



Fischer Panda

Power - wherever you are



Manual

Marine Generator

Panda 6500 PMS / Panda 7mini PMS

Super silent technology

120 / 240 V - 60 Hz / 6 kW

Fischer Panda GmbH



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1. General References and Regulations

				
Icemaster GmbH	Fischer Marine Generators	Conclusion Fischer - Icemaster GmbH	100 % water cooled Panda generators	Panda Vehicle Generators

Fischer Panda

FISCHER GENERATORS have been manufactured since 1978 and are a well-known brand for first class diesel generators with especially effective sound-insulation. Fischer has been one of the leading manufacturers for marine generators in respect of quality and know-how during this period. FISCHER, as the worldwide manufacturer of modern marine diesel generators, developed the Sailor-Silent series for example and produced a GFK sound-insulated capsule as early as 1979 and the basis for new generator technology.

The companies Fischer and Icemaster amalgamated under the direction of Icemaster in 1988, in order to concentrate on the development of new products. Production was moved to Paderborn. The amalgamation of the two qualified companies led to the development of a complete new programme within a short space of time. The generators developed at that time set new technological standards worldwide.

The generators became more efficient and powerful than other generators in the same nominal performance range, because of the improved cooling. Panda generator demonstrated its superiority in several tests by renowned institutes and magazines during the past years. The patented VCS (voltage Control System) means it can meet all demands including motor speed. The start-boost (ASB) means Panda generators meet the highest demands in respect of voltage stability and starting values.

A water-cooled Fischer Panda generator, with the same drive motor, produces 15 % more effective output than the majority of conventional generators. This superiority in efficiency also ensures a fuel saving to the same extent.

The Fischer Panda generators are currently manufactured in the performance range from 2 to 200 kW in various versions. Fast running motors are preferred for performances up to approx. 30 kW (nominal speed 3000 resp. 3600 rpm). The heavier slow runners are preferred for the higher range. The fast running generators have proved themselves many times for many uses, that they meet the demands in quality of yachts and vehicles, and offer space and weight saving of 50 % compared to slow running generators.

In addition to the Panda series, Fischer Panda also supply the super compact high-tech sound-insulated battery charging generators from the DC/AC Panda AGT series, which is a very interesting solution for the production of mobile power.

The HTG-alternators ensure that a charging rate of 280 amps is achieved that was scarcely thought possible for this compact construction. This alternator replaces a separate shipboard generators (constant 230 volts AC with up to 3.500 W from the main machine)



1.1 Safety first symbols

These symbols are used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use unit.

This danger symbol refers to toxic danger and draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in severe personal injury or loss of life.

Warning!: Toxic elements



This warning symbol draws attention to special warnings, instructions or procedures which, if not strictly observed, may result in damage or destruction of equipment

Attention!: Important Advice



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!: Danger of fire



Do not smoke in that area / do not smoke during the describes works

Prohibition!: No Smoking



Fires and open light are ignition sources, which must be avoided.

Prohibition: Fire and open flames prohibited



Do not turn on or start operation. People are working at the generator and/or electrical system

Prohibition: Turn on / start operation prohibited





Berühren der entsprechenden Teile und Anlagen verboten

Proscription!: Do not touch



Generator can be started by an external signal

Warning!: Automatic start.



These symbols refer to electrical danger and points to special warnings, instructions and advices, which must be noticed. Otherwise an electrical shock with personal injury or death can be the consequence.

Warning!: High voltage / danger by electricity - Danger for life



General Warning

Warning!: Danger for life and/or equipment



Substances can be harmful or lead to death, if accumulated or swallowed

Warning!: Harmful if accumulate



Warning of live parts, which can cause electrical impacts during contact. Special danger for persons with heart problems and/or pace makers.

Warning!: Electric shock



Danger of injury by drawing into the machine. Injury by crushes and eventually the separation of extremities. Danger of drawing during contact with extremities, loose clothes, scarf, ties etc.

Warning!: Rotating parts





Warning of materials, which can lead to explosions under certain conditions - e.g. heat or ignition sources

Warning!: Risk of explosion



Surfaces and substances may be hot. Danger of burn / scalding

Warning!: Hot surface



Warning of materials, which cause corrosive damage during contact. These materials can work contaminating when entering into the body.

Warning!: Danger corrosive material - contamination of persons possible



When opening the system the pressure can suddenly escape and drag along liquids. Danger of injury by parts flying around, danger of burn by liquids and gases.

Warning!: System can be under pressure!





Warning!: Hearing damage



Warning!: Magnetic field



Warning!: High pressure



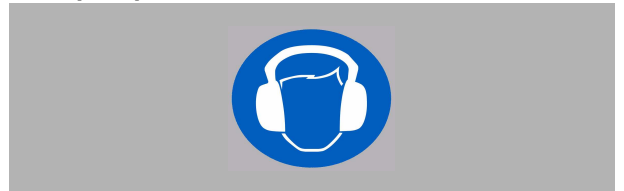
Protective clothing is close fitting, with low resistance to tearing, with narrow sleeves and without protruding parts. It mainly provides protection against being entangled by moving machine parts.

Instruction!: Wear personal protective equipment (PPE)



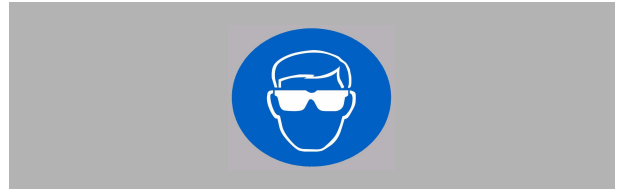
Wear ear defenders to protect the ears against hearing damage.

Instruction!: Wear personal protective equipment (PPE)



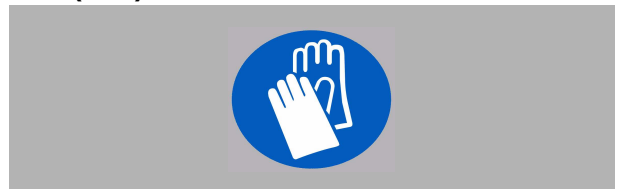
Wear safety glasses to protect the eyes against parts flying around or squirts of fluids. Optical eyeglasses are not replacement for appropriate eye protectors.

Instruction!: Wear personal protective equipment (PPE)



Wearing protective gloves protects the hands against friction, graze, punctures or deep cuts as well as contact with hot surfaces.

Instruction!: Wear personal protective equipment (PPE)





Read and consider the regulations, safety instructions and installation guidelines of manual, in order to avoid dangers and accidents. You protect yourself and the generator.

Instruction!: Read the manual instructions



Environmental protection is the protection of our habitat. For you and your children

Instruction!: Environmental protection





1.2 Tools

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

	Spanners SW X = required size X mm
	Hook wrench for oil filter
	Screw driver, for slotted head screws and for recessed head screws
	Multimeter, multimeter with capacitor measuring
	Socket wrench set
	Hexagon wrench keys



	Current clamp (DC for synchron generators; AC for asynchron generators)
	Torque wrench



1.3 Manufacturer declaration in accordance with the machine guideline 98/37/EG

Manufacturer declaration in accordance with the machine guideline 98/37/EG

The generator has been developed in such a way, that all assembly groups correspond to the CE guidelines. If machine guideline 98/37/EG 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 corresponds to the machine guideline regulation 98/37/EG. This includes the exhaust system, cooling system and electrical installation.

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

1.4 Customer registration and guarantee

Use the advantages of the customer registration:

- Thus you receive to extended product informations, which are sometimes safety-relevant
- you receive, if necessarily free Upgrades

Far advantages:

By your full information Fischer Panda technicians can give you fast assistance, since 90% of the disturbances result from errors in the periphery.

Problems due to errors in the installation can be recognized in the apron.

1.4.1 Technical Support

Technical Support per Internet: info@fischerpanda.de

1.4.2 Attention, important directions regarding operation!

1. The installation certificate must be completed when taken into use, and certified by a signature.
2. The installation certificate must be despatched within two weeks of use to Fischer Panda.
3. The official guaranty confirmation will be completed by Fischer Panda after receipt and sent to the customer.
4. A guaranty must be shown to make any claims.

Claims against the guaranty will not be accepted of the above said instructions are not, or only partially, carried out.



1.5 Safety instructions - Safety first!

1.5.1 Safe operation

Careful operation is your best assurance against an accident. Read and understand this manual carefully before operating the engine. All operators, no matter how much experience they may have, should read this and other related manuals before operating the generator or any equipment attached to it. It is the owner's obligation to provide all operators with this information and instruct them on safe operation.



1.5.2 Observe safety instructions

Read and understand carefully this manual and „Labels at the engine“ before attempting to start and operate the generator. Learn how to operate and work safely. Know how your equipment and its limitations. Always keep the generator in good condition.

1.5.3 Wear personal protective equipment (PPE)

Do not wear loose, torn or bulky clothing around the machine that may catch on working controls and projections or into fans, pulleys and other moving parts causing personal injury.



Use additional safety items-PPE, e.g. safety protection, safety goggles, gloves, etc.

Do not operate the generator or any equipment attached to it while under the influence of alcohol, medication, or other drugs, or while fatigued.



Do not wear radio or music headphones while operating the generator.



1.5.4 Cleanliness protect

Keep the engine and the surrounding clean.

Ensure that the generator is stopped before cleaning. Keep the generator clean and free of accumulated dirt, grease and trash to avoid fire. Store flammable liquids in proper containers and cabinets away from sparks and heat. Check for leak immediately and repair if necessary.





1.5.5 Safe handling of fuel and lubricants - Keep away from fire

Keep away open fire from fuels and lubricants.

Always stop the generator before refueling and/or lubricating and protect against unintentional starting.

Do not smoke or allow flames or sparks in your work area. Fuel is extremely flammable and explosive under certain conditions.

Refuel at a well ventilated and open place. When fuel and/or lubrication are spilled, refuel after letting the generator cool down.

Do not mix gasoline or alcohol with diesel fuel. The mixture can cause a fire or severe generator damage.

Do not use unapproved containers e.g. buckets, bottles, jars. Use approved fuel storage containers and dispensers.



1.5.6 Exhaust gases and fire prevention

Generator exhaust fumes can be very harmful if allowed to accumulate. Be sure to run the engine in a well ventilated location and where there are no people or livestock near the engine.

Check the Generator and all pipes and hoses regularly for leaks and repair immediately if necessary.

The exhaust gas and the engine can be very hot during operation and afterwards. To prevent a fire, do not expose dry grass, moved grass, or any other combustible material to exhaust gas or the hot generator surface.

To prevent a fire, do not short electrical cables. Check regularly all electrical cables and wires. Uncoated wires and loose connections can cause electrical shock, electrical short circuit and fire.

The generator should be integrated in the local fire protecting system.



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.



Exhaust gases of diesel engines and some components are carcinogenic and can cause deformations and other genetic effects.





1.5.7 Cautions against burns and battery explosion

To avoid burns, be cautious of hot components, e.g. muffler, muffler cover, radiator, hoses, engine body, coolants, engine oil, ect. during operation and after the engine has been shut down.



The Coolant system can be under pressure, Open the coolant system only, when the generator is colled down. Wear „Personal Protective Equipment,,.

Be shure that the coolant system is closed and all hose clamps are tightend before operating the generator.



The battery (Starter battery and AGT battery bank) presents an explosive hazard. When the battery is being charged, hydrogen and oxigen gasses are extremly explosive.

Do not use or charge a battery if its fluid level is below the lower mark. Otherwise, the component parts may deteriorate earlier than expected, which may shorten the the service life or cause an explosion. Immediatly, add distilled water until the fluid level is between the lower and the upper marks.



Keep sparks and open flames away from the battery, especially during charging. Do not strike a match near the battery.

Do not check the battery charge by placing a metal object across the terminals (danger of short circuit, battery damage and high danger of explosion). Use a Voltmeter or a hydrometer.



Do not charge a frozen battery. There is a riosk of explosion. When frozen, warm the battery up to at least 16°C.(61°F).

1.5.8 Keep hands away from rotating parts

Operate the generator with closed sound cover capsul only.

Be shure to stop the generator befor checking or adjusting the belt tension.

Keep your hands and body away from rotating parts, such as the cooing fan, V-Belt, fan drive belt, ra'w water pump drive belt, pulley or Flywheel.



Do not operate the generator without safety guards. Install safety guards securly before operation.

1.5.9 Anti-Freeze and disposal of fluids

Anti-freeze contains poison. Wear rubber gloves to avoid personal injury. In case of contact with skin, whash it off immedeately. Do not mix different types of Anti-freeze. The mixture can produce chemical reactioncausing harmful substances. Use approved or genuine Fischer Panda Anti-freeze.



Protect the environment. When draining fluids from the generator, place a siutable container underneath the generator body. Consider the relevant enviromental protection regulations when disposing of oil, fuel, coolant, breakfluid, filters and batteries. Do not poor waste onto the ground, down a drain, or into any water source. Conducting safety checks and maintenance





1.5.10 Implementation of security and maintenance

Disconnect the battery from the generator before conducting service. Put a „DO NOT OPERATE“ tag on the remote control panel to avoid accidental starting. Disconnect any automatic starter device, e.g. battery monitor to prevent automatic starting.

To avoid sparks from an accidental short circuit always disconnect the battery's ground cable (-) first and connect it last. be shure that the generator is stopped and cooleed down when conducting daily and periodic maintaenance, service and cleaning.

Always use the apprrppirate tools and fixtures. Verify that they are in good conditions before performing any service work. Make shure you understand how to use them before service.

Keep first aid kit and fire extinguisher handy at all times.



1.6 Warning and caution labels

Keep warning and caution labels clean and free from obstructing material.

Clean warning and caution labels with soap and water, dry with a soft cloth.

Replace damaged or missing warning and caution labels with new labels.

1.6.1 Safety instructions concerning operating the generator

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

The generator must not be taken into use with the cover removed.

If the generator is being installed without a sound insulation capsule, make sure 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 well-placed signs must show that the generator can only be switched on with a closed capsule.

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

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.





1.6.1.1 Protective grounding and potential equalisation

In the low voltage board for power supply of the consumers therefore a protective conductor is grounded and connected with electrically conductive objects. The connection with an outer conductor with these object then leads to the earth fault. This earth fault leads to the release of an over-current protection mechanism and thus to the disconnection of the voltage.

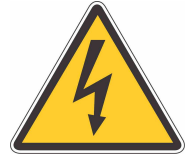
1.6.1.2 Ground wire

The generator, is "earthed" as series (centre and ground are connected together in the generator terminal box by a bridge). This is an initial ground fuse, which offers protection, as long as no other measures are installed. Above all, it is conceived for the delivery and possible test run.

This "neutralisation" (Protective Earthing Neutral - PEN) is only effective, if all parts of the electrical system are commonly "earthed" to a common potential. The bridges can be removed, if this is necessary for technical reasons and another protective system has been setup.

There is full current in the AC control box when the generator is running. It must therefore be ensured that the control box is closed and cannot be touched when 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 unintentionally started.



1.6.1.3 Switch off all load when working on the generator

All load must be disconnected, in order to avoid damages to the devices. In addition the semi conductors in the AC control box must be disconnected in order to avoid the boat capacitors being activated. The minus pole of the battery ought to be removed.

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 are electrical stores. There could be a residual of high electrical current at the contacts for a period disconnection from the circuit. The contacts may not be touched for safety reasons, If the capacitors are to be exchanged or checked, and then a short circuit between the contacts should be made so that the stored energy is discharged.

If the generator is switched off in the normal manner, the working capacitors are automatically discharged by means of the windings. The booster capacitors are discharged by means of internal discharge resistors.

All capacitors must be short-circuited before work is carried out on the AC-Control box for safety reasons.

Potential equalisation at Panda AGT DC generators.

Further information for your generator see capture installation.





1.6.1.4 Safety instructions concerning the cables

Cable Type

It is recommended is that the cable used be UL 1426 (BC-5W2) compliant, with Type 3 stranding (ABYC Section E-11)

Cable Size

The cable size must be selected taking into account the amperage, voltage 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 that a self draining wire loom classified as V-2 or better in accordance with UL 94 be installed in the section of the cable routed in the interior of the sound capsule. Care should be taken to avoid hot surfaces such as the exhaust manifold or engine oil drain bolt and routed clear of any possible sources of chafing.

1.6.2 Recommended starter battery size

Only use batteries which are certified as starter battery by the manufacturer.

Only use batteries with capacity recommended by the engine manufacturer.

Attention !! Check before installation if the starter battery voltage correspond with the generator start system.

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

f.e. 24V starter battery for 24V start system



1.6.3 Important Advice for Batteries - Starting batteries and Traction batteries

ATTENTION!!! Initial operation:

Installation of battery lines.

Consider the regulations and installation instructions of the battery manufacturer.

Consider ABYC regulation E11 AC and DC electrical systems on boats and/or EN ISO 10133:2000 small watercrafts, electrical systems, low voltage (DC) systems !

Ensure a professional battery installation.

The battery separation can be made mechanically or by an appropriate power relay.

Consider the appropriate notes of the battery manufacturer concerning fire and explosion prevention.

Install a right sized fuse in the positive battery line as close as possible to the battery, but max. 12 inch, 300mm from the battery.

The length of the cable to the fuse, the cable must be protected by a sheath or conduit against damage of the insulation.





Use only cable with self retardant and self extinguishing insulation suitable for high temperatures up to 195°F, 90°C.

Install battery lines in a safe way that the cable insulation will not be shaved or damaged.

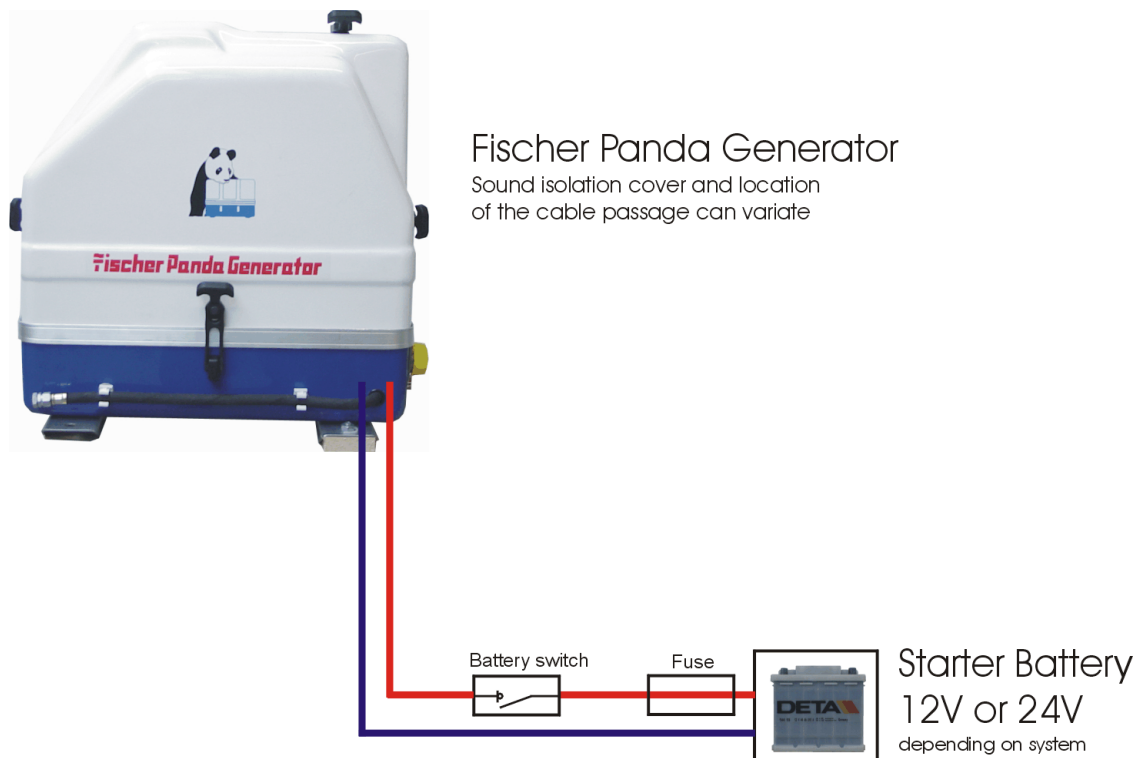
Battery poles must be protected against short circuits by error.

Inside the capsule of the Fischer Panda Generator the battery positive line must be protected against heat and vibration by a suitable conduit or sheath and must be routed that way it is not touching any area that will get hot under normal operation like entire engine itself, exhaust elbow and exhaust manifold or exhaust lines or the V-belt and pulleys. The cable shall not be too tight otherwise damage will happen.

Run the generator carefully after installation and double check, if there is any possibility for damage of the battery cable. Correct if necessary.



Fig. 1.6-1: Sample scheme for starter battery installation



1.6.4 Safety Instructions for the Handling with Batteries

These instructions must be noticed additionally to the instructions of the battery manufacturer:

- If the batteries are working, someone should be in your near area to help you in a case of emergency.
- Water and soap must be hold ready if battery acid corrode your skin.
- Wear eye protection and protective clothing. During working with the batteries don't touch the eyes.
- If you got a acid splash on your skin or clothing grow it with much water and soap out.
- If you got acid in your eyes rinse them immediately with clear water until no cauterization is noticeable. Visit immediate a doctor.





- Never smoke in the near of the batteries. Avoid naked flames or open fires. In the area of batteries exists danger of explosions.
- Pay attention that no tools fall on the battery poles, if necessary cover them.
- During the installation don't wear a wrist watch or arm jewels, you can create under these circumstances a battery short-circuit. Burning of the skin could be the result.
- Protect every battery contact against unintentional touch.
- For battery banks: Use only cyclical profoundly dischargeable batteries. Starter batteries are not appropriate. Lead-gel batteries are commended. They are maintenance-free, profoundly dischargeable and not produce gas.
- Do not charge a frozen battery.
- Avoid a batterie short-curcuit.
- Take care of a good ventilation of the battery to drain off developing gas.
- The battery connection terminals must be checked of a tight contact at least before operating.
- The battery connection cable must be carefully mounted and checked about incorrect heating at operation with load. The vibrating devices must be regulary checked about scour points and flaw in the isolation.



Attention !! For battery charge generators (Fischer Panda AGT-DC)!

Check before installation if the battery bank voltage correspond with the generator output voltage



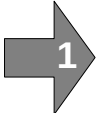
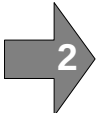
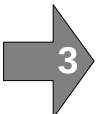
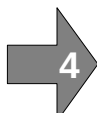
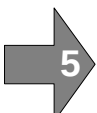


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2. In case of Emergency First Aid / Im Notfall - Erste Hilfe



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

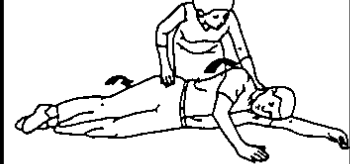
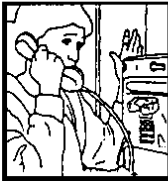


2.7 WHEN AN ADULT STOPS BREATHING

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

Warning:



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



3. Basics

3.0.1 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 voltage control system (VCS).

For the process is a sufficient amount of fuel and combustion air necessary. Arising exhaust and heat must be lead away.

If the electrical power should be applied to a local net, The regulation and installation instructions of the Net owner and the regional authorities must be respected. This includes lightening conductor, personal protection switch etc.

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. 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.

3.0.2 Purpose of the manual und description of the definitions trained person/operator/user

This manual is work instruction and operation instruction for the owner and user of Fischer Panda generators.

The manual is the base and the guideline for the correct installation and maintenance of Fischer Panda Generators.

The manual does not substitute the technical evaluation and should be used as an example guide only.

The installation must be undertaken and proved by a suitable qualified/trained person and may in accordance with the law as required by the country and special situation.

3.0.2.1 Trained persons

Trained persons for the mechanical components are motor mechanics or persons with similar education and training.

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

After the Installation, the trained person must instruct the owner for operation and maintenance of the generator. This must include the hazards of the generator use.

3.0.3 Operator

The operator is the for the operation of the generator responsible person.

After the installation, the operator must be instructed for the operation and maintenance of the generator. This must include the hazards during operation of the generator and a instruction for the maintenance.

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

3.0.3.1 User

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

The operator must assure that the user read and understand the manual and that all hazard notes and safety instructions are respected. The user must be instructed by the operator regarding his activity at the generator.



3.1 Panda Transport Box

3.1.1 Bolted Fischer Panda Transport Box

1. Remove the bolts for cover / sidewalls
2. Remove the cover
3. Remove the loose accessories
4. Remove the bolts for sidewalls / floor pallet
5. Remove the sidewalls
6. Open the generator attachment

3.1.2 Fischer Panda Transport Box with metal tab closure

1. Bend up the metal tab closures on the transport box lid.
2. Remove the cover
3. Remove the loose
4. Bend open the metal tab closures on the transport box bottom.
5. Remove the sidewalls
6. Open the generator attachment

3.2 Transport and Loading/Unloading

3.2.1 Transporting the generator

- The generator must always be upright for transport.
- For transport, the Fischer Panda Transport Box shall be used for the generator. The generator shall be securely attached to the bottom of the box.
- For loading/unloading, an adequate industrial truck shall be used.
- Depending on the transport distance (e.g. air cargo), the generator fluids (coolant, engine oil, fuel) may have to be drained. The corresponding instructions and warnings must be fitted to the transport packaging.

3.2.2 Loading/unloading of the generator

For loading/unloading the generator, appropriate ring eye bolts shall be installed in the holes in the support rails. The load bearing capacity of each ring eye bolt must at least equal the generator weight.



An adequate lifting yoke shall be used for transport/ loading

Fig. 3.2-1: Lifting yoke (example)



3.3 Scope of delivery

The Fischer Panda PMS generator system contains following components:

3.3.1 Asyncron Genertoren:

Fischer Panda Generator

representative picture

Fig. 3.3-1: Fischer Panda Generator



Remote control panel

representative picture

Fig. 3.3-2: Remote control panel





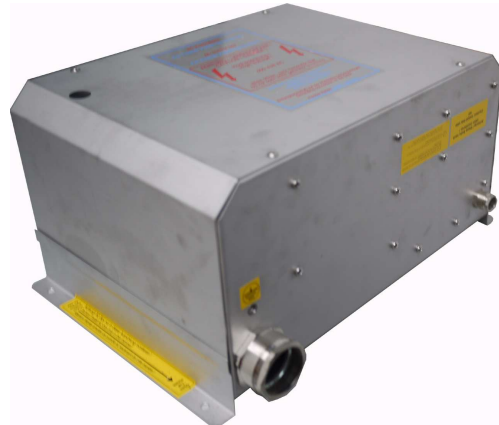
AC Control Box

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

Fig. 3.3-3: AC Control Box



Fischer Panda Manual

The Fischer Panda Manual contains the following components:

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

representative picture

Fig. 3.3.1-4: Fischer Panda Manual



Optional components

f.e.:

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



3.3.2 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.



Closure locked

Fig. 3.3-1: Sound insulation capsule, side part

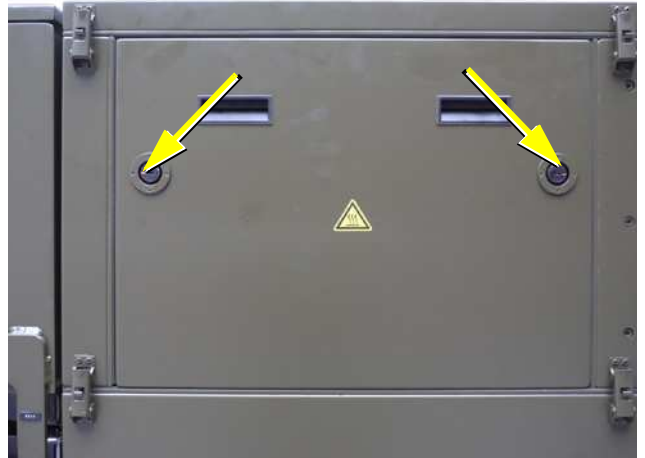


Fig. 3.3.2-2: Closure locked



Closure open

Fig. 3.3-3: Closure open



3.3.3 Opening the GFK sound insulation capsule



GFK sound insulation capsule with lash closures

Fig. 3.3-1: Lash closures



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

Fig. 3.3-2: Lash closures



3.4 Special maintenance notes and arrangements at long periods of stand still time or shutdown

Stand still is divided into the following groups:

- Short-term standstill (1 to 3 months).
- Medium-term standstill / winter storage (3 to 6 months).
- Long-term standstill (storage) / shutdown (more than 6 months).

3.4.1 Reference note for the starter battery at a long-term standstill

Starter batteries

Notice:

Self-discharge of batteries is a physical and chemical process and cannot even be avoided by disconnecting the battery.



- Disconnect the battery from the generator at a long-term standstill.
- Charge the battery on a regular basis. Follow the notes of the battery manufacturer.

Before charging the battery, check the acid level according to the type of battery and refill each cell with distilled



water up to the marking if necessary.

Today's starter batteries are normally maintenance-free.

Deep discharge may damage the battery and may be useless afterwards.

Keep the battery clean and dry. Continuously clean the battery terminals (+ and -) and clamps and lubricate with an acidfree and acid-resistant grease. Make sure there is a good contact of the clamp connections when assembling. If voltage is approx. below 1,95 Volt, the cell should not decline the open-circuit voltage of the battery. This equates approx. 2,1V / cell open-circuit voltage when battery is fully charged.

For a 12 V battery applies 11,7 V lower open-circuit voltage (battery flat) - conservation charging 13,2 V.

For a 24 V battery applies 23,4 V lower open-circuit voltage (battery flat) - conservation charging 26,4 V.

These data relate to a battery temperature of 20-25°C. Consider the specifications of the battery manufacturer.

Fischer Panda recommendation:

- Install a battery main switch and turn it to the off-position.
(Disrupt the battery circuit)
- Install a sufficient fuse in the positive battery line close to the battery
- Check contacts for corrosion on a regular basis.

Notice:



3.4.2 Arrangements at a short-term standstill

Short-term standstill (1 to 3 months)

- Measure the charge of battery via the open-circuit voltage
- At stand still >7 days - disconnect the battery (e.g. put battery main switch to 0)
- Within 2-3 months - let the engine run for at least 10 min

3.4.3 Arrangements at a medium-term standstill / winter storage

Medium-term stand still (3 to 6 months)

3.4.3.1 Arrangements for conservation:

- Check the charge of battery and recharge approximately every 3 months if necessary. Consider the specifications of the battery manufacturer.
- Check anti-freeze protection of the cooling water and refill if applicable.

The anti-freeze protection should not be older than 2 years. The content of the anti-freeze protection should be between 40% and 60% to ensure corrosion protection in the cooling water circuit; Refill anti-freeze if necessary.

If cooling water will be drained, for example after a conservation of the engine, no water should remain within the engine during the stand still. At the control unit a correspondent note „NO COOLING WATER“ has to be placed.

- Drain engine oil as required. Refill engine with conservation oil up to maximum at the oil dip stick.
- Drain diesel fuel from tank and refill with conservation mixture (90% diesel and 10% conservation oil - up to max).

Let engine run for 10 min.

- Remove v-belt as required and store packed at a dry place. Protect from UV radiation.

Cover alternator openings.

Attention!

No cleaning fluids or preserving agents may enter the alternator. Danger to destroy the alternator.





- Clean engine according to the manufacturer.
- Inject engine parts and v-belt pulleys with a preserving agent.
- Clean air filter housing and inject with a preserving agent.
- Close suction hole and exhaust opening (e.g. with tape or end caps).
- Drain sea water circuit.
- Close sea cock.
- Clean sea water filter.
- Remove impeller and store.

Carry out a deconservation before recommissioning.

Attention!



3.4.3.2 Arrangements for deconservation after a medium-term standstill (3 to 6 months).

- Check charge of battery and recharge if necessary. Consider the specifications of the battery manufacturer.
- Check anti-freeze protection of the cooling water and refill if applicable.
- Drain engine oil. Renew oil filter and oil according to specification.
- Remove preservation agent of the engine with petroleum.
- Degrease the v-belt pulleys and install v-belt correctly. Check v-belt tension!
- Disconnect turbocharger oilpressure line if existent and refill clean motor oil in pipe.
- Keep engine shut-off lever in 0-position and turn engine several times by hand.
- Clean air filter housing with petroleum, check air filter and renew if necessary.
- Remove covers of the exhaust opening and the suction holes.
- Connect battery. Close battery main switch.
- Install impeller.
- Open sea cock.
- Check sea water filter.
- Keep shut-off lever at generator in 0-position and activate starter for approx. 10 sec. Make a break for 10 sec. and repeat procedure twice.
- Visual inspection of the generator according to initial operation and start generator.

3.4.4 Arrangements at a long-term standstill / shutdown

Standstill (more than 6 months)

3.4.4.1 Arrangements for conservation:

- Check the charge of battery and recharge approximately every 3 months if necessary. Consider the specifications of the battery manufacturer.
- Check anti-freeze protection of the cooling water and refill if applicable.

The anti-freeze protection should not be older than 2 years. The content of the anti-freeze protection should be between 40% and 60% to ensure corrosion protection in the cooling water circuit; Refill anti-freeze if necessary.

If cooling water will be drained, for example after a conservation of the engine, no water should remain within the



engine during the stand still. At the control unit a correspondent note „NO COOLING WATER“ has to be placed.

- Drain engine oil as required. Refill engine with conservation oil up to maximum at the oil dip stick.
- Drain diesel fuel from tank and refill with conservation mixture (90% diesel and 10% conservation oil - up to max).

Let engine run for 10 min.

- Remove v-belt as required and store packed at a dry place. Protect from UV radiation
- Disconnect battery. Sprinkle terminals with acid-free grease.

Cover alternator openings.

Attention!

No cleaning fluids or preservative agents may enter the alternator. Danger to destroy the alternator.



- Clean engine according to the manufacturer.
- Inject engine parts and v-belt pulleys with a preserving agent.
- Clean air filter housing and inject with a preserving agent.
- Sprinkle exhaust turbo charger (if existent) with conservation agent at intake and exhaust and close lines again. Sprinkle preserving agent to the intake and exhaust lines than attach again.
- Remove valve cover and sprinkle the inside of the cover, shafts, springs, rocker lever etc. with preserving agent.
- Remove injectors and sprinkle the cylinder area with preserving agent. Keep the shut-off lever on the 0-position and turn the engine by hand for several times. Screw in the injectors with new gaskets. Consider the torsional moments.
- Sprinkle slightly the radiator cap and tank lid and respectively the radiator cap at the expansion tank and reinstall.
- Close intake and exhaust openings (for example with tape or end caps).
- Drain sea water circuit.
- Close sea cock.
- Clean sea water filter.
- Dismount impeller and store.

Carry out a deconservation before recommissioning.

Attention!



3.4.4.2 Arrangements after a long-term standstill (shutdown) / recommissioning (more than 6 months):

- Check the charge of battery and recharge if necessary. Consider the specifications of the battery manufacturer.
- Check anti-freeze protection and level of the cooling water and refill if applicable.
- Drain engine oil. Renew oil filter and oil according specification.
- Remove preservation agent of the engine with petroleum.
- Degrease the v-belt pulleys and install v-belt correctly. Check v-belt tension!
- Disconnect turbocharger oilpressure line if existent and refill clean motor oil in pipe.
- Keep engine shut-off lever in 0-position and turn engine several times by hand.
- Clean air filter housing with petroleum, check air filter and renew if necessary.
- Remove covers of the exhaust opening and the suction holes.
- Connect battery. Close battery main switch.
- Install impeller.



- Open sea cock.
- Check sea water filter.
- Keep shut-off lever at generator in 0-position and activate starter for approx. 10 sec. Make a break for 10 sec. and repeat procedure twice.
- Visual inspection of the generator according to initial operation and start generator.

Fischer Panda recommendation:

After a long-term standstill a complete 150 h inspection according to inspection schedule should be carried out.

Notice:



4. The Panda Generator

4.1 Type plate at the Generator

Fig. 4.1-1: Type plate

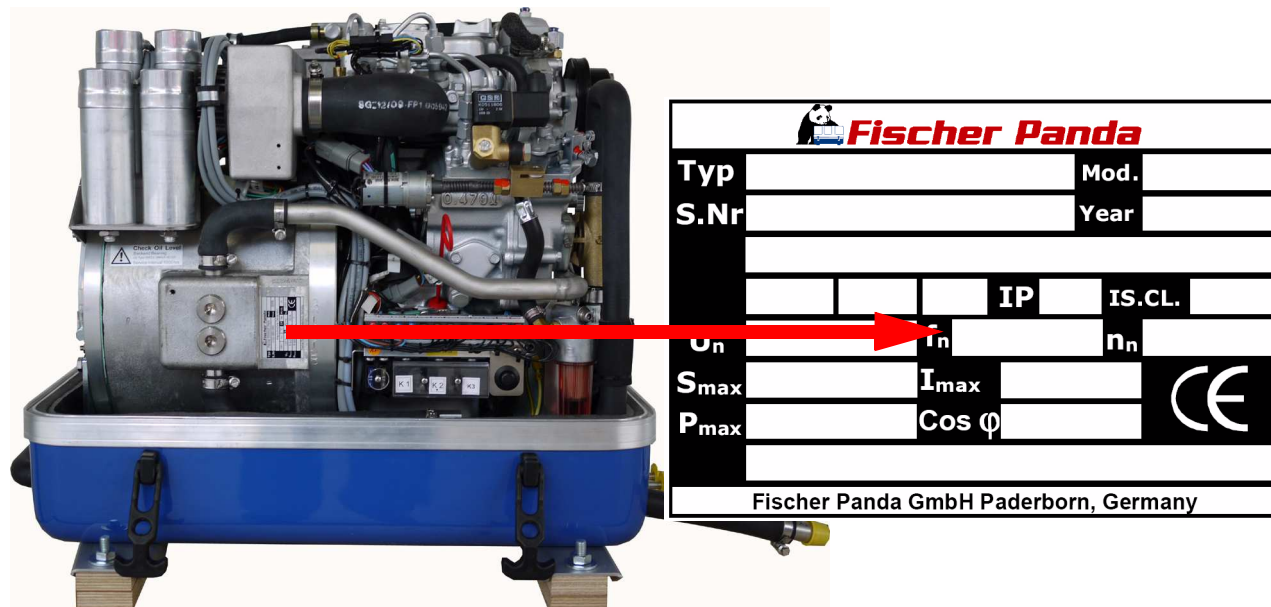
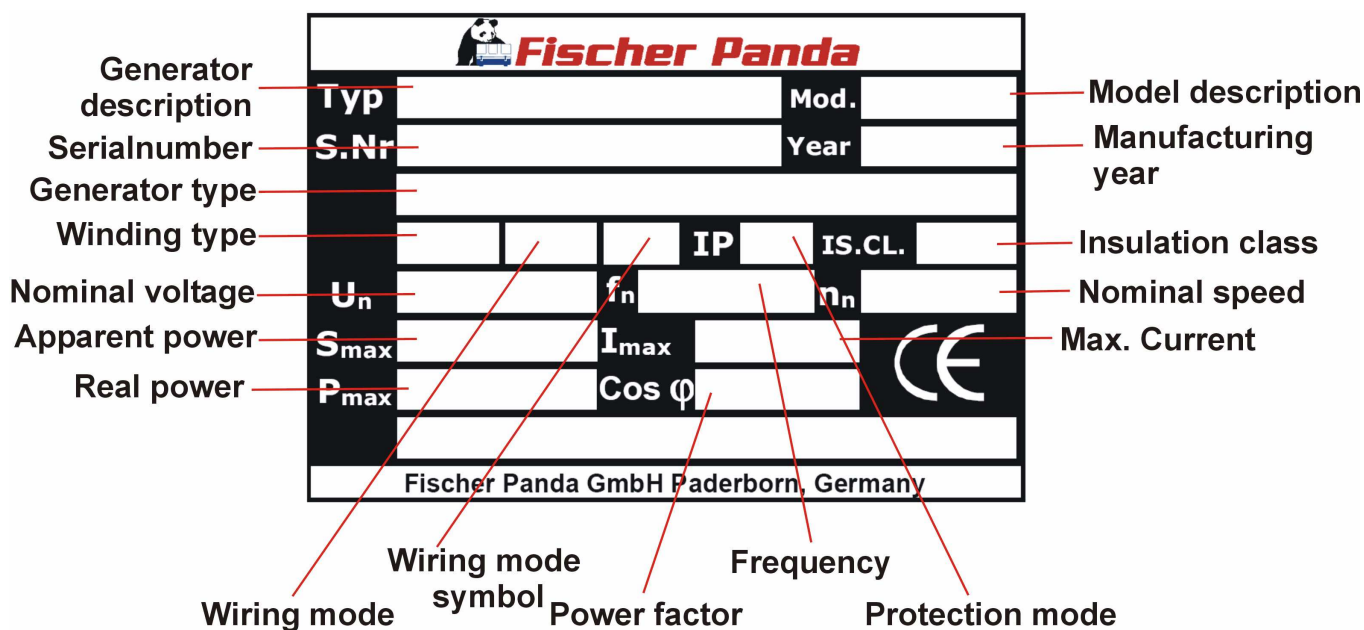


Fig. 4.1-2: Discription type plate

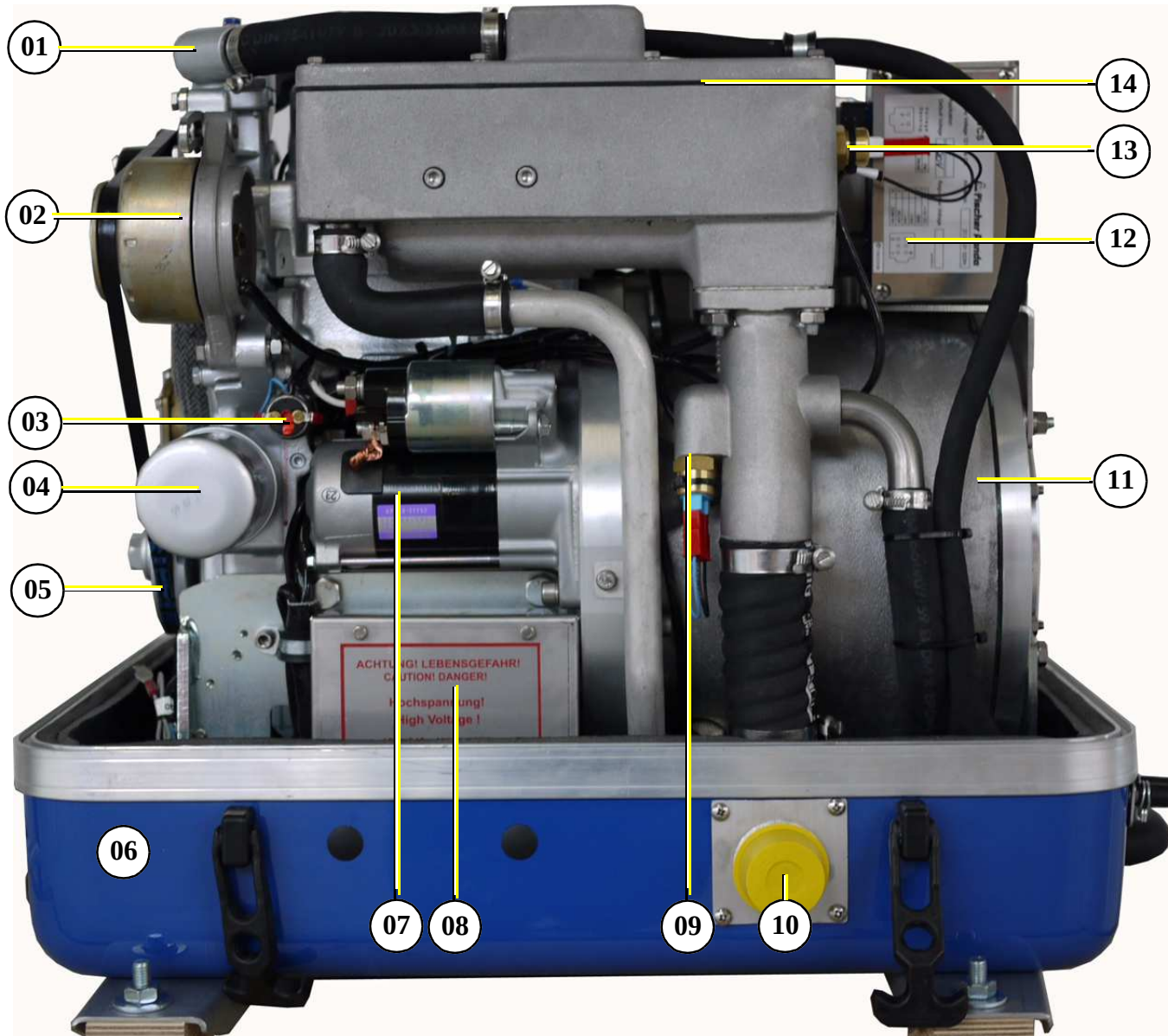




4.2 Description of the Generator

4.2.1 Right Side View

Fig. 4.2-1: Right side view



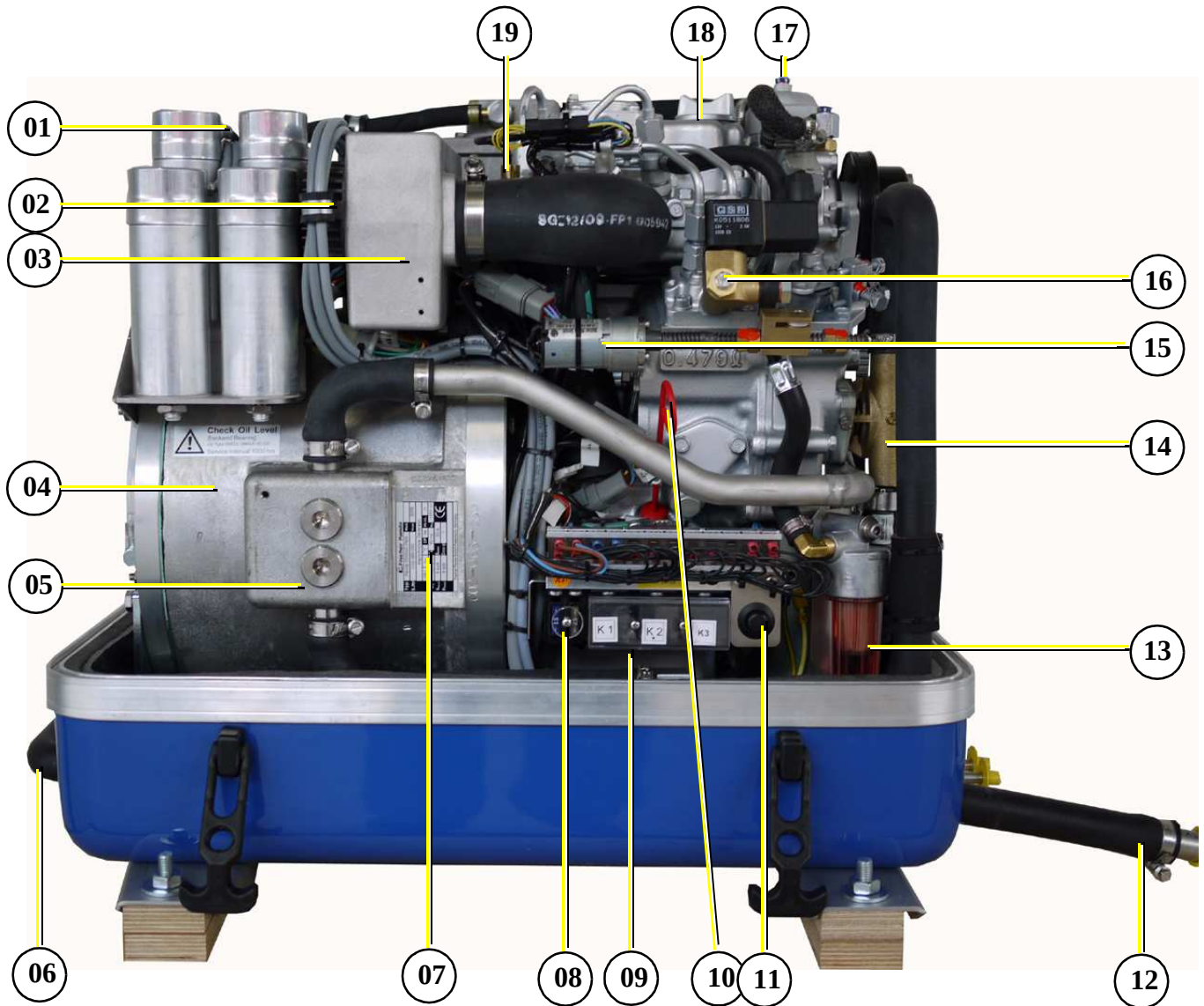
- 01) Thermostat housing
- 02) Alternator 12 V
- 03) Oil Pressure switch
- 04) Oil Filter
- 05) Pulley with tooth belt
- 06) Sound isolation capsule base part
- 07) Starter Motor with solenoid

- 08) Generator power terminal box
- 09) Thermo switch water injection elbow
- 10) Exhaust out
- 11) Generator housing with stator winding
- 12) Mini VCS
- 13) Thermo switch exhaust elbow
- 14) Water cooled exhaust elbow



