Fischer Panda

Operation manual

Description of the generator and operation manual

Marine Generator
Panda AGT-DC 5000 PMS

Super silent technology

12V - 250A / 4,5kW

Fischer Panda GmbH

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Revision	**Page**
Updated the whole manual	

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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-booster (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

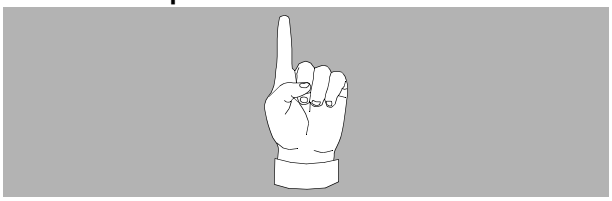
These symbols are used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use unit.

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

Prohibitation!: No Smoking

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

Prohibitation: Fire and open flames prohibited

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

Prohibitation: 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 carrosive material - contermination 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.

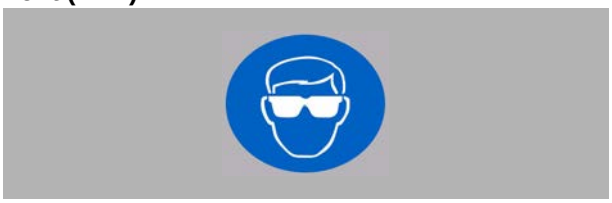
Instruction!: Wear personal protective equipment (PPE)

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 befor operating the generator or any equipment attached to it. It is the owner´s obnligation 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 maschine that may catch on working controls and prejections or into fans, pulleys ond other moving parts causing personal injury.

Use additional safety items-PPE, e.g. safety protection, safety googles, 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 Cleanness 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 immidiately 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 lubrivating 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 alkohol with diesel fuel. The mixture can couse a fire or severe generator damage.

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

1.5.6 Exhaust gases and fire prevention

Generator exhaust fumes can be very harmful af allowed to accumulated. 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 of 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 gras, moved gras, 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 carcinogen and can cause deformations and other gene 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℃.(61℉).

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 immideately. 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 apprppirate 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 insu-

lation.

Use only cable with self retardant and self extinguishing insulation suitable for high temperatures up to 195℉, 90℃.

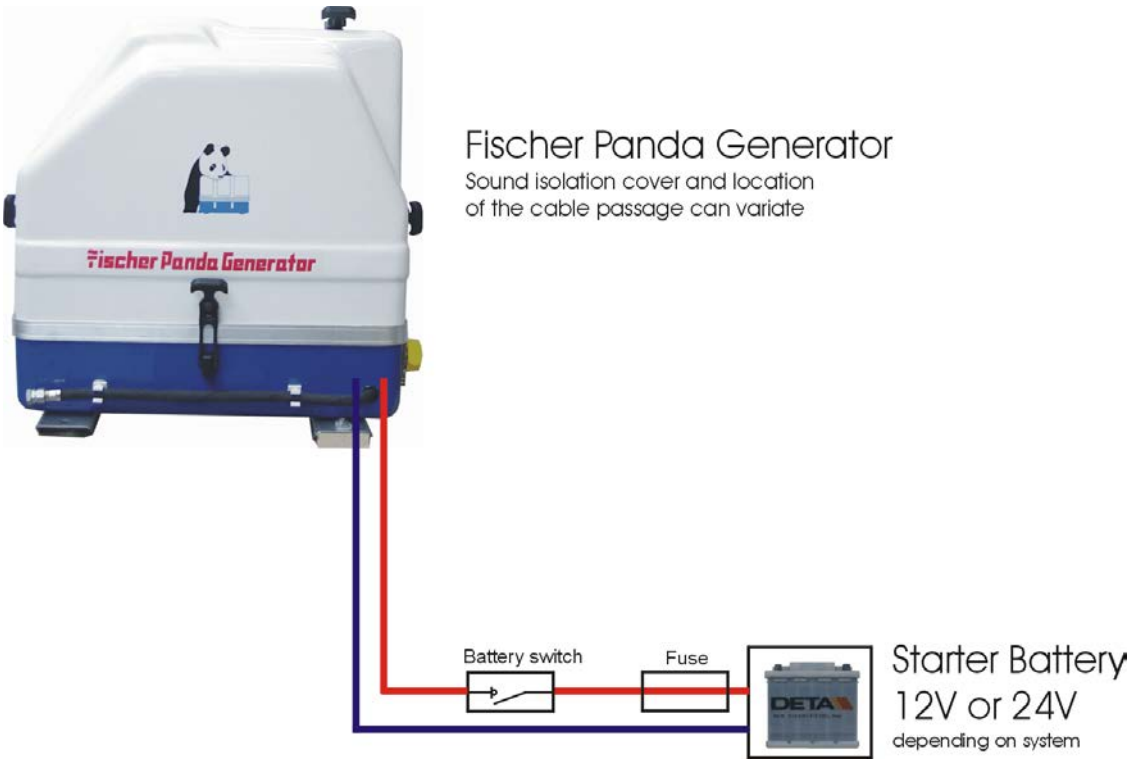
Install battery lines in a safe way that the cable insulation will not be shaved or damaged.

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 to 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. Special notes and safety instructions for AGT- Generators

2.1 General safety references concerning operation of an AGT generator.

Special safety precautions must me made with all energy systems, in order to protect the environment of the components against fire.

It is very important to ensure that the main switch on the battery is well accessible, so that in case of danger, this main switch can immediately be separated. However, the main switch must also be mounted close to the battery. If the place is not well accessible, it is necessary to install a power relay instead of the main switch, which can eventually be controlled from different places. The switches for the power relay must be marked as main switch DC battery "switch off at danger".

2.1.1 Cooling of the rectifier block at the marine versions

The rectifier block is cooled with fresh water. A normal cooling of the rectifier block is therefore only possible, as long as the cooling water supply of the generator functions correctly.

Bus bars and radiator boxes are controlled by thermal relays. After a cooling system fault, the diodes must be examined. See chapter failure/maintenance in this manual.

Never start the generator with disconnected battery as the rectifiers can be damaged!

Warning! General Warning

Contact of the electrical contacts may be DANGER TO LIVE!

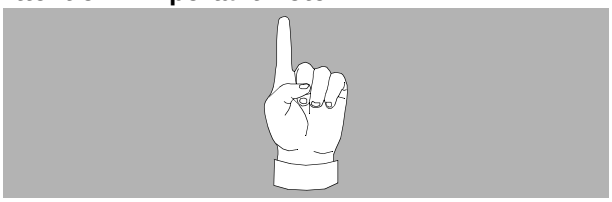
CAUTION! Danger of electrical impact during contact

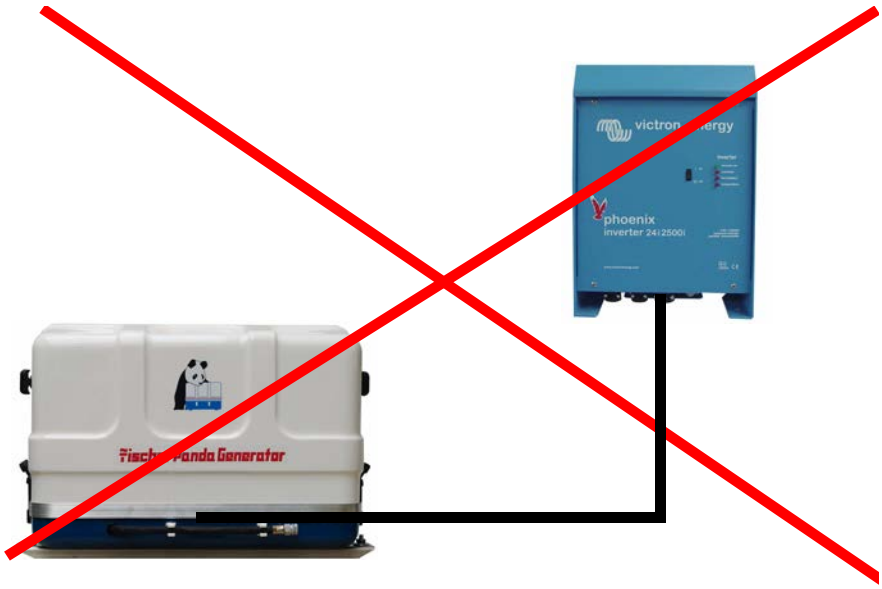
2.2 Sample System AGT DC Generator

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

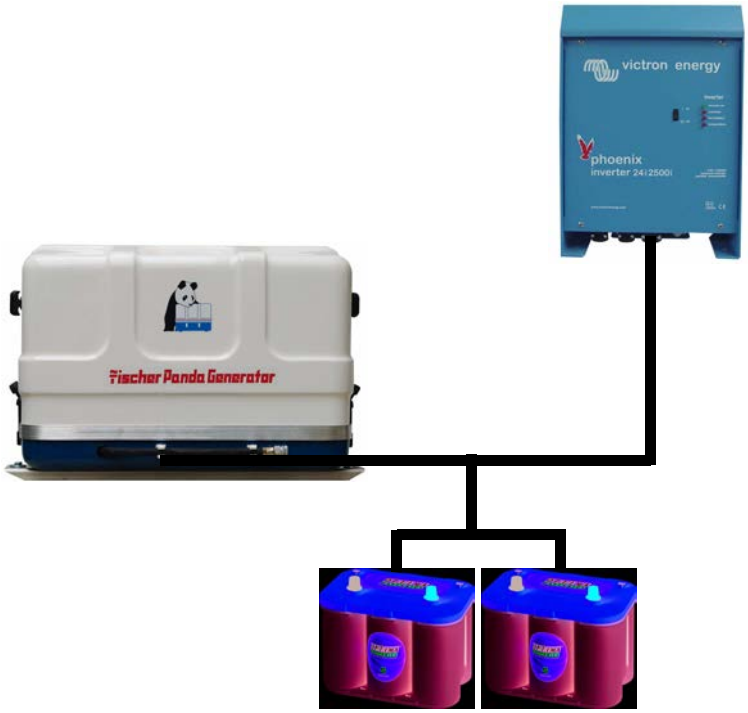
The Inverter generates voltage peaks, which can destroy the rectifier rectifiers of the generator!

Attention!: Important Note





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



Recommended capacity

- at 12V ≥ 240Ah
- at 24V ≥ 120Ah

The screws at the electric rectifier may be pulled tight only with a torque wrench. Recommend torque: see technical datasheet of the diodes (f.e. Torque 6 Nm mechanical and electrical connections of the diode DD171N)

The battery cable must be secured at the generator and at the batteries with appropriate safety devices.

The generator is also include into the CO_2 - fire-extinguishing system.

2.2.1 Measures to the fire protection.

All construction units in the environment of energized parts, which carry more than 50 Amp., must be fire protection-moderately secured.

All junction points at the energized parts must be examined regularly on heating up (infrared thermometers).

In particular temperature differences are a sign of high transition resistances or bad connections of the warmer contact.

2.3 Special Tools

This symbols are used throughout this manual to show which tool must be used at maintenance or installation.	
	Thermometer
	Infrared temperature mesuring pistol

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

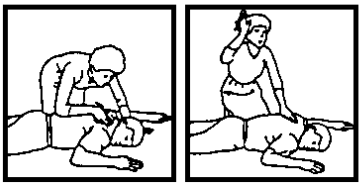
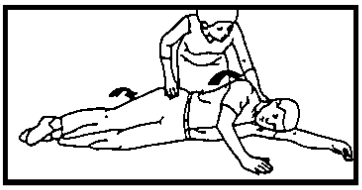
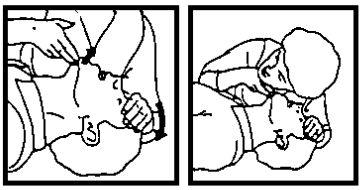
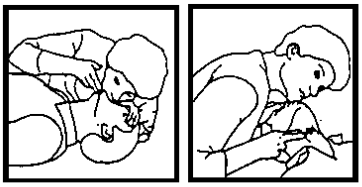


	First Aid in case of accidends by electrical shocks 5 Safety steps to follow if someone is the victim of electrical shock	
1	Do not touch the injured person while the generator is running.	
2	Switch off the generator immediately.	
3	if you cannot switch off the generator, pull, push, or lift the person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

3.1 WHEN AN ADULT STOPS BREATHING

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

Warning:

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

4. The Panda Generator

4.1 Type plate at the Generator

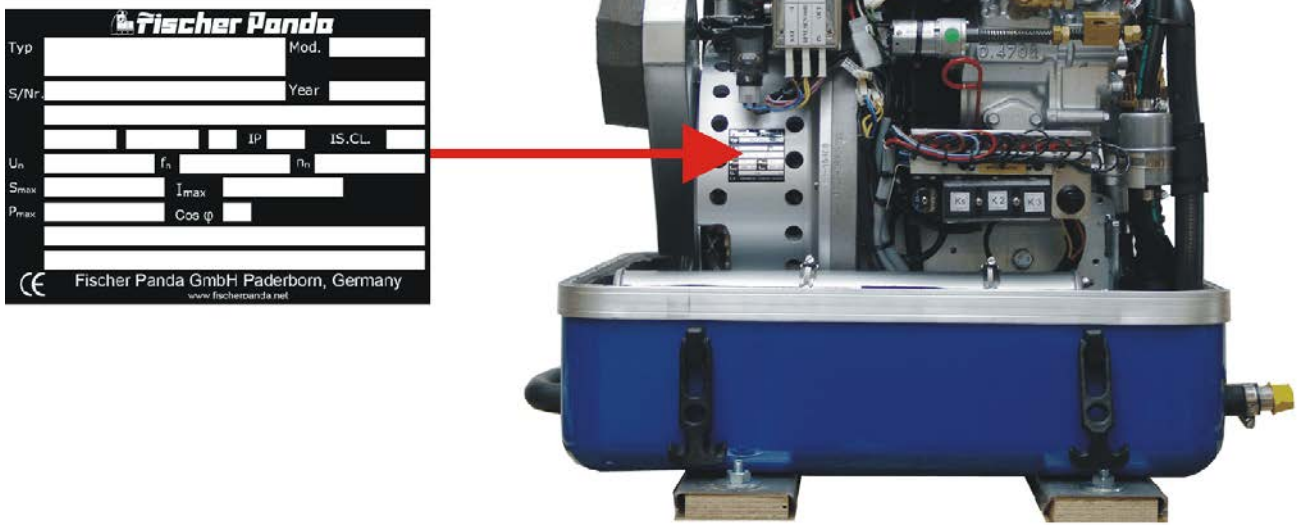


Fig. 4.1-1: Type plate at the generator

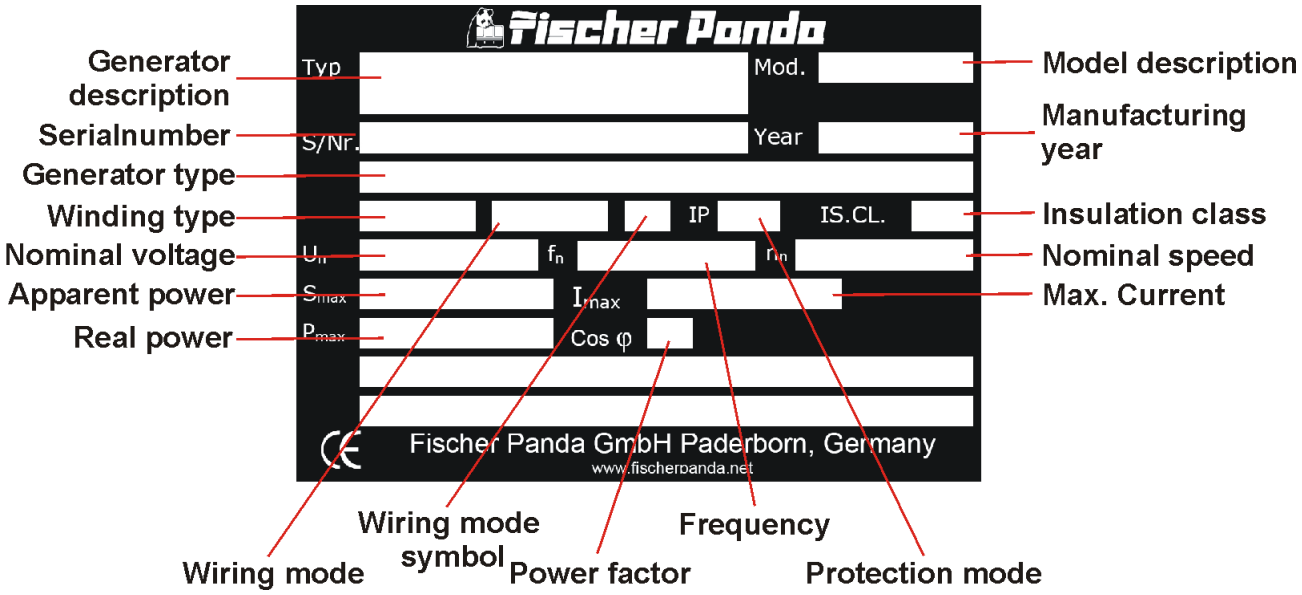
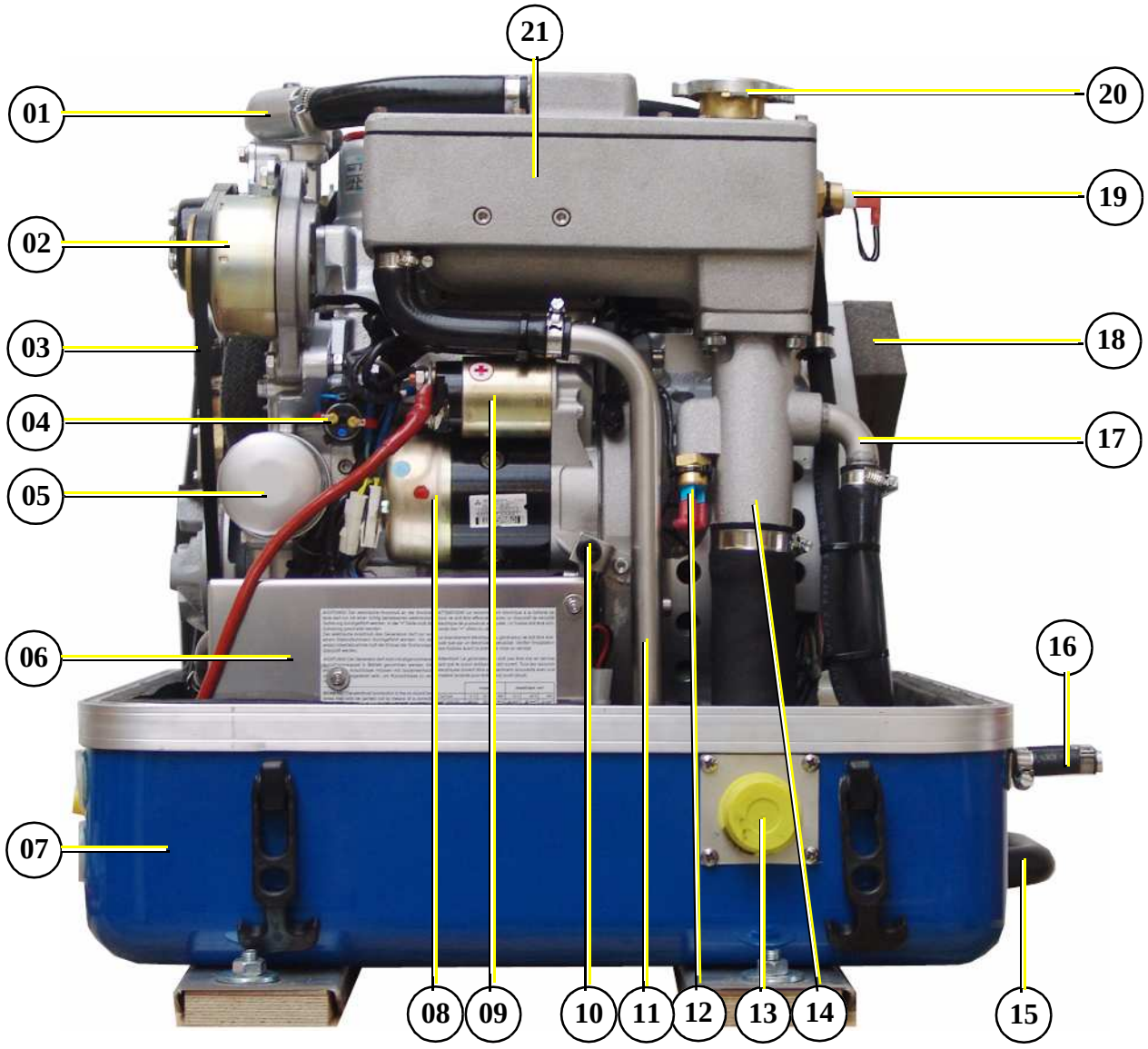


Fig. 4.1-2: Discription type plate

4.2 Description of the Generator

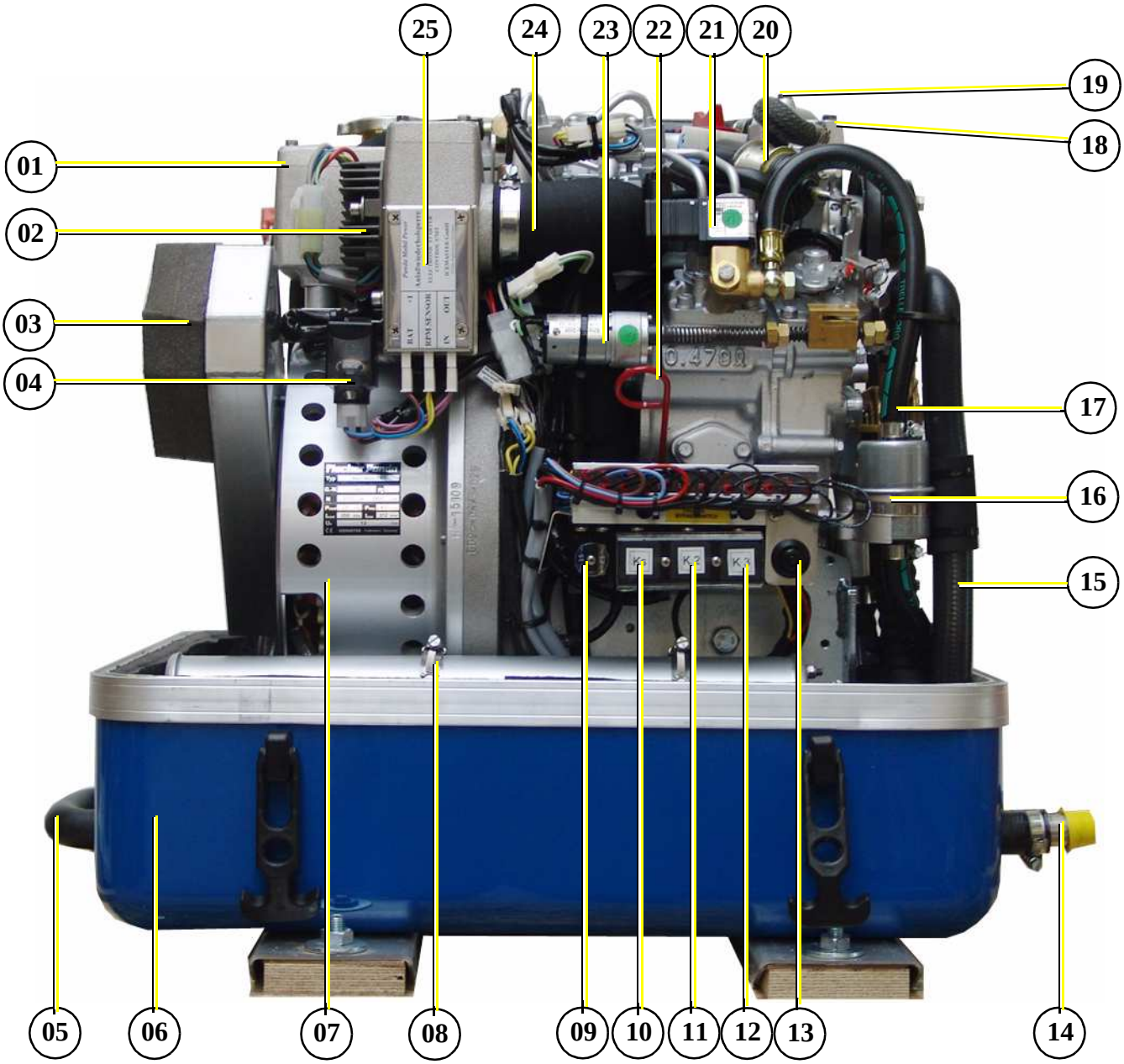
4.2.1 Right Side View



01) Thermostat housing
02) DC-alternator 12V
03) V-belt für DC-alternator and cooling water pump
04) Oil pressure switch
05) Oil filter
06) Rectifier under protection cover
07) Sound cover base parrt
08) Starter motor
09) Solenoid for starter motor
10) Fuse for voltage sense
11) Cooling water return pipe
12) Thermo-switch exhaust
13) Exhaust output
14) Exhaust connection port
15) Connection external ventilation valve
16) Connections for external cooling water expansion tank
17) Injection port raw water
18) Air suction port for coil cooling
19) Thermo-switch exhaust elbow
20) Cooling water filler neck
21) Water-cooled exhaust elbow

Fig. 4.2.1-1: Right side view

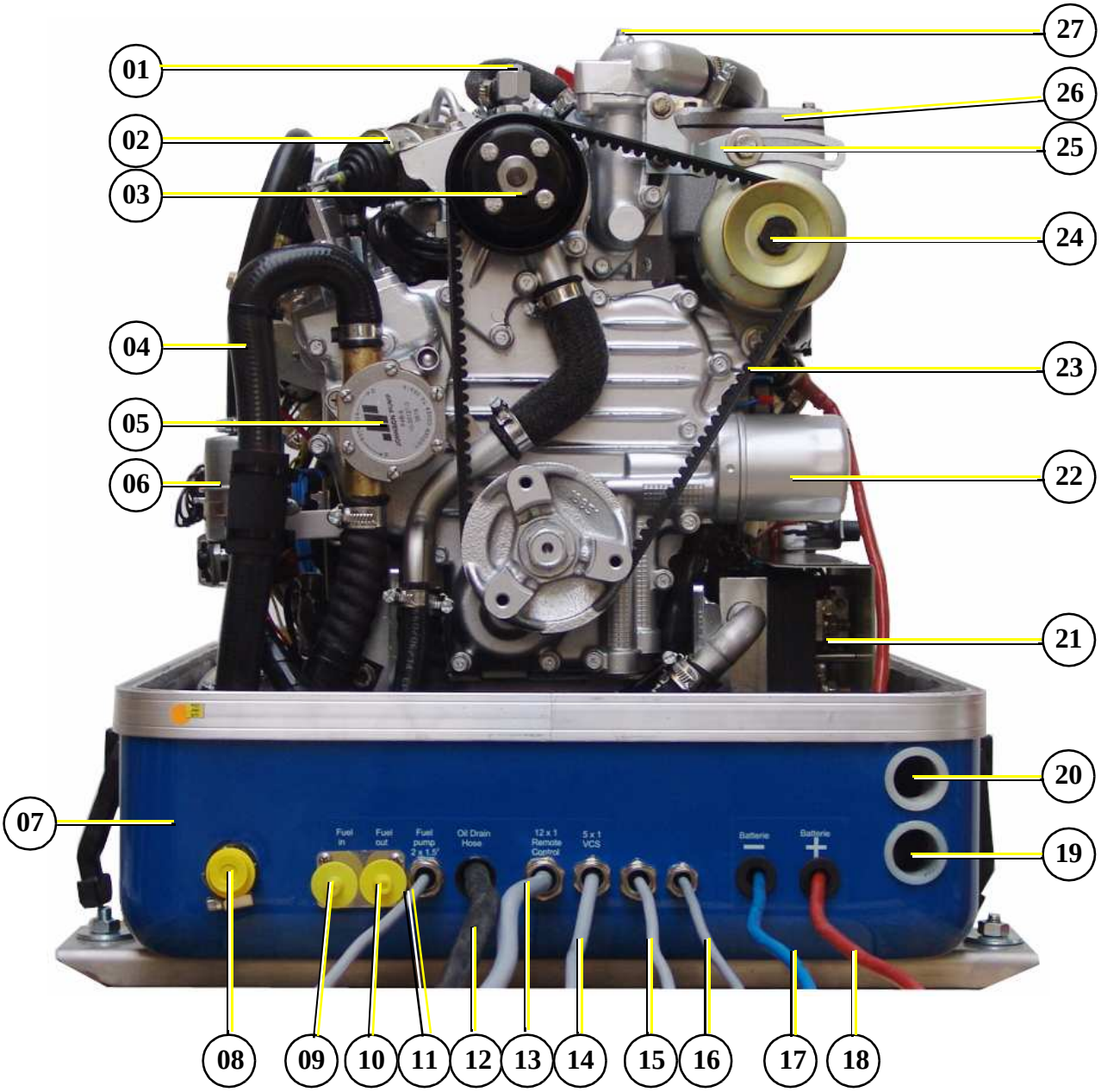
4.2.2 Left Side View



01) Air suction housing with air filter
02) Charge control for DC-alternator
03) Air suction port for coil cooling
04) Time relay for stop solenoid
05) Connection for external ventilation valve
06) Sound cover base part
07) Generator housing with coil
08) Heat exchanger
09) Electrical fuses (blue=15A, white=25A)
10) Starter-relay Ks
11) Pre-glow relay (glow plugs) K2
12) Fuel pump start relay K3
13) Failure bypass switch
14) Raw water intake
15) Raw water intake hose
16) Fuel filter
17) Raw water pump
18) Ventilation screw cooling water pump
19) Ventilation screw thermostat housing
20) Stop solenoid
21) Fuel solenoid valve
22) Oil dipstick
23) Actuator for rpm-regulation
24) Suction hose, air suction housing - induction elbow
25) Electric starter control unit

Fig. 4.2.2-1: Left side view

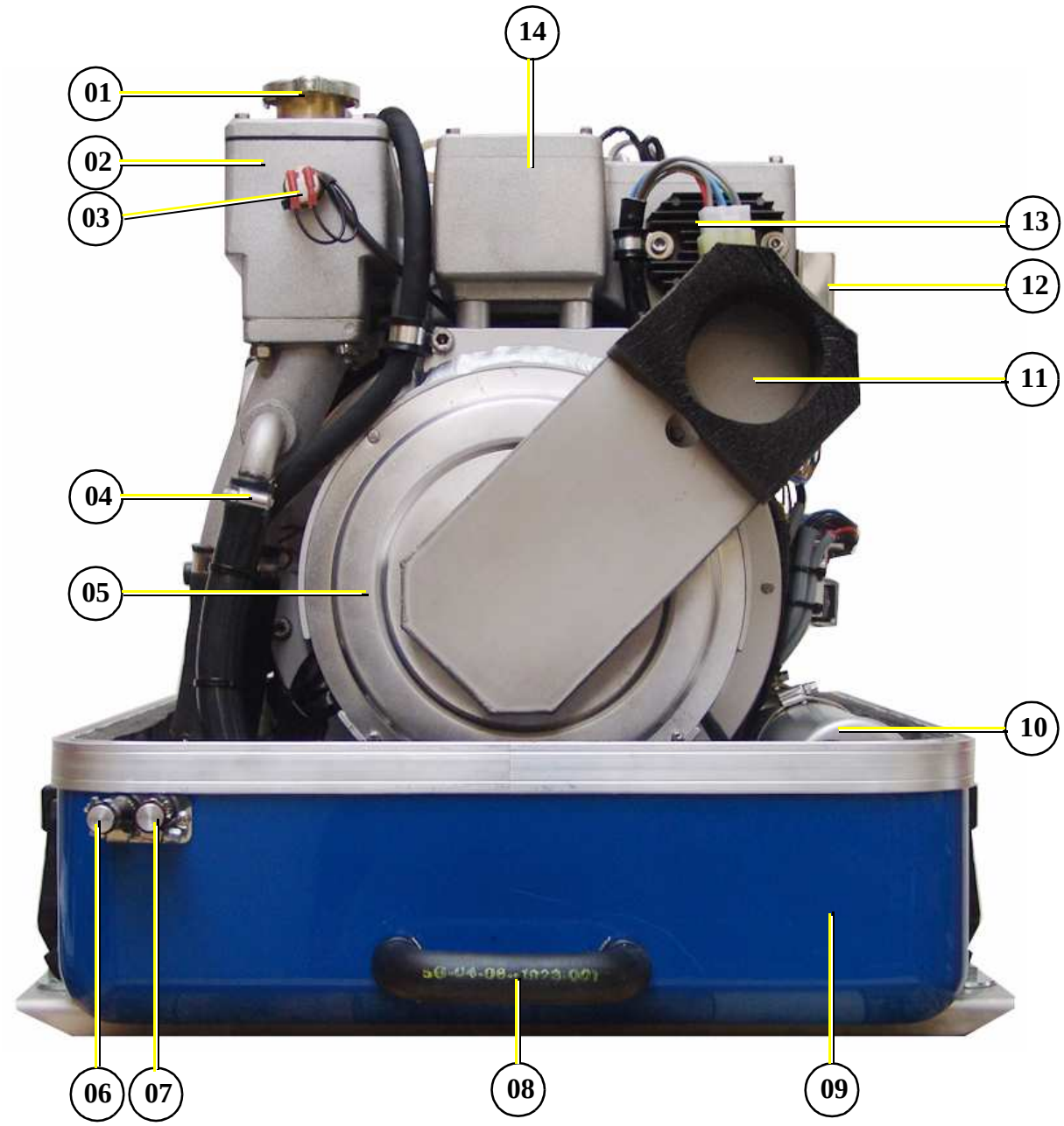
4.2.3 Front View



01) Ventilation screw internal cooling water pump
02) Stop solenoid
03) Pulley for internal cooling water pump
04) Raw water intake hose
05) Raw water pump
06) Fuel filter
07) Sound cover base part
08) Raw water intake
09) Connection fuel in
10) Connection fuel out
11) Cable fuel pump (2x1,5mm²)
12) Oil drain hose
13) Cable remote control panel (12x1mm²)
14) Cable voltage control VCS (5x1mm²)
15) Voltage sense 12V
16) Shunt measurement
17) Starter battery minus (-)
18) Starter battery plus (+)
19) Passage for service battery cable
20) Passage for service battery cable
21) Rectifier
22) Oil filter
23) V-belt
24) DC-alternator 12V
25) Clamp device for DC-alternator
26) Water-cooled exhaust elbow
27) Ventilation screw thermotast housing

