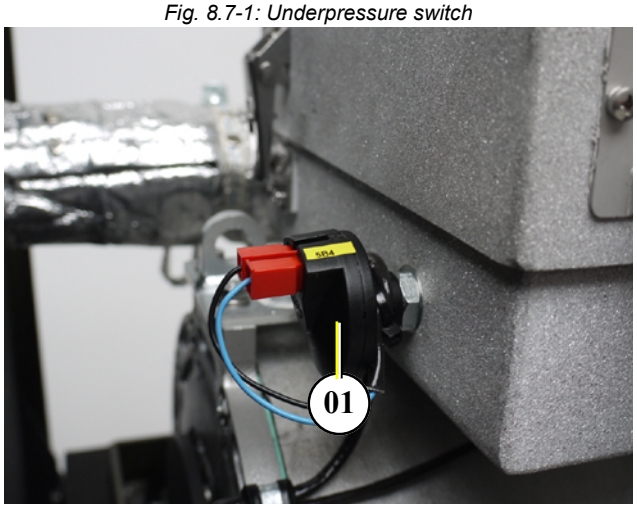
Ensure that the generator cannot be started up accidentally. Remove battery main switch.

ATTENTION!

For part numbers, refer to the spare parts catalogue.

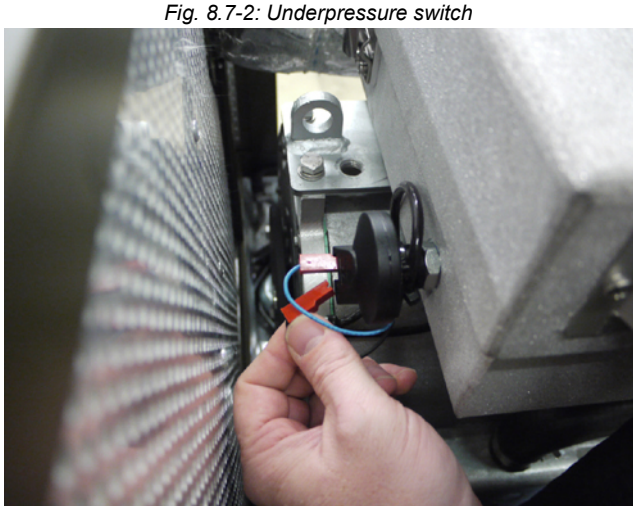
1. Open the capsule.
   01. Air filter underpressure switch

Fig. 8.7-1: Underpressure switch



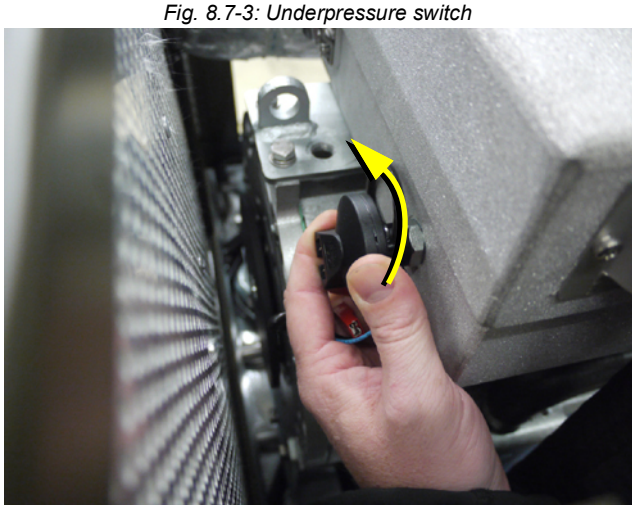
2. Disconnect electric supply line of the switch.

Fig. 8.7-2: Underpressure switch



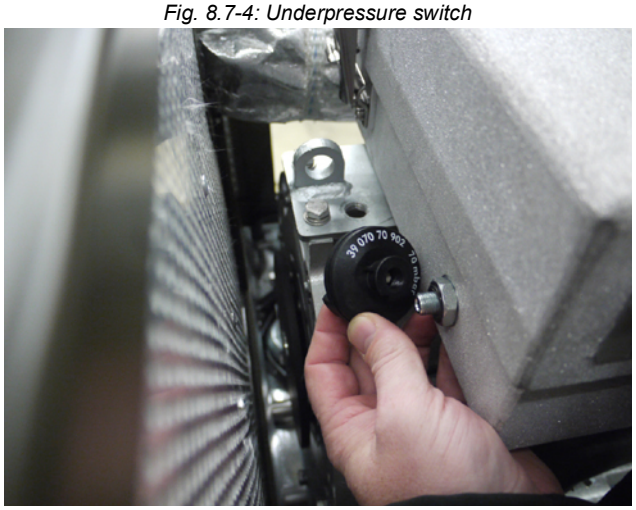
3. Unscrew and remove the switch by rotating counter-clockwise.

Fig. 8.7-3: Underpressure switch



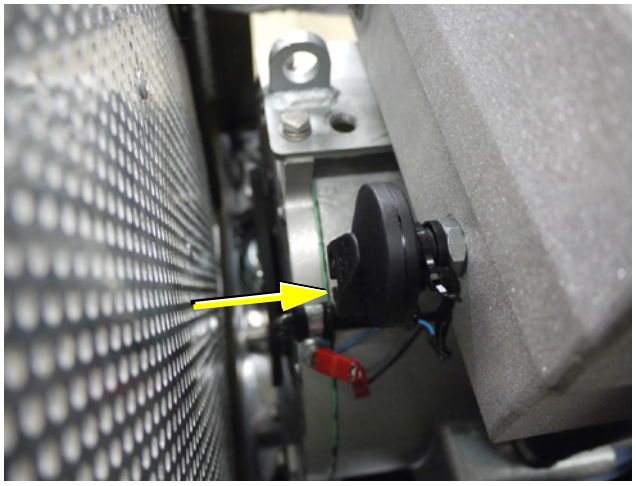
4. To reinstall, reverse the order of steps.

Fig. 8.7-4: Underpressure switch



5. For reinstallation, please note that the terminals must point downward.

Fig. 8.7-5: Underpressure switch



8.8 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, xControl or fpControl system do not need a failure bypass switch. At these generators the fuel pump can be activated by an option of the control panel. See Control panel manual.

1. Main power switch „OFF“

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

Note!

Generators with iControl, xControl or fpControl system has no failure bypass switch. The Fuel pump can be activated at the Control panel.

Please see Control panel manual for details.

3. Pressing the failure bypass switch for approx 3 - 4 minutes will loosen the ventilation screw located at the fuel solenoid valve. The button must continue to be pressed, whilst opening the screw. A large cloth or Kleenex tissue must be laid beneath the connection to prevent escaping fuel running into the capsule. If the fuel runs out without air bubbles, then the ventilation screw can be closed. Only then may the button be released.

   Use spanner size 10 mm.

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

Attention:

Fig. 8.8-1: Failure bypass switch

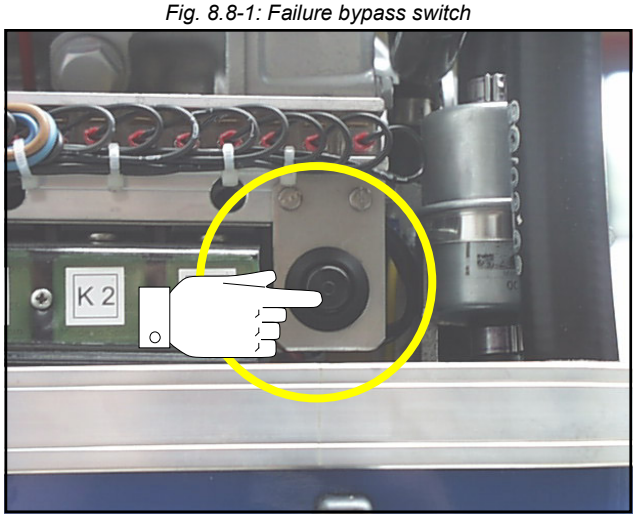
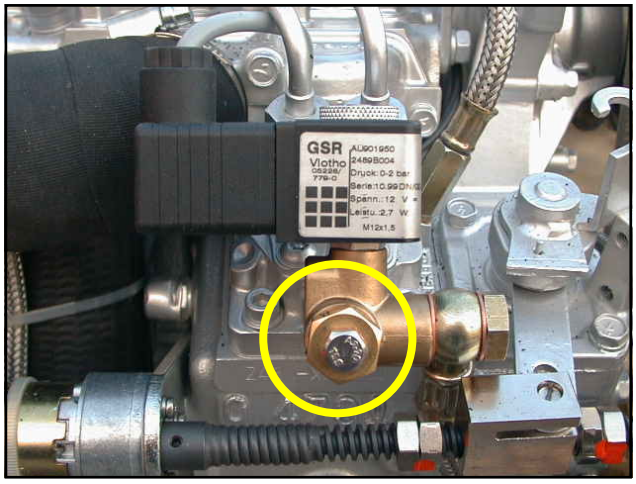


Fig. 8.8-2: Ventilation screw at the fuel solenoid valve



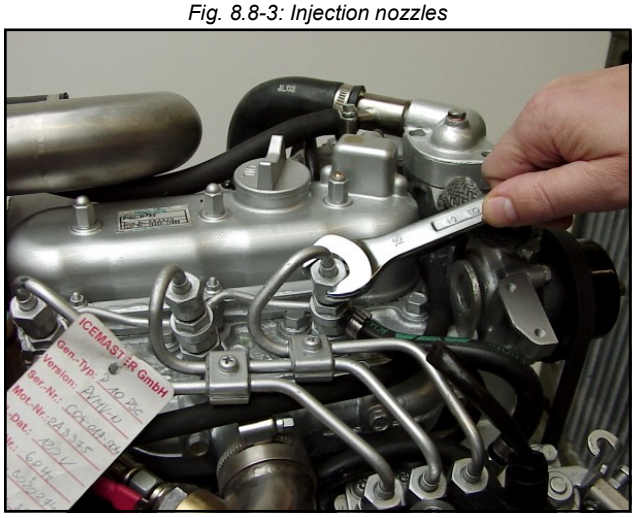
Note!:

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

   Use spanner size 17 mm.

6. Switch main switch „OFF“.

Fig. 8.8-3: Injection nozzles



8.8.1 Replacement of the fuel filter

Exchanging the filter, depending upon fuel contamination, should take place once a year 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. 8.8.1-1: Fuel Filter

8.9 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.

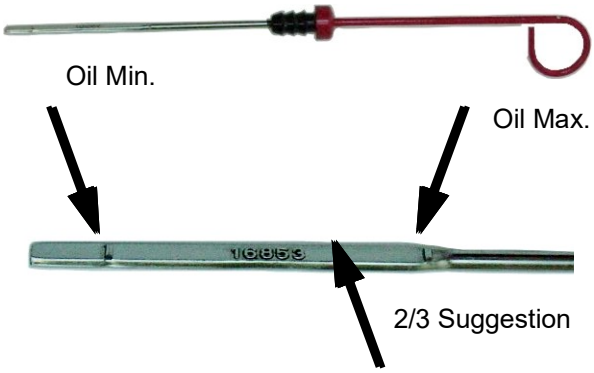
Oil dipstick

Fig. 8.9-1: Oil dipstick - Sample

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



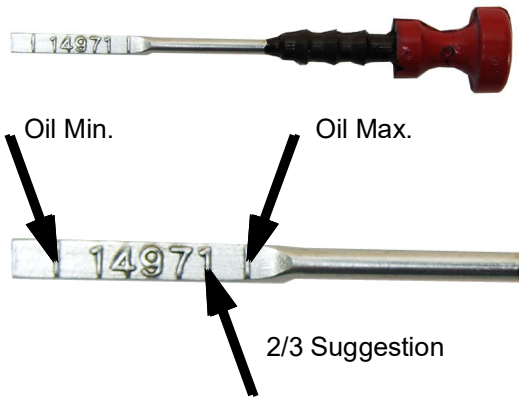
Oil dipstick EA 300 Engine

Fig. 8.9-2: Oil dipstick

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

We recommend an oil-level of 2/3.

Sample picture



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

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

8.9.1 Refilling oil

You require:

Engine oil

1. Check oil-level as described under section 8.9, “Checking oil-level,” on Page 88.
2. Oil dipstick is pulled out of the check rail.
3. Open the oil filler cap.
4. Fill in oil (approx. 1/2 litre) and wait for about 2 min. so this it can flow into the oil pan.
5. Wipe off the oil dipstick and put it into the check rail.

6. Pull the oil dipstick out of the check rail and check the oil-level. See section 8.9, “Checking oil-level,” on Page 88.

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

8.9.2 After the oil level check and refilling the oil

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

8.10 Replacement of engine oil and engine oil filter

You require:

- Engine oil. See attachment.

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

- Sealing for oil drain screw

- Personal protective gear

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

- Open-ended wrench for oil drain screw

- Paper towels and cloth

- Oil filter wrench

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

The generator must be placed at level.

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

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

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

Generator and coolant can be hot during and after operating.

Caution: Burn hazard!

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

1. Prepare generator.
   - Assure generator against accidental start.

- Open the generator casing.

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

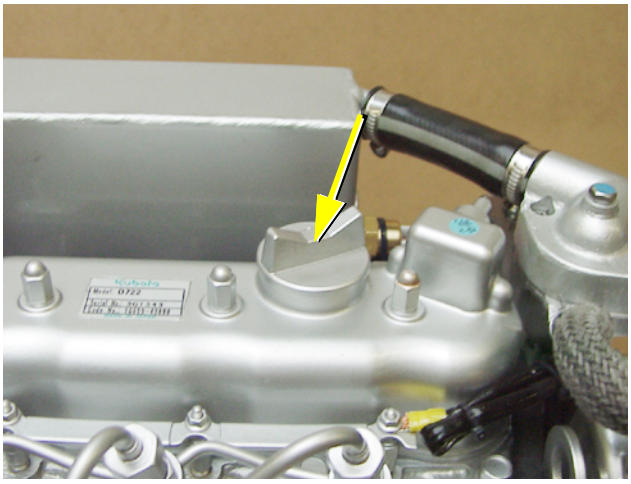
- with generators that have an internal oil drain hose: Open the lead-through for the oil drain hose (left turn of the sealing). Pull out the sealing with the oil drain hose.

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

2. Loosen oil filling cap

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

Fig. 8.10-1: Oil filling cap



3. Open oil drain screw.

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

Fig. 8.10-2: Oil drain hose

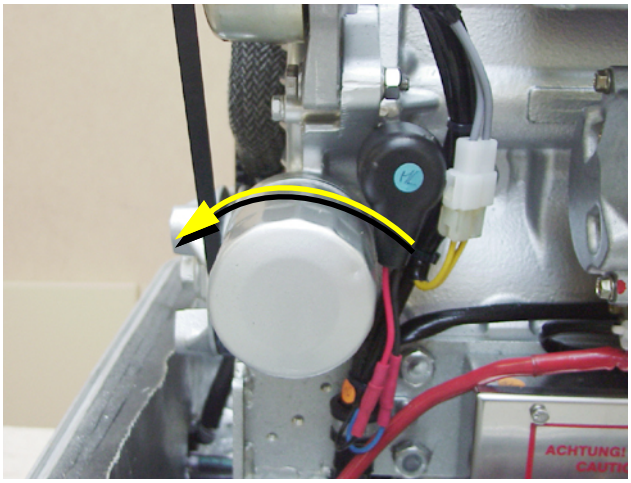
4. Discharge used oil.

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

5. Remove used oil filter / clean oil screen

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

Fig. 8.10-3: Oil filter



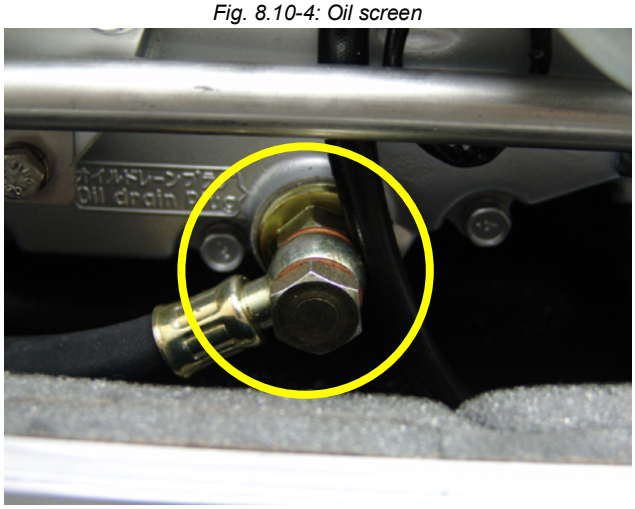
Oil screen with generators with EA300 engines

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

Use spanner size 17 mm.