4.2.2 Left Side View

Fig. 4.2-1: Left side view



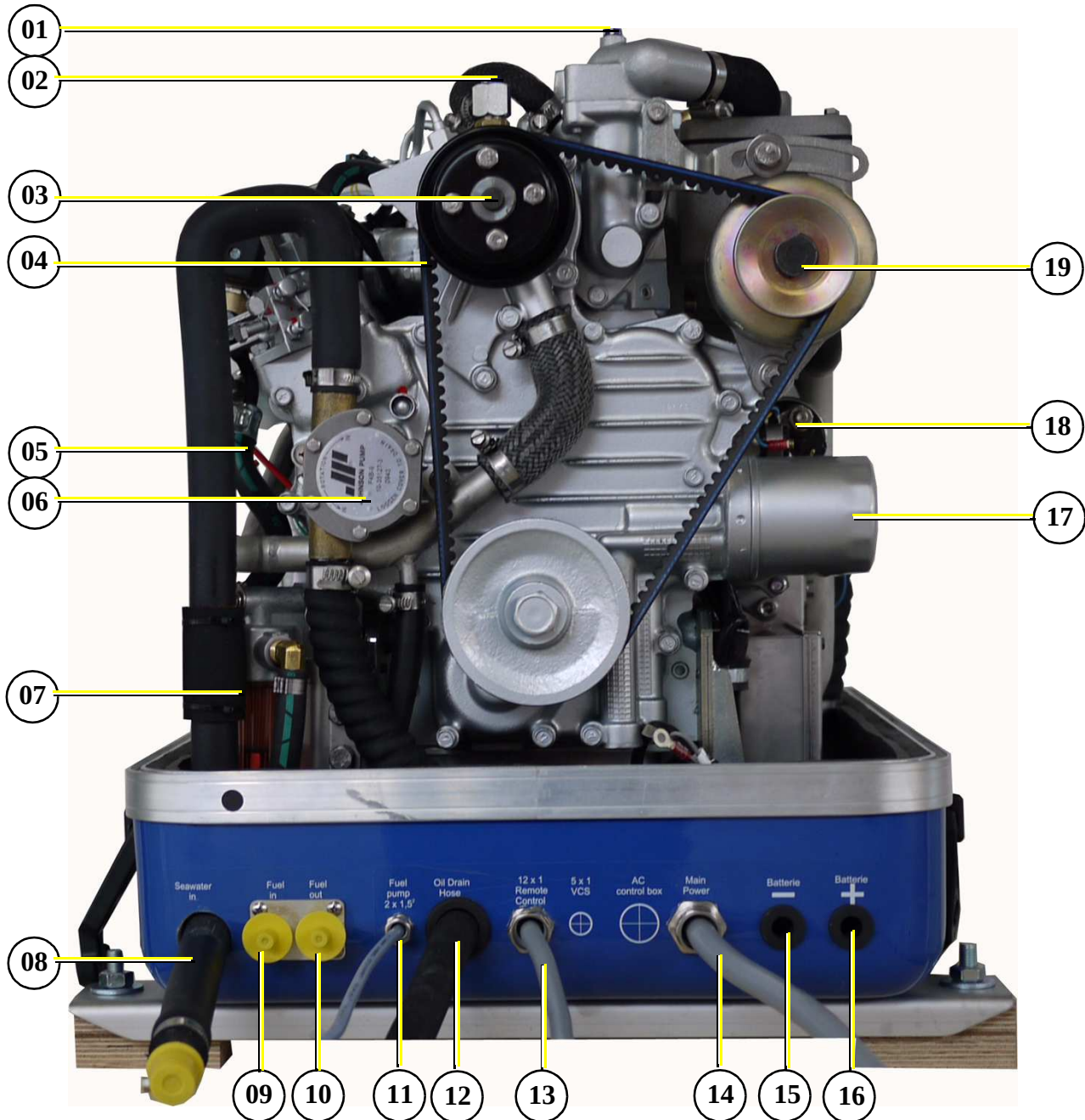
- 01) Capacitors
- 02) Regulator for dc alternator
- 03) Air suction housing with air filter mat
- 04) Generator housing with stator winding
- 05) Cooling water connection block
- 06) Connection external raw water venting valve
- 07) Type plate
- 08) Fuses DC
- 09) Relays
- 10) Oil dipstick

- 11) Failure bypass switch
- 12) Raw water in
- 13) Fuel filter
- 14) Raw water pump
- 15) Actuator
- 15) Fuel solenoid valve
- 16) Thermostat housing with ventilation screw
- 17) Oil filler cap
- 18) Thermo switch cylinder head



4.2.3 Front View

Fig. 4.2-1: Front view



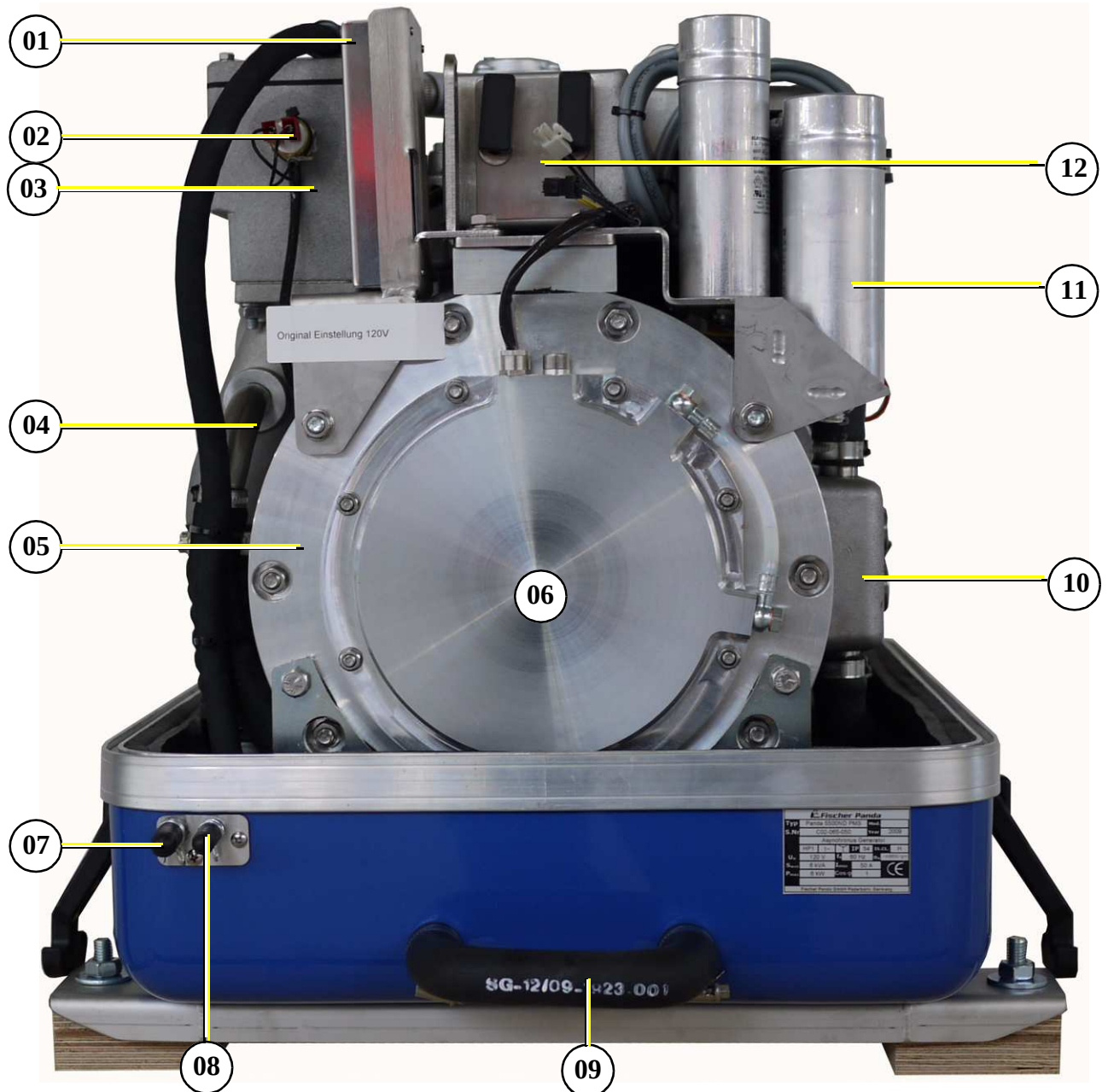
- 01) Thermostat housing with venting screw
- 02) Ventilation screw fresh water pump
- 03) Fresh water pump with pulley
- 04) Tooth belt
- 05) Oil dipstick
- 06) Raw water impeller pump
- 07) Fuel filter
- 08) Raw water in
- 09) Fuel in
- 10) Fuel out

- 11) Cable for fuel pump
- 12) Oil drain hose
- 13) Cable for remote control panel
- 14) Cable for main power out
- 15) Passage for battery (-) cable
- 16) Passage for battery (+) cable
- 17) Oil filter
- 18) Connection point battery (+)
- 19) DC alternator



4.2.4 Back View

Fig. 4.2-1: Back view

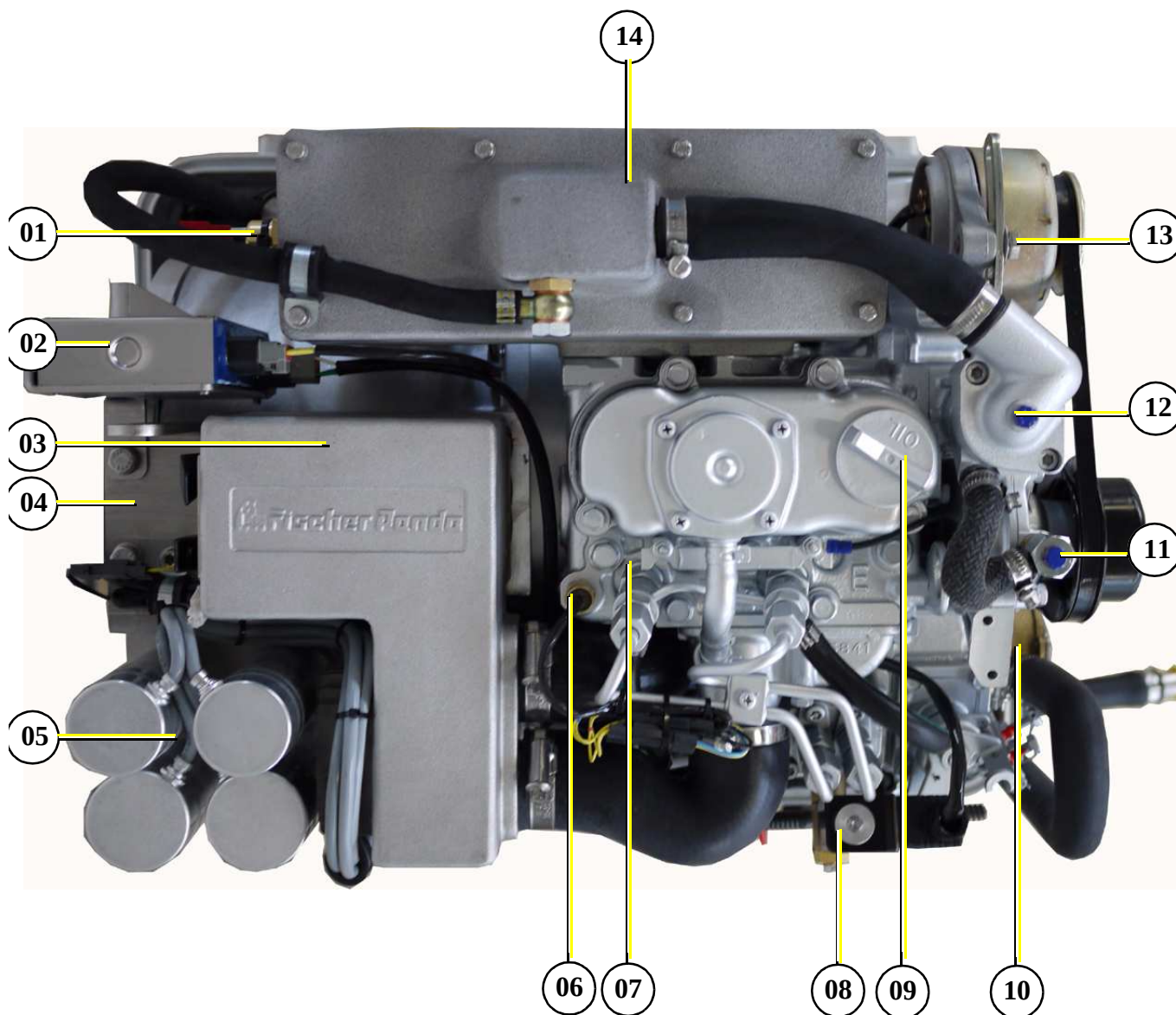


- | | |
|--|--|
| 01) Mini VCS | 08) Connection to external expansion tank fresh water (upper Connection) |
| 02) Thermo switch at exhaust elbow | 09) Connection to external venting valve raw water |
| 03) Water cooled exhaust elbow | 10) Coolant connection block |
| 04) Raw water injection nozzle | 11) Capacitors |
| 05) Generator front cover | 12) Air filter housing with air filter mat |
| 06) Oil cooled ball bearing | |
| 07) Connection from external expansion tank fresh water (lower connection) | |



4.2.5 View from above

Fig. 4.2-1: View from above



- 01) Thermo switch at exhaust elbow
- 02) Mini VCS
- 03) Air filter housing with air filter mat
- 04) Lifting eye
- 05) Capacitors
- 06) Thermo switch at cylinder head
- 07) Cylinder head

- 08) Fuel solenoid valve
- 09) Oil filler cap
- 10) Raw water impeller pump
- 11) Venting screw at fresh water pump
- 12) Venting screw at thermostat housing
- 13) DC alternator
- 14) Water cooled exhaust elbow



4.3 Details of Functional Units

4.3.1 Remote control panel

With the remote control panel the generator is started and stopped. It also displays the warning and fault alerts.

It is not allowed to run the generator without the Fischer Panda remote control panel. See the Remote control panel manual for details. (At the end of this manual)

4.3.2 Components of the Cooling System (Raw Water)

Raw water intake

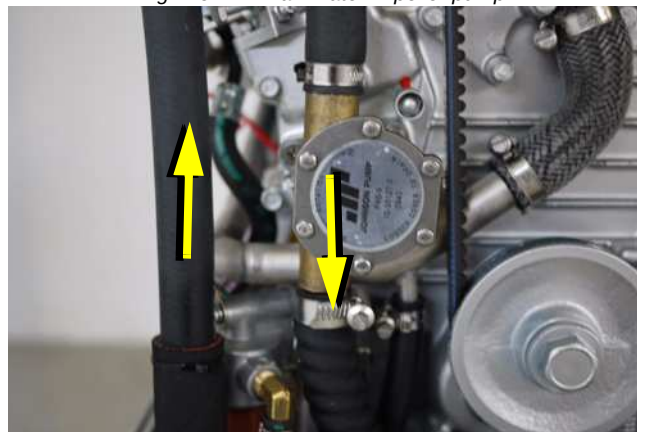
Fig. 4.3.2-1: Raw water intake



Raw water impeller pump

The raw water pump is fitted with a rubber impeller.

Fig. 4.3.2-2: Raw water impeller pump

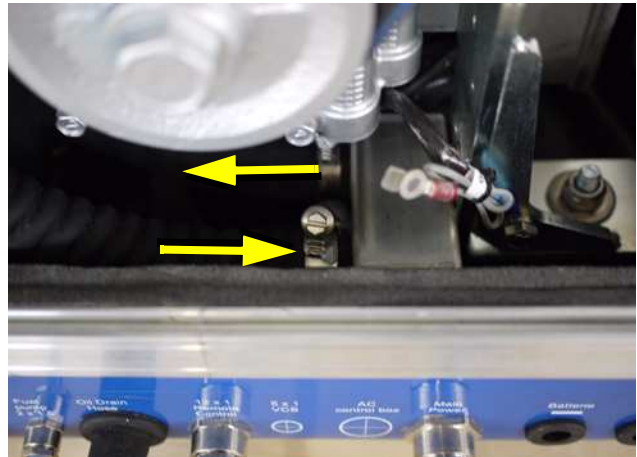




Impeller filter

If the impeller breaks, the parts will be caught by the impeller filter.

Fig. 4.3.2-3: Impeller Filter



Ventilation valve

A siphon must be installed if the generator sinks below the water line because of the rocking of the boat, even if it is only for a short period of time.

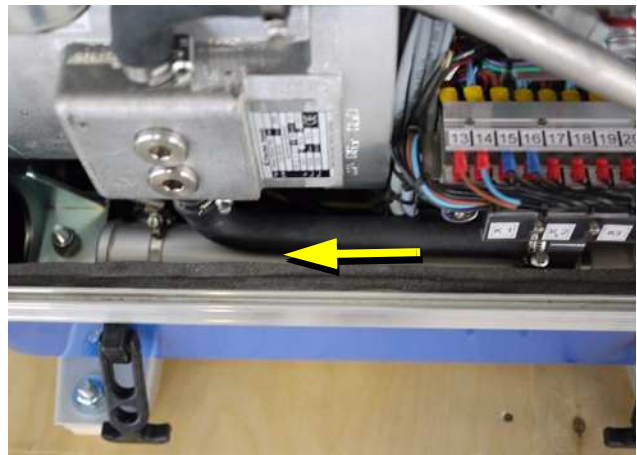
Fig. 4.3.2-4: Connection external ventilation valve



Heat exchanger

The heat exchanger separates the raw water system from the fresh water system, so that the generator components do not have contact with the raw water circulation system.

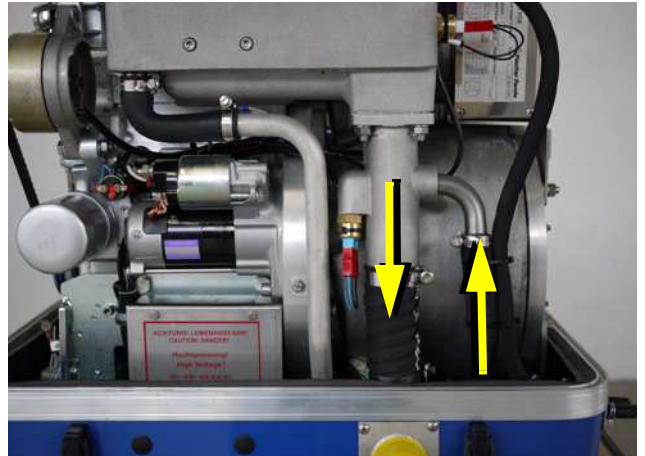
Fig. 4.3.2-5: Heat exchanger





Raw Water Injection

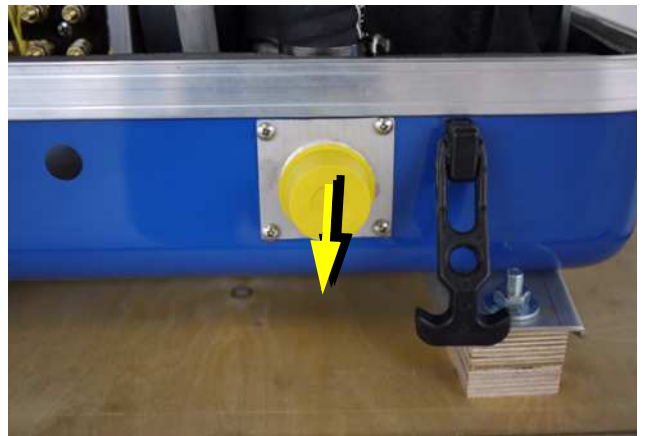
Fig. 4.3.2-6: Injection raw water



Raw water output

Fig. 4.3.2-7: [Raw water output

The raw water discharges together with the exhaust.

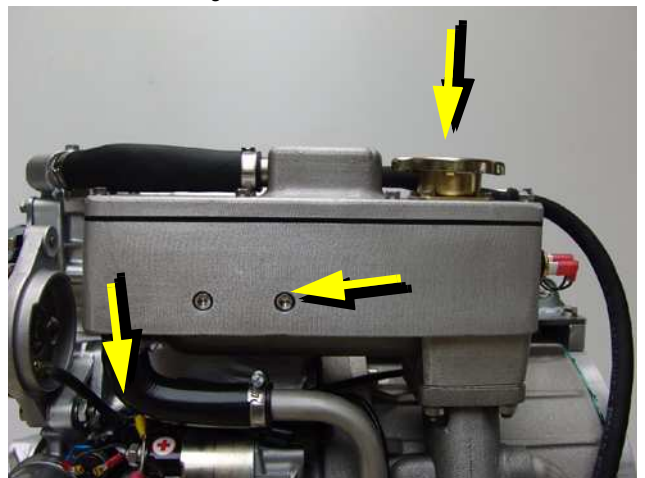


4.3.3 Components of the Cooling System (Fresh water)

Filler neck (not all models)

The cooling water filler necks situated at the water-cooled manifold are only used, when the generator is initially started.

Fig. 4.3.3-1: Exhaust elbow

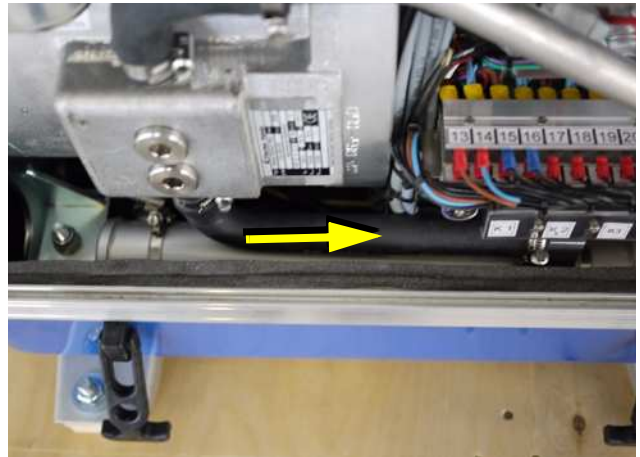




Heat exchanger

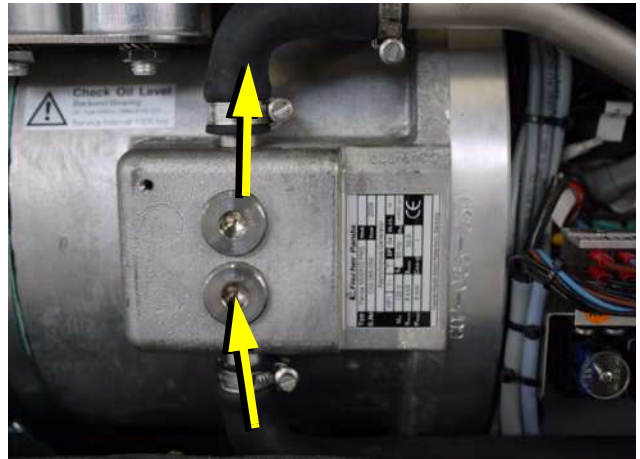
The heat exchanger separates the raw water system from the fresh water system, so that the generator components do not have contact with the raw water circulation system.

Fig. 4.3.3-2: Heat exchanger



Cooling Water Connection Block

Fig. 4.3.3-3: Cooling Water Connection Block



Internal Fresh Water Cooling pump

The fresh water pump aids the circulation of the fresh water.

The fresh water enters and leaves the engine at the fresh water pump.

Fig. 4.3.3-4: Internal Fresh Water Cooling Pump





Ventilation Screw Fresh Water Cooling Pump

Fig. 4.3.3-5: Ventilation Screw Fresh Water Cooling Pump



Ventilation Screw Thermostat Housing

Fig. 4.3.3-6: Ventilation Screw Thermostat Housing



4.3.4 Components of Fuel System

External Electrical Fuel Pump

Fig. 4.3.4-1: External Electrical Fuel Pump

The Panda generator is always supplied with an external, electrical (DC) fuel pump.

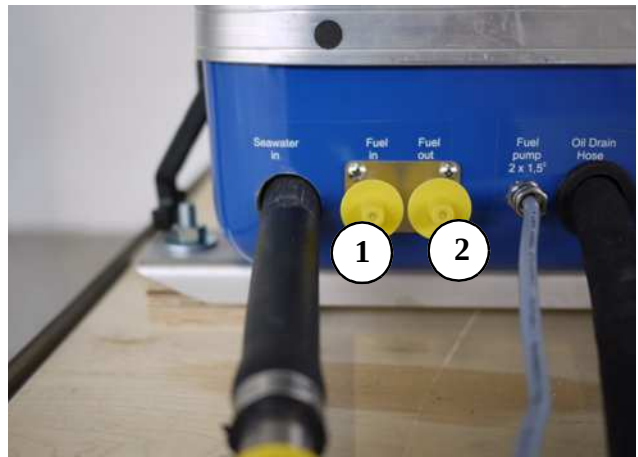




Connecting point for the fuel pipes

1. Fuel intake
2. Fuel backflow

Fig. 4.3.4-2: Fuel Connections



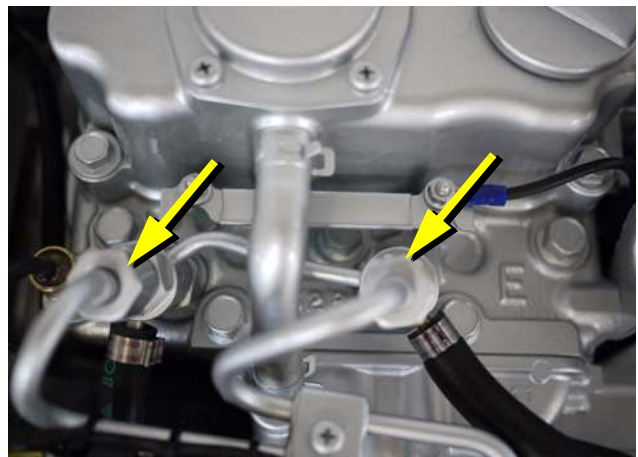
Fuel solenoid valve

Fig. 4.3.4-3: Fuel Solenoid Valve



Injection nozzles

Fig. 4.3.4-4: Injection Nozzle



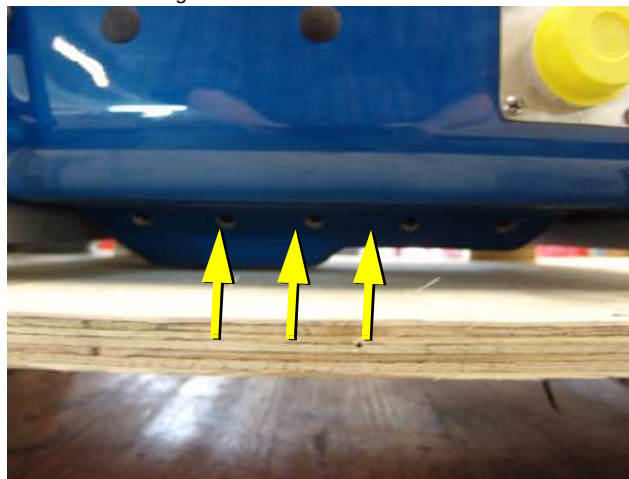
4.3.5 Components of combustion air



Air suction openings at the sound insulated capsule

The sound cover for the marine generator is normally provided at the lower surface with drillings, through which the combustion air can inflow.

Fig. 4.3.5-1: Combustion air intake



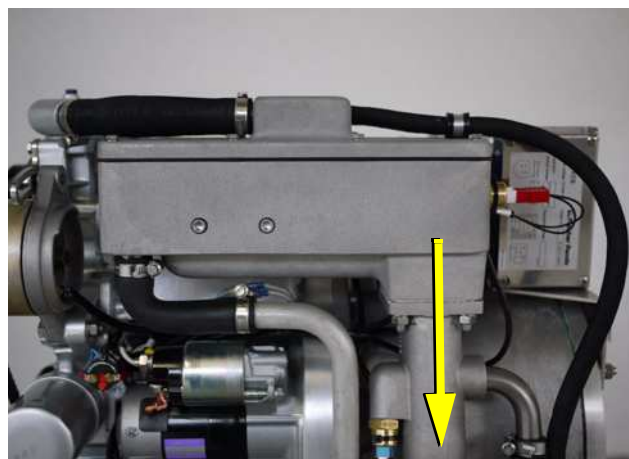
Air suction housing with air filter set

Fig. 4.3.5-2: Air suction housing



Water-cooled Exhaust Elbow

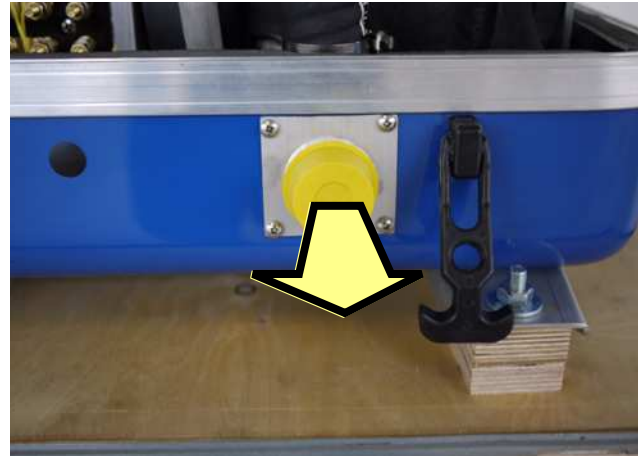
Fig. 4.3-3: Water cooled exhaust elbow





Exhaust outlet

Fig. 4.3.5-4: Exhaust Output



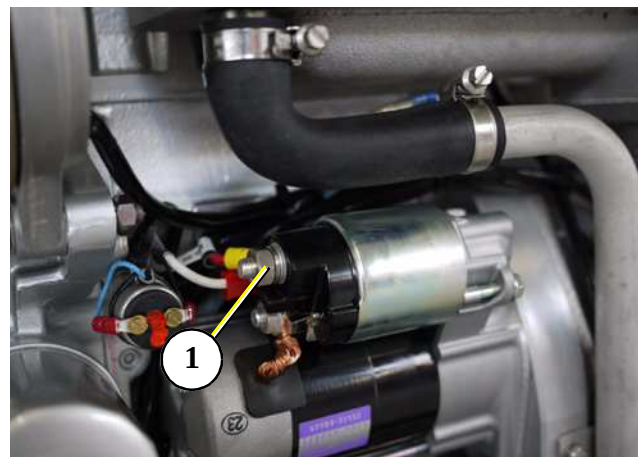
4.3.6 Components of Electrical System

Connection starter battery

1. Cable for starter battery (plus)

Connect the battery (+) directly to the starter solenoid

Fig. 4.3.6-1: Battery cable (+)

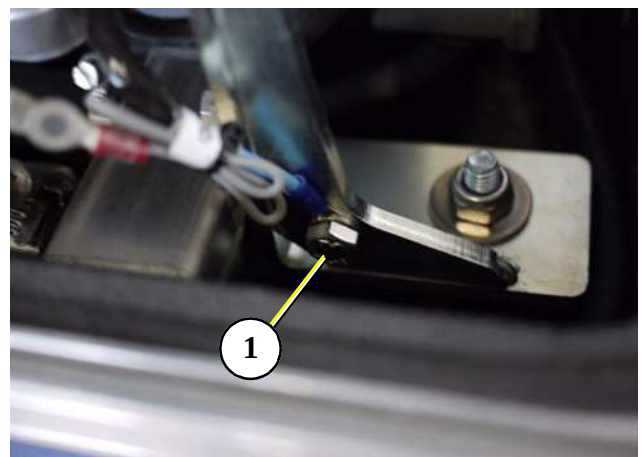


Connection starter battery

1. Cable for starter battery (minus)

Connect the battery (-) to the generator foot connection point.

Fig. 4.3.6-2: Connections for starter battery

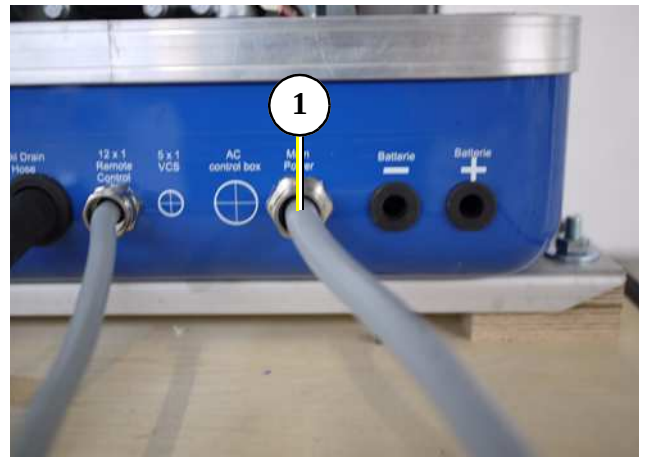




Main power

At the front of the sound insulation cover is also the outlet for the main power cable.

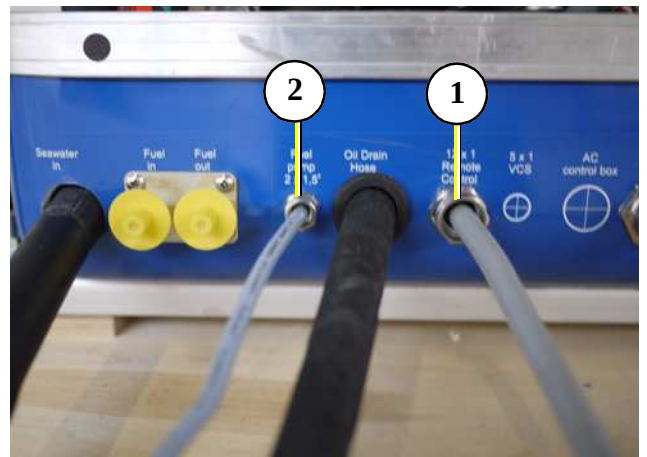
Fig. 4.3.6-3: Load



Electrical connections for control / fuel pump

1. Remote control panel
2. Fuel pump

Fig. 4.3.6-4: Electrical connections



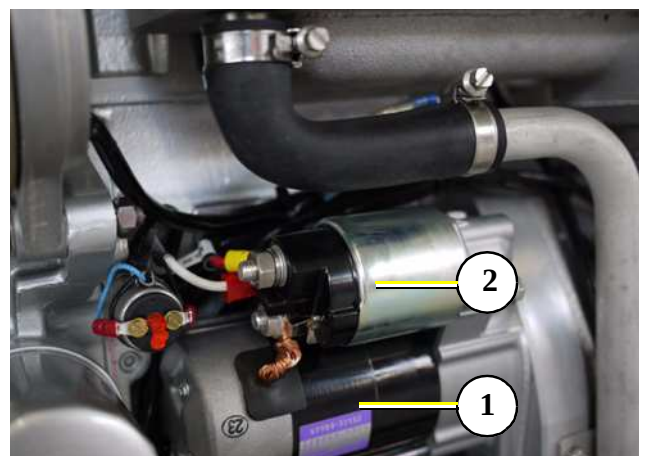
Starter motor

1. Starter motor and
2. Solenoid switch

The diesel engine is started electrically.

The electrical starter with the solenoid switch is located on the right side of the generator, in front of the engine.

Fig. 4.3.6-5: Starter motor





Generator power terminal box

Located in this box are the electrical connection points for the AC generator.

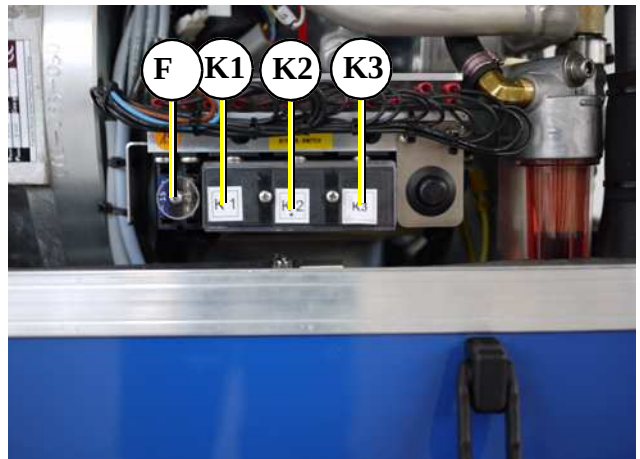
Fig. 4.3.6-6: Generator power terminal box



Terminal block for remote control cable with fuses and power relays

see wiring diagram

Fig. 4.3.6-7: Terminal block



Excitation capacitors

Fig. 4.3.6-8: Excitation capacitors



4.3.7 Sensors and Switches for Operation Surveillance



Thermo-switch at cylinder head

The thermo-switch at the cylinder head serves to monitor the generator temperature.

83 / 78 °C

Fig. 4.3.7-1: Thermo-switch at cylinder head



Thermo-switch at water-cooled exhaust elbow

This thermo-switch is located at the water-cooled exhaust elbow and serves to monitor the freshwater circulation system. It takes a measurement at the warmest spot, since the combustion gases are guided from the cylinder head to the exhaust elbow.

83 / 78 °C

Fig. 4.3.7-2: Thermo-switch at exhaust elbow



Thermo-switch in the stator winding

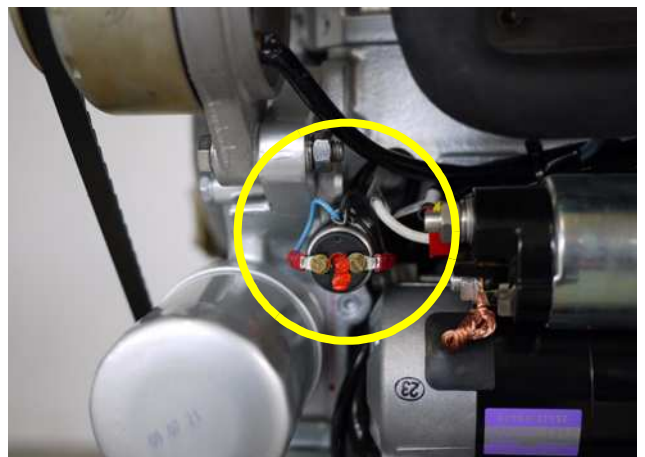
Thermo-switch 2 x 165 / 175 °C

Two thermos-switches and one NTC inside the winding protect the stator winding, which for safety reasons are installed independently in parallel.

Oil pressure switch

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

Fig. 4.3.7-3: Oil pressure switch



4.3.8 Components of Oil Circuit



Oil filler neck with cap

Normally the filler neck for the engine oil is on the top side of the valve cover.

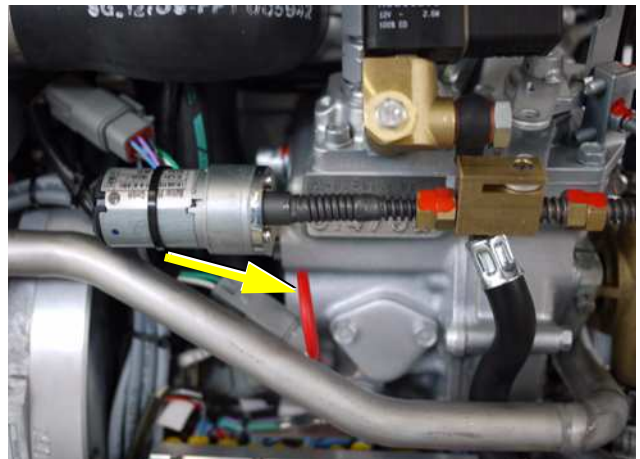
Fig. 4.3.8-1: Engine oil filler neck



Oil dipstick

At the dipstick the permissible level is indicated by the markings "maximum" and "minimum".

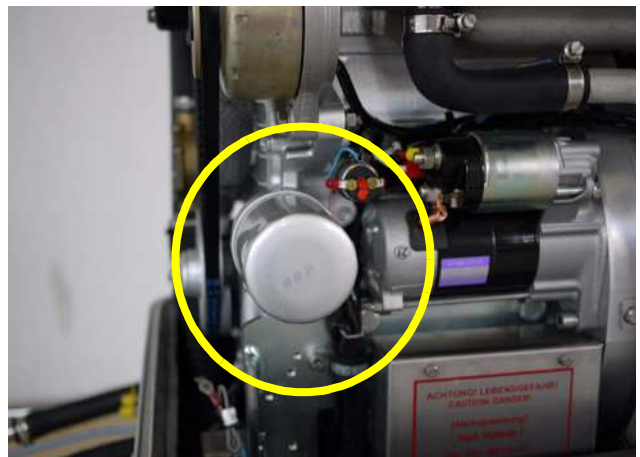
Fig. 4.3.8-2: Engine oil dipstick



Engine oil filter

This oil filter should also be replaced, when an oil change is carried out.

Fig. 4.3.8-3: Engine oil filter





Oil drain hose

The Panda generator is so equipped that the engine oil can be drained over a drain hose.

Fig. 4.3.8-4: Engine oil drain hose



4.4 Operation of the generator - see separate remote control panel manual

4.4.1 Daily routine checks before starting - see separate remote control panel manual.

4.4.2 Starting Generator - see separate remote control panel manual.

4.4.3 Stopping Generator - see separate remote control panel manual.





5. Installation Instructions

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

In situations where Fischer Panda has no detailed information concerning certain installation requirements (such as vehicle specifications, maximum vehicle speed -and all other conditions concerning special operating situations) the installation instructions should be used as an example guide only.

The installation must be undertaken and proved by a suitable qualified/trained person and may in accordance with the law as required by the country and special situation.

Damages caused by faulty or incorrect installation are not covered by the warranty.

5.1 Personal requirements

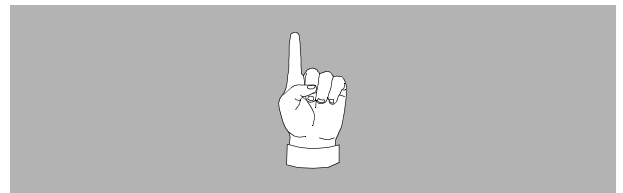
The described installation must be done by a technical trained person or a Fischer Panda service point.

5.1.1 Hazard notes for the installation

see "Safety instructions - Safety first!" on Page 18.

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

Notice!:



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

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

Warning!: Risk of injuryr



Do not run the generator with removed sound isolation cover

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

Warning!: Risk of injuryr



- 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 avalilable 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 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.

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

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

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

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

-Warning!: Danger of fire



Danger!: Danger of poisoning



ATTENTION!: Danger to Life - High voltage



Warning!: Hot surface/material



Instruction!: Personal protective equipment necessary.



Attention!: disconnect all load





5.2 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.

High temperature of the intake air decline the power of the generator and increases the coolant temperature. Air temperatures of more than 40 °C reduce the power by 2 % per temperature rise of 5 °C. In order to keep these effects as small as possible, the temperature in the engine room should not be higher than 15 °C in relation to the outside temperature.

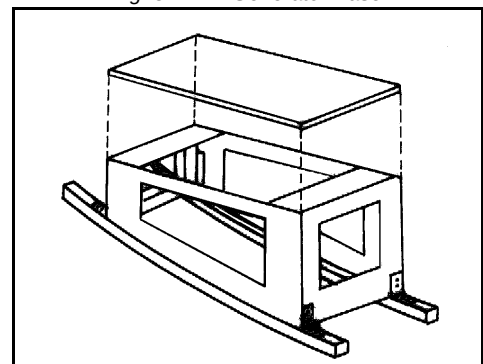
5.2.1 Advice for optimal sound insulation

The convenient base consists of a stable framework, on which the generator is fastened by means of shock-mounts.

Since the aggregate is "free" downward, the combustion air can be sucked in unhindered.

In addition are void the vibrations, which would arise with a closed soil.

Fig. 5.2.1-1: Generator Base



5.3 Generator Connections

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

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

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

ATTENTION!





5.4 Installation of the cooling system - raw water

5.4.1 General Information

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

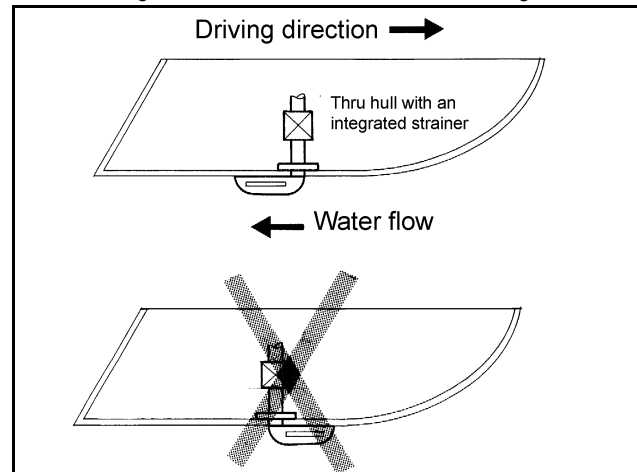
For the avoidance of galvanic corrosion, refer to the chapter "Service instruction for marine generators (corrosion protection)".

5.4.2 Installation of the thru hull fitting in Yachts

It is good practice for yachts to use a thru hull fitting with an integrated strainer. The thru hull fitting (raw water intake) is often mounted against the sailing direction to induce more water intake for cooling.

For Panda generators, the thru hull inlet should NOT point in the sailing direction! When sailing at higher speeds more water will be forced into the inlet than the pump can handle and your generator will flood!

Fig. 5.4.2-1: Position of the Thru Hull Fitting



5.4.3 Quality of the Raw Water Sucking In Line

In order to keep the suction resistance in the line at a minimum, the raw water intake system (i.e. sea cock, thru-hull fitting, inlet filter, etc.) must have an inner diameter of at least 1" (25 mm).

This applies also to installation components such as thru-hull fitting, sea cock, raw water filter etc.

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

After start-up the cooling water quantity must be measured (e.g. by catching at the exhaust). The flow rate, as well as the necessary cross section of the cooling water pipe see section 8.10, "Diameter of conduits," on page 177



5.4.4 Generator Installation above Waterline

The Panda is equipped with a direct drive water intake pump mounted directly on the motor. Since the intake pump is an impeller pump there are wearing parts which are likely to require replacement after a period of time. Ensure that the genset is installed so that the intake pump can be easily accessed. If this is not possible, an external intake pump could be installed in an easily accessible location.

If the generator is installed above the waterline, it is possible that the impeller will wear out faster, because after starting, the pump runs dry for some seconds.

The raw water hose should form a loop as near as possible to the raw water inlet of the generator (see picture below). This ensures the pump only sucks in air for a short time. The impeller pump will be lubricated by raw water and the impeller life span will be increased.

By the installation of a check valve in the raw water inlet line, which is under the waterline, this problem can be restricted.

The impeller pump will remain intact longer, if an electrical booster pump is installed, and is strongly recommended in order to preserve the impeller pump.

Never change the impeller for many years, without exchanging the old pump. If the sealing ring is defective within the pump, raw water runs into the sound cover of the genset. A repair is then very expensive.

NOTE:



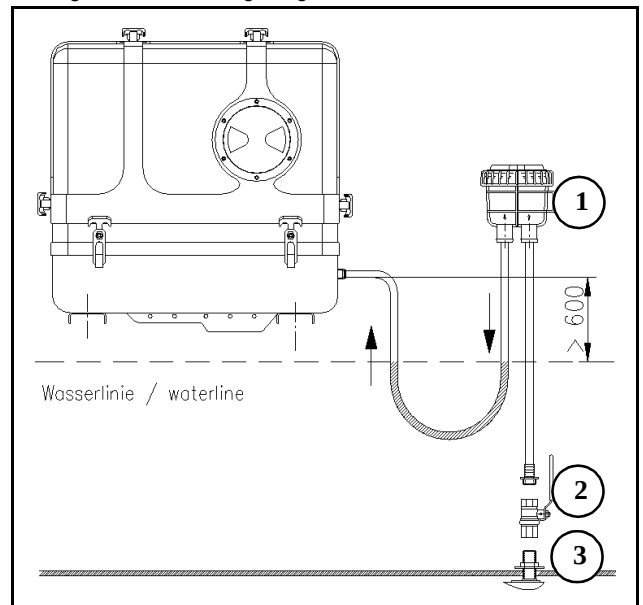
Replacement impeller and also a spare pump should always be on board. The old pump can be sent back to Fischer Panda.

Installation above water level

1. Raw water filter
2. Water cock
3. Thru hull

Make certain that the raw water filter lies above the water level, otherwise when cleaning, water can penetrate by the thru hull. An external pre-pump can relieve the impeller.

Fig. 5.4.4-1: Installing the generator above the water level





5.4.5 Generator Installation below Water-Line

If the generator cannot be attached at least 600 mm above the waterline, a vent valve must be installed at the raw water line.

Possible heeling must be taken into consideration if installed at the "mid-ship line"!

The water hose for the external vent valve is located at the back of the sound insulated cover. This hose is split in the middle and extended respectively at each end by an additional hose and a connecting nipple. Both hose ends must be led outside of the sound cover to one point, if possible 600 mm over the waterline in the mid-ship line. The valve is connected at the highest place to the two hose ends.

Fig. 5.4.5-1: Vent Valve



Note:

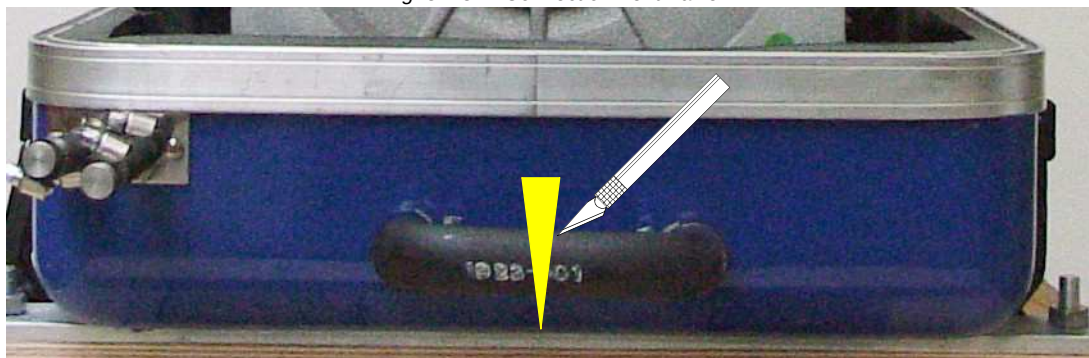


The vent valve must be installed directly behind the water pump.