Fig. 4.2.3-1: Front view

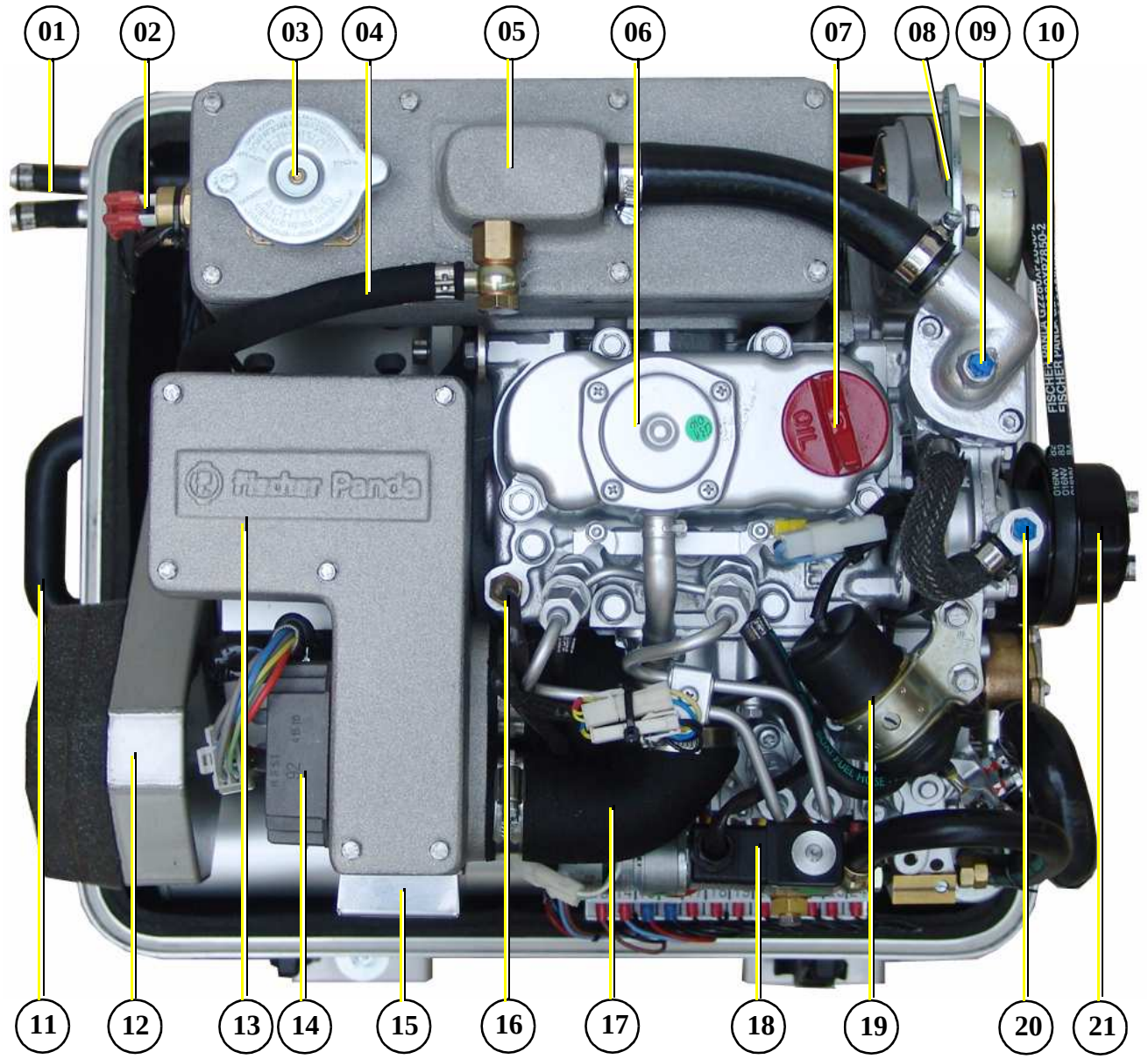
4.2.4 Back View



01) Cooling water filler neck
02) Water-cooled exhaust elbow
03) Thermo-switch exhaust elbow
04) Injection port raw water
05) Generator front cover
06) In-flow from external cooling water expansion tank
07) Return to external cooling water expansion tank
08) Connection external ventilation valve
09) Sound cover base part
10) Heat exchanger
13) Suction port for coil cooling
12) Electric starter control unit
13) Charge control for DC-alternator
14) Air suction housing with air filter

Fig. 4.2.4-1: Back view

4.2.5 View from Above



01) Connections for external cooling water expansion tank
02) Thermo-switch exhaust elbow
03) Cooling water filler neck
04) Ventilation hose to external expansion tank
05 Water-cooled exhaust elbow
06) Valve cover
07) Oil filler neck
08) DC-alternator
09) Ventilation screw thermostat housing
10) V-belt
11) Connection external ventilation valve
12) Suction port for coil cooling
13) Air suction housing with air filter
14) Charge control for DC-alternator
15) Eletctric starter control unit
16) Thermo-switch cylinder head
17) Suction hose, air suction housing - induction elbow
18) Fuel solenoid valve
19) Stop solenoid
20) Ventilation screw internal cooling water pump
21) Pulley for internal cooling water pump

Fig. 4.2.5-1: View from above

4.3 Details of functional units

4.3.1 Components of Cooling System (Raw water)

Raw water intake

The diagram shows the supply pipes for the generator. The connection neck for the raw water connection is shown on the left hand side. The cross-section of the intake pipe should be nominally larger than the generator connection.

Fig. 4.3.1-1: Raw water intake

Raw water impeller pump

The raw water pump is fitted with a rubber impeller. This pump is self-inductive. If, for example, you forget to open the sea valve, then you must expect the impeller to be destroyed after a short period of time. It is recommended to store several impellers on board as spare parts.

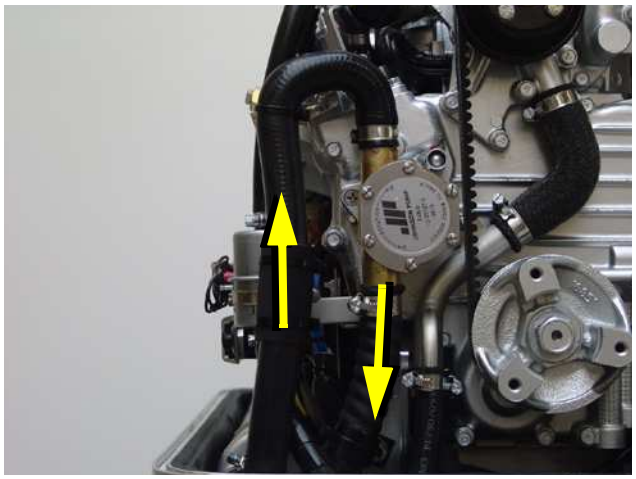


Fig. 4.3.1-2: Raw water impeller pump

Heat exchanger

Separates the raw water system from the freshwater system.

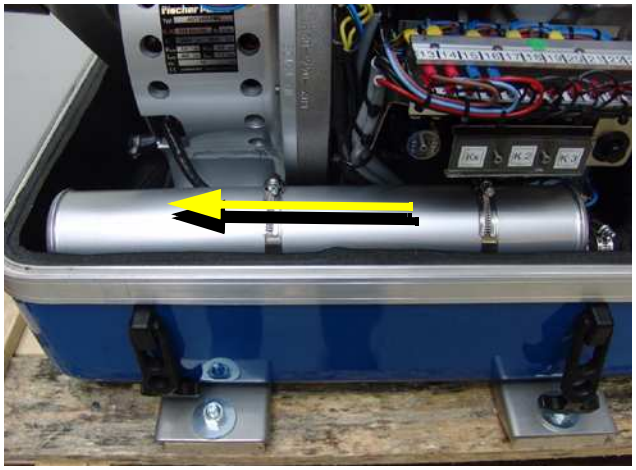


Fig. 4.3.1-3: Heat exchanger

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. A hosepipe on the generator casing has been produced for this. Both connecting pieces are bridged by a formed piece of hose.

Fig. 4.3-4: Connection ventilation valve

Cooling water injector nozzle

The injection point for the marine generator water-cooled exhaust system is situated at the exhaust connection pieces The exhaust connections must be regularly checked for signs of corrosion.

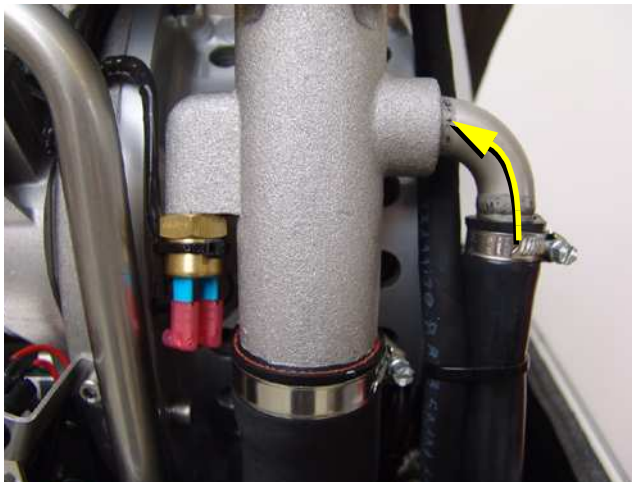


Fig. 4.3-5: Cooling water injector nozzle

Exhaust outlet

Toghether with the exhaust the raw water gets out here.

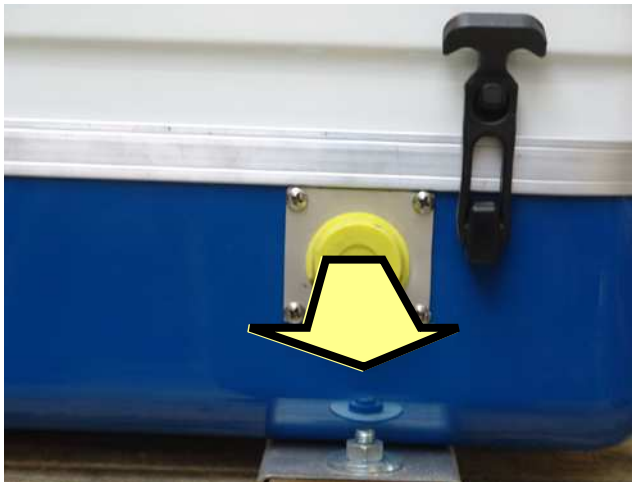


Fig. 4.3.1-6: Exhaust outlet

4.3.2 Components of Cooling System (Freshwater)

Cooling water filler neck

The cooling water filler nck situated at the water-cooled manifold are only used, when the generator is initially started. Since the generator is normally already filled with cooling water, these components are only by the user, if repairs are to be carried out. Topping up with cooling water may only carried out at the external cooling water compensation tank. Note that the water level in the cooling water compensation tank is only 20% of the volume in a cold state.

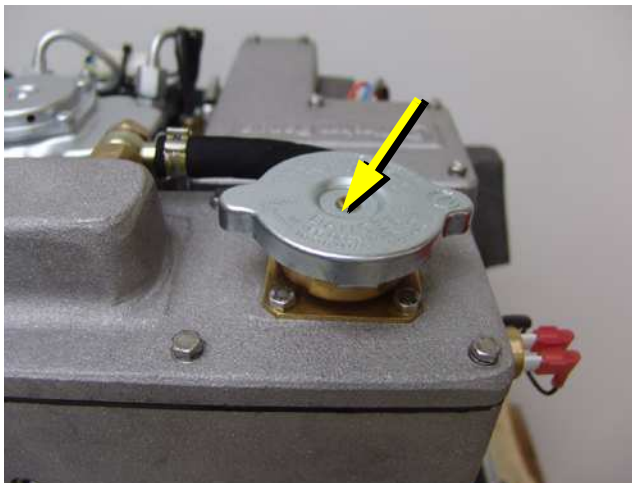


Fig. 4.3.2-1: Cooling water filler neck

Freshwater backflow

The cooling water is fed to the heat exchanger from the water-cooled manifold by means of the pipe shown in the diagram.

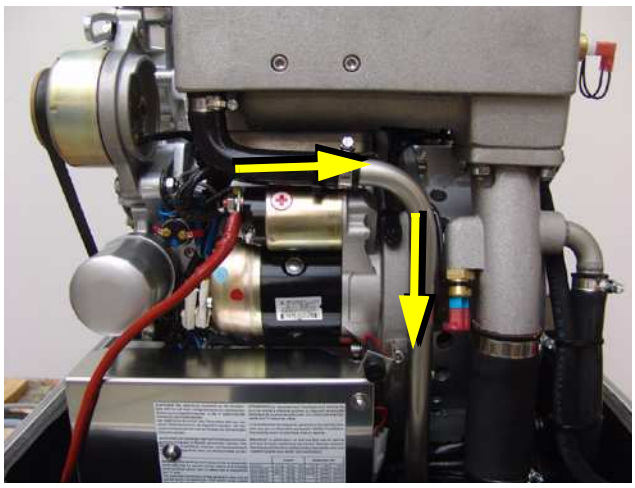


Fig. 4.3.2-2: Freshwater backflow

Ventilation pipe

The ventilation pipe at the water-cooled exhaust manifold leads to the external expansion tank. This pipe only serves as a ventilation pipe, if both pipes are to be connected to the external expansion tank (ventilation pipe and intake pipe).

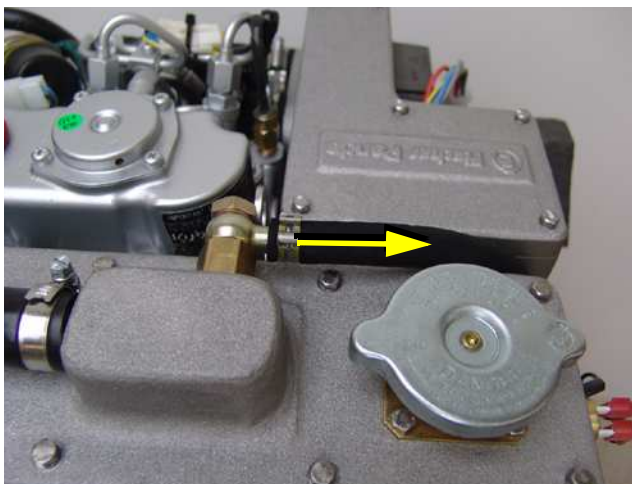


Fig. 4.3.2-3: Ventilation pipe

Hose connection pieces for the external expansion tank

The external expansion tank is connected by two hose connections. The connecting pieces shown here serves as constant ventilation for the water-cooling system.

In case the external expansion tank is connected with two hoses, the system will ventilate itself. In this case, additional ventilation is only necessary when the generator is initially filled, or if the cooling water is not circulating.

Fig. 4.3.2-4: External expansion tank

Heat exchanger

Separates the raw water system from the freshwater system.

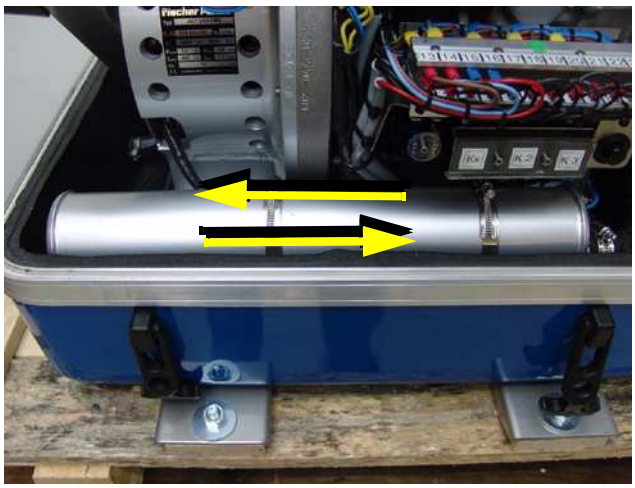


Fig. 4.3.2-5: Heat exchanger

Rectifier

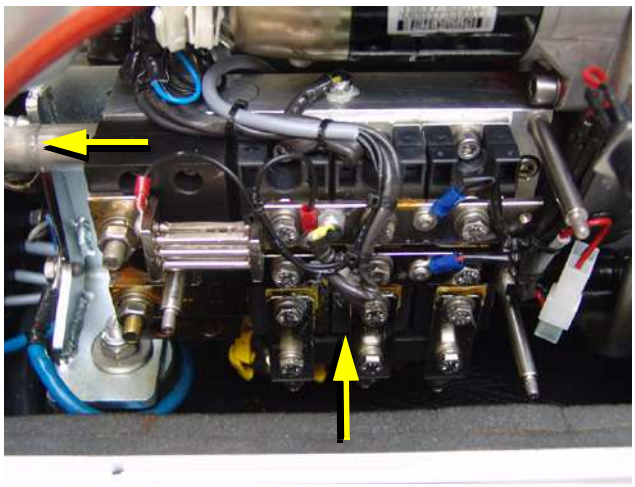


Fig. 4.3.2-6: Rectifier

Cooling water injection

A.) To the thermostat housing

B.) From the external expansion tank

The intake pipe from the external cooling water expansion tank is connected to the point shown with „B“.

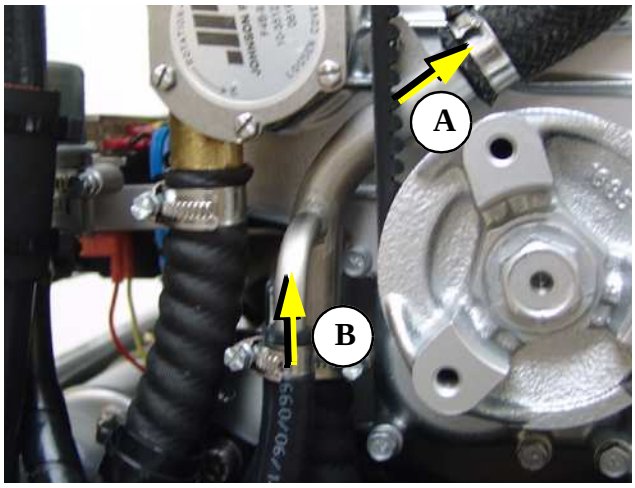


Fig. 4.3.2-7: Cooling water injection

Internal cooling water pump

The diesel motor cooling water pump (see arrow) aids the circulation of the internal freshwater system.

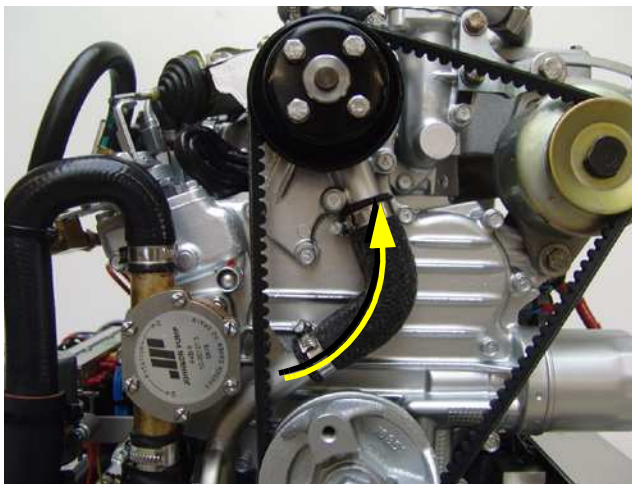


Fig. 4.3.2-8: Internal cooling water pump

Ventilation screw cooling water pump

The ventilation screw above the cooling water pump casing may not be opened, whilst the generator is running. If this occurs by mistake, air will be drawn through the opening. Extensive ventilation of the whole system is then necessary.

Fig. 4.3.2-9: Ventilation screw cooling water pump

Ventilation screw thermostat housing

The ventilation screw on the thermostat housing should occasionally be opened for control purposes. Standing machinery should principally carry out ventilating.

Fig. 4.3.2-10: Ventilation screw thermostat housing

Water-cooled exhaust elbow

The manifold is cooled by means of the internal cooling system (freshwater). The cooling water filler necks on the casing of the elbow may not be opened. These cooling water necks are only required to fill the motor with cooling water in cases of repair. The normal cooling water controls may only be carried out at the external expansion tank.

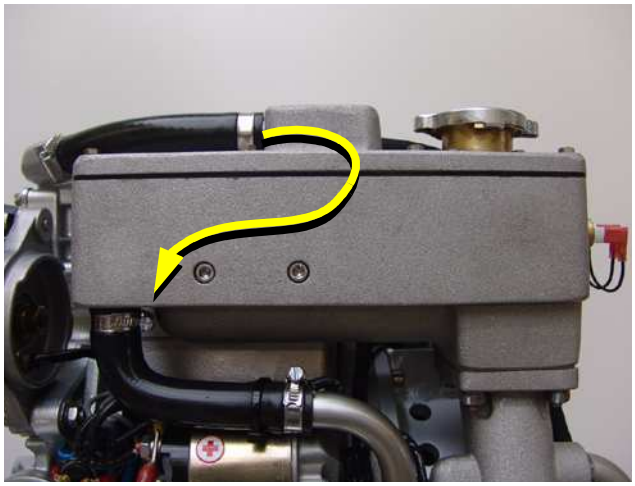


Fig. 4.3.2-11: Water-cooled exhaust elbow

4.3.3 Components of the fuel system

External fuel pump

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

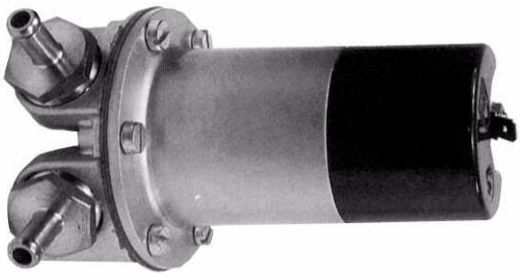


Fig. 4.3.3-1: External fuel pump

Connecting pieces for the fuel pipe

1. Fuel intake
2. Fuel backflow

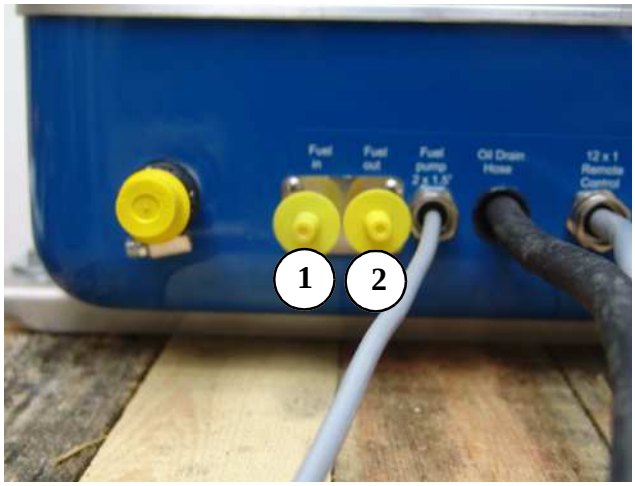


Fig. 4.3.3-2: Fuel connections

Fuel filter

A consequential filtering of fuel is especially important for all marine systems. A fine filter, which is firmly attached to the inside of the sound insulation capsule for the marine version, is supplied on delivery, and loose for other makes. In all cases a further pre-filter with water separator must be installed. See directions for fuel filter installation.

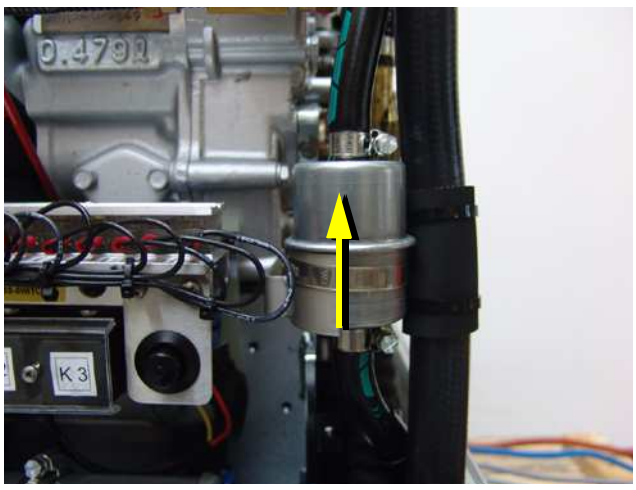


Fig. 4.3.3-3: Fuel filter

Fuel solenoid valve

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

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

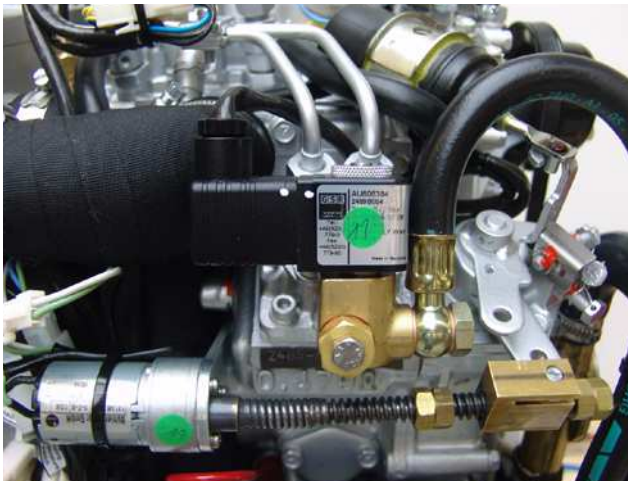


Fig. 4.3.3-4: Fuel solenoid valve

Injection nozzles

If the engine does not start after the ventilation, the fuel injection lines must be de-aerated individually.

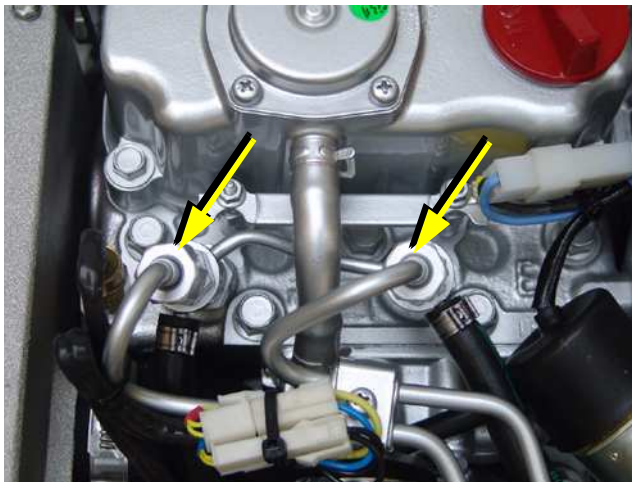


Fig. 4.3.3-5: Injection nozzle

Glow plugs

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

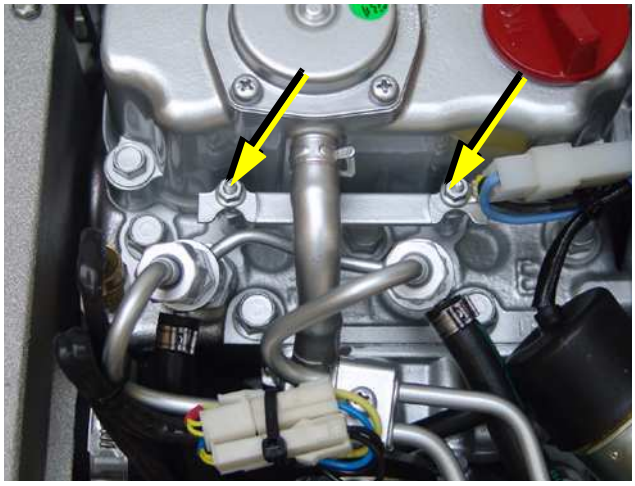


Fig. 4.3.3-6: Glow plugs

Stop solenoid for engine stop

Some model are additional equipped with an stop solenoid. The generator is stopped by the co-operation of the stop solenoid immediately after switching off. The adjustment of the stop solenoid must always be checked, in order to be sure that the stop lever can move also during the operation freely and is not under prestressing.

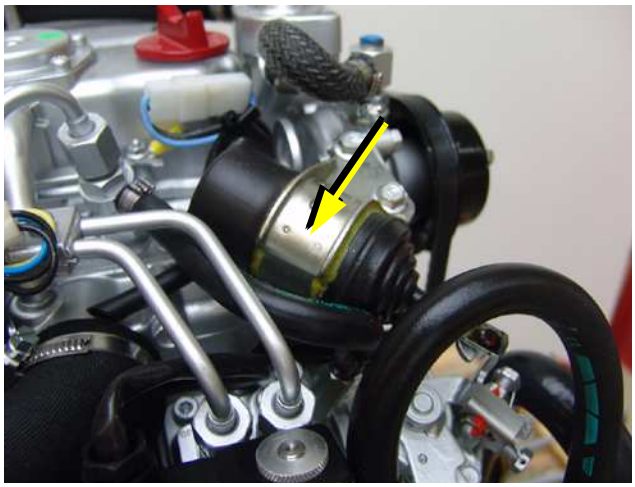


Fig. 4.3.3-7: Stop solenoid

4.3.4 Components of combustion air

Air suction openings at the sound cover

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

It must be consistently paid attention that the generator is installed in such a way that from no water can arrive into the proximity of these air openings. (minimum distance 150 mm)

Fig. 4.3.4-1: Combustion air intake

Cooling air for coil cooling

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

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

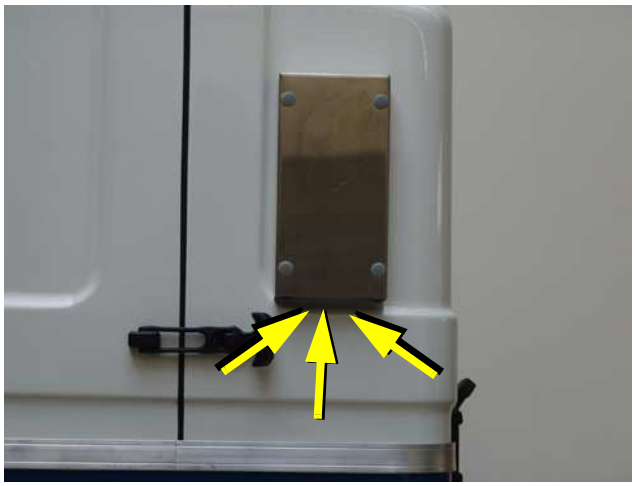


Fig. 4.3.4-2: Cooling ait intake

Air suction housing

Remove the cover to look indes the housing. There is a filter element. This must be checked from timt to time.

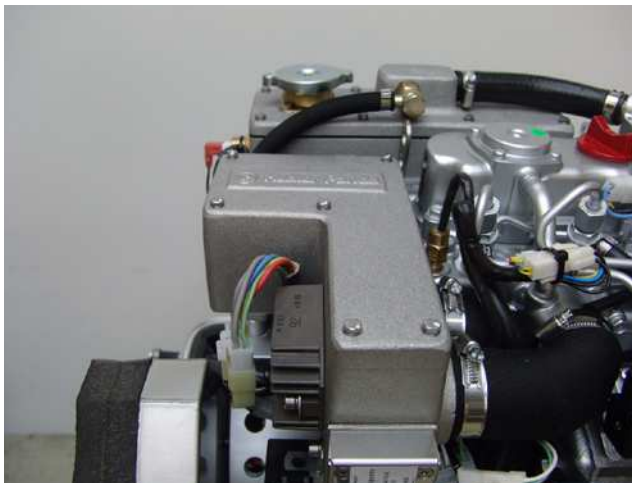


Fig. 4.3.4-3: Air suction housing

Air suction housing with air filter set

The figure shows the air filter element in the air suction housing. However the return pipe of the crank case exhaust flows also into the air suction housing, it can be faced with older generators and/or with engines on high running time that oel vapors affect the air filter. Therefore an check is advisable once in a while.

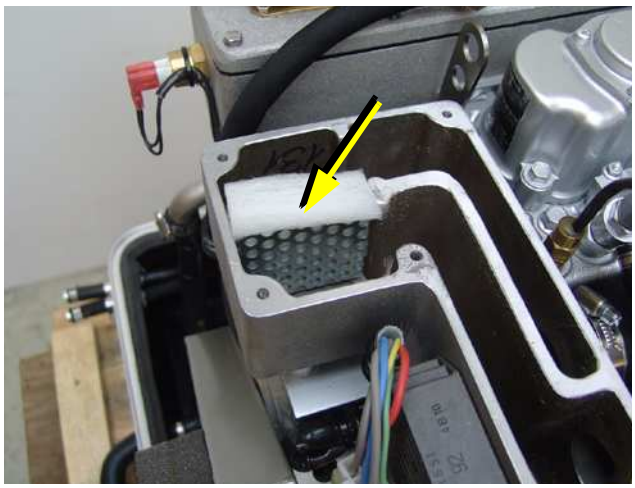


Fig. 4.3.4-4: Air filter

Induction elbow

The figure shows the induction elbow at the combustion engine. At the front of this induction elbow you can see the hose connection between air suction housings and induction elbow. The air filter must be checked, if this hose pulls together at operation.

