



Fischer Panda



Panda AGT 6000 PVMV-N
Super silent technology

24V / 6kW

Fischer Panda GmbH

Current revision status

	Dokument
Actual:	AGT 6000 PVMV-N 12V_24V.R01_8.4.08
Replace:	AGT_6000PVMV-N_

Revision	Page
Design changed - installation drawing starter battery changed	

Copyright

Duplication and change of the manual is permitted only in consultation with the manufacturer!

Fischer Panda GmbH, 33104 Paderborn, reserves all rights regarding text and graphics. Details are given to the best of our knowledge. No liability is accepted for correctness. Technical modifications for improving the product without previous notice may be undertaken without notice. Before installation, it must be ensured that the pictures, diagrams and related material are applicable to the genset supplied. Enquiries must be made in case of doubt.




Table of contents

Current revision status	2
Safety first.....	6
Tools	7
Safety Precautions	10
5 Safety steps to follow if someone is the victim of electrical shock	13
WHEN AN ADULT STOPS BREATHING.....	14
A The Panda Generator.....	15
A.1 Type plate at the Generator	15
A.2 Description of the genset	16
A.2.1 Right side view	16
A.2.2 Left side view	17
A.2.3 Front view	18
A.2.4 View from back side	19
A.2.5 View from above	20
A.3 Detailed views of the operation units	21
A.3.1 Remote control panel - see remote control panel datasheet	21
A.3.2 Components of the cooling system	21
A.3.3 Components of the fuel system	25
A.3.4 Components of the combustion air	27
A.3.5 Components of the electrical system	30
A.3.6 Sensors and switches for operating surveillance	34
A.3.7 Components of the oil circuit	36
A.3.8 Externe Komponenten	38
A.4 Operating instructions	39
A.4.1 Preliminary remark	39
A.4.2 Daily routine checks before starting	40
A.4.3 Starting Generator	41
A.4.4 Stopping the Generator	41
A.4.5 Starting the Generator by a „Failure bypass switch“	42
B Installation Instructions	43
B.1 Generator Connections	43
B.1.1 General Instructions	43
B.1.2 Connections	43
B.1.3 Fuel System Installation	44
B.2 Generator DC System-Installation	45
B.2.1 Installation Panda AGT 12 V System	45
B.2.2 Installation Panda AGT 24 V-system - Optional	46
B.3 Connection to Starter Battery-Block	47
B.4 Remote control Panel - see remote control panel datasheet	47
B.4.1 Electronic starter control unit	47
B.5 Voltage Control System - see VCS datasheet	48
B.6 The Battery Monitor - see battery monitor datasheet	49
B.7 The fan control - see fan control datasheet	49
B.8 Insulation test	50

Table of contents

B.9.1	Connection of the external radiator	52
B.10	Exhaust Installation	66
C	Maintenance Instructions	67
C.1	Maintenance Requirements	67
C.2	Oil Circuit Maintenance	67
C.3	De-aerating the fuel system	70
C.4	Ventilation of the coolant circuit	72
D	Generator Failure.....	77
D.1	Overloading the Generators	77
D.1.1	Automatic Voltage Monitoring and Auto-Shut Down	78
D.1.2	Adjusting Instructions for the Spindle of the actuator	78
D.1.3	Adjustment of the maximum upper revolution	79
D.1.4	Adjustment of the normal rev limitation	80
D.1.5	Lubrication of the spiral thread spindle	81
D.1.6	Effects of a longer overload of the generator to the actuator	81
D.1.7	Low Generator Output Voltage	83
D.2	Testing Generator Stator Windings	84
D.2.1	Testing Generator Stator Winding for "Shorts" to Ground	84
D.2.3	Measuring the Coil Inductive Resistance	86
D.3	Starting Problems	87
D.3.1	Fuel Solenoid Valve and Hubmagnet	87
D.3.2	Failure Bypass Switch	88
D.4	Troubleshooting Table	89
E	Appendix	91
E.1	Maintenance Intervalls	91
E.2	Operating Resources	92
E.2.1	Engine oil	92
E.2.2	Coolant specification	93
E.3	Troubleshooting	94
E.4	Technical Data Engine	99
E.5	Technical Data Generator	99
E.6	Capsule Measurements	100
A	VCS-AGT-U/I.....	101
A.1	VCS-AGT-U/I Versions	101
A.2	Voltage control system	101
A.2.1	General working of the VCS	102
A.2.2	Safety instructions for the voltage control	103
A	Battery monitor in DIN-tracks housing (RE9517)	105
A.1	Safety instructions	105
A.2	Brief description	106
A.3	Function	106