If the water pump ceases, the valve spring ensures that air can enter and therefore, a syphon effect is avoided.

The de-aeration valve must be regularly controlled. If the water pump stops, the valve spring ensures that air enters. It must be opened, cleaned and greased.

Fig. 5.4.5-2: Connection Vent Valve



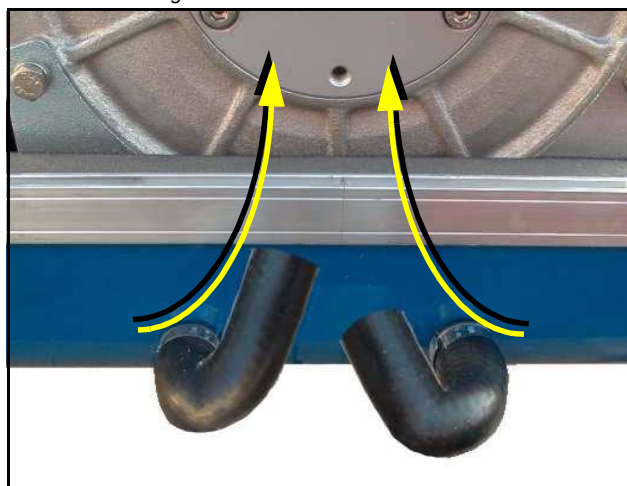
Cut the hose for the external vent valve....



...and bend it upwards.

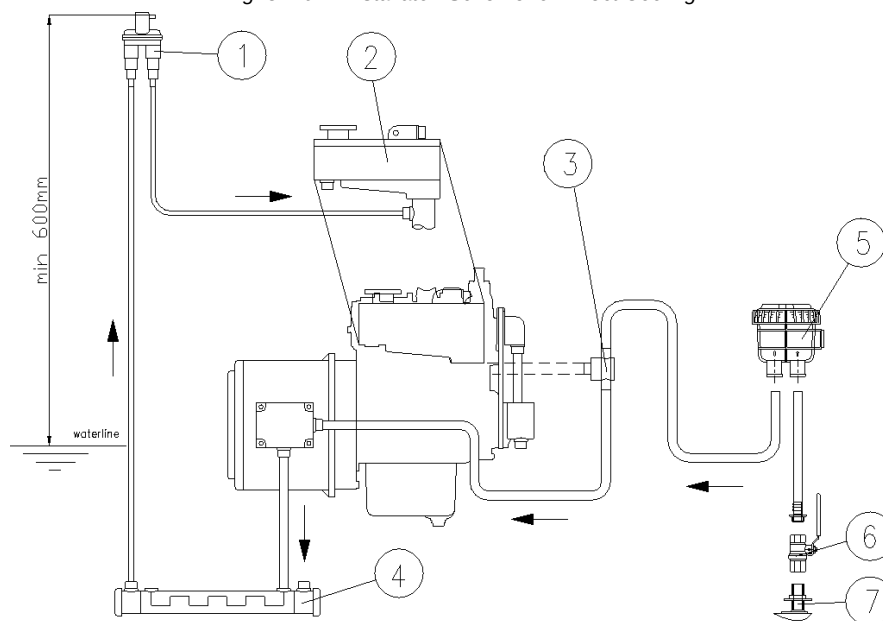
Both hose ends must be led out outside of the sound cover to one point, if possible 600 mm over the waterline at the mid-ships line. The valve is connected at the highest place with the two hose ends.

Fig. 5.4.5-3: Connection Vent Valve



5.4.6 Generator Housing cooled by Raw Water

Fig. 5.4.6-1: Installaton Scheme for Direct Cooling



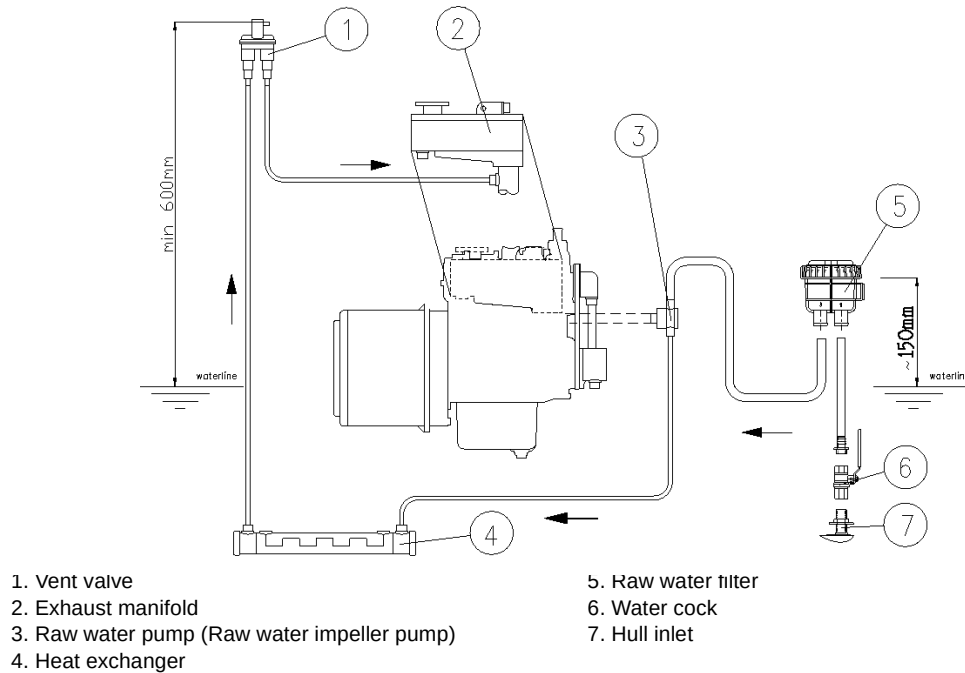
1. Vent valve
2. Coolant connection block
3. Raw water pump
4. Exhaust manifold

5. Raw water filter $\varnothing$ 1"
6. Water cock $\varnothing$ 1"
7. Thru hull



5.4.7 Indirect Cooling of the Genset Housing (by the Heat Exchanger)

Fig. 5.4.7-1: Installation Scheme Indirect Cooling of the Genset Housing



5.5 Installation of the cooling system - fresh water

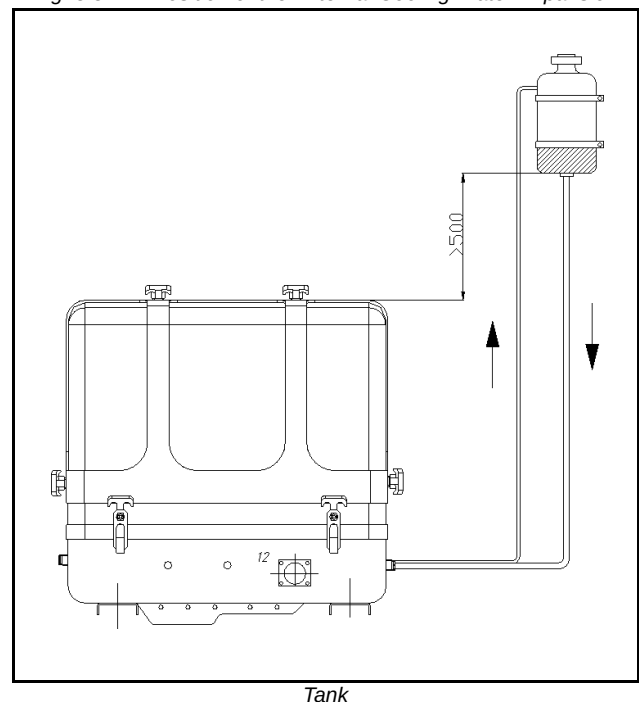
5.5.1 Position of the external cooling water expansion tank

Position of the external cooling water expansion tank

The Panda generator is normally supplied with an additional, external cooling water expansion tank. This tank must be installed in such a way that its lower edge is at least 500 mm more highly arranged than the upper edge of the sound cover.

If this 500 mm should be fallen below, i.e. the cooling water expansion tank is lower installed, very large problems can occur with filling and ventilating. Extend and displace the hose lines to the outside or possibly even up to the deck.

Fig. 5.5.1-1: Position of the External Cooling Water Expansion





The external cooling water expansion tank may be filled only up to the lower edge of the lower tension tape (see note "max") in the maximum filling level in cold condition.

ATTENTION!



5.5.2 Ventilating at the first filling of the Internal Cooling Water Circuit

Expansion Tank

1. Fill up the external cooling water expansion tank with coolant.

ATTENTION: maximum fill level = „max.“- mark.

The cover of the external expansion tank temporarily must be opened (all other closures are now closed!).

Fig. 5.5.2-1: Expansion tank



Venting Screws

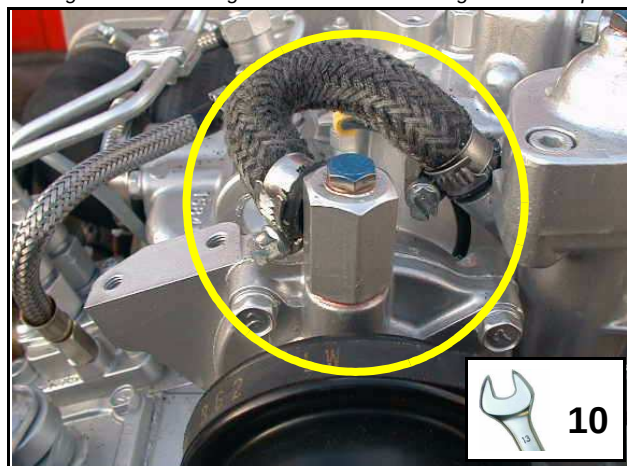
2. Open venting screw on the pipe socket of the internal cooling water pump. Close the vent screw when air free water comes out

- Check the water level in the expansion tank during the venting. Fill up if necessary.

Never open the vent screw while the generator is running.

Sample picture

Fig. 5.5.2-2: Venting screw - Internal Cooling Water Pump



3. Open vent screw on the thermostat housing. Close the vent screw when air free water comes out

- Check the water level in the expansion tank during the venting. Fill up if necessary.

Never open the vent screw while the generator is running

Sample picture

4. Start the Generator

After filling the generator it must be started. During this first phase of start-up, the generator may not be loaded. Switch the generator off after about 10 sek. of operation!

5. Repeat the steps 1-4 till no air comes out of the vent screw at thermostat housing.

Fig. 5.5.2-3: Venting screw - Thermostat housing





6. Close the vent screws.
7. Fill up the expansion tank.
8. Close the expansion tank.
9. Re-ventilating process 10 Operating hours after the first start-up (and if necessary)

Also after the first implementing a small amount of air can be reside in the cooling circuit. To ensure an imaculate und actual operating of the cooling system the ventilating process must be repeated casual in the next few days (weeks, if necessary). Small amount of air will still exit out of the ventilating openings, especially if the generator stood still for a long time.

During the ventilating process repeated checks must be made to check the cooling water is indeed circulating. If there are air bubbles in the internal cooling water pump, it could be that the cooling water is not circulating. The generator will heat up very quickly and switch off, because of overheating.

ATTENTION!



Anti-freeze

In the interest of safety, the freezing point of the closed circuit coolant should be checked on a regular basis. Be sure that the coolant/antifreeze mixture is good for at least -15°C (5 °F) and if it is possible that your genset experiences lower temperatures, for example during storage or transportation, then the entire cooling system should be drained and purged

5.5.3 Pressure Test for Controlling the Cooling Water Circuit

Check if a temperature difference exists between cooling water in-flow and cooling water return flow by use of the hand.

Feel the cooling water in-flow line at the internal cooling water pump.

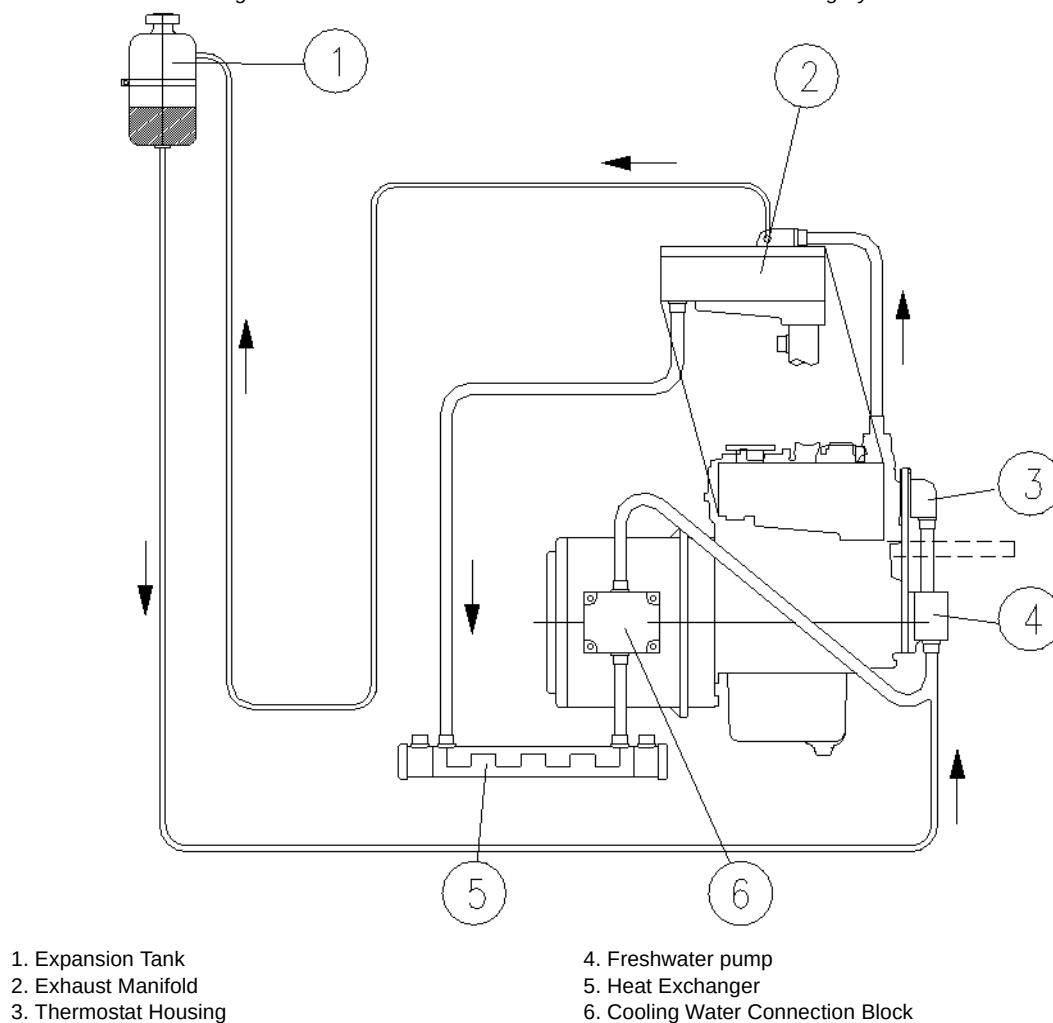
Feel the cooling water return pipe either at the outlet of the water-cooled exhaust elbow union or at the side, where this pipe exits at the heat exchanger.

The temperature difference between in-flow and return should be approx 10 degrees.



5.5.4 Scheme for Freshwater Circuit at Two Circuit Cooling System

Fig. 5.5.4-1: Scheme for Freshwater Circuit at Two Circuit Cooling System





5.6 Installation of the water cooled exhaust system

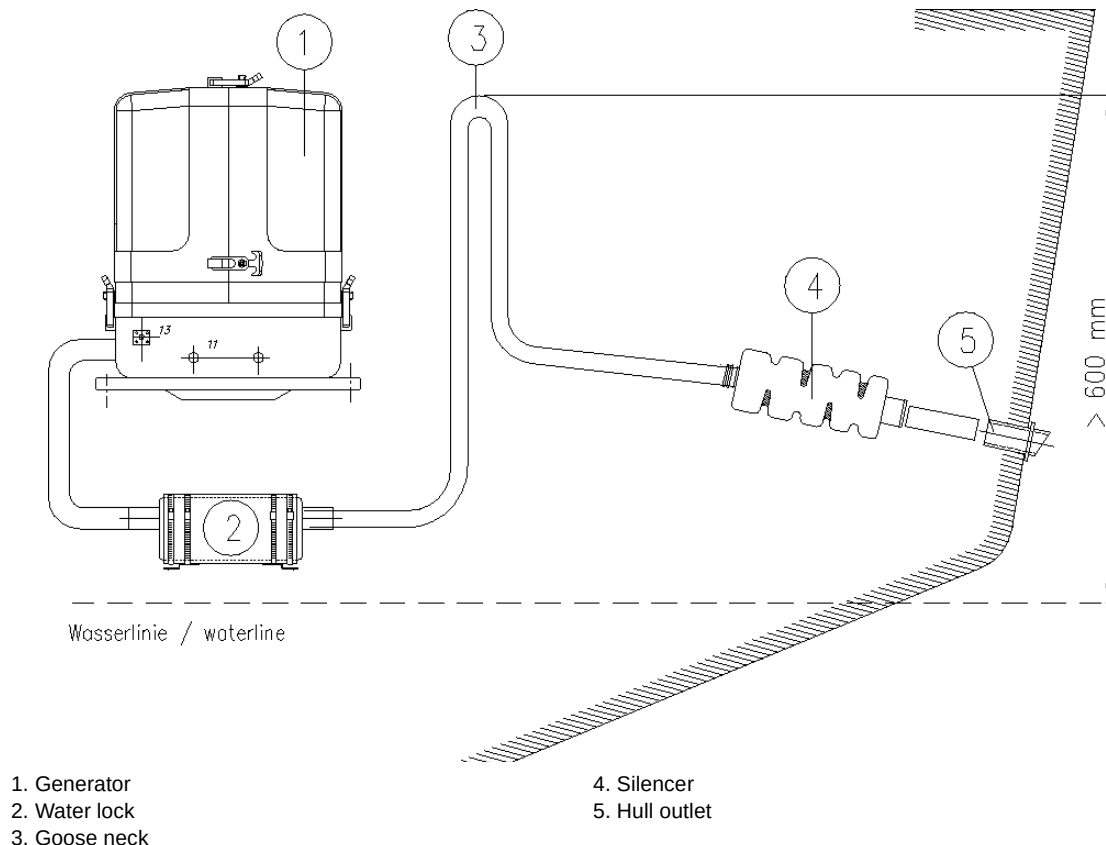
5.6.1 Installation of the standard exhaust system

The generator exhaust system must remain completely independent and separate from the exhaust system of any other unit(s) on board. The exhaust hose has an inner diameter of 30 mm. The water lock must be installed at the lowest point of the exhaust system. An optional noise insulated water lock can also be installed. The exhaust hose descends from the capsule to the water lock. Then the hose rises via the "goose neck" to the silencer (see drawing). The goose neck must be vertical and sit preferably along the ship's keel centre line. In order that the back pressure inside the exhaust is not too high, the total length of the exhaust system should not exceed 6 m (20 ft.)

By injecting the outlet raw water into the exhaust manifold, the exhaust gases are cooled and the noise emissions from the exhaust system are reduced.

Exhaust diameter see section 8.10, "Diameter of conduits," on page 177

Fig. 5.6.1-1: Installation Scheme Standard Exhaust System



5.6.2 Installation of the water collector

Unfortunately, it can occasionally occur that, because of an disadvantageous mounting position of the water collector, sea water gets into the diesel engines' combustion chamber. This disables the diesel engine by irreversible damages. Quite frequently, this leads to discussions during which the parties involved in the yachts' construction or the installation of the generator have to explain themselves.

One point in this situation can be clarified definitely:

If sea water gets into the inner section of the engine, this is not possible due to constructional defects of the generator or to malfunctions on the engine itself. It can only reach the combustion chamber via the exhaust duct and thus



get into the engine.

Thereby, the position of the generator and the water collector, as well as the arrangement of the coolant and exhaust ducts plays the decisive role.

If the water collector is arranged in an unfavourable position, the coolant flowing back in the exhaust duct can rise so high, that it reaches the exhaust stack. Since at least one discharge valve is always open when the engine is shut off, the sea water has free access to the combustion chamber. By capillary action, this sea water then flows past the cocks and even reaches the engine oil in that way. (In fact, a surprisingly high oil level is a first indication of an upcoming catastrophe.)

If an usual high oil level can be detected and/or the oil is of a greyish colour, the engine must not be used anymore. This is a certain sign for coolant that got into the oil pan. If the engine is started under these conditions, the water and the oil are mixed into an emulsion. The oil will quickly become so viscous that one will have to call it a paste. In this phase the fine oil ducts are blocked and a few moments later the machine gets destroyed because of insufficient lubrication. Before this happens, an immediate oil should be made. (Since the water can only reach the engine via the combustion chamber, it can be assumed that the compression rings will start to corrode. These effects have to be discussed with an engine expert. It will certainly be reasonable to immediately inject plenty penetrating oil through the intake stack and to slowly turn the engine with the starter motor.)

The coolant can reach the exhaust area via the exhaust duct as well as via the coolant feed.

5.6.3 Possible cause: Exhaust duct

If the cause is the exhaust duct itself, the following points are to be checked at the duct:

- a) Position of the water collector is too high. The water reaches the exhaust duct.
- b) Position of the water collector is too far away from the middle of the generator. The water reaches the exhaust duct in tilted position.
- c) The water collector is too small relating to the length of the exhaust duct.

5.6.4 Possible cause: Coolant duct

If the generator is not clearly installed 600 mm over the water line, the coolant feed must be equipped with a 'venting valve', which is at least lead out 600 mm over the water line. (This position must also be assured in every tilted position. Therefore the venting valve should be located in the ships' center line, so that it can not move in tilted position.)

- a) Position of the venting valve is too low. The water flows into the exhaust area when the ship is tilted.
- b) Position of the venting valve is too far from the ships' center line. The water reaches the exhaust area when the ship is tilted.
- c) The venting valve does not work, because it jams or it is clotted. (The venting valves' function needs to be checked regularly.)

As it consistently happens that functioning risks are not realised during the laying of the exhaust duct, the following explanations refer explicitly to the exhaust duct. Here, the location, the size and the position of the 'exhaust water collector' play a very decisive part:

5.6.5 Installation area of exhaust water collector

Concerning a water-cooled exhaust system, it must be regarded that - under no circumstances - coolant from the exhaust duct can get into the exhaust elbow area at the engine. If this happens, the coolant can get into the combustion chamber via an open discharge valve. This would lead to irreparable damage at the engine.

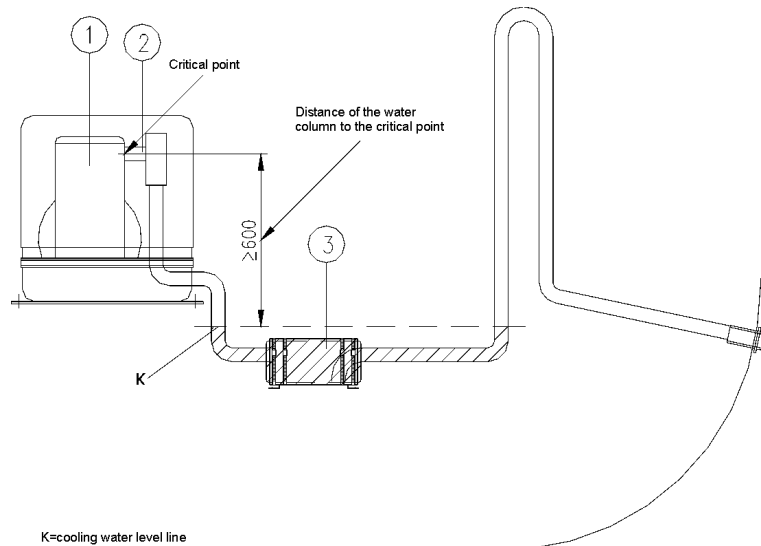
In addition to that, one has to reckon with possible tilted positions of sailing yachts, which makes the position of the water collector even more important. In general one could say that:



The deeper the water collector is located underneath the generator, the better the protection from entering water into the combustion chamber.

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

Fig. 5.6.5-1: Installation area of the exhaust water collector



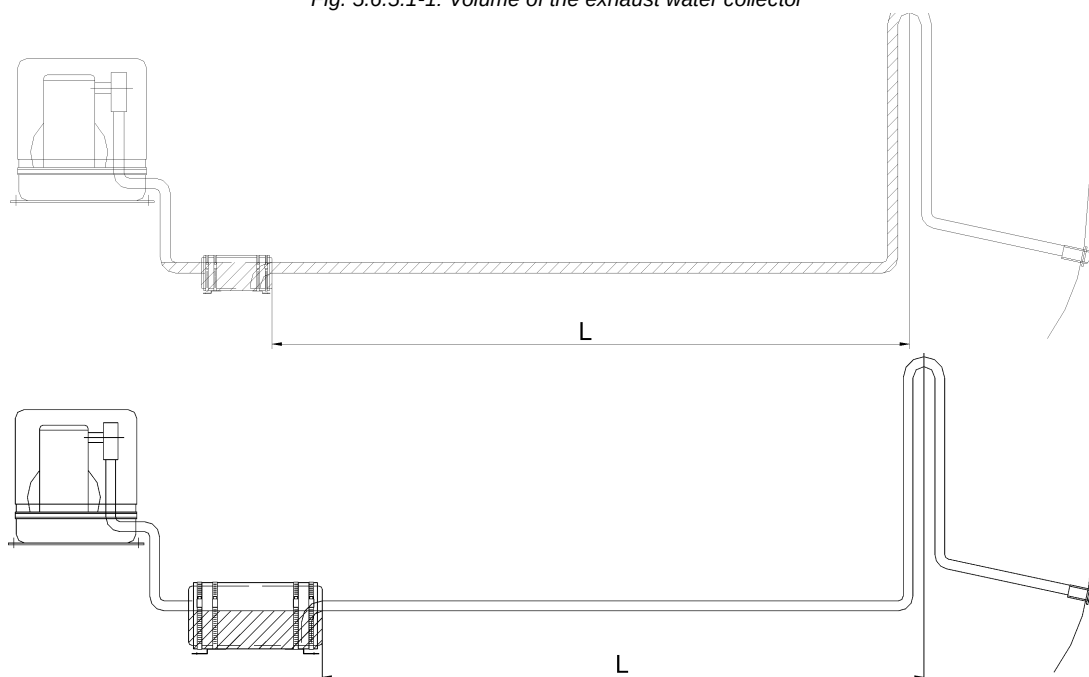
5.6.5.1 The volume of the exhaust water collector

The exhaust water collector must be measured so large, that it can take the entire amount of water flowing back from the exhaust duct. The amount of water depends on the ducts' length (L) and its cross section. While the diesel engine is running, coolant is continuously injected into the exhaust system and is carted outside with the emissions by the exhaust gas pressure. When the engine is turned off, the number of revolutions sinks quite fast. By doing so, the point is reached where the exhaust gas pressure does not suffice anymore to cart the coolant out. All coolant remaining in the duct at that point flows back into the water collector. At the same time, the diesel engine itself continues to cart coolant through the coolant pump, as long as it keeps on rotating.

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

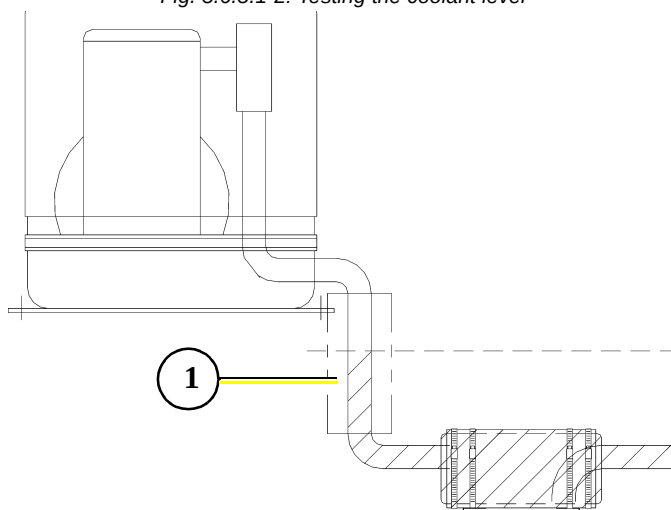


Fig. 5.6.5.1-1: Volume of the exhaust water collector



If there are any doubts, a verification can easily be made by temporarily using a clear-sighted hose as exhaust hose. In that way, the coolant level can be checked very easily.

Fig. 5.6.5.1-2: Testing the coolant level





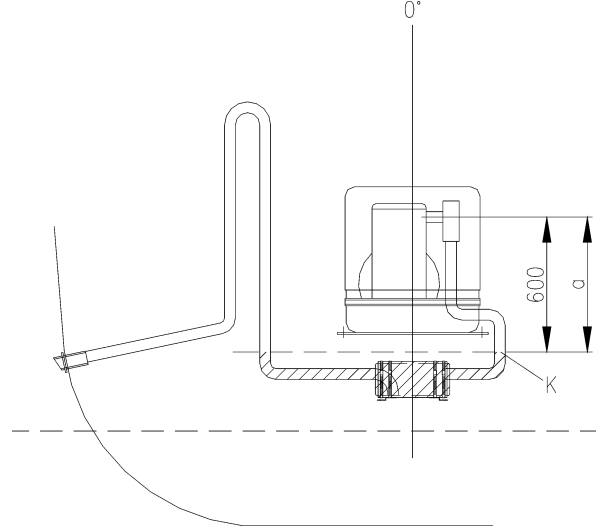
5.6.5.2 Position of the water collector

Important Note!

The ideal position of the water collector would be in center underneath the generator. Only in this position it is assured that the water level can not change drastically in tilted position by the water collector moving out of the center line. See the following pictures:

In this picture, the water collector is mounted in center underneath the generator. When the ship tilts, the position of the water collector related to the critical point at the exhaust duct changes only slightly.

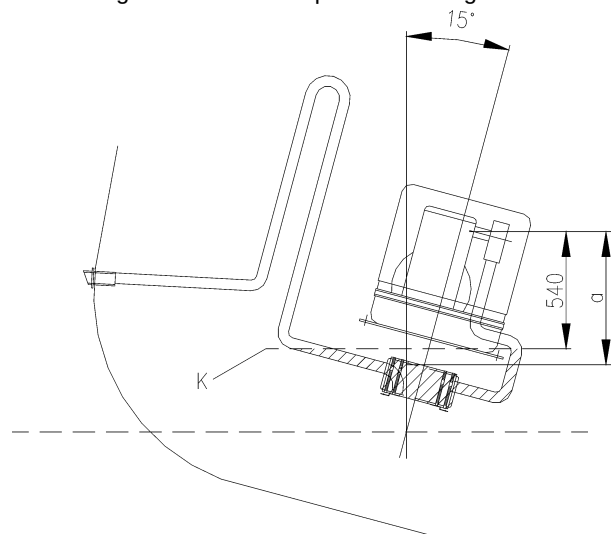
Fig. 5.6.5.2-1: Ideal position of the water collector



Tilted position 15 degrees

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

Fig. 5.6.5.2-2: Tilted position 15 degrees

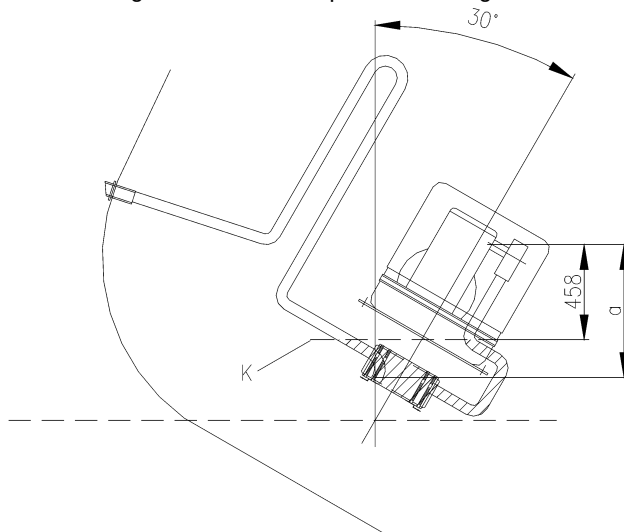




Tilted position 30 degrees

The distance of the water level, even in ideal position, changes in a way that only 458 mm distance remain. So the critical distance is under-run already.

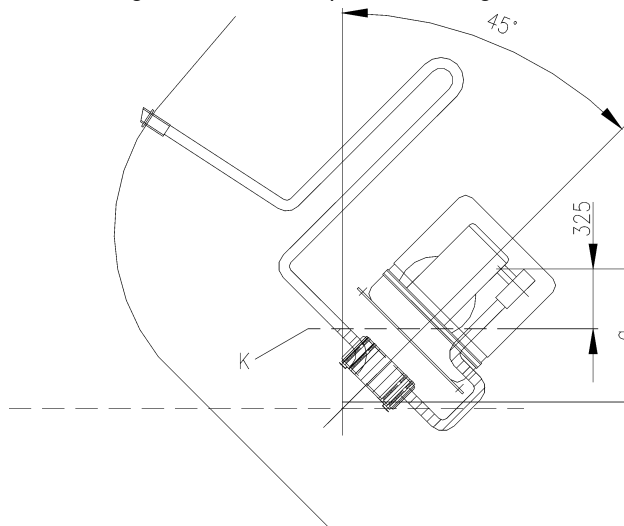
Fig. 5.6.5.2-3: Tilted position 30 degrees



Tilted position 45 degrees

In this case the water level rose so high, that the distance constitutes only 325 mm.

Fig. 5.6.5.2-4: Tilted position 45 degrees



Even when the collector is mounted in the ideal spot, at an extremely tilted position of 45 degrees there is still the risk that water can get straight into the discharge stack area through strong rocking motion ('Sloshing'). This shows that the distance of 600 mm represents a minimum size at which, even when installed ideally, the water can slosh into the exhaust elbow when the ship is very tilted or rocks very hard.

Summary:

The preset minimum height of 600 mm must be regarded unconditionally and is only valid, if the water collector is mounted in its ideal position in center underneath the generator. A higher position is highly recommended if it has to be reckoned with tilted positions of 45 degrees.

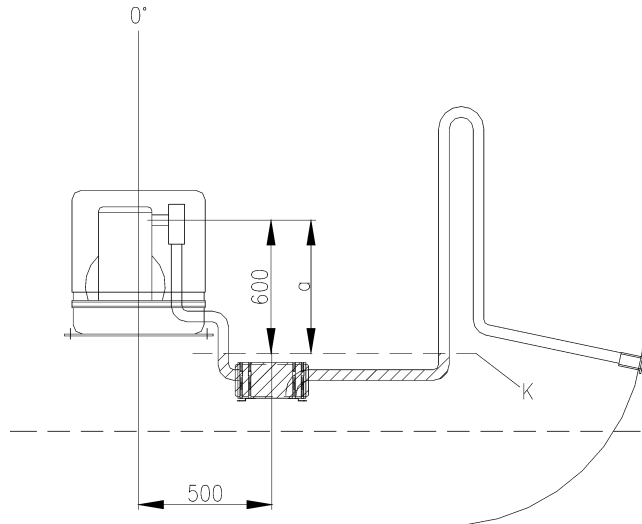


5.6.5.3 Example of the installation of the water collector off-center and possible effects:

The following pictures are primarily relevant for an installation of the generator with the water collector on sailing yachts. A change in the mounting position caused by tilted position does not have to be reckoned concerning motor yachts. Here it is only necessary to regard that the volume of the water collector is measured so large, that it can take the entire amount of water flowing back and at the same time maintains the minimum distance of 600 mm.

A) Installation of the water collector 500 mm next to the generators center line:

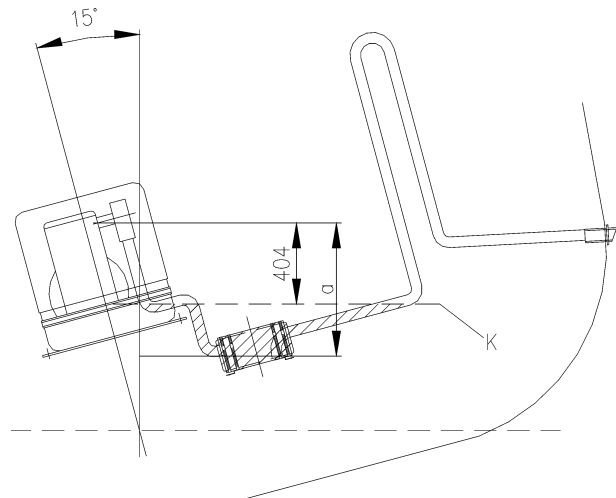
Fig. 5.6.5.3-1: Water collector, 500 mm next to the center line



Tilted position 15 degrees

The distance is only 404 mm instead of the original 600 mm. So this is very close to the critical point.

Fig. 5.6.5.3-2: Tilted position, 15 degrees





Tilted position 30 degrees

The distance between the hydrostatic head and the critical point at the exhaust elbow is only 216 mm. This means that in a tilted position of 30 degrees you already face the highest risk of sea water sloshing into the combustion chamber.

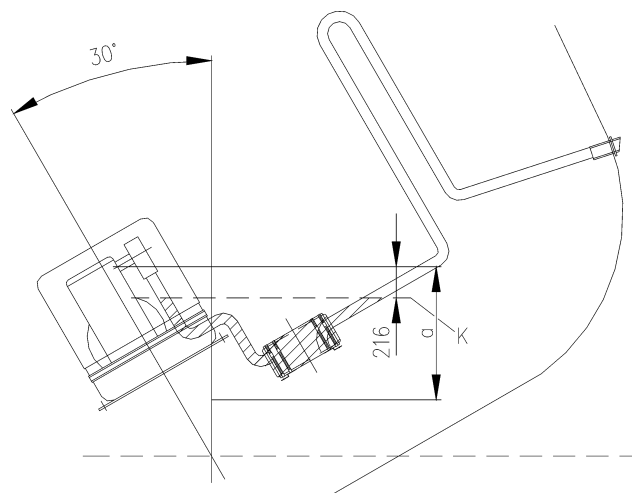


Fig. 5.6.5.3-3: Tilted position 30 degrees

Tilted position 45 degrees

The water level is now at the same height as the critical point at the exhaust elbow. If the ship is sailed in a tilted position of 45 degrees with an installation like this, the infiltration of coolant into the combustion chamber is inevitable. Irreparable damages are preprogrammed.

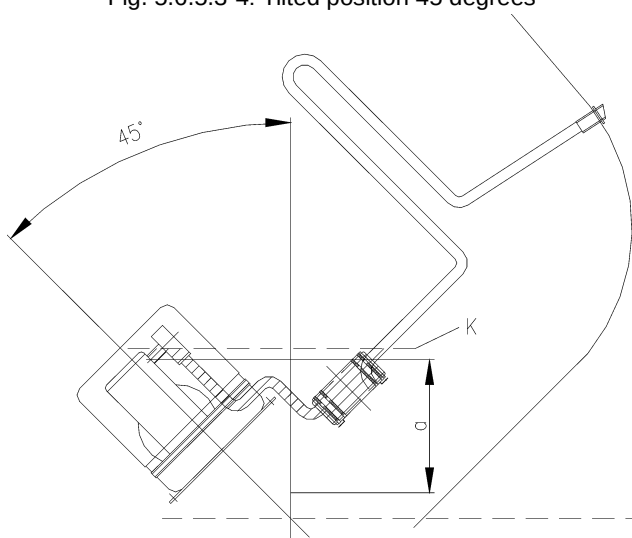
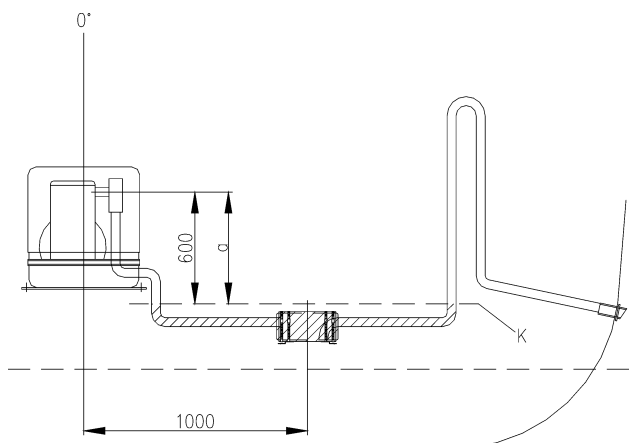


Fig. 5.6.5.3-4: Tilted position 45 degrees

B) Installation distance between exhaust water collector and generators' center line 1000 mm

Fig. 5.6-5: Exhaust water collector, 1000 mm next to center line

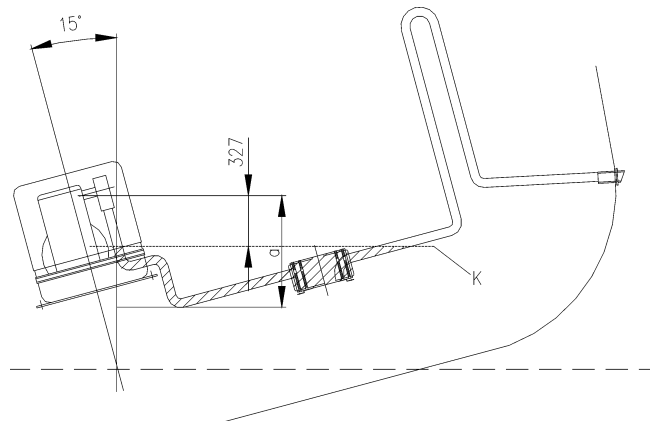




Tilted position 15 degrees

The distance is, contrary to the original 600 mm, only 327 mm. This is very close to the critical point already.

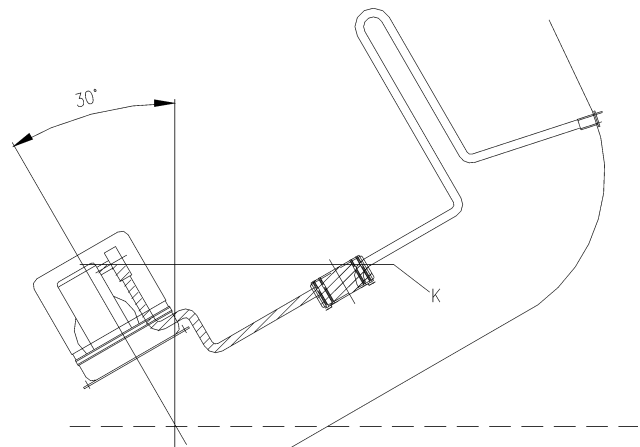
Fig. 5.6.5.3-6: Tilted position 15 degrees



Tilted position 30 degrees

The water level and the critical point at the exhaust elbow are at the same level now. If the ship is sailed in a tilted position of 30 degrees with an installation like that, the infiltration of coolant into the combustion chamber is inevitable. Irreparable damages are preprogrammed.

Fig. 5.6.5.3-7: Tilted position 30 degrees



Summary:

Concerning sailing yachts it must be regarded, that the water collector is mounted in center underneath the generator, at least in reference to the ships' center line. Thus the water collector is prevented from 'leaking' very strongly when the ship is tilted.

The 'leaking' of the water collector leads to a rise of the water level which then gets too close to the exhaust elbows' critical point.

5.6.6 Exhaust / water separator

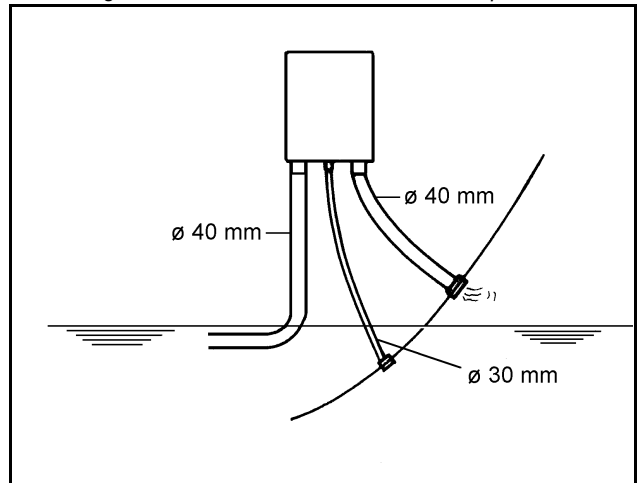
In order to reduce the noise level of the generator unit to a minimum, an optional exhaust outlet muffler can be mounted next to the thru-hull fitting. Additionally there is a component at Fischer Panda, which acts as both an "exhaust goose neck", and water separator. With this "exhaust/water separator" the cooling water is derived over a separate pipe. The exhaust noises emanating from the exterior of the yacht are strongly decreased. Particularly the "water splash".



Water flow exhaust water Separator

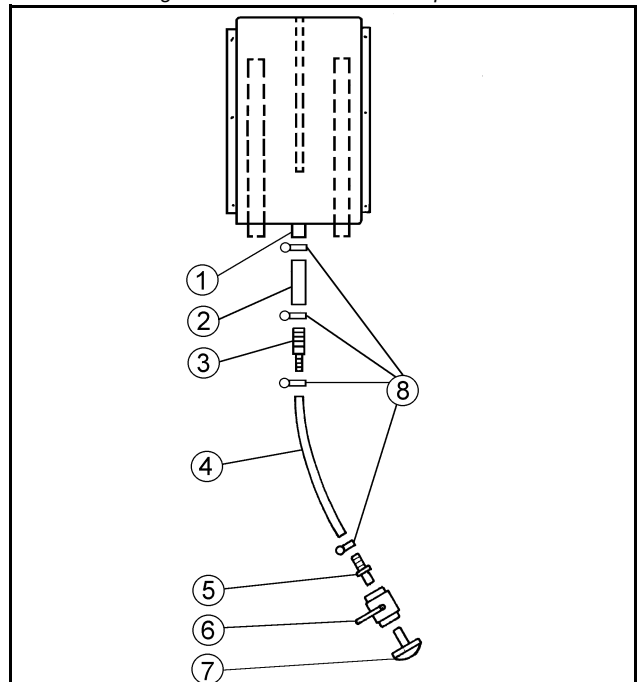
The water flow on the exhaust/water separator unit has an inner diameter (ID) of 30 mm. If the path from the water separator to the raw water outlet is very short, the hose can be further reduced to 1" (25mm) ID.

Fig. 5.6.6-1: Water Flow Exhaust Water Separator



- (1) Raw water outlet ø 30mm
- (2) Hose connector ø 30mm
- (3) Reducer 30/20mm (if required)
- (4) Hose
- (5) Hose connector
- (6) Sea cock
- (7) Hull outlet
- (8) Hose Clips

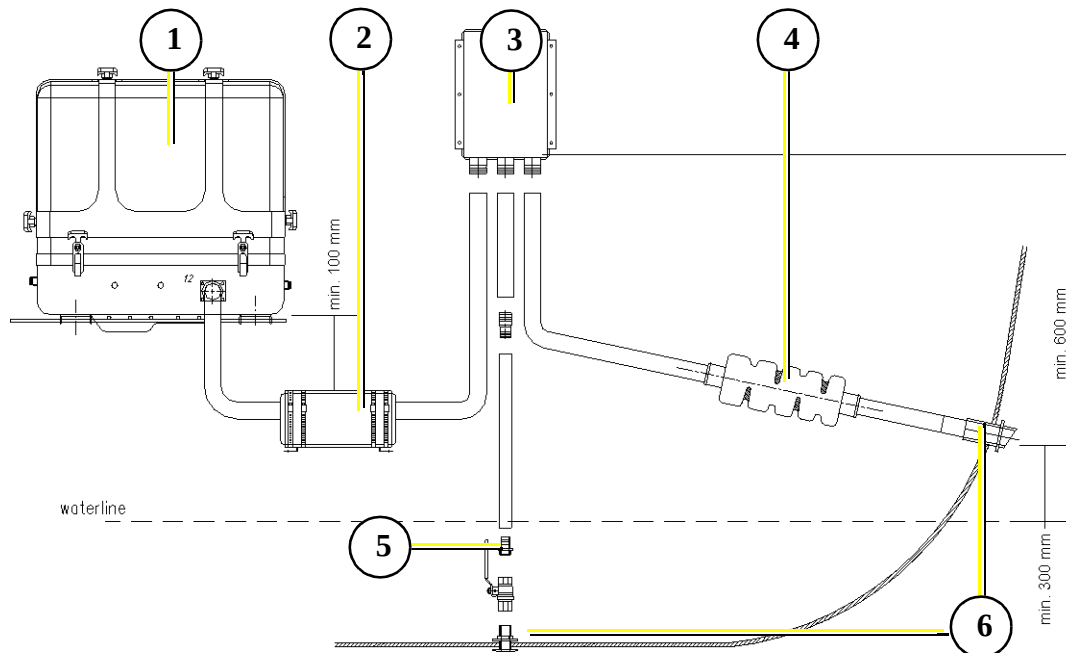
Fig. 5.6.6-2: Exhaust Water Separator





5.6.7 Installation exhaust water separator

Fig. 5.6.7-1: Installation Exhaust Water Separator



- 1. Generator
- 2. Silencer / Water lock
- 3. Exhaust-Water-Separator

- 4. Silencer
- 5. Sea cock
- 6. Hull outlet

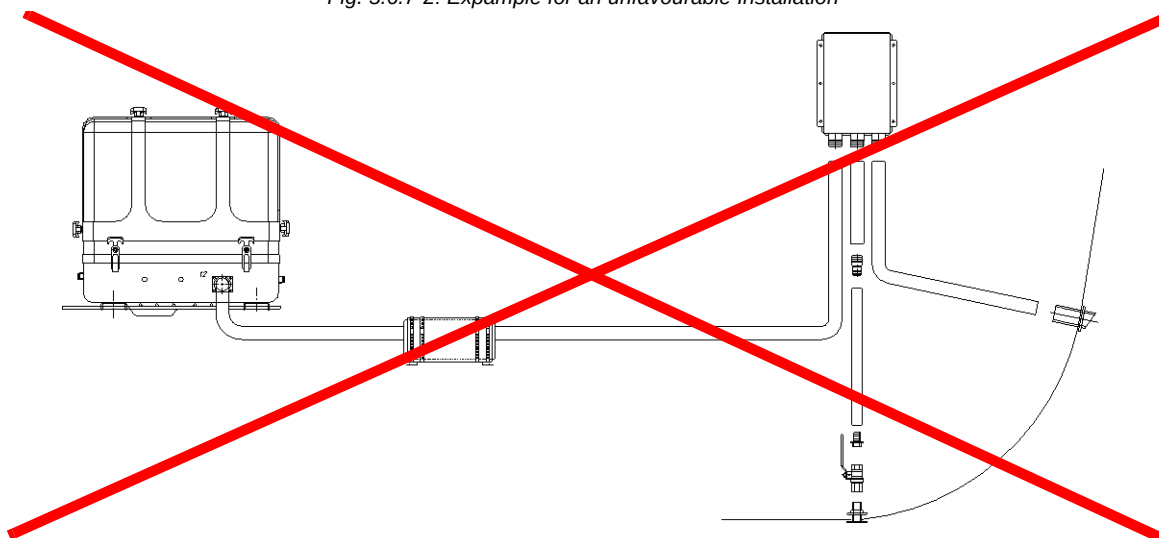
If the exhaust water separator was sufficiently highly installed, a goose neck is no longer necessary. The exhaust/water separator fulfils the same function. If the "Super silent" exhaust system were installed correctly, the generator will not disturb your boat neighbour. The exhaust noise should be nearly inaudible. The best result is reached, if the hose line, which derive the cooling water, is relocate on a short way "falling" directly to the outlet and this outlet is under the waterline.