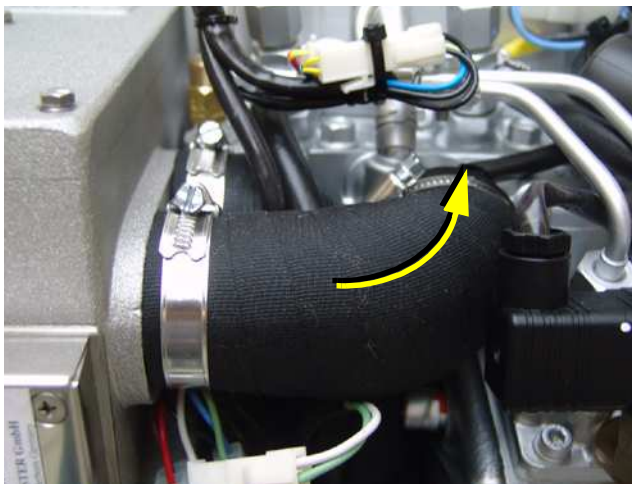


Fig. 4.3.4-5: Induction elbow

Valve cover

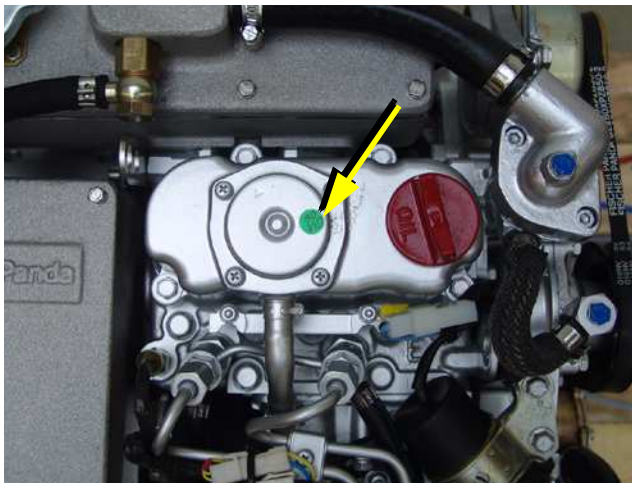


Fig. 4.3.4-6: Valve cover

Exhaust elbow

On the back of the engine is the water-cooled exhaust elbow. On the top side the pipe union for the internal raw water circuit is to be seen and the filler neck for the cooling water. This cooling water filler neck is used only at first filling. Control of the cooling water and if necessary refill takes place at the external cooling water expansion tank.

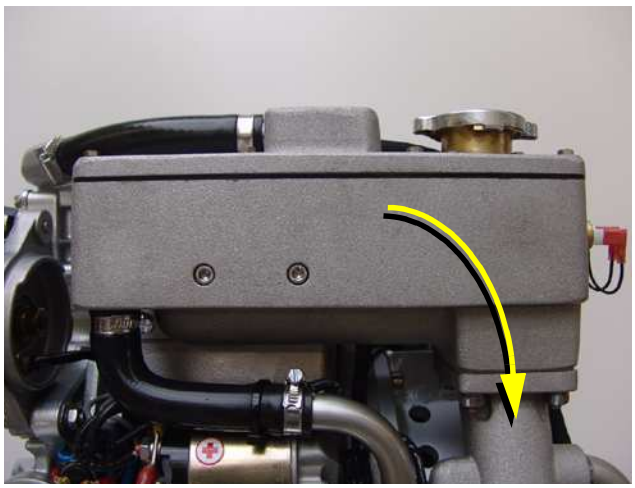


Fig. 4.3.4-7: Water-cooled exhaust elbow

Exhaust connection at the exhaust elbow

Raw water from the external cooling circle is fed here.

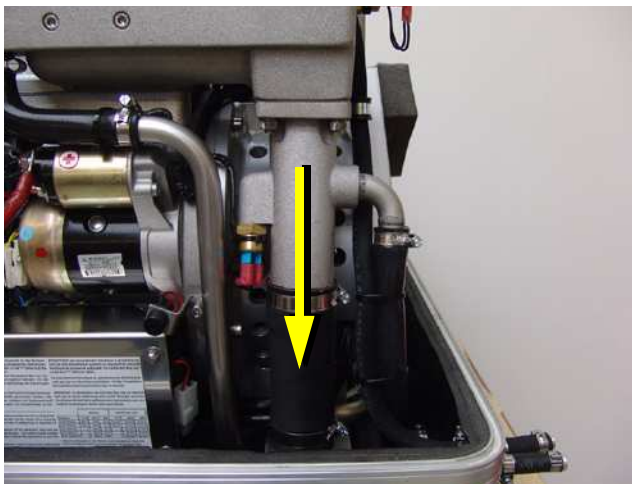


Fig. 4.3.4-8: Exhaust port

Exhaust outlet

Connect the exhaust pipe with the water lock.

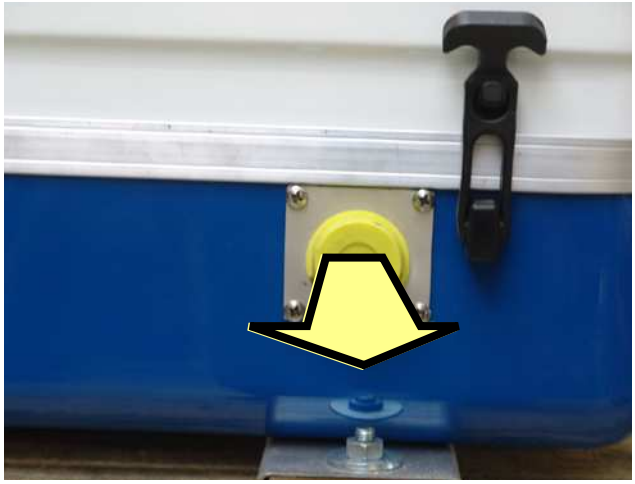


Fig. 4.3.4-9: Exhaust outlet

4.3.5 Components of the electrical system

Connection starter battery

1. Cable for starter battery (plus)
2. Cable for starter battery (minus)

During the connection to the starter battery it must be always ensured that the contact is perfectly guaranteed.

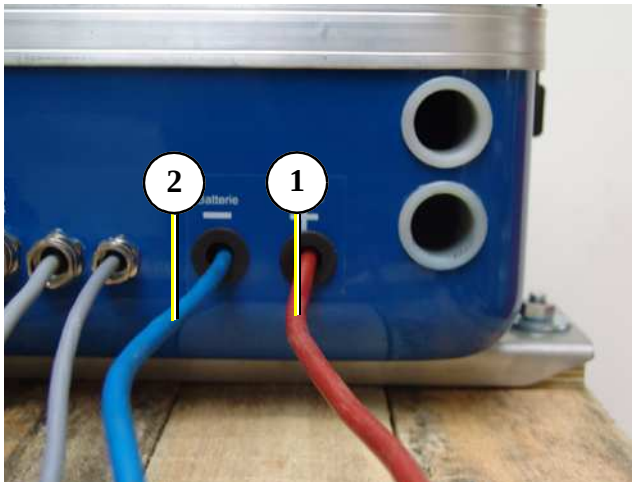


Fig. 4.3.5-1: Cable for starter battery

Service battery cables

At the front of the sound cover is also the withdrawal for the cable for the service batteries.

1. Passage for service battery (-)-cable
2. Passage for service battery (+)-cable

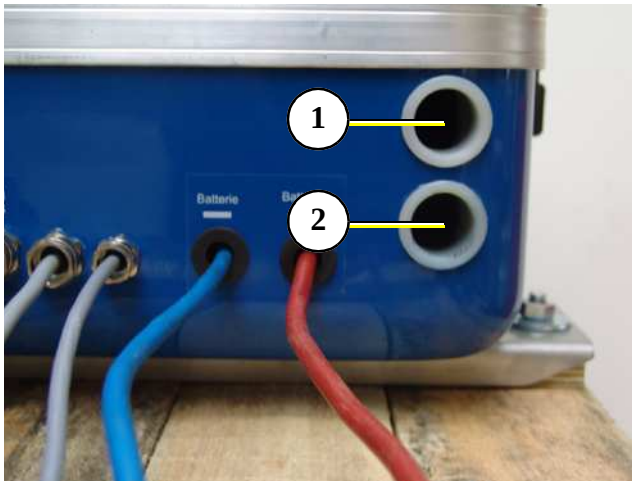


Fig. 4.3.5-2: Service battery cables

Electrical connections for control

At the front of the generator also all remaining cables for the electrical connections are depending upon type. The allocation of the connections result from the plan for the AC-Control box. See here:

1. Fuel pump
2. Remote control panel
3. VCS
4. Voltage sense 24V
5. Shunt measurement

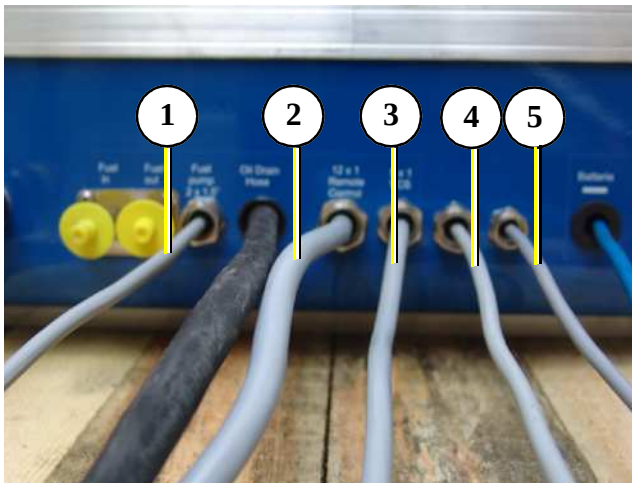


Fig. 4.3.5-3: Electrical connections

Starter motor

1. Starter motor and
2. Solenoid switch

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

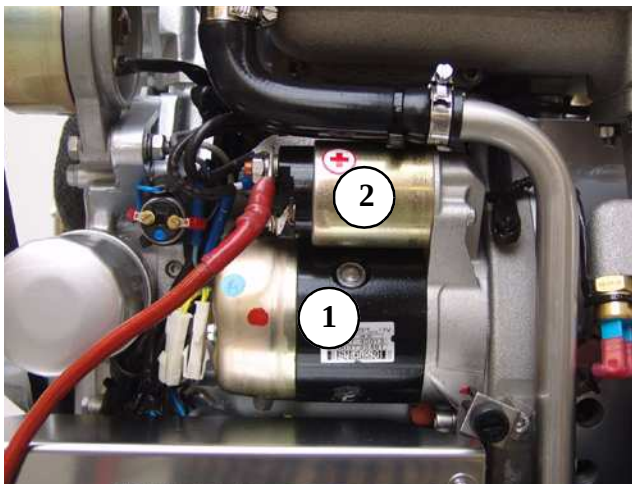


Fig. 4.3.5-4: Starter motor

Actuator for speed regulation

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

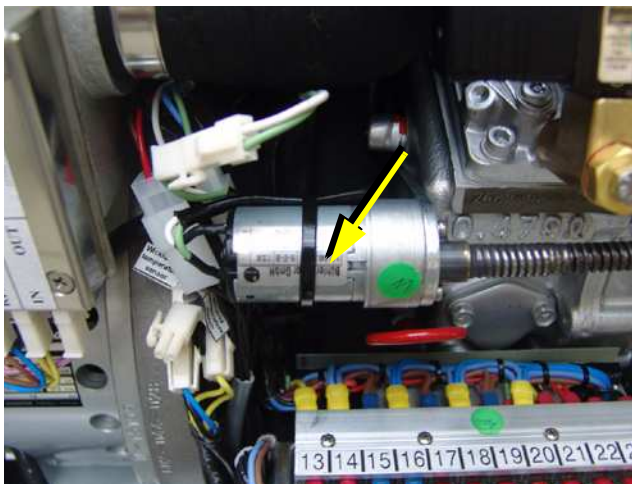


Fig. 4.3.5-5: Actuator

Speed sensor

All Panda generators can be equipped with an external automatic start. For the operation of this automatic starting system a separate speed sensor is necessary. At some models the speed sensor is standard installed.

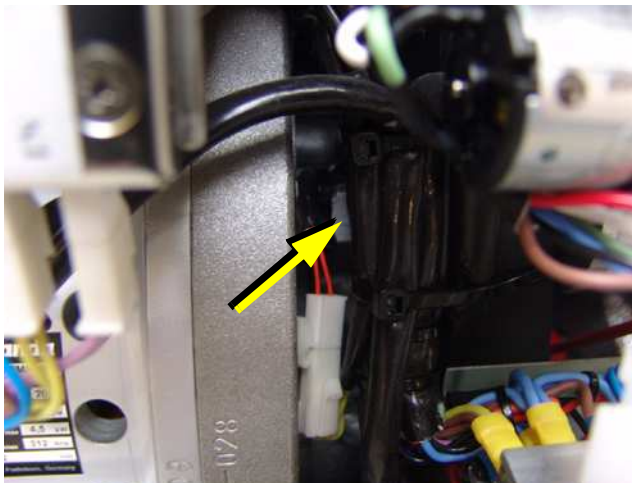


Fig. 4.3.5-6: Speed sensor

Electric starter control unit

If there is an automatic starting requirement and if the remote control panel is switched off, then this automatic starting requirement is ignored. Automatic starting is only possible if after switching on of the remote control panel the automatic starting requirement takes place.

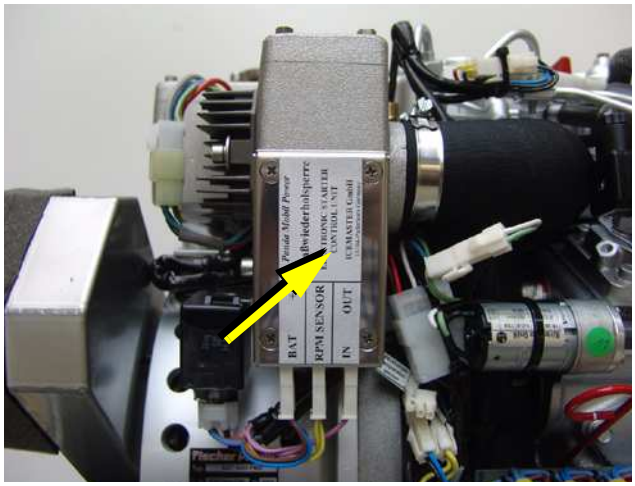


Fig. 4.3.5-7: Electronic starter control unit

DC-alternator

All Panda generators from Panda 6.000 are provided with its own charge system for the 12V DC mains. This DC-alternator is powered over a v-belt together with the internal cooling water pump.

The 12V charge system may be used only for the generator-own starter battery.

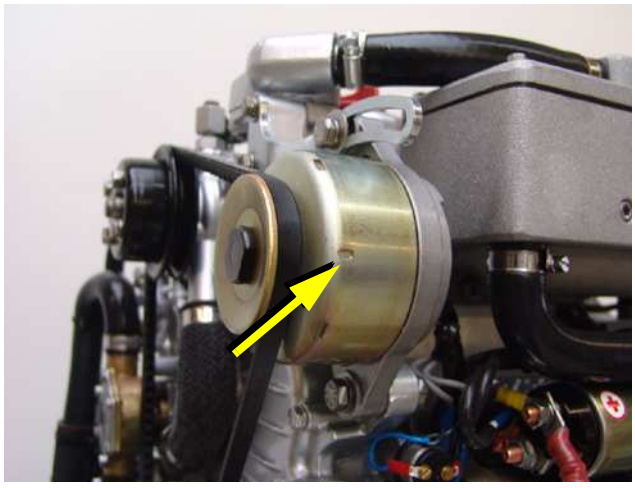


Fig. 4.3.5-8: DC-alternator

Charge control for DC-alternator

The voltage regulator for the 12V DC-alternator is on the back of the air suction housing. The housing is formed for cooling purposes. The voltage regulator may not be covered from the outside. The surface must be accessible for the cooling.

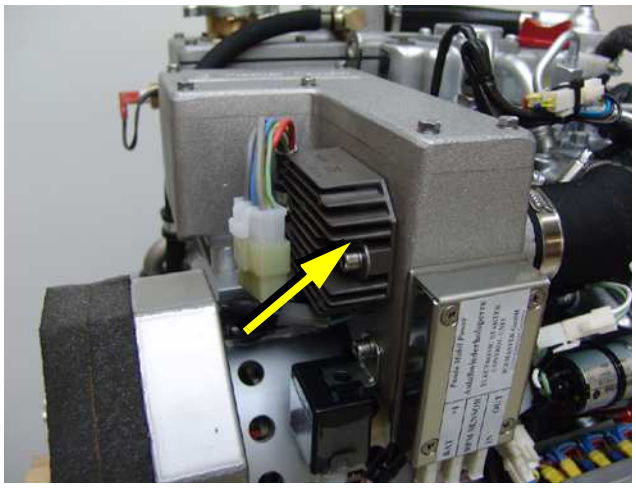


Fig. 4.3.5-9: Charge control

Time relay for stop solenoid

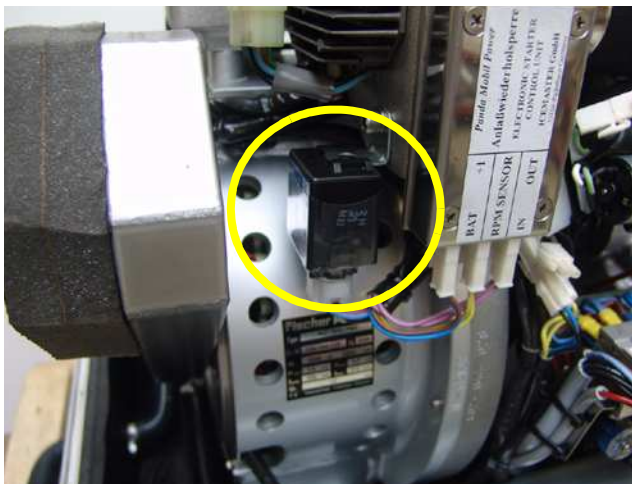


Fig. 4.3.5-10: Time relay for stop solenoid

Rectifier

Fig. 4.3.5-11: Rectifier

Fuse for voltage sense

F4 1,6A

Fig. 4.3.5-12: Fuse for voltage sense

Terminal block for remote control cable with fuses and power relais

F1 fuse 15A for DC

F2 fuse 25A for starter motor

Ks relay for starter motor

K2 relay for glow plugs

K3 relay for fuel pump

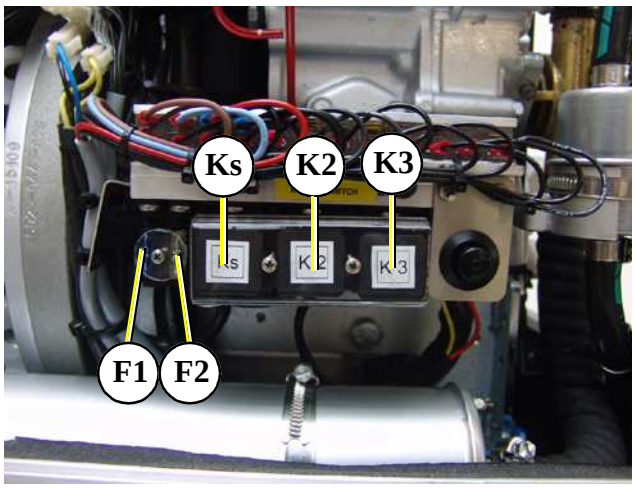


Fig. 4.3.5-13: Terminal block

4.3.6 Sensors and switches for operating surveillance

Thermo-switch at cylinder head

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

110℃ and 130℃

Fig. 4.3.6-1: Thermo-switch at cylinder head

Thermo-switch at watercooled exhaust elbow

This thermo-swich is located at the water-cooled exhaust elbow and monitors the temperature of the fresh water circuit. The switch measures at the hottest place, because the flue gases lead from the cylinder head into the exhaust elbow.

105/90℃

Fig. 4.3.6-2: Thermo-switch at exhaust elbow

Thermo-switch at exhaust connection

If the impeller pump drop out and deliveres no more raw water, the exhaust connection becomes extremely hot.

98/83℃

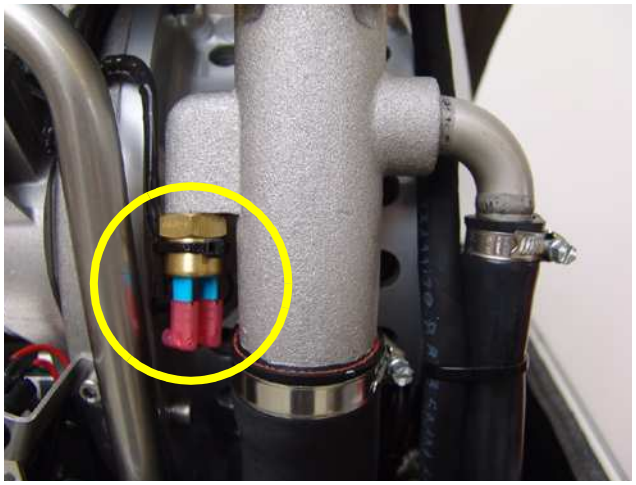


Fig. 4.3.6-3: Thermo-switch at exhaust connection

Thermo-switch coil

1. Thermo-switch coil 4x130℃
2. Generator housing
3. Thermo-sensor NTC 981S

(for measuring)

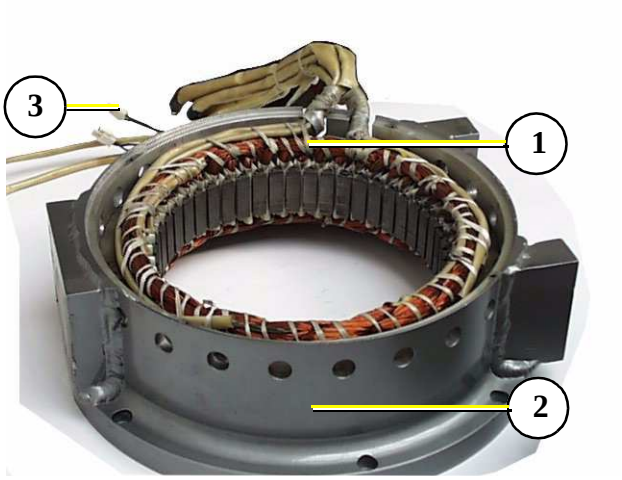


Fig. 4.3.6-4: Thermo-switch coil

Thermo-switch on the (-)- connection bar

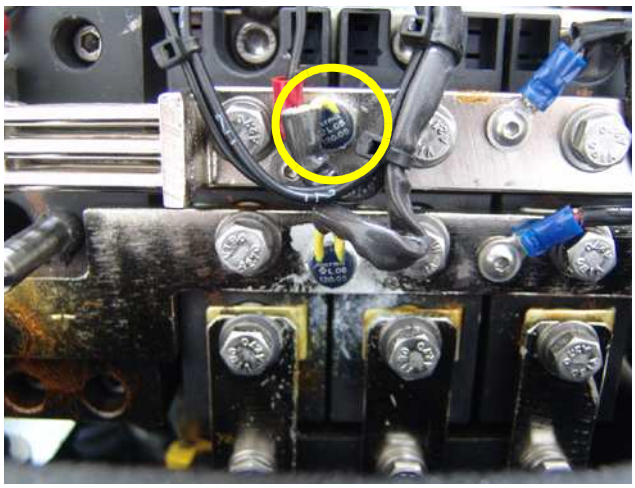


Fig. 4.3.6-5: Thermo-switch on the (-)-connection bar

Thermo-switch on the (+)-connection bar

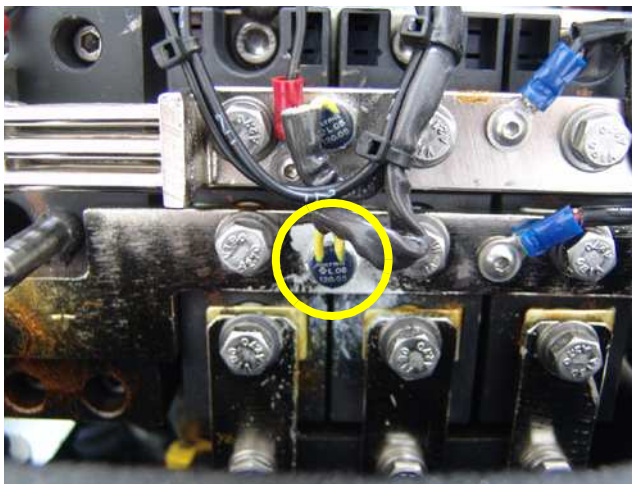


Fig. 4.3.6-6: Thermo-switch on the (+)-connection bar

Thermo-switch on the rectifier block

Fig. 4.3.6-7: Thermo-switch on the rectifier block

Oil pressure switch

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

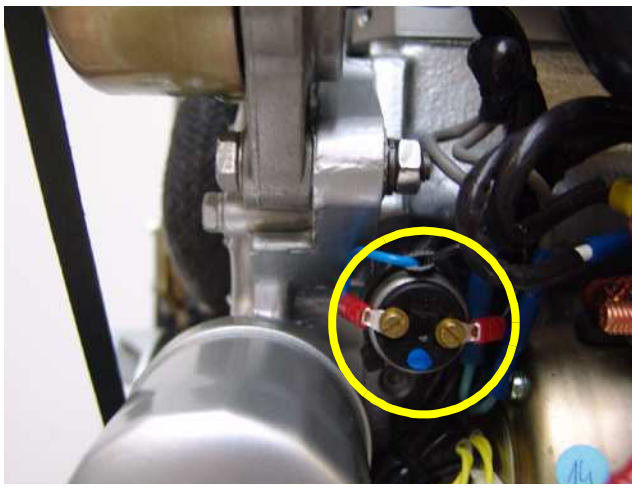


Fig. 4.3.6-8: Oil pressure switch

Failure bypass switch

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

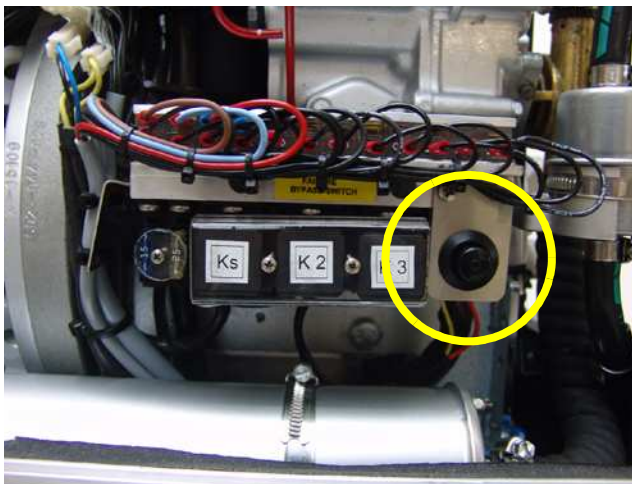


Fig. 4.3.6-9: Failure bypass switch

4.3.7 Components of the oil circuit

Oil filler neck with cap

Normally the filler neck for the engine oil is on the top side of the valve cover. At numerous generator types a second filler neck is attached additionally at the operating side. Please pay attention that the filler necks are always well locked after filling in engine oil.

Consider also the references to the engine oil specification.

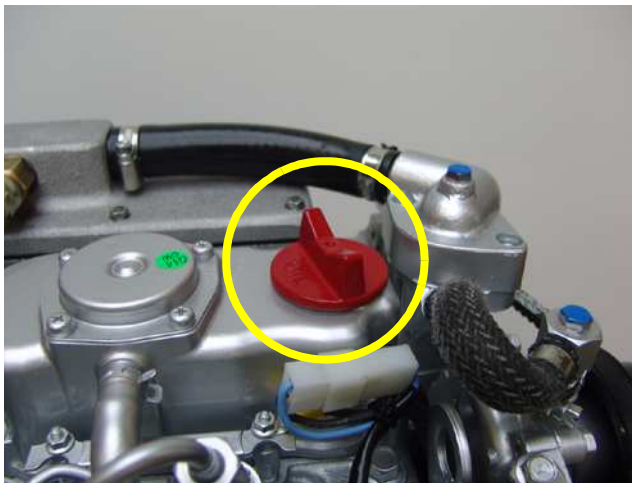


Fig. 4.3.7-1: Oil filler neck

Oil dipstick

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

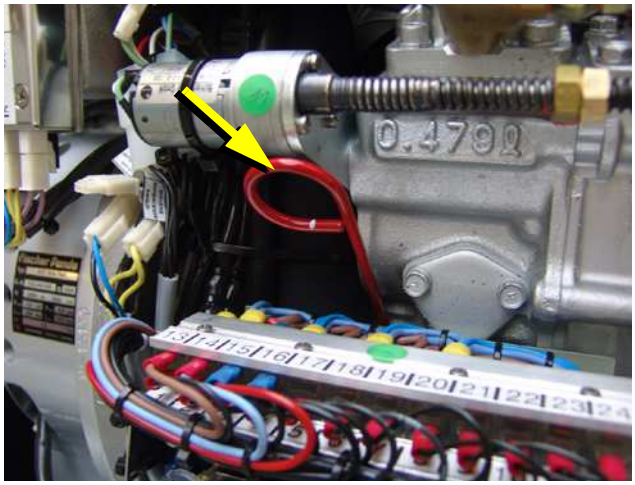


Fig. 4.3.7-2: Oil dipstick

Oil filter

The oil filter should be exchanged with an oil change.

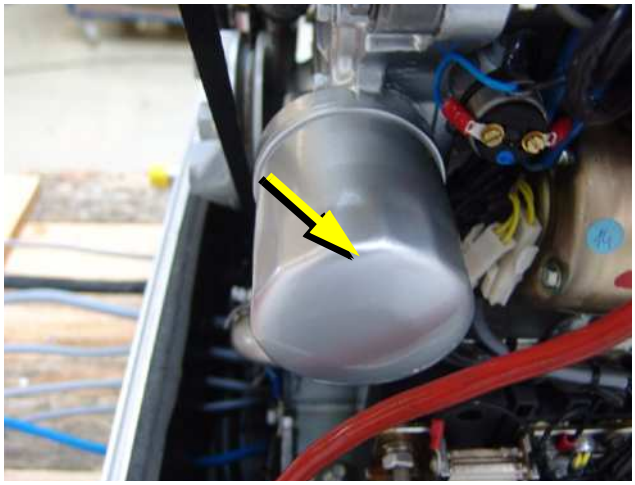


Fig. 4.3.7-3: Oil filter

Oil drain hose

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

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

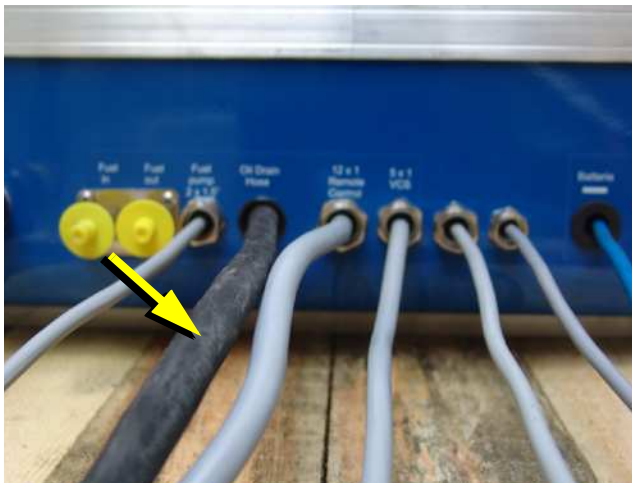


Fig. 4.3.7-4: Oil drain hose

4.3.8 External components

Voltage control VCS

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

Fig. 4.3.8-1: VCS

Battery monitor

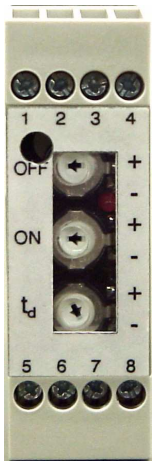


Fig. 4.3.8-2: Batrtery monitor

4.4 Operation Instructions

4.4.1 Daily routine checks before starting

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

AtTTENTION! OIL PRESSURE CONTROL!
True, the diesel motor automatically switches off when there is a lack of oil, but it is very damaging for the motor, if the oil level drops to the lowest limit. Air can be sucked in suddenly when the boat rocks in heavy seas, if the oil level is at a minimum. This affects the grease in the bearings. It is therefore necessary to check the oil level daily before initially running the generator. The oil level must be topped up to the 2/3 of maximum level, if the level drops below the mark between maximum und minimum levels.

2. State of cooling water.

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

3. Open sea cock for cooling water intake.

For safety reasons, the seacock 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. Check all hose connections and hose clamps are leakage.

Leaks at hose connections must be immediately repaired, especially the raw water impeller pump. It is certainly possible that the raw water impeller pump will produce leaks, depending upon the situation. (This can be caused by sand particles in the raw water etc.) In this case, immediately exchange the pump, because the dripping water will be sprayed by the belt pulley into the sound insulated casing and can quickly cause corrosion.

6. Check all electrical lead terminal contacts are firm.

This is especially the case with the temperature switch contacts, which automatically switch off the generator in case of faults. There is only safety if these systems are regularly checked, and these systems will protect the generator, when there is a fault.

7. Check the motor and generator mounting screws are tight.

The mounting screws must be checked regularly to ensure the generator is safe. A visual check of these screws must be made, when the oil level is checked.

8. Switch the land electricity/generator switch to zero before starting or switch off all the load.

The generator should only be started when all the load have been switched off. The excitation of the generator will be suppressed, if the generator is switched off with load connected, left for a while, or switched on with extra load, thus reducing the residual magnetism necessary for excitation of the generator to a minimum. In certain circumstances, this can lead to the generator being re-excitated by means of a DC source. If the generator does not excitate itself when starting, then excitation by means of DC must be carried out again.

9. Check the automatic controls functions and oil pressure.

Removing a cable end from the monitoring switch carries out this control test. The generator should then automatically switch off. Please adhere to the inspection timetable (see Checklist in the appendix).

4.4.2 Starting Generator - see remote control datasheet

4.4.3 Stopping the Generator - see remote control datasheet

4.4.4 Starting the Generator by a „Failure bypass switch“

There is a "pressure switch" at the terminal block. Faults (e.g. caused by overheating) can be manually overcome by means of this switch. The generator can be started by using the remote control panel. The operating temperature can be reduced for a short period of time (without stress of course), so that the fault switch returns to the original position should overheating cause the generator to shut down because of overheating.

