Manual Vehicle Generator

Panda 12.000NE PVK-UK 10 kW
Panda 14.000NE PVK-UK 12 kW
Panda 15.000NE PVK-UK 12,7 kW

230/400 V - 50 Hz 110/220 V 60 Hz
Current revision status

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Dear Customer,

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

Installation Approval and Warranty

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

Service and Support

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

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

Product Registration

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

http://www.fischerpanda.de/mypanda

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

Fischer Panda Quality - Tried and Tested

DIN-certified according DIN ISO 9001

Thank you for purchasing a Fischer Panda Generator.

Your Fischer Panda Team
3. General Instructions and Regulations

3.1 Safety first!

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

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

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

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

In the environment described / during the work specified, smoking is prohibited. **PROHIBITED: No smoking**

Fire and naked light are ignition sources that must be avoided. **PROHIBITED: No fire or naked light**

The equipment shall not be activated or started up while work is in progress. **PROHIBITED: Do not activate/start up**

Touching of the corresponding parts and systems is prohibited. **PROHIBITED: Do not touch**

Danger for life! Working at a running generator can result in severe personal injury. **DANGER: Automatic start-up**

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

This danger symbol refers to the danger of electric shock and draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in severe personal injury or loss of life due to electric shock. **WARNING: Hazardous electric voltage**
General warning of a hazard area

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

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

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

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

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

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

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 of hearing damages.

Warning of magnetic field.

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

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

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

MANDATORY INSTRUCTION: Wear hearing protection (PPE).

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

MANDATORY INSTRUCTION: Wear safety goggles (PPE).

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

MANDATORY INSTRUCTION: Wear protective gloves (PPE).

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

MANDATORY INSTRUCTION: Observe the instructions in the manual.

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

MANDATORY INSTRUCTION: Comply with environmental protection requirements.

3.2 Tools

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

<table>
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3.3 Manufacturer declaration in accordance with the Machinery Directive 2006/42/EC

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

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

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

3.4 Customer registration and guarantee

Use the advantages of registering your product:

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

Additional advantages:

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

Problems due to installation errors can be recognized in advance.

3.4.1 Technical support

Technical Support via the Internet: info@fischerpanda.de

3.4.2 Caution, important information for start-up!

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

If the above requirements are not or only partly fulfilled, the warranty claim shall become void.
3.5  Safety Instructions - Safety First!

3.5.1  Safe operation

Careful handling of the equipment is the best insurance against an accident. Read the manual diligently, and make sure you understand it before starting up the equipment. All operators, regardless of their experience level, shall read this manual and additional pertinent manuals before commissioning the equipment or installing an attachment. The owner shall be responsible for ensuring that all operators receive this information and are instructed on safe handling practices.

3.5.2  Observe safety instructions!

Read and understand this manual and the safety instructions on the generator before trying to start up and operate the generator. Learn the operating practices and ensure work safety. Familiarise yourself with the equipment and its limits. Keep the generator in good condition.

3.5.3  Personal protective clothing (PPE)

For maintenance and repair work on the equipment, do not wear loose, torn, or ill-fitting clothing that may catch on protruding parts or come into contact with pulleys, cooling disks, or other rotating parts, which can cause severe injury.

Wear appropriate safety and protective clothing during work.

Do not operate the generator while under the influence of alcohol, medications, or drugs.

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

3.5.4  Cleanliness ensures safety

Keep the generator and its environment clean.

Before cleaning the generator, shut down the equipment and secure it against accidental start-up. Keep the generator free from dirt, grease, and waste. Store flammable liquids in suitable containers only and ensure adequate distance to the generator. Check the lines regularly for leakage and eliminate leaks immediately as applicable.
3.5.5 Safe handling of fuels and lubricants

Keep fuels and lubricants away from naked fire.

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

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

Refuel in well-ventilated open spaces only. If fuel/lubricant was spilled, eliminate fluids immediately.

Do not mix diesel fuel with petrol or alcohol. Such a mixture can cause fire and will damage the generator.

Use only approved fuel containers and tank systems. Old bottles and canisters are not adequate.

3.5.6 Exhaust fumes and fire protection

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

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

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

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

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

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.
3.5.7  Safety precautions against burns and battery explosions

The generator and its cooling agents and lubricants as well as the fuel can get hot while the generator is operated. Use caution around hot components such as parts containing exhaust fumes, radiator, hoses, and engine block during operation and after the generator was shut down.

The cooling system may be pressurised. Open the cooling system only after letting the engine and the coolant cool down. Wear appropriate protective clothing (e.g. safety goggles, gloves).

Prior to operation, ensure that the cooling system is sealed and that all hose clamps are tightened.

The battery represents an explosion hazard, this applies both to the starter battery and the battery bank of the AGT generators. While batteries are being charged, a hydrogen-oxygen mixture is generated, which is highly explosive (electrolytic gas).

Do not use or charge batteries if the fluid level is below the MINIMUM marking. The life span of the battery is significantly reduced, and the risk of explosion increases. Refill to a fluid level between maximum and minimum level without delay.

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

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

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

3.5.8  Protect your hands and body from rotating parts!

Always keep the capsule closed while operating the generator.

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

Keep your hands and body away from rotating parts such as V-belt, fans, pulleys, and flywheel. Contact can cause severe injury.

Do not run the engine without the safety devices in place. Prior to start-up, mount all safety devices securely and check for proper attachment and function.

3.5.9  Anti-freeze and disposal of fluids

Anti-freeze contains toxic substances. To prevent injury, wear rubber gloves and wash off any anti-freeze immediately in case of skin contact. Do not mix different anti-freeze agents. The mixture may cause a chemical reaction generating harmful substances. Use only anti-freeze that was approved by Fischer Panda.

Protect the environment. Collect drained fluids (lubricants, anti-freeze, fuel), and dispose of them properly. Observe the local regulations for the respective country. Ensure that no fluids (not even very small quantities) can drain into the soil, sewers, or bodies of water.
3.5.10 Implementation of safety inspections and maintenance

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

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

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

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

3.6 Warning and instruction signs

Keep warning and instruction signs clean and legible.

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

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

3.6.1 Special instructions and hazards of generators

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

The generator must not be operated with the cover removed.

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

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

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

Electrical voltages above 60 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.
3.6.1.1 Protective conductor and potential equalisation:

Electric voltage above 60 V may be life-threatening. For 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 safe operation of the generator.

3.6.1.2 Protective conductor for Panda AC generators:

The generator is "earthed" as a standard (centre and ground are interconnected in the generator terminal box by a shunt). This is a basic first-level safety measure, which offers protection as long as no other measures are installed. Above all, it is designed for delivery and a possible test run.

This „neutralisation“ (Protective Earthing Neutral - PEN) is only effective if all parts of the electrical system are jointly „earthed“ to a common potential. The shunt can be removed if this is necessary for technical reasons and another protective system has been set up instead.

While the generator is being operated, the full voltage is applied to the AC control box, as well. Therefore, it is essential to ensure that the control box is closed and secured against touch while the generator is running.

The battery must always be disconnected if work on the generator or electrical system is to be carried out, so that the generator cannot be started up unintentionally.

3.6.1.3 Switch off all loads while working on the generator

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

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

A) The working capacitors
B) The booster capacitors

Both groups are located in a separate AC control box.

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

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

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

3.6.1.4 Potential equalisation for Panda AGT DC generators

For further information specific to your generator, see the chapter installation.
3.6.1.5 Safety instructions concerning cables

Cable types
It is recommended to use cables that are in compliance with the standard UL 1426 (BC-5W2) with type 3 (ABYC section E-11).

Cable cross-section
The cable shall be selected taking into account the amperage, cable type, and conductor length (from the positive power source connection to the electrical device and back to the negative power source connection).

Cable installation
It is recommended to install a self-draining cable conduit classified as V-2 or higher in compliance with UL 94 in the area of the cable guide inside the capsule. It must be ensured that the cable guide is not routed along hot surfaces such as the exhaust manifold or the engine oil drain screw but instead is installed free from any influence due to friction and crushing.

3.6.2 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.
4. In case of Emergency First Aid / Im Notfall - Erste Hilfe

First Aid in case of accidents by electrical shocks

5 Safety steps to follow if someone is the victim of electrical shock

1. Do not touch the injured person while the generator is running.

2. Switch off the generator immediately.

3. If you cannot switch off the generator, pull, push, or lift the person to safety using a wooden pole, rope or some nonconducting material.

4. Call an emergency doctor as soon as possible.

5. Immediately start necessary first aid procedures.
4.1 WHEN AN ADULT STOPS BREATHING

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

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<th>Description</th>
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<td>Does the Person Respond? Tap or gently shake victim. Shout, ”Are you OK?”</td>
</tr>
<tr>
<td>2</td>
<td>Shout, “Help!” Call people who can phone for help.</td>
</tr>
<tr>
<td>3</td>
<td>Roll Person onto Back. Roll victim towards you by pulling slowly.</td>
</tr>
<tr>
<td>4</td>
<td>Open Airway. Tilt head back, and lift chin. Shout, ”Are you OK?”</td>
</tr>
<tr>
<td>5</td>
<td>Check for Breathing. Look, listen, and feel for breathing for 3 to 5 seconds.</td>
</tr>
<tr>
<td>6</td>
<td>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.</td>
</tr>
<tr>
<td>7</td>
<td>Check for Pulse at side of Neck. Feel for pulse for 5 to 10 seconds.</td>
</tr>
<tr>
<td>8</td>
<td>Phone EMS for Help. Send someone to call an ambulance.</td>
</tr>
<tr>
<td>10</td>
<td>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.</td>
</tr>
</tbody>
</table>
5. Basics

5.1 Intended use of the machine

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

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

Sufficient amount of fuel and combustion air is necessary for this process. Arising exhaust and heat must be conducted according to the specification.

If the electrical power is fed to a local net, the regulations and installation instructions of the system operator and the regional authorities with reference to the power network/shipboard power supply system must be respected. Safety applications and safety devices (including lightening conductor, personal protection switch, ect.) have to be installed.

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

5.2 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.

5.2.1 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.

5.2.2 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.
5.2.3 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.

5.3 Scope of delivery of Fischer Panda generators

The Fischer Panda generator system contains the following components:

5.3.1 Asynchronous generators:

**Fischer Panda Generator**

*representative picture*

**Remote control panel**

*representative picture*
**AC Control Box**

The AC Control Box contains the capacitors and the control circuit board (VCS) for the generator.

At ND generators and generators with mini VCS the capacitors and the VCS may be mounted at the generator. The AC Control Box is not required for these generators.

*representative picture*

---

**Fischer Panda Manual**

The Fischer Panda Manual contains the following components:

- Transparent sheet with general information, guarantee conditions, installation inspection, and service list.
- Generator manual with attached remote control panel manual
- Spare part catalogue „Installation & Service Guide“
- Engine manual of the engine manufacturer
- Wiring diagram of the generator

*Optional components*

Optional components could be for example:

- Fuel pump
- Installation kits
- Radiators
- ect.

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**5.4 Panda transport box**

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**5.4.1 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
5.4.2 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

5.5 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.
5.5.1 Opening the GFK sound insulation capsule

GFK sound insulation capsule with 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.
5.6 Transport and loading/unloading

5.6.1 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.

5.6.2 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. 5.6.2-1: Lifting yoke (example)

5.7 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 damages through wrong decommissioning and storage.

Downtimes are categorised in the following groups:
• Short downtime (1 to 3 months)
• Medium term downtime / hibernation (3 to 6 months)
• Extended downtime / decommissioning (more than 6 months)
5.7.1 Instructions for the starter battery for extended downtimes

Starter batteries

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

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

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

Modern starter batteries are typically maintenance-free.

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

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

General limits for lead-acid batteries:

2.1 V / cell corresponds with full battery (charged).
1.95 V / cell corresponds with empty battery - recharge.

For a 12 V battery, the following applies:
- 11.7 V lower open-circuit voltage (battery empty), recharge battery.
- 12.6 V upper open-circuit voltage (full battery) - trickle charge full battery at 13.2 V.

For a 24 V battery, the following applies:
- 23.4 V lower open-circuit voltage (battery empty), recharge battery.
- 25.2 V upper open-circuit voltage (full battery) - trickle charge full battery at 26.4 V.

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

Fischer Panda recommends:

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

5.7.2 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).

5.7.3 Measures for medium term downtimes / hibernation

Medium term downtimes (3 to 6 months)
5.7.3.1 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.**

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.**

5.7.3.2 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.
5.7.4 Measures for extended downtimes / decommissioning

Downtimes (more than 6 months)

5.7.4.1 Courses for preservation:

• Check battery charge status and recharge regularly, roughly every 3 months, as necessary. Observe instructions of the battery manufacturer.

• Check cooling water anti-freeze level and refill as necessary.

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

  If the cooling water is drained, e.g. after engine surface protection is applied, no water may remain inside the engine during the downtime. The control unit must be marked accordingly with a note specifying “NO COOLING WATER”.

• Drain engine oil as specified. Refill engine with preservative oil to the max. level on the oil dipstick.

• Drain diesel from tank and refill with a protective mixture (90 % diesel and 10 % preservative oil) (level to full).

Crank engine without start.

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

• Disconnect battery. Coat terminals with acid-free grease.

  Attention! Cover alternator apertures.

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

• Clean engine as per manufacturer's instructions.

• Spray engine parts and V-belt disks with preservative.

• Clean air filter housing and spray with preservative (metal housing only).

• Spray preservative on intake and exhaust side of exhaust turbocharger (where applicable) and reconnect the lines.

• Remove valve cover and spray inside of valve cover, valve stems, springs, rocker, etc. with preservative oil.

• Remove injection nozzle and coat cylinder surface with preservative oil. Hold stop lever in zero delivery position and crank engine manually several times. Refit injection nozzles with new seals (at an operation hour of min. 100 hours after the last change). Observe torque values.

• Spray radiator cover and tank cover or radiator cover on expansion tank lightly with preservative oil and refit.

• Close off intake and exhaust apertures (e.g. with tape or end caps).