Sample picture

Fig. 8.10-4: Oil screen



6. Preparing a new filter

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

Fig. 8.10-5: Oil screen sealing ring

7. Mounting the new filter

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

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

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

9. Check proper filling level. See section 8.9, "Checking oil-level," on Page 88.

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

10. Clean up

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

8.10.1 After the oil change

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

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

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

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

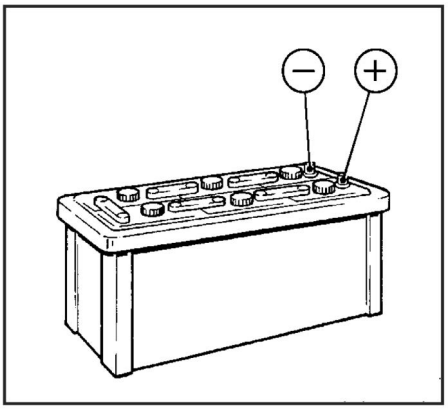
If from the battery manufacturer not otherwise mentioned.

8.11.1 Battery

8.11.1.1 Check battery and cable connections

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

Fig. 8.11.1.1-1: Battery

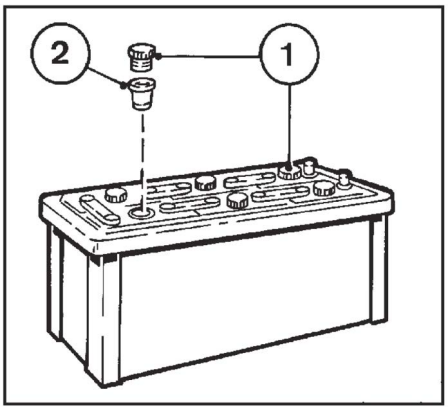


8.11.1.2 Check electrolyte level

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

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

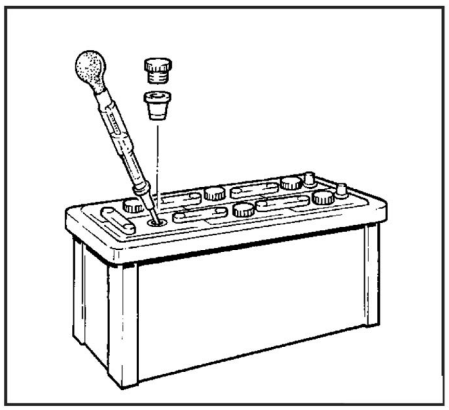
Fig. 8.11.1.2-1: Battery



8.11.1.3 Check electrolyte density

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

Fig. 8.11.1.3-1: Battery



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

Attention

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

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

Wear protective goggles!

Do not rest tools on the battery!

8.12 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.

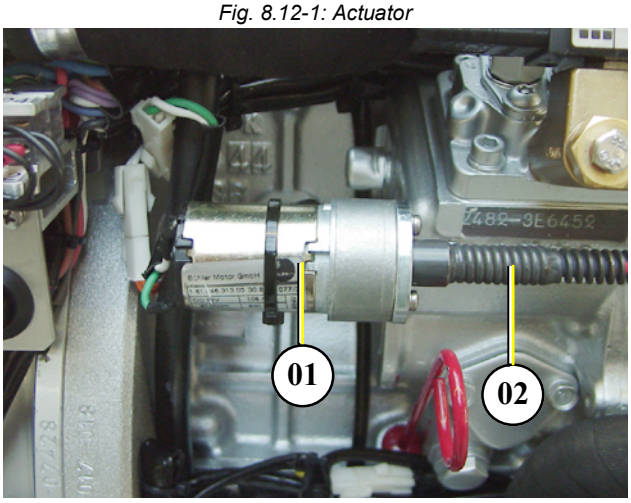
All screws at the actuator and the spindle must be ensured „solvable" with a screw safety grease.

01. Rev actuator

02. Spiral thread spindle

Representative picture

Fig. 8.12-1: Actuator



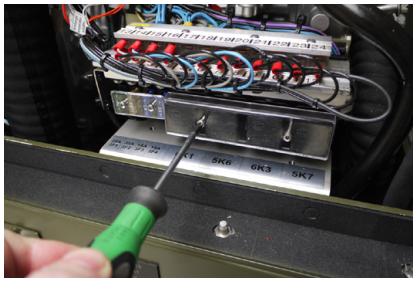
8.13 Replacing the operating current relays

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

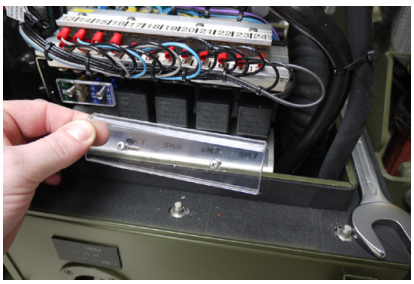
1. Remove the two fixing screws of the plastic cover using a size 0 or 1 phillips screwdriver.

Fig. 8.13-1: Relay



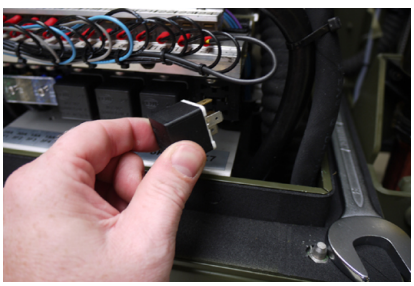
2. Remove the plastic cover.

Fig. 8.13-2: Relay



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

Fig. 8.13-3: Relay



8.14 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

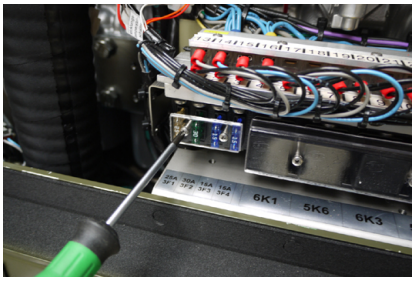
The fuses should be replaced every 2000 operating hours.

Figures similar!

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

Reprasentative picture

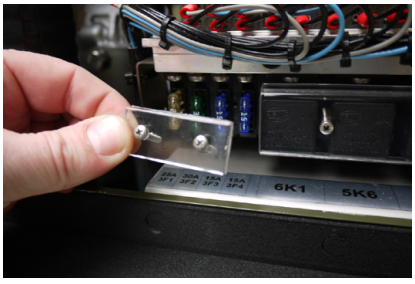
Fig. 8.14-1: Fuse



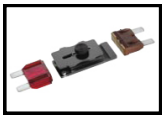
2. Remove the plastic cover.

Reprasentative picture

Fig. 8.14-2: Fuse



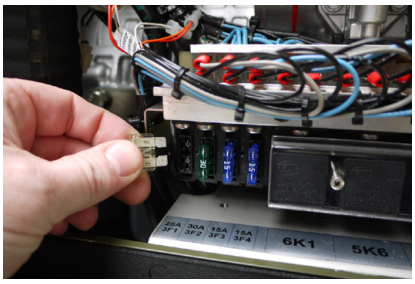
3. Using the fuse extraction tool, remove the fuse and replace it with a new one.



4. To reinstall, reverse the order of steps.

Reprasentative picture

Fig. 8.14-3: Fuse



8.15 V-belt replacement for the internal cooling water pump

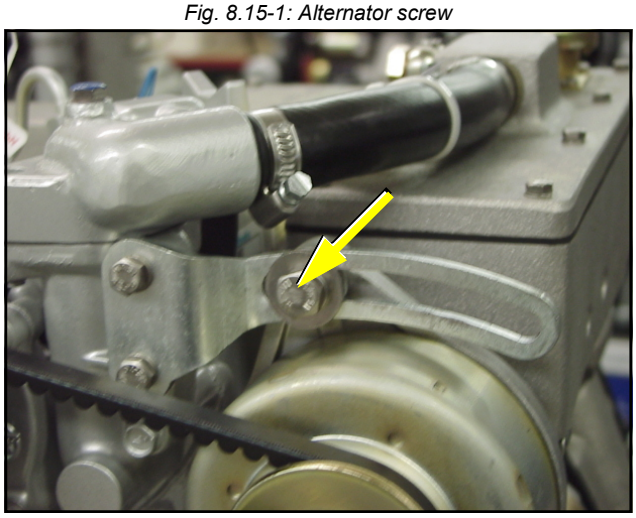
The V-belt wears in a short time due to high ambient temperature within the closed capsule (approx. 85 °C). The air in the generator capsule is not only warm but also very dry. Therefore it is possible, that the „softener“ in the rubber composers wear after a very short time of operation.

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

1. Loose the screw on the upper alternator mounting.

Sample picture

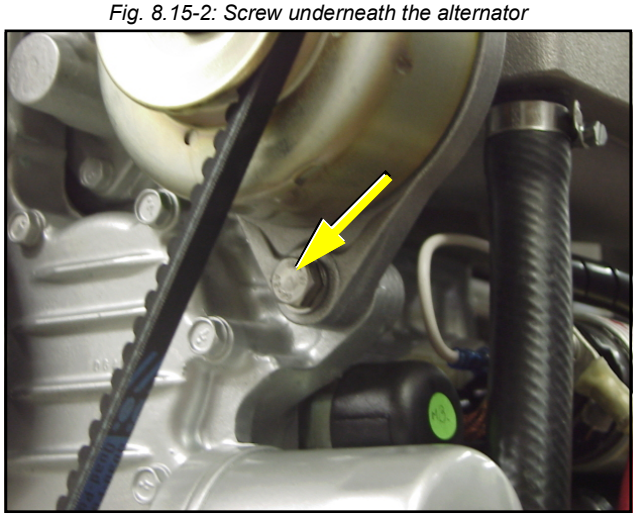
Fig. 8.15-1: Alternator screw



2. Loose the screw underneath the alternator.

Sample picture

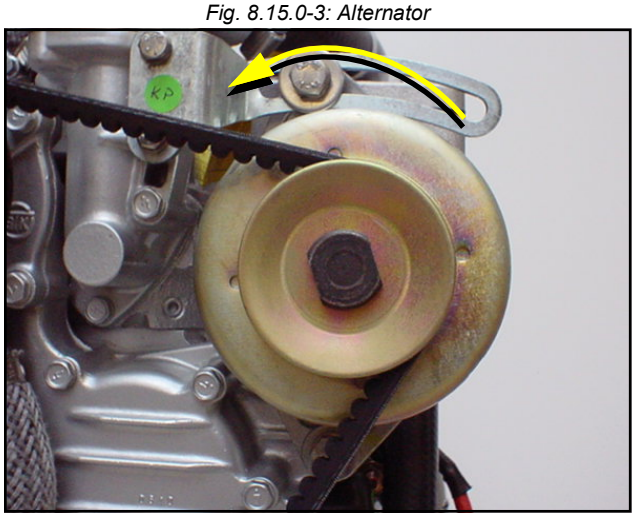
Fig. 8.15-2: Screw underneath the alternator



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

Sample Picture

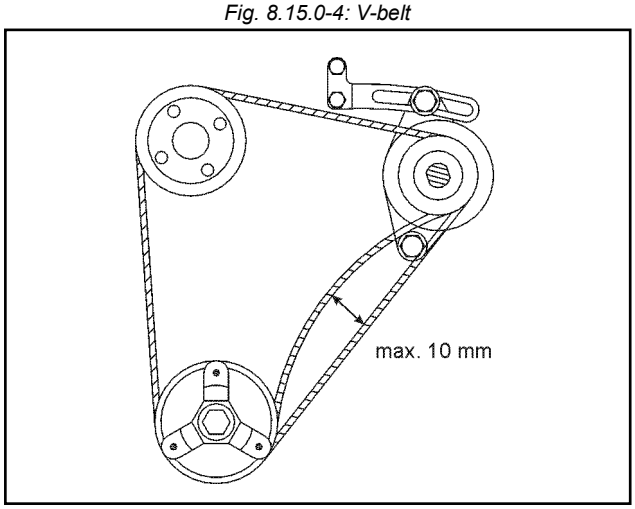
Fig. 8.15.0-3: Alternator



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

Sample picture

Fig. 8.15.0-4: V-belt



9. Generator Failure

9.1 Personal requirements

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

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

9.2 Hazard notes for the troubleshooting

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

Notice!

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

Warning! Automatic start

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

Warning! Risk of injury

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

Do not run the generator with removed sound isolation cover.

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

Warning! Risk of injury

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

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

Warning! Danger of fire

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

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

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

Danger! Danger of poisoning

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

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

Attention! Danger to Life - High voltage

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

Warning! Hot surface/material

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

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

Instruction! Personal protective equipment necessary.

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

Attention! Disconnect all load

9.3 Overloading the Generators

Please ensure that the genset is not overloaded. This is especially the case with multi aggregates. Overloading occurs when the electrical load (demand) induces a load torque in the generator which is higher than what the diesel drive motor can provide. Overloading causes the engine to run rough, burn oil, create excessive exhaust (environmentally unfriendly) and even to stall.

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).

In order to prolong the genset life expectancy, the nominal electrical demand on the system should not be more than 70 % of the rated genset power.

Bear this in mind when switching on electrical devices. This ensures a longer life expectancy.

Continuous performance is the uninterrupted running of the generator for many hours. The genset can be run for several hours at partial load (i.e. 2/3 of rated power), however it is not advised that it is run for more than 2-3 hours at full load.

The Panda is designed so as not to overheat even under extreme conditions. Note: The exhaust gas will become sooty during peak-load operation.

9.3.1 Effects of short circuiting and overloading on the Generator

The generator **cannot** be damaged by short circuiting or overloading. Short circuiting and overloading suppress the magnetic excitation of the generator, thus, no current is generated and the voltage will collapse. This condition is immediately offset once the short-circuit has been eliminated and/or the electrical overload removed.

9.3.2 Overloading the Generator with electric motors

Please note that electric motors require six to ten times more power than their rated capacity to start.

If the supplied generator power is lower than what the electric motor requires, the generator voltage will collapse. For applications where a high current draw is required to start an electrical device (such as an electric motor), the motor manufacturer should be consulted for possible solutions (for example: stronger capacitors, gradual power-up switches, or a specially designed starting unit for electric motors).

System efficiency can be improved by up to 50 % and motor current draw (to start) reduced by as much as 100 % if it is properly designed. If the inductive load (i.e. E-Motor) is more than 20 % of the generator nominal power, a compensation is necessary. See also the information brochure „Special information for operation of Panda generators with inductive load“.

9.3.3 Automatic voltage monitoring and auto-shut down

If air conditioning units (compressors) or other such valuable equipment are installed on-board, an automatic voltage monitoring unit should be installed to protect this equipment from possible sharp voltage drops. The voltage monitoring system shuts down the entire system (and therefore all users) through a circuit breaker relay as soon as the voltage falls below a set value (the monitor will also shut down the on board grid automatically when the generator is stopped). The monitoring system also switches the grid back on once the required voltage level is again reached. This ensures no damage is caused to the consumers and fittings through under voltage. Such a voltage relay can be obtained from wholesale dealers or as a complete unit from PANDA dealers.

The circuit is always automatically cut off if the generator is stopped.

9.3.4 Adjusting instructions for the spindle of the actuator

There are two independent regulation devices for the rev range of the generator. Limited upward and downward:

- With the regulation nuts at the spindle of the actuator left and right of the spindle nut.
- With an adjusting screw directly at the base of the rev regulator lever. (only up)

After all work at the components of the rev regulation is done the adjustment of the limitation must be checked.

01. Actuator

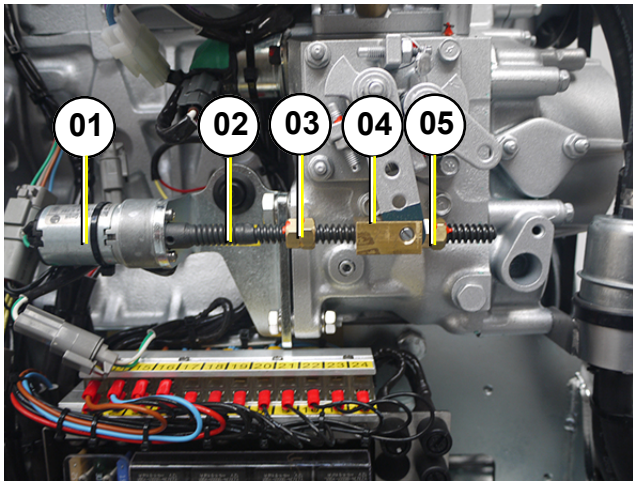
02. Spiral thread spindle

03. Regulating nuts max. revolution

04. Spindle nut with rev regulator lever

05. Regulating nuts minimum revolution

Fig. 9.3.4-1: Actuator



During any operation at the generator all consumers have to be switched off to avoid damages at the equipment.

9.3.5 Adjustment of the maximum upper revolution

- Disconnect the plug at the electrical supply line of the actuator.
- Loosen the countering nut at the limitation screw with a wrench SW 10.
- Connect an electrical voltage instrument (voltmeter) with a display range until 100 V DC to the clamps 7 and 8 of the VCS.
- Be sure that no electrical load is adjusted.
- Start the generator.
- Increase the rev of the generator by turning the spindle of the actuator manually until the voltmeter reach a value of 33 V DC.
- Turn the limit stop screw tight against the limit stop point at the rev regulator lever.
- Protect the limit stop screw with the countering nut.
- Check again if the voltage of the generator is limited to max. 33 V without load.