A.4	Technical data and settings	106
A.5	Additional products	107
A	Intelligent stepless automatic controller for DC-fan	109
A.1	Brief description	110
A.1.1	Function	110
A.1.2	Master - Slave - Operation	111
A.1.3	Function of the clamps for the Master-Slave-Operation	112
A.1.4	Remote controlled switching on and off of the fan controller	112
A.1.5	12V / 24V - Operation	113
A.2	Technical Data	113
A	Remote Control Panda 6-50	117
A.1	Cleaning and replacement of parts at the generator	118
A.2	General information	118
A.3	Operation instructions	119
A.3.1	Preliminary remark	119
A.3.2	Daily routine checks before starting	120
A.3.3	Starting Generator	121
A.3.4	Stopping the Generator	122
A.3.5	Starting the Generator by a „Failure bypass switch“	122
A.3.6	Installation of the Remote Control Panel	123
A.3.7	Fuse on control panel board	123
A.3.8	Installation assembly kit automatic start - optional - F1WT5-95702	123
A.3.9	Mounting of the circuit board on the remote control panel	125
A.3.10	The speed sensor	126
A.3.11	Requirement for Automatic Start	127
A.4	Slave Panel - optional	127
A.5	Slave panel and automatik start together - optional	127
A.6	Wiring diagrams	128

				
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 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 aggregates developed at that time set new technological standards worldwide.

The aggregates became more efficient and powerful than other aggregates 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 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 100% water-cooled Panda Aggregate are currently manufactured in the performance range from 2 to 100 kW in various versions. Fast running motors are preferred for performances up to approx 30 kW (Nominal speed 3000 rpm). The heavier slow runners are preferred for the higher range. The fast running aggregates 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 aggregate from the DC/AC Panda AGT series, which is a very interesting solution for the production of mobile power.

The new HTG-alternators ensure that a charging rate of 285 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 3500 kW from the main machine)

Fischer Panda GmbH, 33104 Paderborn, reserves all rights regarding text and graphics. Details are given to the best of our knowledge. No liability is accepted for correctness. Technical modifications for improving the product without previous notice may be undertaken without notice. Before installation, it must be ensured that the Pictures, diagrams and related material are applicable to the aggregate supplied. Enquiries must be made in case of doubt.

Safety first

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.



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



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



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



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

Tools

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



Spanners
X = number of spanner



Hook wrench for oil filter



Screw driver, for slotted head screws and for recessed head screws



Multimeter, multimeter with capacitor measuring



Infrared temperature measuring pistol



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



Socket wrench set



Hexagon wrench keys

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.



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 if the above said instructions are not, or only partially, carried out.

Manufacturer declaration in terms of the machine guideline 98/37/EG .

The generator is in such a way developed that all assembly groups correspond to the CE guidelines. If machine guideline 98/37/EG is applicable, then it is forbidden to bring the generator into operation until it has been determined that the system into which the generator is to be installed also corresponds to the regulations of the machine guideline 98/37/EG. This concerns among other things the exhaust system, cooling system and the electrical installation.

The evaluation of the "protection against contact" can only be accomplished in connection with the respective system. Likewise among other things responsibility for correct electrical connections, a safe ground wire connection, foreign body and humidity protection, protection against humidity due to excessive condensation as well as the overheating through appropriate and inappropriate use in its installed state on the respective machine lies within the responsibility of those who undertake installation of the generator in the system.

Use the advantages of the customer registration:

- Thus you receive 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.

Technical Support per Internet: info@fischerpanda.de

Safety Precautions



The electrical Installations may only be carried out by trained and tested personnel!

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

The rotating parts (belt-pulley, belts, etc) must be so covered and protected so that there is no danger to life and body!

If a sound insulation covering must 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 be 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.

General safety references for the enterprise of a AGT generator.

With all energized systems, with which the current is more than 50 Ampère, special safety precautions must be made, in order to protect the environment of the components against fire.

It is to be ensured absolutely that at the battery a main switch in well accessible place is accommodated, so that with danger of the main switches can be separated immediately. The main switch must be however also directly at the battery installed. If this place is not well accessible, a power relay must be used instead of the main switch which can be served manually, which can be served then if necessary from different places. The switches for the power relay are to mark accordingly as main switches DC battery "with danger switch off!".

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 duly. The cooling water supply of the generator must be so furnished therefore that by a wide dirt deflector it is guaranteed that from outside no dirt can be sucked in into the line system. If this is not attainable, the supply must be secured by a flow switch or a negative pressure switch. The generator must be switched off, if the cooling water supply is impaired.

The temperature safety device on the rectifier block can be regarded only as additional safety device. The temperature rise at the diodes is so fast that the rectifiers can be damaged during a unique interruption of the cooling water supply. A safe protection from damage of the rectifiers is not possible by the temperature monitoring on the rectifier radiator box. Thus this can take place only by means of an appropriate external monitoring of the cooling system.

ATTENTION!

Do not connect the minus pole of the starter battery to the ground of the boat because of galvanic reason.

Warning!