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

Before recommissioning, remove preservatives and protective measures.

Attention!

5.7.4.2 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.
6.1 The Panda Generator: Type plate at the Generator

Fig. 6.1-1: Type plate

Fig. 6.1-2: Description type plate
6.2 Description of the genset

6.2.1 Front View (Complete)

Fig. 6.2.1-1: Front view (complete)

01. Radiator
02. Water-cooled pre-silencer
03. Ventilation screw at pre-silencer
04. Thermo-switch at pre-silencer
05. Engine oil filter
06. Air suction housing with air filter
07. Air suction tube, housing - induction elbow
08. Actuator for rpm-regulation
09. Fuel solenoid valve
10. Thermostat housing
11. Pulley for internal cooling water pump
12. Alternative oil filler neck
13. Fuel filter
14. Oil dipstick
15. Failure bypass switch
16. Power relays
17. Passage for oil drain hose
18. Electrical fuses
19. Cooling water connection block
6.2.2 Front View

Fig. 6.2.2-1: Front view

- 01. Water-cooled pre-silencer
- 02. Ventilation screw at pre-silencer
- 03. Thermo-switch at pre-silencer
- 04. Engine oil filter
- 05. Air suction housing with air filter
- 06. Air suction tube, housing - induction elbow
- 07. Actuator for rpm-regulation
- 08. Fuel solenoid valve
- 09. Thermostat housing
- 10. Pulley for internal cooling water pump
- 11. Alternative oil filler neck
- 12. Oil dipstick
- 13. Fuel filter
- 14. Failure bypass switch
- 15. Fuel pump relay K3
- 16. Pre-glow relay K2
- 17. Starter relay Ks
- 18. Passage for oil drain hose
- 19. Electrical fuses (blue=15A, white=25A)
- 20. Cooling water connection block
- 21. Generator housing with coil
Fig. 6.2.3-1: Back view (complete)

01. DC-alternator  
02. Thermo-switch at water-cooled exhaust elbow  
03. Water-cooled exhaust elbow  
04. Compensator under heat isolation  
05. Ventilation hose to expansion tank  
06. Thermo-switch at radiator  
07. Radiator  
08. Oil pressure switch  
09. Generator power terminal box  
10. Starter motor  
11. Generator housing with coil  
12. Cooling water pipe to radiator  
13. Cooling water pipe to generator  
14. Exhaust output
6.2.4 Right Side View

Fig. 6.2.4-1: Right side view

01. Ventilation screw internal cooling water pump
02. Fuel solenoid valve
03. V-belt
04. Alternative oil filler neck
05. Fuel filter
06. Connection fuel IN
07. Connection fuel OUT
08. Cable for fan control
09. Cable for thermo-switch radiator
10. Cable for fuel pump
11. Cable for remote control panel
12. Cable for VCS
13. Cable for AC-control box
14. Cable for Generator output
15. Cable for Starter battery plus (+)
16. Cable for Starter battery minus (-)
17. Air suction intake
18. Pulley for internal cooling water pump
19. Thermostat housing
20. Ventilation screw thermostat housing
6.2.5 View from above

Fig. 6.2.5-1: View from above

01. Water-cooled pre-silencer
02. Ventilation hose to expansion tank
03. Compensator under heat isolation
04. Cooling water hose
05. Water-cooled exhaust elbow
06. Cap oil filler neck
07. DC-alternator
08. Ventilation screw at water pump
09. Ventilation screw at water pump
10. Fuel solenoid valve
11. Air suction tube, housing - induction elbow
12. Thermo-switch at cylinder head
13. Air suction housing with air filter
14. Thermo-switch at pre-silencer
15. Ventilation screw at pre-silencer
6.3 Details of functional 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
02. LED for cooling water level red/yellow
03. LED for fuel level and air filter replacement red/yellow
04. LED for AC voltage ok green
05. LED for winding temperature red
06. LED for oil pressure red
07. Battery loading voltage DC charging light
08. LED for pre-heat, „heat“ orange
09. LED for generator „start“ green
10. LED for generator „stand-by“ green
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!: See remote control panel data sheet for details!
6.3.2 The coolant system

Fig. 6.3.2-1: The coolant system
6.3.3 The Fuel and combustion air system

Fig. 6.3.3-1: The Fuel and combustion air system
6.3.4 The electrical connections

Fig. 6.3.4-1: The electrical connections

01. Fischer Panda Generator
02. Fan control unit (may integrated in the AC-Box)
03. Fuel pump
04. Remote control panel
05. AC-Control box
06. Customers electrical cabinet
07. Battery switch
08. Fuse
09. Starter battery bank
6.3.5 Sensors and switches for operating surveillance

Thermo-switch at cylinder head

110°C and 130°C

Thermo-switch at water-cooled exhaust elbow

105/90°C

Thermo-switch at pre-silencer

At this point the coolant usually achieves its highest value. From here it flows back into the radiator.

105/90°C
**Thermo-switch at backend bearing**

120°C

In order to be able to supervise the temperature in the oil-cooled generator bearing, an oil temperature switch is installed into the system.

**Thermo-switch at radiator**

**Thermo-switch at the generator coil**

1. Generator coil
2. Thermo-switch 4x165/175°C
3. Housing

For the protection of the generator coil four thermal switches inside the coil, which are for safety's sake independently parallel inserted.
Oil pressure switch at engine

In order to be able to supervise the lubricating oil system, an oil pressure switch is installed into the system. The oil pressure switch is on the back of the engine (in front of the electrical starter).

Failure bypass switch

The failure bypass switch offers the possibility of starting the generator if the electrical control has switched off due to an error in the cooling system by overheating.
6.3.6 The oil circuit

Fig. 6.3.6-1: The oil circuit
7. Installation Instructions

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

Attention!

In situations where Fischer Panda has no detailed information concerning certain installation requirements (such as 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!” on Page 14.

Notice!:

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

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

DANGER: Automatic start-up

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

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

Warning!: Risk of injury

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

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

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
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.

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

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

Warning! Hot surface/material

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

Observe the instructions from your battery manufacturer.

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 Environmental protection

Engine liquids/batteries are harmful for the environment. Environmental protection.

Collect discharged engine liquids and dispose it properly.

Batteries should be disposed properly.
7.3 Placement

7.3.1 General instructions

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

7.3.2 Preparing the base - Placement

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

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

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

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

The Power out of the generator based on the following data:
Ambient temperature: 20°C
Air pressure: 1000mbar (100m above normal Zero)
Rel. air moisture: 30% reg. the ambient temperature
Fuel temperature: bis zu 20°C
Exhaust backpressure: 80mbar (at the exhaust out of the sound isolation cover)

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

7.3.3 Advice for optimal sound insulation

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

Fischer Panda recommend captive shock mount!
01. Shock mount

representative picture

02. Captive shock mount

representative picture
7.4 Air suction filter as a source of noise

The external suction filter (not included on delivery) must always be used if the generator is to be used in a dust-free environment. This filter is connected by means of a hose with a connecting piece to the generator housing. The filter can be the source of considerable noise. If this is the case, an air intake muffler with the appropriate nominal width should be ordered from Fischer Panda. This is a cylinder, which takes up relatively large amount of room (Total length approx 700mm, Diameter 100mm).

7.5 Generator Connections

The position of the connections can differ, depending on the generator type. The appropriate cables and connections are described at the generator.

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

![Connection scheme](image)

01. Connection fuel IN
02. Connection fuel OUT
03. Cable for fuel pump
04. Cable for remote control panel
05. Cable for VCS
06. Cable for AC-Control box (not all models)
07. Load
08. Cable starter battery plus (+)
09. Cable starter battery minus (-)

7.6 Fuel system installation

7.6.1 The following items need to be installed:

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

The external fuel pump should be installed near the tank

**Electrical fuel pump**

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

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

**External fine filter**

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

_Representative picture_
7.6.2 Connection of the fuel lines at the tank

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

**Note:**

Connection of the return pipe to the tank

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

Non-return valve in the suction pipe

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

Non-return valve for the fuel return pipe

**ATTENTION!**

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

7.6.3 Position of the pre-filter with water separator

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

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

representative picture

7.7 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):

1. Press switch „ON“. All functional elements must light up.
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). 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.

3. Pressing the starter button can now start the machine. The machine should start after a short period. 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!

**Ventilation screw at the fuel solenoid valve**

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

**Sample picture**

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### 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.

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

#### 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.

**Note:** 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.
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 - Siehe “Installation location for radiators for roof, side, or underfloor mounting on the vehicle” auf Seite 61.
2. Built-in radiator for installation in the vehicle wall or cabin wall - Siehe “Installation location for radiator in the vehicle wall or cabin wall” auf Seite 65.
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 - Siehe “Installation location for radiator in a tunnel” auf Seite 66.

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. 7.9.3.1-1: 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**

**Dachkühler**

*Radiator on the roof*

*Radiateur sur le toit*

A = mind. 500 mm  
D = mind. 100 mm  
G = mind. 1/2 B

Freies Abbläsen muß gewährleistet sein
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

![Schematic: radiator, vehicle wall installation]

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

![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.

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:

Figs. 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

Note:

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 Ablassen 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

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
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

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
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](Ansicht von oben)

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 Kapitel 7.11, “Installation schematics,” auf Seite 71*
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.

A corresponding indicator kit can be procured from Fischer Panda.

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.

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.
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

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

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).

**Note:**

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

### 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.

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. Thermal switch (on the hot side)
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 04. T-fitting
02. Coolant expansion tank 05. Radiator
03. T-fitting with connection for thermal switch 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

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

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

Note:
7.12 Exhaust installation

7.12.1 Exhaust connection for roof outlet

Fig. 7.12.1-1: Exhaust installation - scheme

1. Exhaust outlet
2. Generator
3. Roof through fitting
4. Vibration damper (option)
5. External pre-silencer (option)
6. Exhaust pipe
7. External series silencer (option)
8. End pipe

7.12.2 Exhaust connection for mounting below the vehicle

Fig. 7.12.2-1: Exhaust installation - scheme

1. Generator
2. Exhaust outlet
3. Compensator (option)
4. External pre-silencer (option)
5. Vibration damper
6. Exhaust pipe
7. External series silencer (option)
8. End pipe
7.13 Connection of the Electrical Components

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

1. Generator
2. External fuel pump
3. Remote control panel
4. AC control box
5. Radiator with fan
6. Switchboard
7. Battery main switch
8. Battery fuse
9. Starter battery

7.14 Generator DC system installation
It is recommended to install an additional starter battery for the generator.

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

The generator is then Earth/Ground free.

### 7.14.1 Connection of the starter battery block

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

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

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

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

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

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

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

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

**ATTENTION!:** Consider correct connection sequence

**ATTENTION!:** Right connection of the battery. Battery connection

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

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

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

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

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

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

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

Examine regularly the cable laying and the electrical connections.

**Positive battery cable**

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

**Negative battery cable**

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

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

**DC starter motor**

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

1. Solenoid switch for starter motor
2. Starter motor
7.14.2 Connection of the remote control panel - see separate control panel manual

7.14.3 Ignition switch at generators with 24 V start system

Optional devices for the 24 V start system only. With the Ignition switch you switch the power at the DC/DC converter on. The DC/DC converter is the power supply for the Remote control panel and other components.

**Ignition switch**

01. Ignition switch
02. Control light for ignition switch

**DC/DC Converter (24 V/12 V) for internal 12 V power supply**

01. DC/DC Converter

Optional devices for the 24 V start system only.
7.15 AC-Control box

In the AC-Control box the needed capacitors for the excitation of the generator are placed as well as the electronic control for voltage/speed regulation VCS and the starting current reinforcement ASB. The AC-Control box must be connected with the conductions (high voltage and low-voltage) to the generator.

The front panel must always be closed, since the AC-Control box produces 400V during operation.

Fig. 7.15-1: AC-Control box - Sample

1. Terminal block for excitation cable
2. VCS
3. Capacitors

The negative pole and the ground are connected to the housing.

Ensure that the power supply system installation conforms to all of the required electrical system safety regulations of your local authorities. Only a qualified electrician should install the electrical system. Especially adherence to the regulations regarding conductors, safety switches etc.

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.

Before working on the System read the “Safety first!” on Page 14.
7.15.1 The VCS-Control (not all models)

This Panda generator is fitted with the electronic voltage control „VCS“ as standard.

The VCS controls the generator voltage and motor speed. An actuator mounted at the injection pump can increase the engine speed by up to 8 %.

If the generator runs without load, the voltage should be 240 V with a frequency of approx 48,5 to 49,5 Hz. The frequency (equates to the speed) can be increased by up to 8 %. This ensures that the engine speed is increased when there is an extra load. The maximum speed is achieved when 80 % load is reached.

The clearance of the speed control range is limited by an adjusting screw, above and below. Adjustment of this screw may not occur without the expressive approval of the manufacturer.

All signals pass through the circuit board in the AC-Control box. The signal impulse for the actuator is passed to the electric motor by means of the 5 core wire.

The generator maintains its full capability if the VCS has a defect. In this case the base current must be raised to at least 260 V by adjusting the minimum setting on the speed gauge, in order to ensure that the generator output voltage at 70 % nominal load does not drop below 236 V.

*Fig. 7.15.1-1: VCS circuit board*

- 01. Connection measuring voltage
- 02. Adjustment booster voltage (do not adjust!)
- 03. Adjustment VCS-voltage
- 04. Connection VCS inlet
- 05. Electrical fuse (1,6A slow to blow)
- 06. Potentiometer for booster time
- 07. Connection for PC
ATTENTION!

The wire for the measuring voltage must be connected directly to the battery, and is not to be connected to the output side of the generator rectifier.

Because of the drop in voltage, the exact voltage is only received directly to the battery. A wrong connection can lead to damage to the battery!

Notice!

Models with Mini VCS:

The Mini VCS can be mounted at the Generator, in the AC Control Box or external. The Mini VCS can not be opened and has no fuse to change.