ATTENTION: - Before using the failure bypass switch, it is important to check the oil level, since the oil gauge is deactivated by the switch. For a further reason it is important to switch off the generator electrical load before the generator is shut down:

Before stopping the generator it is highly recommended that electrical devices (e.g. refrigerating compressors, air conditioning compressors etc) are switched off, because the voltage drops as the rotational speed (rpm) decreases as the engine comes to a halt.

(Also see information regarding voltage control with automatic shut-off for protection of load when over or undervoltage occurs).

This is also the case when the generator is started when load is switched on.

Normally the generator will no longer excitate if a certain amount of base load is stepped up. The electrical load should also be shut-off before starting the generator.

If started under electrical load, the engine will still run but the generator will not generate the proper voltage (or even no voltage) since the stator windings do not have the chance to reach full excitation. Electrical units which are switched on in this condition could possibly be damaged (special caution should be practised with electric motors to avoid burnout).

Failure bypass switch

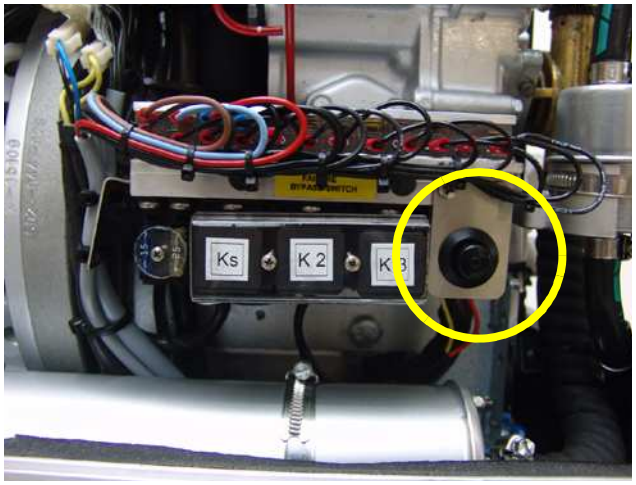


Fig. 4.4.4-1: Failure bypass switch

Intentionally Blank

5. Installation Instructions

5.1 Placement

5.1.1 Placement and Basemount

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 installed in the proximity of light walls, which can get into resonant vibrations by airborne sound. If this is not possible, these surfaces should line with 1mm lead foil, so the mass and the swinging behavior are changed.

Avoid to install the generator on a smooth surface with small mass (e.g. plywood plate). This affects in the unfavorable case like an amplifier the airborne sound waves. An improvement obtains by compound these surfaces by ribs. Also break-throughs should be sawed, which interrupt the surface. Disguising the surrounding walls with a heavy layer (e.g. lead) plus foam material improves the conditions additionally.

The engine draws its inlet combustion air through several holes in the capsule base. Therefore the capsule must be fitted with sufficient clearance between the capsule underside and the base plate (min. 12mm (½")).

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

High temperature of the intake air decline the power of the genset and increases the coolant temperature. Air temperatures of more than 40℃ reduce the power by 2% per temperature rise of 5℃. In order to keep these effects as small as pos sible, the temperature in the engine room should not be higher than 15℃ in relation to the o utside temperature.

5.1.2 Notice 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 genset is "free" downward, the combustion air can be sucked in unhindered.

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

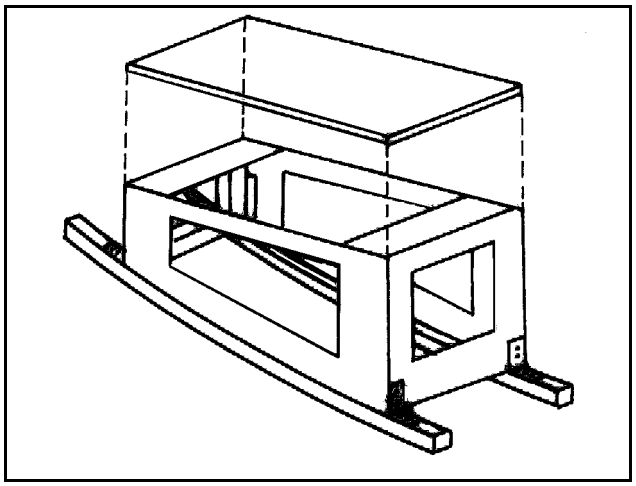


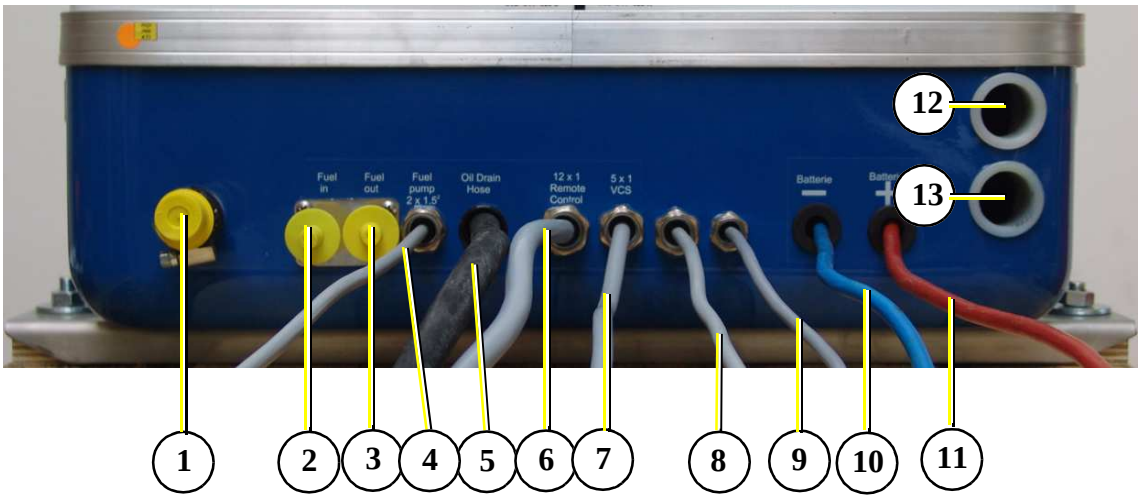
Fig. 5.1.2-1: Convenient base

5.2 Generator Connections - Scheme

The generator comes supplied with all supply lines (i.e. electric cables, fuel lines etc.) already connected to the motor and generator. The supply lines are fed through the capsule's front base panel and are shielded at the capsule inlets with water-proof grommets.

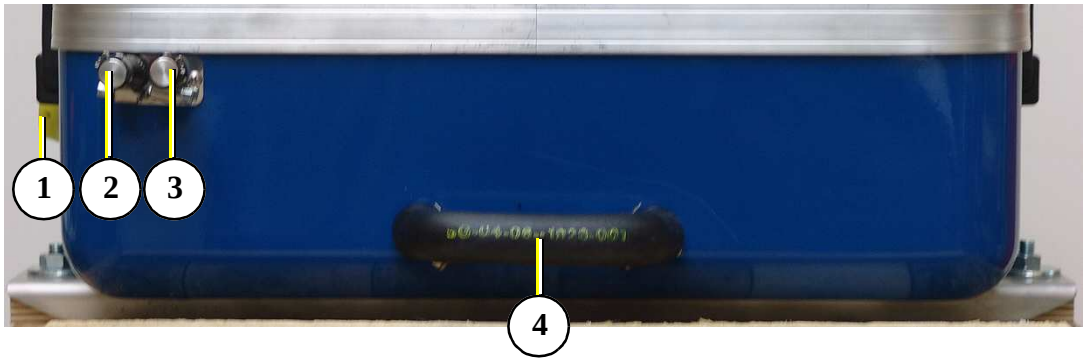
All electrical connections, cable types and sizes must comply to the appropriate regulations. The supplied cables are rated for ambient temperatures up to 70℃ (160℉). If the cables are required to meet higher temperature requirements, they must be run through conduits.

ATTENTION! Before working (installation) on the System read the section see "General safety references concerning operation of an AGT generator." on page 25 in this Manual.



1. Raw water intake
2. Connection fuel IN
3. Connection fuel OUT
4. Cable for fuel pump
5. Oil drain hose
6. Cable for remote control panel
7. Cable for VCS
8. Cable for voltage sense (clamp 7+8)
9. Cable for measuring shunt (clamp 9+10)
10. Cable for starter battery minus (-)
11. Cable for starter battery plus (+)
12. Passage for service batterie cable
13. Passage for service batterie cable

Fig. 5.2-1: Connections



1. Exhaust output
2. In-flow from external cooling water expansion tank
3. Return to external cooling water expansion tank
4. Connection external ventilation valve

Fig. 5.2-2: Connections

5.3 Cooling System Installation - Raw water

5.3.1 General References

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:

Avoid galvanic corrosion

For the avoidance of galvanic corrosion the chapter "Service instruction for marine gensets (corrosion protection)“ is to be considered.

5.3.2 Installation of the thru-vessel fitting in Yachts

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

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

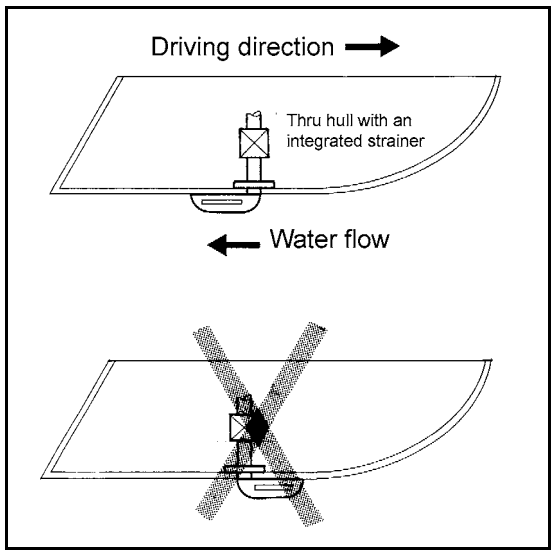


Fig. 5.3.2-1: Thru/vessel fitting

5.3.3 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" (25mm).

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 take from section 8.2, “Technical Data Engine,” on page 121.

5.3.4 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 will likely require replacement after some time. Ensure that the genset is installed such that the intake pump can be easily accessed. If this is not possible, an external intake pump could be installed in an easily accessed location.

If the generator is installed above the waterline it is possible that the impeller wearout will be stronger. After the start the pump runs dry some seconds.

The raw water hose should describe a loop as near as possible to the raw water inlet of the generator (see picture below). With it the pump only sucks in air for a short time. The impeller will be lubricated by the raw water and its life time will rise.

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

It is very important to change the impeller every few month. When starting the generator you should pay attention and listen when raw water comes out from the exhaust. If this lasts longer than 5 seconds the impeller has to be changed, because he sucks to much air before raw water reaches the impeller and the impeller wears out strongly. In this case the impeller looses its function, which leads to an overheating of the engine.

If the impeller isn't exchanged early enough, the impeller wings can break into pieces and clog the cooling circuit. Therefore it is very important to change the impeller every few month.

NOTE:

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.

Replacement impeller and also a spare pump should always be on board. The old pump can be sent back to Fischer Panda, where it is then economically overhauled completely.

1. Raw water filter
2. Water cock
3. Hull inlet

Make certain that the raw water filter lies above the water level, otherwise with cleaning water can penetrate by the hull inlet.

An external pre-pump can relieve the impeller.

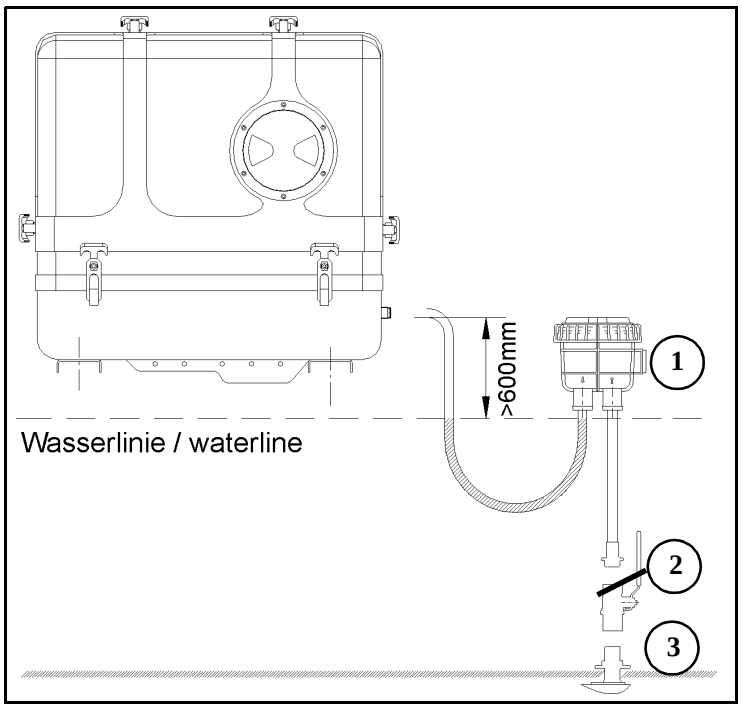
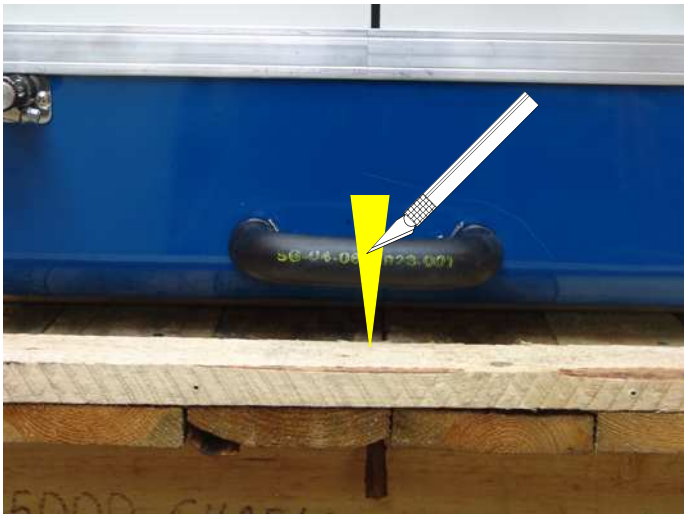


Fig. 5.3.4-1: Raw water filter

5.3.5 Installation below waterline

If the generator can not be attached at least 600mm over the waterline, a vent valve must be installed into the raw water line. With location beside the "midship line" a possible heeling must be considered! The water hose for the external vent valve at the back of the sound cover splits on the pressure side of the pump and at both ends in each case extended with a connecting nipple by a hose end. Both hose ends must be led out outside of the sound cover to one point, if possible 600mm over the waterlinee in the midship line. The valve is connected at the highest place with the two hose ends. If the valve is blocked, the cooling water pipe cannot be ventilated after the stop of the generator, the water column is not interrupted and the water can penetrate into the combustion chamber of the engine. This leads to the destruction of the engine!

Fig. 5.3.5-1: External ventilation valve



Cut the hose for the external vent valve...

Fig. 5.3.5-2: External ventilation valve

...and bent it upwards.

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

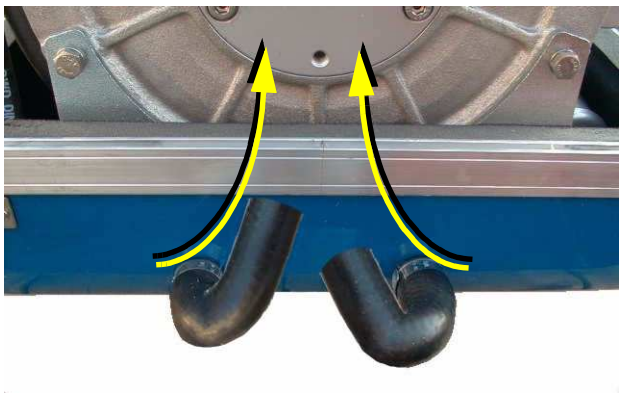
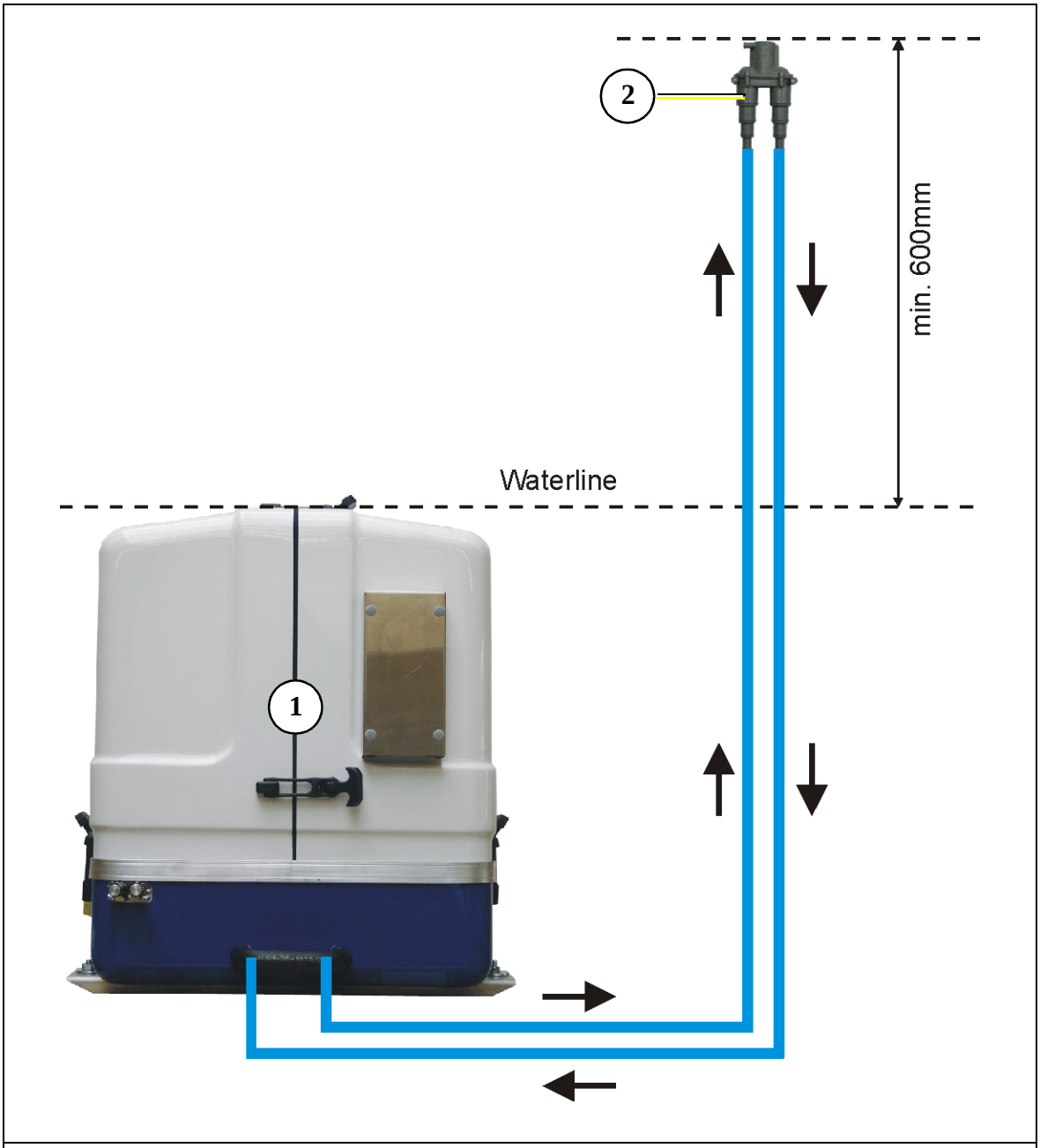


Fig. 5.3.5-3: External ventilation valve



1. Generator
2. Ventilation valve

Fig. 5.3.5-4: Installation example - ventilation valve

5.4 The Freshwater - Coolant Circuit

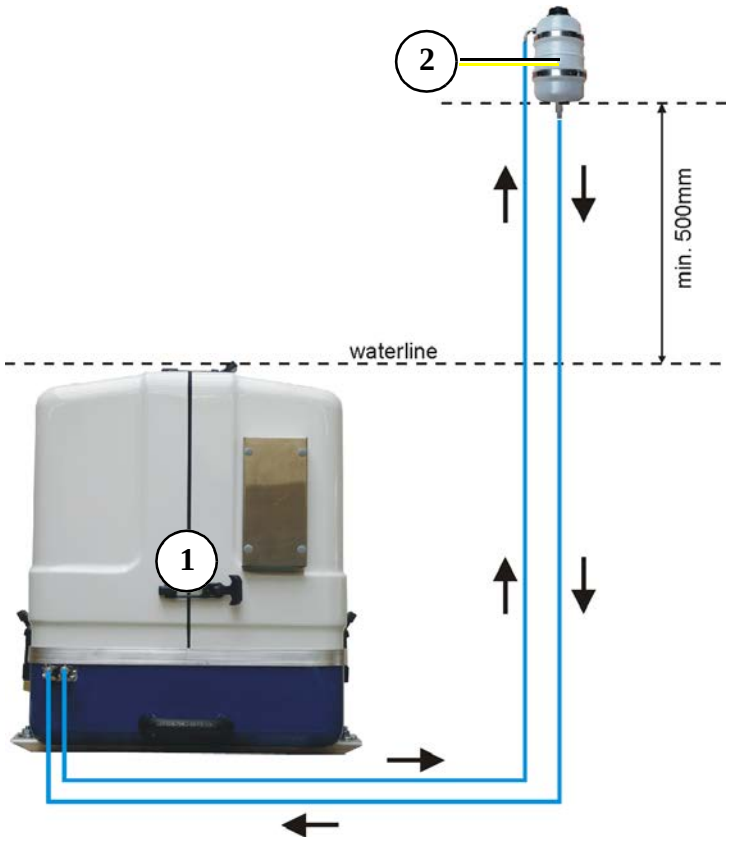
5.4.1 Position of the external Cooling Water Expansion Tank

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 500mm more highly arranged than the upper edge of the sound cover.

If this 500mm 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. 5.4.1-1: External cooling water expansion tank

ATTENTION! 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.



1. Generator
2. ooling water expansion tank

Fig. 5.4.1-2: Installation example - cooling water expansion tank

5.4.2 Ventilation at the first filling of the internal cooling water circuit

1. For the preparation of filling the following steps are to be undertaken:

a. Open the cooling water cap on the housing of the water-cooled exhaust elbow union,

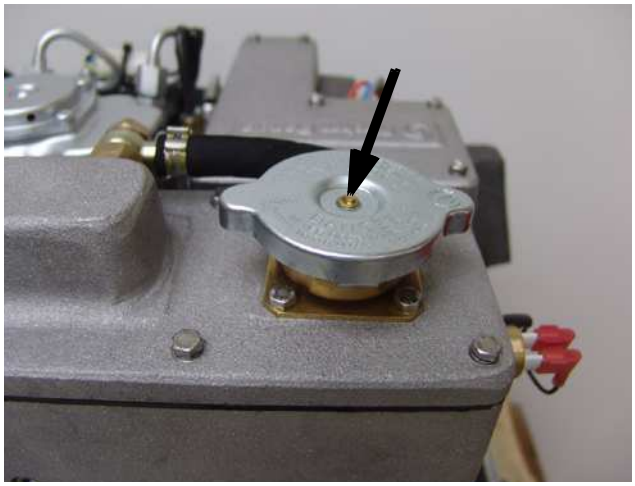


Fig. 5.4.2-1: Cooling water filler neck

b. Ventilation screw on the thermostat housing,

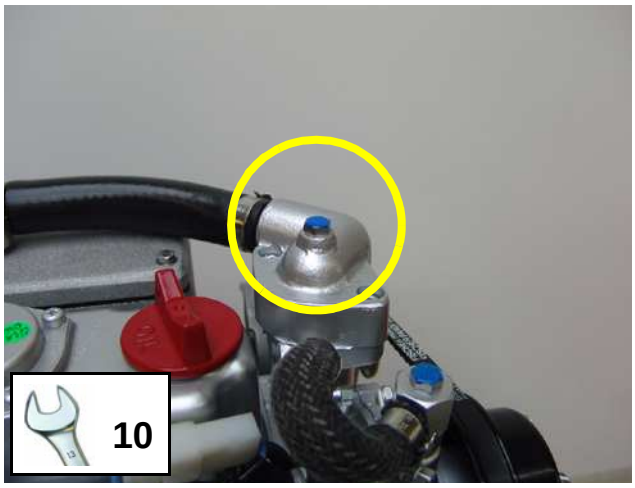


Fig. 5.4.2-2: Ventilation screw -thermostat housing

c. Ventilation screw on the pipe socket of the internal cooling water pump.

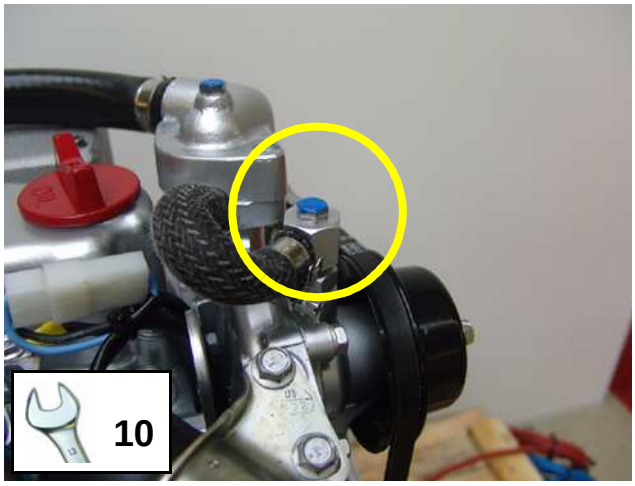


Fig. 5.4.2-3: Ventilation screw - water pump

2. Filling the cooling water circle

a. Fill in the prepared mixture (cooling water with anti-freeze protection according to the intended mixture) at the filler neck at the housing of the water-cooled exhaust elbow union slowly so long, until cooling water leaks at the ventilation screw of the thermostat housing.

b. Afterwards the cooling water cap must be screwed on firmly. Further both de-aerating screws at the thermostat housing and at the internal cooling water pump must be closed.

Fig. 5.4.2-4: Cooling water filler neck

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℃ (5℉) 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. To purge the cooling system, compressed air at about 0.5 bar (7.5 psi) is sufficient.

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

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

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

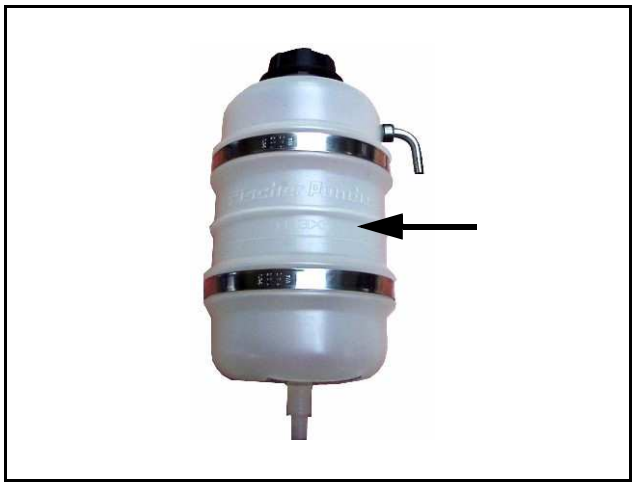


Fig. 5.4.2-5: External cooling water expansion tank

d. Start the generator

After filling the generator this must be started. During this first phase of start-up, the generator may not be loaded. Switch the generator off after max. 2 minutes of operation!

3. First ventilation

The cooling water circuit of the generator must be ventilated now by multiple repeating of the ventilation procedure. During the entire procedure the external cooling water expansion tank remains opened (i.e. the cap must be removed).

After the first stopping of the the generator wait about one minute until the air in the cooling water can be drop off and raise to the highest point (ventilation point).

Now open all three ventilation points one after another as long as cooling water exit. Then the closure screw must be closed immediately. (Turn on only lightly to treat the thread.)

Pay attention that the external cooling water expansion tank is filled with enough cooling water during the ventilation. (If necessary refill over and over.)

One ventilation step will be last as a rule max. 2 minutes and following steps contained:

1. The generator runs approx. 1 minute.

2. Stop the generator.

3. Hold on one minute for drop of air.

4. The collected air is led out over the two ventilation points.

The ahead described ventilation process must be repeated as long as after the stopping and drop off air none air exit out of the ventilation ports, only cooling water.

4. Again ventilation process in the few days after the first startup

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 ventilation process must be repeated casual in the next few days (if necessary weaks). Small amount of air will be still exit out of the ventilation openings especially if the generator stood still for a long time.

ATTENTION! During the ventilation process it must be checked again and again if the cooling water is indeed circulating. If air bubbles established in the internal cooling water pump, it could be, that the cooling water circuit is not circulate. Then the generator would be warming very fast and switched off by overheating.

5.4.3 Pressure test for control of cooling water circuit

Check with the hand if a temperature difference exists whether between cooling water in-flow and cooling water return.

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 entry at the heat exchanger.

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

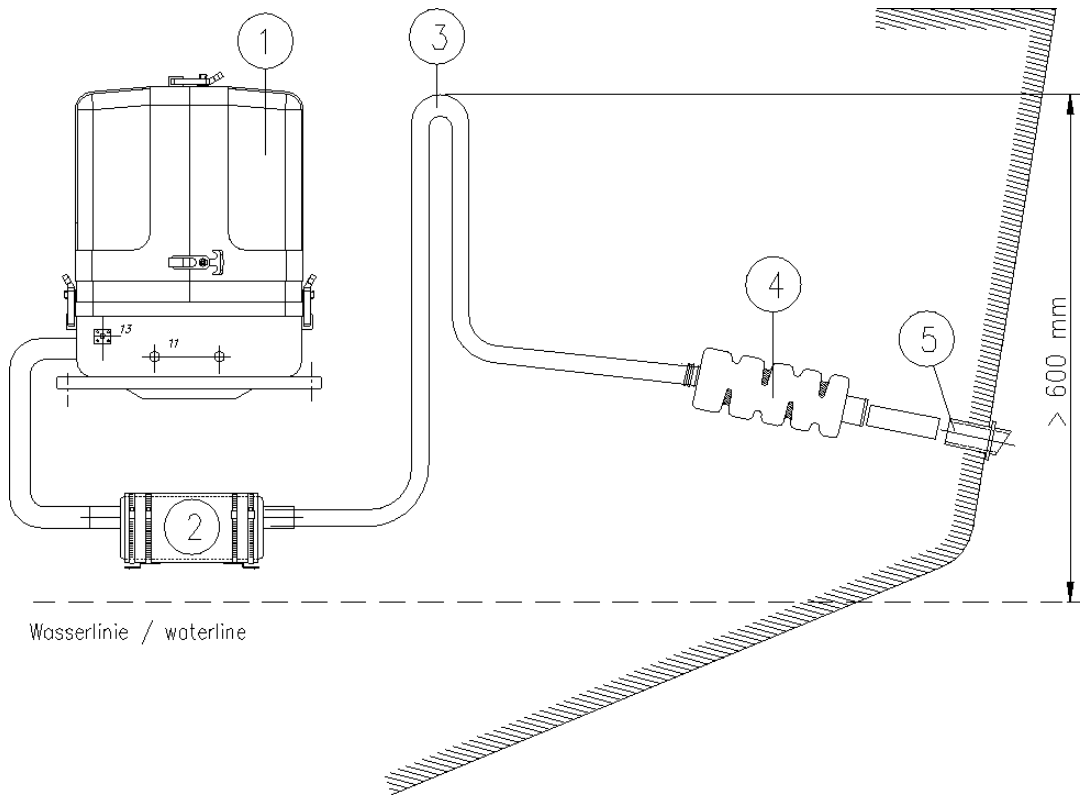
5.5 Watercooled Exhaust System

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.

5.5.1 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 40mm (1.6") (Panda 14000 and above approx. 50mm). 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. The exhaust system must be installed so that the back pressure inside the exhaust does not exceed 0.4 bar (6 psi) and total length does not exceed 6m (20 ft.).

Exhaust diameter see section 8.2, “Technical Data Engine,” on page 121.



1. Generator
2. Water lock
3. Goose neck
4. Silencer
5. Hull inlet

Fig. 5.5.1-1: Installation stanrd exhaust system - example

5.5.2 Exhaust / water separator

The exhaust/water separator

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

The water flow on the exhaust/water separator unit has an inner diameter (ID) of 30mm. 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.