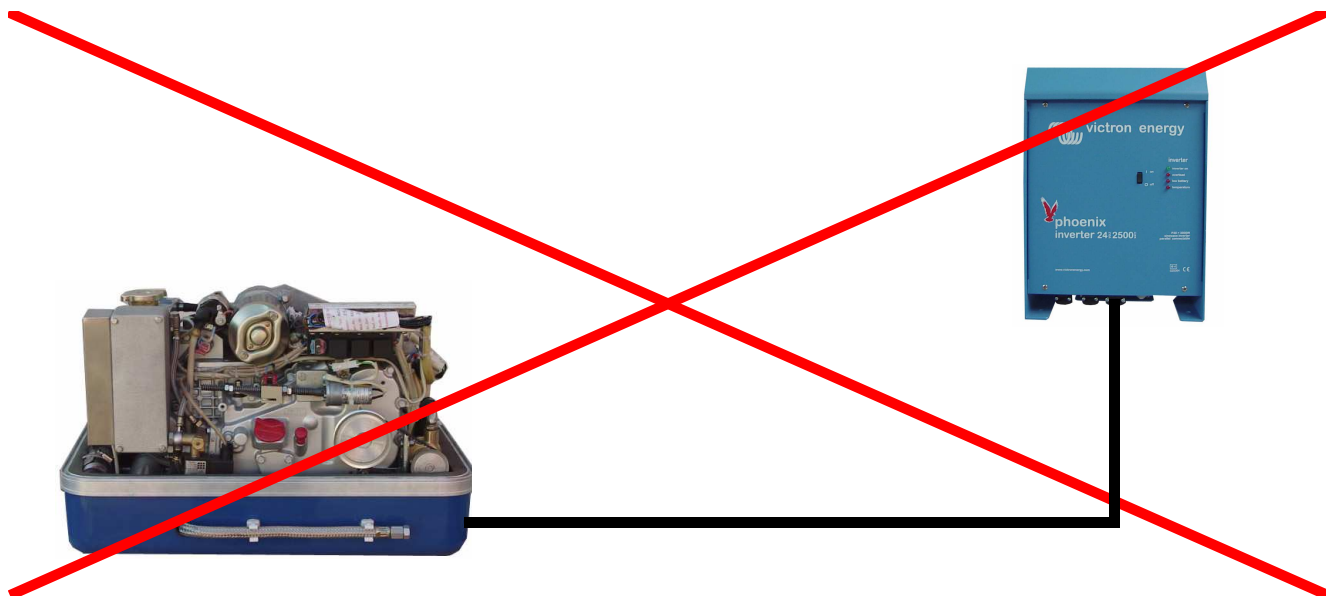
Never start the generator with the battery disconnected, the rectifiers will be damaged!

CAUTION!

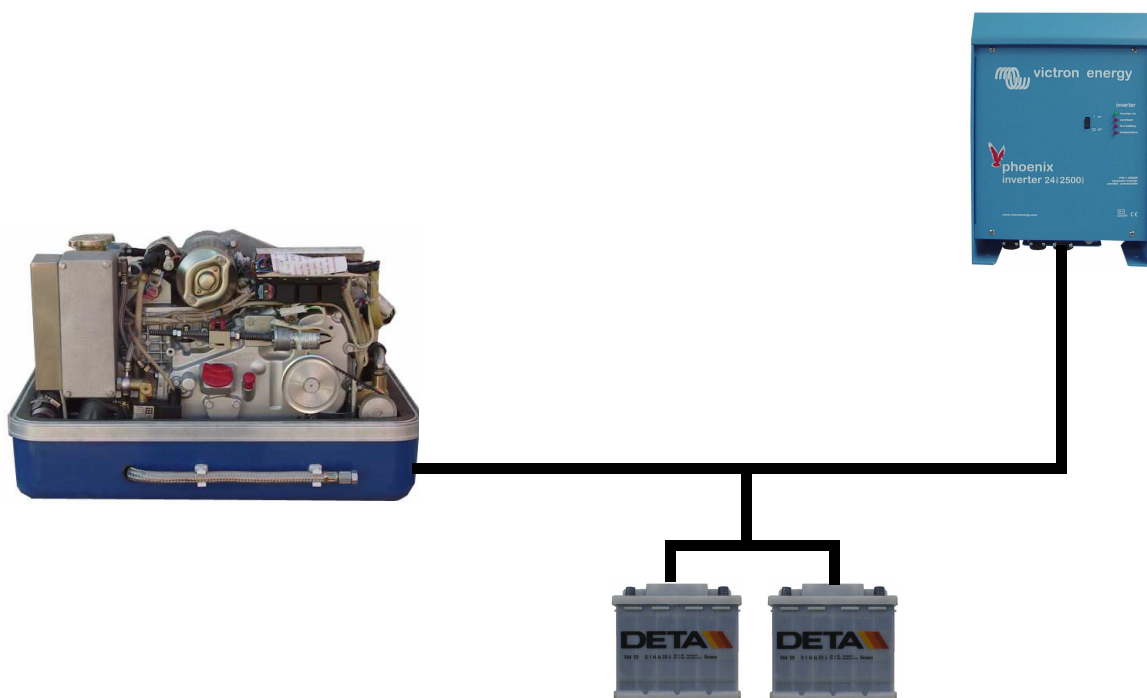
Contact of the electrical contacts may be DANGER TO LIVE!

CAUTION!

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!



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

Recommended capacity at 12V \geq 240Ah at 24V \geq 120Ah

The screws at the electric rectifier may be pulled tight only with a torque wrench. Torque 6 Nm.