If the thru-hull exhaust outlet has to be mounted far from the generator, an exhaust-water separator must definitely be installed. The raw water from the separator must then run along the shortest possible path is the thru-hull outlet. For such long exhaust routes, the exhaust hose diameter should also be increased from NW40mm to NW50mm in order to reduce the back-pressure. The exhaust may have a length of over 10m (32 ft.) if the exhaust hose diameter is increased to 50mm. An additional outlet exhaust muffler close to the hull outlet will help further to reduce noise emissions.

The generator will not disturb your boat neighbours, if the "Super silent Exhaust System has been correctly installed. The exhaust noise should be almost inaudible.



Fig. 5.6.7-2: Example for an unfavourable Installation



Example of an unfavourable installation:

- Water lock not far enough below the lowest level of the generator
- Distance water lock to exhaust/water separator too large



5.7 Installation of the fuel system

5.7.1 General references

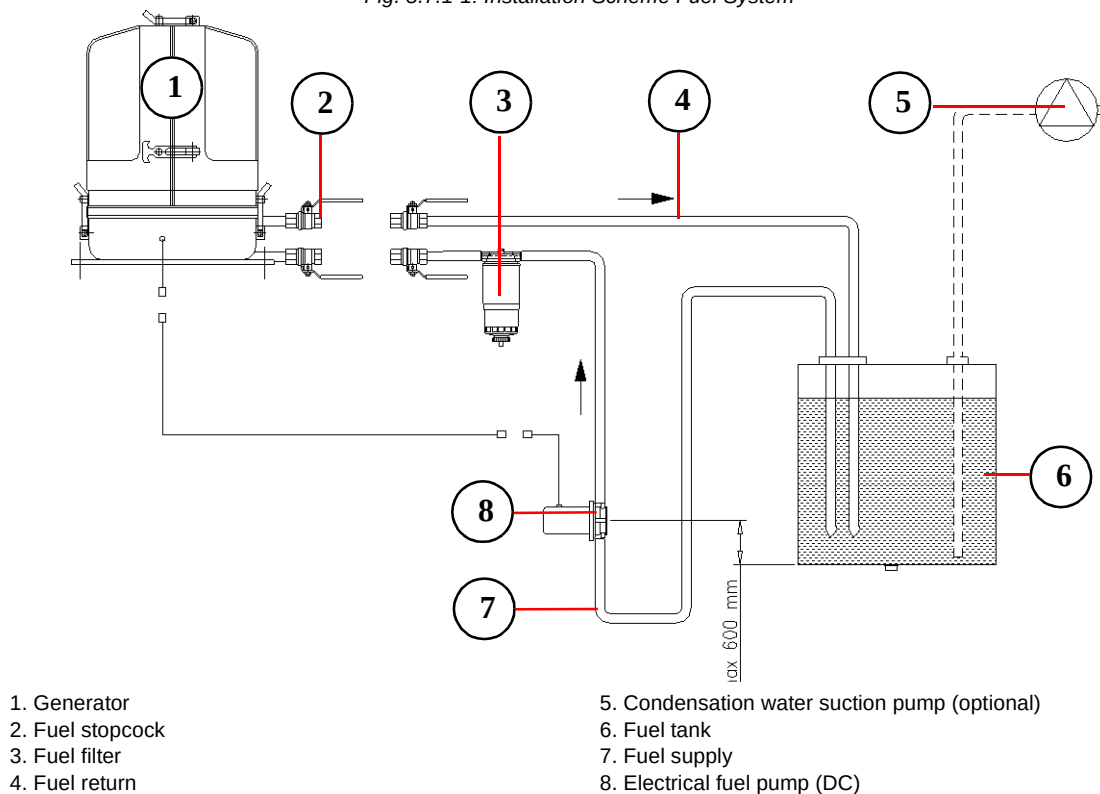
Inside the generator capsule itself, there is the fuel filter installed (exception: Panda 4200 and 4500). Additional fuel filters (with water separator) must be mounted outside the capsule in easily accessible places in the fuel lines between the tank intake fuel pump and the diesel motor's fuel pump.

Generally forward and return fuel flow pipes must be mounted to the diesel tanks. Do not connect the generator fuel supply lines with any other fuel lines of other diesel systems.

- 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 fuel supply pump should be mounted as close to the fuel tank as possible. The electric cable for the fuel pump is already installed on the generator (length 5 m).

Fig. 5.7.1-1: Installation Scheme Fuel System





5.7.2 The Electrical Fuel Pump

Electrical fuel pump

With the 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 are pre-loaded at the generator with the lead planned.

Suction height of the pump: max. 1,2 m at 02, bar

Diameter of fuel lines: section 8.10, "Diameter of conduits," on page 177.

Fig. 5.7.2-1: Electrical Fuel Pump



5.7.3 Connection of the fuel lines at the tank

Lead the return fuel pipe connected to the day tank to the floor

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

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.

ATTENTION!





5.7.4 Position of the pre-filter with water separator

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

Fig. 5.7.4-1: Pre-filter with water separator



5.7.5 Ventilating air from the fuel system

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

1. Switch main power switch on control panel "ON".
2. Push failure bypass switch and hold tight.

The electric fuel pump has to be run audibly. By moving the failure bypass switch you can hear the solenoid valve of the generator starting and stopping (when the sound insulation cover is taken off).

3. After the fuel pump has been running 3 to 4 minutes, because the failure bypass switch has been pressed down, the bleeding screw of the solenoid valve has to be unscrewed. The switch has to be continuously depressed, when opening the screw. A piece of cloth or absorbent paper should be put under the connection to avoid fuel entering the sound insulation cover.

4. The air vent screw can be screwed in again, as soon as fuel runs out without bubbles. Then release the depressing the failure bypass switch.

5. Starting the generator

Now the generator can be started by pushing the "START"-button. The generator should start after a short while. One of the pipe union nuts of an injection hose has to be unscrewed, should the unit not start; then try to restart the generator. After the generator has started, the pipe union nut has to be tightened again.

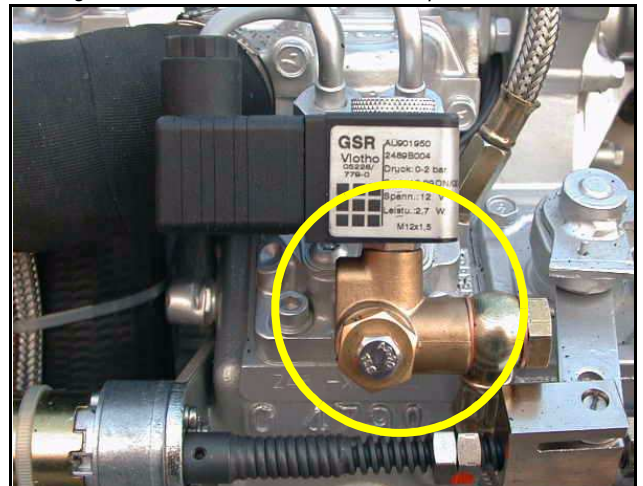
Main power switch "OFF"



Vent Screw at the fuel stop solenoid valve

Not installed at all models!

Fig. 5.7.5-1: Vent Screw at the Fuel Stop Solenoid Valve



5.8 Generator DC system installation

The Panda generators from 6.500 NE upwards have their own dynamo to charge a DC starter battery.

It is recommended to install an additional starter battery for the generator.

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

The generator is then Earth/Ground free.

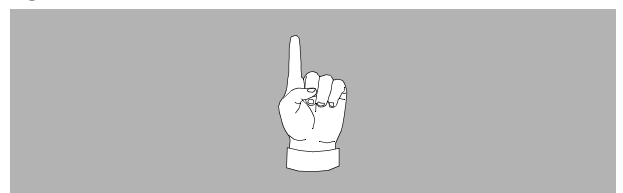
5.8.1 Connection of the starter battery block

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

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

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 shure that the voltage of the starter battery fits to the start system voltage

ATTENTION!

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

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





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

It must be guaranteed that first the cables are attached at the generator and then at 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 batterie, but with a distance to the battery of up to 300 mm (12 inch) at maximum.

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

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

The batteries must be layed 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.

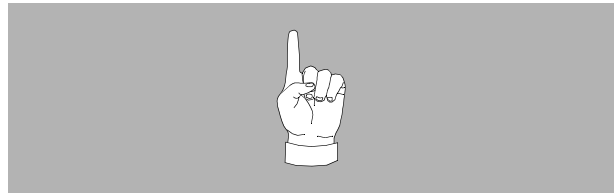
Make a test run after the installation and check the laying of the batteries during the test run and afterwards. If necessary, correct the laying.

Examine regularly the cable layings and the electrical connections.

Positive battery cable

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

NOTE:



Attention!: Consider correct connection sequence



Attention!: Right connection of the battery.



Fig. 5.8.1-1: Positive Battery Cable





Negative battery cable

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

Note! The battery negative pole may not be connected with the boat ground or with the protective grounding of the 120 V installation!

Fig. 5.8.1-2: Negative Battery Cable



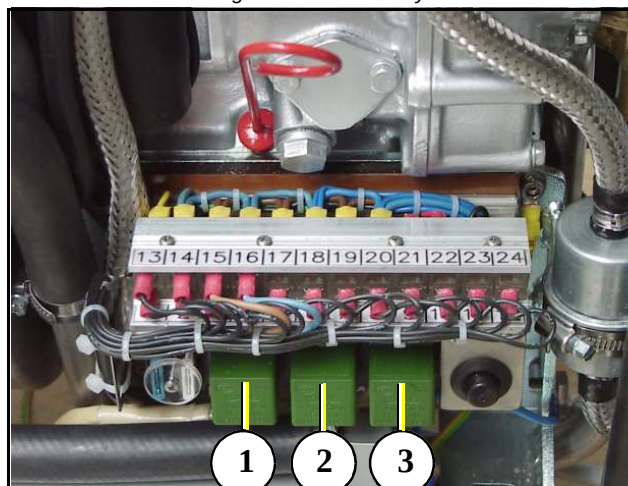
DC-Relay

The Panda generators 8000 to 30 are equipped with various DC-relays, which can be found under the terminal strip. The various relays have the following tasks (also see the DC circuit diagram)

1. Starter motor relay
2. Pre-glow relay (glow plugs)
3. Fuel pump relay

Sample Picture - See wiring diagram

Fig. 5.8.1-3: DC-Relay



DC Starter Motor

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

1. Solenoid switch for starter motor
2. Starter motor

Fig. 5.8.1-4: DC Starter Motor

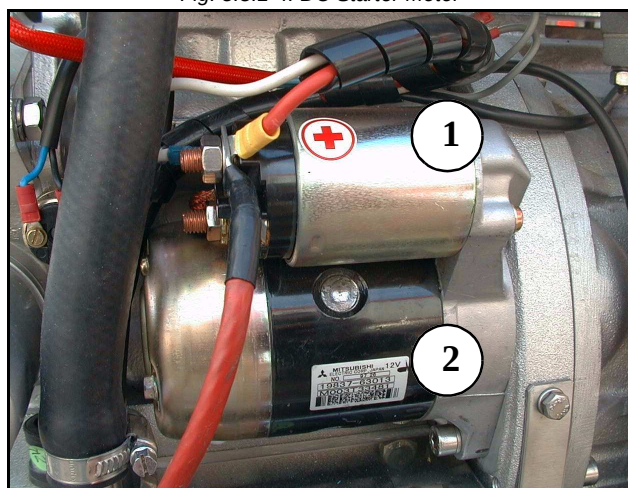
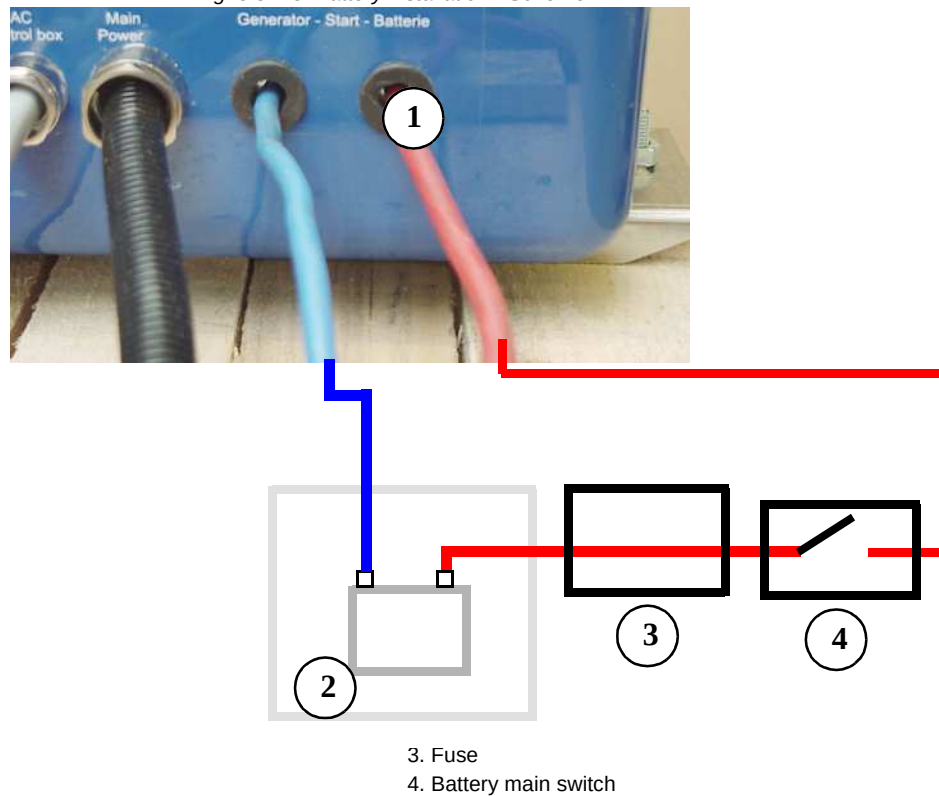




Fig. 5.8.1-5: Battery installation - Scheme



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



5.9 Generator AC System Installation

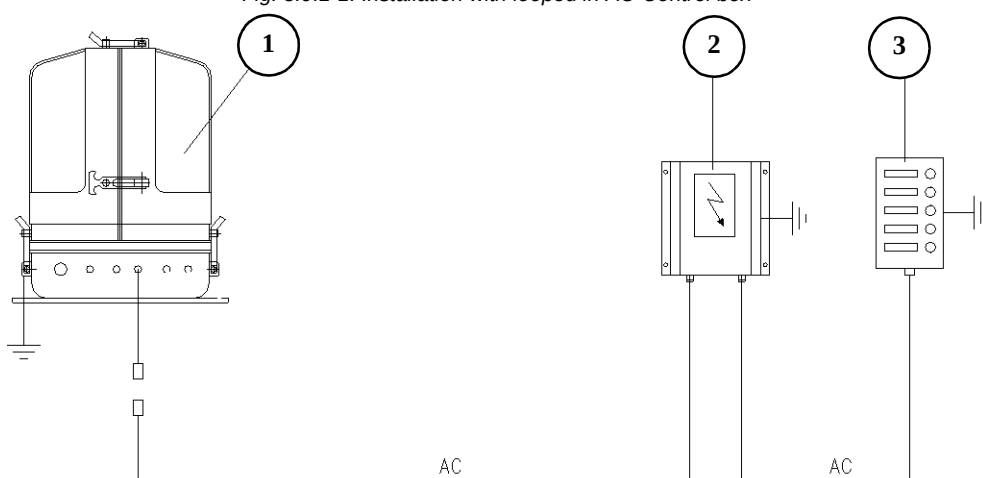
Before the electrical system is installed, READ the SAFETY INSTRUCTIONS of this manual FIRST! Be sure that all electrical installations (including all safety systems) comply with all required regulations of the regional authorities. This includes lightning conductor, personal protection switch etc.

ATTENTION!



5.9.1 Installation with looped in AC-Control box

Fig. 5.9.1-1: Installation with looped in AC-Control box



- 1. Generator
- 2. AC-Control Box

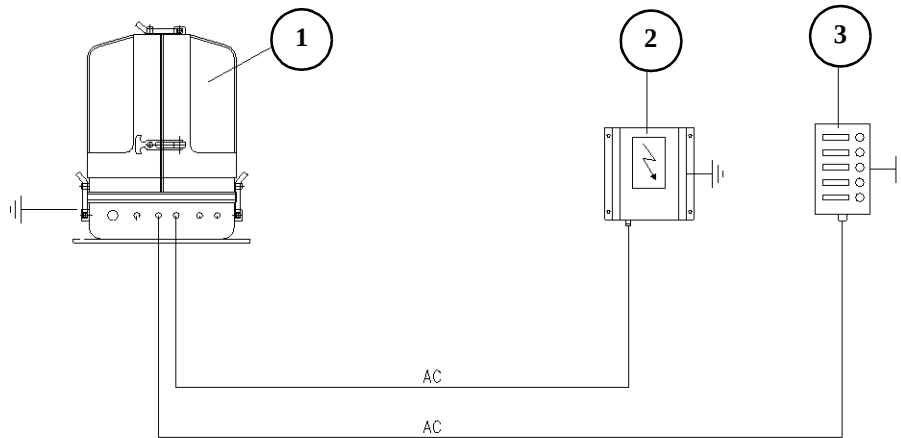
- 3. Distribution panel

All electrical safety installations have to be made on board.



5.9.2 Installation AC-Box / distribution panel separate connected

Fig. 5.9.2-1: Installation AC-Box / distribution panel separate connected



- 1. Generator
- 2. AC-Control Box

- 3. Distribution panel

A power source selector switch must be installed between the generator (or if applicable, AC-Control box) and the ship's electrical supply system. This switch must be used to ensure that all AC consumers can be switched off at once. This switch should also be installed to keep the generator and shore (grid) power systems separate.

3-Way Cam Switch

A 3-way cam switch should be used. This switch basic positions: "Shore power" - "OFF" - "Generator". If an (DC-AC) inverter is used, a fourth position will be required.

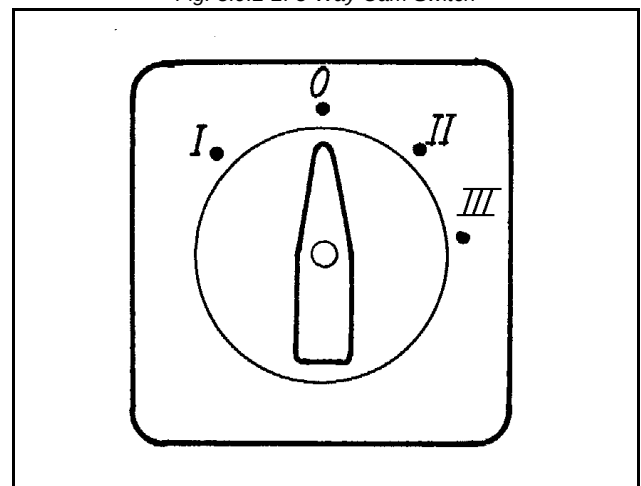
0. OFF

I. Generator

II. Shore power connection

III. Inverter

Fig. 5.9.2-2: 3-Way Cam Switch



The cam-type switch must have 2 poles, so that "MP" and "phase" can be switched off.

If a 3-phase current system is also installed with the option of supplying from either the generator or shore power, an additional switch must be installed to keep these systems separate.

An alternative to a manual rotating switch is an automatic power relay. When the generator is not running, the relay remains in the shore power position. As soon as the generator is running, the power relay switches automatically to the generator position.

Note: If the system has both single and 3-phase AC, it is CRITICAL that the two systems remain SEPARATE!

Protection conductor

The generator is provided with a PEN safety system, as standard, which connects the 3-phase delta centre point "N" to the safety ground strap.

If a separate ground protection cable is necessary (i.e. due to national safety regulations), the bridge between the



generator housing and ground (in the AC-Control box) must be disconnected. Once such a ground protection cable is installed, it must be connected to the ground straps of all on board electrical devices.

In order to monitor the electrical system, it is recommended to install a voltmeter (and, if possible, a current meter) down line from the power source selector switch so that all respective power sources can be monitored. A separate voltmeter for the generator, itself, is therefore not required.

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 rated current on the type plate

Required cable cross-sections

The following recommended electrical cable dimensions (cross sections) are the minimum required sizes for a safe installation. (siehe see "Cable cross section" on page 171.)



5.9.3 AC-Control Box with VCS and ASB - not all models

The required capacitors for the excitation of the generator are located in the AC-Control box, as well as the electronic control for voltage/speed regulation (VCS) and the starting current re-inforcement (ASB). The AC-Control box must be connected by electrical wires (high voltage and low-voltage) to the generator.

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

The AC-Control box must be electrically connected to the generator (high and low voltage).

ATTENTION! Before working on the System read the "Section Safety Instructions in this Manual".

Danger - High voltage



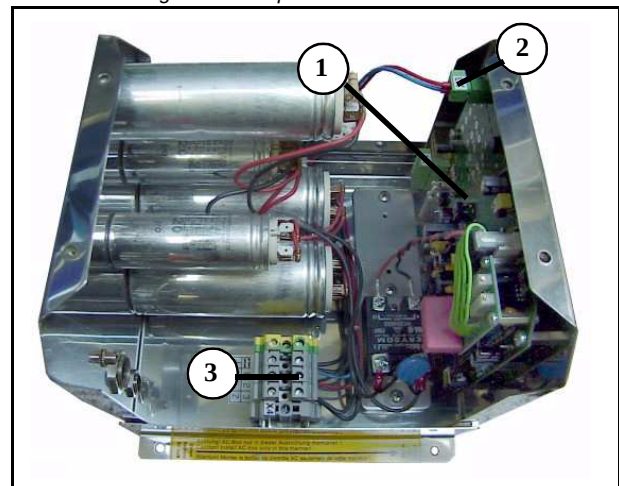
AC-Control Box

Inlet VCS-connection (X1)

Inlet measuring voltage (X3)

Excitation cable to generator (X4)

Fig. 5.9.3-1: Opened AC Control Box



AC-Control Box - from Panda 30 upwards

Fig. 5.9.3-2: Opened AC Control Box from Panda 30 upwards





5.9.4 VCS voltage control

All Panda generators from Panda 8000 upwards are fitted with the electronic voltage control "VCS" as standard.

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

If the generator is run without load, the voltage should be 231V with a frequency of approx 48.5 to 49Hz. 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.

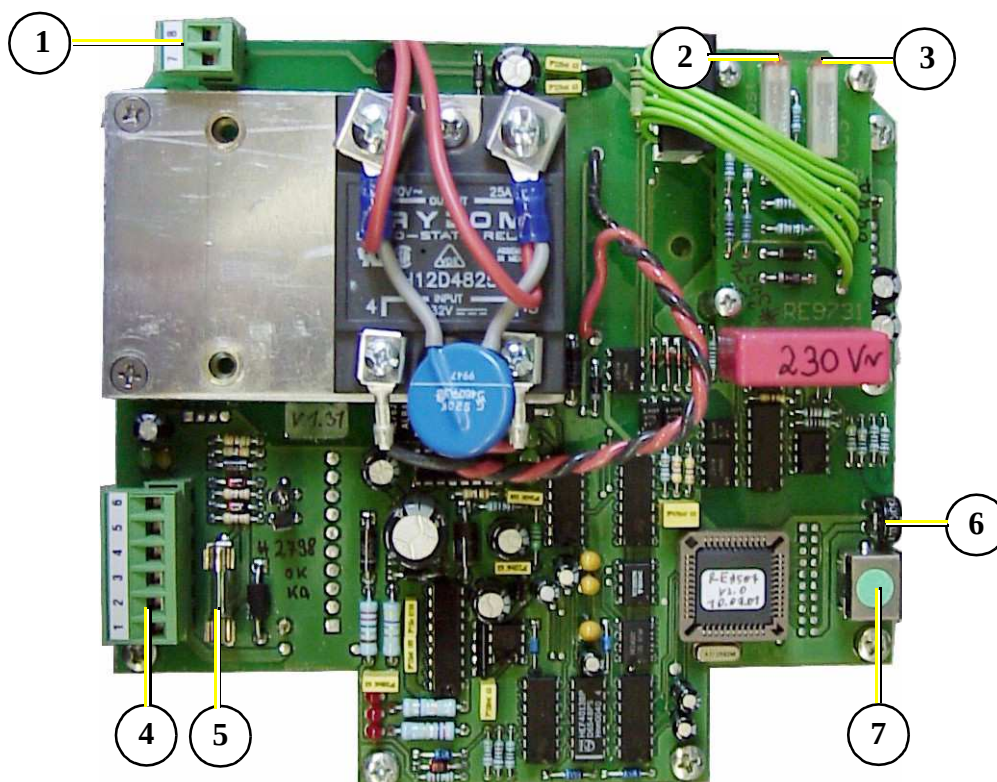
The speed gauge is governed by an adjusting screw, above and below. Adjustment of this screw may not occur without the expressive approval of the manufacturer.

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 240 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 215 V.

Fig. 5.9.4-1: VCS Control



- | | |
|---|--|
| 1. Connection measuring voltage | 5. Electrical fuse (1.6 A, slow to blow) |
| 2. Adjusting booster voltage (do not adjust!) | 6. Potentiometer for booster time |
| 3. Adjustment VCS-voltage | 7. Connection for PC |
| 4. Connection VCS inlet | |



5.9.4.1 Alternative Mini VCS

Alternative for generators without AC control box the Mini VCS.

The Mini VCS and the capacitors are is mounted at the generator.

Mini VCS at the Panda 6500 NE PMS

Fig. 5.9.4.1-1: Mini VCS at the Panda 6000 ND PMS



Capacitors at the Panda 6500 NE PMS

Fig. 5.9.4.1-2: Capacitors at the Panda 6000 ND PMS



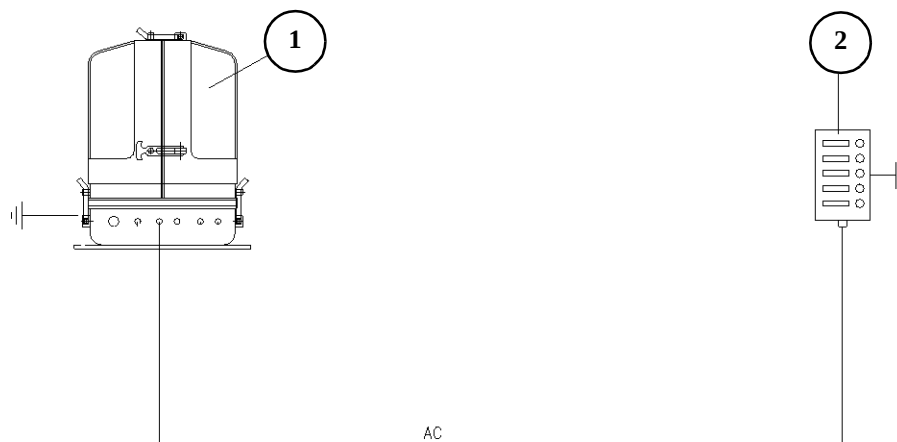
Note:

The Mini VCS has no internal fuse.



5.9.5 Installation with mini VCS mounted at the generator

Fig. 5.9.5-1: Installation with mini VCS mounted at the generator



1. Generator

2. Distribution panel

All electrical safety installations have to be made on board.

5.9.6 Jump start at high starting current (Booster)

Additionally, the automatic start booster is located on the circuit control board. The starting current is increased by connecting a second group of capacitors (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.



5.9.7 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).

6. Once the safety systems have been installed, they must be checked. If a RCD (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).
7. 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.

Checking the electrical connections

There is always the possibility that circuits have been rerouted/changed or individual components have not been 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 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 also be performed with all electrical devices (i.e. voltage check between common and metallic housings) while the generator is running.



6. Maintenance Instructions

6.1 Personal requirements

All maintenance work - if not specially marked - can be made by the trained persons.

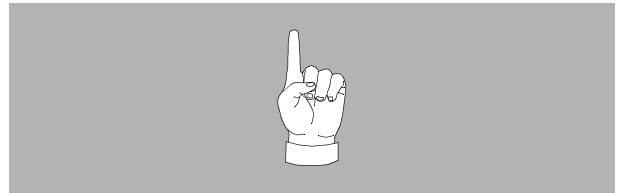
Further maintenance work must only be made by Technical personel or Fischer Panda service points.

6.2 Hazard notes for this chapter

see "Safety instructions - Safety first!" on Page 18.

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

Notice!:



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

Warning!: Automatic start



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

Make shure that the generator ist stopped and the starter battery is diconnected 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 servere personal injuries or material damage.

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

- Ensure that there is sufficient space for maintenance work before starting.

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

- Only use commercially available tools and special tools for maintenance work. Incorrect or damaged tools can lead to 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. Therefor :

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

Danger for Life. Improper handling, operation, installation and maintenance can result in sévere 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.

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

During Installation/mainenance personal protective equipment is required to minimize the helth hazards.

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

Disconnet all load during the work atthe generator to avoid damages at the load.

Batteries contains acid or alkalis.

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

See the operation and safety instruction from your battery manufacturer.

Danger!: Danger of poisoning



ATTENTION!: Danger to Life - High voltage



Warning!: Hot surface/material



Instruction!: Personal protective equipment necessary.



Attention!: Disconnect all load



Warning!:





6.3 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.

Environmental protection.



6.4 General maintenance instructions

6.4.1 Checks before each start

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

Once a month

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

Maintenance intervals - see separate datasheet

6.4.2 Check of Hoses and Rubber Parts in the sound insulated capsule

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to environmental influences. They wear out quickly in an environment of dry air, oil and fuel vapours, and high temperatures. The hoses must be checked regularly for elasticity. There are operating situations, when hoses must be renewed once a year.

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

6.5 Oil Change Intervals

The first oil change is to be accomplished after a period of operation from 35 to 50 hours. Afterwards the oil is to be changed after 150 hours. For this, the oil SAE30 for temperatures over 20°C and SAE20 for temperatures between 5°C and 20°C is to be used. At temperatures under 5 °C oil of the viscosity SAE10W or 10W-30 is prescribed.

For filling quantity, see „Technical Data“ at page 107.

6.5.1 Checking oil-level



You require:

paper towels / cloth for the oildipstick

The generator must be placed at level.

- with vehicular generators: Place the vehicle on a leveled surface.
- with PSC generators: Place the generator on a leveled 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.

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

Caution: Burn hazard!



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

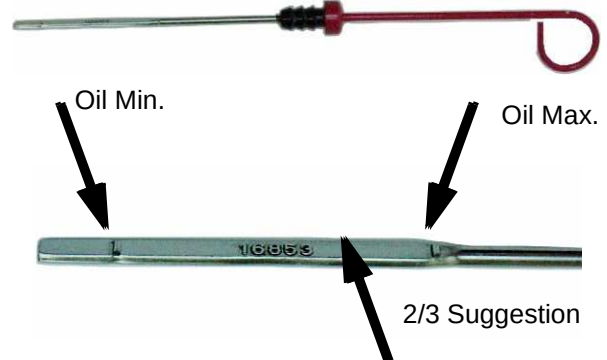
Oildipstick

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

We recommend an oil-level of 2/3.

Sample picture

Fig. 6.5-1: Oildipstick - Sample



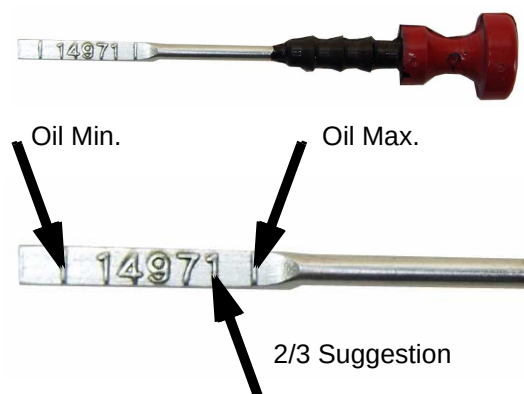
Oildipstick EA 300 Engine

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

We recommend an oil-level of 2/3.

Sample picture

Fig. 6.5-2: Samplepicture Oildipstick





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 servicepoint.

- *if the oil is cloudy or even „creamy“, coolant might have mixed with the oil. See a garage or a Fischer Panda servicepoint immediately.*

6.5.2 Refilling Oil

You require:

Engine oil

1. Check oil-level as described under „Checking oil-level“ on page 1.
2. Oildipstick is pulled out of the check rail.
3. Open the oil filler cap.
4. Fill in oil (approx. 1/2 liter) and wait for about 2 min. so this it can flow into the oil pan.
5. Wipe off the oildipstick and put it into the check rail.
6. Pull the oildipstick out of the checkrail and check the oil-level. See „Checking oil-level“ on page 1.

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

6.5.3 After the oil level check and refilling the oil

- Put the oildipstick 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.



6.6 Replacement of engine oil and engine oil filter

You require:

- Engine oil. See attachment.
- New oil filter (not with generators with EA300 engines)
- Sealings 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 leveled surface.
- with PSC generators: Place the generator on a leveled surface.
- with marine generators: Change the oil when the ship is not lop-sided.

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

Generator and coolant can be hot during and after operating.

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

Caution: Burn hazard!



1. Prepare generator.

- Assure generator against accidental start.
- Open the generator casing.
- with generators that have an external oil drain hose: Release the oil drain hose from the mounting.
- with generators that have an internal oil drain hose: Open the lead-through for the oil drain hose (left turn of the sealing). Pull out the sealing with the oil drain hose.

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



2. Loosen oil filling cap

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

Sample picture

Fig. 6.6-1: Oil filling cap



3. Open oil drain screw.

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

Use spanner size 17mm.



Fig. 6.6-2: Oil drain hose



4. Discharge used oil.

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

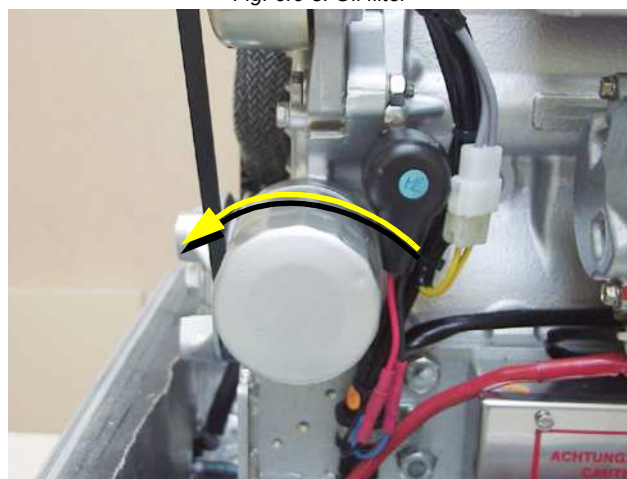
5. Remove used oil filter / clean oil screen

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

Sample picture



Fig. 6.6-3: Oil filter





Oil screen with generators with EA300 engines

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

Use spanner size 17mm.



Sample picture

Fig. 6.6-4: Oil screen



6. Preparing a new filter

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

Fig. 6.6-5: Oil screen sealing ring



7. Mounting the new filter

Carefully screw in the new filter by hand. It must not be tightened too much. Screw in the oil drain screw again and tighten it 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 liters with the oil dipstick.

9. Check proper filling level. See „Checking oil-level“ on page 1.

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.

6.6.1 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.

11. Duly disposal 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).



6.7 Verifying the starter batterie and (if necessary) the battery bank

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

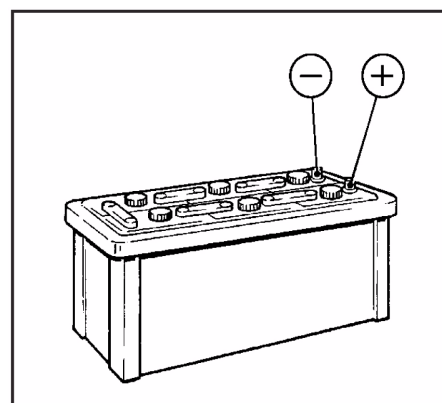
If from the battery manufakturer not otherwise mentioned

6.7.1 Battery

6.7.1.1 Check battery and cable connections

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

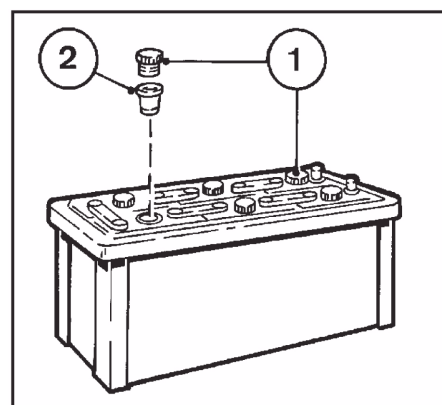
Fig. 6.7.1-1: Battery



6.7.1.2 Check electrolyt level

- Remove sealing caps 1.
- If testers 2 are present:
- Electrolyte level should reach the base of these.
- Without testers:
The electrolyte level should be 10-15 mm above the top of the plates.
- If necessary, top up with distilled water.
- Screw sealing caps back in.

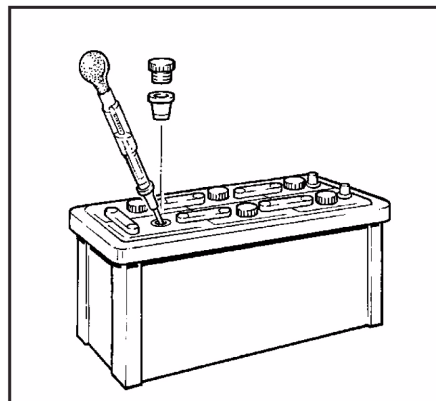
Fig. 6.7.1-1: Battery



6.7.1.3 Check electrolyt density

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

Fig. 6.7.1-1: Battery



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

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

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

Wear protective goggles!

Do not rest tools on the battery!

Attention



6.8 Grease lubricated generator backend bearing

A bearing change should only be executed by a trained expert.

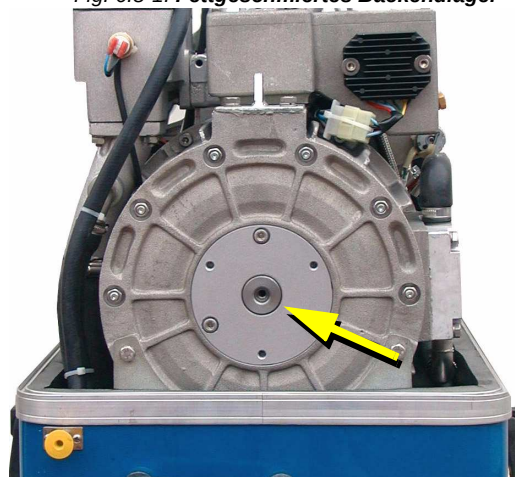
The bearing is, depending on the generator model, equipped with a black cooling disc.

The grease lubricated generator bearing is maintenance free over its durability, but should be exchanged every 1500 operating hours.

Grease lubricated backend bearing without cooling disc.

Sample Picture

Fig. 6.8-1: Fettgeschmiertes Backendlager

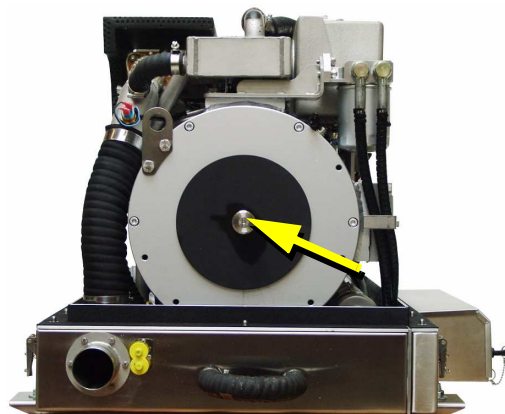




Grease lubricated backend bearing with cooling disc.

Sample Picture

Fig. 6.8-2: Grease lubricated backend bearing



6.8.1 Exchange of grease lubricated bearing

Only special trained persons are allowed to do this maintenance!

STOP!



DANGER FOR LIFE! - Inappropriate handling can lead to health damages and death.

Warning!: Automatic start

The battery bank must always be disconnected (first negative pole, then positive pole), while working at the generator or at the generators' electrical system, so that the generator can not be started unintentionally.

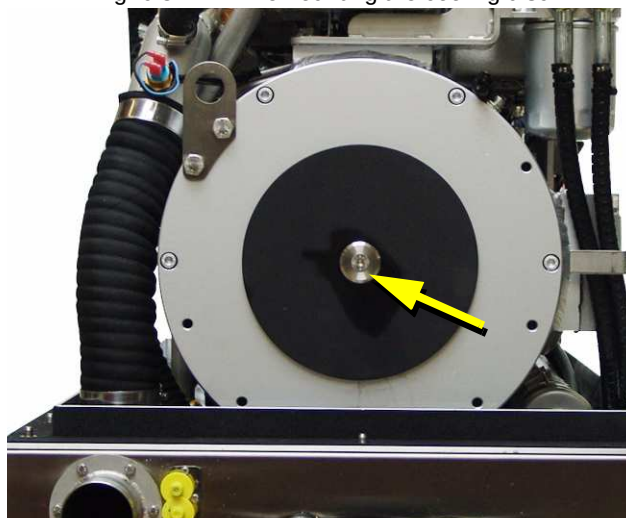


6.8.1.1 Demounting the cooling disc (if existent)

To demount the cooling disc, detach the cooling discs' holding nut and take off the disc.

Sample Picture

Fig. 6.8.1.1-1: Demounting the cooling disc



6.8.1.2 Demounting the backend bearing

Degrease the spot with a fat solvent as shown, apply markings with a waterproof pen.

Sample Picture

Fig. 6.8.1.2-1: Marking the bearing cover.



Demounting the bearing cover

- Unscrew fixing bolts (Tools Allen key SW6).
- Fasten fixing bolts by hand into the holes for disengaging as far as possible.
- Then alternately fasten these three bolts equally.

Thus the bearing cover will be pushed out of the generator cap equally.

- Remove ball bearing with a usual extractor from the shaft.

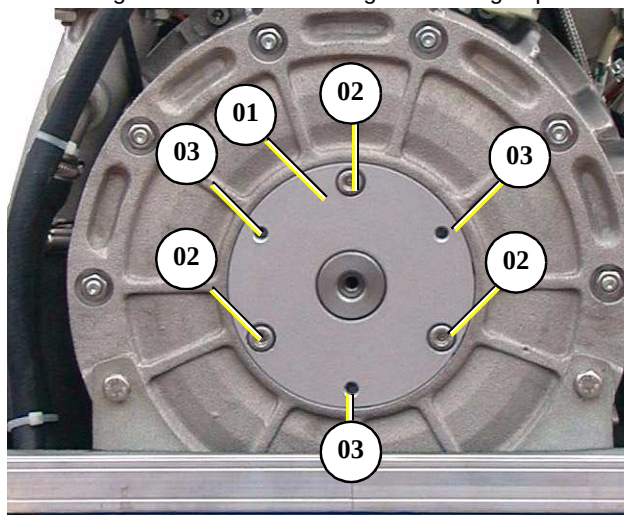
01. Bearing cover

02. Fixing screw

03. Holes for disengaging

Sample picture

Fig. 6.8.1.2-2: Demounting the bearing cap



If there is no suitable extractor available, a suitable extractor can be purchased from Fischer Panda.

Note:

Check the O-ring seal which is mounted in the bearing cover and replaced if damaged.

6.8.1.3 Installing the new backend bearing



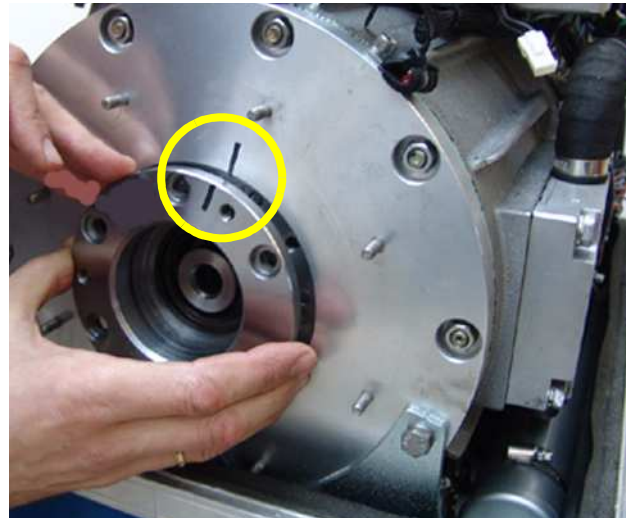
Mount bearing case in the generator cap.

Place bearing case loosely into the generator cap, assure with one hand against falling out.

Thereby pay attention that the case is mounted in the same position as before - the previously added markings have to match again!

Sample Picture

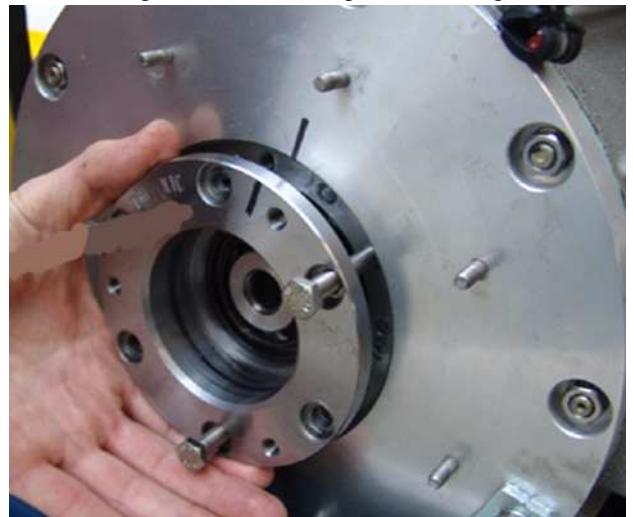
Fig. 6.8.1.3-1: 1Mount bearing cover



With the other hand, loosely screw in the ejector screws as guide line.

Sample Picture

Fig. 6.8.1.3-2: Bearing case mouting



Carefully press the bearing case with a soft-head hammer (or a hammer plus mandrel) in its hub.

Thereby relocated mandrel rotatory after each hit to avoid canting.

Otherwise there is a risk that the case is slightly canted because of the material which is brought up by the ejector screws.

A canted bearing case causes a canted ball bearing, which will wear out quite fast!

Sample Picture

Fig. 6.8.1.3-3: Press fit bearing case





Tighten fixing bolts M8 with 22 to 25 Nm (Allen key SW6).

Now carefully press the bearing case with a soft-head hammer (or a hammer plus mandrel) in its hub.

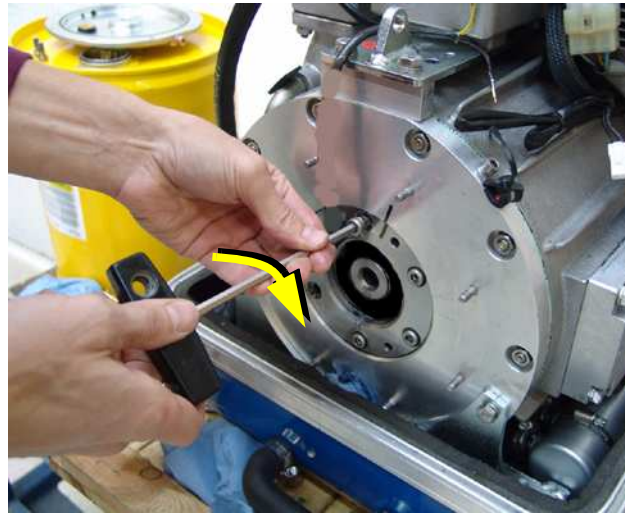
Thereby relocate mandrel rotatory after each hit to avoid canting.