7.16 Alternative Mini VCS

The Mini VCS can be mounted at the generator or in the AC-Control box.

7.16.0.1 Option 1: The Mini VCS and the capacitors are mounted at the generator.

Mini VCS at the Panda 6500 NE PMS

representative picture

Fig. 7.16.0.1-1: Mini VCS at the Panda 6500 PMS

Capacitors at the Panda 6500 NE PMS

representative picture

Fig. 7.16.0.1-2: Capacitors at the Panda 6500 PMS
7.16.2 Option 2: The Mini VCS is mounted in the AC-Box

Mini VCS and Capacitors in the AC-Control box

representative picture

Notice!: Models with Mini VCS:

The Mini VCS can be mounted at the Generator, in the AC-Control Box or external. The Mini VCS can not opened and has no fuse to change.

7.16.1 Jump start at high starting current (booster) - not available for all models

Additionally, the automatic start booster is located on the circuit control board. The starting current is increased by connecting a second group of condensers (C2), if the voltage drops below a pre-set voltage.

The starting current can be increased by 300 % for a short period by combining both components voltage/speed control and ASB start booster.

7.16.2 Electrical Fuses

It is absolutely essential that the electrical system installation is inspected by a qualified electrical technician. The generator should have its own AC input electrical fuses. The fuses should be sized such that the rated current of the generator on each of the individual phases is not exceeded by more than 25 %.

Data for gensets with power output greater than 30 kW on request.

The fuses must be of the slow type. A 3-way motor protection switch must be installed to protect the electrical motor.

Required fuses see Tabelle 11.5, “Cable cross-section,” auf Seite 136

7.16.3 Required cable cross-sections

The following recommended electrical cable dimensions (cross sections) are the minimum required sized for a safe installation. (see Tabelle 11.5, “Cable cross-section,” auf Seite 136)

7.16.4 Checking the Electrical Connections

There is always the possibility that circuits have been rerouted / changed or individual components have not been correctly laid out on the circuit diagrams.

The installation electrician should therefore check and label all electrical connections to ensure that they correspond
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to the main circuit diagram, the inspection and correct labelling is especially critical for terminals L1/L2/L3/L1'/N (for the 230 V - 50 Hz model) and for terminals L1/L2/L3/N & 1/2/4 for the 60 Hz (120 V) models. The electrician is therefore obliged, before installation to check whether the generator is earth-free. As long as this test has not been carried out all other components for electrical installation must be removed. Once the system has been installed and inspected, this test should be performed with all electrical devices (i.e. voltage check between common and metallic housings) while the generator is running.

7.17 Voltage Controller with Isolating Relays

It must always be taken into account that speed control can be affected in the case of a motor driven generator, when there is a fault with the diesel motor controls. In this case, the diesel engine could run up infinitely and produce a voltage, which becomes substantially larger than the electrical consumers can process. This can destroy very expensive items of equipment. To ensure solid installation, a voltage controller with isolating relays must be used for the protection of electrical consumers. The appropriate accessory components are available at Fischer Panda.

In the case of a Dual Combination Generator, the voltage control for both output parts (single phase AC and three-phase AC) should be provided.

A voltage control is integrated for various Fischer Panda generators. This voltage control affects only the diesel engine. If the rated voltage exceeds approx. 15 %, this voltage control is activated, by turning the diesel engine off. This is only possible, when there is a few seconds delay; consumers could otherwise be damaged. The only safe method for the protection of the electrical devices is the installation of an external voltage controller with separation contactor.

We strongly recommend this measure and also wish to point out that the generator manufacturer is not responsible for damage, which is caused by over voltage to external devices.

Protect your valuable devices by using an external voltage controller.

7.17.1 Further information for the recommendation "External, electrical voltage controller"

It must always be taken into account that a diesel engine "revs up" due to special circumstances. This is the case when due to a fault in the system engine oil gets into the sucking way. This is possible with many engines by ventilation of the crank case. For example, a crank damage could cause an overpressure in the crank case. This leads to the fact, that too much oil will be pressed into the exhaust and reaches the sucking way. The engine fails to stop. Usually, engine damage is the result. It would be fatal, if this fault would lead to a damage of at this time all connected consumers (the "rev up" of the engine leads to an extremely high voltage increase). Only an external voltage control with separator can prevent such damage.

7.18 Radiator fan control / electronic fan control

To control the radiator fan, various controls/electronic controls can be chosen from the Fischer Panda delivery program.

Note: In the following the basic functions of the fan controls are described. The original manual/data sheet with further informations of the fan control must be respected.

7.19 Standard fan control for 1-phase and 3-phase generators.

In the standard kit, the generators will be equipped with a one step fan control.
Fan control 230 V

*representative picture*
7.20 Electronic fan control for DC fans RE 0201

For DC Fans the fan control RE 0201 can be used.

Fig. 7.20-1:

7.21 Brief description

Temperature-dependent continuous speed controlling device for one or two DC-fans.

7.21.1 Function

The speed regulation of the fan is made by pulse tracing modulation (PWM) of the operating voltage. Pulse/no pulse ratio becomes over an external temperature sensor (NTC resistance to attach at clamp 7 and 8) dependent on the coolant temperature. Between the lower limit temperature (starting temperature) and the upper limit temperature the fan is controlled with 30 to 100 % of the available operating voltage (PWM = 30 % to 100 %).
<table>
<thead>
<tr>
<th>Poti Start:</th>
<th>Adjusting the starting temperature (fan start-up). The start temperature is with left stop 60 °C and with right stop 80 °C. Ex factory a starting temperature of 70 °C is adjusted (potentiometer position: In the middle).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poti Window:</td>
<td>Adjusting the temperature window: With the potentiometer „Window“ the size of the window between starting temperature and temperature for full number of revolutions (upper limit temperature) can be adjusted. The temperature window can be adjusted from 5 °C to 20 °C. Is the starting temperature adjusted to 70 °C and the temperature window to 10 °C thus the fan start-up with 70 °C and reaches the maximum speed with 80 °C (upper limit temperature). Ex factory a temperature window of 12.5 °C is adjusted (potentiometer position: In the middle).</td>
</tr>
<tr>
<td>Poti Freq:</td>
<td>Adjusting of the PWM frequency. Desired to many customers a potentiometer was added for changing the PWM frequency. A selection of the frequency between approx. 1,7 and 3.5 kHz is possible, which can serve for the avoidance of unwanted oscillation/resonances. Ex factory a PWM frequency of 2 kHz is adjusted.</td>
</tr>
</tbody>
</table>

### Function of the temperature sensors (NTC-resistance, extern und intern):

| extern: | Over this temperature sensor the coolant temperature is collected. The starting temperature (fan start-up) and the upper limit temperature can be adjusted by means of potentiometer present at the plate. The PWM ratio starts with the exceeding of the starting temperature with approx. 40% (for 2 seconds), so that the fan starts reliably. According to expiration of the 2 seconds the PWM ratio is determined by coolant temperature and potentiometer adjust. Since the coolant temperature will not continue to rise in the 2 seconds, the PWM ratio will jump back to the minimum value of 30 %. At, from here, far rising coolant temperature, the PWM ratio will then rise linear with the temperature. If the upper limit temperature is nearly reached, the PWM ratio rose to 85 %. By 85% to 100 % PWM ratio with reaching the upper limit temperature switching over is made by one step, in order to avoid very short turn-off times. Likewise switch-back is made with falling coolant temperature of 100 % to 85% PWM ratio. If the coolant temperature falls under the starting temperature, the minimum PWM ratio is not fallen below of 30%, but remains constant. If the coolant temperature sinks approx. 3°C under the starting temperature, then the fan is switched off completely. All data exclusively apply on use of the temperature sensor type S891-100k of the manufacturer Epcos. |
| intern: | Over this temperature sensor the temperature of the output stage is collected. If the temperature of the output stage rises over 85 °C, the PWM ratio, independently of the coolant temperature, is set to 100 %, in order to avoid the switching losses and cool the output stage down again. If the temperature of the output stage continues to rise nevertheless and beyond 90 °C, the fan controller switches itself off. **NOTE:** The cooling of the generator is not ensured anymore. If the output stage temperature sinks again under 85 °C, the fan controller restarts itself. Such output stage temperatures cannot occur however with intended use of the equipment. |

### Light emitting diodes: The 3 light emitting diodes (LED’s) indicate the operating condition of the fan controller and have the following meaning:

| LED (green): | Shines with normal operation. After the self check and successful recognizing of the sensors the fan controller jumps into the normal operating condition, in which the fan regulates, if the temperature lies in the appropriate range. |
| LED (yellow): | Shines if the fan controller is in slave-mode. |
| LED (red): | Shines with the occurrence of the following errors:  
Incorrect external temperature sensor. If the temperature sensor for the cooling water is defective or the feeder line to it interrupted (cable break), then the fan is accessed with 100 % PWM.  
Incorrect internal temperature sensor. If the temperature sensor for the output stage is defective or the feeder line to it interrupted (cable break), then this is indicated over the LED. The fan controller continues working normally.  
Overheating of the output stage. If the output stage of the fan controller becomes too hot, then this switches itself off. Please read in addition the description of the function of the internal temperature sensor. |

### 7.21.2 Master - Slave - Operation

Two or three fan controllers can be connected with each other that over one temperature sensor for the cooling water, all fan controllers can be operated synchronous.

On the connection between master and slave the PWM signal of the masters will transfer. The slave takes over of it the PWM ratio and the frequency. The slave spends its PWM impulse only then if that of the masters is terminated. Thus even load of the current supply is reached. The second slave (if available) regards the first slave as its master (see also drawing).

The slave operation is activated automatically, by the presence of a PWM signal at the slave control inlet. As soon as such a signal is present, the slave follows the control signal and ignores its own adjusts and its own temperature measuring input. If the master does not spend a PWM signal, because the coolant temperature is under its starting temperature, the slave drops back into the master operation and uses its own adjusts and analyses its own temperature measuring input. So that the slave behaves correctly now, a 100k fixed resistor must be attached at its temperature measuring input, which corresponds to a coolant temperature below the starting temperature.

The plug-able plug-in for the master-slave-connection and the 100k fixed resistor belong not to the normal scope of supply and must be ordered separately.
### 7.21.3 Function of the clamps for the Master-Slave-Operation

| Clamp 11+12: | Control input for slave operation. Clamp 11 is the positive input. Clamp 12 is the negative input. The input is floating, so that via this input connected fan controllers of the same source can be supplied, without a ground loop develops. |
| Clamp 13+14: | Output for the master-slave-operation. At clamp 13 is the signal and at clamp 14 is ground. |

### 7.21.4 Remote controlled switching on and off of the fan controller

The fan controller can be switched on and/or off over the connection „ON“ (clamp 9). If at connection „ON“ lies the same voltage as at the connection „BAT +“, the fan controller is switched on. If at connection „ON“ lies no voltage, the fan controller is switched off. If this option is not needed, then the connection „ON“ can connected directly on the printed circuit board, over the solder joint J101, with the connection „BAT +“:

- J101 closed: Fan control always on
- J101 open: Fan control only on if operation voltage at connection „ON“

The solder joint J101 is seen from the direct line clamp directly behind the main safety device (main fuse) on the printed circuit board.

### 7.21.5 12 V / 24 V - Operation

For 12 V and/or 24 V-operation the pre-resistor for the operating voltage of control electronics must be adapted. This pre-resistor consists of two resistances, which are connected in series. For 12 V-operation one of these resistances is short circuit with the solder joint J102. For 24 V-operation the solder joint J102 must be opened. Additionally different safety devices (fuses) must be installed depending upon operating voltage.

**Main fuse** (flat fuse on the printed circuit board):
- 12 V-operation: 50 A flat fuse
- 24 V-operation: 30 A flat fuse

**Output fuse** (plug fuse on the terminal block, each two pieces):
- 12 V-operation: 25 A plug fuse
- 24 V-operation: 20 A plug fuse
### 7.22 Technical Data

#### Characteristics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>closed current (electronics off)</td>
<td>0.5 mA</td>
</tr>
<tr>
<td>closed current (electronics on)</td>
<td>10 - 15 mA</td>
</tr>
</tbody>
</table>

#### Benchmark figure of the temperature control:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>fan start-up</td>
<td>60 °C - 80 °C</td>
</tr>
<tr>
<td>max. number of revolution</td>
<td>65 °C - 100 °C</td>
</tr>
<tr>
<td>tolerance of the temperatures</td>
<td>± 5 %</td>
</tr>
</tbody>
</table>

#### Maximum ratings

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximum ambient temperature (for operation)</td>
<td>50 °C</td>
</tr>
</tbody>
</table>

#### Maximum ratings: Battery operation 12 V

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>nominal load operating voltage (continuity)</td>
<td>11 VDC - 14.4 VDC</td>
</tr>
<tr>
<td>load operating voltage (15 min)</td>
<td>- 16.0 VDC</td>
</tr>
<tr>
<td>maximum idle speed operating voltage (3 sec)</td>
<td>17 VDC</td>
</tr>
<tr>
<td>nominal load current (continuity)</td>
<td>40 A</td>
</tr>
<tr>
<td>maximum load current (3 sec)</td>
<td>44 A</td>
</tr>
<tr>
<td>nominal voltage fan</td>
<td>12 VDC</td>
</tr>
</tbody>
</table>

#### Maximum ratings: Battery operation 24 V

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>nominal load operating voltage (continuity)</td>
<td>18 VDC - 28.0 VDC</td>
</tr>
<tr>
<td>load operating voltage (15 min)</td>
<td>- 28.8 VDC</td>
</tr>
<tr>
<td>maximum load operating voltage (3 sec)</td>
<td>30 VDC</td>
</tr>
<tr>
<td>idle speed voltage (continuity)</td>
<td>34 VDC</td>
</tr>
<tr>
<td>maximum idle speed operating voltage (3 sec)</td>
<td>36 A</td>
</tr>
<tr>
<td>nominal load current (continuity)</td>
<td>20 A</td>
</tr>
<tr>
<td>maximum load current (3 sec)</td>
<td>22 A</td>
</tr>
<tr>
<td>nominal voltage fan</td>
<td>24 VDC</td>
</tr>
</tbody>
</table>