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

The generator is also include into the CO₂ - fire-extinguishing system.

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).

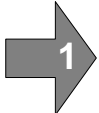
Safety Instructions for the Handling with Batteries

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

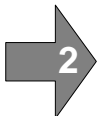
- If the batteries are working, someone should be in your near area to help you in a case of emergency.
- Water and soap must be hold ready if battery acid corrode your skin.
- Wear eye protection and protective clothing. During working with the batteries don't touch the eyes.
- If you got a acid splash 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.
- Don't 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.
- 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.



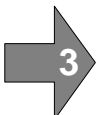
5 Safety steps to follow if someone is the victim of electrical shock



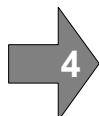
Do not try to pull or grab the individual.



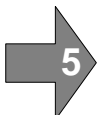
Send for help as soon as possible.



If possible, turn off the electrical power.



If you cannot turn off the electrical power, pull, push, or lift the person to safety using a wooden pole, rope, or some nonconductive material.



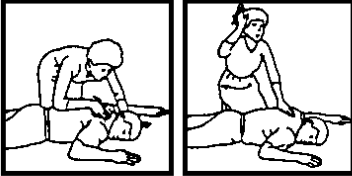
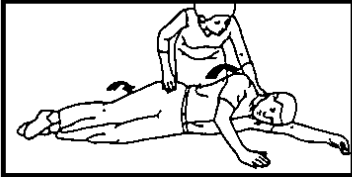
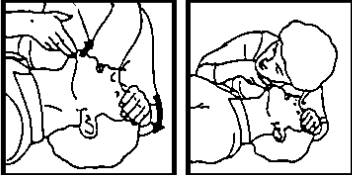

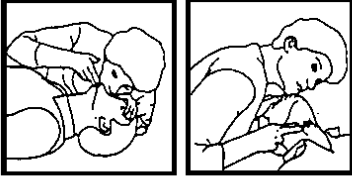
After the injured person is free of contact with the source of electrical shock, move them a short distance away and immediately start necessary first aid procedures.

WHEN AN ADULT STOPS BREATHING

WARNING



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.

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.