The adjustment of the upper limitation of the rev serves an additional safety. The value of the max. voltage lies 5V above the normal operating border.

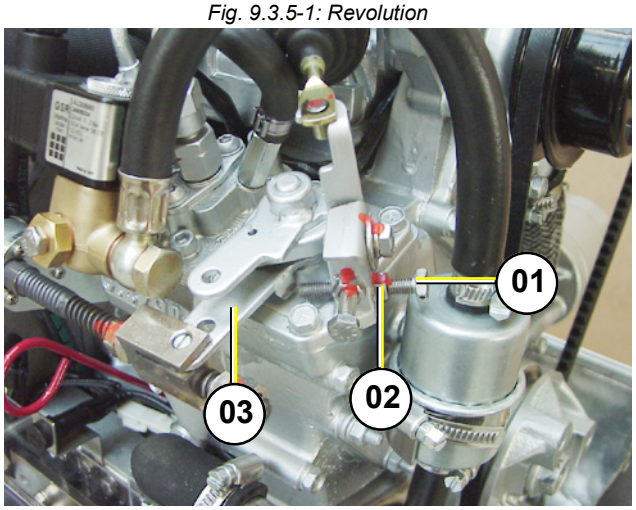
01. Countering nut

02. Adjusting screw for upper limitation

03. Speed regulator lever

This adjustment should not be changed, otherwise the warranty expires.

Fig. 9.3.5-1: Revolution



9.3.6 Adjustment of the normal rev limitation

Adjusting the lower limitation:

- Disconnect the plug at the electrical supply line of the actuator.
- Loosen the countering nuts with two wrench SW 10.
- Connect an electrical voltage instrument (voltmeter) with a display range until 100 V DC to the clamps 7 and 8 of the VCS.
- Be sure that no electrical load is adjusted.
- Start the generator.
- Decrease the rev of the generator by turning the spindle of the actuator manually until the voltmeter reach a value of 23 V DC.
- Both nuts must be screwed tight.
- Check again if the lower voltage of the generator is limited to min. 23 V without load.

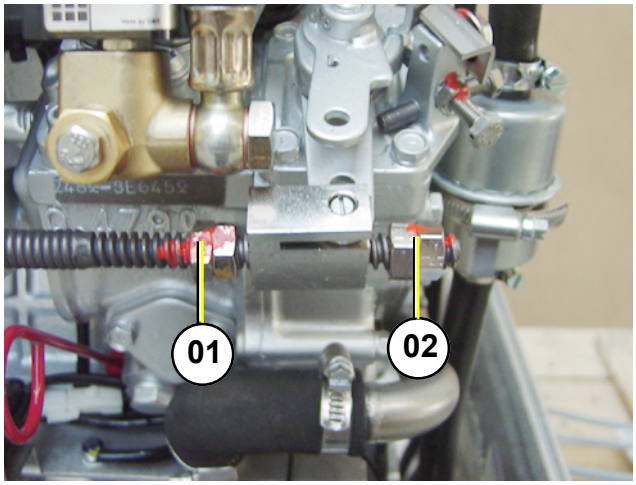
Adjusting the upper limitation:

- Proceed like before and tighten the countering nuts at a voltage of max. 33 V without load.
- Check again if the upper voltage of the generator is limited to this value.

01. Adjusting nut for upper rev limitation

02. Adjusting nut for bottom rev limitation

Fig. 9.3.6-1: Normal rev setup



If the adjustment is finished the plug of the actuator must be re-connect for operation.

9.3.7 Effects of a longer overload of the generator to the actuator

If the generator is overloaded the voltage falls on account of a not adequate motor power under the nominal value. The actuator stays at the upper keystroke and tries to rev up the diesel engine. An internal regulation limits the current to the actuator, nevertheless a longer overload can damage the winding of the actuator. (short of the winding). The motor gets not strictly inoperative but it can happen that the cranking torque of the actuator is getting weak. This has the consequence that the rev spindle can not be turned to all positions faultless. Therefore the voltage of the generator is regulated not good or sometimes not at all.

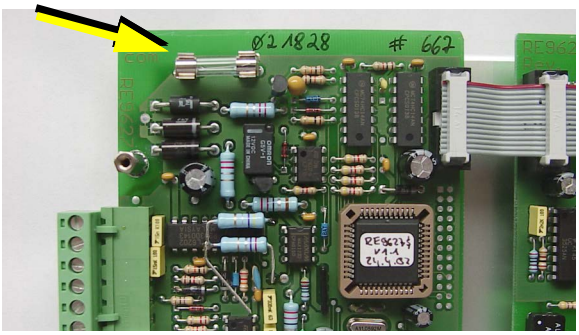
If you notice that the spindle of the actuator doesn't run faultless, first check if the aggregate was overloaded for a short time and if thereby the winding of the actuator was damaged. Then the actuator has to be changed.

Check firstly the electrical fuse on the control printed circuit board if the actuator will not turn at all.

Change fuse here

(1,6 A slow to blow)

Fig. 9.3.7-1: VCS- fuse



The generator can’t be damaged by an overload because the winding is overload- and short-circuit safety. But damages are possible in the periphery. Especially connected consumers are endangered because a lower voltage can damage them by order.

Possible disturbances in the area of the rev regulation „VCS“	
Failure	Cause

Possible disturbances in the area of the rev regulation „VCS“	
The spindle of the actuator jams	- not regularly lubricated. surface is mechanical damaged. - actuator is defect (short of winding). - defect of the VCS control. - signal DC missing. - limiting nut jams the spindle.
Fuse on the printed circuit board of the VCS control is melted.	- constant overload of the generator.

Steps to check the voltage control by a disturbance:

1. Switch off all electrical consumers.
2. Disconnect the plug of the actuator.
3. Turn the actuator manually to check if the adjusting nut is jammed to the limit stop points.
4. Turn the actuator manually to check if the adjusting nut on the spindle runs faultless. The spindle has a clockwise rotating thread, use a wrench SW14 to the assistance take.

If there is no result by these steps the actuator is working mechanically correct. After this the electrical components must be checked:#

1. Connect the plug of the actuator.
2. Start the generator.
3. Turn the actuator by hand and check if the spindle turns back by the motor.
4. If the motor reacts strongly to the manual turn (the motor can’t normally hold with the fingers) the drive will be working correctly. If the voltage control works faulty anyway there is a fault in the control VCS.

The actuator don’t turns	The actuator is defect and have to be changed.
The actuator turns and works faultless:	1. Check the fuse on the VCS printed circuit board. 2. Check if the sense voltage is wired to the VCS circuit board. 3. Check if the VCS supply voltage is wired to the VCS. 4. Check if the VCS outlet signal for the actuator is wired.

9.3.8 Low Generator output voltage

Before working on the system read the see „Safety fist!“ ATTENTION!

Panda generators are designed such that even high electrical disruptions will not cause serious damage to the generator.

If the generator does not produce any voltage while the diesel drive engine is running, the suspected cause lies outside the generator capsule.

- electrical load not switched off prior to start
- short circuit somewhere in electrical system
- electrical overload

9.3.8.1 If the actuator is not moving the following points are necessary:

1. The motor turns only weak:

- The actuator has shorts in the winding and must be changed. (pay attention that the generator is not overloaded anymore.)

2. The actuator does not move but the spindle can be turned manually:

- Disconnect the plug of the actuator. Connect provisional an external voltage source 12 V-DC to the motor. If the actuator with the external voltage supply does not turn likewise, the actuator is defective. Exchange actuator.

Change the VCS printed circuit board if the points above carries no clearance.

9.3.8.2 Check the limitation of the generator voltage

The mechanical voltage limitation must be checked regularly. The following steps have to be done:

1. Disconnect the plug of the actuator.
2. Switch off all consumers.
3. Connect an electrical voltmeter.
4. Start the generator.
5. Turn the actuator manually to the lower limit stop point.
6. The voltage must be 23 V.
7. Turn the actuator manually to the upper limit stop point.
   The max. voltage is 96 V.
8. A new adjustment is necessary in case of deviants.

9.4 Testing Generator stator windings

9.4.1 Testing Generator stator winding for „shorts“ ground

The generator stator windings can be tested as follows:

1. Ensure that the generator is „OFF“ and cannot be accidentally started. Disconnect the battery.
2. Remove the cover of the power terminal box.
3. All terminal box connections are to be removed. (See appropriate circuit diagram.)
4. Remove all cables.
5. A check of the power terminal box is made by means of a multi meter to determine whether there is continuity between the individual windings connections.

If continuity is detected for any of the combinations, the generator must be sent to the factory for inspection and repair. If this is not possible, the stator can be rewound by a qualified trades person/technician. Winding diagrams can be obtained from Fischer Panda GmbH, Germany.

This test, unfortunately, is carried out at very low voltage (9 V) when a normal multi meter is used. Therefore only positive short circuits will be displayed. There is the possibility that a short circuit will occur in spite of a negative test result (i.e. moisture). A reliable check can only be carried by using an essentially higher voltage (approx 500 V). This type of measuring instrument is normally only used by experts.

If in doubt an electrician must check the winding for a short circuit with an isolation meter.

Rectifier at the Panda generator

Fig. 9.4.1-1: Rectifier

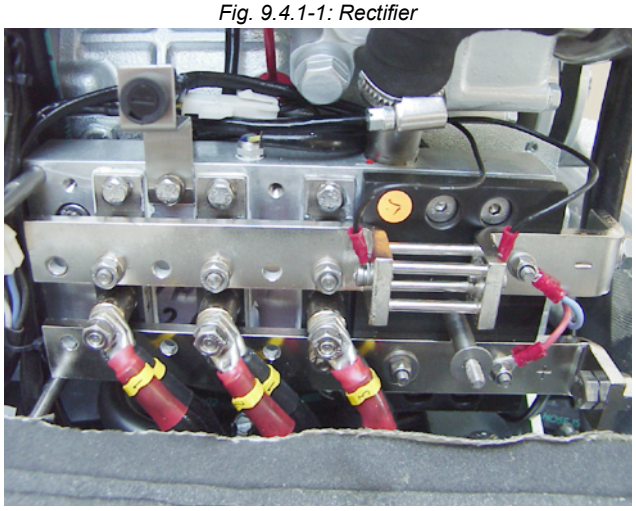
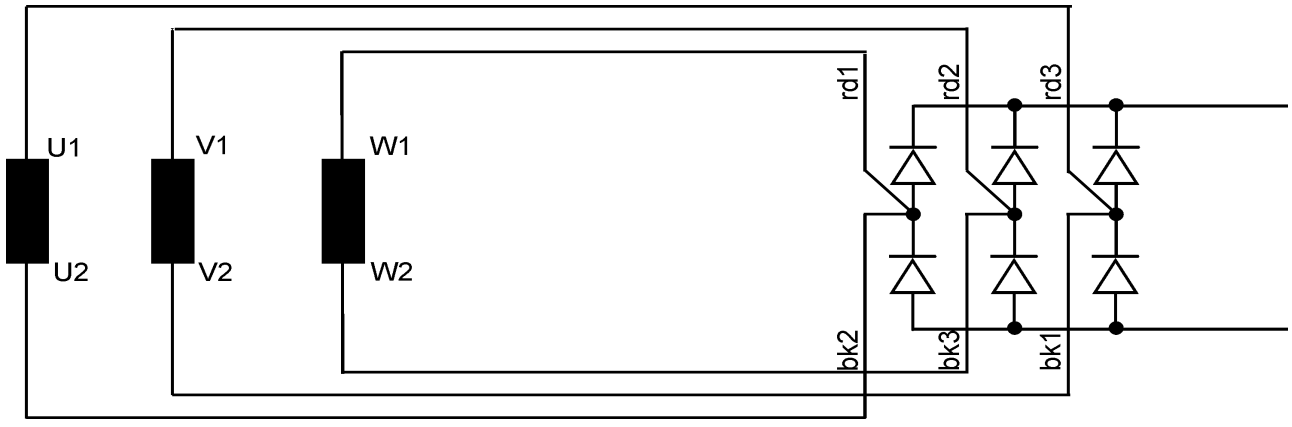


Fig. 9.4.1-2: Wiring diagram



9.4.2 Coil resistance measurements in stator windings

If the testing set determined no earthing, the coil windings of the generator must be controlled with a resistance measuring instrument (ohm meter). To measure coil resistance a meter capable of measuring low resistances (Milli-Ohm resolution if possible) accurately. The measured resistance values should be close to the same between the following terminals:

U1-U2, V1-V2, W1-W2

9.4.2.1 Checking windings.

- Disconnect all connections from the power terminal box. Loose the nuts and deduct the cables.
- Remove all winding connections from the power terminal box.
- Switch your meter in resistance range. When you put the probes of you meter together, you should get a reading of 0.00Ohm. When you isolate the probes, the reading will be Overflow. Please do this tests to check your meter.
- Measure of the resistance within the individual windings. The values should be very small. It mainly depends on the relation between the values. Some measuring instruments operate very inaccurately, if the measured values are very small.
- Resistance measure between different windings. If the value is in the Giga ohm area, the coil is correct.

If you find any abnormality, when doing this test, please ask your Fischer Panda dealer.

If strong deviations are measured in the individual coil windings, there is a coil short-cut in one coil. No voltage is induced.

The actual values between the coil windings are not determined so exactly. It depends on the fact that the values of all three measurements are as alike as possible. Deviations among themselves refer to a coil short-cut. In this case the generator must be newly wound by a specialist.

9.4.3 Measuring the coil inductive resistance

Unfortunately the checking of the ohmic resistance permits still no reliable statement about the condition of the coil. If the ohmic resistance values arise inequalities between the coils, that is a safe indication for the fact that the coil is defective. To be exactly sure the inductive resistance of the coil have to be measured. For this a special measuring instrument is necessary, which measures the inductance of a coil.

Inductance is measured in the same way as the ohmic resistance, i.e. the coils are compared. The value is indicated in mH (milli Henry).

Note: These values depends strongly from the measuring method (kind of the measuring instrument).

An alternative test method to check the stator windings can be performed as follows:

1. Ensure that the connection to the circuit system is disconnected.
2. All electrical wires in the power terminal box must be disconnected.
3. Reconnect the battery connections.
4. Start the generator.
5. Measure the voltages between the following terminals and compare for symmetry:

U1-U2, V1-V2, W1-W2

9.5 Starting problems

9.5.1 Fuel solenoid valve and stop solenoid

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.

1. Fuel solenoid valve

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“ turning 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.

2. Solenoid for engine stop

The solenoid for engine stop is located at the injection pump.

1. Energized to stop

By pressing the „OFF“-button on the remote control panel, the solenoid is supplied with voltage and attracts, whereby the fuel injection pump resets to the zero position and the generator stops.

2. Energized to run

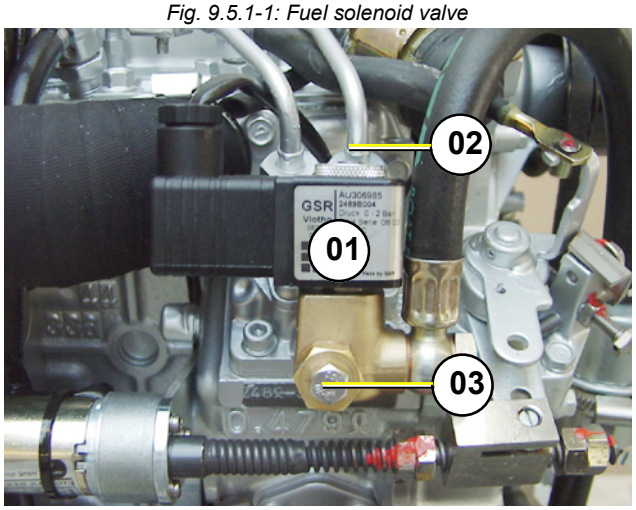
This version is equipped with two solenoids an actuating and a stop solenoid. After being fed with current, the actuating solenoid attracts the adjusting lever of the fuel injection pump, through which the fuel can flow. The actuating solenoid is switched parallel to the starter motor, the stop solenoid is switched parallel to the fuel pump. The position is held by the stop solenoid as long as the generator is running.