Otherwise there is a risk that the case is slightly canted because of the material which is brought up by the ejector screws.

A canted bearing case causes a canted ball bearing, which will wear out quite fast!

Sample Picture

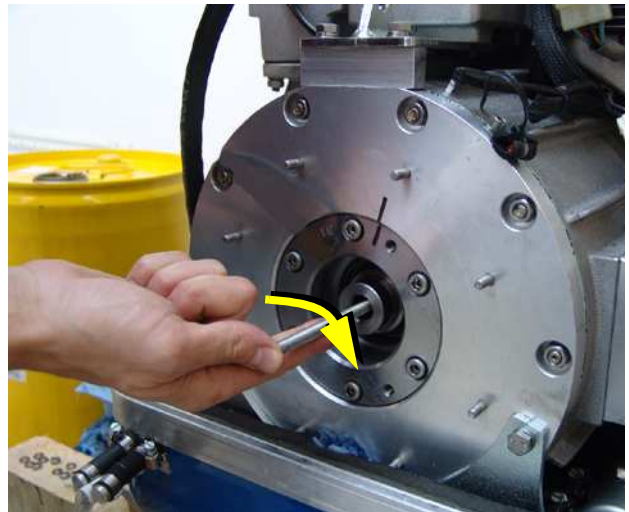
Fig. 6.8.1.3-4: 'Attach bearing case



Screw in thread rod into the thread hole of the generator shaft as far as possible.

Sample Picture

Fig. 6.8.1.3-5: Screw in thread rod



Slide on ball bearing, pressure ladle, grommet up to the shaft, screw on long hexagon nut. Grease/Oil thread rod.

Guide ball bearing with one hand to avoid canting on the shaft.

Sample Picture

Fig. 6.8.1.3-6: Put on ball bearing





With the other hand, put a screw wrench on the long nut, fasten slowly.

Thus the ball bearing is pressed onto the shaft.

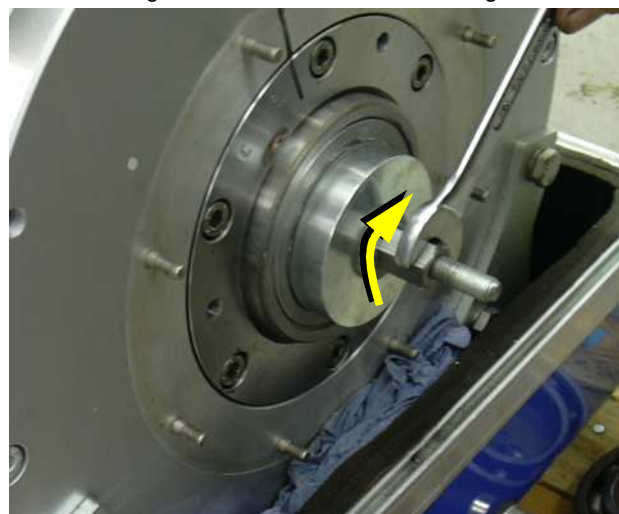
If necessary hold driving shaft with suitable wrench, to prevent diesel engine from rotation simultaneously.

Press on ball bearing as far as possible.

(Tool Wrench SW13 and SW 22)

Sample Picture

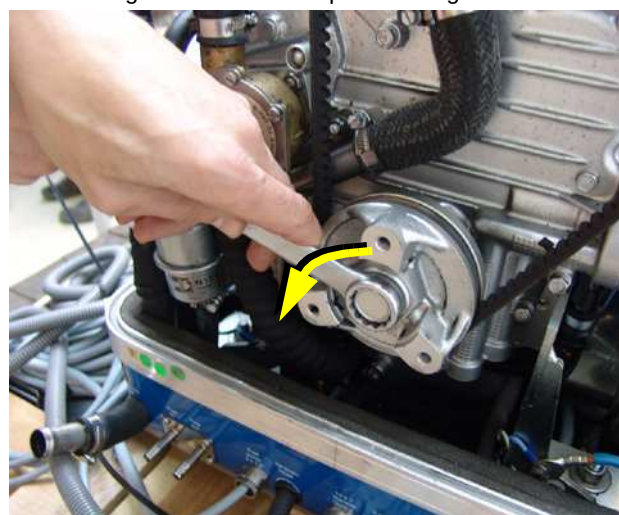
Fig. 6.8.1.3-7: Press in ball bearing



Hold up the driving shaft.

Sample Picture

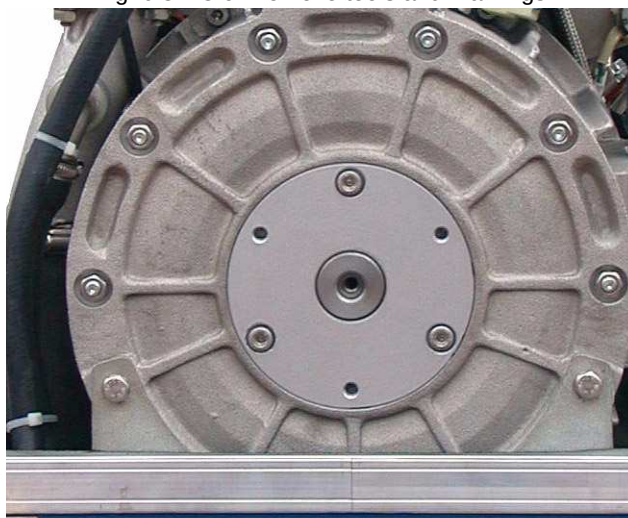
Fig. 6.8.1.3-8: Hold up the driving shaft



- Remove tools.
- Remove markings.
- Mount cooling disc (if existent).
- Mount presilencer and circuit points.
- Refill cooling water and vent cooling water circuit (see generator manual).
- Remove starting lock.
- Reconnect starter battery.
- Run generator 3 to 5 minutes.
- Mount casing.

Sample Picture

Fig. 6.8.1.3-9: Remove tools and markings

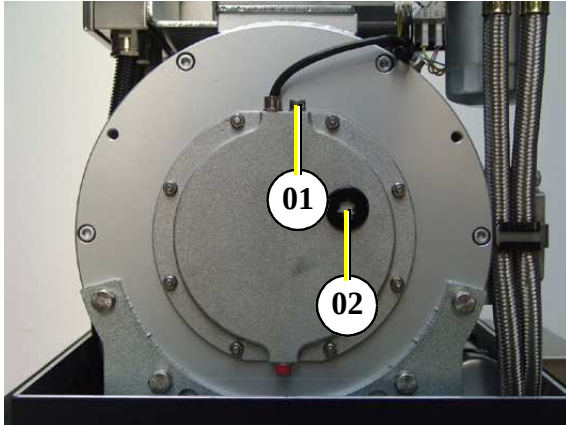




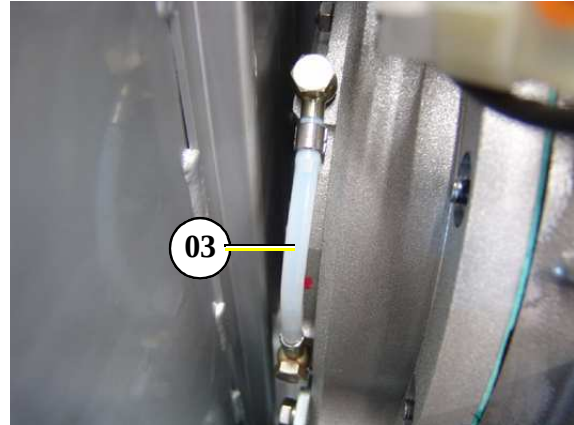
6.9 Checking the oil level of the generator end bearing at Fischer Panda generators

The oil level check is a visual check. Older generators are equipped with an sight glass, newer ones with an sight hose.

Fig. 6.9-1: Oil check



Older version



Newer version

- 01. Screw plug
- 02. Sight glass

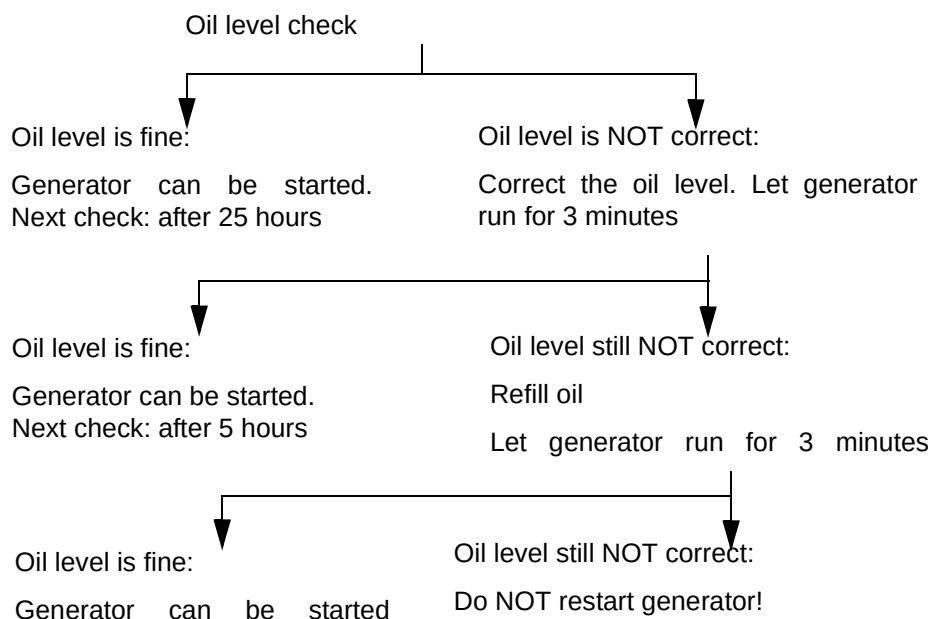
- 03. Sight hose

If your generator does not feature these control modules or if these are not accessible, please refer to your Fischer Panda distribution partner or to Fischer Panda directly. The correct oil level is at the middle of the sight glass/ sight hose.

Oil level check is only to be executed when the generator is switched off!

6.9.1 Oil level check

Fig. 6.9-1: Oil level check





6.9.2 Refilling oil

1. Remove the Allen screw M8 at the right side of the sensor cable.
2. Refill some oil by means of a small hopper or a syringe.
3. Now tighten the screw again and fasten it with 20 Nm.

6.9.3 Refiller-Set

An appropriate refiller set can be purchased at Fischer Panda.

The refiller set contains:

Oil: Shell Omala HD220.

Syringe plus hose

6.9.4 Screw plug

ATTENTION:

The screw plug has a ventilation hole!

Do NOT replace it by a normal screw - this will cause oil loss!

Fig. 6.9.4-1: Screw plug





6.10 Replacement of the oil-cooled backend bearing

A bearing replacement should only be executed by a trained professional.

6.10.1 Exchange oil-cooled bearing

DANGER TO LIFE! - Inappropriate handling can lead to health damages or death.

The battery bank must always be disconnected (first negative pole, then plus pole), to ensure that the generator can not be started by accident when operations at the generator itself or its electrical system shall be executed.

Warning!: Automatic start



6.10.2 Demounting the bearing

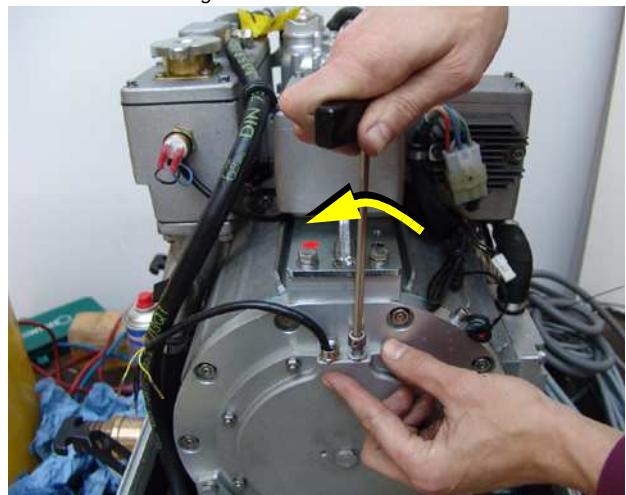
Suction or discharging the oil

It is difficult to access the drain screw.

Therefore we recommend to withdraw the oil by suction by means of a gun/ syringe plus hose (from tool package). Let the generator warm up 3-5 minutes, so the oil gets thinner.

Unscrew the ventilation screw (Tool: Allen wrench SW6)

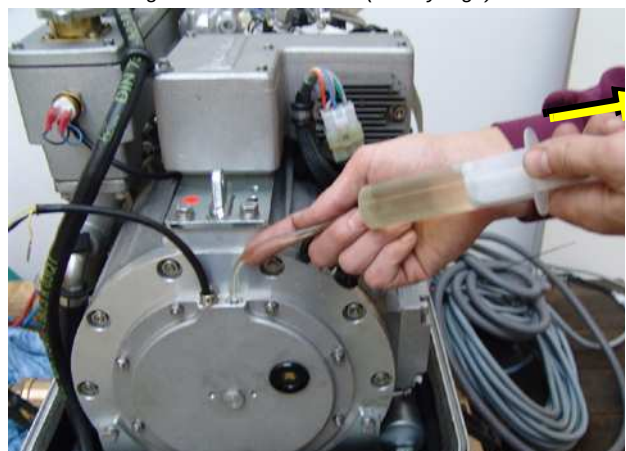
Fig. 6.10.2-1: 3. Oil suction



Inserting the hose through the ventilation screws' tap hole.

Extract the oil.

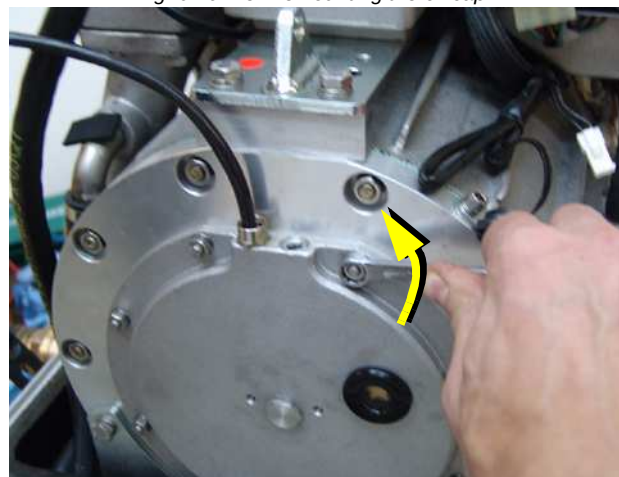
Fig. 6.10.2-2: Oil suction (with syringe)





Demount the oil cap by loosening the nuts M6 (Tool: Socket wrench SW10).

Fig. 6.10.2-3: Demounting the oil cap



As shown, degrease the spot with a fat solvent and make a mark with a waterproof pen.

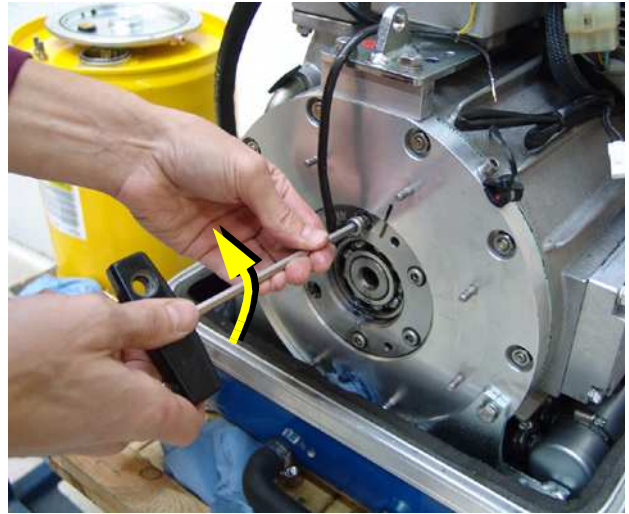
Fig. 6.10.2-4: Marking the bearing position





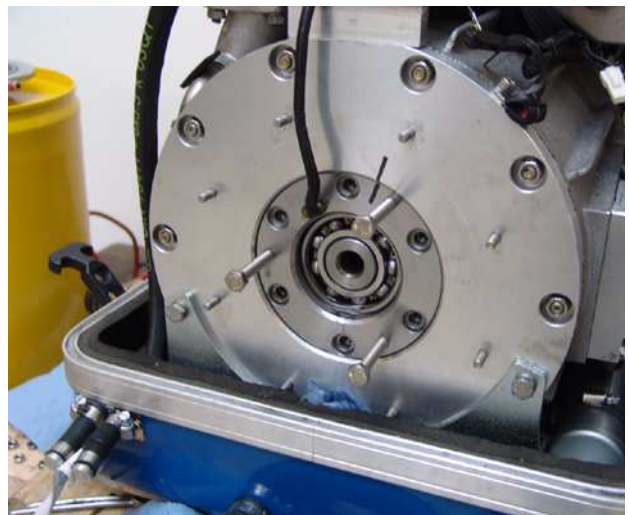
Unscrew the fastening screws (Tool: Allen wrench SW6).

Fig. 6.10.2-5: Loosen fastening screws



As shown, screw in 3 lifting screws M8x50 as far as possible by hand.

Fig. 6.10.2-6: Insert lifting screws



Then screw in those 3 screws with a screw wrench SW13 equally and in turns.

Fig. 6.10.2-7: Pull off the bearing seat

By doing this, the bearing housing including the ball bearing and the shaft sealing ring are pushed out of the generator cap.





Knocking out the ball bearing

Put the bearing housing horizontally on e.g. 2 wood ledges, the ball bearing pointing downwards. Alternatively, the bearing housing can rest on the lifting screws.

Place an appropriate bolt (e.g. extension of a ratch) on the inner bearing ring.

Knock the bearing out of the seat with several careful hammer scales.

Thereby move the bolt after each scale to keep the bearing from canting.

Fig. 6.10.2-8: Knocking out the ball bearing



Dismounted ball bearing

Fig. 6.10.2-9: Dismounted ball bearing



Dismount the shaft sealing ring:

We recommend our mandrel.

Put it in the sealing ring with the small end downwards.

Knock the sealing ring out of the seat with careful hammer scales.

Fig. 6.10.2-10: Dismount the shaft sealing ring





Dismounted shaft sealing ring

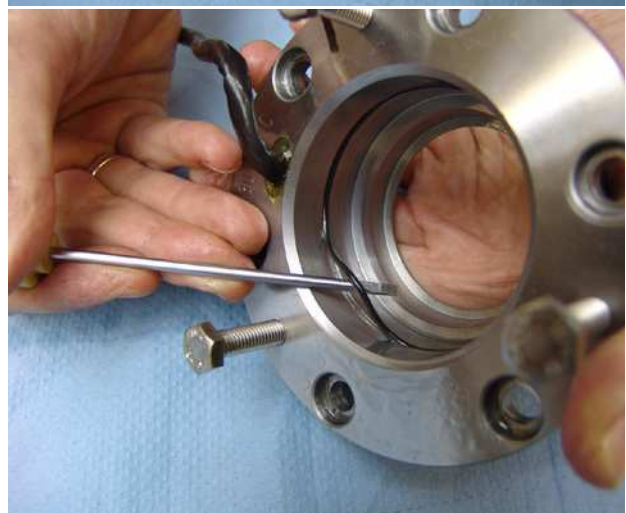
Fig. 6.10.2-11: Dismounted shaft sealing ring



Remove O-rings from the bearing seat:

Take both O-rings out of the bearing seat.

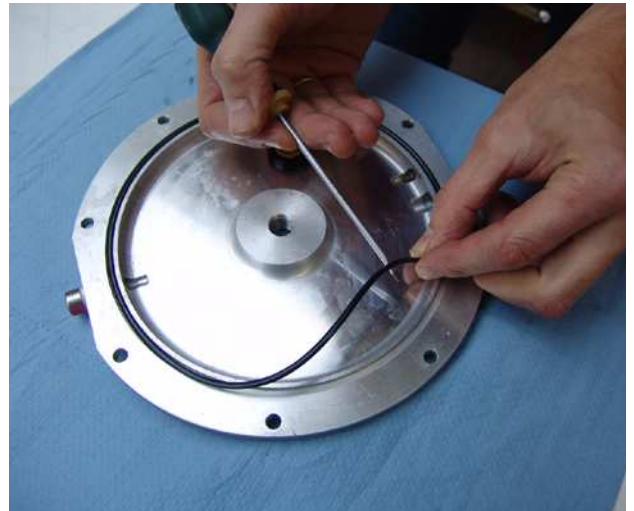
Fig. 6.10.2-12: Remove o-rings





Remove O-ring from the oil cap.

Fig. 6.10.2-13: Remove O-ring



Clean the bearing seat and the oil cap.

Slightly lubricate the new O-rings and mount them.

Mounting the NEW shaft sealing ring:

Lubricate/grease the shaft sealing rings' lip seal.

Fig. 6.10.2-14: Mounting the shaft sealing ring



Clean the mandrel, slightly grease/lubricate the connecting surface and the chamber-bevel.

Fig. 6.10.2-15:



Push the sealing ring on the mandrel, the open side should point towards the handle. The side marked with „X“ is to be used.

Fig. 6.10.2-16:



Mounting of the shaft sealing ring

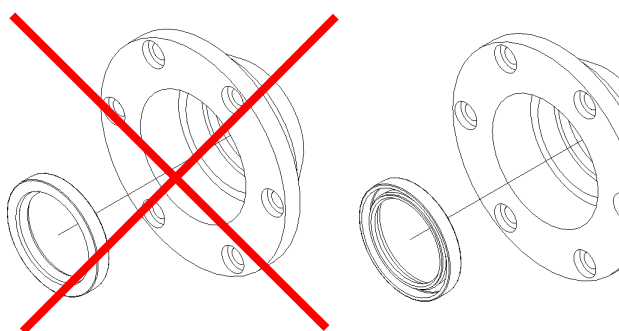
Fig. 6.10.2-17: Fitting the shaft sealing ring



Correctly mounted sealing ring

Fig. 6.10.2-18: shaft sealing ring

Dichtring: Einbaurichtung



FALSCH

KORREKT



Clean the shaft

Fig. 6.10.2-19: Cleaning the shaft

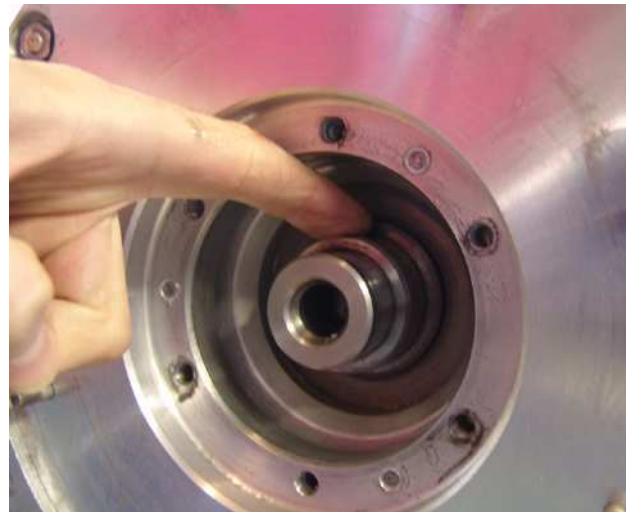


Check the wheel tread for damages

The wheel tread has to be

- clean
- free of partial damages (drafts, indentations, notches, scratches).

Fig. 6.10.2-20: Checking the wheel tread

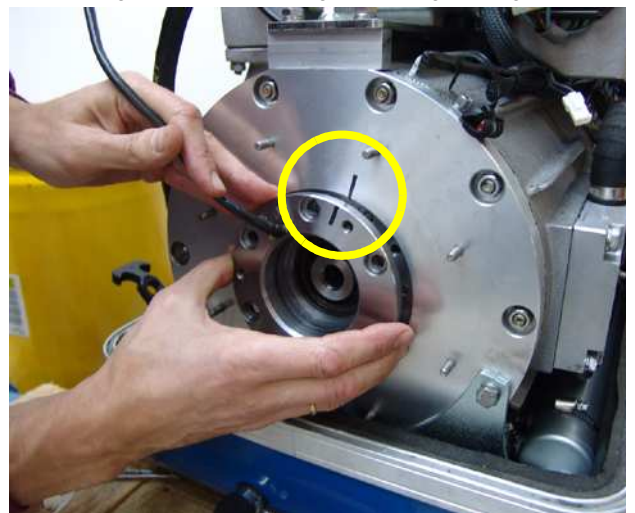


Mounting the bearing housing inside the generator cap:

Put the bearing housing loosely into the generator cap; securing it against dropping out with one hand.

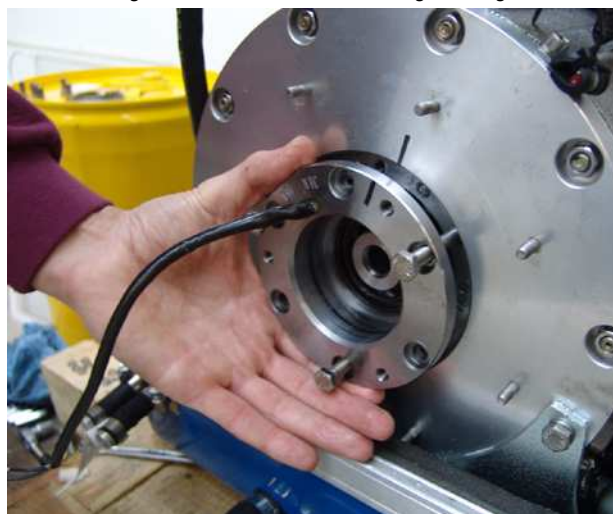
Please make sure the housing is mounted in the same position as it was before - the marking that have been made before dismounting have to fit to each other again!

Fig. 6.10.2-21: Mounting the bearing housing



With the other hand, loosely screw in the lifting screws for guidance.

Fig. 6.10.2-22: Mount the bearing housing



Now carefully press the bearing housing in its seat with a soft headed hammer (or hammer plus mandrel).

By doing that, shift the mandrel after each scale in a circle to avoid canting.

Otherwise you might risk that the housing is a little bit canted because of the material that is curled up by the lifting screws.

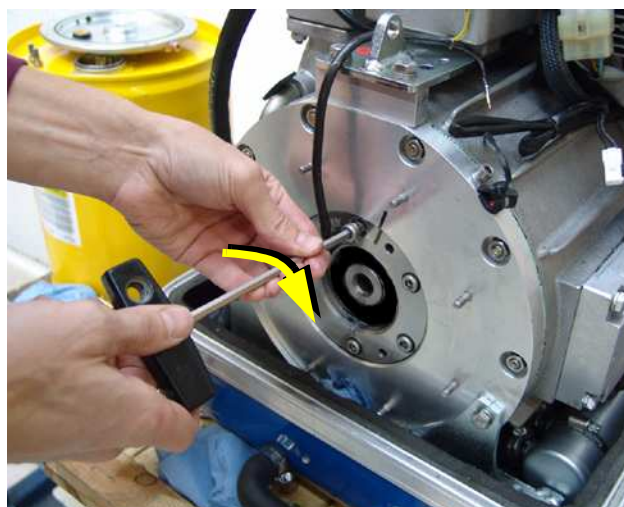
A canted bearing housing causes a canted ball bearing, which will wear out very quickly!

Fig. 6.10.2-23: Mount the bearing housing



Tighten the fastening screws M8 with 22 to 25 Nm (Tool: Allen wrench SW6).

Fig. 6.10.2-24: Tighten the fastening screws

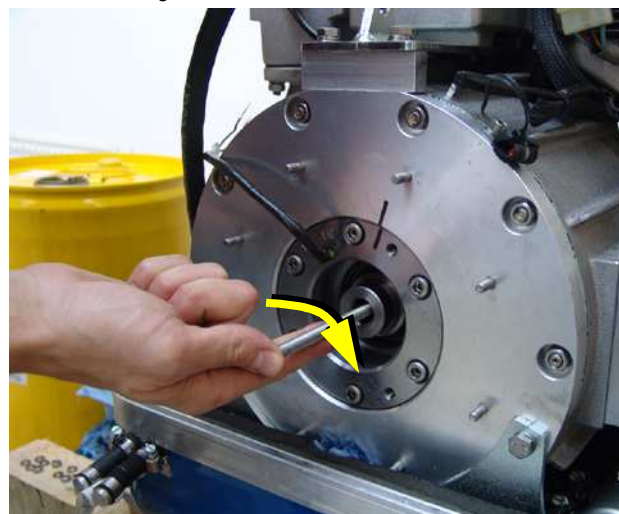




Mounting the ball bearing:

Screw the thread rod into the generator shafts' tap hole as far as possible.

Fig. 6.10.2-25: Mount the thread rod



Push the ball bearing, the pressure ladle and the washer up against the shaft, then screw on the hex nuts. Grease/lubricate the thread rod.

Fig. 6.10.2-26: Mount the ball bearing



Guide the ball bearing with one hand to avoid canting on the shaft.

Fig. 6.10.2-27: Mounting the ball bearing

Put the screw wrench on the long nut with the other hand and tighten it slowly.





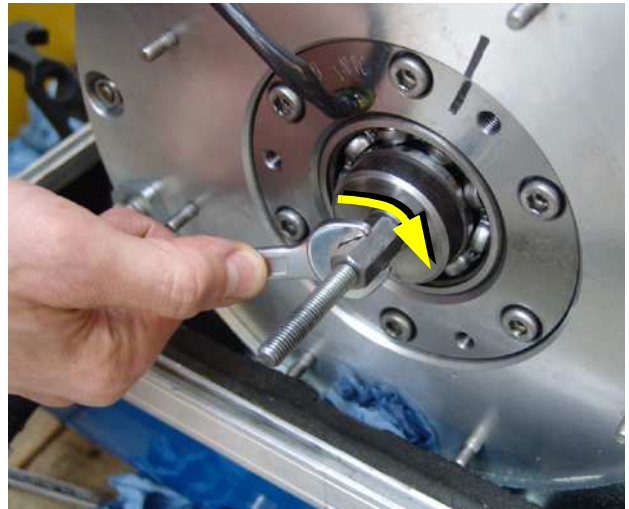
By doing that, the ball bearing is pressed onto the shaft.

If necessary, hold the crank shaft with an appropriate wrench to keep the diesel engine from rotating concurrently.

Press the ball bearing on as far as possible.

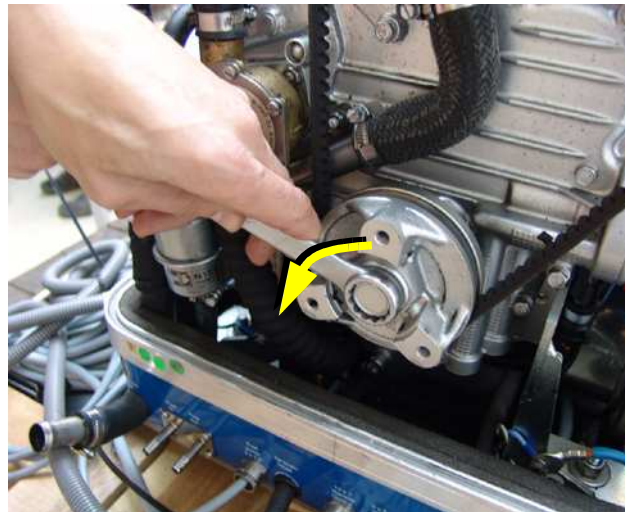
(Tool: Wrench SW13 and SW22)

Fig. 6.10.2-28: Mount the ball bearing



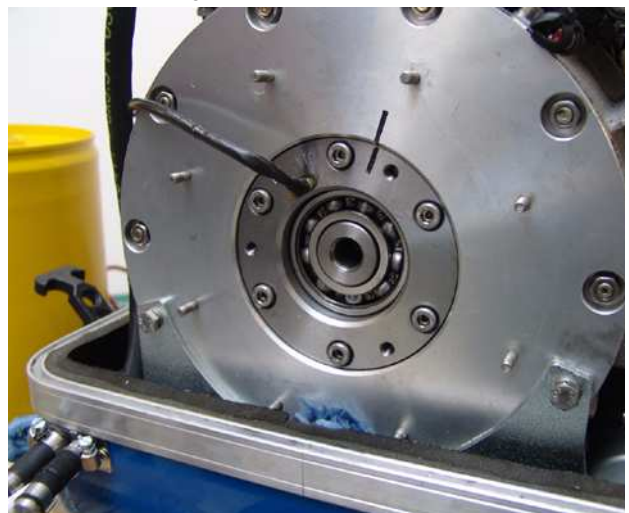
Hold up the crank shaft

Fig. 6.10.2-29:



Remove tools

Fig. 6.10.2-30: Remove tools





Remove markings

Fig. 6.10.2-31: Remove markings

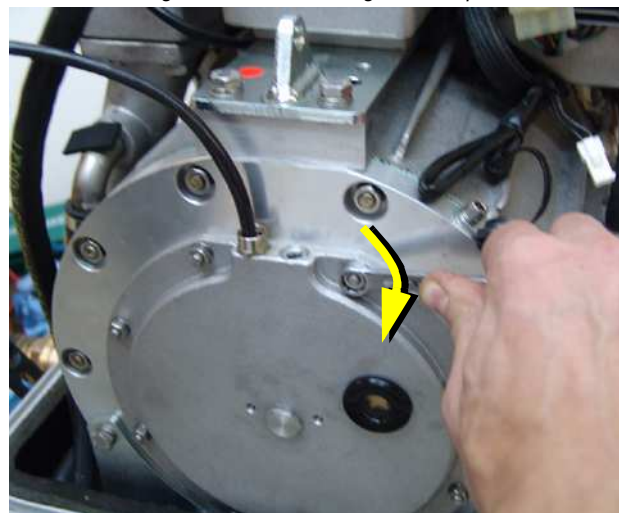


Tighten oil cap:

By doing that, pay attention that the O-ring stays in its flute. If necessary, fasten the O-ring with a bit of grease (Tool: Allen wrench SW6).

Nut torque M6: 10 Nm

Fig. 6.10.2-32: Mounting the oil cap



Filling up the oil:

Up to the middle of the inspection glass /-hose.

Oil type:

Shell Omala HD 220

Shell Omala HD 320 (Temperature over 35°C)*

Mobil 1 0W-40 **

Oils that have the following specifications, are classified as adequate:

synthetic gear oil (PAO)

Grades of oil 220 to 320

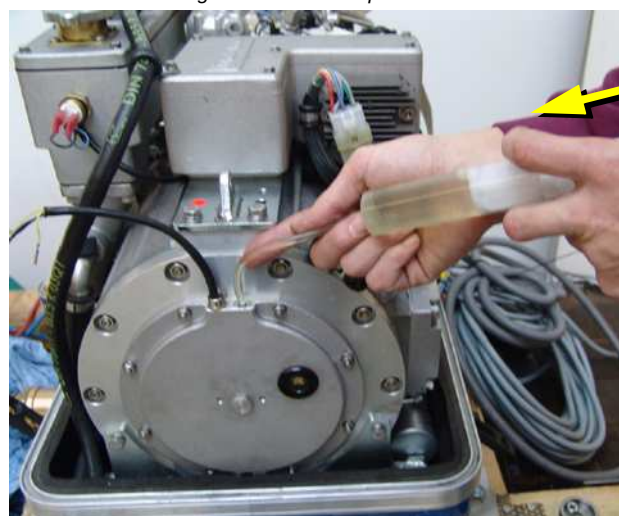
Minimum requirement gear oil: CLP HC

These oils are available at industrial lubricant commerces as well as Fischer Panda.

* Oil change intervals every 1500 hours

** Oil change intervals every 300 hours

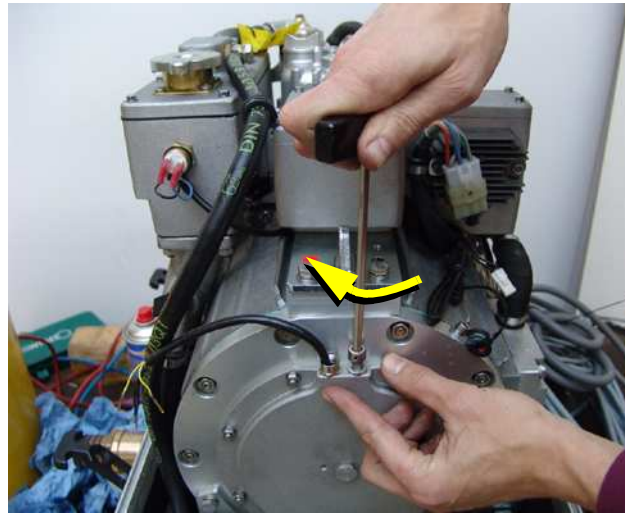
Fig. 6.10.2-33: Fill up the oil





Screw in the ventilation screw and tighten it (Tool: Allen wrench SW6 - 20 Nm).

Fig. 6.10.2-34: Screw in the ventilation screw



Remove the start interlock.

Re-connect the starter battery.

Run the generator for 3-5 minutes.

Check the oil level, if necessary refill/ discharge some oil.

Mount the capsule.



6.11 Checking the water separator in the fuel supply

The pre-filter with water separator has a cock underneath, by which means the water can be drained.

This water sinks to the bottom, due to the difference in the densities of water and fuel. Water is heavier than the diesel

Sample picture

Fig. 6.11-1: Pre-filter with water separator



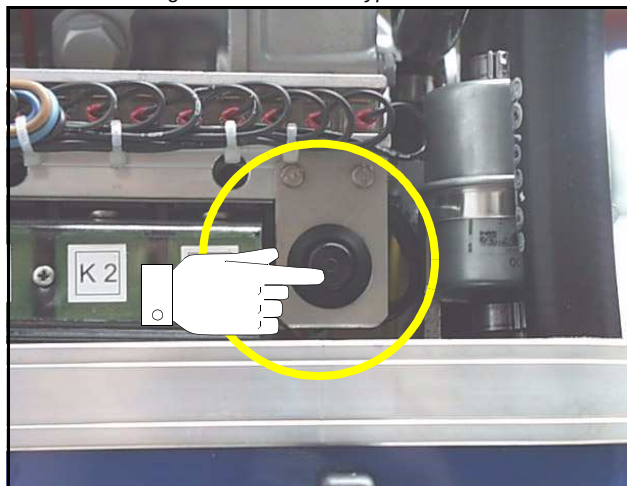
6.11.1 Ventilating the fuel system

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 prior to the first operation (as all hoses are empty) as follows:

1. Power switch "ON". Functional lights should 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).

Sample Picture

Fig. 6.11.1-1: Failure Bypass Switch

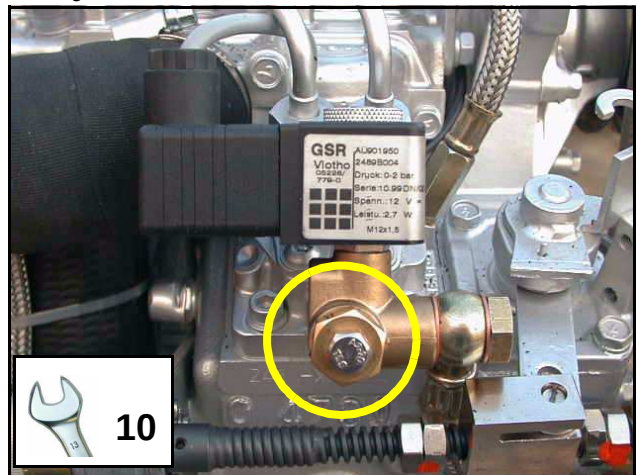




3. After pressing the failure bypass switch for approx 3 - 4 minutes the ventilation screw located at the fuel solenoid valve has to be loosened. The button must be kept pressed, whilst opening the screw. A large cloth or Kleenex tissue must be laid beneath the connection to prevent escaping fuel running 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.

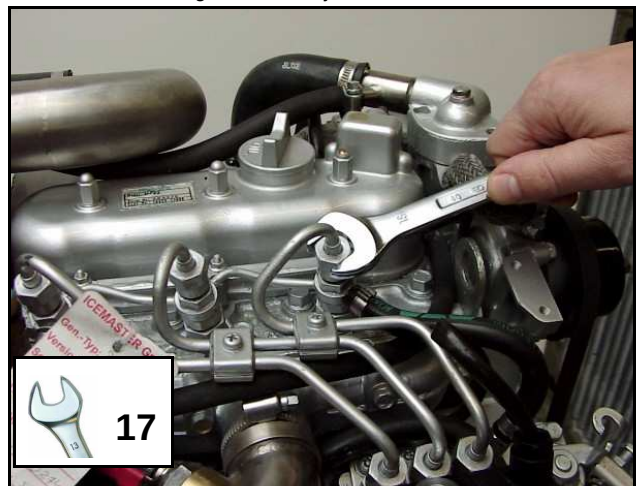
Not installed in all models

Fig. 6.11.1-2: Ventilation Screw at the fuel solenoid valve



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.
6. Switch power switch "OFF"

Fig. 6.11.1-3: Injection nozzles



6.11.2 Exchange of the Fuel Filter

Exchanging the filter, depending upon fuel contamination, should take place after 300 operational hours at the very least. T

he inlet must be clamped, before exchanging the filter.

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

Fig. 6.11.2-1: Fuel Filter





6.11.2.1 Optional fuel filter with sight glass

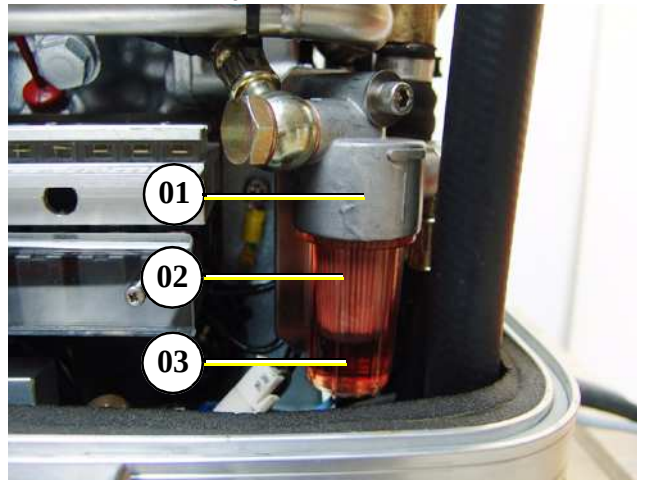
The filter change depends on the fuels' degree of pollution, but should be executed every 300 operating hours at the latest.

01. Fuel filter housing

02. Fuel filter element

03. Sight glass

Fig. 6.11.2-1: Fuel filter



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

Fig. 6.11.2-2: Fuel filter



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

Fig. 6.11.2-3: Fuel filter





Screw the new filter element into the mount.

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

Fig. 6.11.2-4: Fuel filter

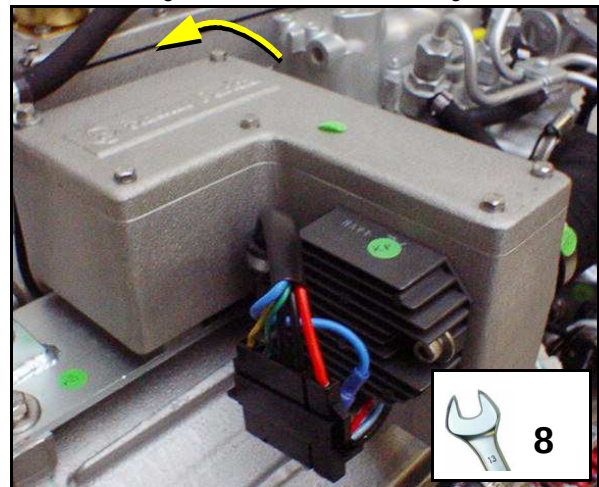


6.11.3 Replacement of the air filter mat

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

Sample Picture

Fig. 6.11.3-1: Air Suction Housing



Change the air filter mat

Close the suction air housing

Sample Picture

Fig. 6.11.3-2: Opened Air Suction Housing

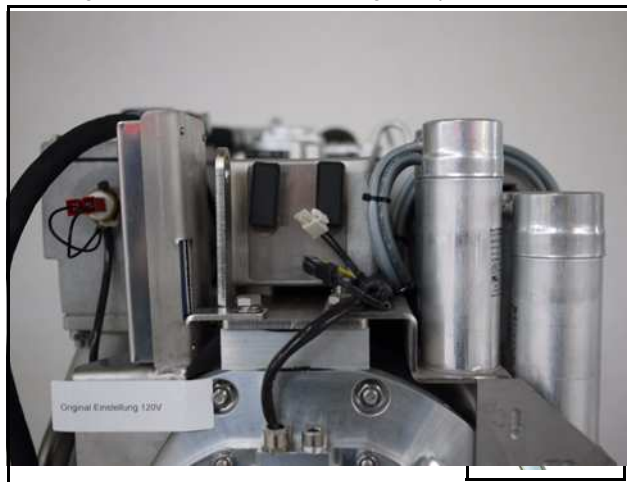




6.11.3.1 Alternative replacement of the air filter mat with pull out holder

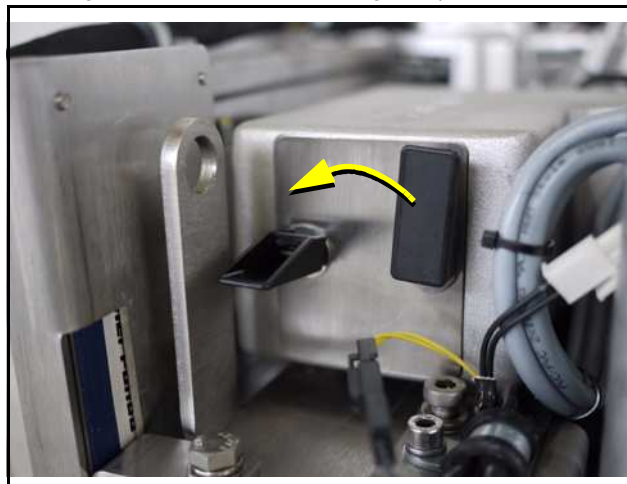
Air filter housing with pull out holder

Fig. 6.11.3-1: Air Suction Housing with pull out holder



Tip the two fasteners 90°

Fig. 6.11.3-2: Air Suction Housing with pull out holder



Pull the filter mat holder out

Fig. 6.11.3-3: Air Suction Housing with pull out holder

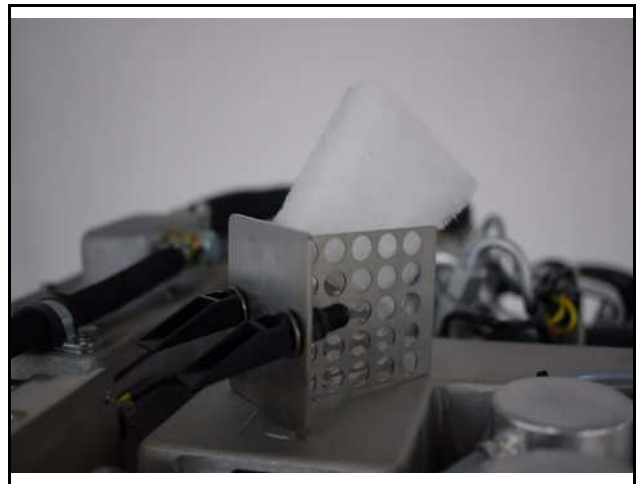




Replace the air filter mat

Assembly in reversed order of steps 1-4

Fig. 6.11.3-4: Air Suction Housing with pull out holder



6.12 Ventilation of the coolant circuit / freshwater

Special notes for the ventilation of the cooling system

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

Attention



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

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

Further it should be guaranteed that the expansion tank is attached in sufficient height (600 mm) over the level of the generator exhaust elbow union. This ventilating procedure must be repeated several times:

Fig. 6.12.0-1: Expansion Tank





Open the ventilating screw above the cooling water pump casing.

Sample Picture

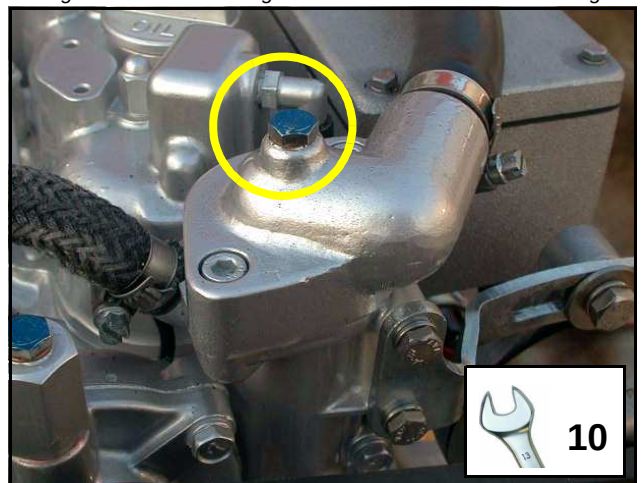
Fig. 6.12.0-2: Ventilating Screw



Open the ventilating screw on the thermostat casing.

Sample Picture

Fig. 6.12.0-3: Ventilating Screw on the Thermostat Housing



The cooling water can be filled into the External expansion tank.

If the cooling water level no longer drops (the cooling water level in cold waters must cover the tin in the exhaust elbow), close the filler cover and the cooling water screws and then start the generator.

Run the generator for approx. 60 seconds, then switch off

Refill cooling water via the compensation tank.

The external compensation tank should be filled to a max 20% in a cold state. It is very important that a larger expansion area is maintained above the cooling water level.

Fig. 6.12.0-4: Cooling Water Expansion Tank



Repeat this procedure several times.

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

It might be advisable to repeat the venting procedure a couple of days later, to ensure that all air that may have remained in the system is finally released.