#### Maximum ratings: Transformer operation 12 V

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>sieving in the power supply</td>
<td>≥ 10000 µF 63 V (depending on the load current)</td>
</tr>
</tbody>
</table>

#### data for secondary winding after rectification/sieving

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>nominal load operating voltage (continuity)</td>
<td>11 VDC - 14.4 VDC</td>
</tr>
<tr>
<td>load operating voltage (15 min)</td>
<td>- 16.0 VDC</td>
</tr>
<tr>
<td>maximum load operating voltage (3 sec)</td>
<td>17 VDC</td>
</tr>
<tr>
<td>idle speed operating voltage (continuity)</td>
<td>28 VDC</td>
</tr>
<tr>
<td>maximum idle speed operating voltage (3 sec)</td>
<td>30 VDC</td>
</tr>
<tr>
<td>nominal load current (continuity)</td>
<td>40 A</td>
</tr>
<tr>
<td>maximum load current (3 sec)</td>
<td>44 A</td>
</tr>
<tr>
<td>nominal voltage fan</td>
<td>12 VDC</td>
</tr>
</tbody>
</table>

#### Maximum ratings: Transformer operation 24 V

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>sieving in the power supply</td>
<td>≥ 10000 µF 63 V (depending on the load current)</td>
</tr>
</tbody>
</table>

#### data for secondary winding after rectification/sieving

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>full load operating voltage (15 min)</td>
<td>18 VDC - 28.0 VDC</td>
</tr>
<tr>
<td>load operating voltage (15 min)</td>
<td>- 28.8 VDC</td>
</tr>
<tr>
<td>maximum full load operating voltage (3 sec)</td>
<td>30.0 VDC</td>
</tr>
<tr>
<td>maximum partial load operating voltage</td>
<td>36.0 VDC</td>
</tr>
<tr>
<td>idle speed operating voltage (continuity)</td>
<td>39.0 VDC</td>
</tr>
<tr>
<td>maximum idle speed operating voltage (3 sec)</td>
<td>40.0 VDC</td>
</tr>
<tr>
<td>maximum input peak voltage</td>
<td>44.0 VDC *1)</td>
</tr>
<tr>
<td>maximum output peak voltage</td>
<td>44.0 VDC *1)</td>
</tr>
<tr>
<td>nominal load current (continuity)</td>
<td>24 A</td>
</tr>
</tbody>
</table>
The maximum input and/or output peak voltage is measured over the appropriate clamps of the fan controller. It may be exceeded at no time. This applies independently of whether a voltage increased height was possibly caused by the fan controller or an external component. To this belong the switch-off-transient of the fan (pulse width modulation = fan will be 2000 times per second switched on and off), and by outside switching operation caused glitches.

Attention!: Configuration at delivery for 24 V-operation.

- solder joint J101 closed
- solder joint J102 open
- main fuse 30 A installed
- output fuse 20 A installed

For 12 V-operation the installed fuses must be replaced against the provided fuses, as described above. The pre-resistors for the operating voltage of control electronics must be configured like above described.

Assembly: Vertical on standard rail, pay attention to good ventilation.

At breach of specification can destroy one or more components of the system or shorten the life span substantially.

Subject to change without prior notice.
**7.23 Electronic fan control for single phase fans PKE-2.5V_Ziehl Abegg**

The electronic fan control variety the fan rpm stepless.

**7.23.1 Preset for the use with Fischer Panda generators**

The Ziehl Abegg fan control is preset for the use with Fischer Panda generators. For the preset following data and jumper settings are used.

*Fig. 7.23-1: Preset*
7.23.2 Connection of the sensor (Ziehl Abegg KTY)

The sensor is connected to E/GND. A resistor 4,2kOhm must be connected parallel to the sensor.

Fig. 7.23.2-1: Connection plan
7.24 Electronic fan control for single phase fans PXET6Q_Ziehl Abegg

The electronic fan control variety the fan rpm stepless.

7.24.1 Preset for the use with Fischer Panda generators

The Ziehl Abegg fan control is preset for the use with Fischer Panda generators. For the preset following data and jumper settings are used.

Fig. 7.24-1: Preset
7.24.2 Connection of the sensor (Ziehl Abegg KTY)

The input TB and D1 are bridget.
The sensor is connected to E1/GND. A resistor 4.2kOhm must be connected parallel to the sensor.

Fig. 7.24.2-1: Connection plan
7.25 Electronic fan control for 3 phase fans PKD T5/PKD M10 Ziehl Abegg

The electronic fan control variety the fan rpm stepless.

**Fan control PKD T5**

*representative picture*

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Fig. 7.25.0-1: Fan control PKD T5
7.25.1 Configuration of the electronic fan control PKD T5 for Fischer Panda Generators

Fig. 7.25.1-1: Configuration of the fan control PKD T5 for Fischer Panda Generators
7.26 Configuration of the electronic fan control PKD M10 for Fischer Panda Generators

Fig. 7.26.0-1: Configuration of the fan control PKD M10 for Fischer Panda Generators
7.27 Insulation test

Once the electrical system installation is complete, a ground insulation test must be performed as follows:

ATTENTION!

1.) Switch off all on-board electrical devices.
2.) Start the generator.
3.) Measure the AC-voltage with a voltmeter (adjust to Volt/AC) between:
   a) generator housing and AC-Control box
   b) generator housing and ground.
   The measured voltage must not exceed 50mV (millivolts).
4.) Once the safety systems have been installed, they must be checked. If a Leakage Current Relay has been installed, it also has to be tested, in order to ensure that it functions properly. The individual phrases must be checked against each other, and between phase and ground, (the single phase or 4th phase also needs to be checked in this fashion).
5.) If the generator is protected by a ground connection, then ALL electrical devices must also be connected to this "common" ground (usually ground contacts are attached to the devices’ metallic housings).

The electrical system installation must also comply with the hook-up requirements of the shore current grid. Generally a leakage current relay is sufficient for safe electrical operation; however, this must be confirmed by the electrical safety standard in the region where the system is attached to a main land power grid. The relay has to meet the required safety standard regulations.

7.28 Set into operation

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

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

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

8.1 Personal requirements

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

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

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

8.2 Hazard notes for the operation

Please note the safety first instructions in front of this manual.

**Notice!:** Please note the safety first instructions in front of this manual.

**Warning!:** Automatic start

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.

**Attention!:** Danger to life

Rotating parts inside of the generator

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

**Attention!:** Danger to Life - High voltage

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.

8.3 General operating instruction

8.3.1 Operation at low temperatures

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

Pre-chamber diesel engines are equipped with a quick glow plug. The maximum pre glow time should not exceed 20 sec. At 20 °C or more the pre glow time should be about 5-6 sec. Below 20 °C the pre glow time should be increased. Note: If the operation fluids have been drained and then filled with cold weather fluids, always run the generator for 10 minutes to ensure the new fuel is present throughout the system.

8.3.1.2 Tips regarding starter battery

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

8.3.2 Light load operation and engine idle

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

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

The cylinder temperatures are too low to ensure complete burning of all the fuel delivered. A further result is that of abnormal carbon build-up on the valves, piston crowns and exhaust ports. Fuel dilution of the lubricating oil will also occur.

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

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

8.3.3 Generator load for a longer period and overload

Ensure the generator is not overloaded. Overloading occurs when the electrical load is higher than the generator can provide. If this occur for a longer period, the engine may be damaged. Overloading may cause rough running, high oil and fuel consumption, increased emissions. For a long engine life, the long term load should not exceed 80 % of the nominal load. Long term load is the load over several hours. It is harmless for the generator to deliver full nominal power for 2-3 hours. The hole conception of the Fischer Panda generator make sure, that the full power operation at extreme condition will not increase the engine temperatures over. Please note that the emissions of the generator also increase at full power operation.
8.3.4 Protection conductor:

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

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

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

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

8.3.5 Operating control system on the Fischer Panda generator

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

8.4 Instructions for capacitors - not present at all models

Danger to Life - High voltage

Do not touch the capacitor contact terminals!

CAUTION!

The generator’s electrical system requires two different groups of capacitors:
A) The booster capacitors
B) The operating capacitors

Both types are mounted in the electrical cabinet. (At some models direct on the generator)

Capacitors store an electrical charge. It is possible that even after they have been disconnected stored energy is still held. Therefore it is essential that the connectors are not touched.

Should it be necessary to check or test the capacitors, they should be shorted out by using an insulated screwdriver.

The operating capacitors are automatically discharged when the generator is stopped in the normal way. The booster capacitors will be discharged through internal resistors.

For safety however, the capacitors have to be discharged (short circuited) prior to carrying out any work on the AC-Control box.

8.5 Checks before start, starting and stopping the generator

see remote control panel data sheet/manual

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

Note:

Respect the safety instruction in front of this manual.
Leere Seite / Intentionally blank
9. Maintenance Instructions

9.1 Personal requirements

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

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

9.2 Hazard notes for the maintenance and failure

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

Warning!:

Risk of injury

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

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

Do not run the generator with removed sound isolation cover

Warning!:

Risk of injury

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

• Always undertake installation/maintenance work when the generator is switched off.

• Ensure there is sufficient installation clearance before start working.

• Ensure tidiness and cleanliness at the workplace. Loose components and tools lying around or on top of each other are sources of accidents.

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

Warning!:

Risk of injury

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

• No open flames during work on the generator.

• Do not smoke.

• Remove oil and fuel residues from the generator and floor.

Warning!:

Danger of fire
Contact with engine oil, antifreeze and fuel can result in damage to health. 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

**ATTENTION!**: Danger to Life - High voltage

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.

**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

**Attention!**: disconnect all load during the work at the generator to avoid damages at the load.

**Batteries contain 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.*

**Warning!**: Batteries contain corrosive acids and lyes.

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

Observe the instructions from your battery manufacturer.
9.3 Environmental protection

**Danger to the environment due to mishandling!**

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

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

*The disposal must be performed by a specialist disposal company.*

9.4 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

9.5 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.

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

9.6 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

Open de-aerating screw at the thermostat-housing
representative picture

Open de-aerating screw at the water-cooled silencer.
representative picture
Pour in coolant through the cooling water filler cap. The coolant flows in very slow.

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

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.
9.7 Replace the air filter

Representative photos.

1. Use a screwdriver to open the tension spring. Place the screwdriver on the closing side between the tension spring and the handle and lever out the tension spring.

01. Tension spring
02. Air filter housing
03. Screw driver

2. Lift the air filter housing.

01. Air filter housing

3. Release the three snap fastenings and remove the lower part of the housing.

01. Snap fastenings
02. Lower part
4. Remove the main element with a light turning movement completely from the inner support pipe.

Fig. 9.7-4: Replace air filter

5. Clean the main element by blowing out with dry compressed air (max. 5 bar) or replace the main element after 2 years at the latest.

6. Replace in reverse procedure.

Fig. 9.7-5: Replace air filter

7. Blow out filter insert in folding direction maximum pressure: 5 bar.

Fig. 9.7-6: Cleaning air filter
8. Blow out filter insert from the inside.

9. Check filter insert with penlight for damage.
9.8 Replacing the air filter

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

   ![Fig. 9.8-1: Replace air filter]

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

   ![Fig. 9.8-2: 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. 9.8-3: Replace air filter]
9.9 Ventilating the fuel system

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

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

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

Please see iControl manual for details.

3. Pressing the failure bypass switch for approx 3 - 4 minutes will loosen the ventilation screw located at the fuel solenoid valve. The button must continue to be pressed, whilst opening the screw. A large cloth or Kleenex tissue must be laid beneath the connection to prevent escaping fuel running into the capsule. If the fuel runs out without air bubbles, then the ventilation screw can be closed. Only then may the button be released. Use spanner size 10 mm.

**Note!:**

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

9.9.1 Replacement of the fuel filter

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

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

9.9.1.1 Optional fuel filter with sight glass

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

01. Fuel filter housing

02. Fuel filter element

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

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

3. Screw the new filter element into the mount.

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

9.10 Checking oil-level

You require:

paper towels / cloth for the oil dipstick

The generator must be placed at level.

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

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

Generator and coolant can be hot during and after operating.

Caution: Burn hazard!

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

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

Oil dipstick

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

We recommend an oil-level of 2/3.

Sample picture

Oil should be refilled, if the oil-level is under 1/3 between the minimum and the maximum mark.
Fischer Panda recommends an oil-level of 2/3 between the minimum and the maximum mark.

If the oil-level is under the MIN-mark, check how many operating hours went by since the last oil change, by means of your service manual or an existing oil change tag. - with operating hours between 50 and 150 hours it is only necessary to refill oil. See „Refilling oil“ on page 2.
• with 150 operating hours or more the oil should be changed (See your generators’ service table)
• if the oil-level is under the minimum mark by less than 50h, there might be a technical problem! In that case, we recommend going to a shop or a Fischer Panda service point.
• if the oil is cloudy or even „creamy“, coolant might have mixed with the oil. See a garage or a Fischer Panda service point immediately.

9.10.1 Refilling oil

You require:

Engine oil

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 9.10, “Checking oil-level,” on page 114.

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

9.10.2 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.

9.11 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.

**Caution: Burn hazard!**

Generator and coolant can be hot during and after operating.

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

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.

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

6. Preparing a new filter
   Clean the engines’ filter holder brush a thin oil layer on the sealing of the new filter.

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.

   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.

9.11.1 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).
9.12 Verifying the starter battery and (if necessary) the battery bank

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

9.13 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.

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

2. Remove the plastic cover.

3. Pull relay from the socket and replace with new relay.

4. To reinstall, reverse the order of steps.

9.14 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.

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.

2. Remove the plastic cover.

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

4. To reinstall, reverse the order of steps.

9.15 Replacing the V-belt at Kubota 02/03/05 series

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.