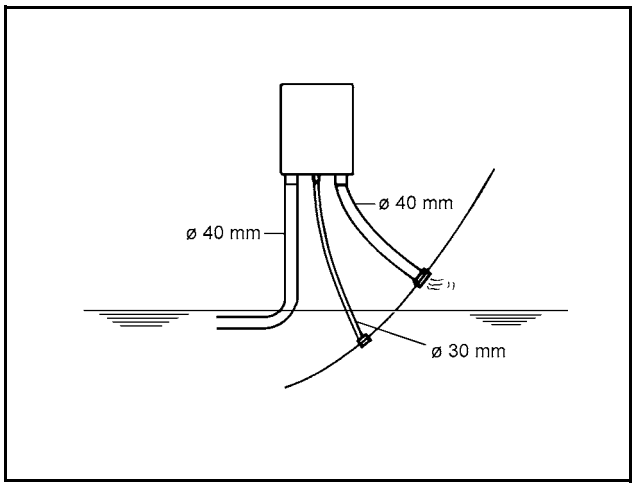


Fig. 5.5.2-1: Exhaust/water separator

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

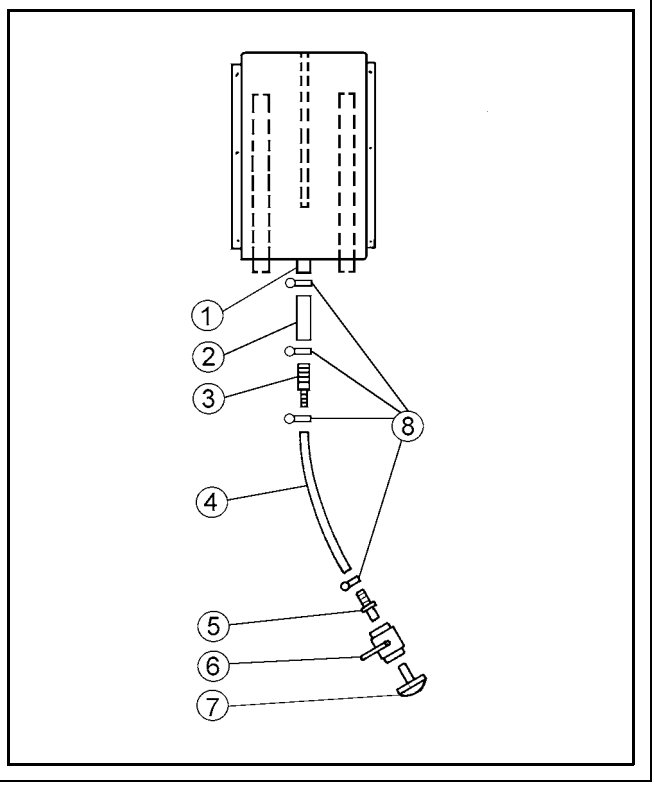
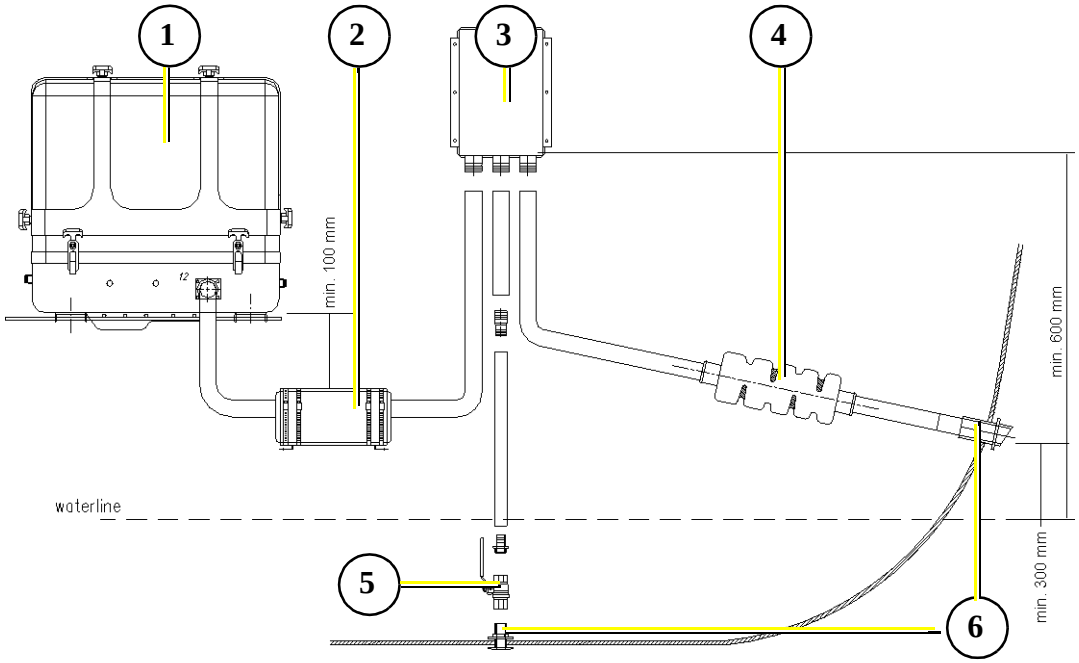


Fig. 5.5.2-2: Exhaust/water separator

5.5.3 Installation exhaust/water separator

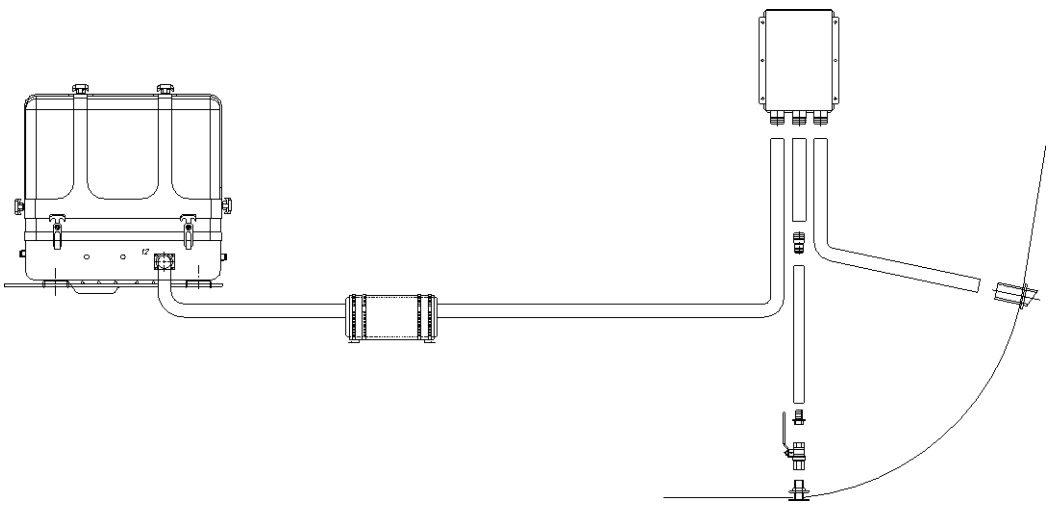
If the exhaust/water separator was sufficiently highly installed, a goose neck is no longer necessary. The exhaust/water separator fulfills the same function. If the "Supersilent" exhaust system were installed correctly, the generator will not disturb your boat neighbour. The exhaust noise should be 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.



1. Generator
2. Silencer / Waterlock
3. Exhaust/water separator
4. Silencer
5. Sea valve
6. Hull outlet

Fig. 5.5.3-1: Installation exhaust/water separator - example

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.



Example of an unfavorable installation:

- water lock not deeply enough under the hights level of the generator
- distance water lock to exhaust/water separator too largely

Fig. 5.5.3-2: Unfavorable installation - example

5.6 Fuel System Installation

5.6.1 General References

Inside the generator capsule itself, there is the fuel filter installed (Exception Panda 4500). Additional fuel filters (with water seperator) 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:

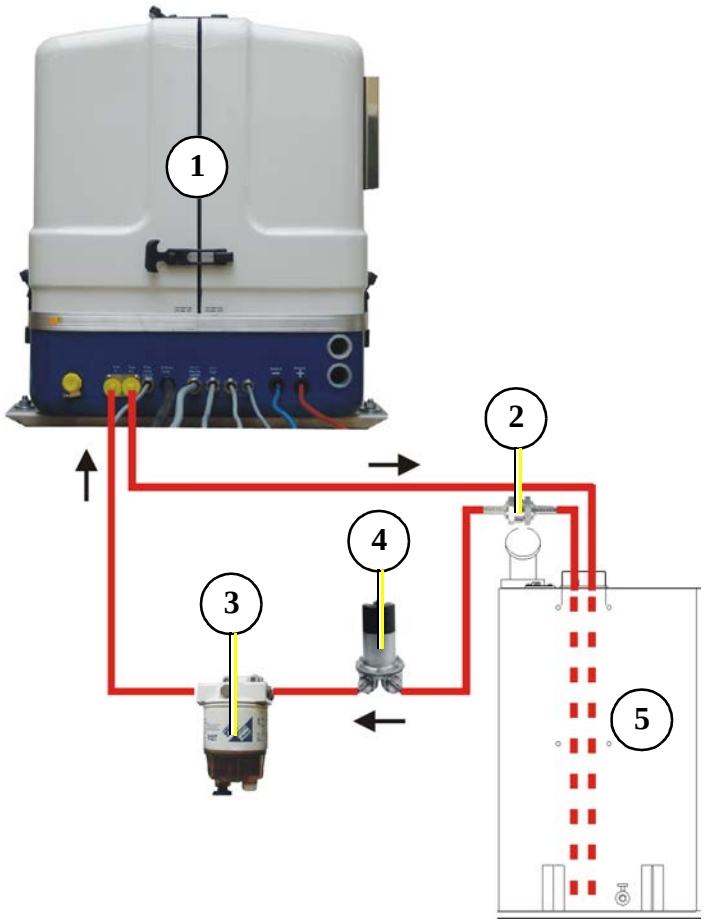
- Fuel supply pump (12V-DC)

- 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 5m).



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

Fig. 5.6.1-1: Installation fuel system - example

5.6.2 The electrical fuel pump

Electrical fuel pump

With the Panda generator is usually supplied an external, electrical fuel pump (12V DC). The fuel pump must be installed close at the fuel tank. The electrical connections are preloaded at the generator with the lead planned.

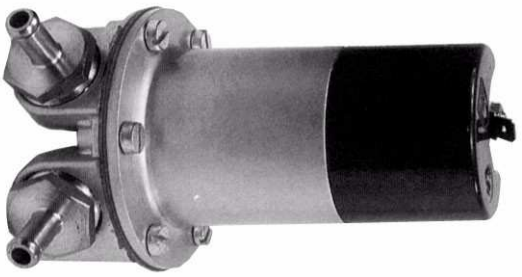


Fig. 5.6.2-1: Fuel pump

- Suction hight of the pump: max. 1,2m at 02, bar
- Diameter of fuel lines: See section 8.2, “Technical Data Engine,” on page 121.

5.6.3 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 generfator 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 be placing it 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.

ATTENTION! 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 guaranteed that through the return pipe no fuel is led into the injection pump.

5.6.4 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 cover in the fuel system line. (is not included in delivery.)

Fig. 5.6.4-1: Fuel filter

5.7 Generator 12V DC System-Installation

5.7.1 Connection of the 12V starter battery

The Panda has its own dynamo to charge a 12V 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 systemfrom the the rest of the boat's DC system, i.e. minus pole (-) is not conected electrically to Earth/Ground.

The generator is then Earth/Ground free with regard to the rest of the boat.

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

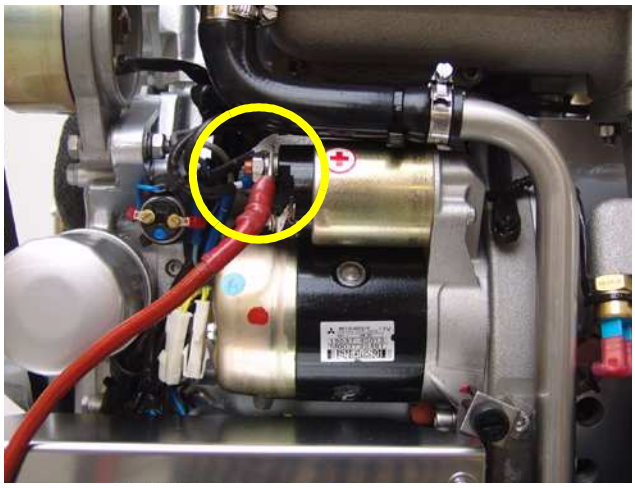
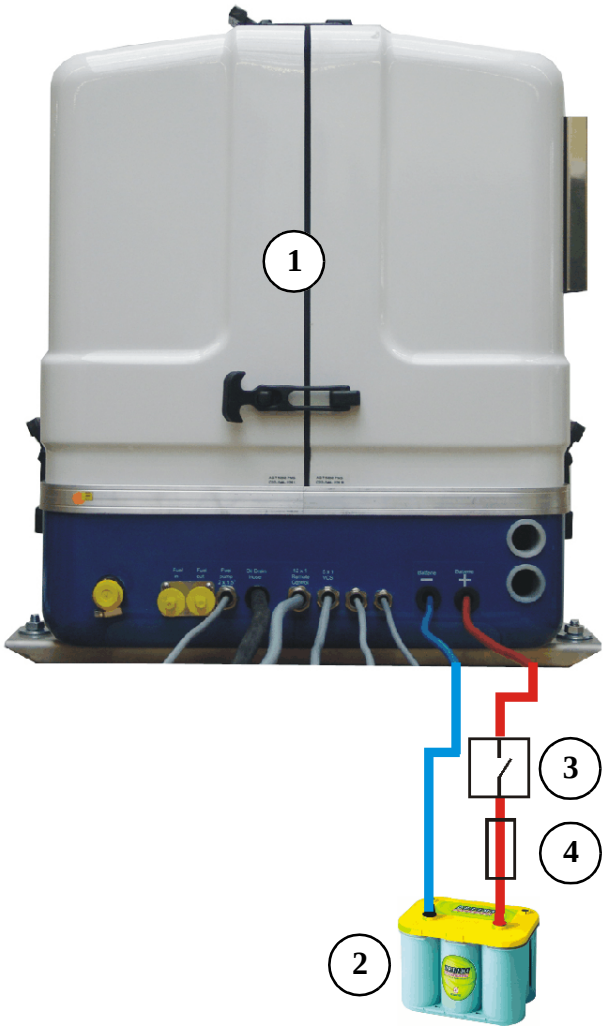


Fig. 5.7.1-1: Connection positve battery cable

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

Fig. 5.7.1-2: Connection negative battery cable



1. Generator
2. Starter battery 12V
3. Battery switch
4. Fuse

Fig. 5.1: Installation starter battery - example

5.7.2 The speed sensor

Speed sensor

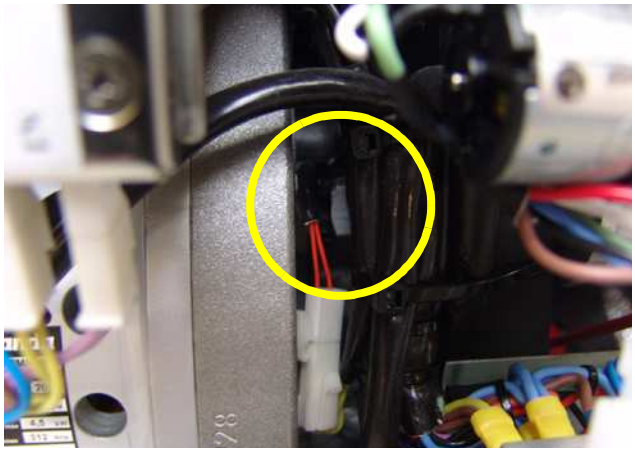
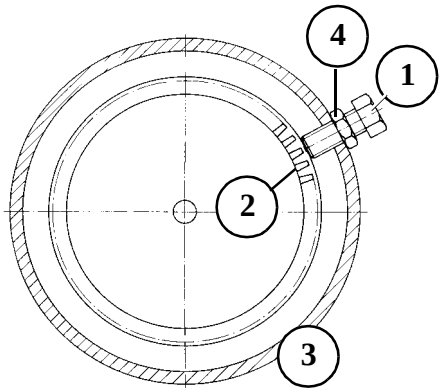


Fig. 5.7.2-1: Speed sensor

Installation of the speed sensor

The speed sensor tip must have between 0.3 to 0.8mm of clearance (air gap) from the gear tooth tips. In order to achieve this clearance: the speed sensor tip should be aligned with the tip of a gear tooth and screwed in until it touches the tip of the tooth. (**ATTENTION! Ensure that when inserting the sensor, that the sensor tip is not screwed into the root of the gear tooth)**. The screw is subsequently turned anticlockwise by half a turn (0.3 to 0.8mm) and held by a counter nut.

1. Speed sensor on threaded seat
2. Engine Flywheel (with gear teeth)
3. Generator housing
4. Retention/tightening nut



1. Speed sensor on threaded seat
2. Engine Flywheel (with gear teeth)

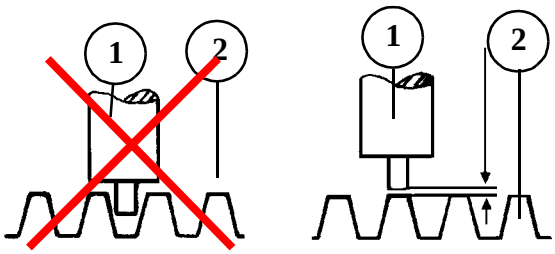


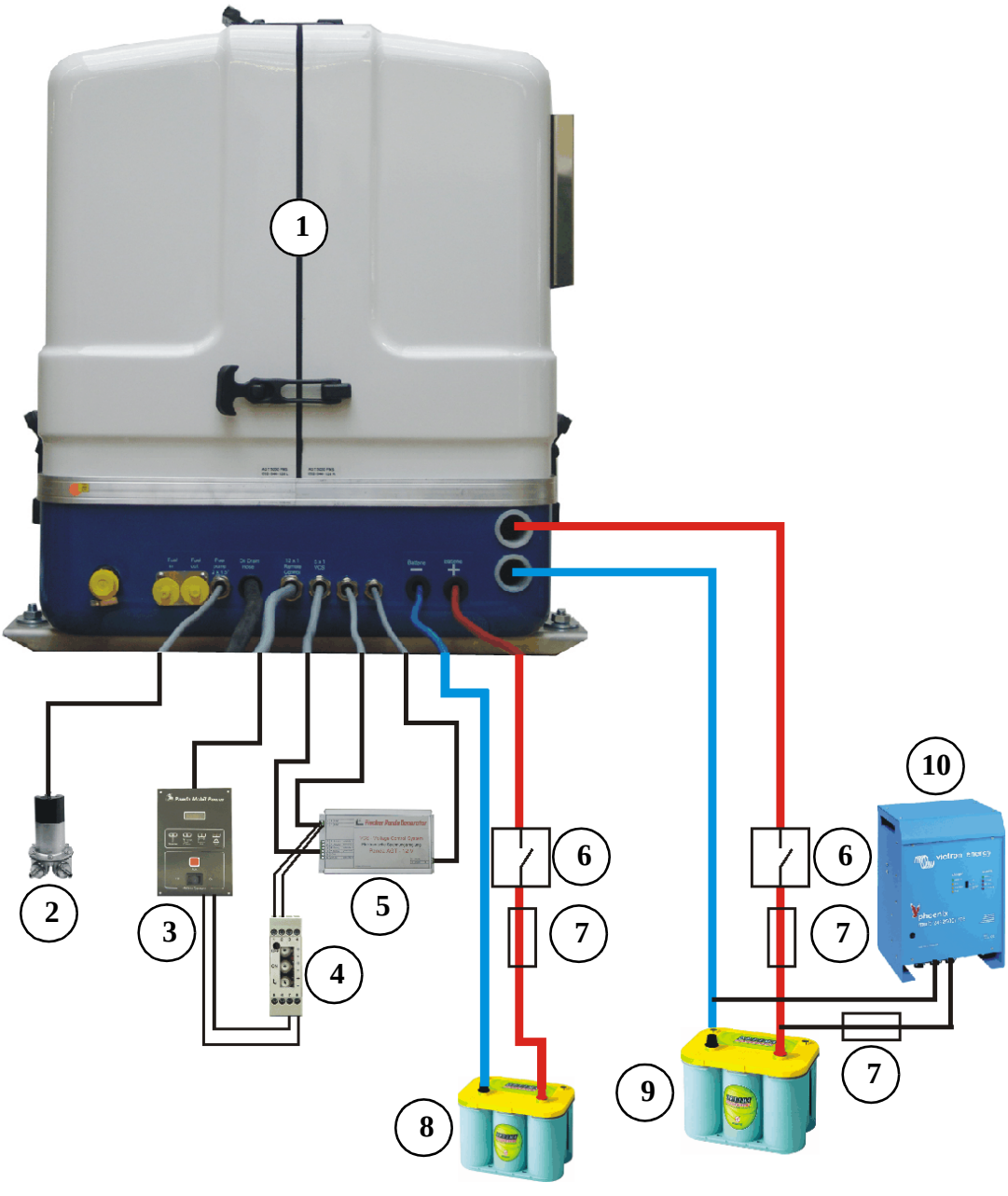
Fig. 5.7.2-2: Installation speed sensor

5.7.3 Electronic starter control unit

If there is an automatic starting requirement and if the remote control panel is switched off, then this automatic starting requirement is ignored. Automatic starting is only possible if after switching on of the remote control panel the automatic starting requirement takes place.

5.7.4 Installation Panda AGT12V-system

ATTENTION! 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 lightnening conductor, personal protection switch etc.



1. Generator
2. Fuel pump
3. Remote control panel
4. Battery monitor
5. Voltage control VCS
6. Battery switch
7. Fuse
8. Starter battery 12VDC
9. Battery bank 12VDC
10. Inverter

Fig. 5.7.4-1: Installation DC-system - example

All electrical safety installations have to be made on board.

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 30kW 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 cable cross-sections

The following recommended electrical cable dimensions (cross sections) are the minimum required sizes for a safe installation. (see section 8.2, “Technical Data Engine,” on page 121.)

5.8 Voltage Control System

It is of upmost importance to check the correct functioning of the voltage control system (VCS) during installation or maintenance.

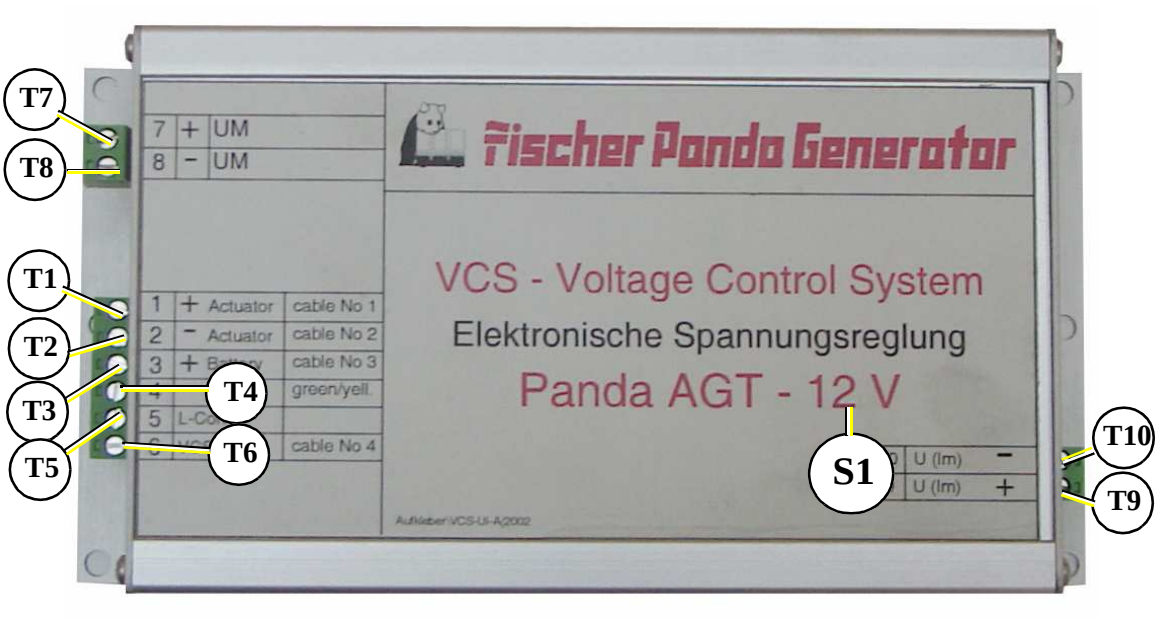


Fig. 5.8-1: VCS

S1 : CAUTION:

The VCS is preset according to the output voltage of the generator. The nominal voltage level of the VCS is imprinted on the top side (S1). Examine whether this voltage agree with the nominal output voltage.

Instructions:

At the installation and at the service it is absolutely necessary that the function of the voltage regulation system is examined correctly.

Connector 1			
T1	Terminal 1	+ Actuator	Actuator +
T2	Terminal 2	- Actuator	Actuator–
T3	Terminal 3	+ Battery	Battery + 12V
T4	Terminal 4	- Battery	Battery 0V
T5	Terminal 5	L-Con	Charge control
T6	Terminal 6	VCS-ON	DP+ fuel pump

Connector 2				
T7	Terminal 7	+ UM	+ Battery sense voltage	+ 12V/24V/36V/48V
T8	Terminal 8	- UM	- Battery sense voltage	0V

Connector 3				
T9	Terminal 9	+ U(Im)	Current sense signal +	Max. + 48mV
T10	Terminal 10	- U(Im)	Current sense signal -	0V

5.8.1 Checking the VCS voltage control without requiring the generator to run

Prerequisites :

1. Is VCS cable connected?
2. Is the cable for measurement voltage connected to VCS?
3. Is the cable for current measurement connected to VCS ?
4. Has graphite grease been smear on the spindle?

1. Remove connection 50 on starter motor (white cable).

2. Switch “Power” on remote control panel, Press “Start” button.

The VCS will keep the governor in the maximum position whenever the starter relay is activated. The actuator will return to stationary (NULL) position when the starter relay is deactivated.

Check that the actuator functions correctly.

Fig. 5.8.1-1: Connection 50

5.8.2 Funktion of the VCS

The output current of the generator is measured via a shunt with an output voltage of 60mV for the rated current.

Factors concerning current measurement:

- The generator will shutdown if a cable break in the measurement wire from the shunt to the VCS is detected.
- A short circuit of the measuring wires or polarity reversal is not recognised and considered as if no current is present. This will cause the VCS functioning for restricting current not to work. Therefore any functions for current restriction must be checked and a secondary protection against excessive current installed.
- A screened or twisted cable must be used for measuring current. One side must be grounded if an unscreened cable is used. The cable used for measurement must not be longer than 3 meters.

  The current regulation threshold can be finely-adjusted using the potentiometer on the rear side of the VCS (+5% / -24%).

The potentiometer should be sealed before the VCS is supplied to the customer.

5.8.3 Checking the voltage regulation

Reconnect terminal 50 to the starter motor and start the generator. Monitor the battery voltage and check that the generator regulates the voltage within the adjusted range. Ensure that the generator regulates the voltage exactly when switching the load on and off .

1. Potentiometer for adjusting the charging voltage.

Turning clockwise will increase the charging voltage.

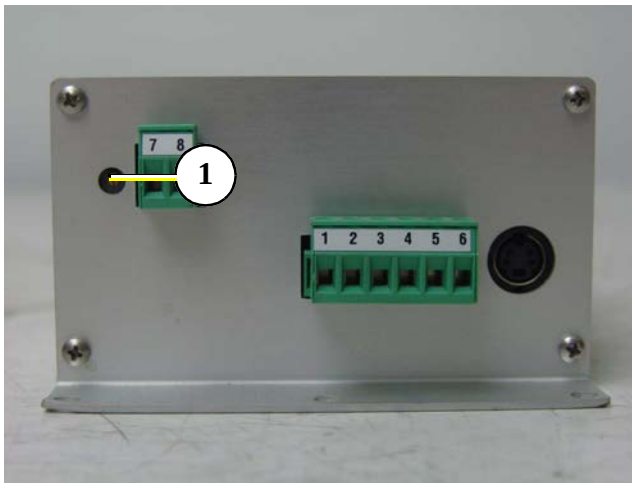


Fig. 5.8.3-1: Potentiometer charging voltage

5.8.4 Checking the current limit

A DC clamp-meter to monitor the generator output current and a multimeter with a mV DC range are required for this test. The batteries must be discharged prior to testing to ensure that the generator is able to deliver the maximum output. Run the generator, monitor the DC output current of the generator and measure DC mV range between connections 9 and 10 on the VCS box. Please check the signal polarity. On generators built before 2003 the maximum DC voltage is 60 mV for the rated current. On generators built after 2003 the DC voltage is 48 mV for the continuous current.If this millivolt level is exceeded, please check the proper connection and polarity of the cable between the shunt and the VCS box.

To set the charging current / voltage, consumers with the rated performance of the generator should be turned on. The charging current must now be measured and the potentiometer set to 110A so that the engine can operate in its nominal performance range.

1. Potentiometer for adjusting the charging current.

Clockwise turning will increase the charging current.

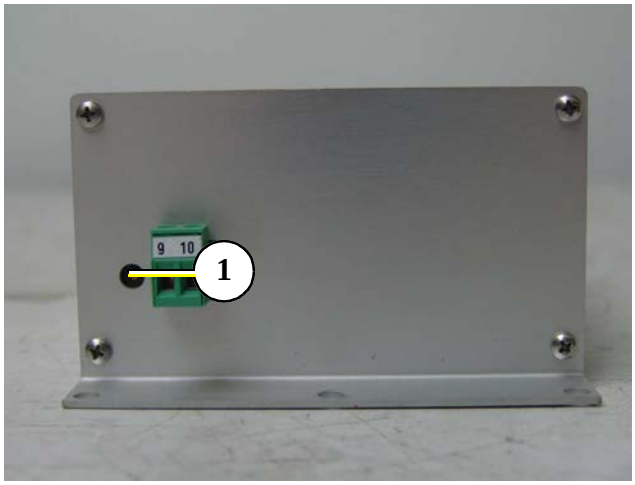


Fig. 5.8.4-1: Potentiometer charging current

5.9 Battery monitor

Purpose:

Automatic battery voltage monitoring. The generator is started automatically via the remote control panel to start charging when the battery voltage drops below a minimum set level. When the battery voltage exceeds a maximum set level the battery-charging generator is stopped after an interval period which is adjustable

Description / Function:

Minimum battery voltage level, maximum battery voltage level (when charging is completed) and interval period before stopping the generator can be adjusted via potentiometers.

An LED indicates when the minimum battery voltage level is sensed. A period of 40 seconds must be present after reaching the minimum level so that the generator can be started correctly.

The battery monitor is supplied from the batteries it monitors.

The outputs are galvanically separated by an optocoupler.

The output signal is poled and must be CORRECTLY connected (connection 7 – positive / connection 8 – negative).

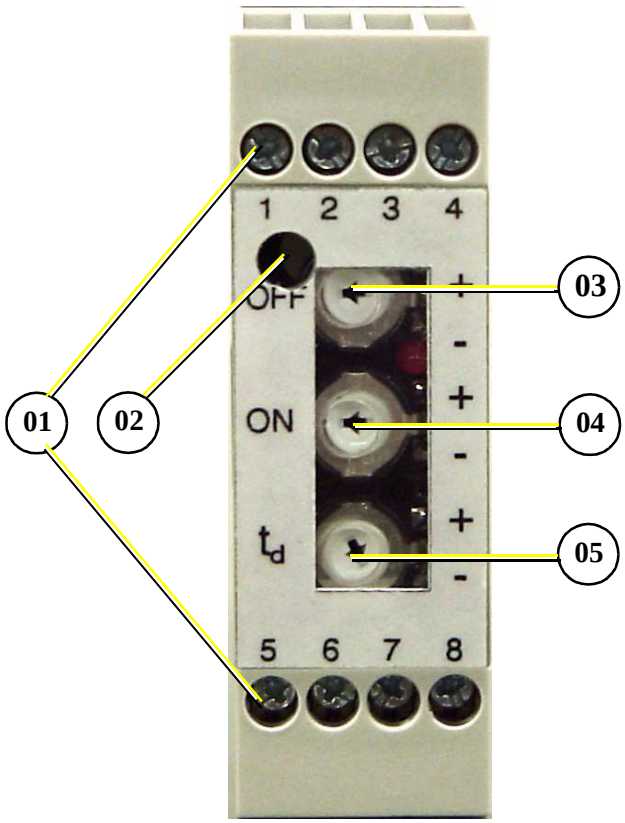
Incorrect poling of the output connections can destroy or damage the battery monitor and other electrically connected units.

- The value set for the maximum voltage level (end of charging) can be measured at connection 3 and connection 2 (negative).
- The value set for the minimum voltage level (begin charging) can be measured at connection 4 and connection 2 (negative).
- The switching voltage levels are measured per cell. The absolute switching voltage levels can be calculated by multiplying the measured voltage by the number of cells.
- Failure to use a multimeter with an impedance of 10 ohms or more for measuring these values will cause significant measurement errors

Rotation direction for trimming: Adjustment in clockwise direction = increases value.

- Using a instrument screwdriver, a switch is accessible through a hole underneath connection 1. For test purposes, this switch can be used to switch between states. This can only be carried out when the battery voltage is between the minimum and maximum levels. The battery monitor is not affected by use of this switch when the voltage level is outside the minimum or maximum levels.
- The connection cable used to connect the battery monitor to the control panel must be either screened or contain twisted wires.

Terminal	Function	Terminal	Function
1	Positive pole (+) of battery	5	not used
2	Negative pole (-) of battery	6	not used
3	Measurement connection switch-off voltage	7	positive output sensor
4	Measurement connection switch-on voltage	8	negative output sensor



01. Terminals 1-8
02. Test switch
03. Potentiometer switch-off voltage
04. Potentiometer switch-on voltage
05. Potentiometer delay time

Fig. 5.9-1: Battery monitor

Intentionally Blank

6. Maintenance Instructions

6.1 General maintenance instructions

6.1.1 Checks before starting

• Oil level
• Cooling system leaks
• Visual check for any changes, leaks oil drain system, v-belt, cable connections, hose clips, air filter, fuel lines
Once a month • Lubrication of actuator-trapezoid thread spindle

For Maintenance Intervalls see section 8.4, “Inspection checklist for services,” on Page 124.

6.1.2 Hose elements and rubber formed component in the sound cover

Check all hoses and hose connections for good condition. The rubber hoses are very sensitive to enviromental influences. They can season fast with dry air, in which environment of muted oil and fuel steams and increased temperature. The hoses must be checked regularly for elasticity. There are operating situations, at which the hoses must be renewed once in the year.
Additionally to usual tasks of maintenance (oil level check, oil filter control etc.) further maintenance activities are to be accomplished for marine gensets. It belongs control of the sacrificial anode (cooling water connection block) and the front seal cover at the generator.

6.2 Oil circuit maintenance

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 100 hours. For this the oil SAE30 for temperatures over 20℃ and SAE20 for temperatures between 5℃ and 20℃ is to be used. At temperatures under 5℃ oil of the viscosity SAE10W or 10W-30 is prescribed.

Type and amount of required oil see:

See section 8.5, “Engine oil,” on Page 125 and section 8.2, “Technical Data Engine,” on Page 121.