The ventilation screw above the cooling water pump casing may not be opened under any circumstances, while the generator is running. Air will be sucked through the opening, if this should happen by mistake. Venting the whole system afterwards is necessary and very difficult.



Fig. 6.12.0-5: Ventilation Screw above the Cooling Water Pump Casing



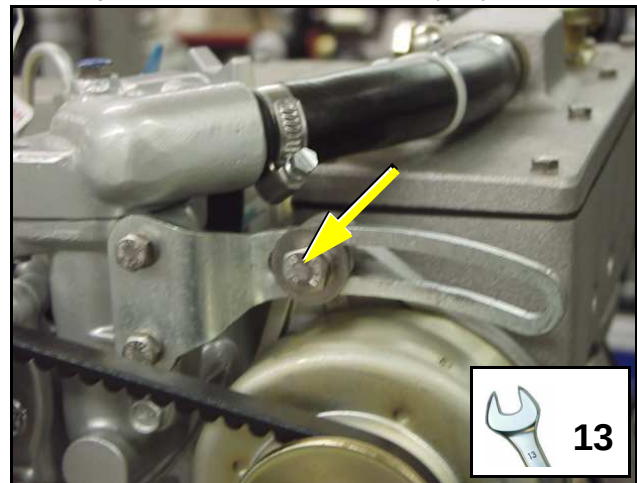
6.12.1 Replacement of the V-Belt for the internal cooling water pump

The relative high ambient temperature in the closed sound insulated capsule (about 85°C) can be a reason for a reduced lifespan of the v-belts. It is possible that the "softeners" in the rubber compound lose their effect after a short operating time because the air in the sound insulated capsule can be relative warm and dry. The v-belt must be controlled at very short time intervals. It may be required to change the v-belt after several weeks because of unfavourable conditions. Therefore, control should be carried out after an interval of 150 operating hours. The v-belt is a wearing part. There should be enough spare v-belts on board. We recommend that you have the respective manual within reach.

Loosen the screw on the deflection pulley bracket

Sample Picture

Fig. 6.12.1-1: Screw on the deflection pulley bracket

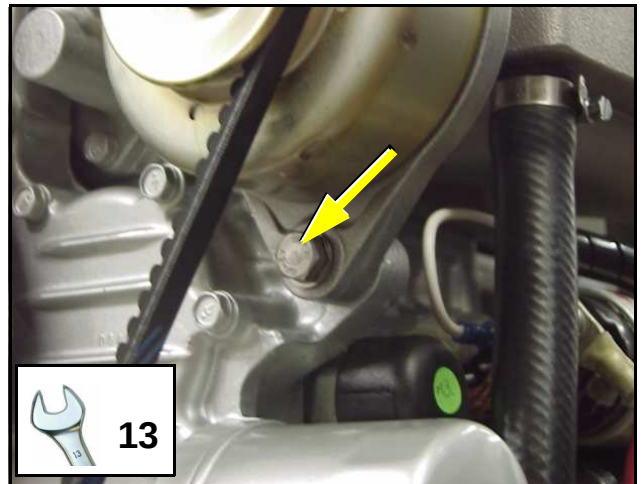




Loosen the screw beneath the alternator

Sample Picture

Fig. 6.12.1-2: Screw beneath the Alternator

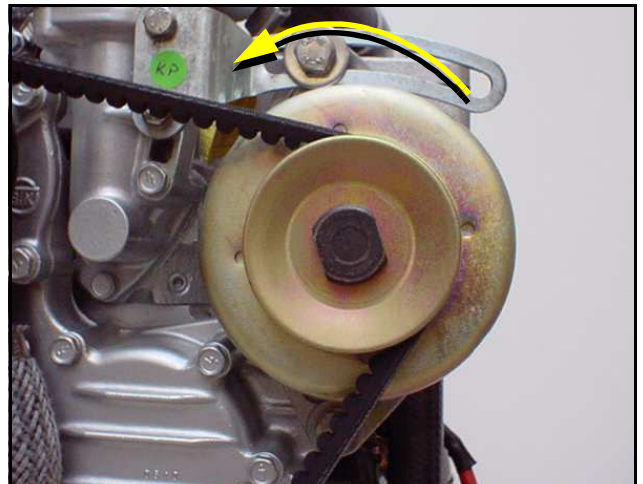


Press the alternator in the direction of the thermostat casing

Exchange V-belt

Sample Picture

Fig. 6.12.1-3: DC Alternator

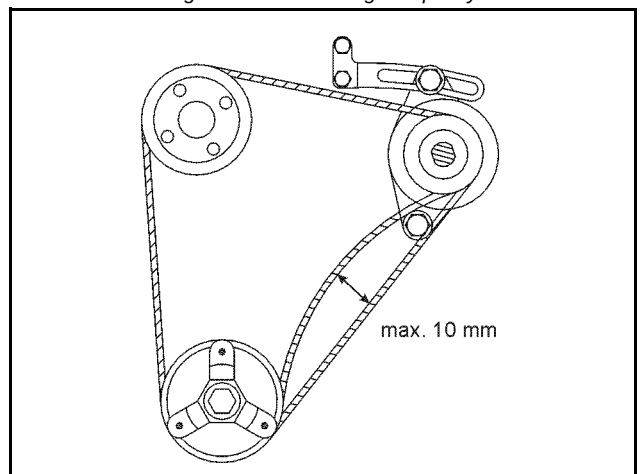


Re-tighten V-belt

The belt pulleys should only be tightened to the extent that it can still be pushed with a thumb (approx. 10 mm).

Re-tighten the screws above and below the alternator

Fig. 6.12.1-4: Drawing belt pulley





6.13 The seawater circuit

6.13.1 Cleaning the seawater filter

Residue should be regularly removed from the seawater filter. The seacock must, in each case, be closed first. It often suffices to merely hit the filter punnet.

If water should seep through the cover of the seawater filter, this may never be sealed with adhesive or sealant. The cause for the leakage must be sought. The sealing ring between caps and filter holders must be exchanged in the simplest cases.

Sample picture

Fig. 6.13.1-1: Seawater Filter



6.14 Reasons for frequent impeller wear

1. Unreasonable operating conditions

The Cooling water pump Impeller must be regarded as a wearing part. The life expectancy of an impeller can vary considerably and depends exclusively upon the operating conditions. The Fischer Panda Generator cooling pumps are designed in a way, that the speed of the pump in comparison to other generators is relatively low. This has a positive effect on the life expectancy of the pump.

2. Longer Suction Distance of Cooling Water

If the cooling water suction distance is long, or is blocked, this has a negative effect on the impeller, so that an under-pressure occurs in the cooling water suction area. This can reduce the efficiency of the impeller and place strain on the blades. This can greatly reduce the life expectancy.

3. Operating in contaminated waters

The impeller is placed under great strain in waters with high contamination. The use of the impeller in coral waters is also critical. There are known cases, where the impeller was so fatigued after 100 hours use, that the lip seals were grinded away by the shaft. In these cases sharp crystal parts from the coral press into the rubber seals and act as a grinding material on the stainless steel shaft of the impeller pump.

4. Generator mounted above the water level

It is especially disadvantageous for the impeller pump, if the generator is mounted above the water level. This means that a few seconds will pass before the impeller can suck in cooling water. This short dry running period damages the impeller. The increased wear can also lead to a breakdown. (See special instruction: "Effect on the impeller pump, if the generator is mounted above the water line").

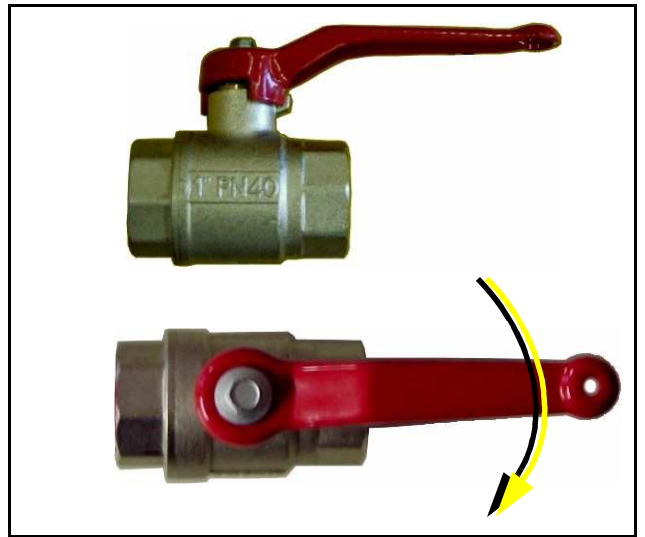


6.14.1 Replacement of the impeller

Close the seawater valve.

Sample Picture

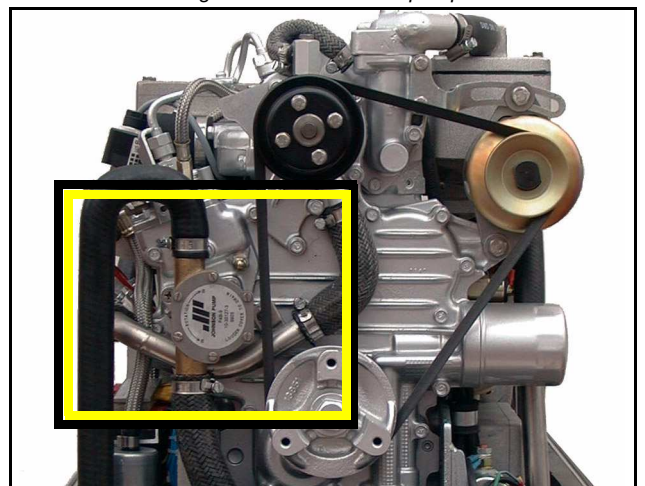
Fig. 6.14.1-1: Seawater valve



The seawater pump is located on the front side of the genset.

Sample Picture

Fig. 6.14.1-2: Seawater pump

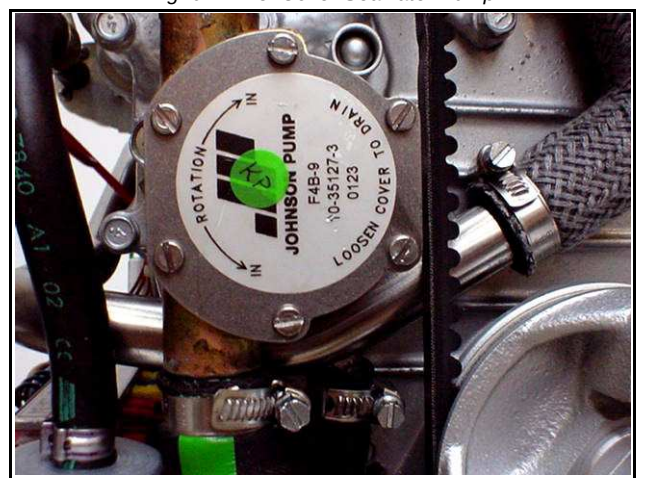


Remove the cover of the seawater pump by loosen the 4 wing screws from the housing.

Fig. 6.14.1-3: Cover Seawater Pump

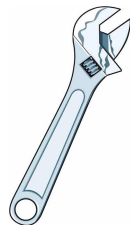


Sample Picture



Remove the impeller from the shaft by means of multi grip pliers.

Mark the impeller, to make sure that it is in the correct position when re-installation is carried out.



Sample Picture

Check the impeller for damage and replace it if necessary.

The impeller should have been lubricated with glycerine or with a non-mineral oil based lubricated e.g. silicone spray, before re-insertion into the housing. Attention: This is very important, because the impeller can quickly be damaged.

Sample Picture

Attach the impeller to the pump shaft (if the old impeller is re-used, initially check the marking).

Fastening the cover and use a new seal.



Sample Picture

Fig. 6.14.1-4: Impeller

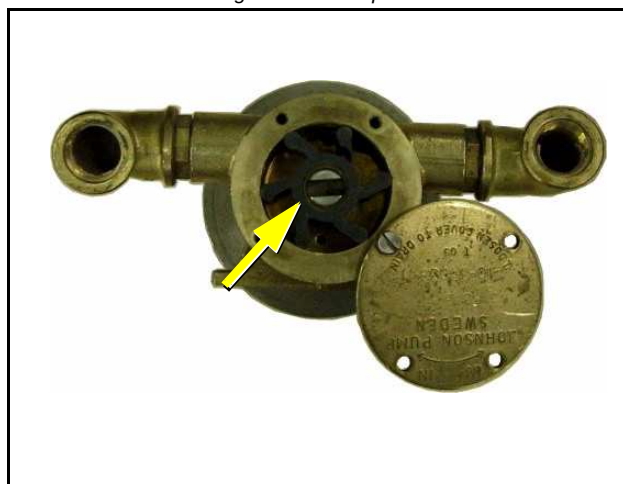


Fig. 6.14.1-5: Impeller



Fig. 6.14.1-6: Cover Pump Shaft





7. Generator Faults

7.1 Personal requirements

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

Any further 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.

7.2 Hazard notes for this chapter

see "Safety instructions - Safety first!" on Page 18.

Also consider the general safety instructions at the first pages of this manual.

Note!:



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.

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 in 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 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.

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

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

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

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

Danger!: Danger of poisoning



ATTENTION!: Danger to Life - High voltage



Warning!: Hot surface/material



Instruction!: Personal protective equipment necessary.



Attention!: Disconnect all load



7.3 Tools and Measuring Instruments

In order to be able to manage disturbances while driving, the following tools and measuring instruments should belong to the equipment kept on board:

- Multi-meter for voltage (AC), frequency and resistance
- Measuring instrument for inductance
- Measuring instrument for capacity
- Current absorbing clamps
- Thermometer (ideal is a infra-red thermometer)
- Pressure device (pincer) for coolant circuit



7.4 Troubleshooting Table and Flowchart

7.4.1 Generator output voltage too low

For 50 Hz versions: less than 200 V

Cause	Solution
Generator is overloaded.	Reduce the electrical load (switch off load)
Motor is not reaching the rated rpm.	Refer to "motor faults" section.
Defective capacitor(s).	Check capacitors and replace if necessary.

7.4.2 Generator voltage too high (more than 240 V - 50 Hz)

Cause	Solution
Over-energizing due to wrong capacitors.	Check capacitors type and replace if necessary.
Measuring voltage on the VCS circuit board is missing.	Check VCS System, check cable connections.

7.4.3 Generator voltage fluctuates

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

7.4.4 Generator not able to start electric motor

Cause	Solution
If the generator is unable to supply enough power to start an electric motor 1-phase, it is usually because the motor draws too much current during starting process.	Check the motor's current draw required for starting (switch to 3-phase, if possible). This could be remedied by providing stronger capacitors or installing an optional "Easy Start Booster Set" (see Appendix). Enquire at your nearest Panda dealer or directly at the manufacturer.

7.4.5 Diesel motor fails to start

Cause	Solution
Starter battery switched "OFF".	Check position of battery switch and switch "ON" (if installed).
Starter battery voltage insufficient (battery too weak).	Inspect battery terminals and cables for a good electrical connection (Inspect against corrosion, tattered wires, etc.).
Starting current disrupted.	During the normal starting process, the battery voltage drops to 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.

7.4.6 Starter is turning motor, but fails to start

Cause	Solution
Fuel inlet solenoid valve not opening.	Check wire connections and circuitry to solenoid valve. (ref. DC wiring diagram: Relay K2, Fuse)
Fuel pump not working.	Check fuel-filter and pump: clean if necessary.
Lack of fuel.	Check fuel supply.



Cause	Solution
Glow-plugs not working correctly.	Check glow plugs and heating time.
Too much air in fuel lines.	Test fuel system for leakage. Bleed air from fuel system (refer to section "Bleeding Air from Fuel System").
Fuel-filter blocked.	Replace fuel filter.

7.4.7 Motor does not achieve enough speed during starting process

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

7.4.8 Motor runs unsteady

Cause	Solution
Disruption in the area of the injection systems' automatic advance.	Repair / Check the automatic advance via the motor service.
Air in the fuel system.	Ventilate the fuel system.

7.4.9 Motor speed drops

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

7.4.10 Motor runs in off position

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



7.4.11 Motor stops by itself

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

7.4.12 Sooty, black exhaust

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

7.4.13 Generator must be shut off immediately if:

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

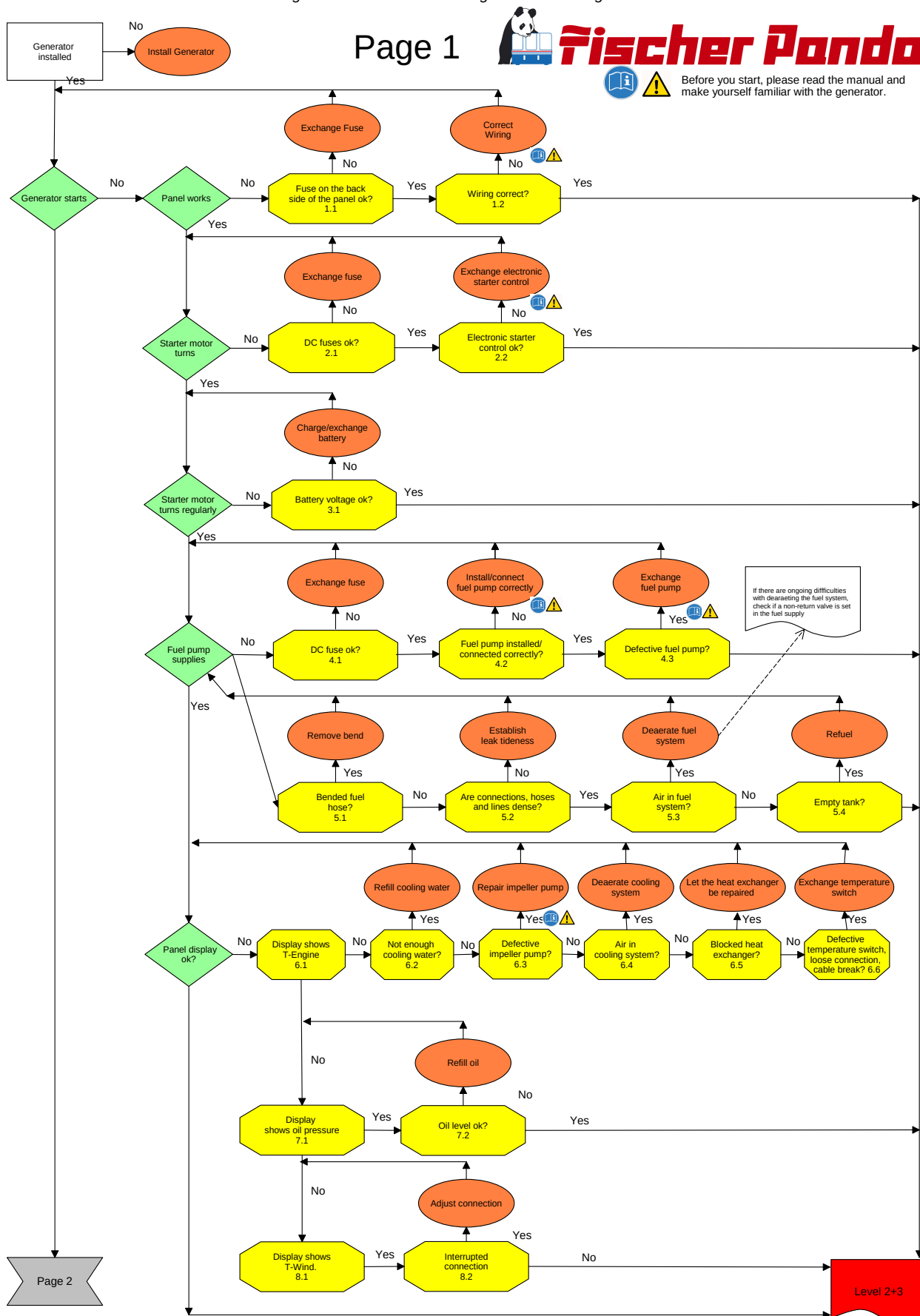
7.4.14 Troubleshooting for the VCS-Voltage Control

Cause	Solution
No movement of the actuator.	Voltage supply for electronics active? Motor connected? 230 V measurement voltage attached?
Actuator controls in idle speed or full throttle.	Correct or change polarity of the motor. 230 V measurement voltage attached?
If it occurs that all electronic components break down or any other failure emerges, the generator can still be operated when the electronic system is overridden. For this the plug is pulled out and the two cables are tied over it. 1. Loosen the speed lever between motor and injection pump controller and adjust to max. 240 V. OR 2. Loosen connection plus motor VCS-electronic, directly feed the motor with 12 V voltage and adjust to max. 240 V.	

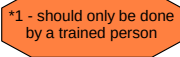


7.4.15 Troubleshooting Flowcharts

Fig. 7.4.15-1: Troubleshooting Flowchart - Page 1



Page 2





7.4.15.1 Details and explanations concerning the troubleshooting flowchart

Each failure position in the flowchart above contains a reference number.

With this reference number, the corresponding work steps can be taken from the list below.

1.1 Fuse at the remote control panel.

Execute the fuse exchange as indicated in the data sheet of your remote control panel. Please note that not all remote control panels do have a corresponding fuse.

1.2 Correct the wiring.

Get the wiring of the generator and the wiring of the external components checked according to the installation instructions in this manual and the data sheets, as well as descriptions of the external components and correct them if necessary.

These operations are to be executed by a trained professional only! Attention: Voltage up to 400V - Danger to life!



2.1 Exchange DC fuse (Fuse for the starter circuit) - see wiring scheme

Exchange the relevant fuses at the generators' terminal block.

A defective fuse is not always visually detectable. Measure the fuse with a multimeter for connecting passage.

2.2 Exchange anti-repeat starter device.

Loosen the connecting plug of the anti-repeat starter device.

Loosen the holding screws of the anti-repeat starter device.

Mount the new anti-repeat starter device in reversed order.

3.1 Charge/exchange starter battery.

Proceed according to battery manufacturer instructions.

4.1 Exchange DC fuse (Fuse for the fuel pump) - see wiring scheme

Exchange the relevant fuses at the generators' terminal block.

A defective fuse is not always visually detectable. Measure the fuse with a multimeter for connecting passage.

4.2 Correct mounting/connection of the fuel pump.

Check the appropriate polarity at the connections and the tight fit of the connections at the fuel pump.

4.3 Exchange fuel pump.

Loosen the electric connections of the fuel pump.

Loosen the holding screws of the fuel pump.

Mount the new fuel pump in reversed order.

5.1 Remove buckling from the fuel hose.

Remove any buckling and improve the installation to avoid further disruptions.

5.2 Sealing the connections.

Seal the system in an appropriate way. The system has to be checked for leakage at frequent intervals.

5.3 Ventilating the fuel system.

Ventilate the fuel system as stated in the chapter 'Installation'. If air keeps entering into the fuel system, this might be an indication for a leaking connection or porose hoses. Then the fuel system should be inspected by a professional.

5.4 Refuelling

Refuel your vehicle/the generator as described in the bord manual.



6.2 Refill cooling water.

Refill the cooling water as described in the chapter 'Maintenance'.

6.3 Defective impeller pump.

Replace the defective impeller as described in the chapter 'Maintenance'.

6.4 Air in the cooling system.

Ventilate the cooling system as described in the chapter 'Maintenance'.

6.5 Heat exchanger blocked.

Get the heat exchanger repaired at a Fischer Panda Servicepoint/Service Center.

6.6 Defective temperature switch, possibly loose contact/cable break.

Get the temperature switch repaired at a Fischer Panda Servicepoint/Service Center.

7.2 Oil level too low.

Refill oil as described in the chapter 'Maintenance'.

8.2 Connection assembly interrupted.

Repair the connection assembly.

9.1 Defective cable to the AC-Box.

Get the cable to the AC-Box exchanged by a Fischer Panda Servicepoint/Service Center.

The operations are to be executed by a trained professional only!

Attention: Voltage up to 400V - Danger to life!



9.2 Defective cable AC out.

Get the cable AC out exchanged by a Fischer Panda Servicepoint/Service Center.

The operations are to be executed by a trained professional only!

Attention: Voltage up to 400V - Danger to life!



9.3 Defective consumer load.

Exchange consumer load/do not operate anymore.

9.4 Missing residual magnetism.

Let the residual magnetism be restored.

The operations are to be executed by a trained professional only!

Attention: Voltage up to 400V - Danger to life!



10.1 Air in the fuel system.

Ventilate the fuel system as described in the chapter 'Installation'.

10.2 Defective DC fuse fuel pump

Exchange the relevant fuses at the generators' terminal block.

A defective fuse is not always visually detectable. Measure the fuse with a multimeter for connecting passage.

10.3 Incorrect attachment of the fuel pump.

Get the installation corrected at a Fischer Panda Servicepoint/Service Center.



10.4 Defective fuel pump.

Get the fuel pump exchanged at a Fischer Panda Servicepoint/Service Center.

10.5 Buckled fuel hose.

Arrange the fuel hose in a way that no buckles can form.

10.6 Leaky connections/pipes.

Seal the connections professionally - Exchange leaky pipes.

11.1 Actuator arbor is jammed.

Check the Max/Min-adjustments and grease the actuator arbor, as described in the chapter 'Generator Faults'.

11.2 Connection assembly actuator disrupted.

Rebuild connection assembly.

11.3 Defective DC fuse on the VCS.

Get the relevant fuses exchanged at a Fischer Panda Servicepoint/Service Center.

The exchange is described in the chapter 'Generator Faults'.

A defective fuse is not always visually detectable. Measure the fuse with a multimeter for connecting passage.

The operations are to be executed by a trained professional only!

Attention: Voltage up to 400V - Danger to life!



11.4 Disrupted measuring voltage to VCS.

Get the measuring voltage cable connected/exchanged by a Fischer Panda Servicepoint/Service Center.

The operations are to be executed by a trained professional only!.

Attention: Voltage up to 400V - Danger to life!



11.5 Generator is overloaded.

Reduce the load. Ensure that the generator does not get overloaded.

12.1 Air in the fuel system.

See 10.1

12.2 Lack of fuel

Re-assemble the fuel supply.

12.3 Faults in the redundant temperature circuit.

Get the temperature switch as well as the connection assemble and electric cables checked and repaired by a Fischer Panda Servicepoint/Service Center

12.4 Generator is overloaded.

See 11.5

13.1 Lack of cooling water.

Refill the cooling water as described in the chapter 'Maintenance'.

13.2 Defective impeller pump.

Replace the defective impeller as described in the chapter 'Maintenance'.

13.3 Air in the cooling system.

Ventilate the cooling system as described in the chapter 'Maintenance'.



13.4 Heat exchanger blocked.

Get the heat exchanger checked and repaired by a Fischer Panda Servicepoint/Service Center.

13.5 Defective temperature switch, possibly loose contact/cable break.

Get the temperature switch checked and repaired by a Fischer Panda Servicepoint/Service Center.

13.6 Leaky ventilation screw.

Renew the ventilation screw sealing.

14.1 Oil level too low.

Refill oil as described in the chapter 'Maintenance'.

14.2 Defective oil pressure switch.

Get the oil pressure switch exchanged by a Fischer Panda Servicepoint/Service Center.



7.5 Versions of the generator power terminal box

Generator Power Terminal Box 230 V / 50Hz

In these terminal boxes there are the electrical connection points for the AC generator. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.

Sample picture

Fig. 7.5.0-1: Generator output terminal box 230V / 50 Hz

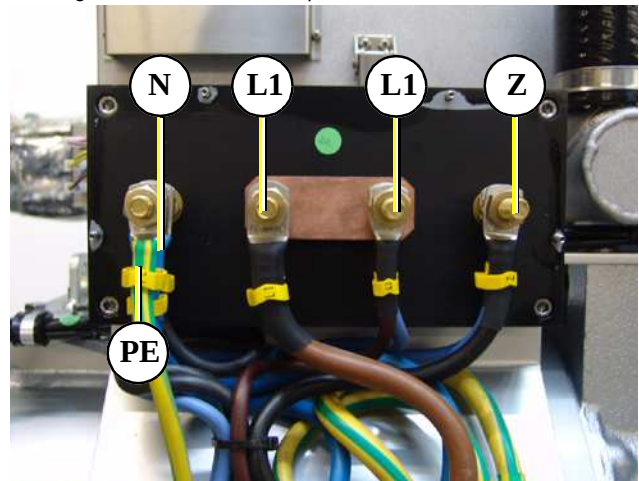
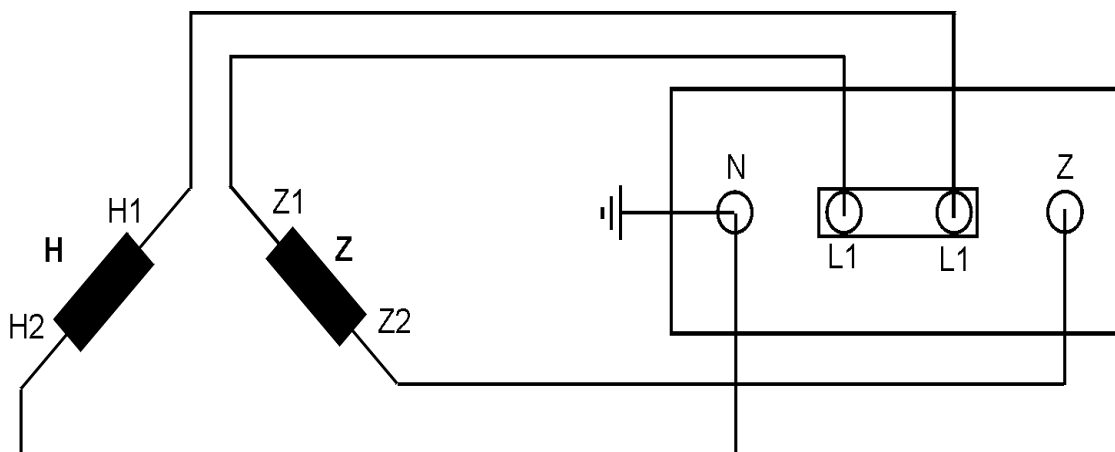


Fig. 7.5.0-2: Wiring diagram HP1 - 230 V / 50 Hz



Generator Power Terminal Box 400 V / 50 Hz

In these terminal boxes there are the electrical connection points for the AC generator. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.

Sample Picture

Fig. 7.5.0-3: Generator Power Terminal Box 400 V / 50 Hz

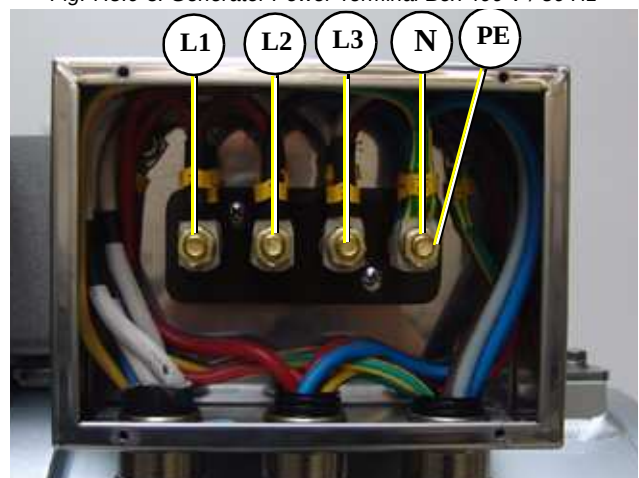
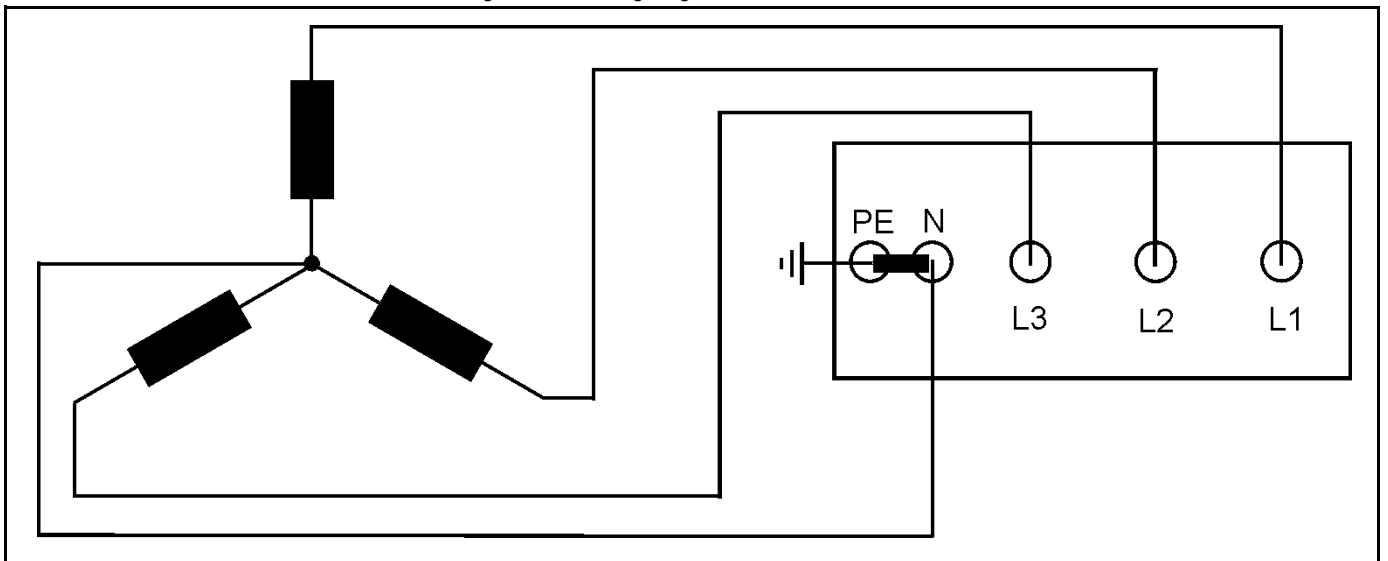




Fig. 7.5.0-4: Wiring diagram HP3 - 400V / 50 Hz



Generator Power Terminal Box 120 V / 60 Hz

In these terminal boxes there are the electrical connection points for the AC generator. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.

Sample Picture

Fig. 7.5.0-5: Generator power terminal box 120 V / 60 Hz

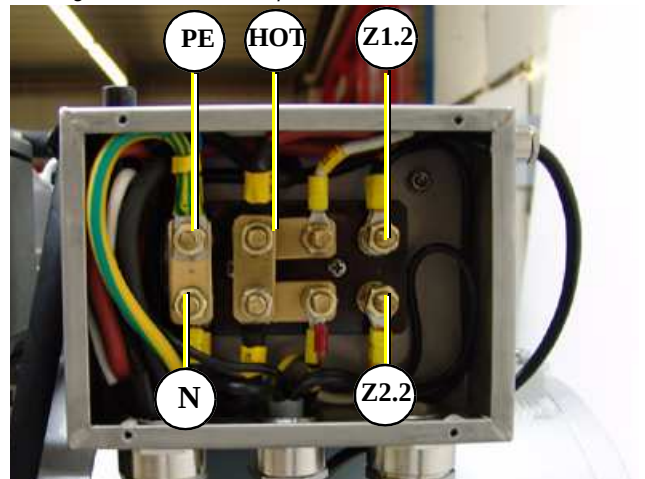
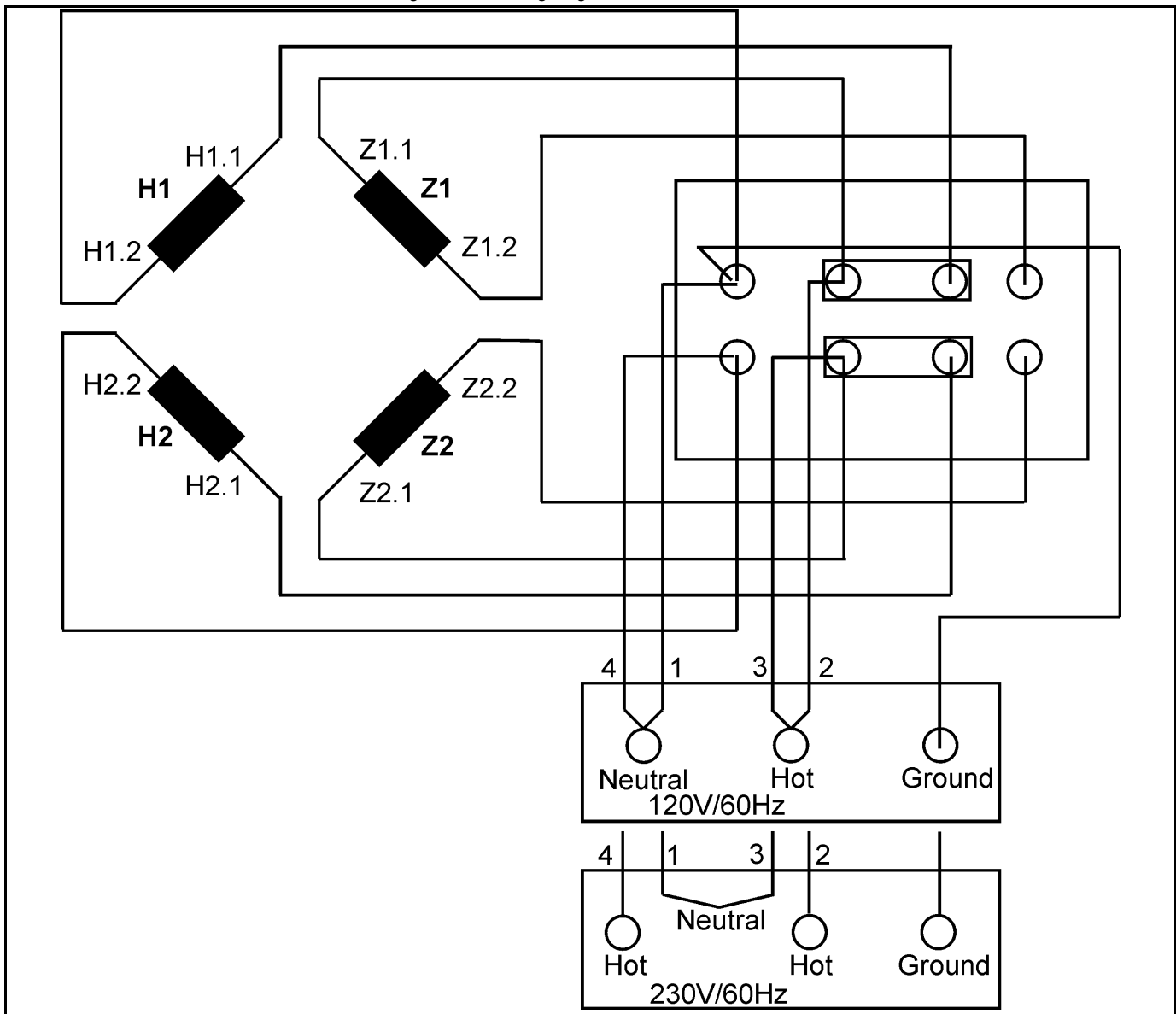




Fig. 7.5.0-6: Wiring diagram HP1 - 120 V / 60 Hz



Generator Power Terminal Box 240 V / 60 Hz (208 V / 60 Hz)

In these terminal boxes there are the electrical connection points for the AC generator. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.

Sample Picture

Fig. 7.5.0-7: Generator power terminal box 240 V / 60 Hz

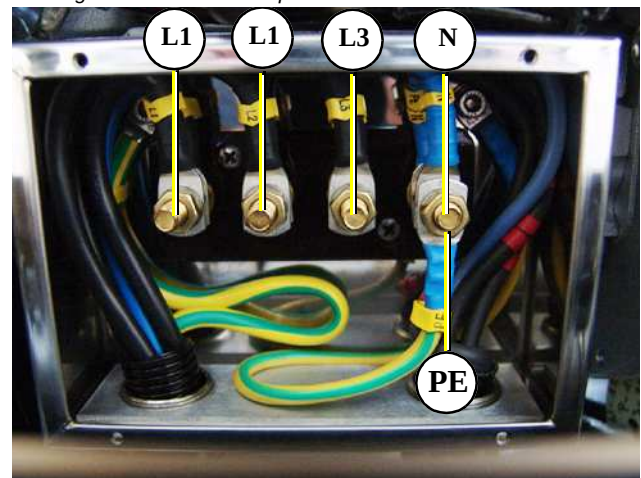
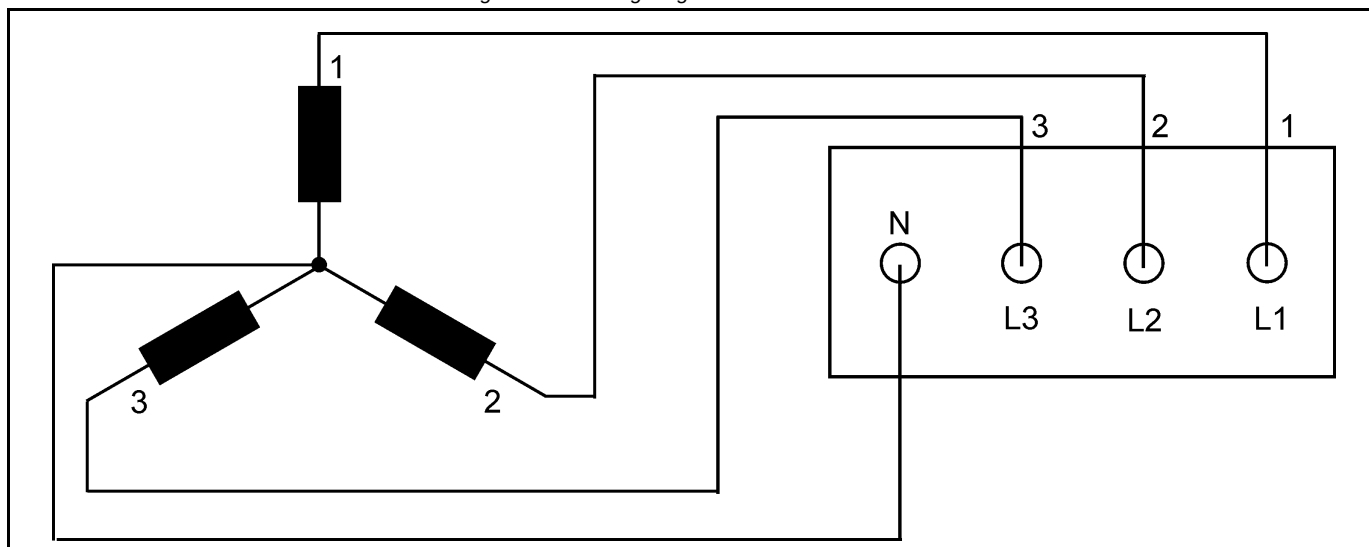




Fig. 7.5.0-8: Wiring diagram HP3 - 240 V / 60 Hz



Generator Power Terminal Box DVS - 120 V + 240 V / 60 Hz

In these terminal box there are the electrical connection points for the AC generator. Here is also the bridge for the protective grounding of the generator. The cover may only be removed, if it is guaranteed that the generator cannot be inadvertently started.

Sample Picture

Fig. 7.5.0-9: Generator power terminal box DVS

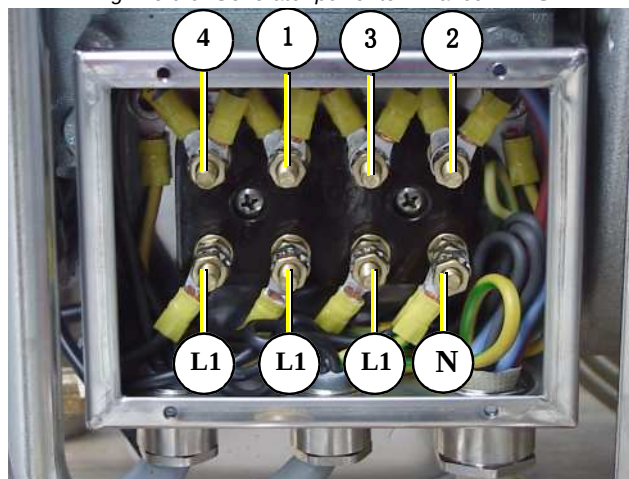


Fig. 7.5.0-10: Wiring diagram DVS - 120 V + 240 V / 60 Hz

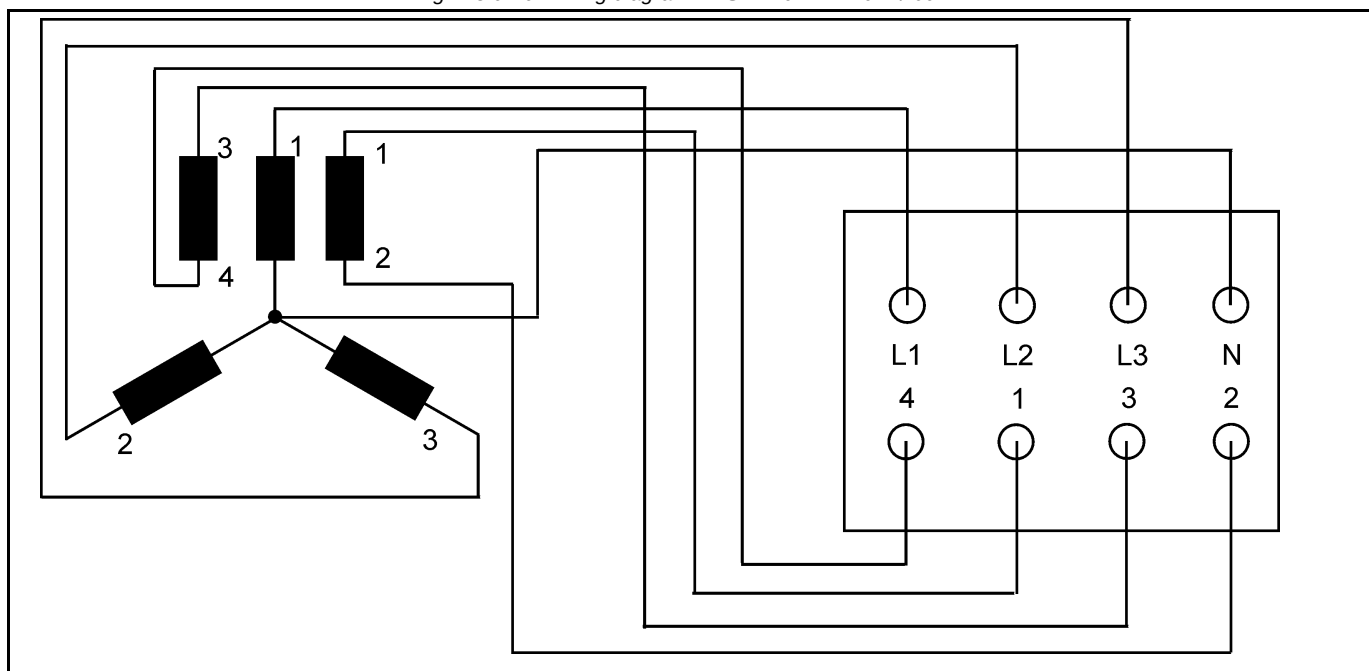
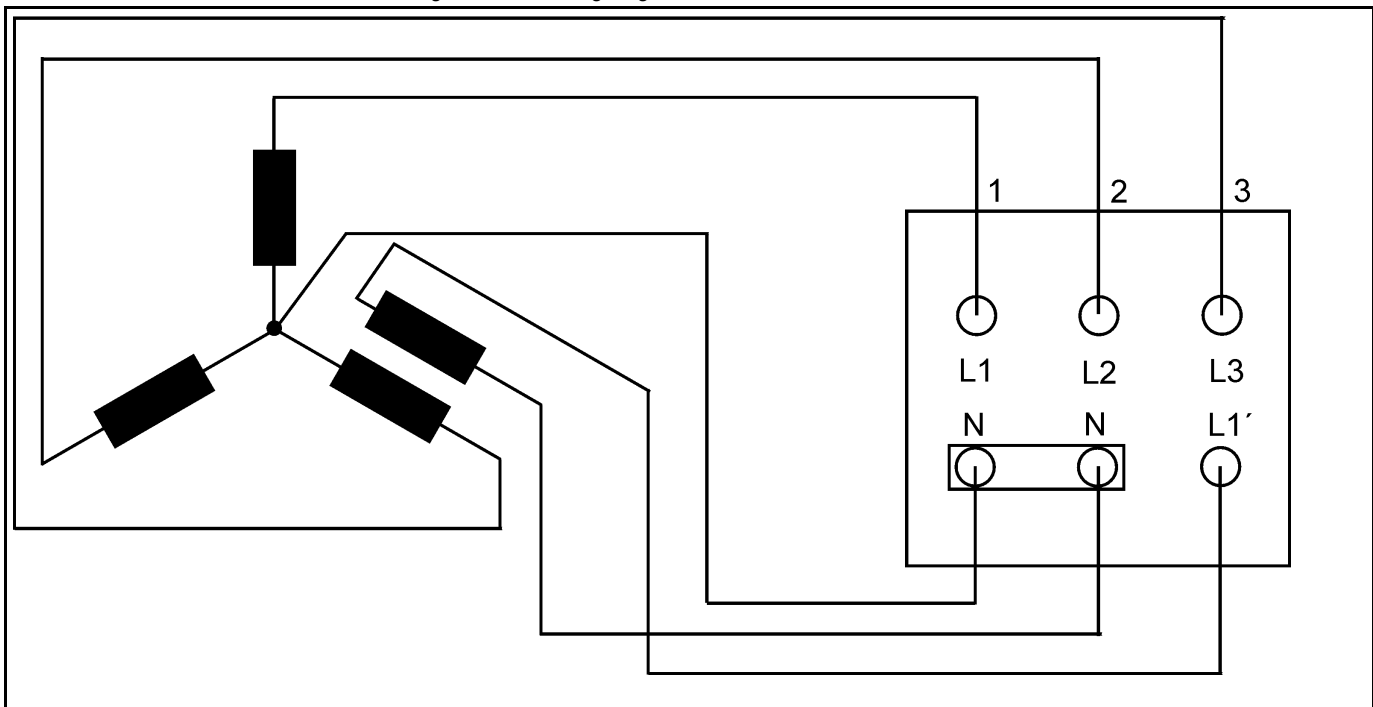




Fig. 7.5.0-11: Wiring diagram DVS - 230 V + 400 V / 50 Hz



7.6 Overloading the generator

Please ensure that the generator is not overloaded. This must be considered, especially with regards to multi power generators. In this case the extra load including the electrical performance can be considerably greater than the drive performance of the motor, which can eventually lead to a damaged motor.