A. The Panda Generator

A.1 Type plate at the Generator

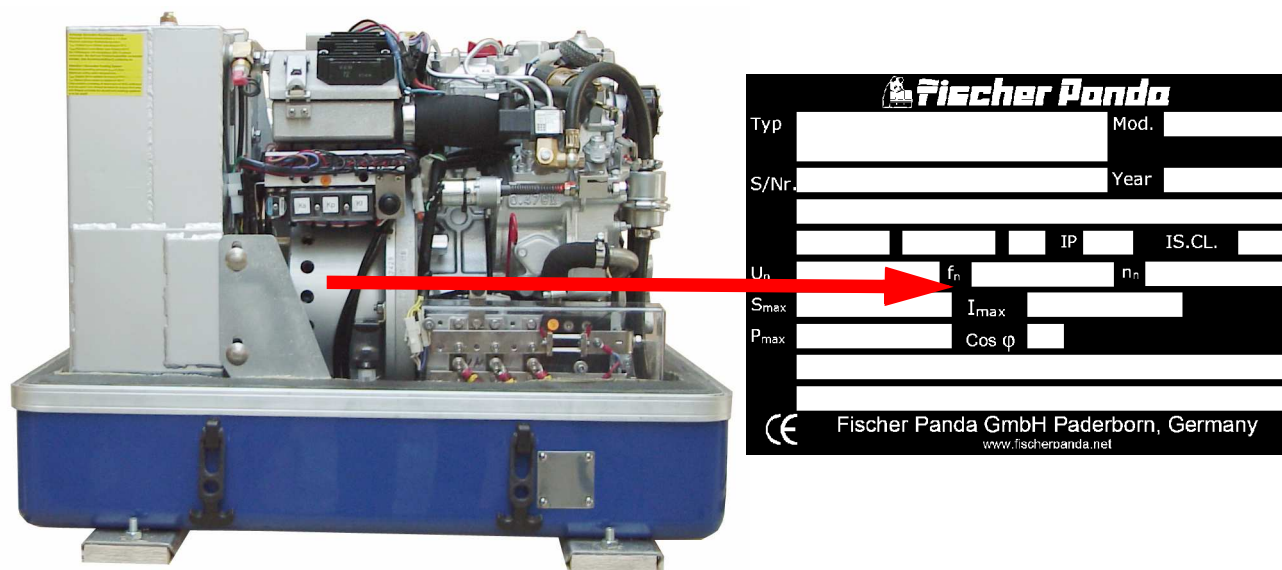


Fig. A.1-1: Type plate

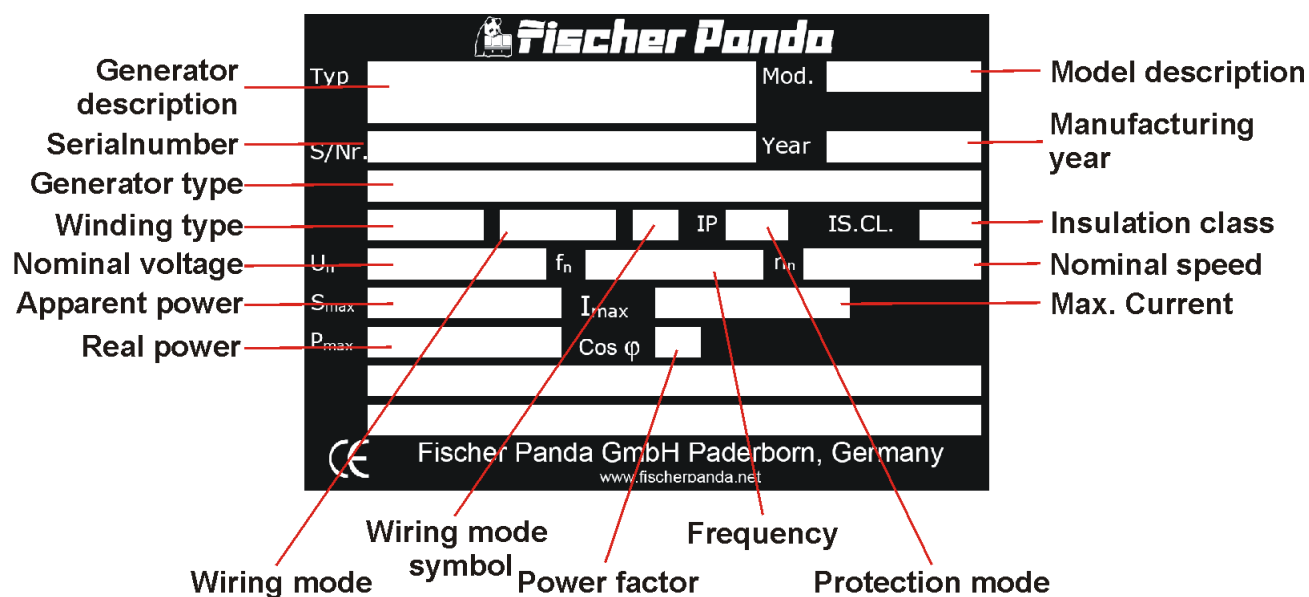
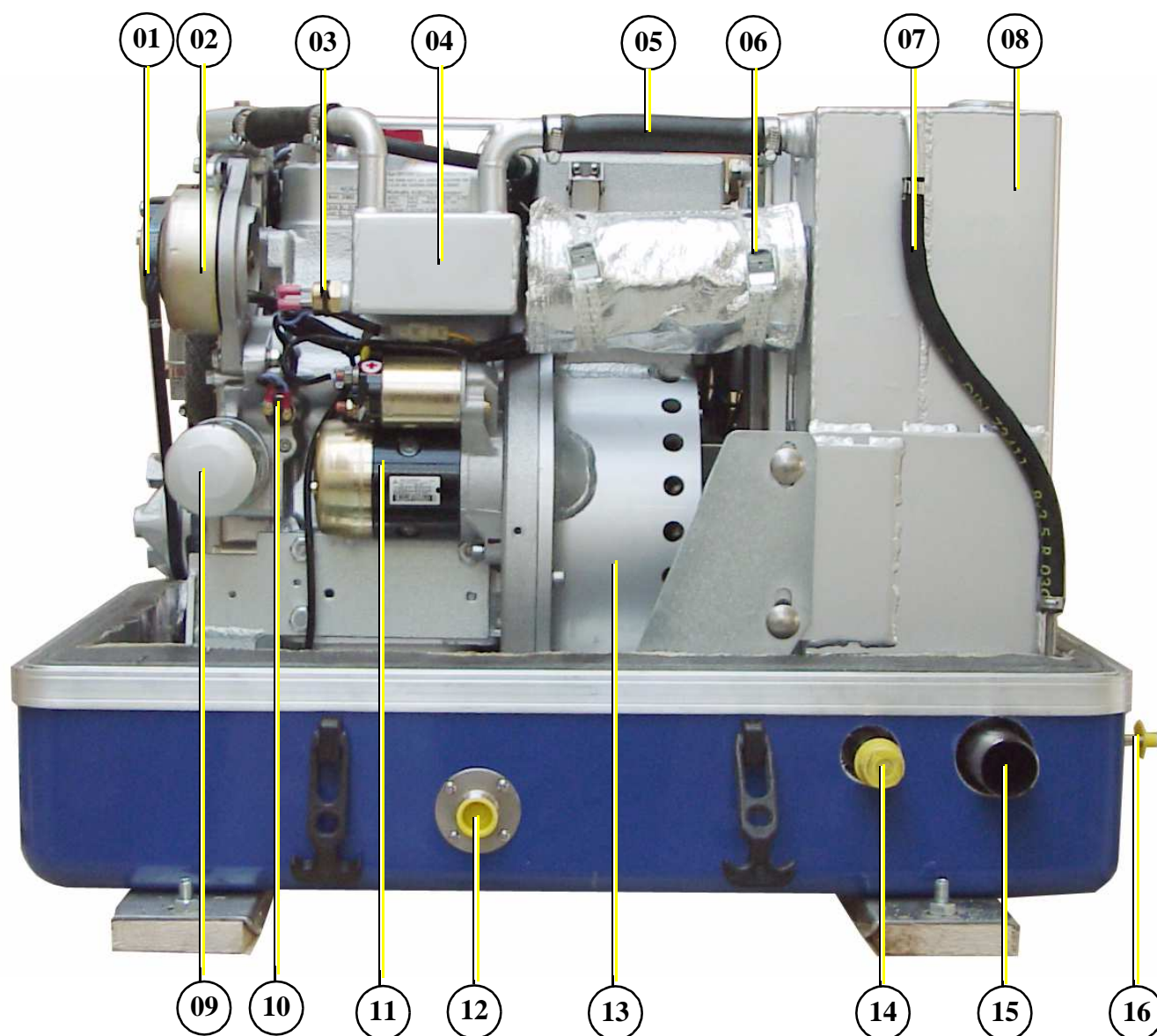