6.2.1 Execution of an oil change

Oil drain hose

Open the passage for the oil drain hose and pull out the hose.

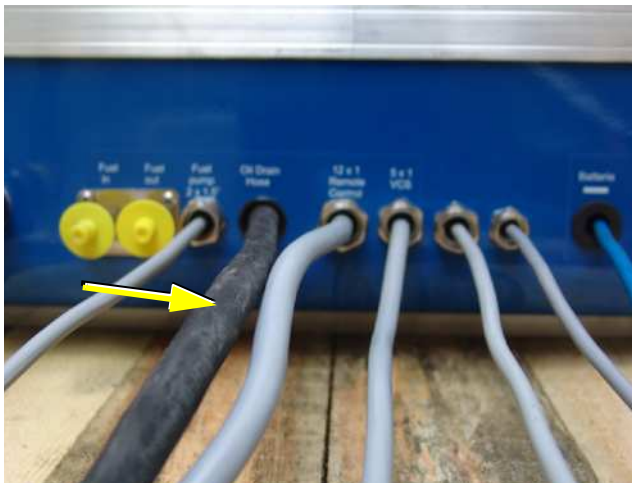


Fig. 6.2.1-1: Oil drain hose

Oil drain screw

The oil can be discharged by opening the oil drain screw. For countering use a second wrench.

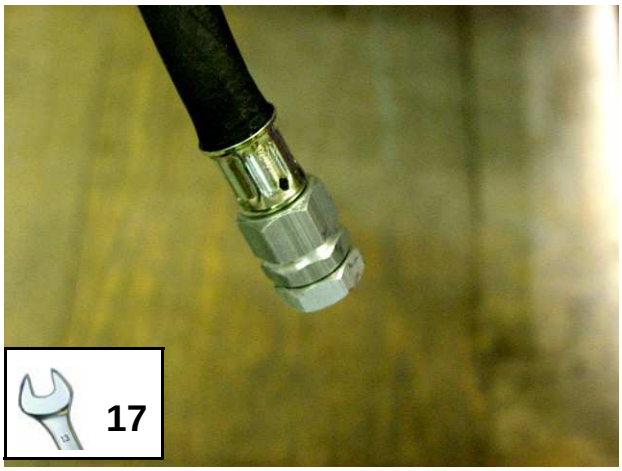


Fig. 6.2.1-2: Oil drain screw

Oil drain pump

If discharging of the oil is not possible, we recommend the employment of a hand pump, which can be attached to the oil drain hose.

Afterwards the oil drain screw is closed again.

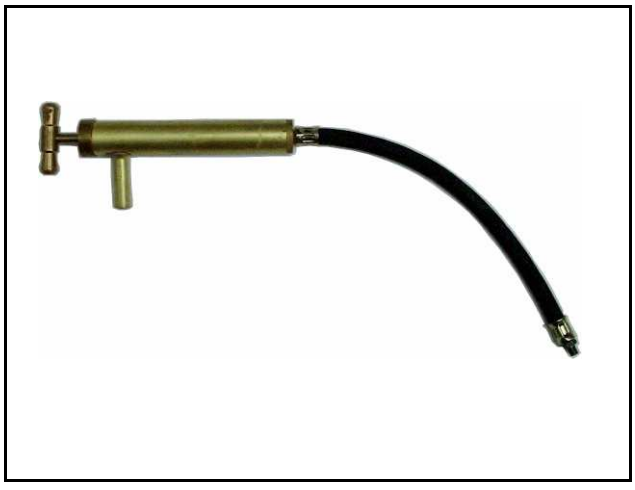


Fig. 6.2.1-3: Oil drain pump

Oil filter change

The oil filter can be loosen with an oil filter strap.

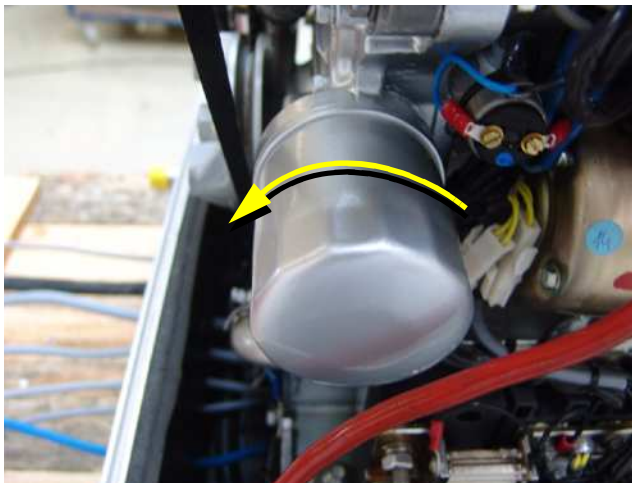


Fig. 6.2.1-4: Oil filter

Oil filter gasket

Before the insertation of the new oil filter the gasket should be coated with some-thing oil.

Tighten the oil filter only by hand.

Fig. 6.2.1-5: Oil filter

Open the oil filler neck

After opening the cap of the oil filler neck the new oil is refilled.

Please wait instant, before measure the oil level, the oil must set off in the sump.

Fig. 6.2.1-6: Oil filler neck

Oil dipstick

With the help of the engine oil dipstick the oil level is to examined. The prescribed filling level may not exceed the „Max“ marking.

We recommend 2/3 oil level.

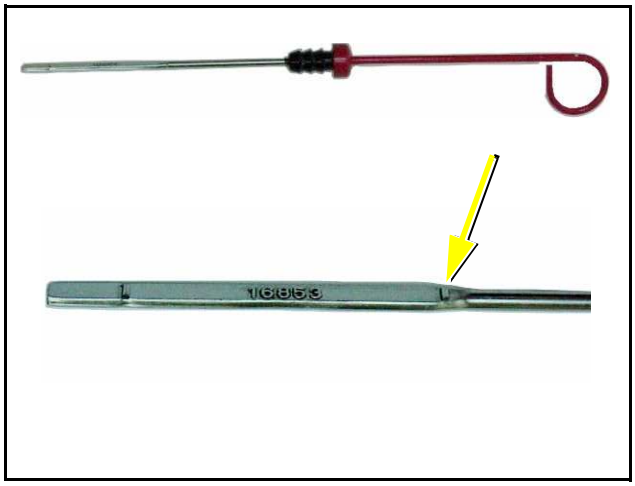


Fig. 6.2.1-7: Oil dipstick

6.3 Ventilating the fuel system

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

1. Switch the main power switch on control panel to „ON“. Functional components must illuminate.

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

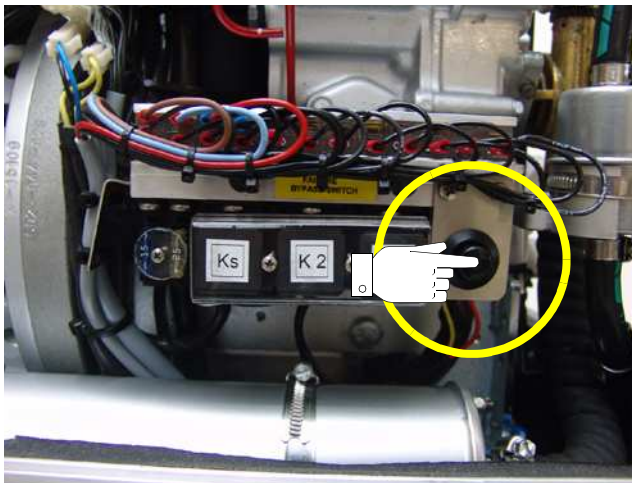


Fig. 6.3-1: Failure bypass switch

3. After the fuel pump has been running 3 to 4 minutes because the failure bypass switch has been pushed down the ventilation screw of the solenoid valve has to be unscrewed. When opening the screw one has to carry on pushing the switch. To avoid fuel getting in the sound cover a piece of cloth or absorbent paper should be put under the connection. As soon as fuel is running out without bubbles the ventilation screw can be screwed in again. Now stop pushing the failure bypass switch.

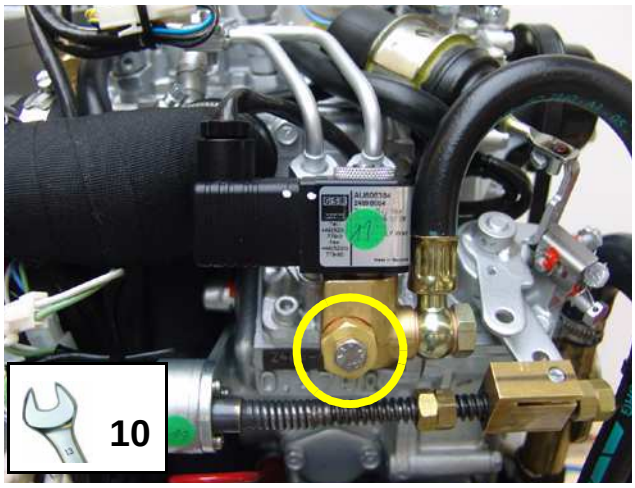


Fig. 6.3-2: Ventilation screw - fuel solenoid valve

4. Now the unit can be started by pushing the "START"-button. The unit should start after a short while.
5. Should the unit not start the pipe union nuts of the injection nozzles has to be loosen and try again to start the unit. After the unit has started the pipe union nut has to be tightened again.
6. Main power switch "OFF".

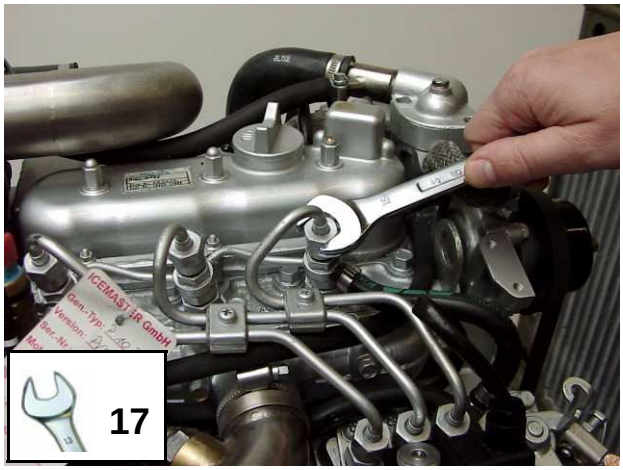


Fig. 6.3-3: Injection nozzle

6.3.1 Replace of the fuel filter

The replace of the filter depends on the contamination of the fuel, should take place at least all 300 operation hours. Before the replace of the filter the inlet must be clamped.

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.

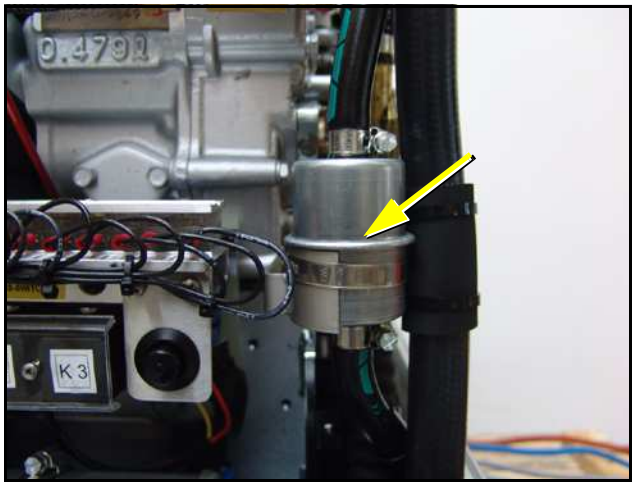


Fig. 6.3.1-1: Fuel filter

6.3.2 Checking the water separator in the fuel supply

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

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

Fig. 6.3.2-1: External fuel filter with water separator

6.4 Replace the air filter

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

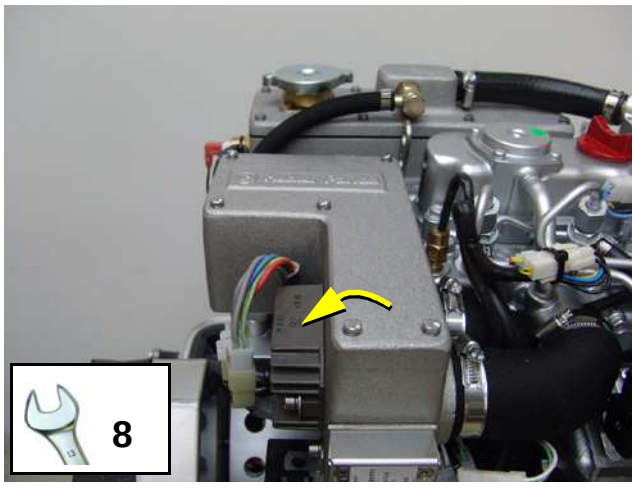


Fig. 6.4-1: Air suction housing

Change the air filter mat:

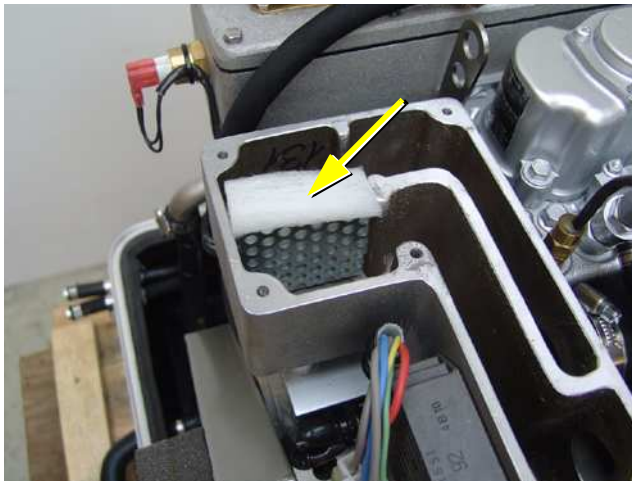


Fig. 6.4-2: Air suction housing

6.5 Ventilating of the coolant circuit / freshwater

Special notes for the ventilation of the cooling system

If the cooling water is drained or if other air should have arrived into the cooling system, it is necessary to ventilate the cooling system. This ventilation procedure must be repeated several times:

ATTENTION ! Before opening the venilation points the generator must be stagnant !!!

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

Further it should be guatanteed that the expansion tank is attached in sufficient height (600mm) over the level of the generator exhaust elbow union.

Fig. 6.5-1: External coolant expansion tank

Open ventilation screw at the cooling water pump.

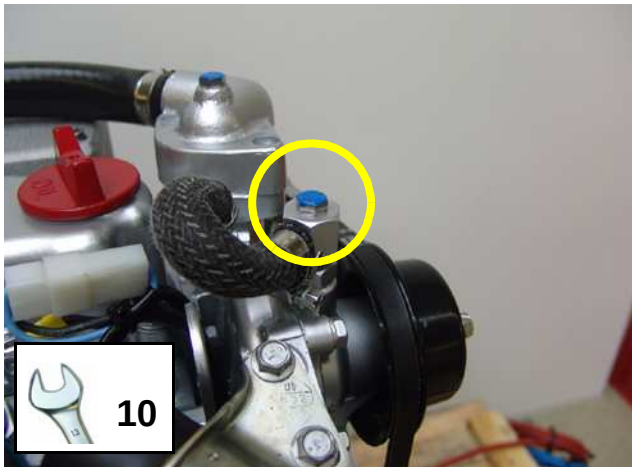


Fig. 6.5-2: Ventilation screw - water pump

Open venlation screw at the thermostat housing.

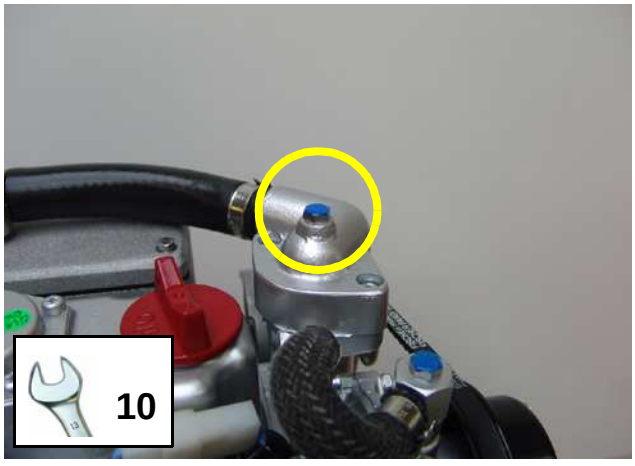


Fig. 6.5-3: Ventilation screw - thermostat housing

Fill in cooling water into the cooling water filler neck. If it is to be recognized that the cooling water level does not fall anymore (with cold cooling water the cooling water levelmust cover the sheet metal in the exhaust elbow), close the filler-cap and the ventilation screws and start the generator.

Run the generator for max. 60 seconds.

Stop the generator.

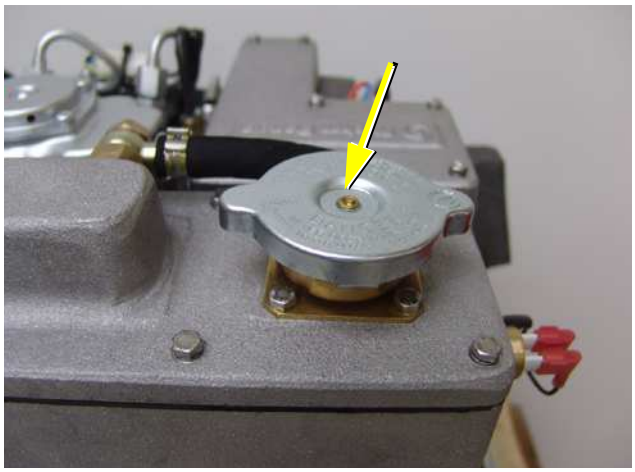


Fig. 6.5-4: Cooling water filler neck

Now the cooling water is only filled over the external expansion tank. This is connected by 2 hoses with the genset.

The external expansion tank should be filled in the cold condition only up to maximally 20%. It is very important that a large extension space over the cooling water level remains.

Repeat this procedure several times.

If no change of the cooling water level can be determined, the generator is started for 5 minutes. Afterwards repeat the ventilation two - three times.

It is meaningful to repeat the ventilation procedure also after some days again to guarantee that in the system remained bubbles are removed.

The ventilation screw over the housing of the cooling water pump may be opened under no circumstances, while the generator runs. If this happens inadvertently, through the opening air is sucked in. A very complex ventilation of the entire system is necessary thereafter.

Fig. 6.5-5: Ventilation screw - water pump

6.5.1 Draining the coolant

In principle only describes here, how the cooling water of the raw water cycle can be drained. The mixture of the fresh water circuit should not be drained in principle. See measures for the preparation of the winter storage.

The simplest and cleanest method consists of the fact to bring the external vent valve below the generator level and hold over a collecting basin. Open the valve now, the water from the raw water circuit flows downward into the container.

6.6 Replace of the v-belt for the internal cooling water pump

The relative high ambient temperature in the closed sound insulated capsule (about 85℃) can be a reason for a reduced lifespan of the v-belts. It is possible that the "softener" 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 in a very short time interval. It can be happen to change the v-belt after some weeks because of unfavorably conditions. Therefore the control is needed in an interval of 100 operating hours. The v-belt ia a wearing part. It should be enough spare v-belts on board. We suggest to stand by the according service-packet.

Loosen the fixing screw above the alternator.

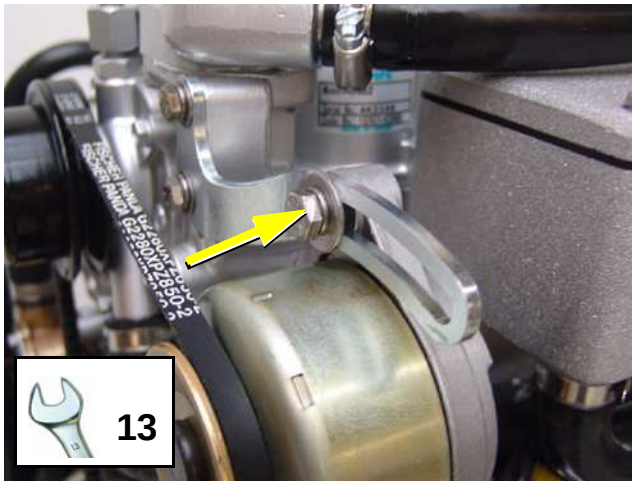


Fig. 6.6-1: Fixing screw - DC-alternator

Loosen the fixing screw below the alternator only a little bit.

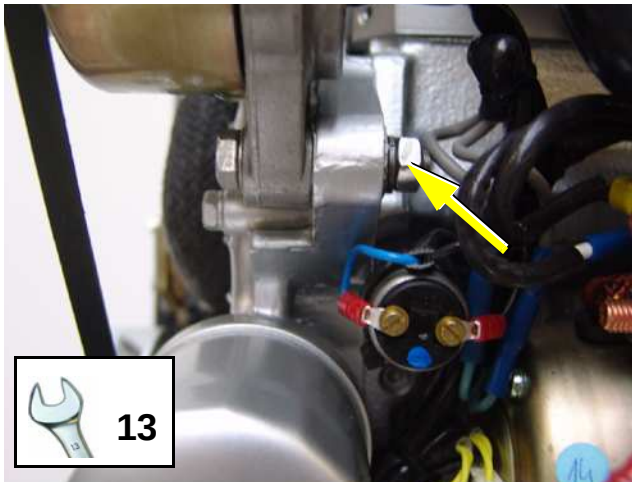


Fig. 6.6-2: Fixing screw - DC-alternator

Press the alternator to the direction of the thermostat housing.

Now the v-belt can be changed (type: XPZ 850-2).

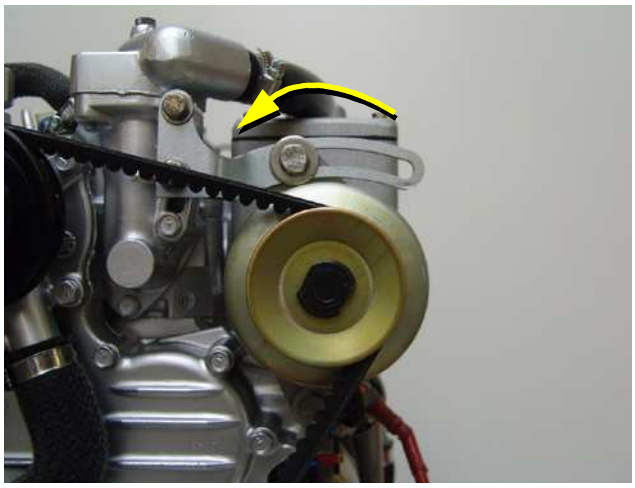


Fig. 6.6-3: V-belt

Stretch the v-belt by pulling the alternator back. The v-belt should be able to be pressing approx. 1cm with the thumb.

Tighten the fixing srews above and below the alternator.

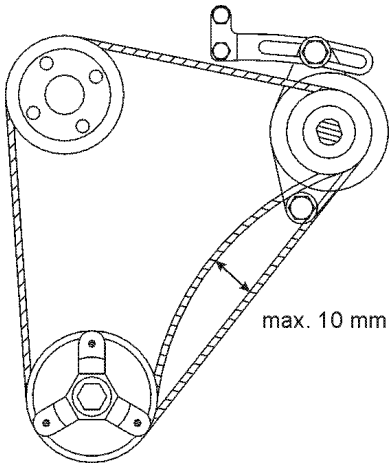


Fig. 6.6-4: V-belt

6.7 The raw water circuit

6.7.1 Clean raw water filter

The raw water filter should be released regularly from arrears. In each case the water cock must be closed before. It is mostly sufficient to beat the filter punnet.

If water should seep through the cover of the raw water filter, this may be sealed in no case with adhesive or sealant. Rather must be searched for the cause for the leakage. In the simplest case the sealing ring between caps and filter holders must be exchanged.

Fig. 6.7.1-1: Raw water filter

6.7.2 Causes with frequent impeller waste

The impeller of the cooling water pump must be regarded as wearing part. The life span of the impeller can be extremely different and exclusively depends on the operating conditions. The cooling water pumps of the PANDA generators are laid out in such a way that the number of revolutions of the pump lies low compared with other gensets. This is for the life span of the pump a positive effect.

Unfavorably affects the life span of the impeller, if the cooling water sucking in way is relatively long or the supply is handicapped, so that the cooling water sucking in range develops a negative pressure. This can reduce first of all the power of the cooling water pump extremely that the wings of the impeller are exposed to very strong loads. This can shorten the life span extremely.

Further the operation of the impeller pump loaded in waters with a high portion of suspended matters. The use of the impeller pump is particularly critical in coral waterbodies. Cases are well-known, which a impeller pump had so strongly run after 100 hours already that the lip seal on the wave was ground in. In these cases sharp crystal parts of the coral sand assess in the rubber seal and affect like an abrasive the high-grade steel shank of the impeller pump.

If the generator were mounted over the water level it is particularly unfavorable for the impeller pump. After the first start some seconds will pass by, until the impeller can suck in cooling water. This short unlubricated operation time damages the impeller. The increased wear can lead after short time to the loss. (see special notes: "Effects on the impeller pump, if the generator is mounted over the waterline")

6.7.3 Replace the impeller

Close the raw water stop cock.

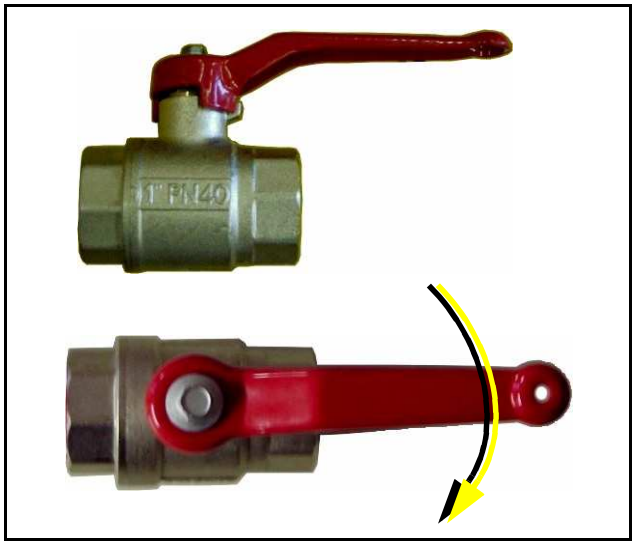


Fig. 6.7.3-1: Raw water stop cock

Raw water pump on the front side of the genset.

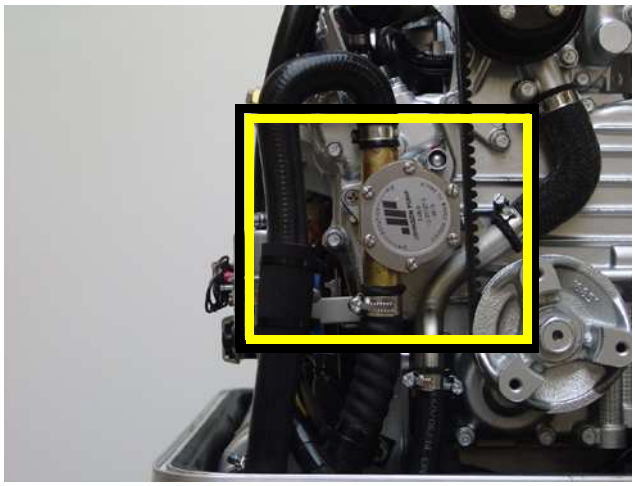


Fig. 6.7.3-2: Raw water pump

Remove the cover of the raw water pump by loosen the screws from the housing..

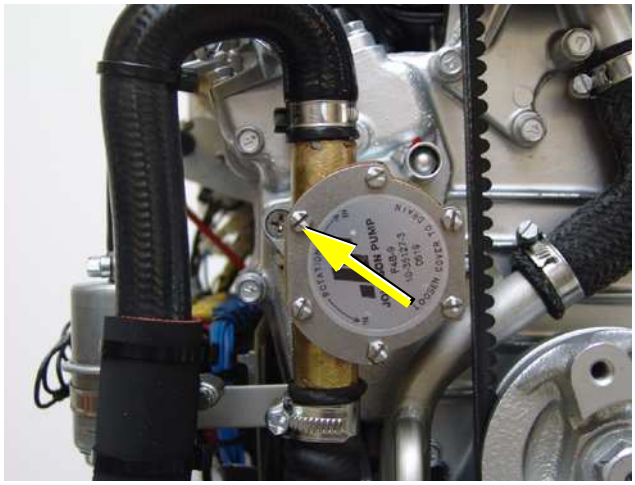


Fig. 6.7.3-3: Raw water pump

Mark the impeller, to make sure that these is used in the correct position at re-installation.

Pull to the impeller with a multigrip pliers of the wave.

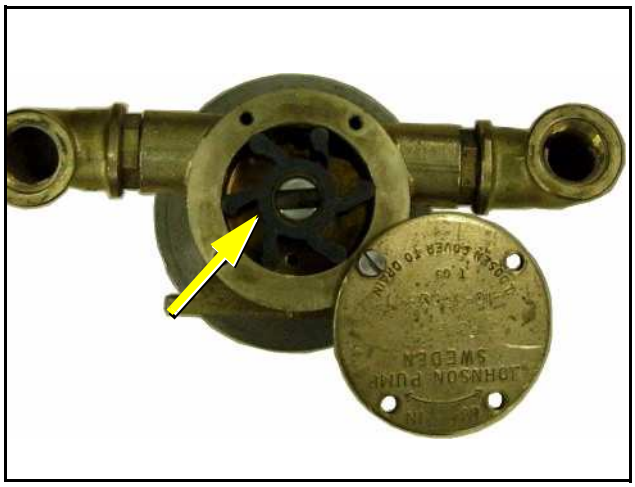


Fig. 6.7.3-4: Impeller

Check to the impeller for damage and replace it if necessary.

Before the reinsertion into the housing the impeller should have been lubricated with glycerin or with a non-mineral oil based lubricant e.g. silicone spray.

Fig. 6.7.3-5: Impeller

The impeller is attached to the pump wave (if the old impeller is used, pay attention to the before attached marking).

Fastening the cover and use a new seal.