The full nominal performance of the generator is fore-mostly for short term use. It is, however, required to start electric motors with high starting current or achieve special starting procedures at peak loads. 70% nominal load is ideal for a long motor life. (Continual use means uninterrupted use of the generator for many hours). This should be taken into consideration when connecting devices. This ensures extended motor life.

It is no problem for the motor to be run occasionally for 2 - 3 hours at full load. The complete conception of Panda Generator ensures that even during extreme conditions, an overheating of the motor will not occur. Accumulation of soot will occur if run for long periods at full load.

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.

Overloading the Generator with Electric Motors

With the operation of electric motors it must be considered that these take up a multiple of their rated output as starting current (six to tenfold).

If the power of the generator for the engine is not sufficient, the voltage in the generator breaks down after switching on the engine. For special approach problems the manufacturer can give recommendations regarding the accomplishment of the situation (e.g. amplified condensers, gradual start switch or extra developed starting unit for electric motors).

The system efficiency can be improved up to 50 % and the starting current can be improved up to 100 % by a professional adjustment of the engines. If the inductive load (electrical motors etc.) lies over 20 % of the generator rated output compensation is appropriate (see in addition also the writing: "Operation Instructions for Generators with Inductive Loads").



7.6.1 Monitoring the Generator Voltage

see "Safety instructions - Safety first!" on Page 18.

ATTENTION!



The voltage range of the power stations normally lies between 200 and 240 V (100 - 130 V in the 60 Hz version). In some countries even substantially larger tension deviations are being called "normally". The Fischer Panda generators are aligned that they keep these default values during normal load.

With high load or overload it can occur that the voltage drops on 190 V (95 V in the 60 Hz version) and partly still more deeply. That can become critical for certain devices (e.g. for electric motors, cooling compressors and possibly for electronic devices). It must be paid attention that the voltage for such consumers are sufficient. This can be supervised by a voltmeter.

The voltmeter should be always installed behind the change over switch generator/land power, so that each voltage source is shown. No further voltmeter is provided for the generator itself.

If additional consumers are switched on, the voltage must be controlled in each case at the voltmeter. Sensitive devices must be switched off so long, until the voltage exceed the critical parameter.

Under certain circumstances the generator provides overvoltage. This arises if the number of revolutions of the generator is increased. Changing the number of revolutions may be made only with a tachometer and/or a voltmeter.

If sensitive and/or valuable devices are used, which are to be protected against this risk, an automatic overvoltage protection must be mounted (voltage control with disconnection).

7.6.2 Automatic voltage monitoring and auto-shut down

If air conditioning units (compressors) or other such valuable equipment is installed on-board, it is recommend that an automatic voltage monitoring unit be installed to protect this equipment from possible sharp voltage drops. The voltage monitoring system shuts down the entire system (and therefore all users) by means of 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). Such a relay with contactor can be obtained from the installer or as a complete unit from your Fischer Panda dealer.



7.7 Setting the speed governor of the actuator

The speed of the generator is determined by two independent settings; an upper and lower speed governor:

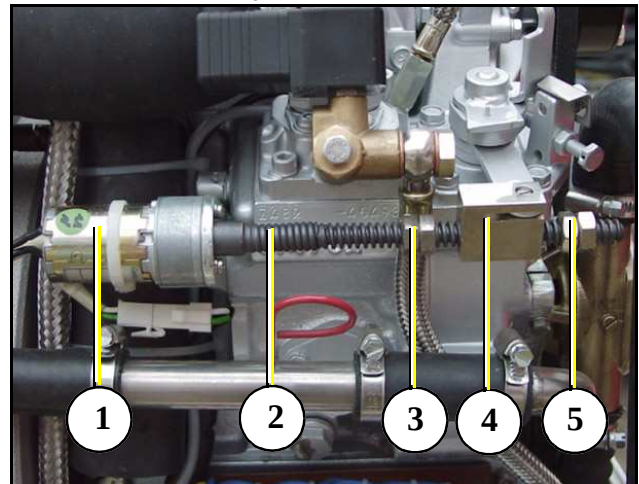
- By means of the adjusting nuts on the spindle of the servomotor right and left from the spindle nut (Setting of the normal speed limit).
- By means of an adjusting screw that is located on the base of the speed control lever. (Setting of the maximum upper speed).

After working on the components of the actuator, the speed must be checked.

Actuator

1. Servo motor
2. Trapezoidal Thread Spindle
3. Adjusting nuts for max. speed
4. Spindle nut with speed adjusting lever
5. Adjusting nuts for the lower setting

Fig. 7.7-1: Actuator



During any operation at the generator all consumers have to be switched off to avoid damages at the equipments. Also the solid state relay, which is installed in the AC control box must be disconnected to avoid an accidentally activation of the booster capacitors.

7.7.1 Setting the maximum upper speed setting

1. Remove the plug from the electrical input for the actuator.
2. Loosen the counter nuts of the speed governor screws with a combination wrench SW 10.
3. Connect a voltmeter with a range up to 300 Volts AC to the AC Output of the AC Control Box.
4. Ensure that no electrical load has been set.
5. Start generator.
6. Raise the speed of the generator by turning the spindle of the servomotor until the voltmeter reaches 260 Volts (130 Volts).
7. Turn the governor screw firmly against the stop setting of the speed adjustment lever.
8. Secure the governing screw by means of the counter nut.
9. Once again check whether the generator voltage is governed to 260 Volts (130 Volts).

The upper speed settings serve as an additional safety factor. The value for the maximum voltage is therefore approx 5 volts above the normal running limit.

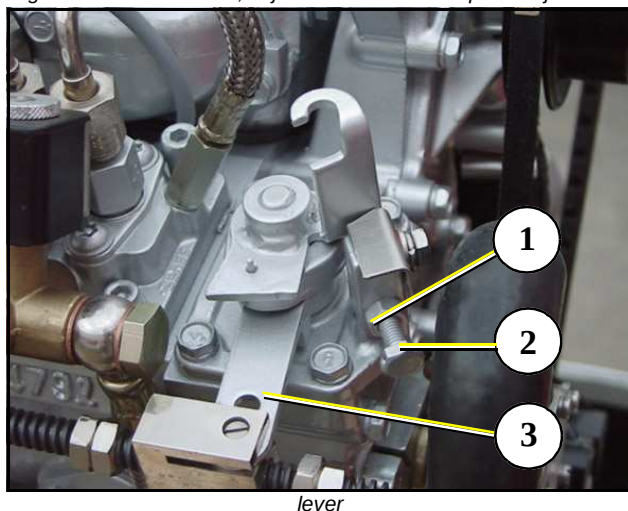


Speed adjustment lever

1. Counter nut
2. Adjustment screw for upper setting
3. Speed Adjustment Lever

This setting should not be changed otherwise the guaranty will expire.

Fig. 7.7.1-1: Counter nut, adjustment screw and speed adjustment



7.7.2 Setting the normal speed settings

Setting the lower speed limit

1. Remove the plug from the electrical input.
2. Loosen the counter nuts against each other by means of two combination spanners SW 10.
3. Connect an electrical voltmeter in the range up to 300 Volt AC to the AC Control Box output.
4. Ensure there is no electrical load.
5. Start generator.
6. By turning the servo meter spindle downwards by hand until the voltmeter shows a value of 225 volts (110V).
7. Tighten both nuts tightly against each other.
8. Once again check whether the lower generator voltage of the generator without load is limited to 225 volts (110 volts).

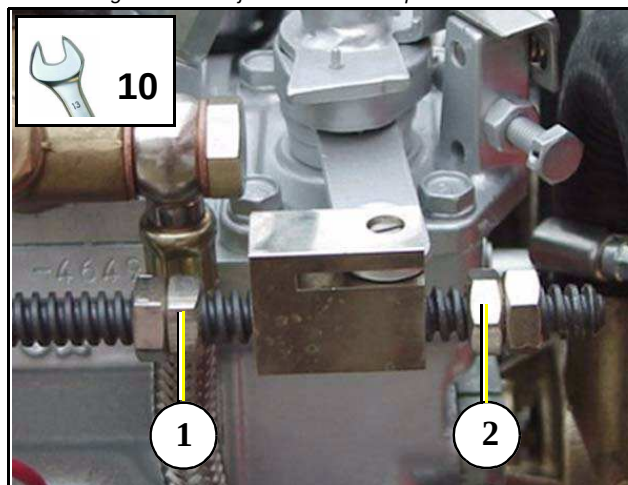
Setting the upper speed limit:

1. Continue as above and tighten the counter nuts at a voltage of max. 260 volts (130 volts).
2. Once again check whether the upper generator voltage without load is limited to 260 V (130 V)

Adjustment Screw Speed Governor

1. Adjustment screw for the upper speed limit
2. Adjustment screw for the lower speed limit

Fig. 7.7.2-1: Adjustment Screw Speed Governor



The electrical plug must be reconnected to drive the actuator servo motor, once the adjustment has been completed. The connection must be remade should the electrical input wires have been removed from the AC control box.



7.7.3 Greasing the trapezoidal thread spindle on the speed actuator

The speed setting of the trapezoidal thread spindle must be regularly greased. Only high temperature-resistant grease (up to 100 °C) may be used. The end of the nuts must also be smeared with grease.



If the spindle has not been sufficiently greased, then it can jam. The generator then cuts out when over or under-heated.

All screws on the rotary servomotor and the spindle should be secured with a screw securing solution, so that they can be easily loosened.

The trapezoidal thread spindle must be checked, if the generator has cut out, because of under or over voltage.

Servicing intervals also includes the checking of cut out functions in cases of defect. Only by making regular checks can it be ensured that the generator switches off, if there is a fault. The generator will not switch off, if the cut out control of the solenoid valve does not function.

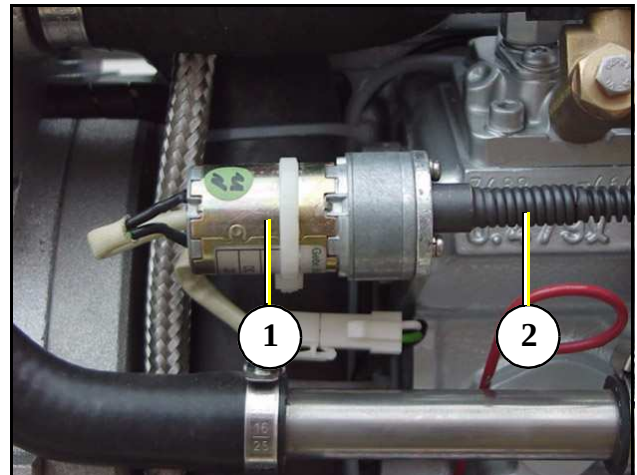
Trapezoidal Thread Spindle

1. Speed actuator

2. Trapezoidal Thread Spindle

Sample Picture

Fig. 7.7.3-1: Trapezoidal Thread Spindle





7.7.4 Consequences of a continual overloading of the Actuator

If the generator is overloaded, the voltage falls under the nominal value due to insufficient engine power. The actuator is already at the upperst speed limit and still tries to rise the rev. speed of the engine. There is an internal control which limits the actuator current, but an overloading over a longer period of time can still damage the winding of the actuator.

This will not effect the operation ability of the engine, but it can happen that the cranking torque of the actuator is getting weak. This has the consequence that the rev. spindle can not be turned to all positions correctly. Therefore the voltage regulatiron of the generator is very bad or the generator is temporarily not beeing regulated at all.

If you should notice that the actuator for the spindle sometimes does not run smoothly, then a check must be made to determine whether the generator has been effectively overloaded for periods, therefore causing damage to the internal winding of the actuator. The actuator must then be exchanged.

The electrical fuses on the circuit board must be checked, if the actuator for controlling the speed does not turn.

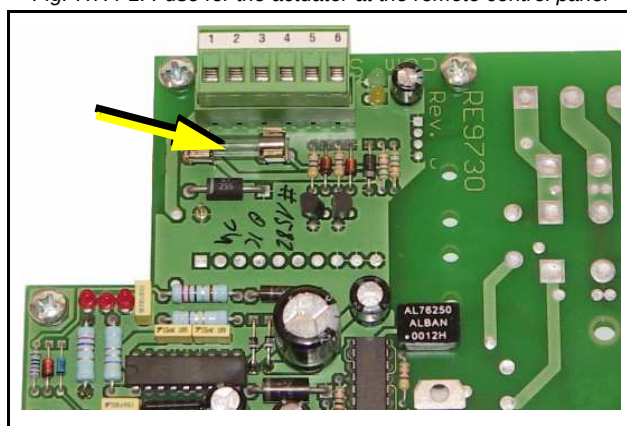
Change fuse for the actuator at the remote control panel here

Note: The Mini VCS has no internal fuse

Change this fuse at standard VCS

(1,6 A slow to blow)

Fig. 7.7.4-1: Fuse for the actuator at the remote control panel



True, overloading cannot damage the actual generator, since the windings are safe from overloading and short circuiting, but damage is always possible to peripheral consumers. This is especially the case for connected consumers, which can easily be damaged because of current that is too low.

7.7.5 Possible faults concerning the speed control „VCS“

Problem	Possible Cause
The spindle of the actuator jams	Not regularly lubricated. Surface has mechanical damage. Actuator is defective (evtl. winding short cut). Defect of the VCS control. Signal 230 V (115 V) AC missing. Limiting nut jams the spindle.
Fuse on the printed circuit board of the VCS control is melted.	Constant overload of the generator.

1.

7.7.6 Steps to check the voltage control in case of a failure:

1. Switch the load off .
2. Remove plug from the actuator.
3. Turn the actuator by hand to determine whether the adjusting nut has jammed against the speed governor.
4. Turn the actuator by hand to check whether the adjusting nut runs smoothly on the spindle.



If the above test produces no result, it can be assumed that the actuator operates smoothly. The electrical groups of components must then be checked:

1. Re-connect plug.
2. Start generator.
3. Turn the actuator by hand to check whether the Spindle is reversed by the motor.
4. It can be assumed that the actuator is faultless, if the turning of the actuator is too much for the hand (It is not normally possible to stop the motor with the fingers). It must be assumed that there is a fault with the voltage control (VCS).

7.7.6.1 The following measures are necessary if the actuator is jammed:

1. If the actuator only turns weakly:
 - Actuator has a destroyed winding and must be exchanged. (In future it should be ensured that the generator is not overloaded).
2. If the actuator does not move, but the spindle can be turned by hand:
 - Remove plug from the actuator and temporarily connect it to an external 12 volt direct current source. The motor is defective if the actuator still does not turn when connected to the external electrical source. Exchange the motor.

Actuator operates with external voltage source and works without flaws

1. Check VCS board fuse.
2. Check if measuring voltage is applied to the VCS board.
3. Check if supply voltage is applied to the VCS.
4. Check if the activation signal of the actuator is applied to the VCS' output.

The VCS circuit board should be exchanged if these measures do not produce clarity.

7.7.6.2 Checking the generator voltage limitation

The mechanical voltage limitation must be checked regularly.

1. Switch the load off
2. Disconnect the plug of the actuator.
3. Connect an electrical voltmeter.
4. Start the generator.
5. Turn the actuator to the lowest limit point by hand. The min voltage is 220 V (110 V).
6. The voltage must be 225 V (110 V).
7. Turn the actuator to the upper limit by hand. The max. voltage is 260 V (130 V). A new adjustment is necessary in case of deviants.

see "Setting the speed governor of the actuator" on
Page 156. for adjustment details



7.8 Generator-Output Voltage is too low

If the AC generated is too low, then the consumers should be disconnected, one after the other, in order to reduce the load on the generator. Generally the problem is then solved. The frequency should be checked, if the output voltage is correct after the consumers have been disconnected. Should this be above the prescribed generator idling speed, it can be assumed that one or several condensers are defective.

7.8.1 Discharging the Capacitors

Never work on the control box, if the generator is running! Do not touch the capacitors contacts, see "Safety instructions - Safety first!" on Page 18.

ATTENTION!



Capacitors

1. Switch off the generator.
2. Remove the starter battery.
3. Open the AC-Control Box.

The capacitors are discharged by short fusing both contacts. The contacts (Flat plug) can be bridged by means of a screwdriver with an insulated handle (short-circuiting).



Fig. 7.8.1-1: Capacitors





7.8.2 Checking the Capacitors

If the capacitors are to be checked, make sure that the capacitors have been discharged.

ATTENTION!



A visual check can give information on whether the capacitors are defective:

- Dielectric leak?
- Did the capacitor become longer?

Multimeter

The capacitors can be tested by means of a multi-meter, which is fitted with a buzzer. The multi-meter should be switched to open and both capacitor connections connected to the multi-meter.

The capacitors can be tested with a multi-meter. Switch the measuring instrument to "pass" and connect both connections of the capacitors to the connections at the measuring instrument.

Touch the two contacts of the capacitors by means of the test prods. A charge should be fed to the capacitor by the internal battery.

Fig. 7.8.2-1: Multimeter



Should a steady sound or no sound be heard, the capacitors are defective and must be replaced.

A capacity measuring instrument must be used in order to check whether the capacitors have full capacity.

The capacitors, which do meet the prescribed capacity value at this measurement, should be exchanged as fast as possible. If all capacitors prove to be still functional, then a check must be made, as to whether the connections to the strip are correct.

7.8.2.1 Checking the electrical connections to the capacitors

It must be ensured that the electrical connections to the capacitors are always tight fitting. Loose connections with transitional resistance can mean that the contact surfaces will become heated externally. This can lead to an increased deterioration of the capacitors.

7.8.3 Check the Generator Voltage

The following steps must be taken, in order to test whether the stator winding generates sufficient voltage:

1. The following steps must be taken, in order to test whether the stator winding generates sufficient voltage:
2. Ensure that the connection to the shipboard circuit is interrupted.
3. Remove all electrical wires in the generator junction box.
4. Starter battery must be connected to the generator.
5. Start generator.
6. Measure the voltage between the phases and neutral. It can be assumed that damage has been caused to the windings, if the measured values are below the values given in Table 8.8 on Page 176



Both partial windings must be connected for the 60Hz Version, i.e. there must be a connection made between wire 1 and 3 (see circuit plan).

(Note: The current arises from the rest magnetism of the rotor, which induces a voltage in the winding).

7.8.4 Measuring the Ohm Resistance of the Generator Windings

If a short circuit could not be found by using a multi-meter, then the windings parts of the generator must be checked by means of an Ohmmeter that is suitable for low resistance values.

- Set the measuring device to measure resistance. If you hold the poles of the measuring device against each other, then 0.00 Ohms should be shown. If the pole has been isolated then the display should show an overflow. Please carry out this test to check the device.
- Measure the resistance within the individual windings.

If there are large deviations, it must be assumed that there is a windings short circuit. This also leads to non-excitation of the generator.

The actual values between the windings parts and the earth cannot, however, be exactly determined. Fore-mostly, the values of all three measurements must be the same, if possible. Deviations from each other show there is windings short-circuit. In this case, the generator windings must be renewed by an electrician.

7.8.5 Check the Windings for Short Circuiting

Ensure that the generator has been switched off and cannot be inadvertently switched on. Disconnect the wires to the battery for this.

1. All wires in the junction box or - if necessary - in the circuit distribution box must be disconnected. Ensure that the wires are no longer carrying an electrical current, before being disconnected (see "Discharging the Capacitors" on Page 161.)
2. Remove the Bridges between "N" and "PE", so that the windings and casing do not come into electrical contact.
3. Make a check, by means of a Multimeter, as to whether there is a current between the individual winding terminals and the casing (PE).

The contacts to measured are not relevant to the type of generator (see type plate):

HP1 - 50 Hz: L, Z

HP1 - 60 Hz: L, Z

HP3 - 50 Hz: L1, L2, L3

HP3 - 60 Hz: L1, L2, L3, 1, 2, 3, 4

DVS - 50 Hz: L1, L2, L3, L1'

DVS - 60 Hz: L1, L2, L3, L1', 1, 2, 3, 4

Fig. 7.8.5-1: Generator type plate

 Fischer Panda					
Typ				Mod.	
S.Nr				Year	
				IP	IS.CL.
U_n		f_n		n_n	
S_{max}		I_{max}			
P_{max}		Cos φ			
Fischer Panda GmbH Paderborn, Germany					

The generator must be sent for a check to the factory or be re-winded locally, when a pass (beep) should be determined. Windings data can be requested for this, if it is necessary.



7.8.6 Measuring the Inductive Resistance

An Ohm measurement of a winding does not always give reliable information concerning the state of the winding. If there are resistance irregularities between the windings parts, this is a sure sign that the winding is defective. This means the opposite cannot be concluded. This means a winding can also be defective, if the resistance values between the windings parts do not show great deviation.

Measurement of the inductive resistance gives a better reading. A Special measuring device is necessary for this.

The inductivity is measured in the same manner as the resistance, i.e. the windings parts are compared. The value of the inductive resistance is given in mH (milli Henry).

The correct values for the inductive resistance can be obtained from Table 8.8 on Page 176.

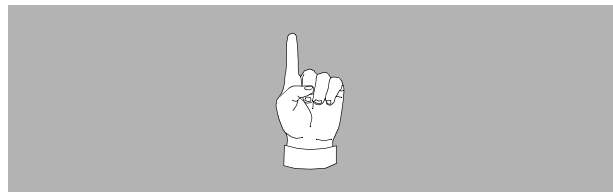
Note: The values are greatly dependent upon the measuring method (type of ohmmeter).

7.9 Generator provides no voltage

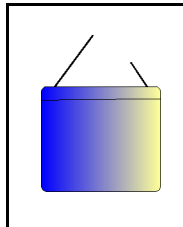
7.9.1 Rotor Magnetism Loss and "Re-magnetising"

"Safety Instructions" on Page IV

ATTENTION!



In the case of asynchronous generators, the generator cannot independently increase voltage after standing still, or, if it is switched off under full load. This is because the rotor has lost its remaining magnetism.



This remaining magnetism can be restored simply by use of a DC battery. In addition the "shore power" must be switched off and any connection to an AC-source must be interrupted.

Likewise the generator must be switched off, i.e. also the starter may not be operated. The power source selector is switched to "generator". Only the plug socket must be connected with the generator.

Now the two poles of a 9 Volt battery are connected to the plug socket or held against the appropriate contacts of the on-board current distributor. Do not use a battery bank or the generator starter battery, this could damage the winding. The DC voltage only may be applied for a short time (1-2 seconds). In the winding the remaining magnetism is restored by a short current pulse, and the generator can normally be started.



7.10 Engine Starting Problems

7.10.1 Electric Fuel Solenoid Valve

The fuel solenoid valve is located in front of the injection pump. It opens automatically, if the "START"-button is pressed on remote control panel. If the generator is switched to "OFF", the solenoid valve closes. It takes some seconds, before the generator stops.

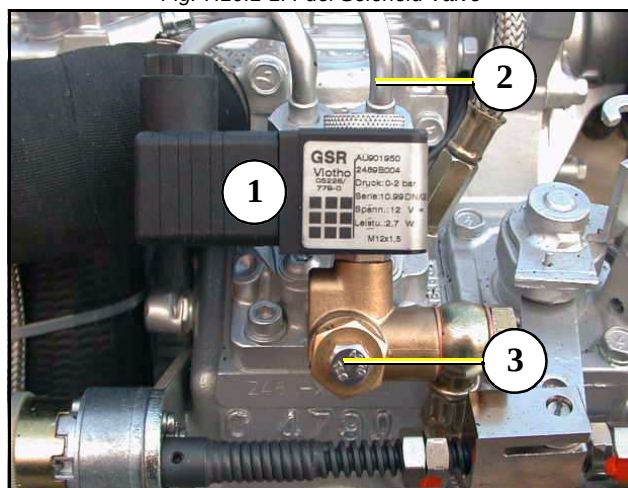
If the generator fails to start, runs rough, does not reach the proper RPM, or does not stop properly, the first item to suspect in most cases it is the fuel solenoid valve and should be inspected first.

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

1. Fuel solenoid valve
2. Fuel injector
3. Ventilation screw

Sample Picture

Fig. 7.10.1-1: Fuel Solenoid Valve



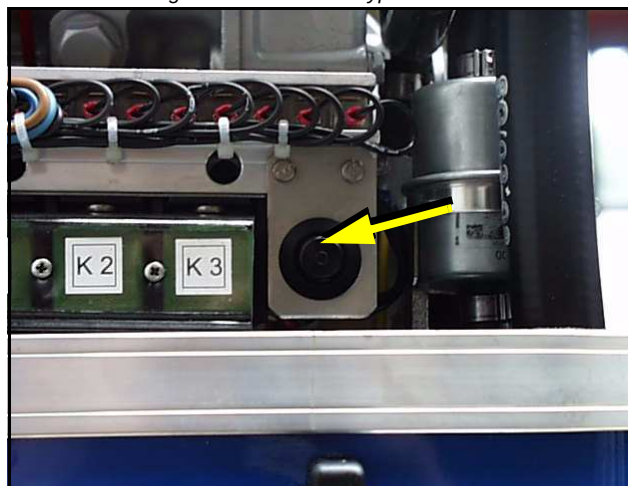
7.10.2 Re-start with Failure Bypass Switch

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

Failure Bypass Switch

Sample Picture

Fig. 7.10.2-1: Failure Bypass Switch





This period can be reduced by pushing the button on the front of the generator. The generator can be started by means of the remote control as long as the button is depressed. The switch/ button bypasses any faults allowing the generator to run.

Before depressing the button, check the oil level with the dip stick 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 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.

7.10.3 Lifting solenoid for motor stop - optional

There are two different versions of lifting solenoids:

A. Energized to stop

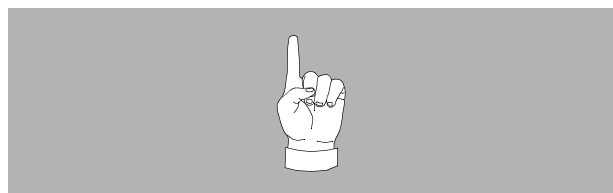
The lifting solenoid is furnished with voltage and pulled by pushing the „OFF“-button on the remote control panel. By doing that, the injection pump is set on zero lift and the generator stops.

B. Energized to run

This version is equipped with two solenoids, an operation- and a holding solenoid. After applying voltage, the operation solenoid pulls the adjusting lever of the injection pump, which gives way to the fuel. After reaching its end position, the operation magnet is switched off and the holding solenoid keeps that position as long as the generator is operating.

The „START“-button should not be pressed any longer than 5 sec. during the starting process, or the lifting solenoid draws too much current over the starter motor. Otherwise the lifting solenoid needs to be disconnected.

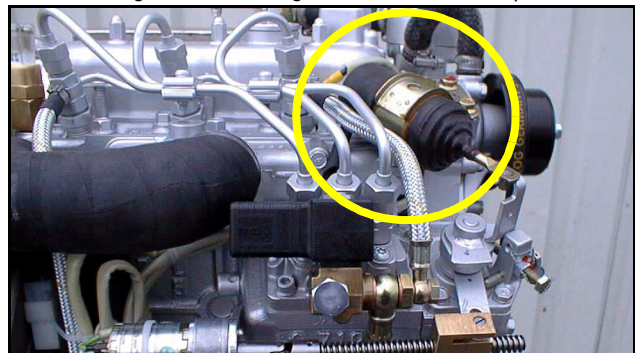
ATTENTION!



Lifting solenoid for motor stop

Sample Picture

Fig. 7.10.3-1: Lifting solenoid for motor stop



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 and operator.

7.10.4 Troubleshooting Table

For Troubleshooting see Table “Troubleshooting” on Page I.



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8. Tables

8.1 Technical Data

Fig. 8.1-1: Technical Data

	Panda 6000 ND	Panda 8000 NE	Panda 9000 ND	Panda 1000NE	Panda 12000 NE
Type	Z482	Z482	D722	Z602	D722
Governor	Mini VCS	VCS	mechanisch	VCS	VCS
Automatic startbooster	nein	ja	nein	ja	ja
Cylinder	2	2	3	2	3
Bore	67mm	67mm	67mm	72 mm	67mm
Stroke	68mm	68mm	68mm	73,6 mm	68mm
Stroke volume	479cm ³	479cm ³	719cm ³	599cm ³	719cm ³
Max. power (DIN 6271-NB) at 3000rpm	9,32kW	9,32kW	14,0kW	11,6kW	14,0kW
Rated speed 50 Hz	3000rpm	3000rpm	3000rpm	3000rpm	3000rpm
Idle running speed ²	3120rpm	2900rpm	3120rpm	3100rpm	2900rpm
Valve clearance (engine cold)	0,2mm	0,2mm	0,2mm	0,2mm	0,2mm
Cylinder head nut torque	42Nm	42Nm	42Nm	42Nm	42Nm
Compression ratio	23:1	23:1	23:1	24:1	23:1
Lubrication oil capacity	2,8l	2,8l	3,8l	2,8l	3,8l
Fuel consumption ³	ca. 0,5-1,4l	ca. 0,7-1,8l	ca. 0,8-2,1l	ca. 1,0-2,66l	ca. 1,1-2,8l
Oil consumption	max. 1% of fuel consumption				
Cooling water requirement for seawater circuit (Marine generators only)	16-28l/min	16-28l/min	16-28l/min	16-28l/min	16-28l/min
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction				

² progressive speed by VCS

³ 0,35l/kW electrical power, the randomized values between 30% and 80% of the rated speed

Fig. 8.1-2: Technical Data

	Panda 14000 NE	Panda 15000NE	Panda 18 NE	Panda 24 NE	Panda 30 NE
Type	D782	D902	D1105	V1505	V1505 TD
Governor	VCS	VCS	VCS	VCS	VCS
Automatic startbooster	ja	yes	yes	no	no
Cylinder	3	3	3	4	4TD
Bore	67mm	72mm	78mm	78mm	78mm
Stroke	73,6mm	73,6mm	78,4mm	78,4mm	78,4mm
Stroke volume	782cm ³	898cm ³	1123cm ³	1498cm ³	1498cm ³
Max. power (DIN 6271-NB) at 3000rpm	13,5kW	17,5kW	18,7kW	23,3kW	31,3kW
Rated speed 50 Hz	3000UpM	3000UpM	3000rpm	3000rpm	3000rpm
Idle running speed ²	2900UpM	2900UpM	2900rpm	2900rpm	2900rpm
Valve clearance (engine cold)	0,2mm	0,2mm	0,2mm	0,2mm	0,2mm
Cylinder head nut torque	68Nm	42mm	68Nm	68Nm	68Nm
Compression ratio	23:1	24:1	22:1	22:1	23:1
Lubrication oil capacity	3,8l	3,7l	5,1l	6,0l	6,7l
Fuel consumption ³	ca. 1,3-3,4l	ca. 1,3-3,6l	ca. 1,7-4,5l	ca. 2,2-5,9	ca. 2,7-7,2l
Oil consumption	max. 1% of fuel consumption				
Cooling water requirement for seawater circuit (Marine generators only)	16-28l/min	6-28l/min	28-40l/min	28-40l/min	40-50l/min



	Panda 14000 NE	Panda 15000NE	Panda 18 NE	Panda 24 NE	Panda 30 NE
Permissible max. permanent tilt of engine	a) 25° crosswise to the longitudinal axis b) 20° in longitudinal direction				

² progressive speed by VCS

³ 0,35l/kW electrical power, the randomized values between 30% and 80% of the rated speed

Fig. 8.1-3: Technical data

	Panda 45LN				
Type	LDW 2204 MT				
Govenor	VCS				
Automatic startbooster	no				
Cylinder	4				
Bore	88 mm				
Stroke	90,4 mm				
Stroke volume	2199 ccm				
Max. power (DIN 6271-NB) at 3000rpm	47 kW				
Rated speed 50 Hz	3000 rpm				
Idle running speed ²	3000 rpm				
Valve clearance (engine cold)	0,2 mm				
Cylinder head nut torque	68 Nm				
Compression ratio	22:16				
Lubrication oil capacity	6,4l				
Fuel consumption ³	ca. 4,9-13,1l				
Oil consumption	max. 1% of fuel consumption				
Cooling water requirement for seawater circuit (Marine generators only)	40-50l/min				
Permissible max. permanent tilt of engine	a) 25° crosswise to the longitudinal axis b) 20° in longitudinal direction				

² progressive speed by VCS

³ 0,35l/kW electrical power, the randomized values between 30% and 80% of the rated speed

Fig. 8.1-4: Technical Data

	Panda 30/4	Panda 40/4	Panda 50/4		
Type	V3600	V3600	V3800 DI-T		
Govenor	VCS	VCS	Mechanical + GAC		
Automatic startbooster	no	no	no		
Cylinder	4	4	4		
Bore	98 mm	98 mm	100 mm		
Stroke	120 mm	120 mm	120 mm		
Stroke volume	3620 ccm	3620 ccm	3769 ccm		
Max. power (DIN 6271-NB) at 3000rpm	45,8 kW	58,8 kW	62,0 kW		
Rated speed 50 Hz	1500 rpm	1500 rpm	1500 rpm		
Idle running speed ²	2800 rpm	2800 rpm	1800 rpm		
Valve clearance (engine cold)	0,2 mm	0,2 mm	0,2 mm		
Cylinder head nut torque	68 Nm	68 Nm	68 Nm		
Compression ratio	22,6:1	22,6:1	19,0:1		
Lubrication oil capacity	13,2 l	13,2 l	13,2 l		
Fuel consumption ³	ca. 3,15-8,4 l	ca. 3,78-10,1 l	4,2-11,2 l		
Oil consumption	max. 1% of fuel consumption				



	Panda 30/4	Panda 40/4	Panda 50/4		
Cooling water requirement for seawater circuit (Marine generators only)	40-50l/min	40-50l/min	40-50l/min		
Permissible max. permanent tilt of engine	a) 25° crosswise to the longitudinal axis b) 20° in longitudinal direction				

² progressive speed by VCS

³ 0,35l/kW electrical power, the randomized values between 30% and 80% of the rated speed

8.2 Rated current

Fig. 8.2-1: Rated current

Panda 8000 - 230 V / 50 Hz	27,0 A		Panda 18 - 230 V / 50 Hz	60,3 A
Panda 8000 - 400 V / 50 Hz	8,3 A		Panda 18 - 400 V / 50 Hz	20,0 A
Panda 8000 - 120 V / 60 Hz	61,8 A		Panda 18 - 120 V / 60 Hz	128,0 A
Panda 9000 - 230 V / 50 Hz	34,9 A		Panda 24 - 230 V / 50 Hz	89,1 A
Panda 9000 - 400 V / 50 Hz	11,1 A		Panda 24 - 400 V / 50 Hz	30,1 A
Panda 9000 - 120 V / 60 Hz	74,5 A		Panda 24 - 120 V / 60 Hz	161,1 A
Panda 12000 - 230 V / 50 Hz	41,7 A		Panda 30 - 230 V / 50 Hz	Anfrage
Panda 12000 - 400 V / 50 Hz	13,7 A		Panda 30 - 400 V / 50 Hz	35 A
Panda 12000 - 120 V / 60 Hz	89,0 A		Panda 30 - 120 V / 60 Hz	219 A
Panda 14000 - 230 V / 50 Hz	48,0 A			
Panda 14000 - 400 V / 50 Hz	15,2 A			
Panda 14000 - 120 V / 60 Hz	112,7 A			

8.3 Cable cross section

Fig. 8.3.0-1: Kabelquerschnitte/Cable cross section

Länge/length	1 - 3 m	4 - 6 m	7 - 10 m	11 - 15 m	16 - 20 m
16 mm ²	70 A	63 A	55 A	48 A	42 A
25mm ²	112 A	100 A	88 A	75 A	63 A
35mm ²	145 A	130	110	100 A	90 A
50mm ²	225 A	200 A	175 A	150 A	125 A
70mm ²	275 A	250 A	225 A	195 A	170 A
95mm ²	340 A	300 A	280 A	260 A	220 A

8.4 Fuel

Use a clean No. 2 Diesel fuel oil (SAE J313 JUN87) according to ASTM D975 and EN 590.

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.



8.5 Engine oil

8.5.1 Engine oil classification

8.5.1.1 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 liquidly) 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..

8.5.1.2 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

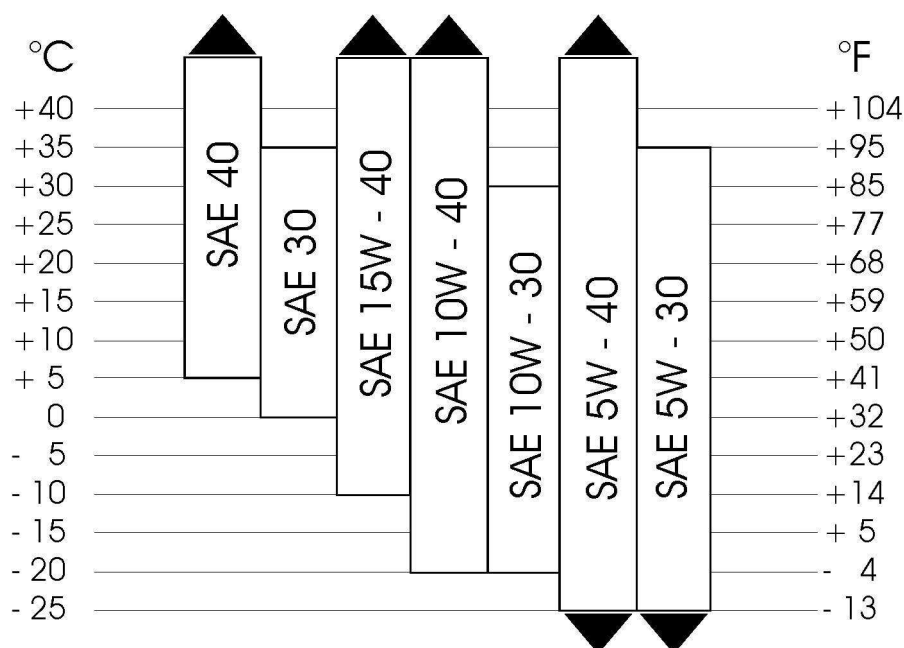
API CG Engine oil for highest demands, turbo-tested

For the Fischer Panda Generator the API CF Oil is needed.

Engine oil type	
over 25°C	SAE30 or SAE10W-30 SAE10W-40
0°C to 25°C	SAE20 or SAE10W-30 SAE10W-40
below 0°C	SAE10W or SAE10W-30 SAE10W-40



Fig. 8.5.1-1: Temp. range of the SAE classes



8.6 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

Engine coolant automotive industry Product description		
Product name	GLYSANTIN ® PROTECT PLUS / G48	
Chemical nature	Monoethylenglycol with inhibitors	
Physical form	Liquid	
Chemical and physical properties		
Reserve alkalinity of 10ml	ASTM D 1121	13 – 15 ml HCl 01 mol/l
Density, 20°C	DIN 51 757 procedure 4	1,121 – 1,123 g/ cm ³
Water content	DIN 51 777 part 1	max. 3,5 %
pH-value undiluted		7,1 – 7,3

8.6.1 Coolant mixture ratio

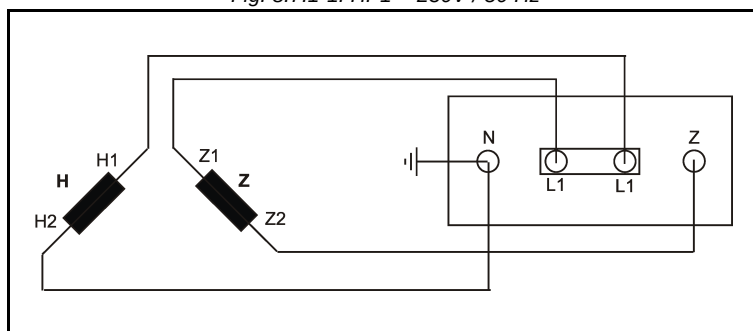
Water/antifreeze	Temperature
70:30	-20°C
65:35	-25°C
60:40	-30°C
55:45	-35°C
50:50	-40°C

8.7 Types of coil

8.7.1 HP1 - 230V / 50 Hz

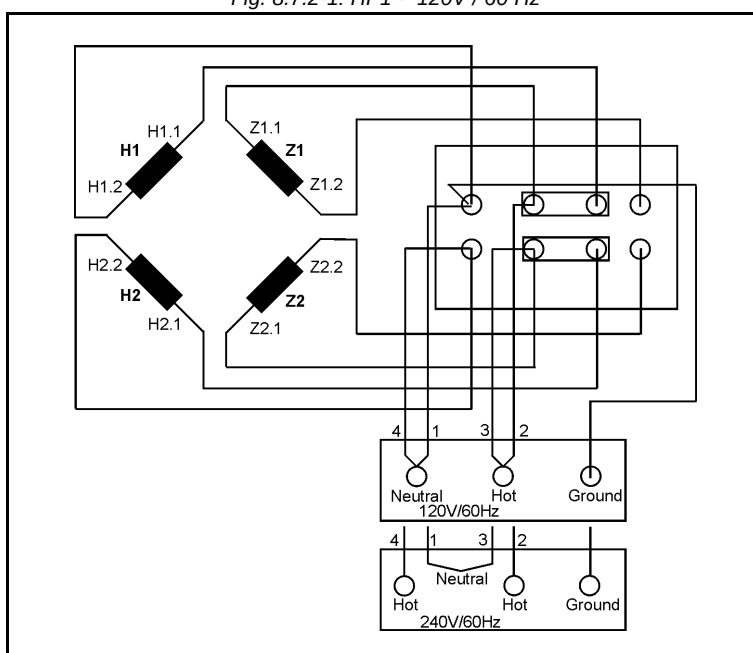


Fig. 8.7.1-1: HP1 - 230V / 50 Hz



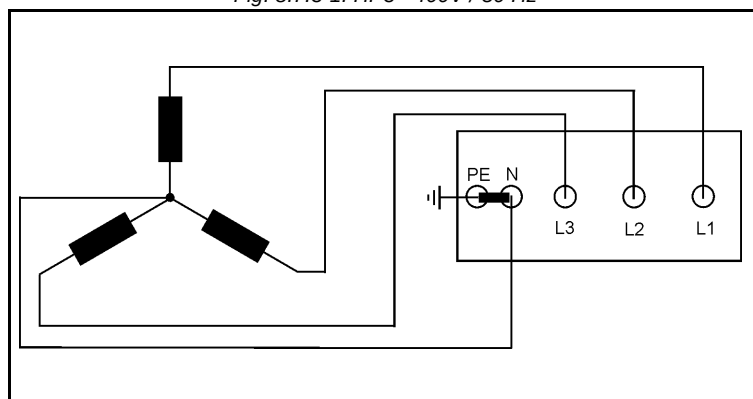
8.7.2 HP1 - 120V / 60 Hz

Fig. 8.7.2-1: HP1 - 120V / 60 Hz

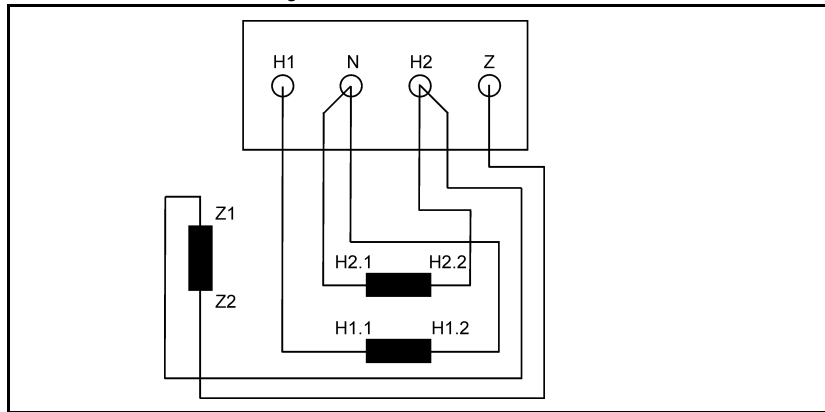


8.7.3 HP3 - 400V / 50 Hz

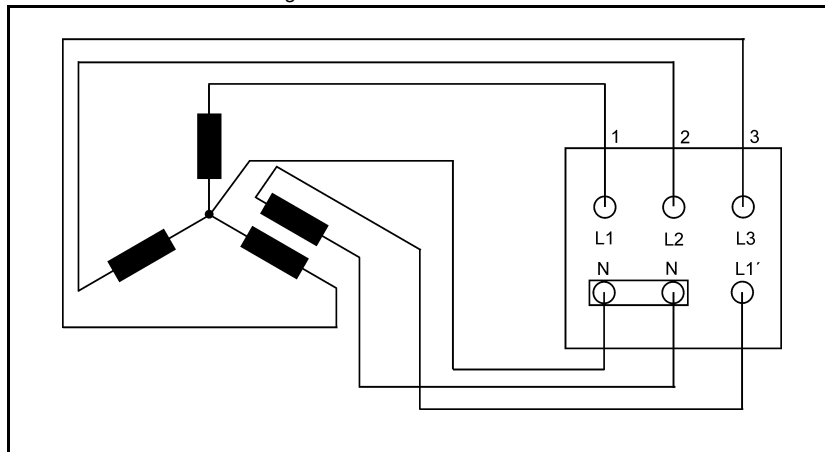
Fig. 8.7.3-1: HP3 - 400V / 50 Hz



8.7.4 HP3 - 120V / 60 Hz

*Fig. 8.7.4-1: HP3 - 120V / 60 Hz*

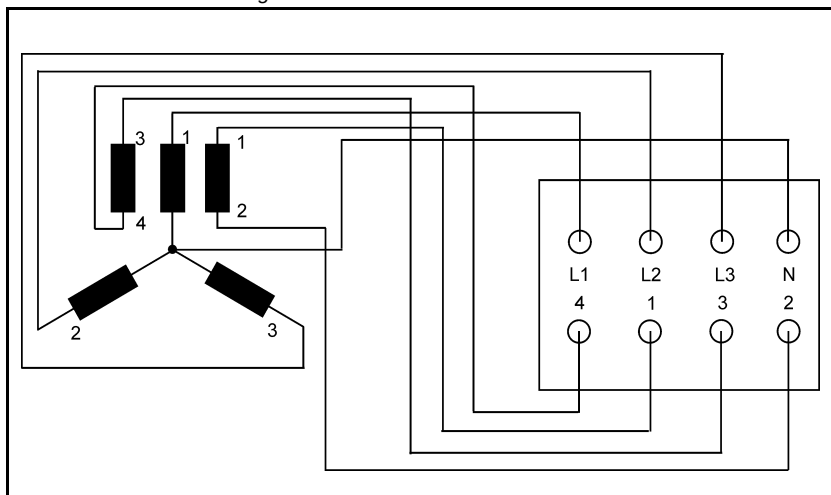
8.7.5 DVS - 400V / 50 Hz

Fig. 8.7.5-1: DVS - 400V / 50 Hz



8.7.6 DVS - 120V 240V / 60 Hz

Fig. 8.7.6-1: DVS - 120V 240V / 60 Hz



8.8 Resistor & inductance of the generator coil

Fig. 8.8-1: Resistor + inductance generator coil HP1

	L-N[Ohm]	L-Z[Ohm]		L-N[Ohm]	L-Z[Ohm]
Mains	120V / 60Hz		Mains	120V / 60Hz	
Panda 8000	ca. 0,7	ca. 0,7	Panda 8000	ca. 2,8	ca. 2,8
Panda 9000	ca. 0,65	ca. 0,65	Panda 9000	ca. 2,8	ca. 2,8
Panda 12000	ca. 0,45	ca. 0,45	Panda 12000	ca. 3,5	ca. 3,5
Panda 18	ca. 0,2	ca. 0,2	Panda 18	ca. 3,2	ca. 3,2
Panda 24	ca. 0,06	ca. 0,06	Panda 24	ca. 0,3	ca. 0,3
Mains:	230V / 50Hz		Mains:	230V / 50Hz	
Panda 8000	ca. 0,9	ca. 0,9	Panda 8000	ca. 3,7	ca. 3,7
Panda 9000	ca. 0,8	ca. 0,8	Panda 9000	ca. 3,7	ca. 3,7
Panda 12000	ca. 0,3	ca. 0,3	Panda 12000	ca. 3,5	ca. 3,5
Panda 14000	ca. 0,25	ca. 0,25	Panda 14000	ca. 2,3	ca. 2,3
Panda 18	ca. 0,25	ca. 0,25	Panda 18	ca. 1,8	ca. 1,8
Panda 24	ca. 0,17	ca. 0,17	Panda 24	ca. 1,3	ca. 1,3
Panda 30	ca. 0,1	ca. 0,1	Panda 30	ca. 0,9	ca. 0,9

Fig. 8.8-2: Resistor generator coil DVS

	L1-N[Ohm]	L2-N[Ohm]	L3-N[Ohm]	L1'-N[Ohm]	1-2[Ohm]	3-4[Ohm]
Mains	120V / 60Hz					
Panda 8000	ca. 0,7	ca. 0,7	ca. 0,7	ca. 0,15	ca. 0,15	
Panda 9000	ca. 0,65	ca. 0,65	ca. 0,65	ca. 0,17	ca. 0,17	
Panda 12000	ca. 0,45	ca. 0,45	ca. 0,45	ca. 0,15	ca. 0,15	
Panda 18	ca. 0,2	ca. 0,2	ca. 0,2	ca. 0,05	ca. 0,05	
Panda 24	ca. 0,06	ca. 0,06	ca. 0,06			
Mains:	230V / 50Hz					
Panda 8000	ca. 0,9		ca. 0,9		ca. 0,9	ca. 0,4
Panda 9000	ca. 0,8		ca. 0,8		ca. 0,8	ca. 0,4
Panda 12000	ca. 0,3		ca. 0,3		ca. 0,3	ca. 0,2
Panda 14000	ca. 0,25	ca. 0,25	ca. 0,25	ca. 0,12		
Panda 18	ca. 0,25	ca. 0,25	ca. 0,25	ca. 0,1		
Panda 24	ca. 0,17	ca. 0,17	ca. 0,17	ca. 0,1		
Panda 30	ca. 0,1	ca. 0,1	ca. 0,1	ca. 0,08		



Fig. 8.8-3: Inductance generator coil DVS

	L1-N[mH]	L2-N[mH]	L3-N[mH]	L1'-N[mH]	1-2[mH]	3-4[mH]
Mains	120V / 60Hz					
Panda 8000	ca. 2,8	ca. 2,8	ca. 2,8	ca. 0,8	ca. 0,8	ca. 0,9
Panda 9000	ca. 2,8	ca. 2,8	ca. 2,8	ca 1,0	ca. 0,9	
Panda 12000	ca. 3,5	ca. 3,5	ca. 3,5		ca. 1,0	ca. 0,4
Panda 18	ca. 3,2	ca. 3,2	ca. 3,2			
Panda 24	ca. 0,3	ca. 0,3	ca. 0,3			
Mains:	230V / 50Hz					
Panda 8000	ca. 3,7	ca. 3,7	ca. 3,7	ca. 2,3		
Panda 9000	ca. 3,7	ca. 3,7	ca. 3,7	ca. 2,3		
Panda 12000	ca. 3,5	ca. 3,5	ca. 3,5	ca. 2,3		
Panda 14000	ca. 2,3	ca. 2,3	ca. 2,3	ca. 1,5		
Panda 18	ca. 1,8	ca. 1,8	ca. 1,8	ca. 1,1		
Panda 24	ca. 1,3	ca. 1,3	ca. 1,3	ca. 0,8		
Panda 30	ca. 0,9	ca. 0,9	ca. 0,9	ca. 0,6		

8.9 Voltage values stator coil

Fig. 8.9-1: Voltage values stator coil HP3

Terminal	Panda 8000	Panda 9000	Panda 12000	Panda 14000	Panda 18	Panda 24	Panda 30
L1 - L2	3-5 Volt	4-6 Volt	5-7 Volt	6-9 Volt	6-10 Volt	6-11 Volt	7-12 Volt
L2 - L3	3-5 Volt	4-6 Volt	5-7 Volt	6-9 Volt	6-10 Volt	6-11 Volt	7-12 Volt
L3 - L1	3-5 Volt	4-6 Volt	5-7 Volt	6-9 Volt	6-10 Volt	6-11 Volt	7-12 Volt
L1' - N (50Hz)	~ 2-3 Volt	~ 2-3 Volt	~ 3-4 Volt	~ 3-5 Volt	~ 3-5 Volt	~ 3-5 Volt	~ 3-6 Volt
4 - 2 (60Hz)	~ 2-3 Volt	~ 2-3 Volt	~ 3-4 Volt		~ 3-5 Volt	~ 3-5 Volt	

Fig. 8.9-2: Voltage values stator coil HP1

Terminal	Panda 8000	Panda 9000	Panda 12000	Panda 14000	Panda 18	Panda 24	Panda 30
L - N	~ 2-3 Volt	~ 2-3 Volt	~ 3-4 Volt	~ 3-5 Volt	~ 3-5 Volt	~ 3-5 Volt	~ 3-6 Volt
4 - 2 (60Hz)	~ 2-3 Volt	~ 2-3 Volt	~ 3-4 Volt		~ 3-5 Volt	~ 3-5 Volt	

If your generator is not mentioned, ask your local Fischer Panda Dealer for the technical datas coil.