Fig. A.1-2: Discription type plate

A.2 Description of the genset

A.2.1 Right side view



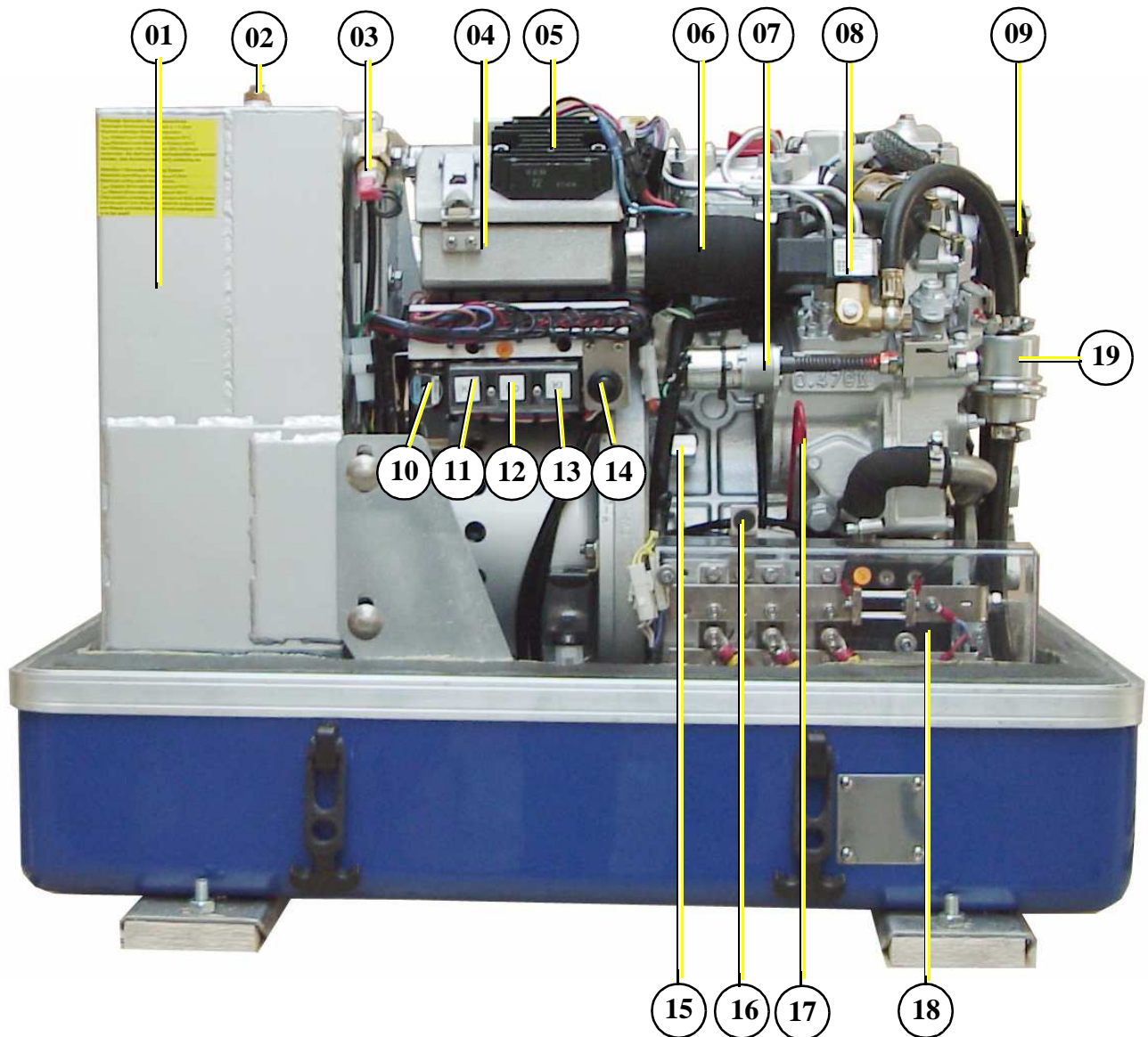
- 01. V-belt
- 02. DC-alternator
- 03. Thermoswitch at exhaust elbow
- 04. Water-cooled exhaust elbow
- 05. Cooling water pipe, exhaust elbow - silencer
- 06. Compensator under heat isolation
- 07. Coolant hose for external expansion tank
- 08. Water-cooled pre-silencer