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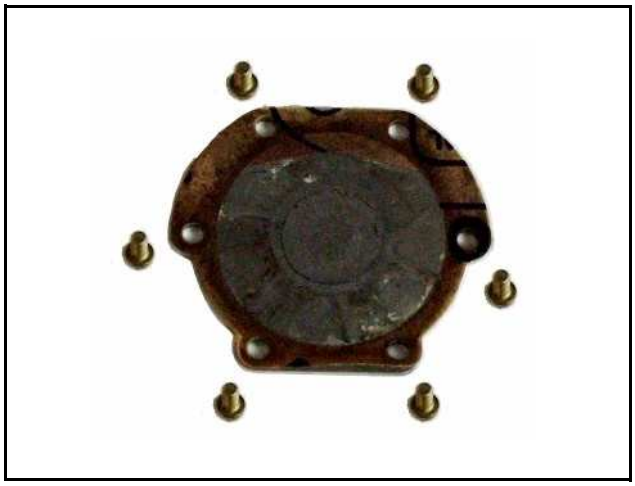


Fig. 6.7.3-6: Gasket

6.8 Additional maintenance

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

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

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

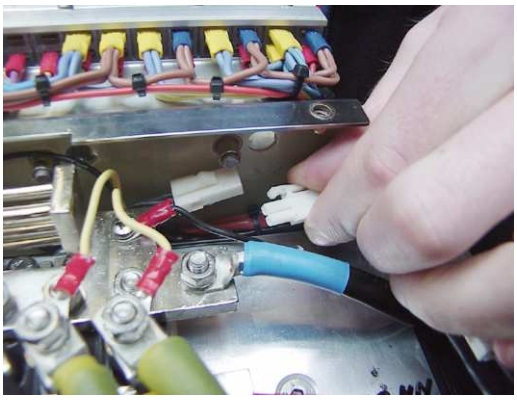
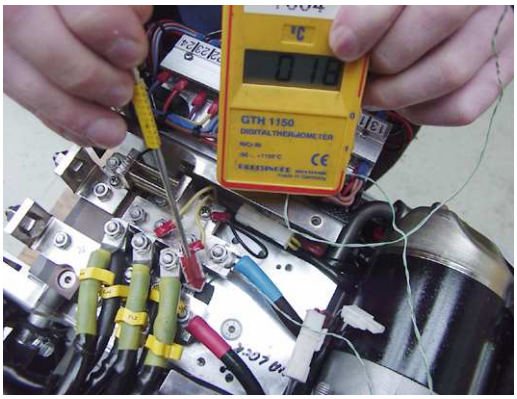


Fig. 6.8-1: Plug thermo-switch

- **Temperatures of the rectifier and heating**

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



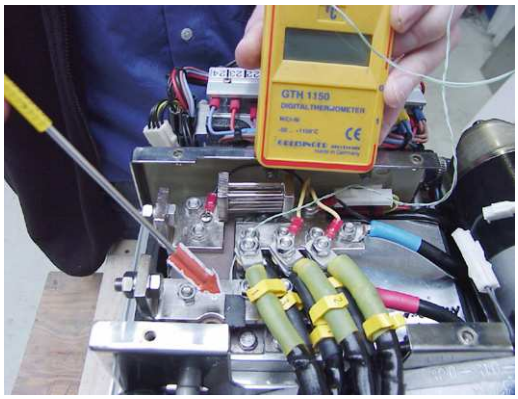


Fig. 6.8-2: Measuring the temperature

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

  Check all the cable connections of the DC- wiring.
  The temperature of the heat sink shall never exceed 95℃.
  The temperature of the copper bars shall never exceed 120℃

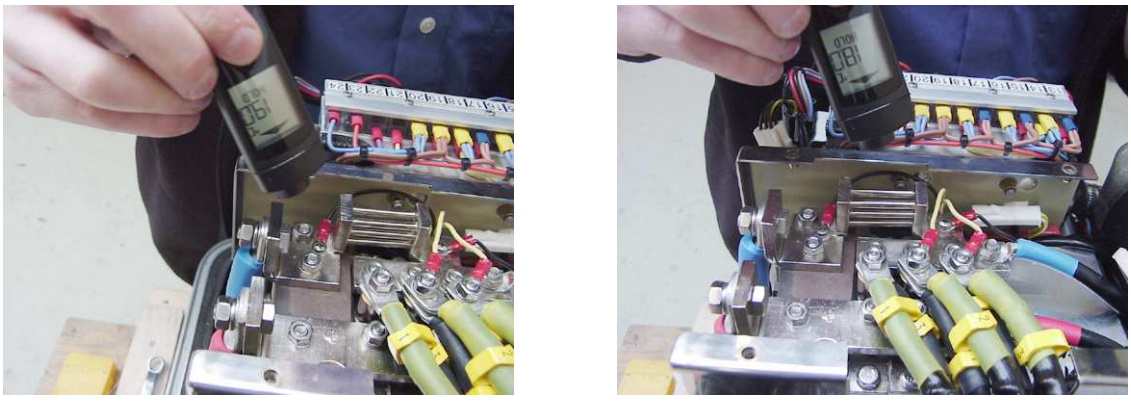


Fig. 6.8-3: Measuring the temperature

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

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

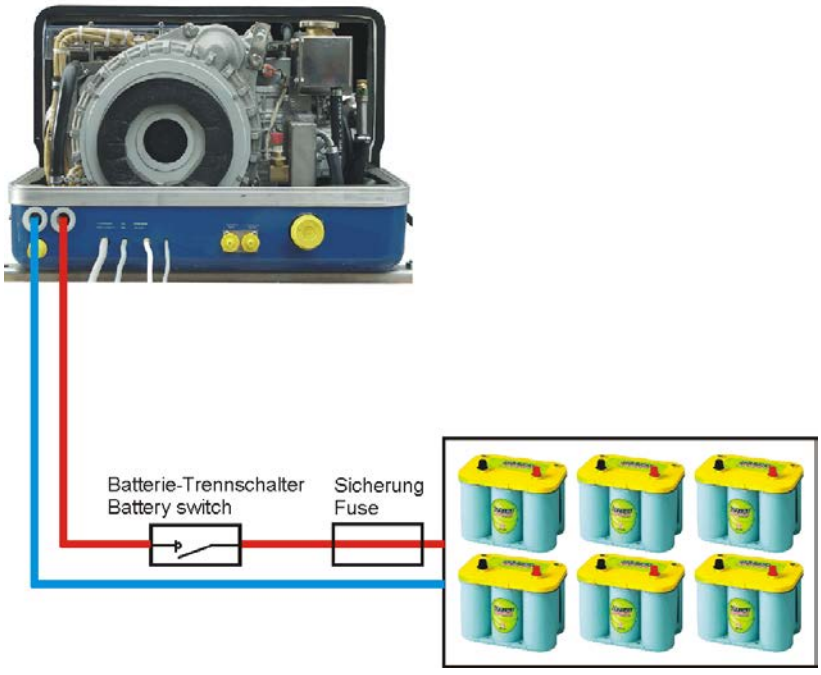


Fig. 6.8-4: |Installation- example

Remind the customer

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

6.9 Conservation at longer operation interruption

6.9.1 Measures on preparation of the winter storage

1. Rinse raw water circuit with an anti-freeze solution, even if this contains a corrosion protection means. The raw water inlet must be removed at the water cock. Over a hose connector the anti-freeze protection mixture is to be sucked in from a container. The leaked cooling water with the exhaust is to be led back into the sucking in container. The circuit must be kept upright some minutes to guaranteed that the anti-freeze protection mixture reaches all ranges of the cooling system.
2. The concentration of the anti-freeze mixture in the internal cooling circuit must be checked with a suitable measuring instrument. The concentration must be furnished according to the lowest temperatures which can be expected.
3. Clean raw water filter and check seal.
4. Check water cock for practicability. And spray with a corrosion protection oil from the inside or lubricate with acidless grease.
5. Check all hoses and hose connectors for good condition. The rubber hoses are very sensitive to enviromental influences. They can age fast with dry air, in environment of light oil and fuel steams and increased temperature. The hoses must be checked regularly for elasticity. There are operating situations, which the hoses must be renewed once in the year.
6. Check the hose connectors at all raw water valves doubly and if possible protect them with double hose clamps.
7. Dismount the impeller of the cooling water pump and check for wear. The impeller may not remain in the pump. It must be greased with vaseline and be kept at a dark place. It can be reintragrated in the spring again into the pump, if it is in good condition. The impeller is a wearing part, it is recommended to renew it always in the spring, independently how many operating hours the genset ran.
8. Control of the vent valve at the raw water inlet. If the generator is installed below the waterline, always a vent valve is necessary. The vent valve must be checked also during the season regularly. In the winter storage the vent valve should always be disassembled, checked and greased. Hardens or got parts dirty are to be replaced.
9. Check water lock: If the generator were rinsed with an anti-freeze mixture, the antifreeze mixture can leave in the water lock. If the generator were rinsed with fresh water, the water in the water lock must be drained. Otherwise the danger exists that the collector is blown up and destroyed by ice.
10. Check the exhaust/water separator on leakage and if the hose connectors at the lower surface of the separation unit are in normal condition. (with extremely sulfureous fuels it is possible that also high-grade steel tube ends are attacked.)
11. Check all construction units at the generator inside the sound cover for leakages. If there are traces of humidity in the sound cover, the cover must be dried. Further the cause for the wetness must be surched and eliminated.
12. During the winter storage the upper section of the sound cover must be taken off, in order to avoid condensed moisture formation, if traces of humidity remain in the sound cover inside casing by leakages in the raw water circuit.

6.9.1 Measures on preparation of the winter storage (conti.)

13. The generator housing and the housing of the engine should be sprayed with a corrosion protection oil before the winter storage. This procedure is recommended also in the season. This procedure can avoid that arising and humidity marks on the surface of the aluminum construction units be noticed too late.
14. Disconnect the starter battery (positive and negative pole).
15. Lubricate the spindle for the number of revolutions adjustment device with a special lubricant (Antiseize grease).
16. Check cooling water connection block at the generator housing on traces of corrosion and if necessary renew. (only such traces are to be considered, which refer to clear "blossoming" of the material. If the surface is only grey coated, this is only an indication for the fact that aluminum came into contact with condensed moisture.)
17. Use of a air dehumidifier. The best way to protect a yacht in the winter storage against damage by humidity is, to places a air dehumidifier inside the ship and locks all hatches. The devices have a hygrometer, which switches the device off, if the humidity is under the adjusted value. There is no better method, in order to protect pads, cable, electronics, wood, engines etc. optimally against any rotting by humidity.

6.9.2 Initiation at spring

- Before the first start turn the engine once with the hand, in order to eliminate necessary existing corrosion beginnings in the bushing. If necessarily carry out normal engine inspection.
- Change engine oil and engine oil filters.
- Reintegrate the impeller of the cooling water pump and check pump for leakage.
- Charge starter battery of the generator, connect cables and check battery voltage.
- Start generator and check the basic adjustments of the generator such as voltage, speed regulation etc..
- Check all switching off devices for function by operational procedures.

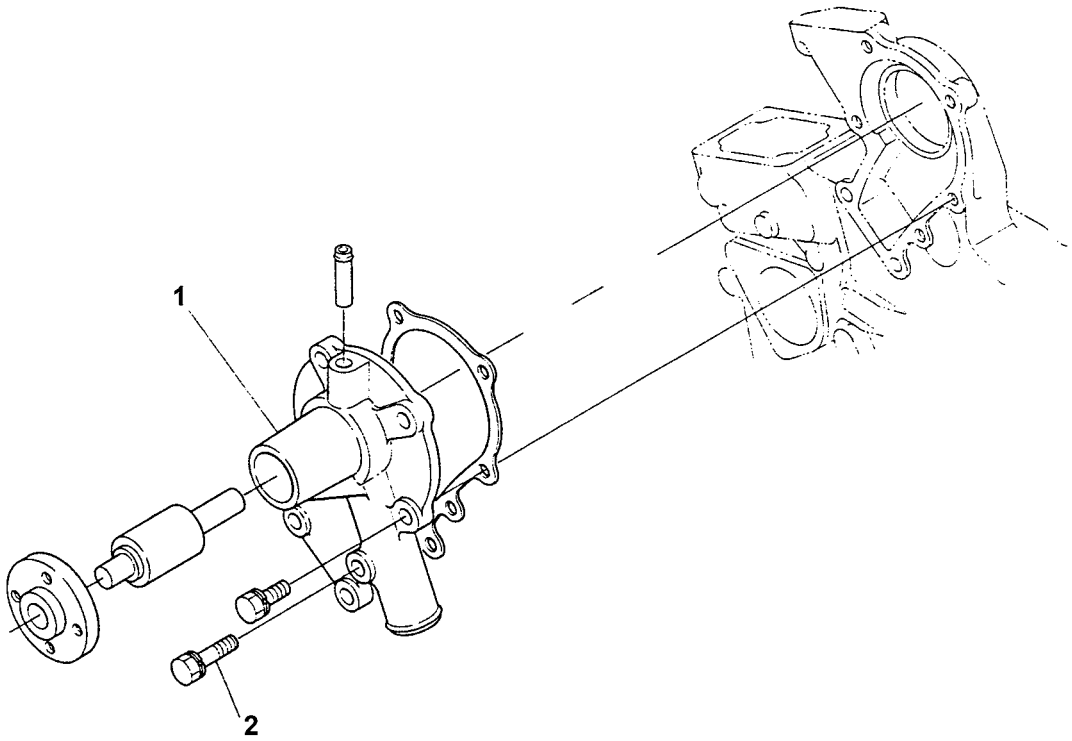
Fischer Panda does not take over adhesion for possible damages!

6.10 Replacing Water pump

1. Drain the freshwater circuit.
2. Unscrew the water pump mounting screws (2), and remove the water pump (1) from the gear case cover. Use a spanner size 10mm.

When reassembling

- Apply liquid-type gasket (Three Bond 1215 or its equivalent) to both sides of the new water pump gasket.

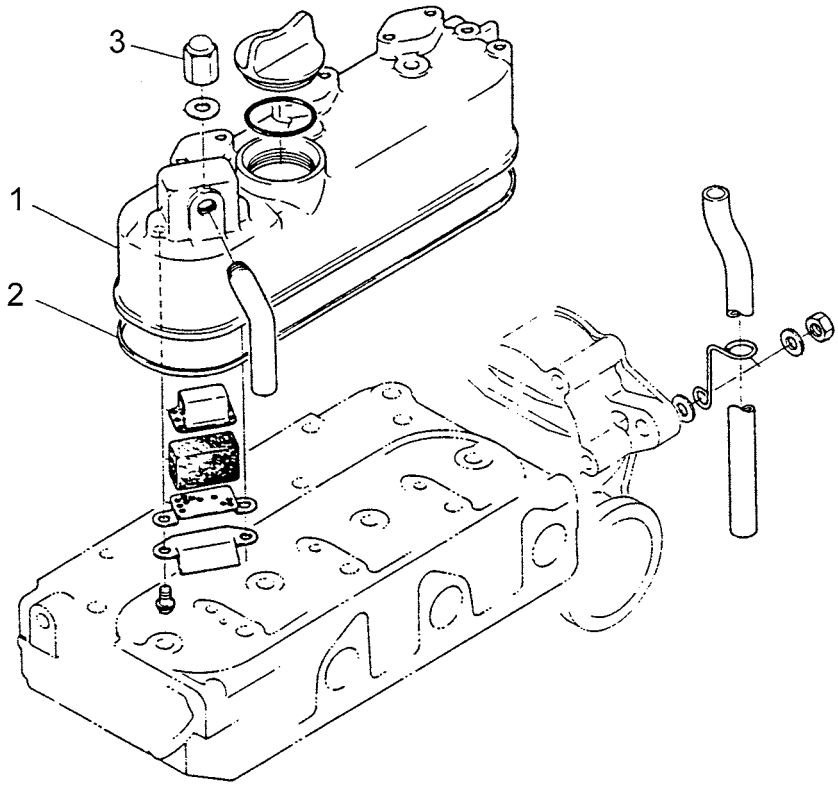


1. Water pump body
2. Hexagon head screw

Fig. 6.10-1: Water pump

6.11 Replacing Valve cover gasket

1. Remove the valve cover cap nuts (3). Use a spanner size 10mm.
2. Remove the valve cover (1).
3. Check to see that the valve cover gasket (2) is defective.
4. Replace the valve cover gasket (2) with a new one.
5. Install the valve cover (1), using care not to damage the o-ring.
6. Tighten the valve cover cap nuts (3). Tighten torque: 3,9 to 5,9Nm.



1. Valve cover
2. Valve cover gasket
3. Hexagon cap nut

Fig. 6.11-1: Valve cover

6.11.1 Adjustment of the valve clearance

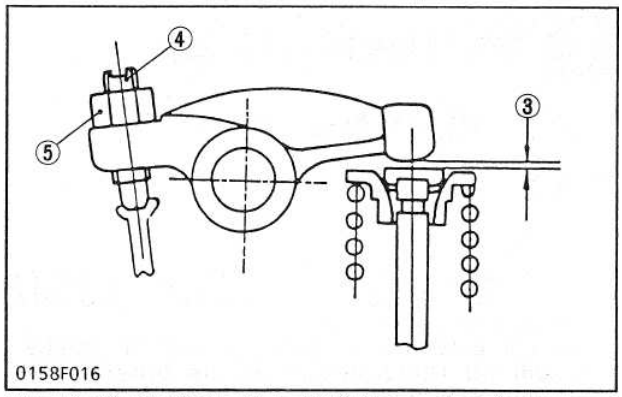
Tools:

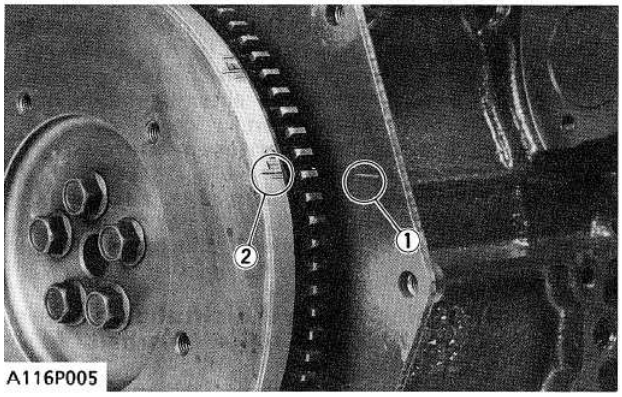
- Spanner for valve cover, spanner size 10mm
- Spanner for counter-nut, spanner size 11mm
- Screw driver for adjusting screw
- Thickness sheet gauge (sliding suction must be between rocker arm and valveshaft)

Valve Clearance

1. Loose the lock nut (5) and the adjusting screw (4) on the rocker arm.
2. Turn the adjusting screw to adjust the valve clearance.
3. Tighten the lock nut (5) and check the valve clearance again after several turns of the flywheel.

Valce clearance	Factory spec.	0.145 to 0.185 mm 0.0059 to 0.0073 in.





1. Notched Portion
2. TC Mark Line
3. Valce Clearance
4. Adjusting Screw
5. Lock Nut

Fig. 6.11.1-1: Valve Clearance

Note:

- The „TC“ marking on the flywheel is just for No. 1 cylinder. There is no „TC“ marking for the other cylinders.
- No. 1 piston comes to the T.D.C. position when the „TC.“ marking is aligned with the punch mark of the rear end plate. Turn the flywheel 15 ° (0.26 rad.) clockwise and counter-clockwise to see if the piston is at the compression top dead center or the overlap position. Now referring to the table below, readjust the valve clearance. (The piston is at the top dead center when both the IN. and EX. valve do not move; it is at the overlap position when both the valves move.)
- Finally turn the flywheel 360 °(6.28 rad.) to ma ke sure the „TC“ marking and the punch mark are perfectly aligned. Adjust all the other valve clearances as required.

Z482-B

Cylinder No.	1		2	
Valve arrangement	IN.	EX.	IN.	EX.
When No. 1 piston compression top dead center	O	O		O
When No. 1 piston is overlap position			O	

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7. Generator Failure

7.1 Overloading the Generator

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

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

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

7.2 Starting Problems

7.2.1 VCS does not work

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

Is the voltage sense connection ok? Check polatrity!

Terminal 7+8

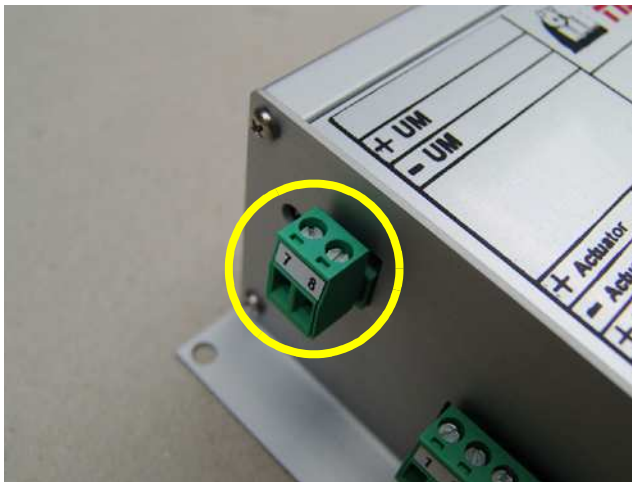

Fig. 7.2.1-1: Terminal 7+8 on VCS

Is the shunt connection ok? Check polatrity!

Terminal 9+10

Fig. 7.2.1-2: Terminal 9+10 on VCS

Is the main supply connection ok? Check polatrity!

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

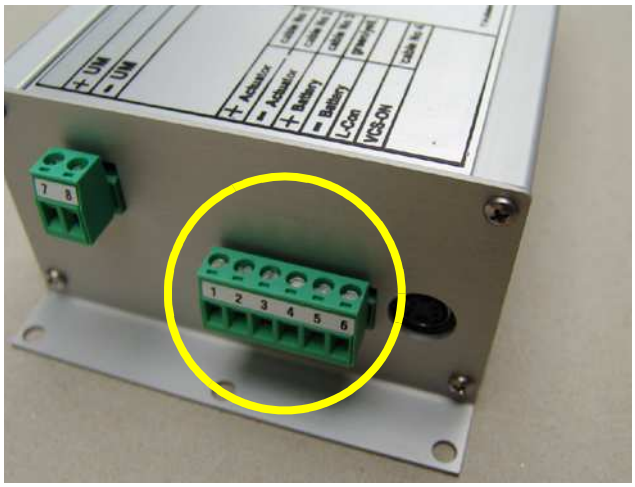

Fig. 7.2.1-3: Terminal 1-6 on VCS

Checking the fuse on the VCS printed circuit board.

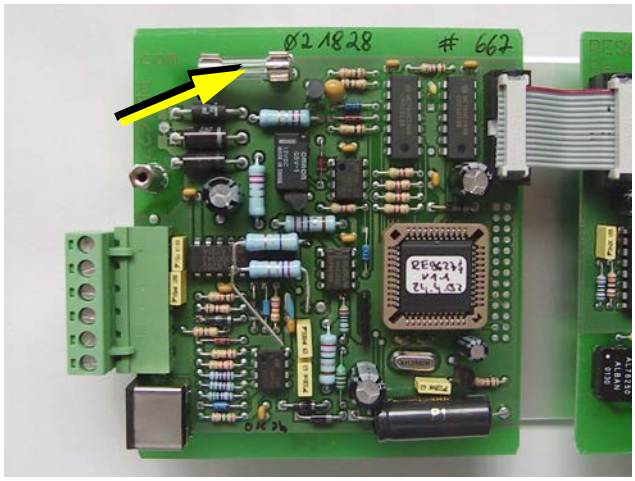

Fig. 7.2.1-4: Fuse on VCS-board

7.2.2 Fuel Solenoid Valve and Stop solenoid

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

1. Fuel solenoid valve

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

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

A check of the fuel solenoid valve by removing the plug from the fuel solenoid valve for a short period whilst in operation (first remove the small retention screw) and replace it immediately. The motor should "react immediately" 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.

2. Solenoid for engine stop

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

1. Energized to stop

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

2. Energized to run

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

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

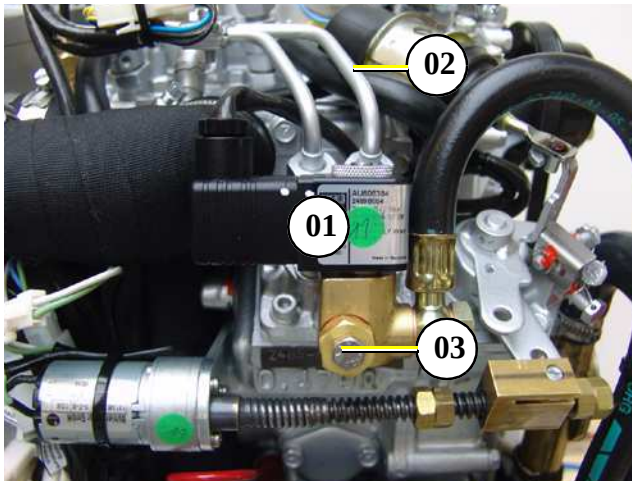

Fig. 7.2.2-1: Fuel solenoid valve

Stop solenoid for engine stop

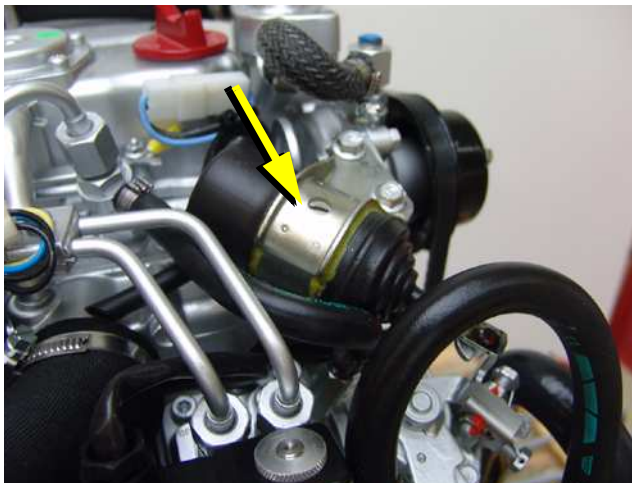

Fig. 7.2.2-2: Stop solenoid

7.2.3 Dirty fuel filter

If the fuel filter is dirty change the filter element.

For replacing the filter element see section 6.3.1, “Replace of the fuel filter” on page 93.

01. Filter element

This protects the injection pump. No water will go thru the filter. If water reaches the filter it will block the fuel flow even if the filter looks clean

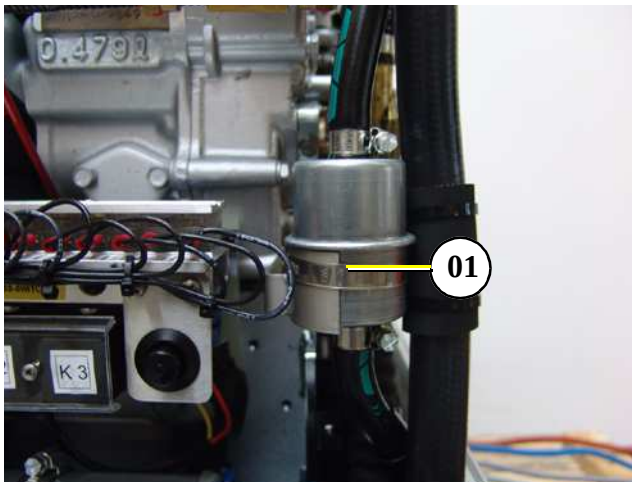

Fig. 7.2.3-1: Fuel filter

7.2.4 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

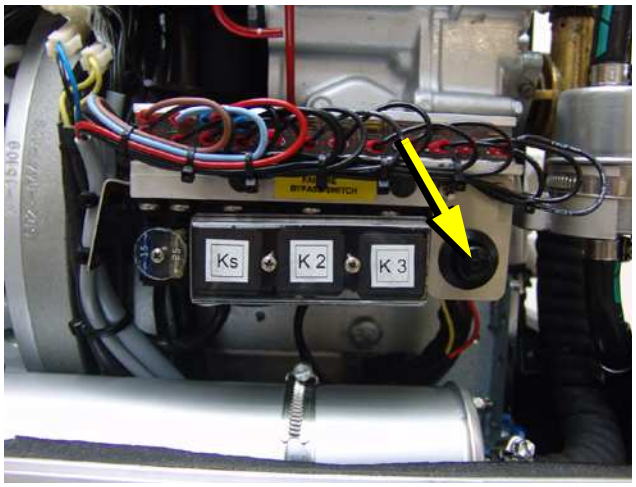

Fig. 7.2.4-1: Failure bypass switch

To prevent such a shut down period the generator can be started in the normal way while pressing the Failure bypass button is depressed. This by-passes any faults thus allowing the generator to run.

Before pressing the bypass button and starting the generator, a manual check of the engine oil level must be carried out as it is possible that the oil pressure switch caused the generator to cut out. Once it has been ascertained that the reason for the engine cutting out is over- heating and not lack of oil, the generator can be started and run for several minutes without load, so that the engine is returned to normal operating temperature.

CAUTION:

If temperature is the reason for the generator cutting out when it is running under load, then an immediate investigation should be made to determine the cause. It could be a fault with the internal cooling system, the fan, the radiator air-intake or dirty radiator.

Repeated use of the failure bypass switch should be avoided, if the generator repeatedly cuts out during operation without determining the cause of the engine cut-outs.

The generator should always be run without load for several minutes before being switched off, so that temperature stabilisation occurs. Residual heat can cause the generator to overheat, even after it has been switched off.

Should the overheating alarm be activated after the generator has been switched off, then this can also be bypassed using the switch.

7.2.5 Troubleshooting Table

For Troubleshooting see section 8.1, “Troubleshooting” on page 117.

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8. Tables

8.1 Troubleshooting

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

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

GENERATOR VOLTAGE FLUCTUATES	
Cause	**Solution**
1. Fault or defect on the load side. 2. A motor fault.	1. Check if the power requirement of the load fluctuates. 2. See "Motor running irregularly".

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

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

MOTOR DOES NOT TURN OVER AT THE NORMAL SPEED DURING THE STARTING PROCESS	
Cause	**Solution**
Starter battery voltage insufficient.	Check battery.
Damaged bearing(s) piston (seized).	Repairs need to be carried out by Kubota-Service. (refer to Kubota motor-manual)
Cooling water in combustion chamber.	1. Turn generator "OFF" at control panel. 2. Remove the glow plug (see Kubota-manual). 3. Rotate the motor by hand carefully. 4. Check if there is water in the oil and change both oil and filter if necessary. 5. Determine cause for excess water in the combustion chamber. The excess water can be caused by a defective air vent in the cooling water system, which should be checked and cleaned, or replaced if faulty.

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

DROP IN THE SPEED OF THE MOTOR	
Cause	**Solution**
Too much oil.	Drain oil.
Lack of fuel.	Check fuel supply system: - fuel filter, renew if necessary - check fuel pump - check fuel lines (bleed if necessary)
Lack of intake air.	Check air intake paths. Check and clean air filter (and intake muffler if installed).
Generator overloaded by too many 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.

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

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

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

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

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

8.2 Technical Data Engine

	Panda AGT 5000 PMS
Type	Z482
Govenour	VCS
Cylinder	3
Bore	67mm
Stroke	68mm
Stroke volume	479cm^3
max. power (SAEJ1349) at 3600 rpm	8,05kW
max. bare speed	3800rpm
Valve clearance (engine cold)	0,145 - 0,185mm
Compression ratio	23:1
Lubrication oil capacity	2,1l
Fuel consumption [a]	ca. 0,5 - 1,3 l
Oil consumption	max. 1% of fuel consumption
Cooling water requirement for raw water circuit	16-28l/min
Permissible max. permanent tilt of engine	a) 25° across the longitudinal axis b) 20° in the longitudinal direction
Stator Da	240m
Stator Di	170mm
Rotor Lfe	40mm

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

Generatortype	**Ø Cooling water conduit**		**Ø Exhaust conduit**	**Ø Fuel conduit**	
	Fresh water	**Raw water**		**Supply**	**Return**
	[mm]	**[mm]**	**[mm]**	**[mm]**	**[mm]**
Panda PMS AGT 5000	20	20	40	8	8

Type	Nominal power [kW]	Continuous power [kW]	Nominal voltage [VDC]	Continuous charging current[A]	Nominal charging current [A]
AGT 5000-12	4,5	3,6	12	250	280

Wiring for vehicle.

single phase, not tin-plated, PVC-isolated.

nominal wire cross-section [mm²]	allowed conrinuous current (reference point) [a]	
	at +30℃ [A]	at +50℃ [A]
1	19	13,5
1,5	24	17,0
2,5	32	22,7
4	42	29,8
6	54	38,3
10	73	51,8
16	98	69,6
25	129	91,6
35	158	112
50	198	140
70	245	174
95	292	207
120	344	244

a. DIN VDE 0298, part 4.

8.3 Types of Coil

HP3 delta-connection

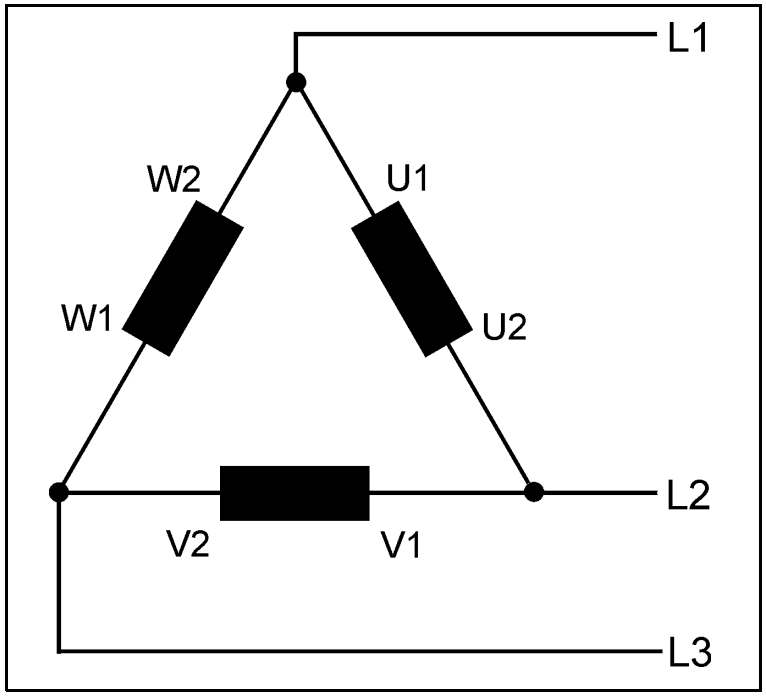


Fig. 8.3-1: HP3 delta-connection

HP3 star-connection

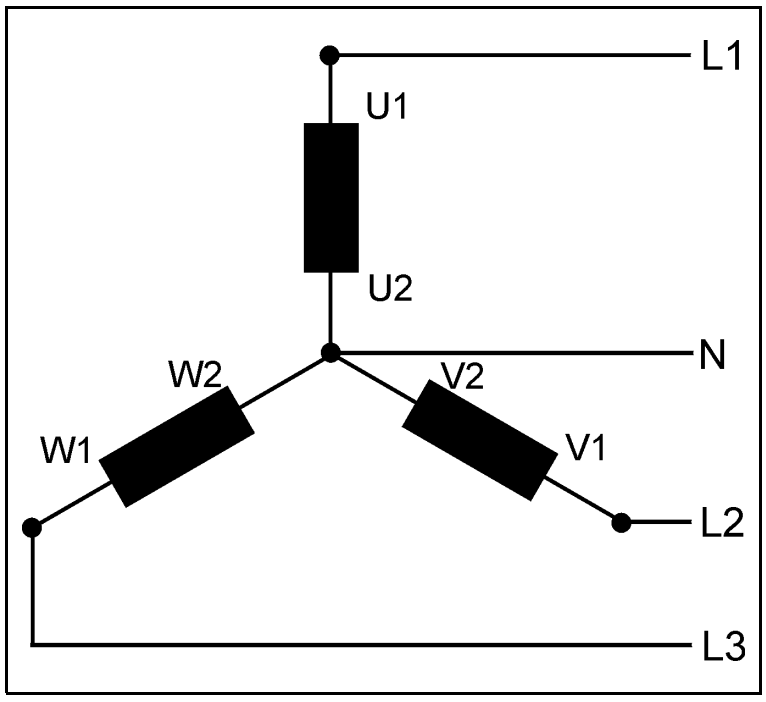


Fig. 8.3-2: HP3 star-connection

8.4 Inspection checklist for services

Inspection-Category			
A	Einbauprüfung / Installation check	D	100 h
		E	500 h
B	täglich / daily	F	1000 h
C	35 - 50 h	G	5000 h

Durchzuführende Inspektionsarbeiten / Inspection work			
1)	prüfen / check	4)	erneuern / change
2)	messen / measure	5)	Dichtheit / sealing
3)	reinigen / clean	6)	Isolation prüf. / check isolation

	Inspection-Category							Inspection work
	A	B	C	D	E	F	G	
01.	5)	5)	5)	5)	5)	5)	4)	coolant water hoses
02.	1)	1)	1)	1)	1)	4)	4)	raw water pump (impeller)
03.	1)	1)	3)	3)	3)	3)	3)	water separator / fuel pre-filter
04.	1)	1)	4)	4)	4)	4)	4)	engine oil
05.			4)	4)	4)	4)	4)	oil filter
06.	1)	1)	1)	4)	4)	4)	4)	air filter
07.	1)	1)	1)	1)	1)	1)	1)	fuel lines (leaks)
08.	1)	1)	1)	4)	4)	4)	4)	fine particle fuel filter
09.	1)		1)		1)	1)	1)	valve clearance
10.	1)	1)	4)	5)	4)	4)	4)	valve cover gasket
11.			1)		1)	1)	1)	coolant therm (sensor)
12.			1)		1)	1)	1)	exhaust temp sensor
13.			1)		1)	1)	1)	oil pressure sensor
14.		1)	1)	1)	1)	1)	1)	belt tension
15.	1)	1)	1)	1)	4)	4)	4)	"V" belts
16.						1)	1)	Thermostat
17.	1)	1)	1)	1)	1)	1)	1)	generator & engine screws
18.	1)	1)	1)	1)	1)	1)	1)	unit's base mount screws
19.	6)	6)	6)	6)	6)	6)	6)	check electrical cables
20.	1)	1)	1)	1)	1)	1)	1)	motor reinforced mountings
21.	1)	1)	1)	1)	1)	1)	1)	actuator mounting
22.	1)	1)	1)	1)	1)	1)	1)	starter motor mounting screws
23.	1)	1)	1)	1)	1)	1)	1)	screws generator-engine
24.	1)	1)	1)	1)	1)	1)	1)	voltage output of alternator 12 V
25.	2)		2)	2)	2)	2)	2)	input temp of coolant under load
26.	2)		2)	2)	2)	2)	2)	outlet temp of coolant under load
27.						4)	4)	generator rotor bearing
28.			1)	1)	1)	1)	1)	signs of corrosion to generator
29.			1)	1)	1)	1)	1)	check generator coolant block
30.	1)		1)	1)	1)	1)	1)	VCS function test
31.	2)		2)	2)	2)	2)	2)	voltage without load
32.	2)		2)	2)	2)	2)	2)	voltage under load
33.	2)		2)	2)	2)	2)	2)	engine speed (rpm)
34.						1)	4)	injector test
35.						1)	1)	compression
36.	1)	1)	1)	1)	1)	1)	1)	hose clips
37.	1)	1)	1)	1)	1)	1)	1)	recifier
38.	1)	1)	1)	1)	1)	1)	1)	test cable with temperature tester

8.5 Engine oil

Engine oil classification

Operating range:

The operating range of an engine oil is determined by SAE class. "SAE" is for the union of American engineers (Society of Automotives Engineers). The SAE class of an engine oil only informs over the viscosity of the oil (larger number = more viscous, lower number = more highly liquidly) e.g. to 0W, 10W, 15W, 20, 30, 40. The first number shows the liquid of cold weather, the second number refers to the fluidity with heat. Complete yearly oils have usually SAE 10W-40, SAE 15W-40 etc.