01. Fuel solenoid valve

02. Fuel injector nozzles

03. Ventilation screw

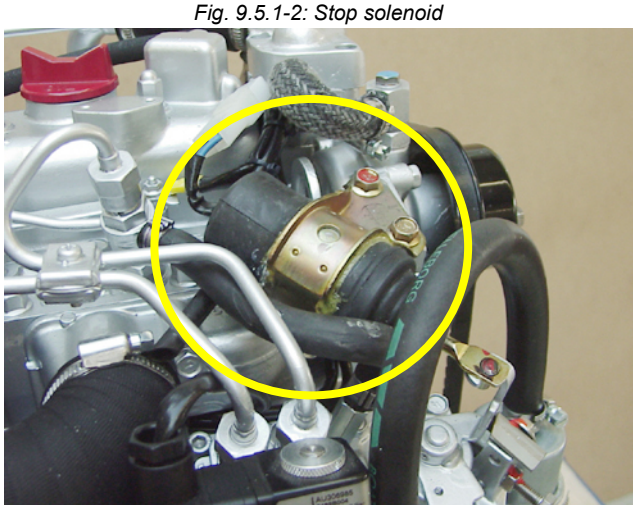
Fig. 9.5.1-1: Fuel solenoid valve



Stop solenoid for engine stop

Energize to stop - sample picture

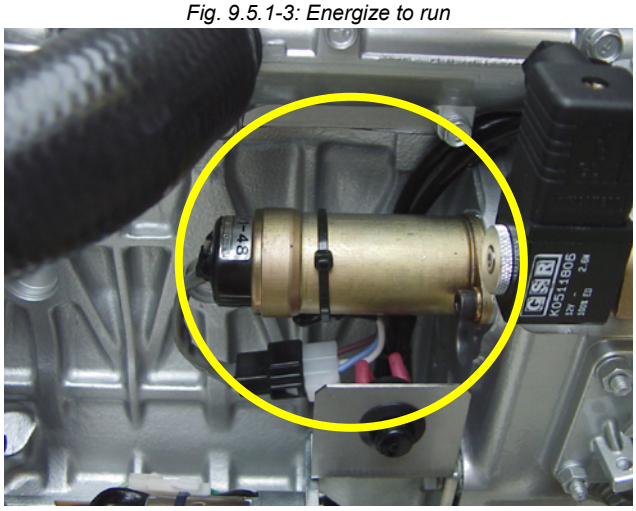
Fig. 9.5.1-2: Stop solenoid



Stop solenoid for engine stop

Energize to run - sample picture

Fig. 9.5.1-3: Energize to run



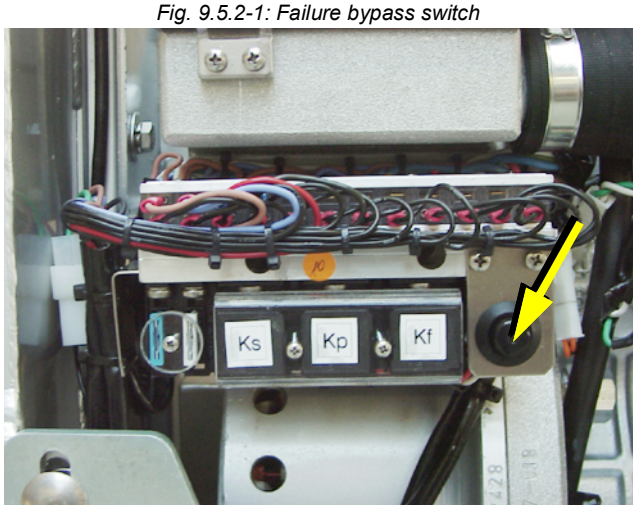
9.5.2 Failure bypass switch

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

Failure bypass switch

sample picture

Fig. 9.5.2-1: Failure bypass switch



This period can be reduced by pushing the button on the front of the generator. The generator can be started by

means of the remote control as long as the button is depressed. The switch/button bypasses any faults allowing the generator to run.

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

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

Notice!:

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

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

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

9.6 Troubleshooting table

GENERATOR OUTPUT VOLTAGE TOO LOW **If the generator delivers less than nominal voltage („under voltage“), there can be various reasons for this:**	
Cause	**Solution**
Generator is overloaded.	Reduce the electrical load. (Switch off consumers)
Motor is not reaching the rated rpm.	Refer to „motor faults“ section.
Actuator is not in maximum position.	Check actuator resp. renew.
VCS-voltage controller defective or wrong adjusted.	Check resp. renew.

GENERATOR VOLTAGE TOO HIGH (MORE THAN NOMINAL VOLTAGE) **The following reasons may be the cause, if the generator delivers more than 80V („overvoltage“):**	
Cause	**Solution**
The engine is running at the wrong speed.	Check the speed of the motor with a rev or frequency counter, set the correct speed.
VCS-voltage controller defective or wrong adjusted.	Check resp. renew.
Actuator defective.	Check resp. renew.

GENERATOR VOLTAGE FLUCTUATES	
Cause	**Solution**
1. Fault or defect on the consumer side. 2. A motor fault.	1. Check if the power requirement of the consumer fluctuates. 2. 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. 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**

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

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 Kubota-Service. (refer to Kubota motor-manual)
Cooling water in combustion chamber.	1. Turn generator „OFF“ at control panel. 2. Remove the glow plug (see Kubota-manual). 3. Rotate the motor by hand carefully. 4. Check if there is water in the oil and change both oil and filter if necessary. 5. Determine cause for excess water in the combustion chamber. The excess water can be caused by a defective air vent in the cooling water system, which should be checked and cleaned, or replaced if faulty.

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

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

MOTOR SWITCHES ITSELF OFF	
Cause	**Solution**
Fuel solenoid valve or throttle shut solenoid is not switching off.	Check wire connections to solenoid. Check valve functions as in the „Inlet Fuel Solenoid Valve“ or in the throttle shut off solenoid sections. 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, inlet water filter, extra heat exchanger coolant flow.

MOTOR STOPS BY ITSELF	
Lack of oil. (oil pressure sensor tripped).	Check oil-level and if necessary top up. Check motor's oil-pressure and have repaired by Kubota-Service if necessary.

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 Kubota-manual).
Poor fuel quality.	Use better quality diesel (recommended: 2-D Diesel).
Poor combustion.	Incorrect AFR (air/fuel ratio) due to motor timing adjustment. Have motor serviced by Kubota.
Low compression pressure.	See Kubota motor manual.

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

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

10. Appendix

10.1 Coolant specification

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

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

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

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

10.1.1 Coolant mixture ratio

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

10.2 Engine oil

10.2.1 Engine oil classification

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

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

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

Fig. 10.2.1-1: Engine oil type.

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

10.3 Fuel

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

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

10.4 Cable cross section

Fig. 10.4-1: Cable cross section

length	1 - 3 m	4 - 6 m	7 - 10 m	11 - 15 m	16 - 20 m
16 mm²	70 A	63 A	55 A	48 A	42 A
25 mm²	112 A	100 A	88 A	75 A	63 A
35 mm²	145 A	130 A	110 A	100 A	90 A
50 mm²	225 A	200 A	175 A	150 A	125 A
70 mm²	275 A	250 A	225 A	195 A	170 A
95 mm²	340 A	300 A	280 A	260 A	220 A

10.5 ATTENTION!

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

ATTENTION!

10.6 Technical data

Fig. 10.6-1: Technical data

	AGT 5000/ AGT 6000	AGT 8000	AGT 12000	AGT 13000 / AGT 14000	AGT 16000
Model	Z482	D722	D902	D1105	V1505
Type	Vertical, water-cooled, 4-cycle diesel engine				
Number of cylinder	2	3	3	3	4
Bore	67 mm	67 mm	72 mm	78 mm	78 mm
Stroke	68 mm	68 mm	73,6 mm	78,4 mm	78,4 mm
Total displacement	479 cm³	719 cm³	898 cm³	1123 cm³	1498 cm³
Combustion chamber	Spherical Type (ETVCS)				
SAE NET Intermittent (SAEJ1349)	9,3 kW / 3600 rpm	14,0 kW / 3600 rpm	17,5 kW / 3600 rpm	18,7 kW / 3000 rpm	25,0 kW / 3000 rpm
SAE NET Continuous (SAEJ1349)	8,1 kW / 3600 rpm	12,2 kW / 3600 rpm	15,2 kW / 3600 rpm	16,4 kW / 3000 rpm	21,6 kW / 3000 rpm
Maximum bare speed	3800 rpm	3800 rpm	3850 rpm	3200 rpm	3200 rpm
Minimum bare idlingspeed	900 to 1000 rpm			850 to 900 rpm	800 to 900 rpm
Order of firing	1-2	1-2-3		1-3-4-2	
Direction of rotation	Counter-clockwise (viewed from flywheel side)				
Injection pump	Bosch MD Type mini pump				
Injection pressure	13,73 MPa, 1991 psi (140 kgf/cm²)				
Injection timing (Before T.D.C.)	0,366 rad (20°)			18°	18°
Compression ratio	23,5:1		24:1		
Fuel	Diesel Fuel No. 2-D				
Lubrication (API classification)	above CF			above CD	

	AGT 5000/ AGT 6000	AGT 8000	AGT 12000	AGT 13000 / AGT 14000	AGT 16000
Lubiration capacity	2,5 l	3,8 l	3,7 l	5,1 l	6,0 l
Fuel consumption [1]	approx. 0,6-1,7l	approx. 0,8-2,2 l	approx. 1,2-3,1 l	approx. 1,4-3,6 l	approx. 1,9-5,0 l
Oil consumption	max. 1 % of fuel consumption				
Dimensions (length x width x height)	341x389x520 mm	426x389x520 mm	467x521x544 mm	497,8x396x608,7 mm	591,3x396,0x613,7 mm
Dry weight	53,1 kg	63,1 kg	72,0 kg	93,0 kg	110,0 kg
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction				
Recommend starter battery size	12 V, 55 Ah equivalent	12 V, 55 Ah equivalent	12 V, 55 Ah equivalent	12 V, 75 Ah equivalent	12 V, 75 Ah equivalent
Recommend cable cross size starter battery cable *Length 4 meter max.*	25 mm²	25 mm²	25 mm²	25 mm²	25 mm²
Max. exhaust back pressure	9,3 kPa 93 Millibar	9,3 kPa 93 Millibar	9,3 kPa 93 Millibar	10,7 kPa 107 Millibar	10,7 kPa 107 Millibar

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

	AGT 25000				
Model	V1505T				
Type	Vertical, water-cooled, 4-cycle diesel engine				
Number of cylinder	4				
Bore	78 mm				
Stroke	78 mm				
Total displacement	1498 cm³				
Combustion chamber	Spherical Type (ETVCS)				
SAE NET Intermittent (SAEJ1349)	31,3 kW / 3000 rpm				
SAE NET Continuous (SAEJ1349)	27,2 kW / 3000 rpm				
Maximum bare speed	3200 rpm				
Minimum bare idlingspeed	800 to 900 rpm				
Order of firing	1-3-4-2				
Direction of rotation	Counter-clockwise (viewed from flywheel side)				
Injection pump	Bosch MD Type mini pump				
Injection pressure	13,73 MPa, 1991 psi (140 kgf/cm²)				
Injection timing (Before T.D.C.)	18°				
Compression ratio	23,5:1				
Fuel	Diesel Fuel No. 2-D				
Lubrication (API classification)	above CD				
Lubiration capacity	6,7 l				
Fuel consumption [1]	approx. 2,3-6,2 l				
Oil consumption	max. 1 % of fuel consumption				
Dimensions (length x width x height)	591,3x439,2x613,7 mm				
Dry weight	114,0 kg				
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction				
Recommend starter battery size	12 V, 75 Ah equivalent				
Recommend cable cross size starter battery cable *Length 4 meter max.*	25 mm²				

	AGT 25000				
Max. exhaust back pressure	10,7 kPa 107 Millibar				

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

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

ATTENTION!

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

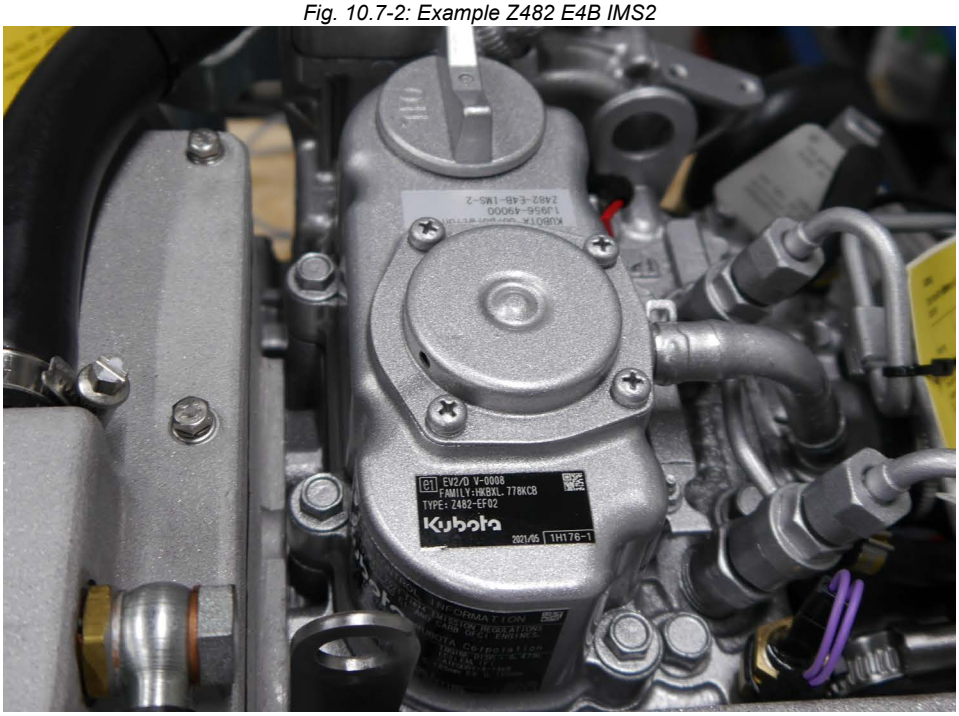
The following CO_2 balance derived from the emission measuring cycle is applicable, with regard to the engine, to generators that are approved in accordance with 2016/1628 EC:

Fig. 10.7-1: CO_2 balance derived from the emission measuring cycle for engines in accordance with 2016/1628 EC

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

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

Fig. 10.7-2: Example Z482 E4B IMS2



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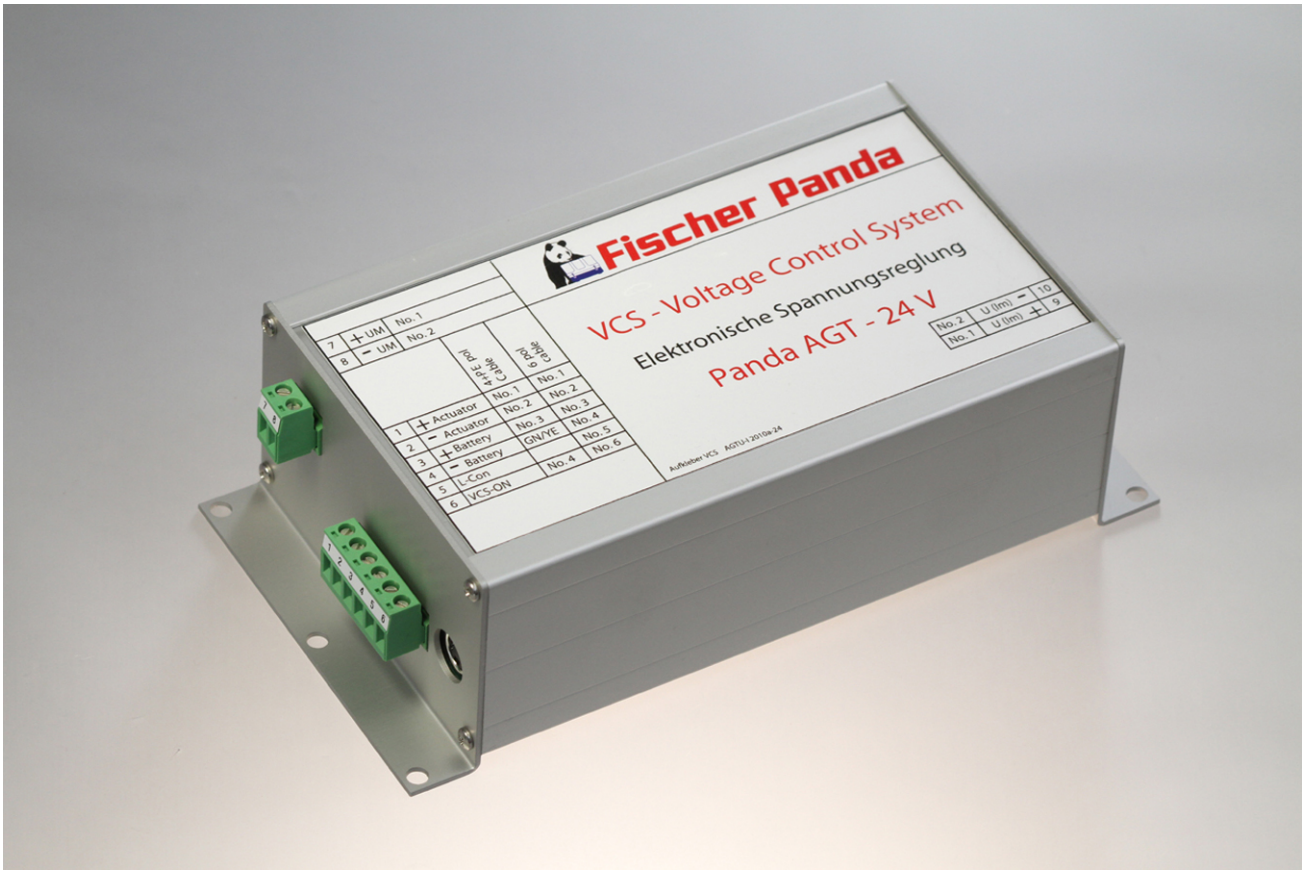
11. VCS-AGT-U/I