- 09. Oil filter
- 10. Oil pressure switch
- 11. Starter motor
- 12. Coolant intake (from radiator)
- 13. Generator housing with coil
- 14. Coolant output (to radiator)
- 15. Exhaust output
- 16. Connection external expansion tank

Fig. A.2.1-1: Right side view



A.2.2 Left side view

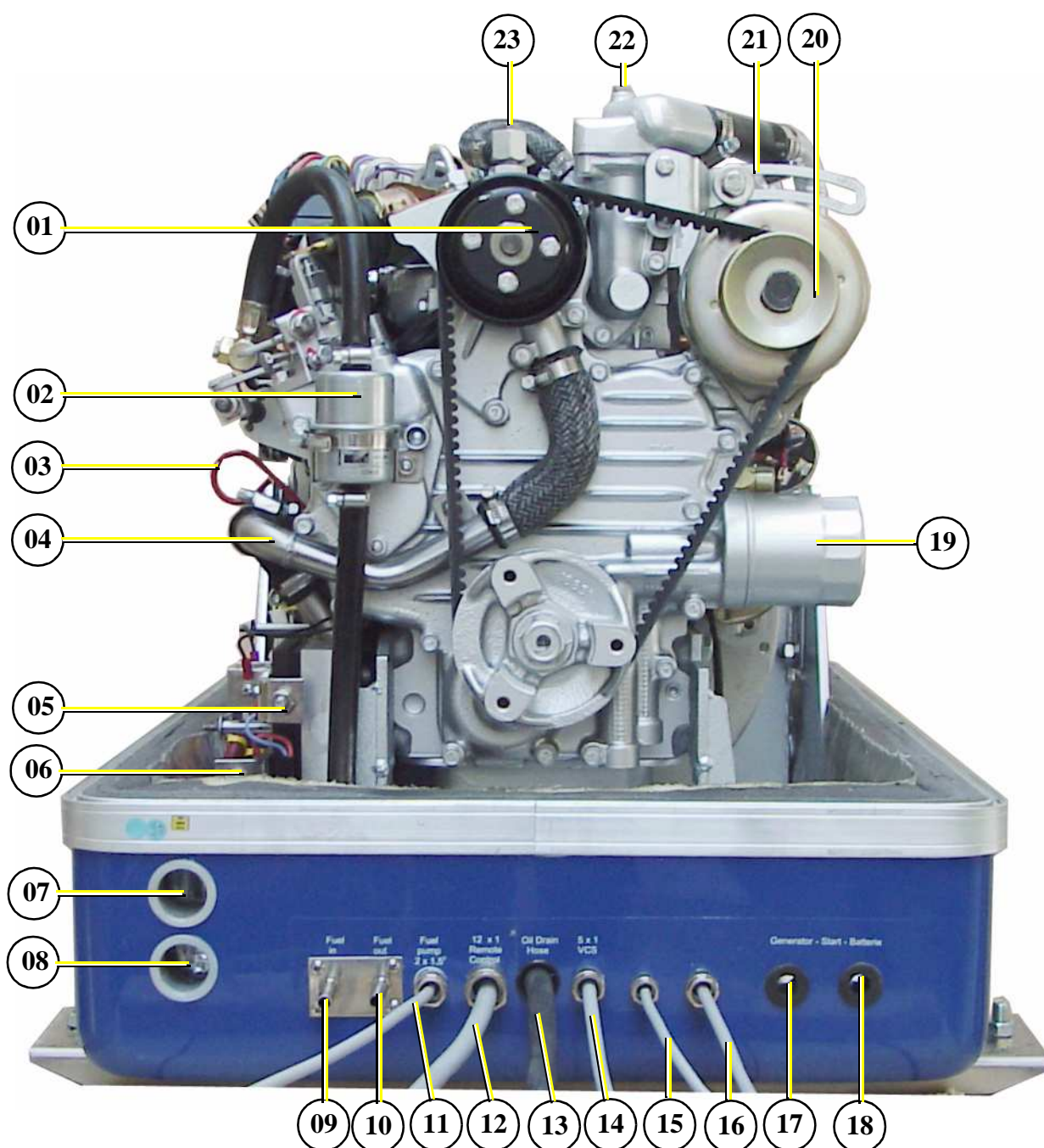


- 01. Water-cooled pre-silencer
- 02. Ventilation screw at silencer
- 03. Thermoswitch at silencer
- 04. Air suction housing with air filter
- 05. Voltage controller for alternator
- 06. Air suction hose to induction elbow
- 07. Actuator
- 08. Fuel solenoid valve
- 09. Pulley for internal cooling water pump and alternator
- 10. Electrical fuses (blue=15A, white=25A)