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 C quality.

Examples for diesel engine oil:

API CG Engine oil for highest demands, turbo-tested

Engine oil types	
above 25℃	SAE30 or SAE10W-30 SAE10W-40
0℃ to 25℃	SAE20 or SAE10W-30 SAE10W-40
below 0℃	SAE10W or SAE10W-30 SAE10W-40

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℃	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

Coolant mixture ratio	
Water/antifreeze	Temperature
70:30	-20℃
65:35	-25℃
60:40	-30℃
55:45	-35℃
50:50	-40℃

8.7 Measurements

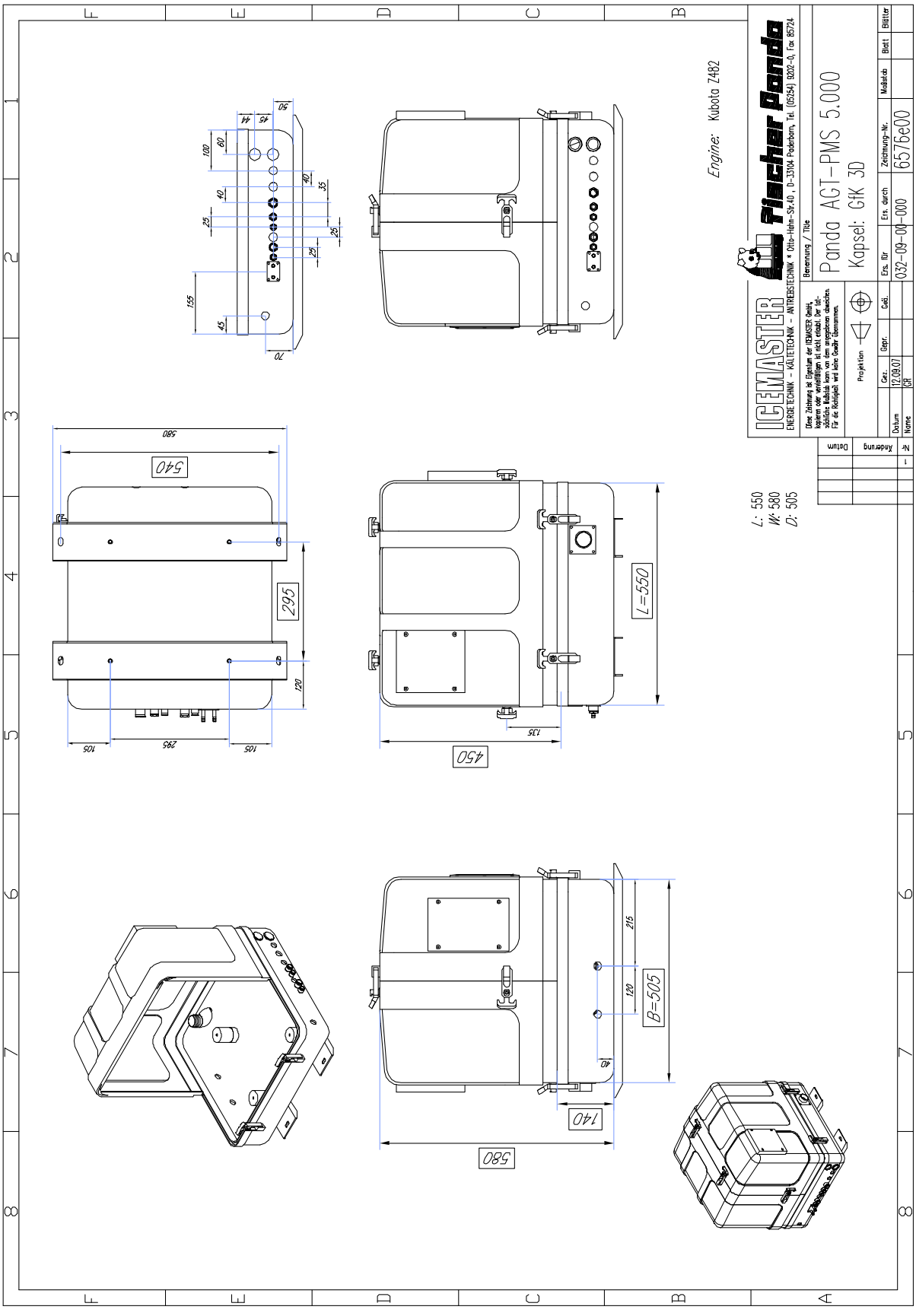


Fig. 8.7-1: Measurements

Intentionally Blank

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_17.2.11
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	

10. Safety Instructions Generator Control P6+

10.1 Personal requirements

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

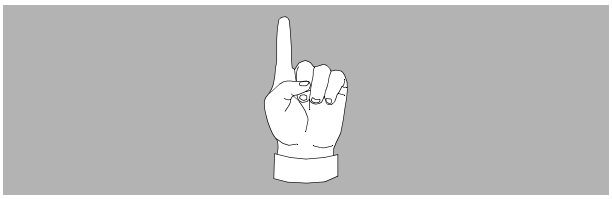
The installation should be carried out by specially trained personnel or by authorized repair shops (Fischer Panda service points).

10.2 Safety instructions for this chapter

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

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

Note!:



Danger for life! - The generator can be equipped with a automatik 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 disconected 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 persoanl 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.

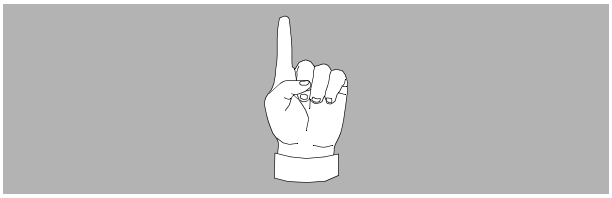
This is especially true for systems with an automatic start function. The automatic start function is to be deactivated before the work.

Sea valve must be closed. (only PMS version)

Attention!:

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

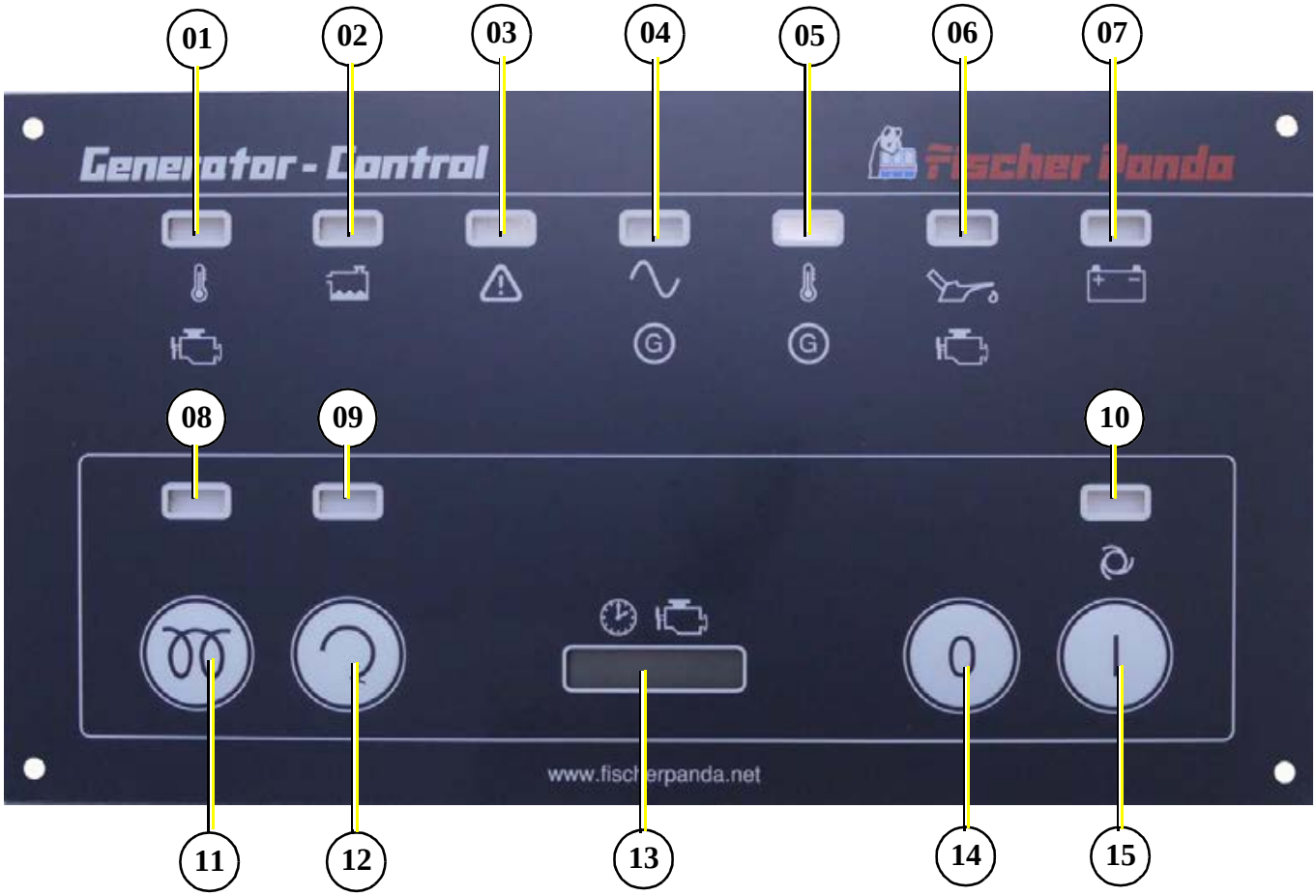
Note!:



11. General operation

11.1 Panel Generator Control

Fig. 11.1-1: Panel front



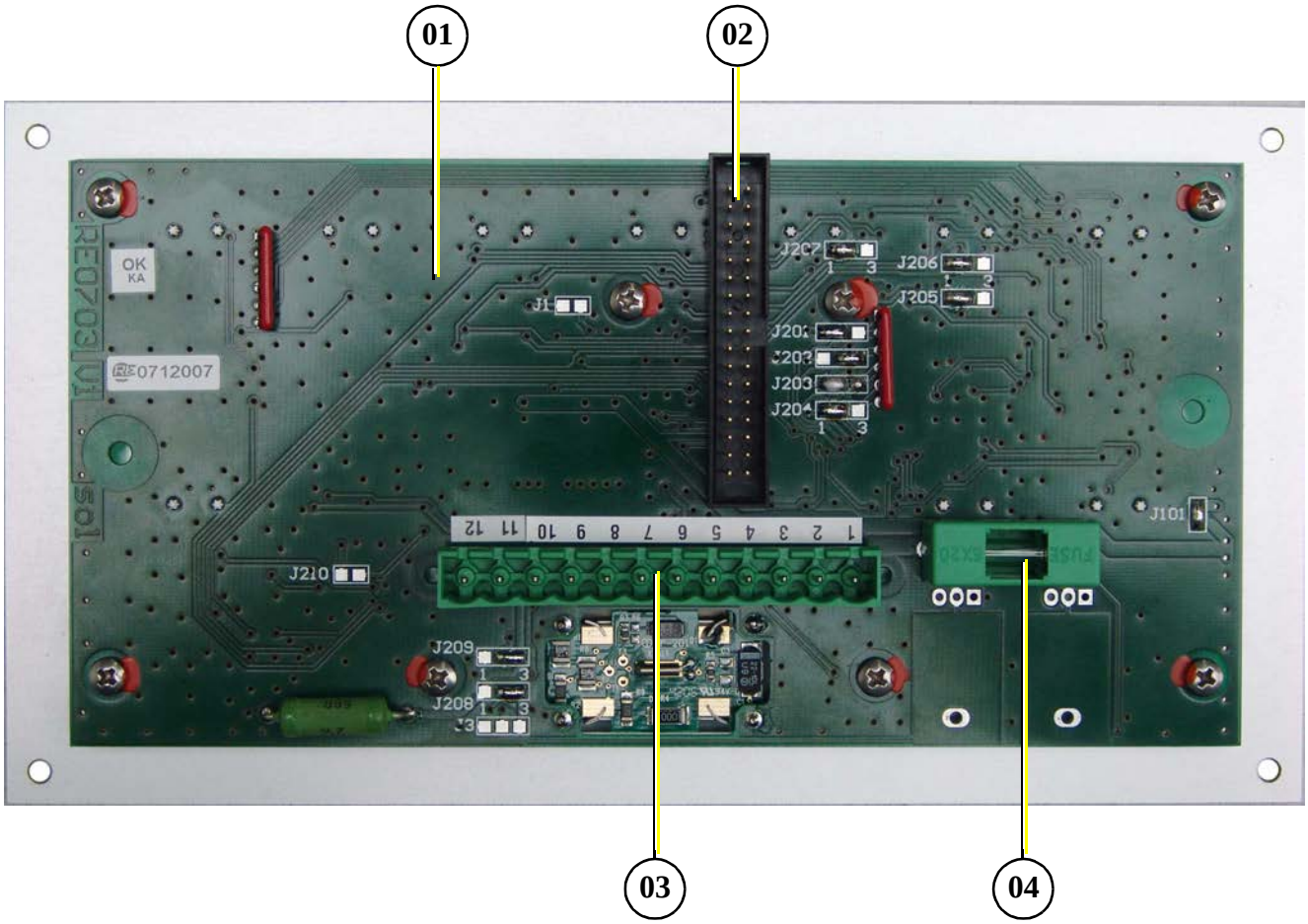
01. LED for coolant temperature red[1]
02. LED for waterleak red/yellow[1] (sensor optional)
03. LED for AC-voltage fault red/yellow[1]
04. LED for AC-voltage ok green[1]
05. LED for winding temperature red[1]
06. LED for oil pressure red[1]
07. LED for battery charge voltage fault green/red[1]
08. LED for pre-glow „heat“ orange[1]
09. LED for Generator „start“ green[1]
10. LED for Generator „stand-by“ green[1]
11. Push button for pre-glow „heat“
12. Push botton 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

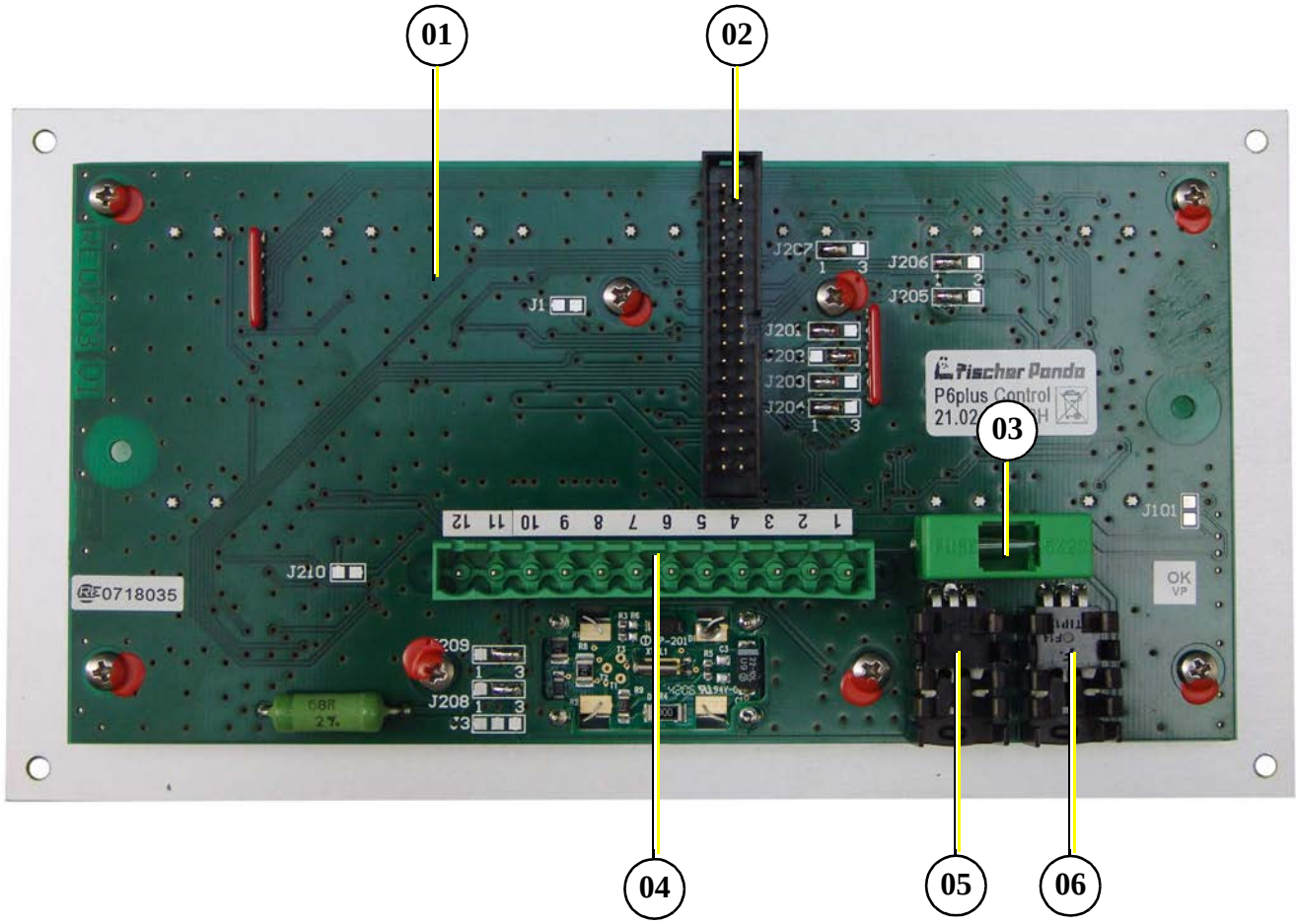


01. Control board
02. Terminal block (master-slave adapter: left row; automatic adapter: right row)
03. Terminals 1-12 (see Kapitel 11.4.2, “Terminal connections,” auf Seite 136)
04. Fuse 630mA slow-blow

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 136)
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 ≥22mA 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 ≥10mA 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 ≥22mA 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 ≥2,5mA 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 ≥2,5mA 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 ≥10mA 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 ≥22mA 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 ≥10mA
	open	Input AC-Fault has Pull-Up-current ≥2,5mA

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 ≥10mA
	open	X	Input AC-Fault has Pull-Up-current ≥2,5mA

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 ≥10mA
	open	X	Input AC-Fault has Pull-Up-current ≥2,5mA

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 ≥10mA
	open	X	Input AC-Fault has Pull-Up-current ≥2,5mA

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 ≥10mA
	open	X	Input AC-Fault has Pull-Up-current ≥2,5mA

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

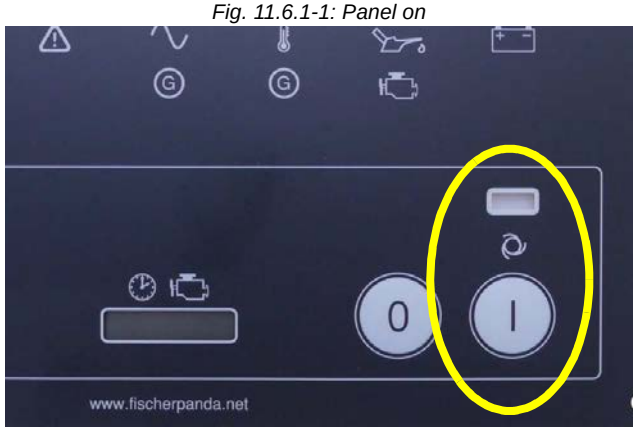
11.6.1 Starting the generator

Danger for life! - The generator can be equipped with a automatik 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 disconected 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℃.

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℃ 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℃) 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.

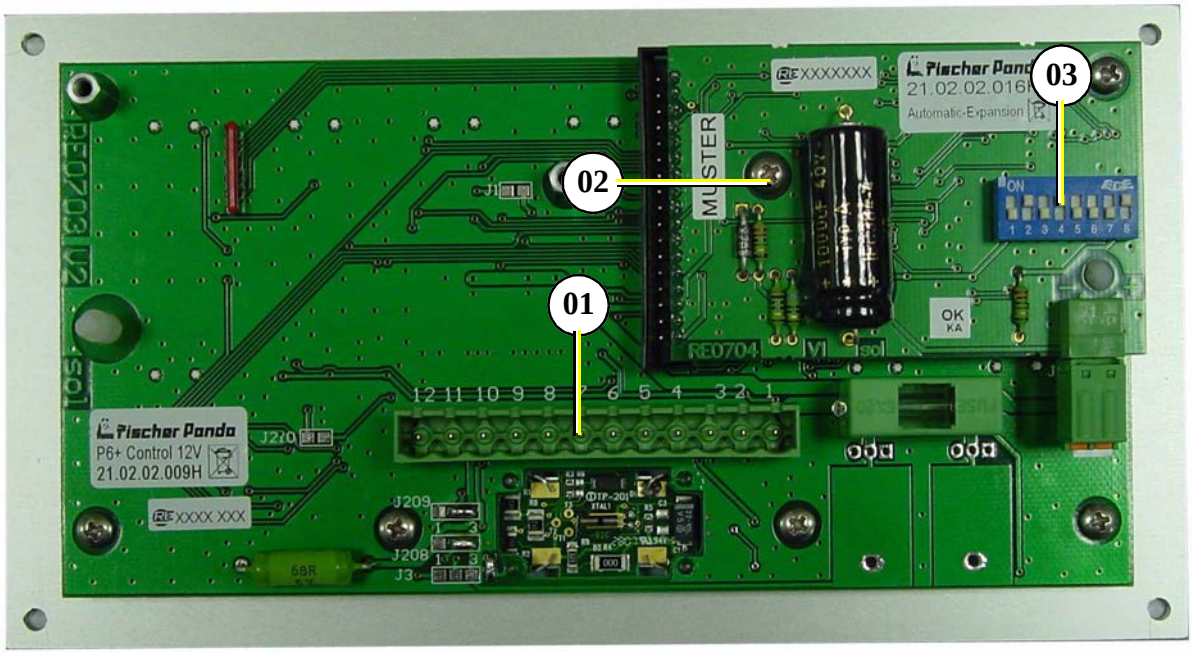
Fig. 11.6.2-1: Stop

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)

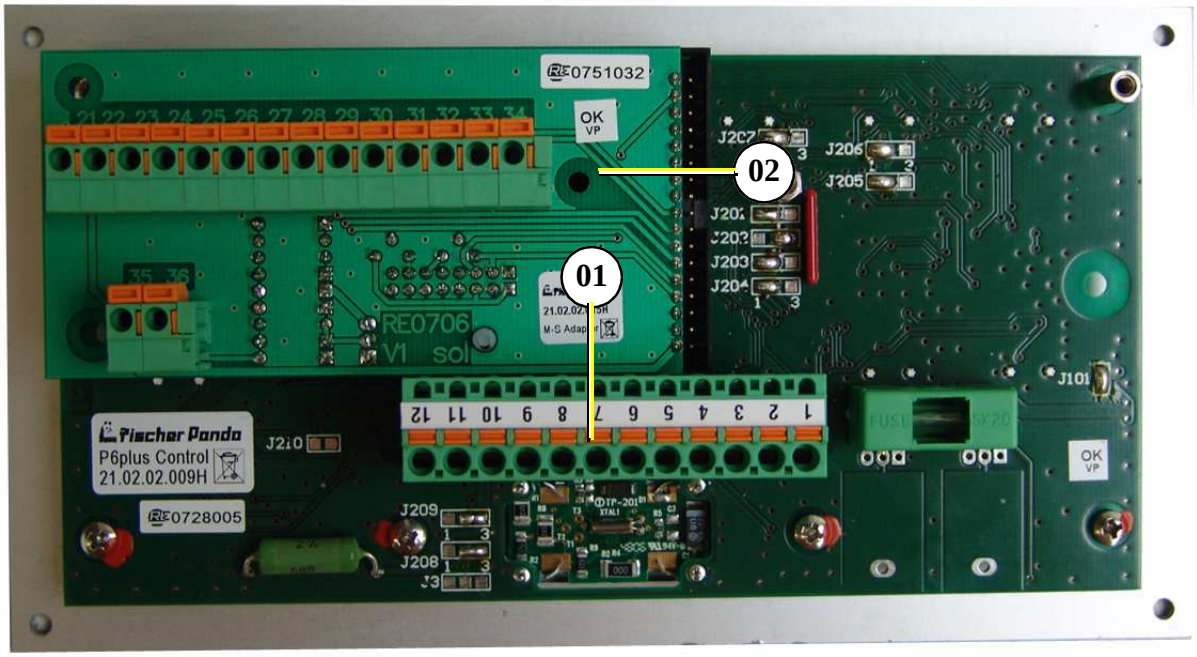
Fig. 11.7.3-1: Terminal connections automatic adapter

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

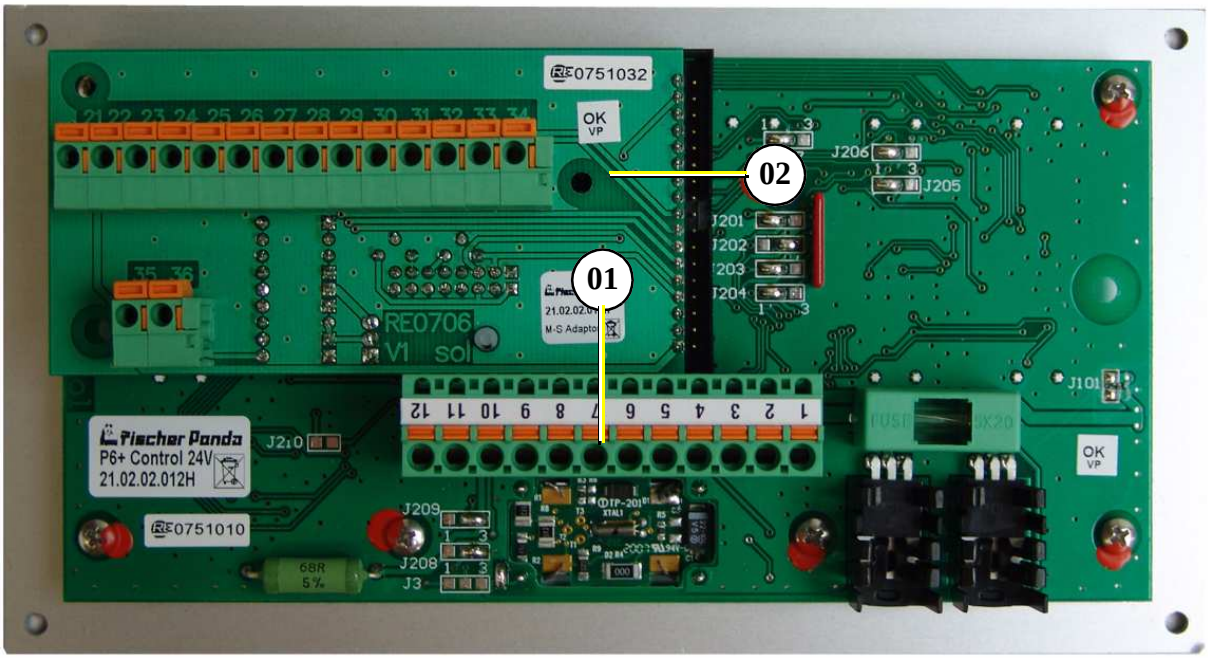
Fig. 11.8.1-1: Panel 21.02.02.009H with master-slave adapter 21.02.02.015H



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-Opearating-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-Win-ding	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 ≥10mA
	open	XM	Input AC-Fault has Pull-Up-current ≥2,5mA

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** Maste-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 ≥10mA
	open	XM	Input AC-Fault has Pull-Up-current ≥2,5mA

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,

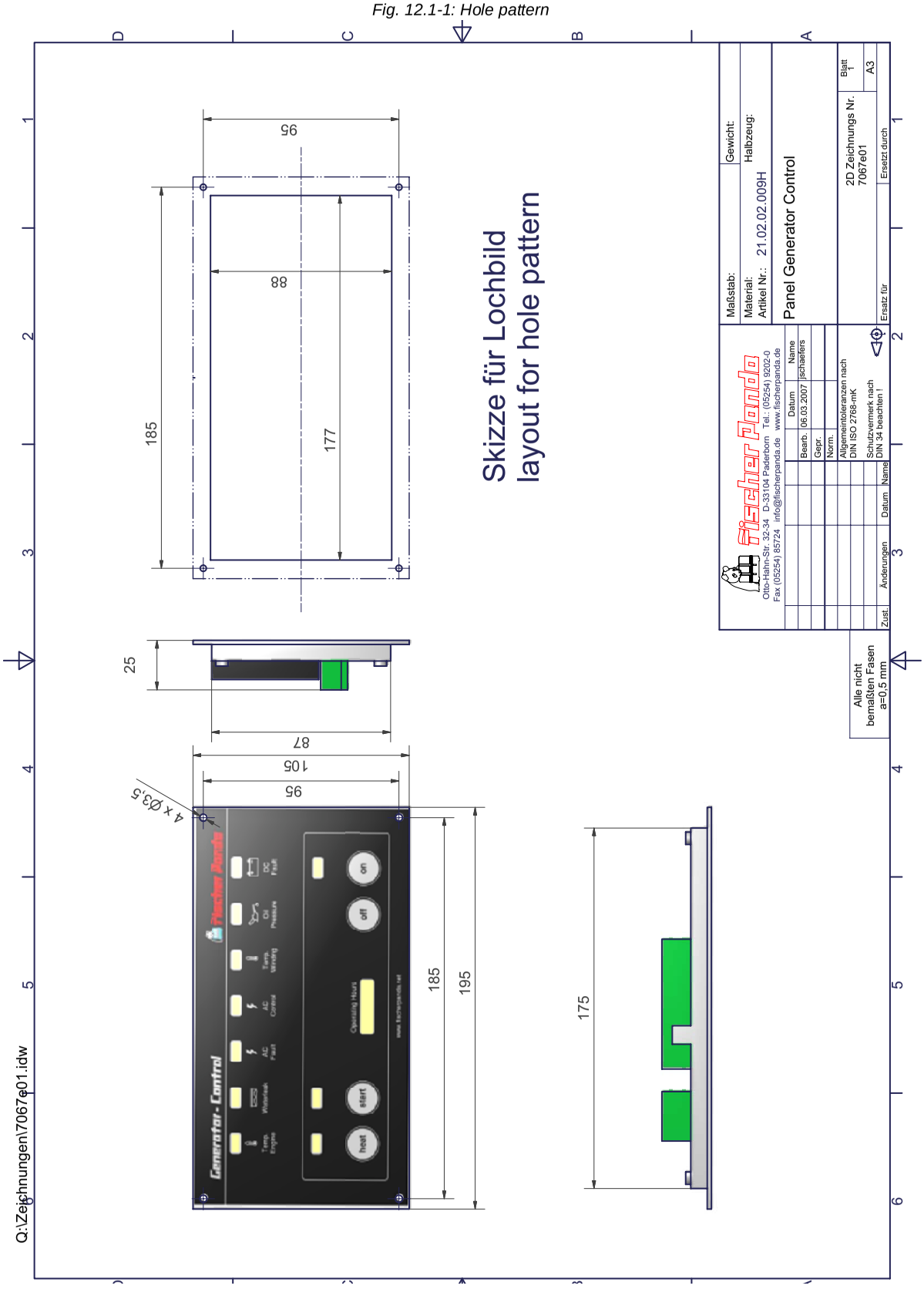
(1): Equivalent resistance for load control lamp e.g. for use with three-phase alternator also integrated automatic controller of Bosch. The resistance value is 68Ω 3W, i.e. only for 12V.

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

12. Measurements

12.1 Hole pattern

Fig. 12.1-1: Hole pattern



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