Art No.	see table
Desc.	see table

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

Fig. 11.0-1: VCS AGT U/I

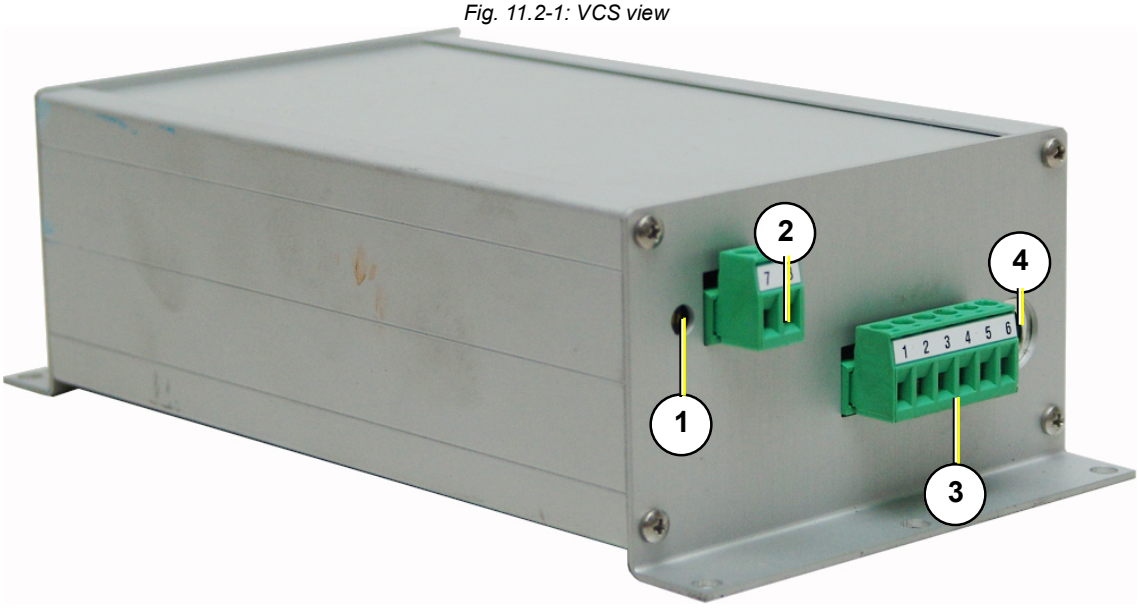


11.1 Delivery versions

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

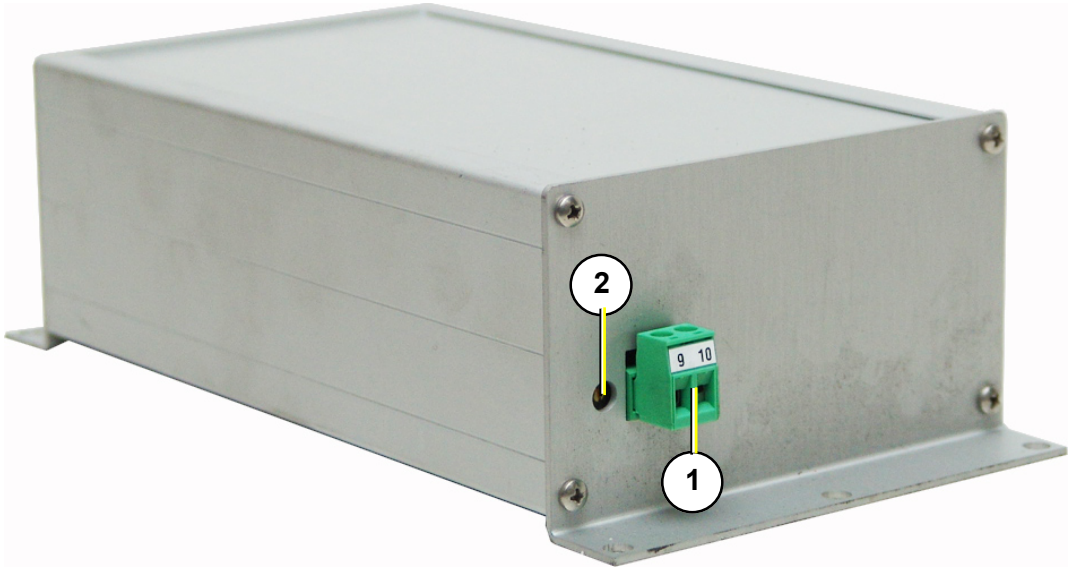
11.2 Voltage control system

Fig. 11.2-1: VCS view



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

Fig. 11.2-2: 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

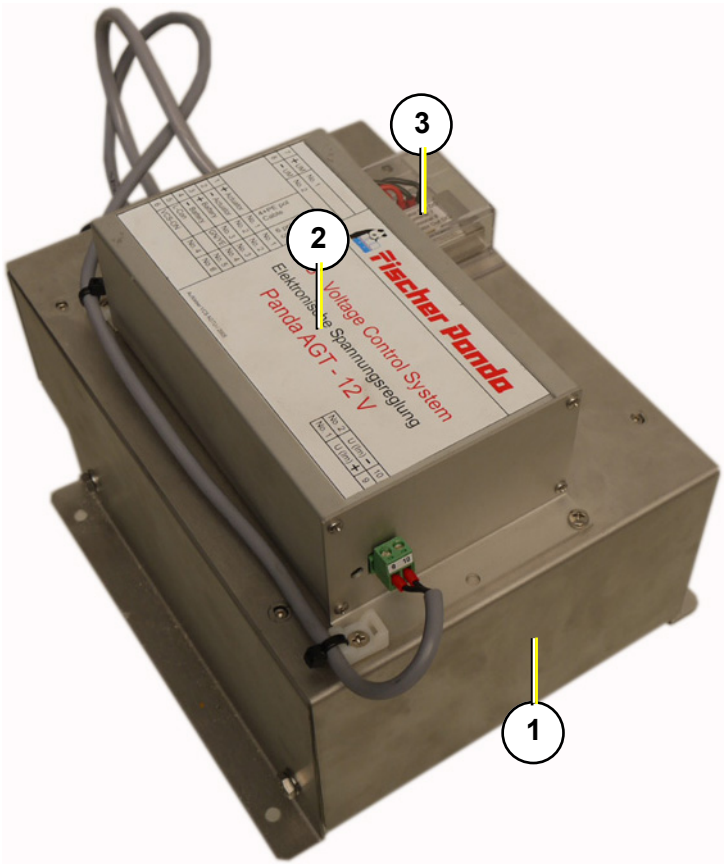
The potentiometer next to clamp 7/8 is needed for adjustment of the measurement voltage and should be done by an service technician only.

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. 11.2-3: Electronic Voltage Control



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

11.3 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).

11.4 Personal requirements

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

11.4.1 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!

11.4.2 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

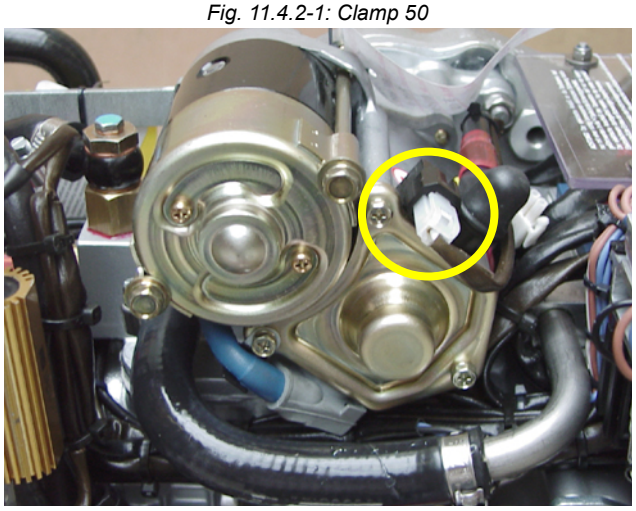
Sample picture

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. 11.4.2-1: Clamp 50



11.4.3 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 %).

11.4.4 Checking the VCS voltage regulation

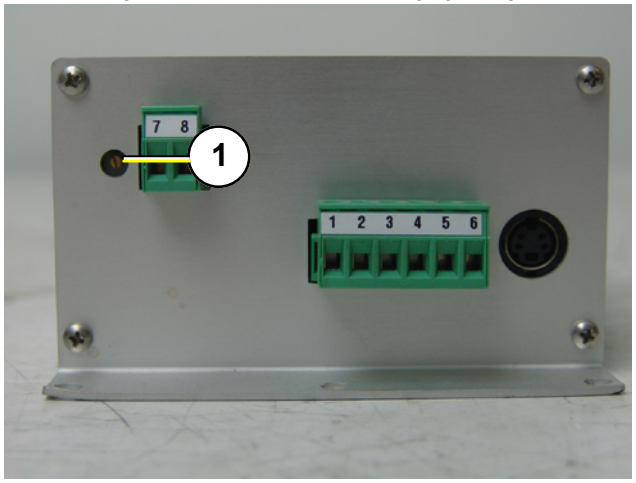
Connect clamp 50 to the starter motor again and start the generator. Control the battery voltage and check if the generator regulates the voltage. Check, if the generator regulates the voltage exactly by switching on and off load.

Readout potentiometer for the charging voltage

1. Potentiometer for setting the charging voltage

Turn to the right for increasing the charging voltage.

Fig. 11.4.4-1: Potentiometer charging voltage



11.4.5 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.

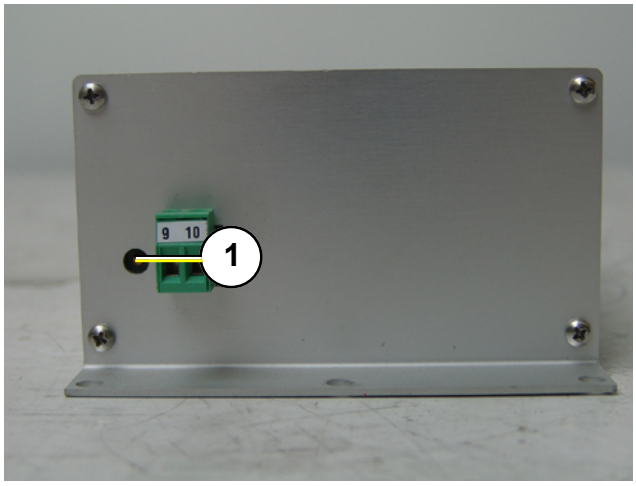
Readout potentiometer for the charging voltage

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. 11.4.5-1: Potentiometer charging current



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Generator Control Panel P6+ Manual

12 V version - 0000139

24 V special version - 0000527

Option automatic adapter - 0000521

Option master-slave adapter - 0000133

Current revision status

	Document
Actual:	Panel Generator Control P6+ RE0703_Kunde_eng.R12_24.7.25
Replace:	Panel Generator Control P6+ RE0703_Kunde_eng.R11

Revision	Page
Design review	
Neue Art.Nr eingepflegt R10	
Update Lochbild R11	
Design review R12	

Hardware

Generator	Revision	Modification Strike Plate	Date	Upgrade

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web: www.fischerpanda.de

12. Safety Instructions Generator Control P6+

12.1 Personal requirements

The settings described here can by performed by the operator, unless otherwise indicated.

The installation should be carried out by specially trained personnel or by authorized repair shops (Fischer Panda service points).

12.2 Safety instructions

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

If these not exist, they can be requested at Fischer Panda GmbH, 33104 Paderborn.

Note!

Danger for life! - The generator can be equipped with a automatic start device. This means expected starting of the generator, the starter battery must 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

The generator must not be put into operation with cover removed.

If the generator is mounted without sound cover, the rotating parts (pulley, belt, etc.) must be covered and protected so that an injury is excluded.

All service, maintenance or repair work on the unit may be made only while the motor is off.

Warning!

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.

Warning! Danger of Life - High voltage

Disconnect the battery when working on the generator.

The battery must always be disconnected (first negative then positive pole), when work on the generator or the electrical system of the generator are made, so that the generator can not be started accidentally.

This is especially true for systems with an automatic start function. The automatic start function is to be deactivated before the work.

Attention!

Sea valve must be closed. (only PMS version)

Note also the safety of the other components of your system.

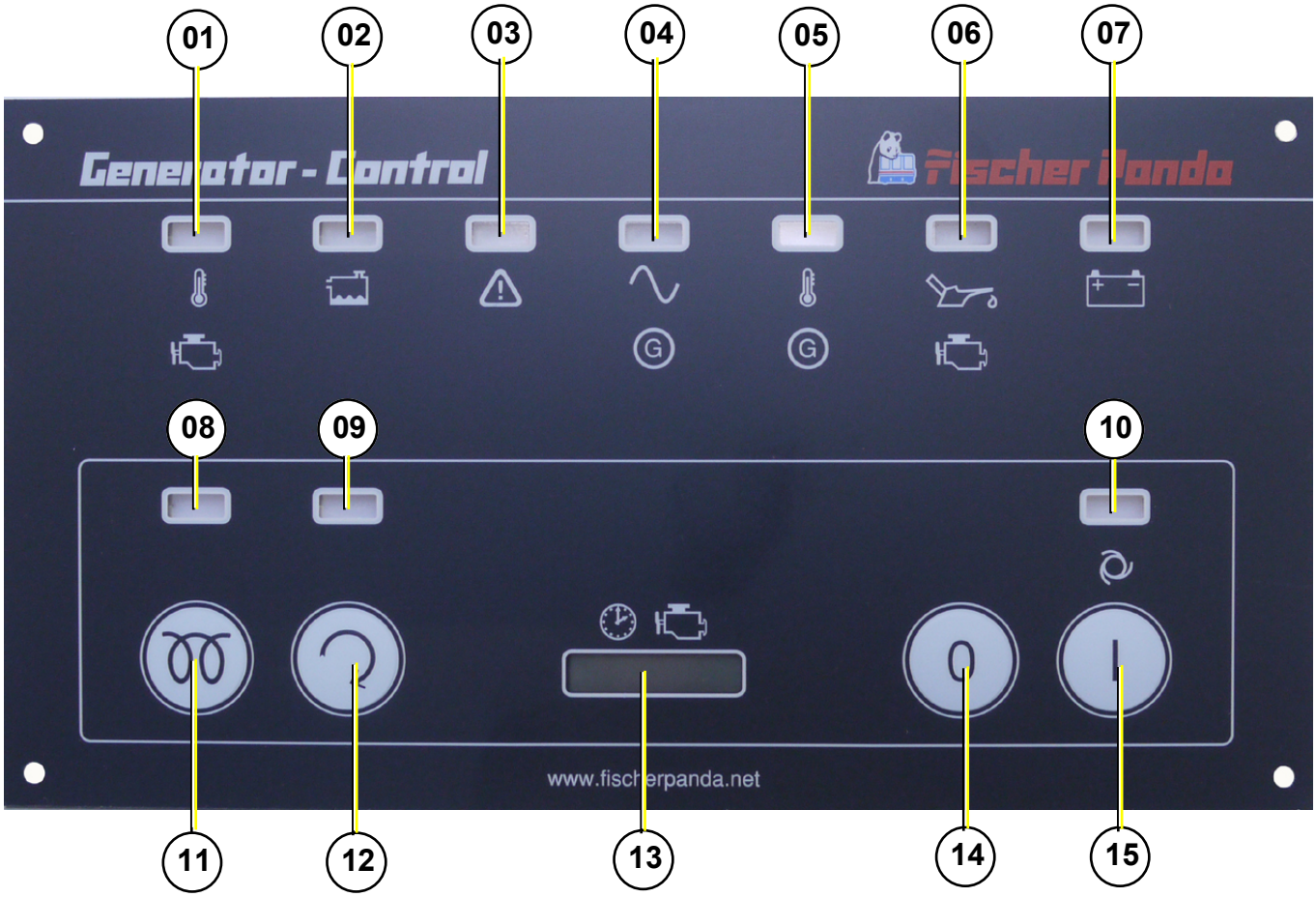
Note!