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

The V-belt must therefore be checked at very short time intervals. It may be necessary to replace the V-belt after several weeks because of unfavourable conditions. A replacement interval of 250 operating hours must never be exceeded. The V-belt should be inspected after 50 operating hours. The V-belt must be considered a wearing part.
1. Loosen the fixing screw above the alternator. Wrench with width across flats of 12 mm.
   ![Alternator fixing screw](image1)
   01. Fixing screw

2. Loosen the fixing screw below the alternator. Wrench with width across flats of 12 mm.
   ![Alternator fixing screw](image2)
   01. Fixing screw

3. Push alternator towards the thermostat housing.
4. Replace the V-belt (Quad Power XPZ 862).

5. The V-belt is tensioned by pulling back the alternator. The V-belt should yield approx. 1 cm when pushed in with a thumb.
   Re-tighten the screws above and below the alternator.
10. Generator Failure

10.1 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.

10.2 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:

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

Warning! Risk of injury

Do not run the generator with removed sound isolation cover.

Warning! Risk of injury

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

- Always undertake installation/maintenance work when the generator is switched off.

- Ensure there is sufficient installation clearance before start working.

- Ensure tidiness and cleanliness at the workplace. Loose components and tools lying around or on top of each other are sources of accidents.

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

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

- Protective clothing
- Safety boots
- Protective gloves
- Ear defender
- Safety glasses

**Instructions!: Personal protective equipment necessary.**

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

**Attention!: Disconnect all load**
10.3 Overloading the Generator

Please ensure that the genset is not overloaded. This is especially the case with multi-power 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 gensets 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.

10.3.1 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.

10.3.2 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“.

10.3.3 Generator Voltage Fluctuations and Monitoring

Before working (installation) on the System read the section Safety Instructions in this Manual.

Notice:

During periods of high electric loading, the voltage may drop to 190V/50Hz (or 95V/60Hz) or even lower. Such voltage drops can potentially cause damage to certain electrical devices such as electric motors, compressors and electronic equipment. In order to ensure that sufficient voltage is available and to avoid the risk of damage to sensitive electrical devices, the supply voltage should be monitored with the voltmeter, which is mounted at the operation unit.
The voltmeter must be respectively checked if additional load is switched on. As long as the voltage remains below the critical level the sensitive devices must be switched off during this period.

Over voltage can be caused by the generator under certain circumstances. This occurs, especially if the speed of the motor changes (increases in speed). Adjustment to the normal motor speed (rpm) should only be done with the use of a rev counter and/or a voltmeter.

A voltage regulated circuit breaker is installed in the electrical system in order to avoid damage, if sensitive or valuable equipment is used. (voltage control with circuit breaker).

10.3.4 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 load 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.

10.4 Low Generator-Output Voltage

If the produced alternating voltage is too low, switch the consumers off, in order to relieve the generator. Mostly the problem already solved. If the output voltage is still too low, even if all consumers are switched off, the generator runs without load, you can assume one or more condensers are defective.
10.5 Testing generator stator windings

10.5.1 Checking the generator voltage

In order to test whether the fixed winding produces enough voltage, proceed in such a way:

1. Guarantee that the connection to the electrical system is interrupted.
2. Remove all conductions in the power terminal box of the generator.
3. Starter battery must be connected with the generator.
4. Start the generator start.
5. Measure with a voltmeter the voltage between the phase(s) and N. If the measured values are under the substantially values in Table 11.4-5, “Voltage values stator coil,” on Page 136, a coil damage is to be accepted.

During the measurement in the 60Hz version both partial coils must be interconnected, i.e. a connection must be provided between line 1 and line 3. (see wiring diagram)

(notes: the voltage results from the remainder magnetism of the rotor, which induced a voltage in the coil.)

10.6 Starting Problems

10.6.1 Fuel Solenoid Valve

All engines are equipped with an electric inlet fuel solenoid valve (12V) which switches off the motor.

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

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

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

01. Fuel solenoid valve
02. Fuel injector line
03. Ventilation screw

Fig. 10.6.1-1: Fuel solenoid
10.6.2 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.

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.

**BEWARE:**

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.

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 it 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.

10.6.3 Stop solenoid

There are two different variations:

**A. Energized to stop**

By pressing the „OFF“-button on the remote control panel the stop solenoid is supplied with voltage and operate, through this the injection nozzles resets to zero position and the generator stops.

**B. 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 off once the final position has been reached, which is maintained by the stop solenoid for as long as the generator is running.

When starting the „START“-button may not be pressed longer than 5 sec., because the stop solenoid pulls too much current over the starter. Otherwise the stop solenoid must be disconnected.

Stop solenoid (optional)

10.6.4 Damage to starter motor

The starter is fitted with a free wheel or axial rotating spring cog, which prevents the starter being driven externally by means of the motor. The free wheel will be heavily worn, if the starter still operates, thereby causing damage to the springs, roller bearings or cog teeth. This could lead to complete destruction of the starter.

It is important that every person who operates the generator is informed of this situation. This is practically the only handling error that can be made on board that can lead to fatal consequences for both generator
10.8 Troubleshooting

10.8.1 Generator faults

10.8.1.1 Generator output to low. For 50Hz versions: less than 200V. For 60Hz versions: less than 100V.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator is overloaded.</td>
<td>Reduce the electrical load. (Switch off load)</td>
</tr>
<tr>
<td>Motor is not reaching the rated rpm.</td>
<td>Refer to „motor faults” section.</td>
</tr>
<tr>
<td>Defective capacitor(s).</td>
<td>Check capacitors and replace if necessary.</td>
</tr>
</tbody>
</table>

10.8.1.2 Generator voltage to high (more then 240V-50Hz / 135V-60Hz). If the generator is providing excessively high voltage, the following potential causes should be investigated:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over-energizing due to wrong capacitors.</td>
<td>Check capacitors type and replace if necessary.</td>
</tr>
<tr>
<td>Measure ring voltage on the VCS circuit board is missing.</td>
<td>Check VCS System, check cable connections.</td>
</tr>
<tr>
<td>Motor is running too fast (rpm too high).</td>
<td>Check motor speed with rpm-meter or frequency meter and adjust to proper speed under „zero” electrical load: (3120 rpm-50Hz / 3720 rpm-60Hz). Inspect ESC or VCS Systems if installed.</td>
</tr>
</tbody>
</table>

10.8.1.3 Generator voltage fluctuates.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Disturbances on the electrical system/user side.</td>
<td>1. Check if electrical load is fluctuating.</td>
</tr>
<tr>
<td>2. Motor disturbances.</td>
<td>2. Refer to section: „Motor runs irregular”.</td>
</tr>
</tbody>
</table>

10.8.1.4 Generator is not able to start a electric motor.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the generator is unable supply enough power to start an electric motor (120V-60Hz or 231V-50Hz), it is usually because the motor draws too much current during starting process.</td>
<td>Check the motor's current draw required for starting (switch to 380V if possible). This could be remedied by providing stronger capacitors or installing an optional „Easy Start Booster Set”. (See Apt. G) Enquire at your nearest Panda dealer or directly at the manufacturer.</td>
</tr>
</tbody>
</table>

10.8.1.5 Diesel motor fails to start

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starter battery switched „OFF”.</td>
<td>Check position of battery switch and switch „ON” (if installed).</td>
</tr>
<tr>
<td>Starter battery voltage insufficient (battery too weak).</td>
<td>Inspect battery terminals and cables for a good electrical connection (Inspect against corrosion, tattered wires, etc.).</td>
</tr>
<tr>
<td>Starting current disrupted.</td>
<td>During the normal starting process, the battery voltage drops to 11V with a fully charged battery. If the voltage does not drop during starting, the electrical connection is faulty. If the battery voltage drops lower than 11V, then the battery has been discharged.</td>
</tr>
</tbody>
</table>
10.8.1.6 Starter motor is turning the engine, but generator fails to start.

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

10.8.1.7 Motor does not achieves enough speed during starting process.

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

10.8.1.8 Motor runs irregular

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty centrifugal injector governor.</td>
<td>Have the centrifugal governor inspected by a motor manufacturer-Service technician.</td>
</tr>
<tr>
<td>Too much air in fuel lines.</td>
<td>Bleed air from fuel system.</td>
</tr>
</tbody>
</table>

10.8.1.9 Motor speed drops.

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

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel inlet solenoid valve or throttle shut solenoid is not switching off.</td>
<td>Check wire connections to solenoid. Check valve functions as in the „Inlet Fuel Solenoid Valve“ or in the truckle shut off solenoid sections. Replace if necessary.</td>
</tr>
</tbody>
</table>

### 10.8.1.11 Motor stops by itself.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of fuel.</td>
<td>Check fuel supply system.</td>
</tr>
<tr>
<td>Excess heat in cooling system (thermo switch tripped)-lack of cooling water. Is indicated on the remote control panel.</td>
<td>Check cooling water system flow: water pump, inlet water filter, extra heat exchanger coolant flow.</td>
</tr>
<tr>
<td>Lack of oil pressure sensor tripped). Is indicated on the remote control panel.</td>
<td>Check oil-level and if necessary top up. Check motor’s oil-pressure and have repaired by motor manufacturer-Service if necessary.</td>
</tr>
<tr>
<td>Over-/under voltage. Is indicated on the remote control panel.</td>
<td>Switch-off the remote control panel, reduce the electrical load (switch-off load), start again.</td>
</tr>
</tbody>
</table>

### 10.8.1.12 Sooty black exhaust.

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

### 10.8.1.13 Generator must be shut off immediately if:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>- motor rpm suddenly rises or drops</td>
<td>Refer to respective section of manual and if necessary, have repaired by motor manufacturer-Service, or Panda representative.</td>
</tr>
<tr>
<td>- unusual noise comes from genset</td>
<td></td>
</tr>
<tr>
<td>- exhaust colour suddenly becomes dark</td>
<td></td>
</tr>
<tr>
<td>- leakage in the cooling water system.</td>
<td></td>
</tr>
</tbody>
</table>

### 10.8.1.14 Troubleshooting VCS system.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle control servo motor does not move.</td>
<td>Check voltage supply and wire connections to servo motor. Motor connected? Check 230V connection to VCS.</td>
</tr>
<tr>
<td>Servo motor sets truckle too high or too low.</td>
<td>Check that the wires to the servo motor are connected properly (±). Check 230V connection to VCS.</td>
</tr>
</tbody>
</table>

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.

1. Loosen the connecting rods motor from the injection pump regulator and turn screw to a max. voltage of 240V. or
2. Loosen the connecting plugs of the Motor VCS electronic and turn the motor direct by hand.
11. Appendix

11.1 Engine oil

11.1.1 Engine oil classification

11.1.1.1 Operating range:

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

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

11.1.1.2 Quality of oil:

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

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

API C for diesel engines

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

API C for diesel engine

Examples for diesel engine oil:

API CC Engine oil for small demands
API CD Engine oil for suction- and turbo diesel engine
API CF Replace the specification API CD since 1994
API CG Engine oil for highest demands, turbo-tested

See technical data for the specified engine oil

Notice!

<table>
<thead>
<tr>
<th>Engine oil type</th>
<th>over 25 °C</th>
<th>0 °C to 25 °C</th>
<th>below 0 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SAE30 or SAE10W-30; SAE10W-40</td>
<td>SAE20 or SAE10W-30; SAE10W-40</td>
<td>SAE10W or SAE10W-30; SAE10W-40</td>
</tr>
</tbody>
</table>

Fig. 11.1.1.2-1: Engine oil type.
11.2 Coolant specifications

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

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

<table>
<thead>
<tr>
<th>Engine coolant automotive industry Product description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
</tr>
<tr>
<td>Chemical nature</td>
</tr>
<tr>
<td>Physical form</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical and physical properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve alkalinity of 10ml</td>
</tr>
<tr>
<td>Density, 20 °C</td>
</tr>
<tr>
<td>Water content</td>
</tr>
<tr>
<td>pH-value undiluted</td>
</tr>
</tbody>
</table>

11.2.1 Coolant mixture ratio

<table>
<thead>
<tr>
<th>Water/antifreeze</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>70:30</td>
<td>-20 °C</td>
</tr>
<tr>
<td>65:35</td>
<td>-25 °C</td>
</tr>
<tr>
<td>60:40</td>
<td>-30 °C</td>
</tr>
<tr>
<td>55:45</td>
<td>-35 °C</td>
</tr>
<tr>
<td>50:50</td>
<td>-40 °C</td>
</tr>
</tbody>
</table>

11.3 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.