8.10 Diameter of conduits

Fig. 8.10-1: Diameter of conduits

Generator type	Ø Cooling water conduit		Ø Exhaust conduit [mm]	Ø Fuel conduit	
	Freshwater [mm]	Seawater [mm]		Supply [mm]	Return [mm]
Panda PMS 3,8 ND	12	12	30	8	8
Panda PMS 4,5 ND	12	12	30	8	8
Panda PMS 4500 SCB	12	12	30	8	8
Panda PMS 5000 SCE	12	12	30	8	8
Panda PMS 4500 FCB	12	12	30	8	8
Panda PMS 5000 LPE	16	16	30	8	8
Panda PMS 6000 ND	20	20	40	8	8
Panda PMS 8000 NE	20	20	40	8	8
Panda PMS 9000 ND	20	20	40	8	8
Panda PMS 12000 NE	20	20	40	8	8
Panda PMS 14000 NE	20	20	40	8	8
Panda PMS 18 NE	25	20	50	8	8
Panda PMS 24 NE	25	20	50	8	8



Generator type	Ø Cooling water conduit		Ø Exhaust conduit [mm]	Ø Fuel conduit	
	Freshwater [mm]	Seawater [mm]		Supply [mm]	Return [mm]
Panda PMS 30 NE	25	20	50	8	8
Panda PMS 33 KU	30	25	50	8	8
Panda PMS 42 KU	30	30	50	8	8
Panda PMS 32 YA	30	30	50	8	8
Panda PMS 50 YA	30	30	60	8	8
Panda PMS 60 YA	-	-	60	8	8
Panda PMS 50 MB	40	30	60	8	8
Panda PMS 60 MB	40	40	60	8	8
Panda PMS 75 MB	40	30	60	8	8
Panda PMS-HD 7,5-4 KU	25	20	40	8	8
Panda PMS-HD 09-4 KU	25	20	50	8	8
Panda PMS-HD 12-4 KU	25	20	50	8	8
Panda PMS-HD 17-4 KU	25	25	60	8	8
Panda PMS-HD 22-4 KU	30	30	60	8	8
Panda PMS-HD 30-4 KU	30	30	60	8	8
Panda PMS-HD 40-4 KU	30	30	60	8	8
Panda PMS-HD 60-4 DZ	-	-	-	-	-
Panda PMS-HD 70-4 DZ	-	-	-	-	-
Panda PMS-HD 85-4 DZ	-	-	-	-	-
Panda PMS-HD 110-4 DZ	-	-	-	-	-
Panda PMS-HD 130-4 DZ	-	-	-	-	-

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Fischer Panda Datasheet

9. Impellerfilter

 Fischer Panda	Art Nr..	31.06.03.003P
 Fischer Panda	Bez.	Impellerfilter for Marine Panda P6, P8, P9, P10, P12 and P14 since March 2007

	Dokument	Hardware	Software
Aktuell:	R2 04.05.07	12.04.07	-----
Replace:	V1 12.04.07		-----

Tested for a flow rate up to 22l/min





Fischer Panda Datasheet

9.1 General

Starting with March 2007 the Fischer Panda generators type 6, 8, 9, 10, 12 and 14 has got an extra impellerfilter.

9.2 How it works

When the impeller breaks, pieces of rubber will penetrate into the cooling system. This pieces can stock in the pipes with lower diameter (such as the heat exchanger) and reduce the cooling water flow. Expensive reconstruction and cleaning of the raw water circle is necessary.

The Fischer Panda impellerfilter hold this pieces of rubber back, so they can be easily removed. The flow through diameter of the cooling water is expanded in the impellerfilter, in emergency situation (like heavy sea) it is possible to change only the impeller itself and clean the impellerfilter afterwards at a better time. an emergency stop of the generator in fact of a to low cooling water flow and an overheating will be nearly banned. The impellerfilter must be cleaned after each impeller break. If you are not sure that every piece of rubber is removed at the cleaning we recommend to change the impellerfilter.

9.3 Cleaning and replacement of the impellerfilter



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 unintentionally started.

Note the safety instruction in the generator manual.

Seawater valve must be shut.



Open the generator sound cover like it is explained in the generator manual!

**ATTENTION!!! Parts of the generator and the cooling water may be hot after operation
!!!DANGER!!!**

Fischer Panda Datasheet

Impellerfilter.

The impellerfilter is mounted at the right front motor-base.

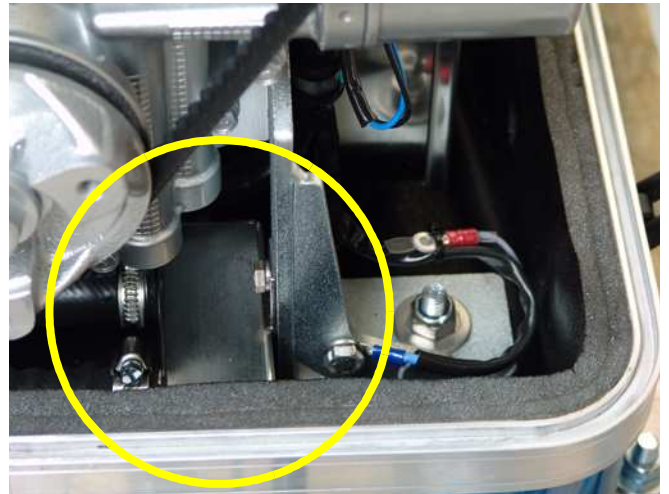


Fig. 9.3-1: Impellerfilter

Loose holding screw.

Loose the holding screw two turns.

Screw M6 (*SW 10)

*SW 10 = wrench size 10mm



Fig. 9.3-2: Holding screw

First hose clamp.

Loose the front hose clamp.

Use a screwdriver, or better a wrench SW 7mm.



Fig. 9.3-3: First hose clamp



Fischer Panda Datasheet

Second hose clamp.

Loose the second hose clamp.

Use a screw driver, or better a wrench SW 7mm.

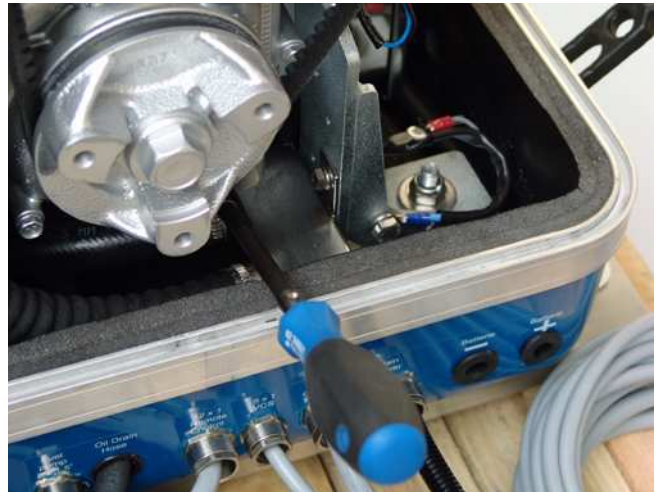


Fig. 9.3-4: Second hose clamp

Remove the cooling water hose.

remove the first cooling water hose.

Some raw water may flow out of the hose or the impellerfilter.

The hose can be closed with the cap you get together with the impellerfilter spare part pack.

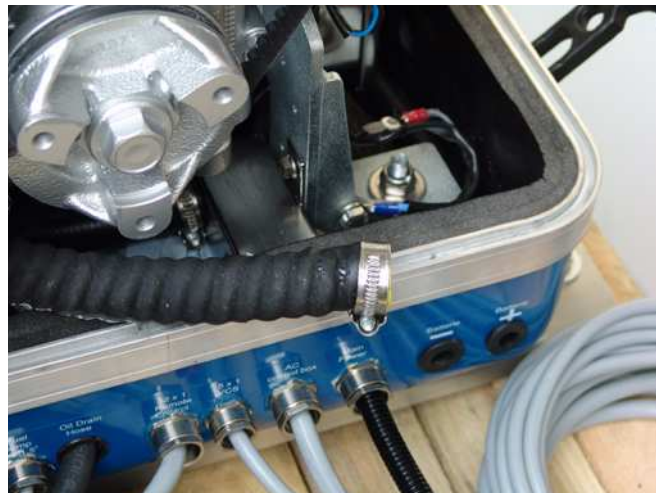


Fig. 9.3-5: cooling hose

Remove the holding screw.

Remove the impellerfilter holding screw.



Fig. 9.3-6: Holding screw

Fischer Panda Datasheet

Pull the Impellerfilter out of the capsule.

The second cooling water hose can be removed within these procedure.

Some raw water may flow out of the hose or the impellerfilter.

The hose can be closed with the cap you get together with the impellerfilter spare part pack.



Fig. 9.3-7: Remove Impellerfilter

Clening of the impellerfilter with water

The best cleanind will be to flush the filter against the flow direction.



Fig. 9.3-8: Cleaning with water

Option: Cleaning of the impellerfilter with air pressure.



Fig. 9.3-9: Cleaning with air

Replace the cleaned/new filter in reverse procedure.

Fischer Panda Datasheet

9.4 Spare part kit

Fischer Panda Art Nr. 21.03.02.005S

Impellerfilter Art. No. 31.06.03.003P

Screw M6x10 Art. No. G3A20093306010

with spring ring Art.No. G3A20012706

cap 19mm (2x) Art.No. PMGPN610U19



Fig. 9.4-1: Spare part kit



Fischer Panda Datasheet

9.5 Dimensions

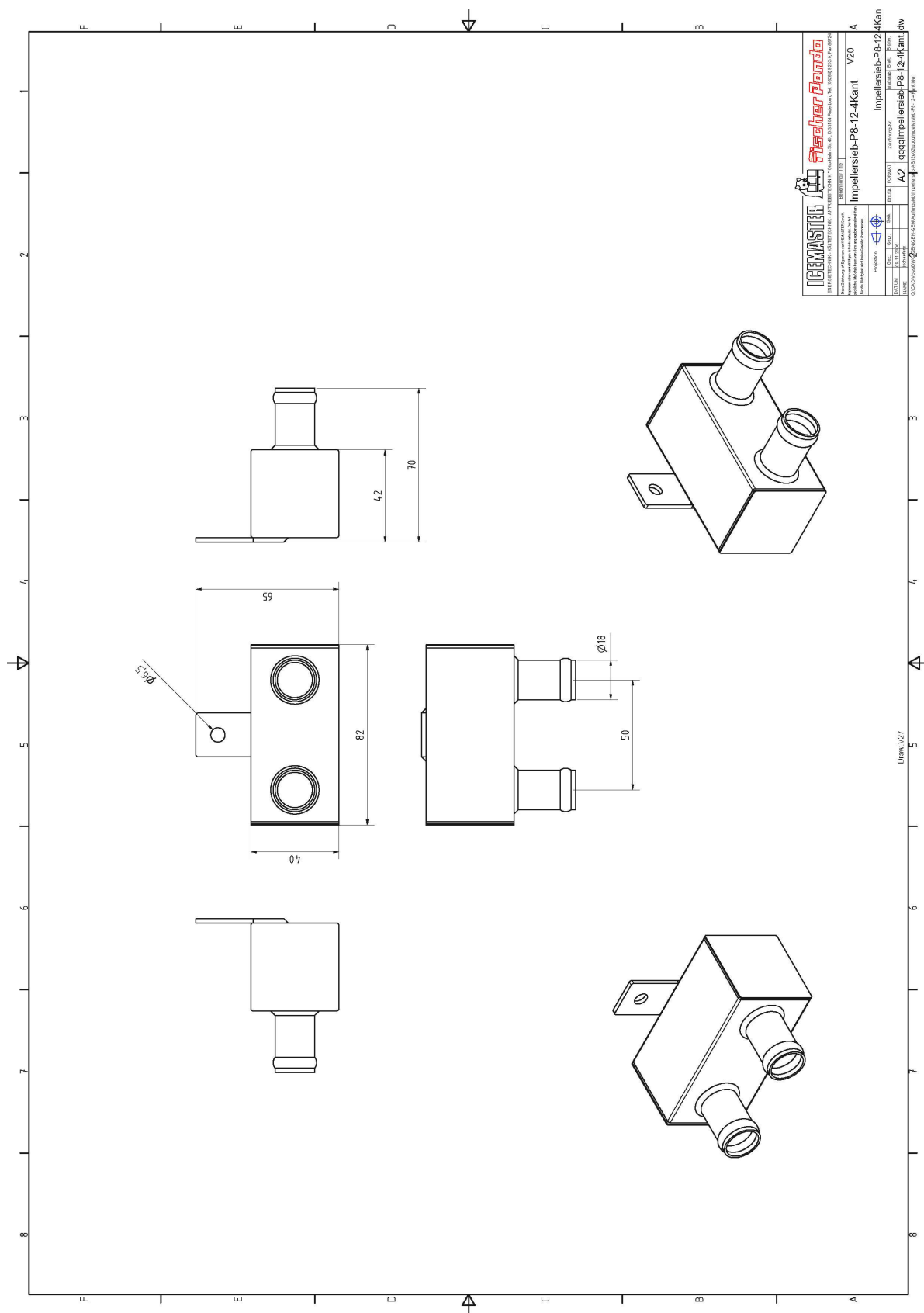


Fig. 9.5-1: Dimensions



Fischer Panda Datasheet

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Fischer Panda

Power - wherever you are

Manual



Generator Control Panel P6+

12V version - 21.02.02.046H

24V special version - 21.02.02.047H

Option automatic adapter - 21.02.02.016H

Option master-slave adapter - 21.02.02.015H

Fischer Panda GmbH



Current revision status P6+ manual

	Document
Actual:	Panel Generator Control P6+ RE0703_Kunde_eng.R06.1_22.3.11
Replace:	Panel Generator Control P6+ RE0703_Kunde_eng.R06

Revision	Page
Upgrade the whole manual	
Safety instruktion See valve added	
Hole pattern changed	
New display foil	

Copyright

Duplication and change of the manual is permitted only in consultation with the manufacturer!

Fischer Panda GmbH, 33104 Paderborn, reserves all rights regarding text and graphics. Details are given to the best of our knowledge. No liability is accepted for correctness. Technical modifications for improving the product without previous notice may be undertaken without notice. Before installation, it must be ensured that the pictures, diagrams and related material are applicable to the genset supplied. Enquiries must be made in case of doubt.



10. Safety Instructions Generator Control P6+

10.1 Personal requirements

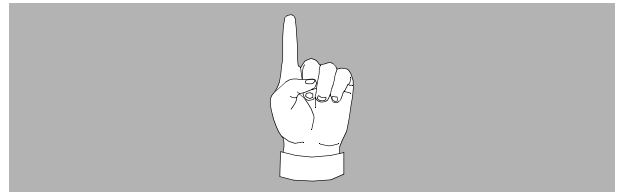
The settings described here can be performed by the operator, unless otherwise indicated.

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

10.2 Safety instructions for this chapter

Follow the general safety instruction at the front of this manual. **Note!:**

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 the generator can be started by an external signal. To avoid an unexpected starting of the generator, the starter battery must be disconnected before start working at the generator.

Warning!: Automatic start



The generator must not be put into operation with cover removed

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

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

Warning!:



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

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

Warning!: Danger of Life - High voltage



Disconnect the battery when working on the generator

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

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

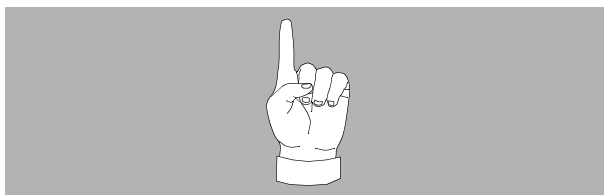
Attention!:



Sea valve must be closed. (only PMS version)

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

Note!:

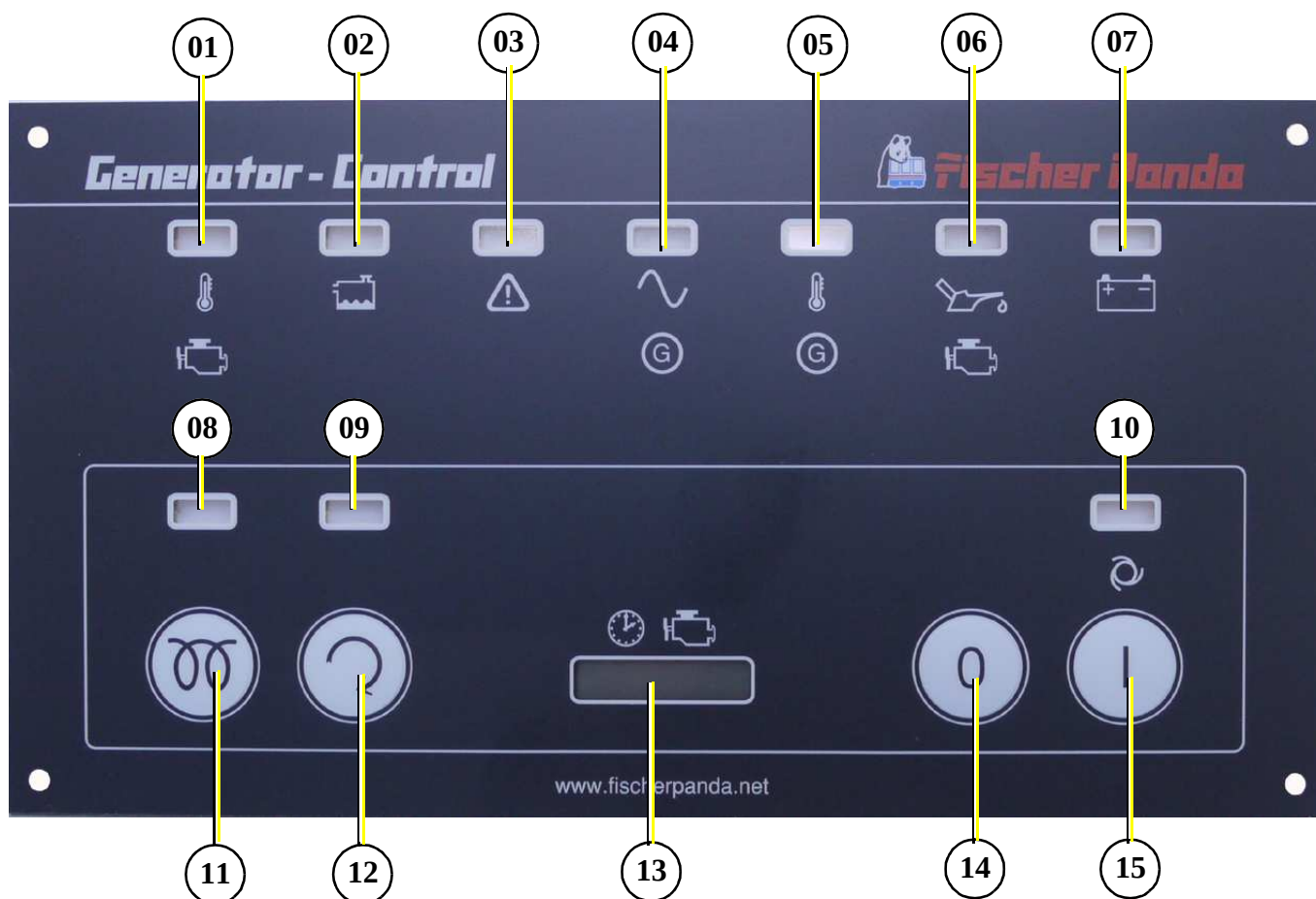




11. General operation

11.1 Panel Generator Control

Fig. 11.1-1: Panel front



- 01. LED for coolant temperature red¹
- 02. LED for waterleak red/yellow¹ (sensor optional)
- 03. LED for AC-voltage fault red/yellow¹
- 04. LED for AC-voltage ok green¹
- 05. LED for winding temperature red¹
- 06. LED for oil pressure red¹
- 07. LED for battery charge voltage fault green/red¹

- 08. LED for pre-glow „heat“ orange¹
- 09. LED for Generator „start“ green¹
- 10. LED for Generator „stand-by“ green¹
- 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“

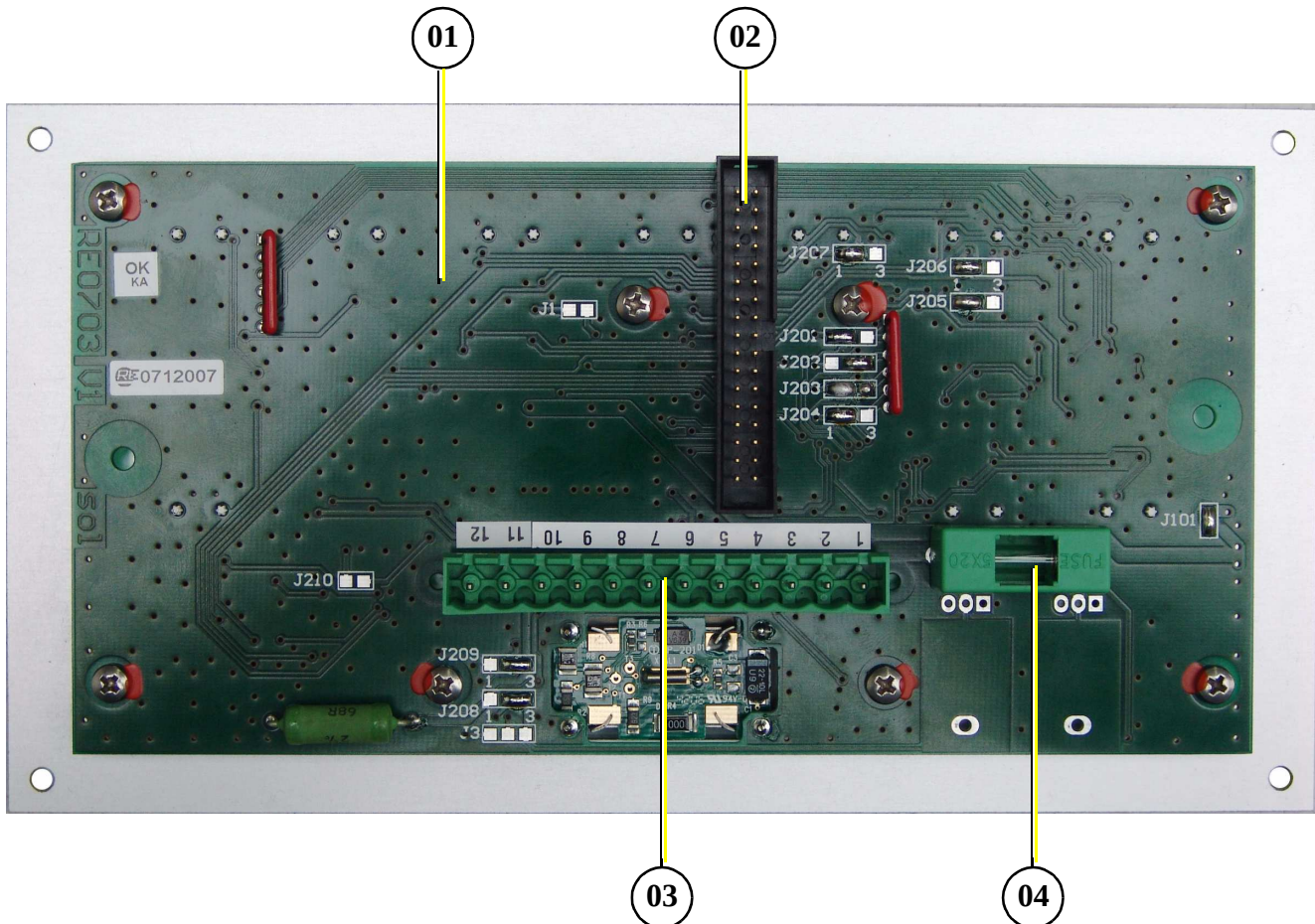
Fischer Panda Art. No. 21.02.02.009H

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



11.2 Rear view 12V-version

Fig. 11.2-1: Panel rear view 12V-version



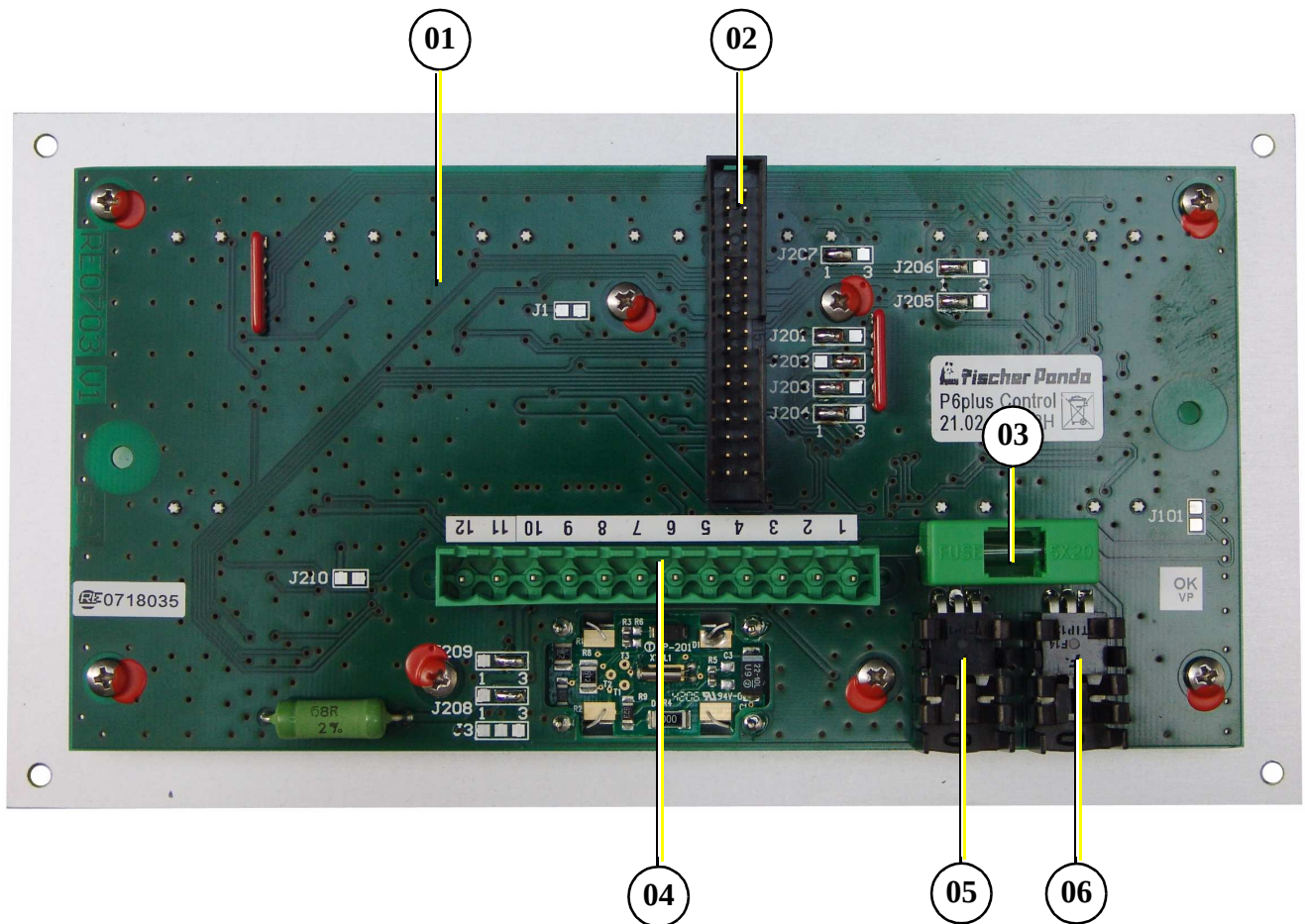
- 01. Control board
- 02. Terminal block (master-slave adapter: left row; automatic adapter: right row)
- 03. Terminals 1-12 (see Kapitel 11.4.2, "Terminal connections," auf Seite 194)
- 04. Fuse 630mA slow-blow

Fischer Panda Art. No. 21.02.02.009H



11.3 Rear view 24V-version

Fig. 11.3-1: Panel rear view 24V-version



- 01. Control board
- 02. Terminal block (master-slave adapter: left row; automatic adapter: right row)
- 03. Fuse 630mA slow-blow
- 04. Terminals 1-12 (see Kapitel 11.4.2, "Terminal connections," auf Seite 194)
- 05. Linear controller 24V
- 06. Linear controller 24V

Fischer Panda Art. No. 21.02.02.012H



11.4 Installation of the remote control panel

11.4.1 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)

11.4.2 Terminal connections

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

Fig. 11.4.2-1: Terminal connections

Clamp no.	Clamp name	IN / OUT	Description
1	Vbat	IN	power supply + 12V (or optional 24V, must be adjusted by jumper)
2	GND	IN	power supply -
3	T-Engine	IN	Error "coolant temperature". Input for thermo-switch to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with $\geq 22\text{mA}$ to +12V (with 24V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 100ms. Omission not. The in/out status is indicated with red LED.
4	Water leak (Replace air filter)	IN	Error "water leak". Input for sensor switch to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with $\geq 10\text{mA}$ to +12V (with 24V-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 "Replace air filter" (must be adjusted by solder Jumper). Then the signal does not lead to switching off and is indicated with yellow LED.
5	Oil-Press	IN	Error "oil pressure". Input for oil pressure switches to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with $\geq 22\text{mA}$ to +12V (with 24V-operated internally generated). The occurrence of an error is delayed, for analysis and displayed, around 1s. Omission not. The input status is indicated with red LED.
6	DC-Control	IN / OUT	Load control display. Input for signal of the dynamo. The input is adjustable for GND = OK or 12V/24V = OK (must be adjusted by solder Jumper). The input loads the signal with 5mA at 12V and 10mA at 24V. 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 12V-operation.
7	AC-Control	IN	AC control display. Input for NC-open-collector-sensor-switch to GND (N = OK). The input loads the switch with $\geq 2,5\text{mA}$ to +12V (with 24V-operated internally generated). The input status is indicated with red and green LED's.
8	Heat	OUT	Output for pre-glow relays. The output is so long active, as the button "Heat" is pressed. The output supplies, if active, the voltage of clamp 1. Additionally the output can be operated via the button "start" (must be adjusted by solder Jumper). Consider (notes 1-4).
9	Fuel-Pump	OUT	Output for fuel pump relay. The output is active, if no error is present (inputs 3, 4, 5, 11 and 12, if configured accordingly). The button "start" suppresses the error analysis and the output is then also active in the case of error, if the button "start" is pressed. The output supplies, if active, the voltage of clamp 1. Consider (notes 1-4).
10	Start	OUT	Output for starting relay. The output is active, as long as the button "start" is pressed. The output supplies, if active, the voltage of clamp 1. Consider (notes 1-4).



11	AC-Fault (Fuel Level) [former T-Oil]	IN	Error generator AC input for NC-open-collector-sensor-switch to GND (N = no error). The input loads the switch with $\geq 2,5\text{mA}$ to +12V. (with 24V-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 $\geq 10\text{mA}$ by +12V (must be adjusted by solder Jumper).
12	T-Winding	IN	Error "winding temperature". Input for thermo-switch to GND. The input is adjustable for NC/NO (N = no error) (must be adjusted by solder Jumper). The input loads the switch with $\geq 22\text{mA}$ to +12V (with 24V-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.

Notes:

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

The supply of all output currents may not exceed (less 0,2A 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.

11.4.3 Function of the jumpers

Fig. 11.4.3-1: Function of the solder jumper

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



J209	1-2	DC-Control-Signal (-) = OK dynamo 12V at Kubota Z 482 / D 722 engines
	2-3	DC-Control-Signal (+) = OK three-phase DC-alternator
J210	closed	Input AC-Fault has Pull-Up-current $\geq 10\text{mA}$
	open	Input AC-Fault has Pull-Up-current $\geq 2,5\text{mA}$

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

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

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



11.4.4 Configuration and adjustment

11.4.4.1 Configuration and setting sheet KE01

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

Panel only for 12V-operation.

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

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

Fig. 11.4.4.1-1: Settings of soldered jumper for this configuration (column Conf.)

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

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

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

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



11.4.4.2 Configuration and setting sheet KE02

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

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

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

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

Fig. 11.4.4.2-1: Einstellung der Lötjumper für diese Konfiguration (Spalte Konf.)

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

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

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

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



11.4.4.3 Configuration and setting sheet KE03

Standard jumpering for generators with DC-alternator.

Panel only for 12V-operation.

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

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

Fig. 11.4.4.3-1: Einstellung der Lötjumper für diese Konfiguration (Spalte Konf.)

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

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

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

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



11.4.4.4 Configuration and setting sheet KE04

Standard jumpering for generators with DC-alternator.

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

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

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

Fig. 11.4.4.4-1: Einstellung der Lötjumper für diese Konfiguration (Spalte Konf.)

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

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

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

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



11.5 Starting preparation / Checks (daily)

11.5.1 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 (switch on).

11.5.2 Vehicle version

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

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

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

2. State of cooling water.

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

3. Visual inspection.

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

4. Switch off the load.

The generator should only be started without load.

5. Open fuel valve, if installed.

6. Close battery main switch (switch on).



11.6 Starting and stopping the generators

11.6.1 Starting the generator

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

Warning!: Automatic start



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

Fig. 11.6.1-1: Panel on



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

Fig. 11.6.1-2: Preglow



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

Fig. 11.6.1-3: Start





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

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

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

Attention!:



11.6.2 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. 11.6.2-1: Stop



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

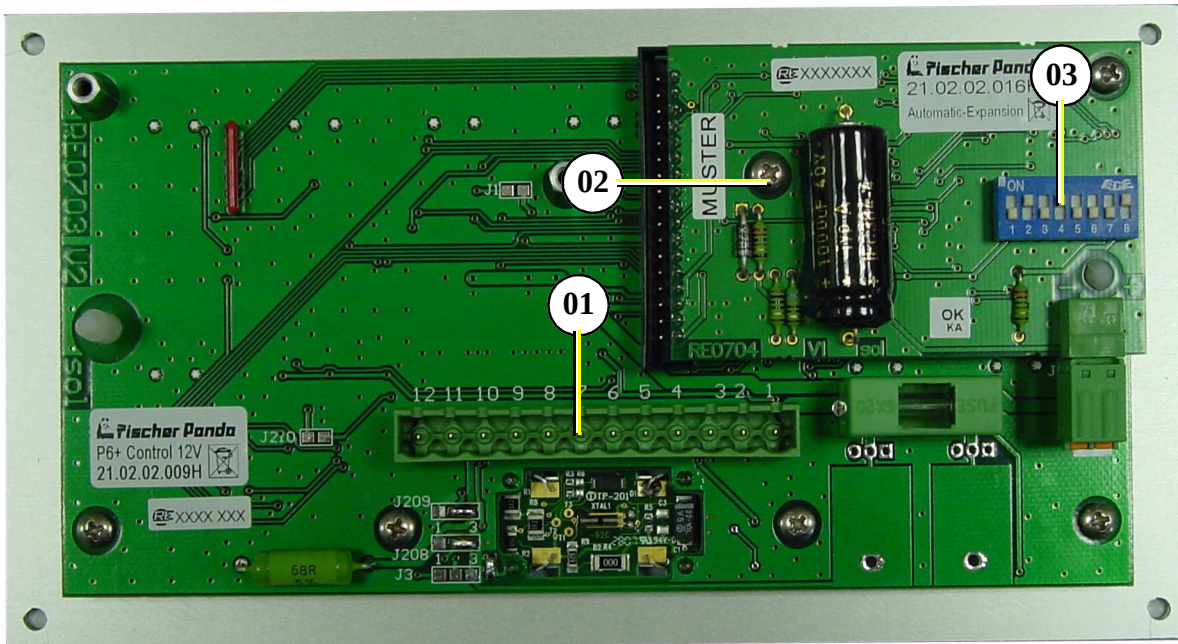
Attention!:





11.7 Automatic adapter - optional

Fig. 11.7-1: Panel 21.02.02.009H with Automatic adapter 21.02.02.016H



- 01. Main terminals
- 02. Automatic adapter 21.02.02.016H
- 03. 8-pole DIP-switch

Fischer Panda Art. No. 21.02.02.016H

11.7.1 Function:

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

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

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

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

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

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

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

11.7.2 The mechanism entrance:

With (-) characterized connection is connected to GND.



With (+) characterized connection is the input.

The input is connected through a resistance to 12V (with 24V-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.1s).

On the input an external voltages must not be set.

Fig. 11.7.2-1: Data

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

Fig. 11.7.2-2: Settings

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

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

Attention:





11.7.3 Terminal connections

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

Fig. 11.7.3-1: Terminal connections automatic adapter

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

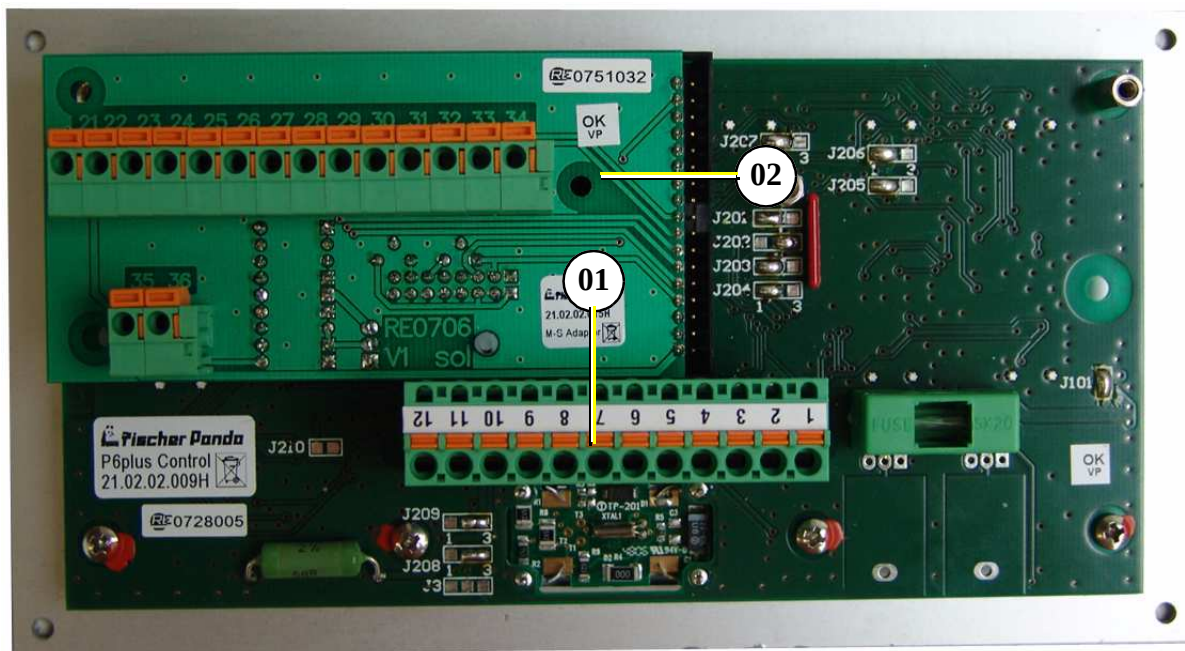


11.8 Master-Slave adapter - optional

11.8.1 Fischer Panda Art. No. 21.02.02.015H

12V-version

Fig. 11.8.1-1: Panel 21.02.02.009H with master-slave adapter 21.02.02.015H

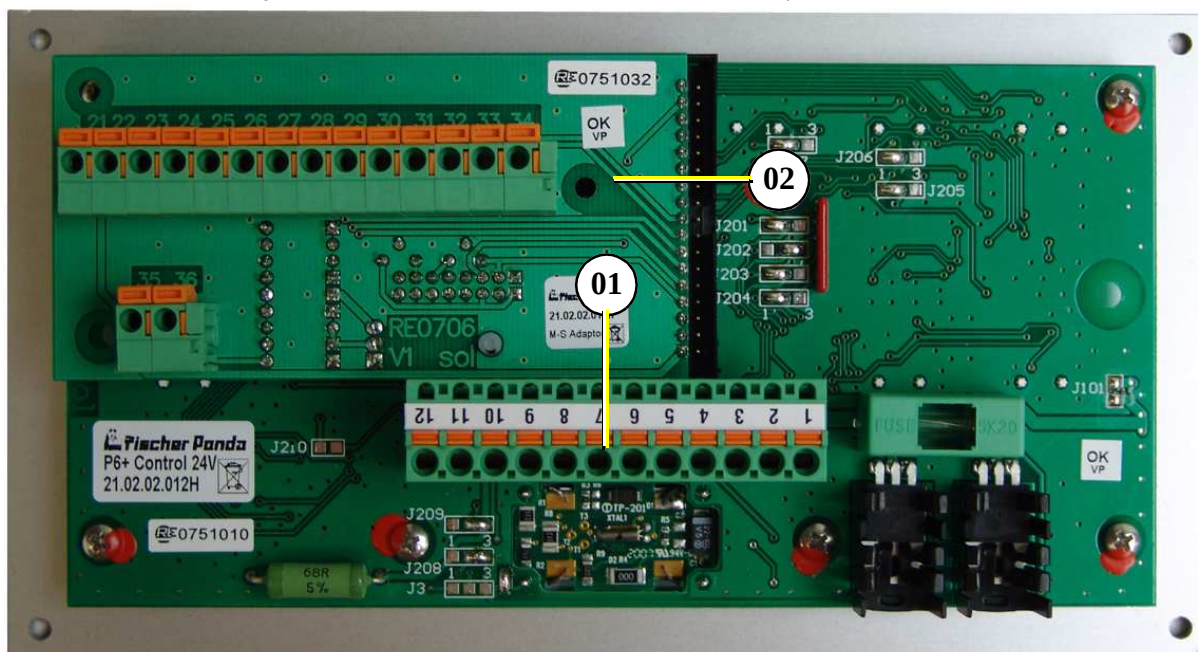


- 01. Main terminals
- 02. Master-slave adapter 21.02.02.015H

11.8.2 Fischer Panda Art. No. 21.02.02.01H

24V-version

Fig. 11.8.2-1: Panel 21.02.02.012H with master-slave adapter 21.02.02.015H



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



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.

11.8.3 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 0,7V - 1,4V. Each output has a free wheeling diode which short circuits externals voltage supplies under 0V and a decoupling diode which decouples the circuitry from external power feeding.

11.8.4 Fuse:

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

11.8.5 Terminal connections

11.8.5.1 Terminal X2 (IN/OUT from view Master-Opearing-Panel)

Fig. 11.8.5-1: Terminal connections terminal X2 (IN/OUT from the view of the master-control-panel)

Pin-No.	Pin-name	IN / OUT	Description
21	VBF	O	power supply + (operation voltage behind fuse 12Vdc or 24Vdc depending on system)
22	GND	O	power supply - (ground)
23	ON-Signal	I / O	Panels are switched on, if the connection is switched using a push button (on master or slave) to VBF
24	OFF-Signal	I / O	Panels are switched off, if the connection is switched using a push button (on master or slave) to VBF
25	/Heat-Signal	I / O	Heat is active, if the connection is switched over a push button (on master or Slave) to GND
26	/Start-Signal	I / O	Start is active, if the connection is switched over a push button (on master or Slave) to GND
27	LED-T-Engine	O	Output for LED T-Engine on the Slave panel, is switched to GND, if the LED is illuminated
28	LED-Water-leak (Replace Airfilter)	O	Output for LED Waterleak on the Slave panel, is switched to GND, if the LED is illuminated
29	LED-Oil-Press	O	Output for LED Oil-Press on the Slave panel, is switched to GND, if the LED is illuminated



30	LED-AC-Fault (Fuel Level)	O	Output for LED AC-Fault on the Slave panel, is switched to GND, if the LED is illuminated
31	LED-T-Winding	O	Output for LED T-Winding on the Slave panel, is switched to GND, if the LED is illuminated
32	DC-Control	O	Output for LED DC-Control-display on the Slave panel. The DC control signal is ground through 1:1.
33	AC-Control		Output for LED AC-Control-display on the Slave panel. The AC control signal is ground through 1:1.
34	VBFS	O	power supply + switched (otherwise like 21, VBF)

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

11.8.5.2 Terminal X3

Fig. 11.8.5.2-1: Terminal connections terminal X3

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

Notes:

1. Power rating of the output: max. 0,5A in continuous operation and briefly 1,0A.
2. The supply of all output currents may not exceed (less 0,2A 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.



11.8.6 Configuration and adjustment

11.8.6.1 Configuration and setting sheet KE05

Standard Jumperung 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 12V-Betrieb.

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

Fig. 11.8.6-1: Settings of soldered jumper for this configuration (column Conf.)

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

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

X = Jumper must be so set

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

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

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

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



11.8.6.2 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 24V-operation. (over attitude of solder jumper J101 alternatively 12V-operation is possible)

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

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

Fig. 11.8.6.2-1: Settings of soldered jumper for this configuration (column Conf.)

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

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

X = Jumper must be so set

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

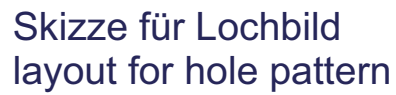
M = Jumper must be set exactly the same, as on the master panel,

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

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



Fig. 12.1-1: Hole pattern





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