13. General operation

13.1 Panel Generator Control

Fischer Panda Art. No. 0000139

Fig. 13.1-1: Panel front



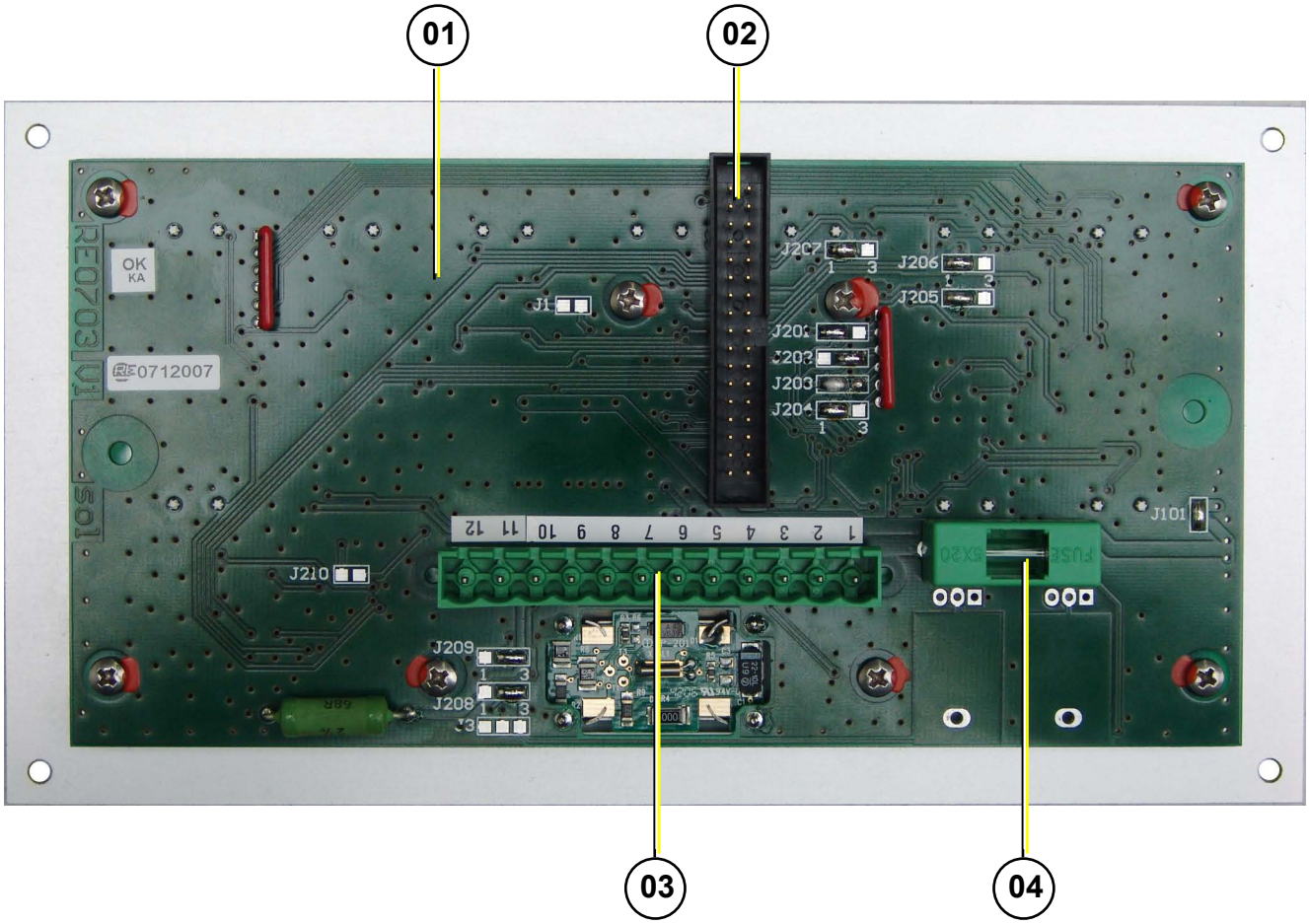
01. LED for coolant temperature red[1]
02. LED for water leak red/yellow[1] (sensor optional)
03. LED for AC-voltage fault red/yellow[1]
04. LED for AC-voltage ok green[1]
05. LED for winding temperature red[1]
06. LED for oil pressure red[1]
07. LED for battery charge voltage fault green/red[1]
08. LED for pre-glow „heat“ orange[1]
09. LED for Generator „start“ green[1]
10. LED for Generator „stand-by“ green[1]
11. Push button for pre-glow „heat“
12. Push button for Generator „start“
13. Operating hours counter
14. Push button panel „off“
15. Push button panel „on“

[1] *LED green: normal operation mode, LED red: fault, LED yellow: warning, LED orange: active*

13.1 Rear view 12 V-version

Fischer Panda Art. No. 0000139

Fig. 13.1-1: Panel rear view 12 V-version

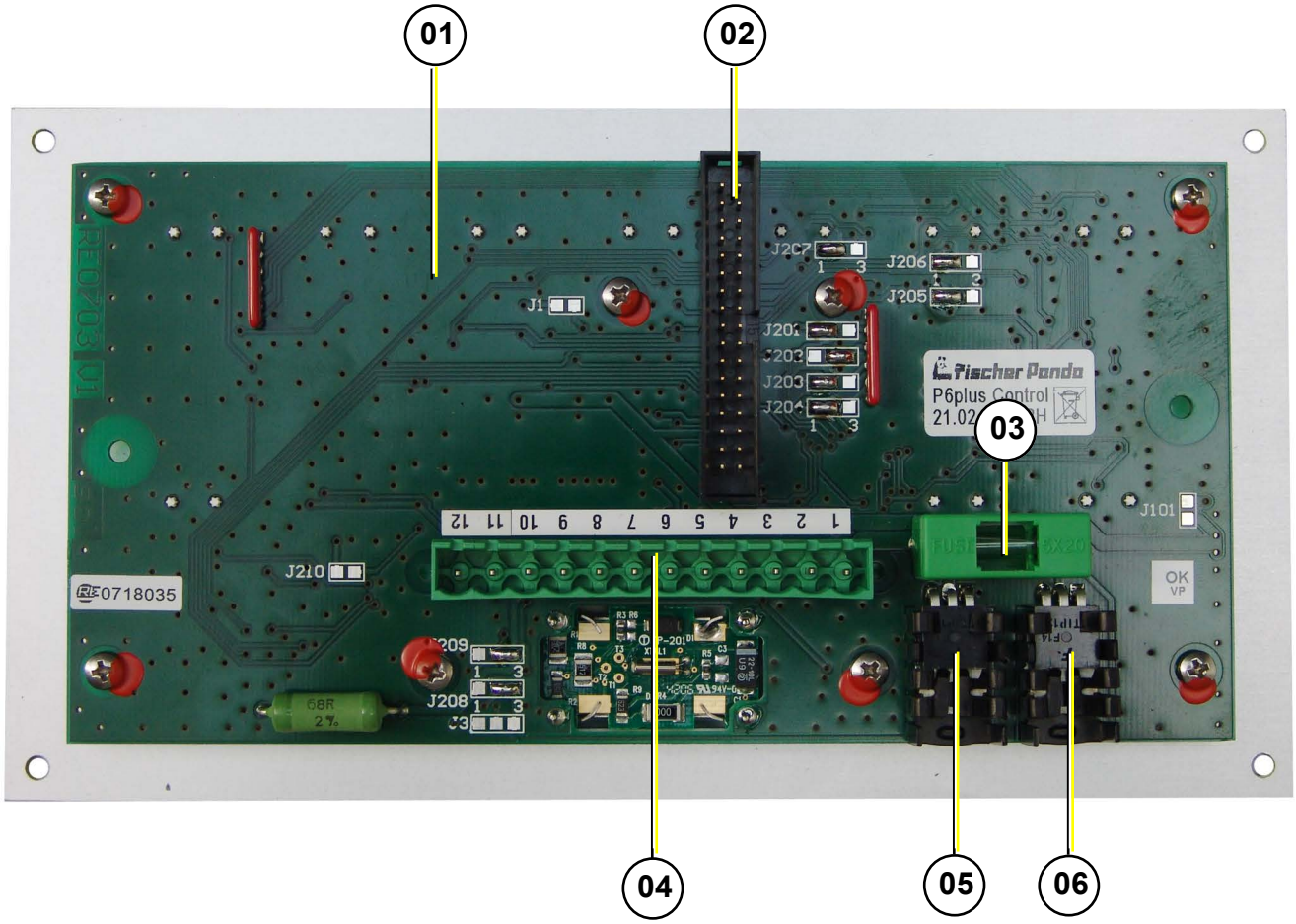


01. Control board
02. Terminal block (master-slave adapter: left row; automatic adapter: right row)
03. Terminals 1-12 (see section 13.3.2, “Terminal connections,” on page 134)
04. Fuse 630 mA slow-blow

13.2 Rear view 24 V-version

Fischer Panda Art. No. 0000527

Fig. 13.2-1: Panel rear view 24 V-version



01. Control board
02. Terminal block (master-slave adapter: left row; automatic adapter: right row)
03. Fuse 630 mA slow-blow
04. Terminals 1-12 (see section 13.3.2, “Terminal connections,” on page 134)
05. Linear controller 24 V
06. Linear controller 24 V

13.3 Installation of the remote control panel

13.3.1 Placement.

Install the remote control panel at a dry, good accessible and shady place.

Connect the remote control panel to the standard 12 core cable at the generator. (1:1)

13.3.2 Terminal connections

Standard for NC temperature switch configured i.e. in case of failure „open“.

Fig. 13.3.2-1: Terminal connections

Clamp no.	Clamp name	IN / OUT	Description
1	Vbat	IN	power supply + 12 V (or optional 24 V, must be adjusted by jumper)
2	GND	IN	power supply -
3	T-Engine	IN	Error “coolant temperature”. Input for thermo-switch to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with ≥ 22 mA to +12 V (with 24 V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 100ms. Omission not. The in/out status is indicated with red LED.
4	Water leak (Replace air filter)	IN	Error “water leak”. Input for sensor switch to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with ≥ 10 mA to +12 V (with 24 V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 100 ms. Omission not. The input status is indicated with red LED. The input can be used alternatively for the signal “Replace air filter” (must be adjusted by solder Jumper). Then the signal does not lead to switching off and is indicated with yellow LED.
5	Oil-Press	IN	Error “oil pressure“. Input for oil pressure switches to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with ≥ 22 mA to +12 V (with 24 V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 1s. Omission not. The input status is indicated with red LED.
6	DC-Control	IN / OUT	Load control display. Input for signal of the dynamo. The input is adjustable for GND = OK or 12 V/ 24 V = OK (must be adjusted by solder Jumper). The input loads the signal with 5 mA at 12 V and 10 mA at 24 V. The input status is indicated with red and green LED. The connection can supply an energizing current for the dynamo over a fixed resistor with 68R. Either with the control panel switched on or with “Fuel pump” switched on (must be adjusted by solder Jumper). This function is available only in 12 V-operation.
7	AC-Control	IN	AC control display. Input for NC-open-collector-sensor-switch to GND (N = OK). The input loads the switch with ≥ 2,5 mA to +12 V (with 24 V-operated internally generated). The input status is indicated with red and green LED´s.
8	Heat	OUT	Output for pre-glow relays. The output is so long active, as the button “Heat” is pressed. The output supplies, if active, the voltage of clamp 1. Additionally the output can be operated via the button “start” (must be adjusted by solder Jumper). Consider (notes 1-4).
9	Fuel-Pump	OUT	Output for fuel pump relay. The output is active, if no error is present (inputs 3, 4, 5, 11 and 12, if configured accordingly). The button “start” suppresses the error analysis and the output is then also active in the case of error, if the button “start” is pressed. The output supplies, if active, the voltage of clamp 1. Consider (notes 1-4).
10	Start	OUT	Output for starting relay. The output is active, as long as the button “start” is pressed. The output supplies, if active, the voltage of clamp 1. Consider (notes 1-4).
11	AC-Fault (Fuel Level) [former T-Oil]	IN	Error generator AC input for NC-open-collector-sensor-switch to GND (N = no error). The input loads the switch with ≥ 2,5 mA to +12 V. (with 24 V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 100ms. Omission not. The input status is indicated with red LED. The input can be used alternatively for the signal “Fuel level” (must be adjusted by solder Jumper). The signal does not lead to switching off and is indicated with yellow LED. The input can be used alternatively for the signal “error oil-temperature”. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The load of the sensor switch is adjustable to ≥ 10 mA by +12 V (must be adjusted by solder Jumper).

Clamp no.	Clamp name	IN / OUT	Description
12	T-Winding	IN	Error “winding temperature”. Input for thermo-switch to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with ≥ 22 mA to +12 V (with 24 V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 100 ms. Omission not. The input status is indicated with red LED.

Notes:
Power rating of the output: max. 0,5 A in continuous operation and briefly 1,0 A.
The supply of all output currents may not exceed (less 0,2 A power consumption) the rated current of the safety device of the control panel.
The output has a free wheeling diode, which short circuits negative voltages (related to GND).
The output has a Z-diode, which prevents a supply of positive voltage (related to GND) into the output.

13.3.3 Function of the jumpers

Fig. 13.3.3-1: Function of the solder jumper

Jumper	Status	Description
J1	closed	during operation of the start button heat is along-operated
	open	Function deactivated
J3	1-2	Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3	Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	open	Dynamo excitation resistor is deactivated
J101	closed	12 V - operation
	open	24 V - operation (optional)
J201	1-2	T-Engine-input, for contact, which opens in case of error (2)
	2-3	T-Engine-input, for contact, which closes in case of error (2)
J202	1-2	Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2	Oil-Press-input, for contact, which opens in case of error (2)
	2-3	Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2	AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3	AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2	T-Winding-input, for contact, which opens in case of error (2)
	2-3	T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	Input Water leak has red LED and switches off
	2-3	Input Water leak has yellow LED and does not switch off
J207	1-2	Input AC-Fault has red LED and switches off
	2-3	Input AC-Fault has yellow LED and does not switch off
J208	1-2	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed	Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)
(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.
(2): A closed contact switches the appropriate input to GND.

13.3.4 Configuration and adjustment

13.3.4.1 Configuration and setting sheet KE01

Standard jumpering for generators with three-phase DC-alternator (Kubota Super 5 series).

Panel only for 12 V-operation.

The safety device is installed with the value 0,63 AT.

The circuit parts for 24 V-operation are not equipped.

Fig. 13.3.4.1-1: Settings of soldered jumper for this configuration (column Conf.)

Jumper	Status	Conf.	Description
J1	closed		during operation of the start button heat is along-operated
	open	X	Function deactivated
J3	1-2		Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3		Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	open	X	Dynamo excitation resistor is deactivated
J101	closed	X	12 V - operation
	open		~~24 V - operation~~ (not possible)
J201	1-2	X	T-Engine-input, for contact, which opens in case of error (2)
	2-3		T-Engine-input, for contact, which closes in case of error (2)
J202	1-2		Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	X	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2	X	Oil-Press-input, for contact, which opens in case of error (2)
	2-3		Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2	X	AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3		AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2	X	T-Winding-input, for contact, which opens in case of error (2)
	2-3		T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	X	Input Water leak has red LED and switches off
	2-3		Input Water leak has yellow LED and does not switch off
J207	1-2	X	Input AC-Fault has red LED and switches off
	2-3		Input AC-Fault has yellow LED and does not switch off
J208	1-2		DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	X	DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2		DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	X	DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed		Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	X	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)

(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.

13.3.4.2 Configuration and setting sheet KE02

Standard jumpering for generators with three-phase DC-alternator.

Panel for 24 V-operation (over attitude of solder jumper J101 alternatively 12 V-operation is possible).

The safety device is installed with the value 0,63 AT.

The circuit parts for 24 V-operation are not equipped.

Fig. 13.3.4.2-1: Settings of soldered jumper for this configuration (column Conf.)

Jumper	Status	Conf.	Description
J1	closed		during operation of the start button heat is along-operated
	open	X	Function deactivated
J3	1-2		Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3		Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	open	X	Dynamo excitation resistor is deactivated
J101	closed		12 V - operation
	open	X	24 V - operation
J201	1-2	X	T-Engine-input, for contact, which opens in case of error (2)
	2-3		T-Engine-input, for contact, which closes in case of error (2)
J202	1-2		Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	X	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2	X	Oil-Press-input, for contact, which opens in case of error (2)
	2-3		Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2	X	AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3		AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2	X	T-Winding-input, for contact, which opens in case of error (2)
	2-3		T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	X	Input Water leak has red LED and switches off
	2-3		Input Water leak has yellow LED and does not switch off
J207	1-2	X	Input AC-Fault has red LED and switches off
	2-3		Input AC-Fault has yellow LED and does not switch off
J208	1-2		DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	X	DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2		DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	X	DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed		Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	X	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)

(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.

13.3.4.3 Configuration and setting sheet KE03

Standard jumpering for generators with DC-alternator.