## 11.4 Technical data coil

Data for generators not mentioned on request. **Notice!:**

### Fig. 11.4-1: Resistor generator coil HP1

<table>
<thead>
<tr>
<th>L-N [Ohm]</th>
<th>L-Z [Ohm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains 120V / 60Hz</td>
<td></td>
</tr>
<tr>
<td>Panda 8000</td>
<td>approx. 0.7</td>
</tr>
<tr>
<td>Panda 9000</td>
<td>approx. 0.8</td>
</tr>
<tr>
<td>Panda 12000</td>
<td>approx. 0.45</td>
</tr>
<tr>
<td>Panda 14000</td>
<td>approx. 0.25</td>
</tr>
<tr>
<td>Panda 18</td>
<td>approx. 0.2</td>
</tr>
<tr>
<td>Panda 24</td>
<td>approx. 0.06</td>
</tr>
<tr>
<td>Panda 30</td>
<td>approx. 0.1</td>
</tr>
</tbody>
</table>

### Fig. 11.4-2: Inductance generator coil HP1

<table>
<thead>
<tr>
<th>L-N [Ohm]</th>
<th>L-Z [Ohm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains 120V / 60Hz</td>
<td></td>
</tr>
<tr>
<td>Panda 8000</td>
<td>approx. 2.8</td>
</tr>
<tr>
<td>Panda 9000</td>
<td>approx. 2.8</td>
</tr>
<tr>
<td>Panda 12000</td>
<td>approx. 3.5</td>
</tr>
<tr>
<td>Panda 18</td>
<td>approx. 3.2</td>
</tr>
<tr>
<td>Panda 24</td>
<td>approx. 0.3</td>
</tr>
<tr>
<td>Panda 30</td>
<td>approx. 0.9</td>
</tr>
</tbody>
</table>

### Fig. 11.4-3: Resistor generator coil DVS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains 120V / 60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panda 8000</td>
<td>approx. 0.7</td>
<td>approx. 0.7</td>
<td>approx. 0.7</td>
<td>approx. 0.15</td>
<td>approx. 0.15</td>
</tr>
<tr>
<td>Panda 9000</td>
<td>approx. 0.85</td>
<td>approx. 0.85</td>
<td>approx. 0.85</td>
<td>approx. 0.17</td>
<td>approx. 0.17</td>
</tr>
<tr>
<td>Panda 12000</td>
<td>approx. 0.45</td>
<td>approx. 0.45</td>
<td>approx. 0.45</td>
<td>approx. 0.15</td>
<td>approx. 0.15</td>
</tr>
<tr>
<td>Panda 14000</td>
<td>approx. 0.25</td>
<td>approx. 0.25</td>
<td>approx. 0.25</td>
<td>approx. 0.06</td>
<td>approx. 0.06</td>
</tr>
<tr>
<td>Panda 18</td>
<td>approx. 0.2</td>
<td>approx. 0.2</td>
<td>approx. 0.2</td>
<td>approx. 0.3</td>
<td>approx. 0.3</td>
</tr>
<tr>
<td>Panda 24</td>
<td>approx. 0.06</td>
<td>approx. 0.06</td>
<td>approx. 0.06</td>
<td>approx. 0.3</td>
<td>approx. 0.3</td>
</tr>
<tr>
<td>Panda 30</td>
<td>approx. 0.1</td>
<td>approx. 0.1</td>
<td>approx. 0.1</td>
<td>approx. 0.3</td>
<td>approx. 0.3</td>
</tr>
</tbody>
</table>

### Fig. 11.4-4: Inductance generator coil DVS

<table>
<thead>
<tr>
<th>L1-N [mH]</th>
<th>L2-N [mH]</th>
<th>L3-N [mH]</th>
<th>L1'-N [mH]</th>
<th>1-2[mH]</th>
<th>3-4[mH]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains 120V / 60Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panda 8000</td>
<td>approx. 2.8</td>
<td>approx. 2.8</td>
<td>approx. 2.8</td>
<td>approx. 0.8</td>
<td>approx. 0.8</td>
</tr>
<tr>
<td>Panda 9000</td>
<td>approx. 2.8</td>
<td>approx. 2.8</td>
<td>approx. 2.8</td>
<td>approx. 0.9</td>
<td>approx. 0.9</td>
</tr>
<tr>
<td>Panda 12000</td>
<td>approx. 3.5</td>
<td>approx. 3.5</td>
<td>approx. 3.5</td>
<td>approx. 1.0</td>
<td>approx. 1.0</td>
</tr>
<tr>
<td>Panda 18</td>
<td>approx. 3.2</td>
<td>approx. 3.2</td>
<td>approx. 3.2</td>
<td>approx. 0.4</td>
<td>approx. 0.4</td>
</tr>
<tr>
<td>Panda 24</td>
<td>approx. 0.3</td>
<td>approx. 0.3</td>
<td>approx. 0.3</td>
<td>approx. 0.4</td>
<td>approx. 0.4</td>
</tr>
</tbody>
</table>

### Mains: 230V / 50Hz

<table>
<thead>
<tr>
<th>Panda 8000</th>
<th>Panda 9000</th>
<th>Panda 12000</th>
<th>Panda 14000</th>
<th>Panda 18</th>
<th>Panda 24</th>
<th>Panda 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>approx. 2.8</td>
<td>approx. 2.8</td>
<td>approx. 2.8</td>
<td>approx. 1.8</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 0.9</td>
</tr>
<tr>
<td>approx. 3.7</td>
<td>approx. 3.7</td>
<td>approx. 3.7</td>
<td>approx. 3.7</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 0.9</td>
</tr>
<tr>
<td>approx. 3.5</td>
<td>approx. 3.5</td>
<td>approx. 3.5</td>
<td>approx. 3.5</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 0.9</td>
</tr>
<tr>
<td>approx. 2.3</td>
<td>approx. 2.3</td>
<td>approx. 2.3</td>
<td>approx. 2.3</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 0.9</td>
</tr>
<tr>
<td>approx. 1.8</td>
<td>approx. 1.8</td>
<td>approx. 1.8</td>
<td>approx. 1.8</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 0.9</td>
</tr>
<tr>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 1.3</td>
<td>approx. 0.9</td>
</tr>
</tbody>
</table>

**Notice:** Data for generators not mentioned on request.
### Appendix

#### 11.5 Cable cross-section

**Fig. 11.5-1: Cable cross-section**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Required cable cross-section</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 6 kW</td>
</tr>
<tr>
<td>120V 1-ph. + PEN</td>
<td>4x6mm² 4x10mm² 4x16mm² 4x25mm²</td>
</tr>
<tr>
<td>230V 1-ph. + PEN</td>
<td>2x4mm² 2x6mm² 2x10mm² 2x25mm²</td>
</tr>
<tr>
<td>400V 3-ph. + PEN</td>
<td>4x2.5mm² 4x4mm² 4x6mm² 4x10mm²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage</th>
<th>6-10 kW 10-15 kW 15-20 kW 20-35 kW 35-45 kW 45-65 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V 1-ph. + PEN</td>
<td>4x35mm² 4x50mm² 4x70mm²</td>
</tr>
<tr>
<td>230V 1-ph. + PEN</td>
<td>2x25mm² 2x35mm² 2x35mm²</td>
</tr>
<tr>
<td>400V 3-ph. + PEN</td>
<td>4x16mm² 4x16mm² 4x25mm²</td>
</tr>
</tbody>
</table>

#### 11.6 Technical data

**Fig. 11.6-1: Technical data**

<table>
<thead>
<tr>
<th>Type</th>
<th>Farymann 18W430</th>
<th>Farymann 18W430</th>
<th>Farymann 18W430</th>
<th>Z482</th>
<th>EA300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governor</td>
<td>mechanic</td>
<td>mechanic</td>
<td>mechanic</td>
<td>mechanic</td>
<td>VCS</td>
</tr>
<tr>
<td>Automatic start booster</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Cylinder</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Bore</td>
<td>82 mm</td>
<td>82 mm</td>
<td>82 mm</td>
<td>67 mm</td>
<td>75 mm</td>
</tr>
<tr>
<td>Stroke</td>
<td>55 mm</td>
<td>55 mm</td>
<td>55 mm</td>
<td>68 mm</td>
<td>70 mm</td>
</tr>
<tr>
<td>Stroke volume</td>
<td>290 cm³</td>
<td>290 cm³</td>
<td>290 cm³</td>
<td>479 cm³</td>
<td>309 cm³</td>
</tr>
<tr>
<td>Max. power (DIN 6271-NB) at 3000 rpm</td>
<td>5.7 kW</td>
<td>5.7 kW</td>
<td>5.7 kW</td>
<td>9.32 kW</td>
<td>5.1 kW</td>
</tr>
<tr>
<td>Rated speed</td>
<td>3600 rpm</td>
<td>3600 rpm</td>
<td>3600 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
</tr>
<tr>
<td>Idle running speed</td>
<td>3690 rpm</td>
<td>3690 rpm</td>
<td>3690 rpm</td>
<td>3120 rpm</td>
<td>2900 rpm</td>
</tr>
<tr>
<td>Valve clearance (engine cold)</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
<td>0.16 - 0.20 mm</td>
</tr>
<tr>
<td>Cylinder head nut torque</td>
<td>30-33 Nm</td>
<td>30-33 Nm</td>
<td>30-33 Nm</td>
<td>42 Nm</td>
<td>58.8 - 63.7 Nm</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>20:1</td>
<td>20:1</td>
<td>20:1</td>
<td>23:1</td>
<td>--</td>
</tr>
</tbody>
</table>
## Fig. 11.6-2: Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>Panda 6500 Panda 7 mini</th>
<th>Panda 8000 Panda 8 mini</th>
<th>Panda 9000</th>
<th>Panda 10000 Panda 9 mini</th>
<th>Panda 12000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governor</td>
<td>Z482</td>
<td>Z482</td>
<td>D722</td>
<td>Z602</td>
<td>D722</td>
</tr>
<tr>
<td>Automatic start booster</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Cylinder</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Bore</td>
<td>67 mm</td>
<td>67 mm</td>
<td>67 mm</td>
<td>72 mm</td>
<td>67 mm</td>
</tr>
<tr>
<td>Stroke</td>
<td>68 mm</td>
<td>68 mm</td>
<td>68 mm</td>
<td>73.8 mm</td>
<td>68 mm</td>
</tr>
<tr>
<td>Stroke volume</td>
<td>479 cm³</td>
<td>479 cm³</td>
<td>719 cm³</td>
<td>599 cm³</td>
<td>719 cm³</td>
</tr>
<tr>
<td>Max. power (DIN 6271-NB) at 3000 rpm</td>
<td>9.32 kW</td>
<td>9.32 kW</td>
<td>14.0 kW</td>
<td>11.6 kW</td>
<td>14.0 kW</td>
</tr>
<tr>
<td>Rated speed</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
</tr>
<tr>
<td>Idle running speed</td>
<td>3120 rpm</td>
<td>2900 rpm</td>
<td>3120 rpm</td>
<td>3100 rpm</td>
<td>2900 rpm</td>
</tr>
<tr>
<td>Valve clearance (engine cold)</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
<td>0.2 mm</td>
</tr>
<tr>
<td>Cylinder head nut torque</td>
<td>42 Nm</td>
<td>42 Nm</td>
<td>42 Nm</td>
<td>42 Nm</td>
<td>42 Nm</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>23:1</td>
<td>23:1</td>
<td>23:1</td>
<td>24:1</td>
<td>23:1</td>
</tr>
<tr>
<td>Lubrication oil capacity</td>
<td>2.8 l</td>
<td>2.8 l</td>
<td>3.8 l</td>
<td>2.8 l</td>
<td>3.8 l</td>
</tr>
<tr>
<td>Fuel consumption</td>
<td>approx. 0.5-1.4 l</td>
<td>approx. 0.7-1.8 l</td>
<td>approx. 0.8-2.1 l</td>
<td>approx. 1.0-2.66 l</td>
<td>approx. 1.1-2.8 l</td>
</tr>
<tr>
<td>Oil consumption</td>
<td>max. 1 % of fuel consumption</td>
<td>max. 1 % of fuel consumption</td>
<td>max. 1 % of fuel consumption</td>
<td>max. 1 % of fuel consumption</td>
<td>max. 1 % of fuel consumption</td>
</tr>
<tr>
<td>Oil specification</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
</tr>
<tr>
<td>Cooling water requirement for seawater circuit (Marine generators only)</td>
<td>16-28 l/min</td>
<td>16-28 l/min</td>
<td>16-28 l/min</td>
<td>16-28 l/min</td>
<td>16-28 l/min</td>
</tr>
<tr>
<td>Permissible max. permanent tilt of engine</td>
<td>a) 25° across the longitudinal axis</td>
<td>b) 20° in the longitudinal direction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommend starter battery size</td>
<td>12 V 28 Ah equivalent</td>
<td>12 V 28 Ah equivalent</td>
<td>12 V 36 Ah equivalent</td>
<td>12 V 36 Ah equivalent</td>
<td>12 V 36 Ah equivalent</td>
</tr>
<tr>
<td>Recommend cable cross size starter battery cable</td>
<td>25 mm²</td>
<td>25 mm²</td>
<td>25 mm²</td>
<td>25 mm²</td>
<td>25 mm²</td>
</tr>
<tr>
<td>Max. exhaust back pressure</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
</tr>
</tbody>
</table>

Supplementary notes:

- progressive speed by VCS
- 0.35 l/kW electrical power, the randomized values between 30 % and 80 % of the rated speed

---

**Lubrication oil capacity**

<table>
<thead>
<tr>
<th>Type</th>
<th>Panda 4000s Panda 4,5ND</th>
<th>Panda 4200 FCB</th>
<th>4500FCB</th>
<th>Panda 4k Panda 5k</th>
<th>Panda 5000 LPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel consumption</td>
<td>approx. 0.42-1.12 l</td>
<td>approx. 0.42-1.12 l</td>
<td>approx. 0.42-1.12 l</td>
<td>approx. 0.5-1.4 l</td>
<td>approx. 0.42-1.12 l</td>
</tr>
<tr>
<td>Oil consumption</td>
<td>max. 1 % of fuel consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil specification</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
</tr>
<tr>
<td>Cooling water requirement for seawater circuit (Marine generators only)</td>
<td>10-12 l/min</td>
<td>10-12 l/min</td>
<td>16-28 l/min</td>
<td>16-28 l/min</td>
<td>--</td>
</tr>
<tr>
<td>Permissible max. permanent tilt of engine</td>
<td>a) 25° across the longitudinal axis</td>
<td>b) 20° in the longitudinal direction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommend starter battery size</td>
<td>12 V 28 Ah equivalent</td>
<td>12 V 28 Ah equivalent</td>
<td>12 V 36 Ah equivalent</td>
<td>12 V 36 Ah equivalent</td>
<td>12 V 28 Ah equivalent</td>
</tr>
<tr>
<td>Recommend cable cross size starter battery cable</td>
<td>Length 4 meter max.</td>
<td>Length 4 meter max.</td>
<td>Length 4 meter max.</td>
<td>Length 4 meter max.</td>
<td>Length 4 meter max.</td>
</tr>
<tr>
<td>Max. exhaust back pressure</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
<td>9.3 kPa 93 Millibar</td>
</tr>
</tbody>
</table>

Supplementary notes:

- progressive speed by VCS
- 0.35 l/kW electrical power, the randomized values between 30 % and 80 % of the rated speed