Panel only for 12 V-operation.

The safety device is installed with the value 0,63 AT.

The circuit parts for 24 V-operation are not equipped.

Fig. 13.3.4.3-1: Settings of soldered jumper for this configuration (column Conf.)

Jumper	Status	Conf.	Description
J1	closed		during operation of the start button heat is along-operated
	open	X	Function deactivated
J3	1-2		Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3		Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	open	X	Dynamo excitation resistor is deactivated
J101	closed	X	12 V - operation
	open		~~24 V - operation~~ (not possible)
J201	1-2	X	T-Engine-input, for contact, which opens in case of error (2)
	2-3		T-Engine-input, for contact, which closes in case of error (2)
J202	1-2		Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	X	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2	X	Oil-Press-input, for contact, which opens in case of error (2)
	2-3		Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2	X	AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3		AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2	X	T-Winding-input, for contact, which opens in case of error (2)
	2-3		T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	X	Input Water leak has red LED and switches off
	2-3		Input Water leak has yellow LED and does not switch off
J207	1-2	X	Input AC-Fault has red LED and switches off
	2-3		Input AC-Fault has yellow LED and does not switch off
J208	1-2	X	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3		DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2	X	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3		DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed		Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	X	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)

(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.

13.3.4.4 Configuration and setting sheet KE04

Standard jumpering for generators with DC-alternator.

Panel for 24V-operation (over attitude of solder jumper J101 alternatively 12 V-operation is possible).

The safety device is installed with the value 0,63 AT.

The circuit parts for 24 V-operation are not equipped.

Fig. 13.3.4.4-1: Settings of soldered jumper for this configuration (column Conf.)

Jumper	Status	Conf.	Description
J1	closed		during operation of the start button heat is along-operated
	closed	X	Function deactivated
J3	1-2		Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3		Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	closed	X	Dynamo excitation resistor is deactivated
J101	closed		12 V - operation
	closed	X	24 V - operation
J201	1-2	X	T-Engine-input, for contact, which opens in case of error (2)
	2-3		T-Engine-input, for contact, which closes in case of error (2)
J202	1-2		Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	X	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2	X	Oil-Press-input, for contact, which opens in case of error (2)
	2-3		Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2	X	AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3		AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2	X	T-Winding-input, for contact, which opens in case of error (2)
	2-3		T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	X	Input Water leak has red LED and switches off
	2-3		Input Water leak has yellow LED and does not switch off
J207	1-2	X	Input AC-Fault has red LED and switches off
	2-3		Input AC-Fault has yellow LED and does not switch off
J208	1-2	X	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3		DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2	X	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3		DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed		Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	X	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)

(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.

13.4 Starting preparation / Checks (daily)

13.4.1 Marine version

1. Oil level control (ideal level: 2/3 MAX).

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

   Further, if installed, the oil level of the oil-cooled bearing must be controlled before each start - see sediment bowl at generator front cover!.

2. State of cooling water.

   The external expansion tank should be filled up to 1/3 of the maximum in a cold state. It is very important that a large expansion area remains above the cooling water level.

3. Check if sea cock for cooling water intake is open.

   For safety reasons, the sea cock must be closed after the generator has been switched off. It should be re-opened before starting the generator.

4. Check raw water filter.

   The raw water filter must be regularly checked and cleaned. The impeller fatigue increases, if residual affects the raw water intake.

5. Visual inspection.

   Control fixing bolts, check hose connectors for leakages, control electrical connections.

6. Switch off the load.

   The generator should only be started without load.

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

13.4.2 Vehicle version

1. Oil level control (ideal level: 2/3 MAX).

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

   Further, if installed, the oil level of the oil-cooled bearing must be controlled before each start - see sediment bowl at generator front cover!.

2. State of cooling water.

   The external expansion tank should be filled up to 1/3 of the maximum in a cold state. It is very important that a large expansion area remains above the cooling water level.

3. Visual inspection.

   Control fixing bolts, check hose connectors for leakages, control electrical connections.

4. Switch off the load.

   The generator should only be started without load.

5. Open fuel valve, if installed.
6. Close battery main switch (on).

13.5 Starting and stopping the generators

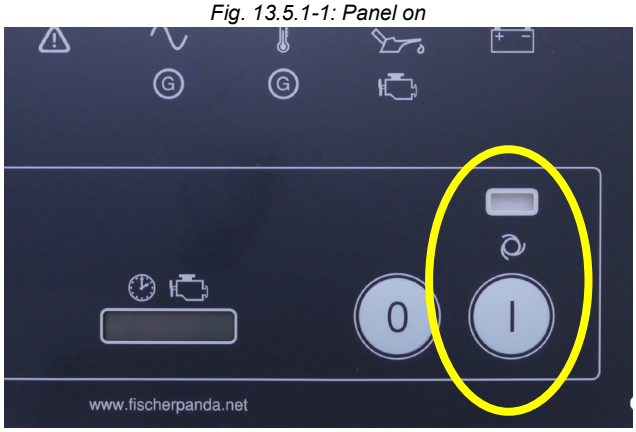
13.5.1 Starting the generator

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

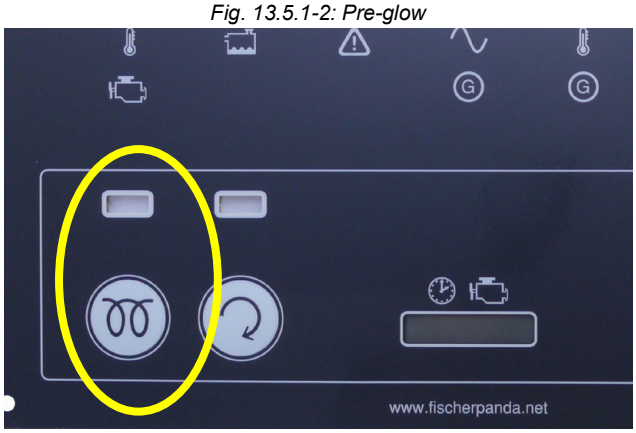
1. Press button „on“ (switch on).
   LED for „on“ = green.

Fig. 13.5.1-1: Panel on



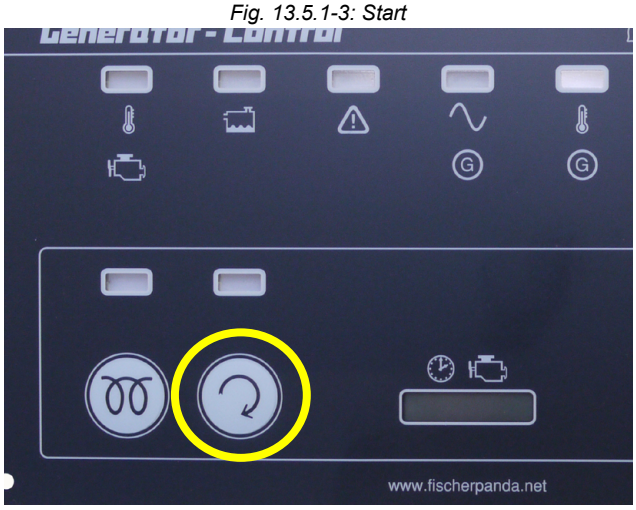
2. Press button „heat“ (pre-glow engine).
   LED for „heat“ = orange.
   Depending upon engine type and execution pre-heating can be necessary. Pre-heat is necessary at an operating temperature <20 °C.

Fig. 13.5.1-2: Pre-glow



3. Press button „start“ (start engine).
   LED for „start“ = green.
   The electric starter may only be used for a maximum of 20 seconds. Thereafter, a pause of at least, 60 seconds is required. If the genset does not immediately start, then the fuel intake should be checked to ensure it is flowing freely. (For temperatures below - 8 °C check whether there is winter fuel)
4. Switch on load.
   The load should only be switched on if the generator voltage is within the permissible range. Parallel connection of several loads should be avoided, especially if there are loads with electric motors, such as air-conditioning units in the system. In this case, the load must be connected Step by Step.

Fig. 13.5.1-3: Start



In the event of starting problems, close the sea water inlet cock. Panda marine generators only.

Should there be any reason to turn the engine (over) or start the engine i.e. to bleed the fuel system, the sea water inlet cock must be closed! During the starting process, the cooling water pump is driven with the motor. The cooling water is discharged to the exhaust outlet and, since the motor has not run, the exhaust pressure is not high enough to expel the sea water which has been brought to the exhaust outlet. To avoid filling the exhaust outlet with water and causing further problems, close the inlet sea water valve.

Once the engine is running, be sure to open the inlet valve!

Attention!

13.5.2 Stopping the generator

1. Switch off load.
2. Recommendation: With turbo engines and during load more than highly 70 % of the rated output, stabilize generator temperature at least 5 minutes with load switched off.

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

   LED for „on“ = off.

Fig. 13.5.2-1: Stop

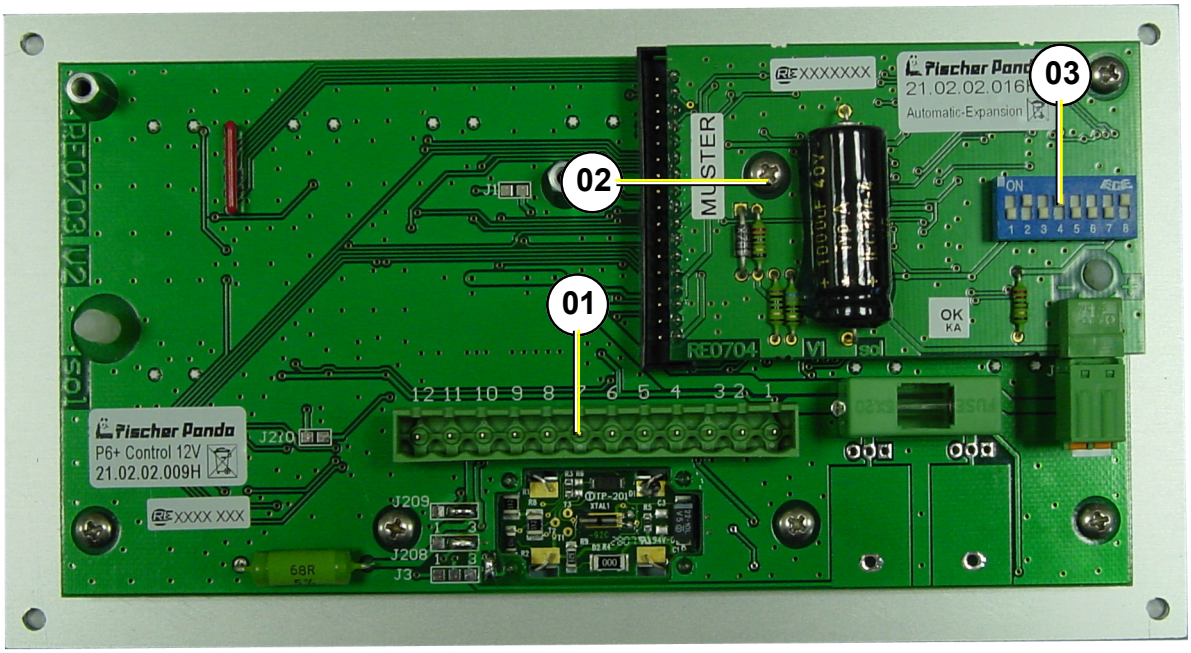
Never switch off the battery until the generator has stopped, if necessary close fuel valve!

Attention!

13.6 Automatic adapter - optional

Fischer Panda Art. No. 0000521

Fig. 13.6-1: Panel 0000139 with Automatic adapter 0000521



01. Main terminals
02. Automatic adapter 0000521
03. 8-pole DIP-switch

13.6.1 Function:

The automatic adapter RE0704 extends the generator control panel P6+ with an automatic input. A potential-free contact can be attached to this input. If this contact is closed, then the generator, which is attached to the generator control panel P6+, is started automatically. If the contact is opened, then the generator is stopped automatically.

The automatic starting procedure consists of pre-heating (heat) and operating the starter (start). It can be again aborted at any time by opening the contact at the automatic input.

For automatic stopping (stop) the output “Fuel pump” (clamp 9 generator control panel) is switched off. The time for the automatic stop procedure can be terminated only by switching off generator control panel prematurely.

The times for “heat”, “start” and “stop” are separately adjustable (see below).

The additional automatic adapter switched on and off using the generator control panel with its push buttons “on” and “off”.

If the contact at the automatic input is connected, while the generator control panel is switched on, then the automatic starting procedure is carried out.

If the power supply is attached or switched on using the generator control panel, while the contact of the automatic input is closed, then the automatic starting procedure won't be carried out, because the generator control panel is always switched off after attaching the power supply (generator the control panel must have been separate from the power supply for at least 60 s).

If the contact at the automatic input is closed and if the panel is switched on again after a voltage drop, the automatic start (glow, start) will be introduced.

Attention!

13.6.2 The Automatic input:

With (-) characterized connection is connected to GND.

With (+) characterized connection is the input.

The input is connected through a resistance to 12 V (with 24 V-operated internally generated). If the two connections are short circuited over a potential-free contact, then the input current flows.

To be considered for an electronic contact the low input current and the polarity is to be selected.

The high input current is to be selected for an electromechanical contact.

The input is debounced (delay time approx.1 s).

On the input an external voltages must not be set.

Fig. 13.6.2-1: Data

Data:	
Parameter	**Information**
Operation voltage	The automatic adapter power is supplied via the generator control panel P6+. The same absolute maximum ratings obtain as with the generator control panel P6+.
Operation temperature	The same absolute maximum ratings obtain as with the generator control panel P6+.
Proper power consumption	10 mA - 20 mA
Tolerance of times	± 10 %

Fig. 13.6.2-2: Settings

8-pole DIP-switch S1 settings (S1.1 to S1.8):										
		standard	**S1.1**	**S1.2**	**S1.3**	**S1.4**	**S1.5**	**S1.6**	**S1.7**	**S1.8**
Heat-time	2,5 s		OFF	OFF						
	5 s		ON	OFF						
	10 s	X	OFF	ON						
	20 s		ON	ON						
Start-time	8 s	X			OFF					
	16 s				ON					
Stop-time	16 s					OFF	OFF			
	32 s	X				ON	OFF			
	64 s					OFF	ON			
	128 s					ON	ON			
Operation-mode	Normal	X						OFF		
	Test (all times over 16)							ON		
Input current	1,25 mA									OFF
	7 mA	X								ON

The automatic adapter must only be used together with an additional device. The starter should only be switched on when the generator stationary shut-down!

Attention!

13.6.3 Terminal connections

Connection for the automatic adapter X2 (row with odd pin numbers // I/O view from operating panel)

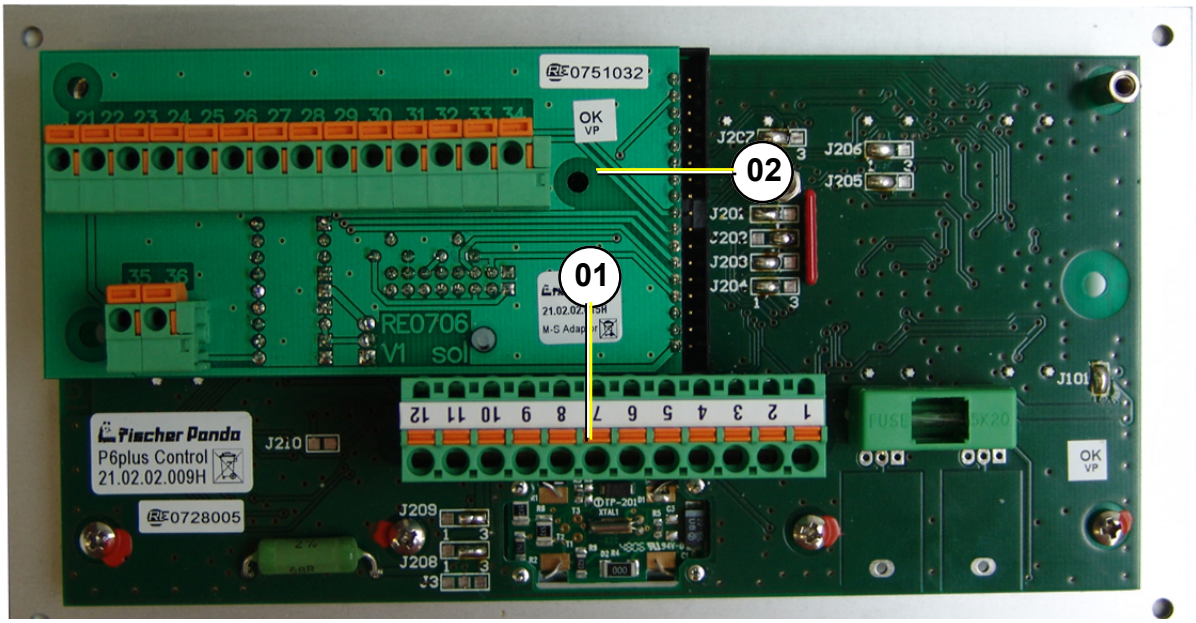
Fig. 13.6.3-1: Terminal connections automatic adapter

Pin-no.	Pin-name	I / O	Description
1	VBF	O	power supply + (operation voltage behind fuse)
3	GND	O	power supply - (ground)
5	VBFS	O	power supply + switched (voltage Pin 1, with panel switched on)
7	12V	O	power supply + switched, at 12 V-operation over closed soldered jumper J101 connected with VBFS (at optional 24 V-operation: VBFS over internal voltage regulator at 12,9 V regulated)
9	GND	O	power supply - (ground)
11	GND	O	power supply - (ground)
13	/Heat-signal	I	Heat is active, if the input is switched to GND
15	/Start-signal	I	Start is active, if the input is switched to GND
17	GND	O	power supply - (ground)
19	GND	O	power supply - (ground)
21	GND	O	power supply - (ground)
23	GND	O	power supply - (ground)
25	GND	O	power supply - (ground)
27	/Stop-signal	I	The Fuel pump signal is switched off, as long as the input is switched to GND, (also when starting)
29	FP-Int	O	Fuel pump signal internally, decoupled over diode from external signal
31	/Fault-signal	O	Output is switched to GND, if an error is present (inputs 3, 4, 5, 11 and 12, if configured and generally for 2 s, after switching on the panel)
33	GND	O	power supply - (ground)

13.7 Master-Slave adapter - optional

13.7.1 Fischer Panda Art. No. 0000133, 12 V-version

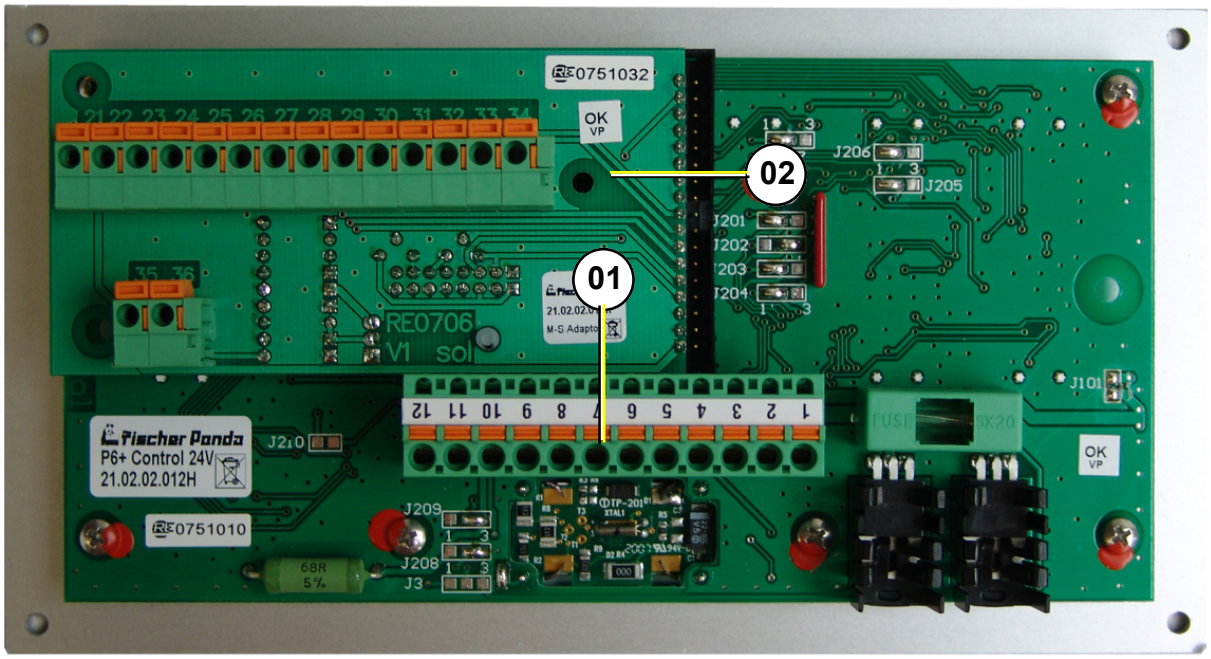
Fig. 13.7.1-1: Panel 0000139 with master-slave adapter 0000133



01. Main terminals
02. Master-slave adapter 21.02.02.015P

13.7.2 Fischer Panda Art. No. 0000133, 24 V-version

Fig. 13.7.2-1: Panel 0000527P with master-slave adapter 0000133



01. Main terminals
02. Master-slave adapter 0000133

With the Master-Slave-Adapter RE0706 two Generator Control Panels P6+ RE0703 can be connected to a Master-Slave-Combination. In addition on each Generator Control Panel P6+ an Master-Slave-Adapter RE0706 is installed. The Generator Control Panel P6+ is interconnected by the 14pole connecting terminals on the Master-Slave-Adapters 1:1. The Master-Panel is hereby defined when the generator is connected to the main connector. Thus, the main connector of the Slave-Panel should not be occupied (unconnected).

The solder jumpers on the Master-Panel have to be coded in the same manner as for a Master-Panel without a Slave-Panel as in normal operation. The solder jumpers on the Slave-Panel are coded as for slave operation (please see the appropriate adjustment pages for the Generator Control Panel P6+ RE0703).

The Master-Panel and Slave-Panel are identical, and only differs as a result of the coding. Both Master-Slave-Panels are also identical.

13.7.3 Terminal connections:

X2: (14polig, 21 - 34) master Slave connection (1:1 wire)

X3: (2polig, 35 - 36) 35: Panel on signal of the Generator Control Panel P6+ RE0703

36: Error signal of the Generator Control Panel P6+ RE0703

The Panel-ON-Signal is active when the panel is switched on.

The error signal is so long active, as the panel recognizes an error, which must lead to switching the generator off.

The output voltage corresponds to the operating voltage of the Generator Control Panel P6+ less 0,7 V - 1,4 V. Each output has a free wheeling diode which short circuits externals voltage supplies under 0 V and a decoupling diode which decouples the circuitry from external power feeding.

13.7.4 Fuse:

A 0,8AT fuse must be installed on the Master-Panel.

13.7.5 Terminal connections

13.7.5.1 Terminal X2 (IN/OUT from view Master-Operating-Panel)

Fig. 13.7.5-1: Terminal connections terminal X2 (IN/OUT from the view of the master-control-panel)

Pin-No.	Pin-name	IN / OUT	Description
21	VBF	O	power supply + (operation voltage behind fuse 12 Vdc or 24 Vdc depending on system)
22	GND	O	power supply - (ground)
23	ON-Signal	I / O	Panels are switched on, if the connection is switched using a push button (on master or slave) to VBF
24	OFF-Signal	I / O	Panels are switched off, if the connection is switched using a push button (on master or slave) to VBF
25	/Heat-Signal	I / O	Heat is active, if the connection is switched over a push button (on master or Slave) to GND
26	/Start-Signal	I / O	Start is active, if the connection is switched over a push button (on master or Slave) to GND
27	LED-T-Engine	O	Output for LED T-Engine on the Slave panel, is switched to GND, if the LED is illuminated
28	LED-Water leak (Replace Air filter)	O	Output for LED Water leak on the Slave panel, is switched to GND, if the LED is illuminated
29	LED-Oil-Press	O	Output for LED Oil-Press on the Slave panel, is switched to GND, if the LED is illuminated
30	LED-AC-Fault (Fuel Level)	O	Output for LED AC-Fault on the Slave panel, is switched to GND, if the LED is illuminated
31	LED-T-Winding	O	Output for LED T-Winding on the Slave panel, is switched to GND, if the LED is illuminated
32	DC-Control	O	Output for LED DC-Control-display on the Slave panel. The DC control signal is ground through 1:1.
33	AC-Control		Output for LED AC-Control-display on the Slave panel. The AC control signal is ground through 1:1.
34	VBFS	O	power supply + switched (otherwise like 21, VBF)

The use of these connections for other purposes, other than the master-slave connection of two generator control panels, is generally forbidden. In individual cases, after consultation and clarifying the technical details, a release for another use can, if technically possible, be allowed.

13.7.5.2 Terminal X3

Fig. 13.7.5.2-1: Terminal connections terminal X3

Pin-No.	Pin-name	IN / OUT	Description
35	Panel ON	O	With panel (ON/OFF) switched voltage of clamp X2.1 (VBF). (Consider notes 1-4)
36	Error	O	Output is switched on, if a critical error is present. (Consider notes 1-4)

Notes:

1.Power rating of the output: max. 0,5 A in continuous operation and briefly 1,0 A.

2.The supply of all output currents may not exceed (less 0,2 A power consumption) the rated current of the safety device of the control panel.

3.The output has a free wheeling diode, which short circuit negative voltages (related to GND).

4.The output has a Z-diode, which prevents an overvoltage (related to GND) into the output.

13.7.6 Configuration and adjustment

13.7.6.1 Configuration and setting sheet KE05

Standard jumpering for use as Slave-Panel in connection with **two** Master-Slave-Adapters RE0706 and a Generator Control Panel P6+ RE0703 as Master-Panel. Panel only for 12 V-operation.

The safety device is installed with the value 0,63 AT. The circuit parts for 24 V-operation are not equipped.

Fig. 13.7.6-1: Settings of soldered jumper for this configuration (column Conf.)

Jumper	Status	Conf.	Description
J1	closed		during operation of the start button heat is along-operated
	open	XM	Function deactivated
J3	1-2		Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3		Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	open	XM	Dynamo excitation resistor is deactivated
J101	closed	M	12 V - operation
	open	M	~~24 V - operation~~ (not possible)
J201	1-2		T-Engine-input, for contact, which opens in case of error (2)
	2-3	XM	T-Engine-input, for contact, which closes in case of error (2)
J202	1-2		Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	XM	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2		Oil-Press-input, for contact, which opens in case of error (2)
	2-3	XM	Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2		AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3	XM	AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2		T-Winding-input, for contact, which opens in case of error (2)
	2-3	XM	T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	M	Input Water leak has red LED and switches off
	2-3	M	Input Water leak has yellow LED and does not switch off
J207	1-2	M	Input AC-Fault has red LED and switches off
	2-3	M	Input AC-Fault has yellow LED and does not switch off
J208	1-2	M	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	M	DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2	M	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	M	DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed		Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	XM	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)

X = Jumper must be so set

XM = Jumper, function must be so set on the master panel is selected

M = Jumper must be set exactly the same, as on the master panel,

(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.

13.7.6.2 Configuration and setting sheet KE06

Standard jumpering for use as Slave-Panel in connection with **two** Master-Slave-Adapters RE0706 and a Generator Control Panel P6+ RE0703 as Master-Panel. Panel for 24 V-operation. (over attitude of solder jumper J101 alternatively 12 V-operation is possible)

The safety device is installed with the value 0,63 AT.

The circuit parts for 24 V-operation are not equipped.

Fig. 13.7.6.2-1: Settings of soldered jumper for this configuration (column Conf.)

Jumper	Status	Conf.	Description
J1	closed		during operation of the start button heat is along-operated
	open	XM	Function deactivated
J3	1-2		Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)
	2-3		Dynamo excitation resistor 68R is switched on with Panel-ON (1)
	open	XM	Dynamo excitation resistor is deactivated
J101	closed	M	12 V - operation
	open	M	24 V - operation
J201	1-2		T-Engine-input, for contact, which opens in case of error (2)
	2-3	XM	T-Engine-input, for contact, which closes in case of error (2)
J202	1-2		Water leak-input / Replace air filter, for contact, which opens in case of error (2)
	2-3	XM	Water leak-input / Replace air filter, for contact, which closes in case of error (2)
J203	1-2		Oil-Press-input, for contact, which opens in case of error (2)
	2-3	XM	Oil-Press-input, for contact, which closes in case of error (2)
J204	1-2		AC-Fault-input / Fuel level, for contact, which opens in case of error (2)
	2-3	XM	AC-Fault-input / Fuel level, for contact, which closes in case of error (2)
J205	1-2		T-Winding-input, for contact, which opens in case of error (2)
	2-3	XM	T-Winding-input, for contact, which closes in case of error (2)
J206	1-2	M	Input Water leak has red LED and switches off
	2-3	M	Input Water leak has yellow LED and does not switch off
J207	1-2	M	Input AC-Fault has red LED and switches off
	2-3	M	Input AC-Fault has yellow LED and does not switch off
J208	1-2	M	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	M	DC-Control-Signal (+) = OK three-phase DC-alternator
J209	1-2	M	DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines
	2-3	M	DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed		Input AC-Fault has Pull-Up-current ≥ 10 mA
	open	XM	Input AC-Fault has Pull-Up-current ≥ 2,5 mA

The solder jumpers are marked on the printed circuit board (with jumper no. and at three-part solder jumper with soldering surface no.)

X = Jumper must be so set

XM = Jumper, function must be so set on the master panel is selected

M = Jumper must be set exactly the same, as on the master panel,

(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68 Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.

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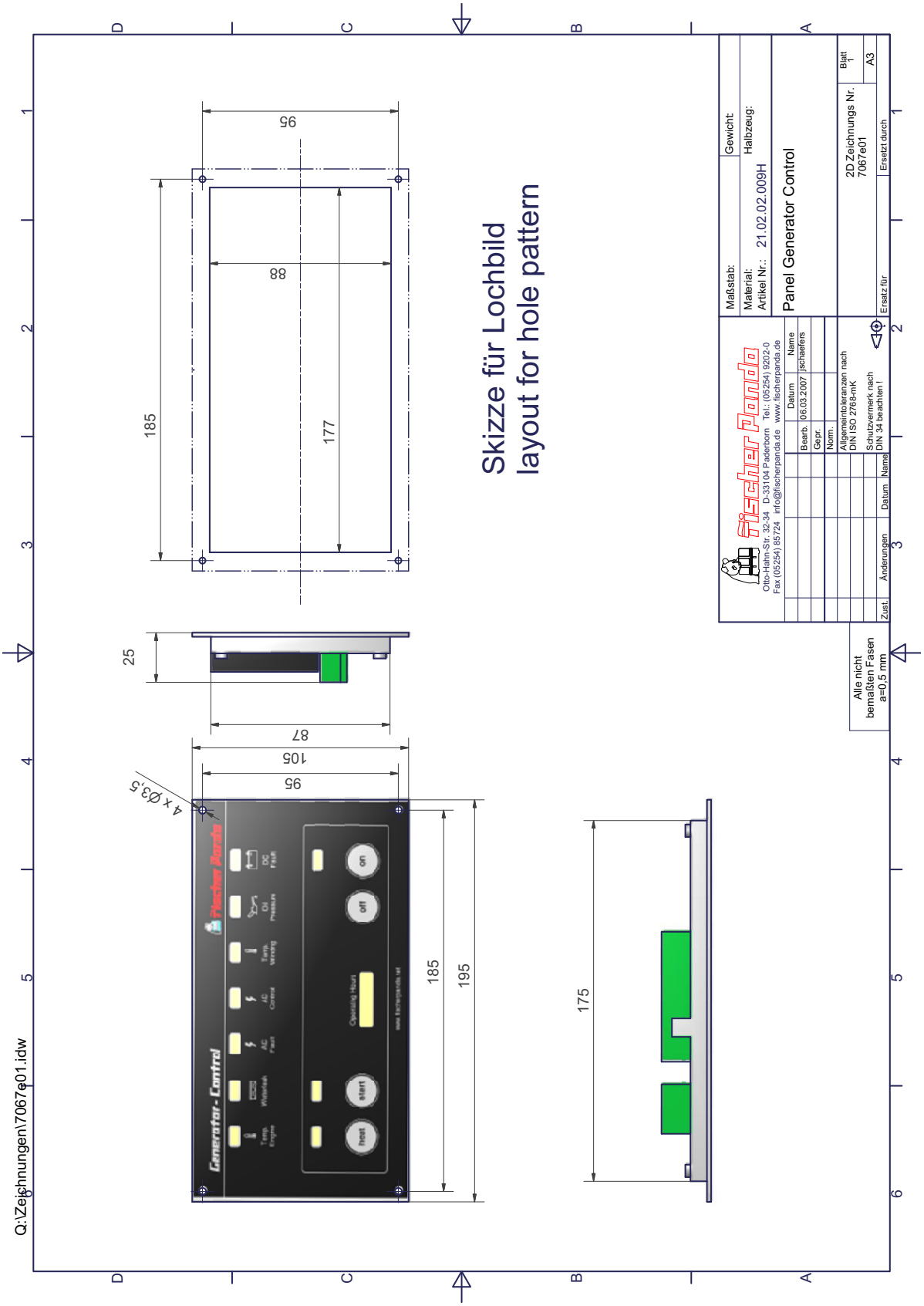
14. Measurements

14.1 Hole pattern

Fig. 14.1-1: Hole pattern



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