---

### Notes:

- **Lubrication oil capacity**
- **Fuel consumption**
- **Oil consumption**
- **Oil specification**
- **Cooling water requirement for seawater circuit (Marine generators only)**
- **Permissible max. permanent tilt of engine**
- ** Recommend starter battery size**
- **Recommend cable cross size starter battery cable**
- **Max. exhaust back pressure**

---

**Supplementary notes:**

- progressive speed by VCS
- 0.35 l/kW electrical power, the randomized values between 30 % and 80 % of the rated speed
### Fig. 11.6-3: Technical data

<table>
<thead>
<tr>
<th></th>
<th>Panda 12000</th>
<th>Panda 15000</th>
<th>Panda 18</th>
<th>Panda 24</th>
<th>Panda 30</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Mitsubishi MVL3E</td>
<td>D902</td>
<td>D1105</td>
<td>V1505</td>
<td>V1505 TD</td>
</tr>
<tr>
<td><strong>Governor</strong></td>
<td>xControl Servo</td>
<td>VCS</td>
<td>VCS</td>
<td>VCS</td>
<td>VCS</td>
</tr>
<tr>
<td><strong>Automatic start booster</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td><strong>Cylinder</strong></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4TD</td>
</tr>
<tr>
<td><strong>Bore</strong></td>
<td>76 mm</td>
<td>72 mm</td>
<td>78 mm</td>
<td>78 mm</td>
<td>78 mm</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>70 mm</td>
<td>73,6 mm</td>
<td>78,4 mm</td>
<td>78,4 mm</td>
<td>78,4 mm</td>
</tr>
<tr>
<td><strong>Stroke volume</strong></td>
<td>952 cm³</td>
<td>898 cm³</td>
<td>1123 cm³</td>
<td>1498 cm³</td>
<td>1498 cm³</td>
</tr>
<tr>
<td><strong>Max. power (DIN 6271-NB) at 3000 rpm</strong></td>
<td>17,5 kW</td>
<td>18,7 kW</td>
<td>23,3 kW</td>
<td>31,3 kW</td>
<td></td>
</tr>
<tr>
<td><strong>Rated speed</strong></td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td></td>
</tr>
<tr>
<td><strong>Idle running speed²</strong></td>
<td>2900 rpm</td>
<td>2900 rpm</td>
<td>2900 rpm</td>
<td>2900 rpm</td>
<td></td>
</tr>
<tr>
<td><strong>Valve clearance (engine cold)</strong></td>
<td>0,2 mm</td>
<td>0,2 mm</td>
<td>0,2 mm</td>
<td>0,2 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Cylinder head nut torque</strong></td>
<td>42 mm</td>
<td>68 Nm</td>
<td>68 Nm</td>
<td>68 Nm</td>
<td></td>
</tr>
<tr>
<td><strong>Compression ratio</strong></td>
<td>23:1</td>
<td>24:1</td>
<td>22:1</td>
<td>22:1</td>
<td>23:1</td>
</tr>
<tr>
<td><strong>Lubrication oil capacity</strong></td>
<td>3,6 l</td>
<td>3,7 l</td>
<td>5,1 l</td>
<td>6,0 l</td>
<td>6,7 l</td>
</tr>
<tr>
<td><strong>Fuel consumption³</strong></td>
<td>approx. 1,1-2,1 l</td>
<td>approx. 1,3-3,6 l</td>
<td>approx. 1,7-4,5 l</td>
<td>approx. 2,2-5,9 l</td>
<td>approx. 2,7-7,2 l</td>
</tr>
<tr>
<td><strong>Oil consumption</strong></td>
<td>max. 1 % of fuel consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oil specification</strong></td>
<td>API CF-4</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF</td>
</tr>
<tr>
<td><strong>Cooling water requirement for seawater circuit (Marine generators only)</strong></td>
<td>16-28 l/min</td>
<td>16-28 l/min</td>
<td>28-40 l/min</td>
<td>28-40 l/min</td>
<td>40-50 l/min</td>
</tr>
<tr>
<td><strong>Permissible max. permanent tilt of engine</strong></td>
<td>a) 25° crosswise to the longitudinal axis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recommend starter battery size</strong></td>
<td>12 V 36 Ah equivalent</td>
<td>12 V 52 Ah equivalent</td>
<td>12 V 65 Ah equivalent</td>
<td>12 V 70 Ah equivalent</td>
<td>12 V 70 Ah equivalent</td>
</tr>
<tr>
<td><strong>Recommend cable cross size starter battery cable</strong></td>
<td>25 mm²</td>
<td>25 mm²</td>
<td>25 mm²</td>
<td>25 mm²</td>
<td></td>
</tr>
<tr>
<td><strong>Max. exhaust back pressure</strong></td>
<td>9,3 kPa</td>
<td>10,7 kPa</td>
<td>10,7 kPa</td>
<td>10,7 kPa</td>
<td>10,7 kPa</td>
</tr>
</tbody>
</table>

² progressive speed by VCS
³ 0,35 kW electrical power, the randomized values between 30 % and 80 % of the rated speed

### Fig. 11.6-4: Technical data

<table>
<thead>
<tr>
<th></th>
<th>Panda 30 IC</th>
<th>Panda 40 LN</th>
<th>Panda 47 LN</th>
<th>Panda 60 MB</th>
<th>Panda 75 MB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Kubota V 1505 TB</td>
<td>LDW 2204 MT</td>
<td>LDW 2204T</td>
<td>Mercedes Benz OM602</td>
<td>Mercedes OM603A</td>
</tr>
<tr>
<td><strong>Governor</strong></td>
<td>VCS</td>
<td>VCS</td>
<td>VCS</td>
<td>mechanic + VCS</td>
<td>mechanic + VCS</td>
</tr>
<tr>
<td><strong>Automatic start booster</strong></td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td><strong>Cylinder</strong></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td><strong>Bore</strong></td>
<td>78 mm</td>
<td>88 mm</td>
<td>88 mm</td>
<td>89 mm</td>
<td>89 mm</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>78,4 mm</td>
<td>90,4 mm</td>
<td>90,4 mm</td>
<td>92,4 mm</td>
<td>92,4 mm</td>
</tr>
<tr>
<td><strong>Stroke volume</strong></td>
<td>1498 cm³</td>
<td>2199 cm³</td>
<td>2199 cm³</td>
<td>2874 cm³</td>
<td>3500 cm³</td>
</tr>
<tr>
<td><strong>Max. power (DIN 6271-NB) at 3000 rpm</strong></td>
<td>31,3 kW</td>
<td>36 kW</td>
<td>36 kW</td>
<td>69 kW</td>
<td>69 kW</td>
</tr>
<tr>
<td><strong>Rated speed</strong></td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>4000 rpm</td>
<td>3000 rpm</td>
</tr>
<tr>
<td><strong>Idle running speed²</strong></td>
<td>2900 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>3000 rpm</td>
<td>2900 rpm</td>
</tr>
<tr>
<td><strong>Valve clearance (engine cold)</strong></td>
<td>0,2 mm</td>
<td>Hydro</td>
<td>Hydro</td>
<td>0,2 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Cylinder head nut torque</strong></td>
<td>63,7 - 68,6 Nm</td>
<td>68 Nm</td>
<td>68 Nm</td>
<td>25 Nm</td>
<td></td>
</tr>
<tr>
<td><strong>Compression ratio</strong></td>
<td>22,5:1</td>
<td>22:16</td>
<td>22:16</td>
<td>22:1</td>
<td></td>
</tr>
<tr>
<td><strong>Lubrication oil capacity</strong></td>
<td>6,0 l</td>
<td>6,4 l</td>
<td>6,4 l</td>
<td>7,5 l</td>
<td>7,5 l</td>
</tr>
<tr>
<td><strong>Fuel consumption³</strong></td>
<td>approx. 2,7 - 7,1 l</td>
<td>approx. 4,9-13,1 l</td>
<td>approx. 3,78-10,1 l</td>
<td>approx. 6,3 - 16,8 l</td>
<td>approx. 6,7 - 17,9 l</td>
</tr>
<tr>
<td></td>
<td>Panda 30 IC</td>
<td>Panda 40 LN</td>
<td>Panda 47 LN</td>
<td>Panda 60 MB</td>
<td>Panda 75 MB</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Oil consumption</td>
<td>max. 1 % of fuel consumption</td>
<td>max. 0.5 % of fuel consumption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil specification</td>
<td>API CF</td>
<td>API CF</td>
<td>API CF-4</td>
<td>API CF</td>
<td>API CF</td>
</tr>
<tr>
<td>Cooling water requirement for seawater circuit (Marine generators only)</td>
<td>40-50 l/min</td>
<td>40-50 l/min</td>
<td>40-50 l/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible max. permanent tilt of engine</td>
<td>a) 25° crosswise to the longitudinal axis</td>
<td>b) 20° in longitudinal direction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommend starter battery size</td>
<td>12 V 70 Ah equivalent</td>
<td>12 V 88 Ah equivalent</td>
<td>12 V 88 Ah equivalent</td>
<td>12 V 95 Ah equivalent</td>
<td>12 V 95 Ah equivalent</td>
</tr>
<tr>
<td>Recommend cable cross size starter battery cable</td>
<td>25 mm²</td>
<td>50 mm²</td>
<td>50 mm²</td>
<td>70 mm²</td>
<td>70 mm²</td>
</tr>
<tr>
<td>Length 4 meter max.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. exhaust back pressure</td>
<td>10,7 kPa 107 Millibar</td>
<td>10 kPa 100 Millibar</td>
<td>10 kPa 100 Millibar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² progressive speed by VCS
³ 0.35 l/kW electrical power, the randomized values between 30 % and 80 % of the rated speed
* progressive speed by VCS
* 0.35 l/kW electrical power, the randomized values between 30 % and 80 % of the rated speed
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Generator Control Panel P6+ Manual

12 V version - 21.02.02.046P
24 V special version - 21.02.02.047P
Option automatic adapter - 21.02.02.016P
Option master-slave adapter - 21.02.02.015P
## Current revision status

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<table>
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<tr>
<th>Revision</th>
<th>Page</th>
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<tr>
<td>Design review</td>
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## Hardware

<table>
<thead>
<tr>
<th>Generator</th>
<th>Revision</th>
<th>Modification Strike Plate</th>
<th>Date</th>
<th>Upgrade</th>
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<td></td>
</tr>
</tbody>
</table>

Created by

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Fischer Panda GmbH, 33104 Paderborn, reserves all rights regarding text and graphics in this document. Details are given to the best of our knowledge. No liability is accepted for correctness. Please note: technical modifications aimed at improving the product may be implemented without prior notice. Therefore, it must be ensured prior to installation that the pictures, diagrams and related material are applicable to the genset supplied. In case of doubt, verify upon delivery that documentation and equipment match.
13. Safety Instructions Generator Control P6+

13.1 Personal requirements

The settings described here can be 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).

13.2 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.

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

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.

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.

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.
14. General operation

14.1 Panel Generator Control

Fischer Panda Art. No. 21.02.02.046P

Fig. 14.1-1: Panel front

01. LED for coolant temperature red
02. LED for water leak red/yellow (sensor optional)
03. LED for AC-voltage fault red/yellow
04. LED for AC-voltage ok green
05. LED for winding temperature red
06. LED for oil pressure red
07. LED for battery charge voltage fault green/red
08. LED for pre-glow „heat“ orange
09. LED for Generator „start“ green
10. LED for Generator „stand-by“ green
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
14.1 Rear view 12 V-version

Fischer Panda Art. No. 21.02.02.046P

Fig. 14.1-1: 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 14.3.2, “Terminal connections,” on page 148)
04. Fuse 630 mA slow-blow
14.2 Rear view 24 V-version

Fischer Panda Art. No. 21.02.02.047P

Fig. 14.2-1: 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 14.3.2, "Terminal connections," on page 148)
05. Linear controller 24 V
06. Linear controller 24 V
14.3 Installation of the remote control panel

14.3.1 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)

14.3.2 Terminal connections

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

<table>
<thead>
<tr>
<th>Clamp no.</th>
<th>Clamp name</th>
<th>IN / OUT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vbat</td>
<td>IN</td>
<td>power supply + 12 V (or optional 24 V, must be adjusted by jumper)</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>IN</td>
<td>power supply -</td>
</tr>
<tr>
<td>3</td>
<td>T-Engine</td>
<td>IN</td>
<td>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 $\geq 22$ 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.</td>
</tr>
<tr>
<td>4</td>
<td>Water leak (Replace air filter)</td>
<td>IN</td>
<td>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 $\geq 10$ 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.</td>
</tr>
<tr>
<td>5</td>
<td>Oil-Press</td>
<td>IN</td>
<td>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 $\geq 22$ 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.</td>
</tr>
<tr>
<td>6</td>
<td>DC-Control</td>
<td>IN / OUT</td>
<td>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.</td>
</tr>
<tr>
<td>7</td>
<td>AC-Control</td>
<td>IN</td>
<td>AC control display. Input for NC-open-collector-sensor-switch to GND (N = OK). The input loads the switch with $\geq 2.5$ mA to +12 V (with 24 V-operated internally generated). The input status is indicated with red and green LED’s.</td>
</tr>
<tr>
<td>8</td>
<td>Heat</td>
<td>OUT</td>
<td>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).</td>
</tr>
<tr>
<td>9</td>
<td>Fuel-Pump</td>
<td>OUT</td>
<td>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).</td>
</tr>
<tr>
<td>10</td>
<td>Start</td>
<td>OUT</td>
<td>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).</td>
</tr>
<tr>
<td>11</td>
<td>AC-Fault (Fuel Level) [former T-Oil]</td>
<td>IN</td>
<td>Error generator AC input for NC-open-collector-sensor-switch to GND (N = no error). The input loads the switch with $\geq 2.5$ 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 $\geq 10$ mA by +12 V (must be adjusted by solder Jumper).</td>
</tr>
</tbody>
</table>
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.

### 14.3.3 Function of the jumpers

**Fig. 14.3.3-1: Function of the solder jumper**

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>closed</td>
<td>during operation of the start button heat is along-operated</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>Function deactivated</td>
</tr>
<tr>
<td>J3</td>
<td>1-2</td>
<td>Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Dynamo excitation resistor 68R is switched on with Panel-ON (1)</td>
</tr>
<tr>
<td>J101</td>
<td>closed</td>
<td>12 V - operation</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>24 V - operation (optional)</td>
</tr>
<tr>
<td>J201</td>
<td>1-2</td>
<td>T-Engine-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>T-Engine-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J202</td>
<td>1-2</td>
<td>Water leak-input / Replace air filter, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Water leak-input / Replace air filter, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J203</td>
<td>1-2</td>
<td>Oil-Press-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Oil-Press-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J204</td>
<td>1-2</td>
<td>AC-Fault-input / Fuel level, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>AC-Fault-input / Fuel level, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J205</td>
<td>1-2</td>
<td>T-Winding-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>T-Winding-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J206</td>
<td>1-2</td>
<td>Input Water leak has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Input Water leak has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J207</td>
<td>1-2</td>
<td>Input AC-Fault has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>Input AC-Fault has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J208</td>
<td>1-2</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J209</td>
<td>1-2</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J210</td>
<td>closed</td>
<td>Input AC-Fault has Pull-Up-current ≥ 10 mA</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>Input AC-Fault has Pull-Up-current ≥ 2.5 mA</td>
</tr>
</tbody>
</table>

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 68Ω 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.
14.3.4 Configuration and adjustment

14.3.4.1 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. 14.3.4.1-1: Settings of soldered jumper for this configuration (column Conf.)](image)

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Status</th>
<th>Conf.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>closed</td>
<td></td>
<td>during operation of the start button heat is along-operated</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>X</td>
<td>Function deactivated</td>
</tr>
<tr>
<td>J3</td>
<td>1-2</td>
<td>X</td>
<td>Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Dynamo excitation resistor 68R is switched on with Panel-ON (1)</td>
</tr>
<tr>
<td>J101</td>
<td>closed</td>
<td>X</td>
<td>12 V - operation</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td></td>
<td>24 V - operation (not possible)</td>
</tr>
<tr>
<td>J201</td>
<td>1-2</td>
<td>X</td>
<td>T-Engine-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>T-Engine-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J202</td>
<td>1-2</td>
<td>X</td>
<td>Water leak-input / Replace air filter, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Water leak-input / Replace air filter, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J203</td>
<td>1-2</td>
<td>X</td>
<td>Oil-Press-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Oil-Press-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J204</td>
<td>1-2</td>
<td>X</td>
<td>AC-Fault-input / Fuel level, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>AC-Fault-input / Fuel level, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J205</td>
<td>1-2</td>
<td>X</td>
<td>T-Winding-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>T-Winding-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J206</td>
<td>1-2</td>
<td>X</td>
<td>Input Water leak has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Input Water leak has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J207</td>
<td>1-2</td>
<td>X</td>
<td>Input AC-Fault has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Input AC-Fault has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J208</td>
<td>1-2</td>
<td>X</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J209</td>
<td>1-2</td>
<td>X</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J210</td>
<td>closed</td>
<td></td>
<td>Input AC-Fault has Pull-Up-current ≥ 10 mA</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>X</td>
<td>Input AC-Fault has Pull-Up-current ≥ 2.5 mA</td>
</tr>
</tbody>
</table>

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.
14.3.4.2 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. 14.3.4.2-1: Settings of soldered jumper for this configuration (column Conf.)**

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Status</th>
<th>Conf.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>closed</td>
<td></td>
<td>during operation of the start button heat is along-operated</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>X</td>
<td>Function deactivated</td>
</tr>
<tr>
<td>J3</td>
<td>1-2</td>
<td></td>
<td>Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td></td>
<td>Dynamo excitation resistor 68R is switched on with Panel-ON (1)</td>
</tr>
<tr>
<td>J101</td>
<td>closed</td>
<td></td>
<td>12 V - operation</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>X</td>
<td>24 V - operation</td>
</tr>
<tr>
<td>J201</td>
<td>1-2</td>
<td></td>
<td>T-Engine-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>T-Engine-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J202</td>
<td>1-2</td>
<td></td>
<td>Water leak-input / Replace air filter, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Water leak-input / Replace air filter, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J203</td>
<td>1-2</td>
<td></td>
<td>Oil-Press-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>Oil-Press-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J204</td>
<td>1-2</td>
<td>X</td>
<td>AC-Fault-input / Fuel level, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td></td>
<td>AC-Fault-input / Fuel level, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J205</td>
<td>1-2</td>
<td></td>
<td>T-Winding-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>T-Winding-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J206</td>
<td>1-2</td>
<td>X</td>
<td>Input Water leak has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td></td>
<td>Input Water leak has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J207</td>
<td>1-2</td>
<td>X</td>
<td>Input AC-Fault has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td></td>
<td>Input AC-Fault has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J208</td>
<td>1-2</td>
<td></td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J209</td>
<td>1-2</td>
<td></td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>X</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J210</td>
<td>closed</td>
<td></td>
<td>Input AC-Fault has Pull-Up-current ≥ 10 mA</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>X</td>
<td>Input AC-Fault has Pull-Up-current ≥ 2.5 mA</td>
</tr>
</tbody>
</table>

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.
14.3.4.3 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. 14.3.4.3-1: Settings of soldered jumper for this configuration (column Conf.)

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

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.
### 14.3.4.4 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. 14.3.4.4-1: Settings of soldered jumper for this configuration (column Conf.)

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

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.
14.4 Starting preparation / Checks (daily)

14.4.1 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).

14.4.2 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.

   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).
14.5 Starting and stopping the generators

14.5.1 Starting the generator

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 starting at the generator.

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

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.

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

Attention! 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!

14.5.2 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. 14.5.2-1: Stop

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

Attention!
14.6 Automatic adapter - optional

Fischer Panda Art. No. 21.02.02.016P

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!
14.6.2 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.

---

**Attention:** 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!

---

### Data:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation voltage</td>
<td>The automatic adapter power is supplied via the generator control panel P6+.</td>
</tr>
<tr>
<td>Operation temperature</td>
<td>The same absolute maximum ratings obtain as with the generator control panel P6+.</td>
</tr>
<tr>
<td>Proper power consumption</td>
<td>10 mA - 20 mA</td>
</tr>
<tr>
<td>Tolerance of times</td>
<td>± 10 %</td>
</tr>
</tbody>
</table>

### Fig. 14.6.2-1: Data

**Fig. 14.6.2-2: Settings**

<table>
<thead>
<tr>
<th>8-pole DIP-switch S1 settings (S1.1 to S1.8):</th>
<th>standard</th>
<th>S1.1</th>
<th>S1.2</th>
<th>S1.3</th>
<th>S1.4</th>
<th>S1.5</th>
<th>S1.6</th>
<th>S1.7</th>
<th>S1.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat-time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5 s</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 s</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 s</td>
<td>X</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 s</td>
<td>ON</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start-time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 s</td>
<td>X</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 s</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop-time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 s</td>
<td>OFF</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 s</td>
<td>X</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64 s</td>
<td>OFF</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>128 s</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation-mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test (all times over 16)</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.25 mA</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 mA</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Fig. 14.6.2-2: Settings**

---

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!
14.6.3 Terminal connections

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

**Fig. 14.6.3-1: Terminal connections automatic adapter**

<table>
<thead>
<tr>
<th>Pin-no.</th>
<th>Pin-name</th>
<th>I / O</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VBF</td>
<td>O</td>
<td>power supply + (operation voltage behind fuse)</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>5</td>
<td>VBFS</td>
<td>O</td>
<td>power supply + switched (voltage Pin 1, with panel switched on)</td>
</tr>
<tr>
<td>7</td>
<td>12V</td>
<td>O</td>
<td>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)</td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>11</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>13</td>
<td>/Heat-signal</td>
<td>I</td>
<td>Heat is active, if the input is switched to GND</td>
</tr>
<tr>
<td>15</td>
<td>/Start-signal</td>
<td>I</td>
<td>Start is active, if the input is switched to GND</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>21</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>23</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>25</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
<tr>
<td>27</td>
<td>/Stop-signal</td>
<td>I</td>
<td>The Fuel pump signal is switched off, as long as the input is switched to GND, (also when starting)</td>
</tr>
<tr>
<td>29</td>
<td>FP-Int</td>
<td>O</td>
<td>Fuel pump signal internally, decoupled over diode from external signal</td>
</tr>
<tr>
<td>31</td>
<td>/Fault-signal</td>
<td>O</td>
<td>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)</td>
</tr>
<tr>
<td>33</td>
<td>GND</td>
<td>O</td>
<td>power supply - (ground)</td>
</tr>
</tbody>
</table>

14.7 Master-Slave adapter - optional

14.7.1 Fischer Panda Art. No. 21.02.02.015P, 12 V-version

**Fig. 14.7.1-1: Panel 21.02.02.046P with master-slave adapter 21.02.02.015P**

01. Main terminals
02. Master-slave adapter 21.02.02.015P
14.7.2 Fischer Panda Art. No. 21.02.02.015P, 24 V-version

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.

14.7.3 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.

14.7.4 Fuse:

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

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

Fig. 14.7.5-1: Terminal connections terminal X2 (IN/OUT from the view of the master-control-panel)

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

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.

14.7.5.2 Terminal X3

Fig. 14.7.5.2-1: Terminal connections terminal X3

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

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.
14.7.6 Configuration and adjustment

14.7.6.1 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. 14.7.6-1: Settings of soldered jumper for this configuration (column Conf.)

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Status</th>
<th>Conf.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>closed</td>
<td></td>
<td>during operation of the start button heat is along-operated</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>XM</td>
<td>Function deactivated</td>
</tr>
<tr>
<td>J3</td>
<td>1-2</td>
<td></td>
<td>Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>Dynamo excitation resistor 68R is switched on with Panel-ON (1)</td>
</tr>
<tr>
<td>J101</td>
<td>closed</td>
<td>M</td>
<td>12 V - operation</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>M</td>
<td>24 V - operation (not possible)</td>
</tr>
<tr>
<td>J201</td>
<td>1-2</td>
<td></td>
<td>T-Engine-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>T-Engine-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J202</td>
<td>1-2</td>
<td></td>
<td>Water leak-input / Replace air filter, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>Water leak-input / Replace air filter, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J203</td>
<td>1-2</td>
<td></td>
<td>Oil-Press-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>Oil-Press-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J204</td>
<td>1-2</td>
<td></td>
<td>AC-Fault-input / Fuel level, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>AC-Fault-input / Fuel level, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J205</td>
<td>1-2</td>
<td></td>
<td>T-Winding-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>T-Winding-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J206</td>
<td>1-2</td>
<td>M</td>
<td>Input Water leak has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>Input Water leak has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J207</td>
<td>1-2</td>
<td>M</td>
<td>Input AC-Fault has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>Input AC-Fault has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J208</td>
<td>1-2</td>
<td>M</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J209</td>
<td>1-2</td>
<td>M</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J210</td>
<td>closed</td>
<td></td>
<td>Input AC-Fault has Pull-Up-current ≥ 10 mA</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>XM</td>
<td>Input AC-Fault has Pull-Up-current ≥ 2.5 mA</td>
</tr>
</tbody>
</table>

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.
14.7.6.2 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. 14.7.6.2-1: Settings of soldered jumper for this configuration (column Conf.)**

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Status</th>
<th>Conf.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>closed</td>
<td></td>
<td>during operation of the start button heat is along-operated</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>XM</td>
<td>Function deactivated</td>
</tr>
<tr>
<td>J3</td>
<td>1-2</td>
<td>XM</td>
<td>Dynamo excitation resistor 68R is switched on with Fuel-Pump (1)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>Dynamo excitation resistor 68R is switched on with Panel-ON (1)</td>
</tr>
<tr>
<td>J101</td>
<td>closed</td>
<td>M</td>
<td>12 V - operation</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>M</td>
<td>24 V - operation</td>
</tr>
<tr>
<td>J201</td>
<td>1-2</td>
<td>XM</td>
<td>T-Engine-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>T-Engine-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J202</td>
<td>1-2</td>
<td>XM</td>
<td>Water leak-input / Replace air filter, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>Water leak-input / Replace air filter, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J203</td>
<td>1-2</td>
<td>XM</td>
<td>Oil-Press-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>Oil-Press-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J204</td>
<td>1-2</td>
<td>XM</td>
<td>AC-Fault-input / Fuel level, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>AC-Fault-input / Fuel level, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J205</td>
<td>1-2</td>
<td>XM</td>
<td>T-Winding-input, for contact, which opens in case of error (2)</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>XM</td>
<td>T-Winding-input, for contact, which closes in case of error (2)</td>
</tr>
<tr>
<td>J206</td>
<td>1-2</td>
<td>M</td>
<td>Input Water leak has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>Input Water leak has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J207</td>
<td>1-2</td>
<td>M</td>
<td>Input AC-Fault has red LED and switches off</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>Input AC-Fault has yellow LED and does not switch off</td>
</tr>
<tr>
<td>J208</td>
<td>1-2</td>
<td>M</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J209</td>
<td>1-2</td>
<td>M</td>
<td>DC-Control-Signal (-) = OK dynamo 12 V at Kubota Z 482 / D 722 engines</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>M</td>
<td>DC-Control-Signal (+) = OK three-phase DC-alternator</td>
</tr>
<tr>
<td>J210</td>
<td>closed</td>
<td>XM</td>
<td>Input AC-Fault has Pull-Up-current ≥ 10 mA</td>
</tr>
<tr>
<td></td>
<td>open</td>
<td>XM</td>
<td>Input AC-Fault has Pull-Up-current ≥ 2.5 mA</td>
</tr>
</tbody>
</table>

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 set

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

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 \( \Omega \) 3 W, i.e. only for 12 V.

(2): A closed contact switches the appropriate input to GND.
Leere Seite / Intentionally blank
15. Measurements

15.1 Hole pattern

Fig. 15.1-1: Hole pattern

Skizze für Lochbild
layout for hole pattern