- 11. Starter-relay Ks
- 12. Pre-glow relay K2
- 13. Relay fuel pump K3
- 14. Failure bypass switch
- 15. Speed sensor
- 16. Fuse 1,5A
- 17. Oil dipstick
- 18. Water-cooled diode plate
- 19. Fuel filter

Fig. A.2.2-1: Left side view

A.2.3 Front view

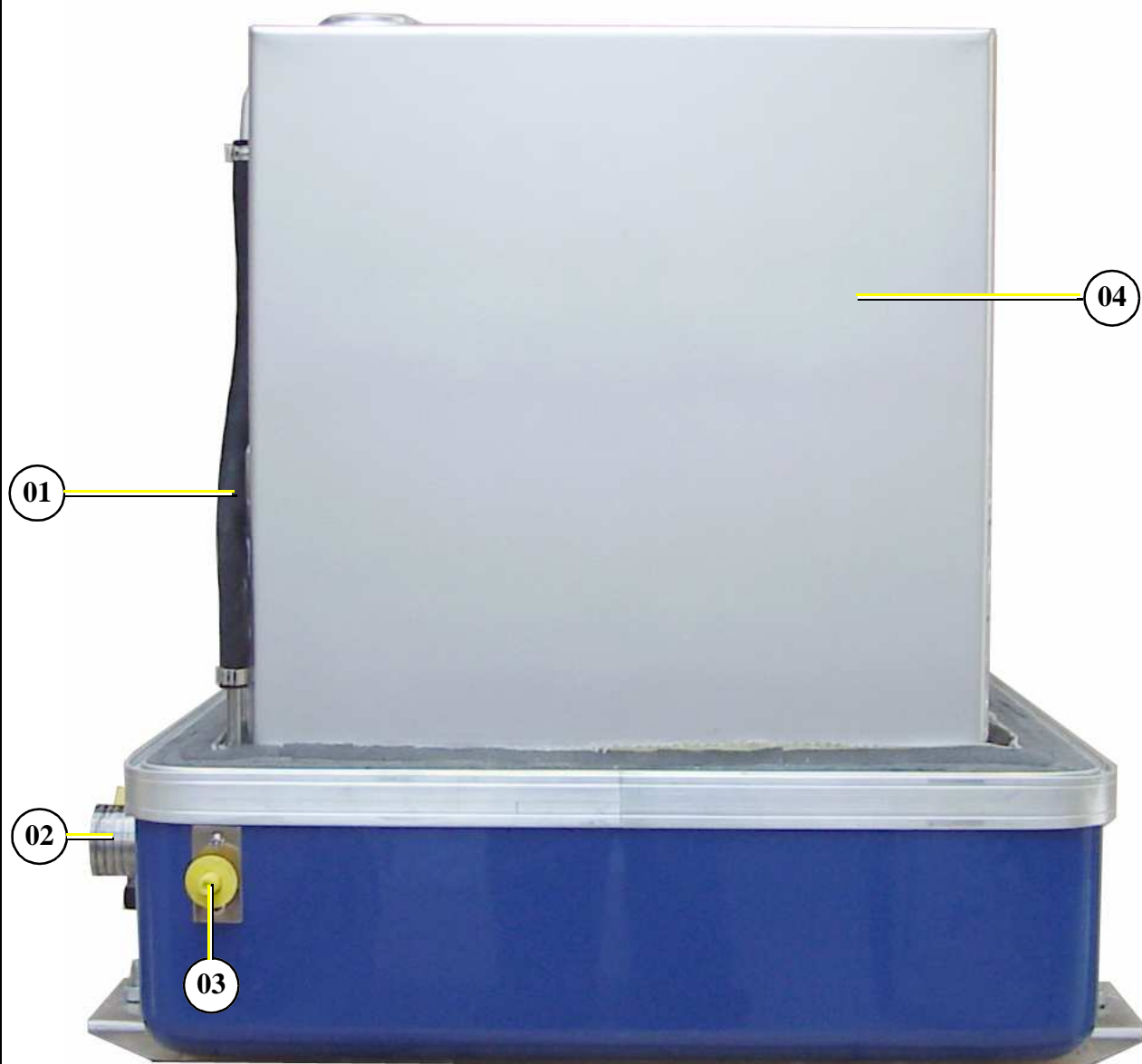


- | | |
|---|--|
| 01. Pulley for internal cooling water pump and alternator | 13. Oil drain hose |
| 02. Fuel filter | 14. Cable for VCS |
| 03. Oil dipstick | 15. Cable for Shunt |
| 04. Coolant pipe | 16. Cable for measuring voltage |
| 05. Main battery connection (-) | 17. Passage for starter battery |
| 06. Main battery connection (+) | 18. Passage for starter battery |
| 07. Passage for battery connection | 19. Oil filter |
| 08. Passage for battery connection | 20. DC-alternator |
| 09. Fuel intake | 21. Clamping device for alternator |
| 10. Fuel output | 22. Ventilation screw thermostat housing |
| 11. Cable for fuel pump | 23. Ventilation screw cooling water pump |
| 12. Cable for remote control panel | |

Fig. A.2.3-1: Front view



A.2.4 View from back side

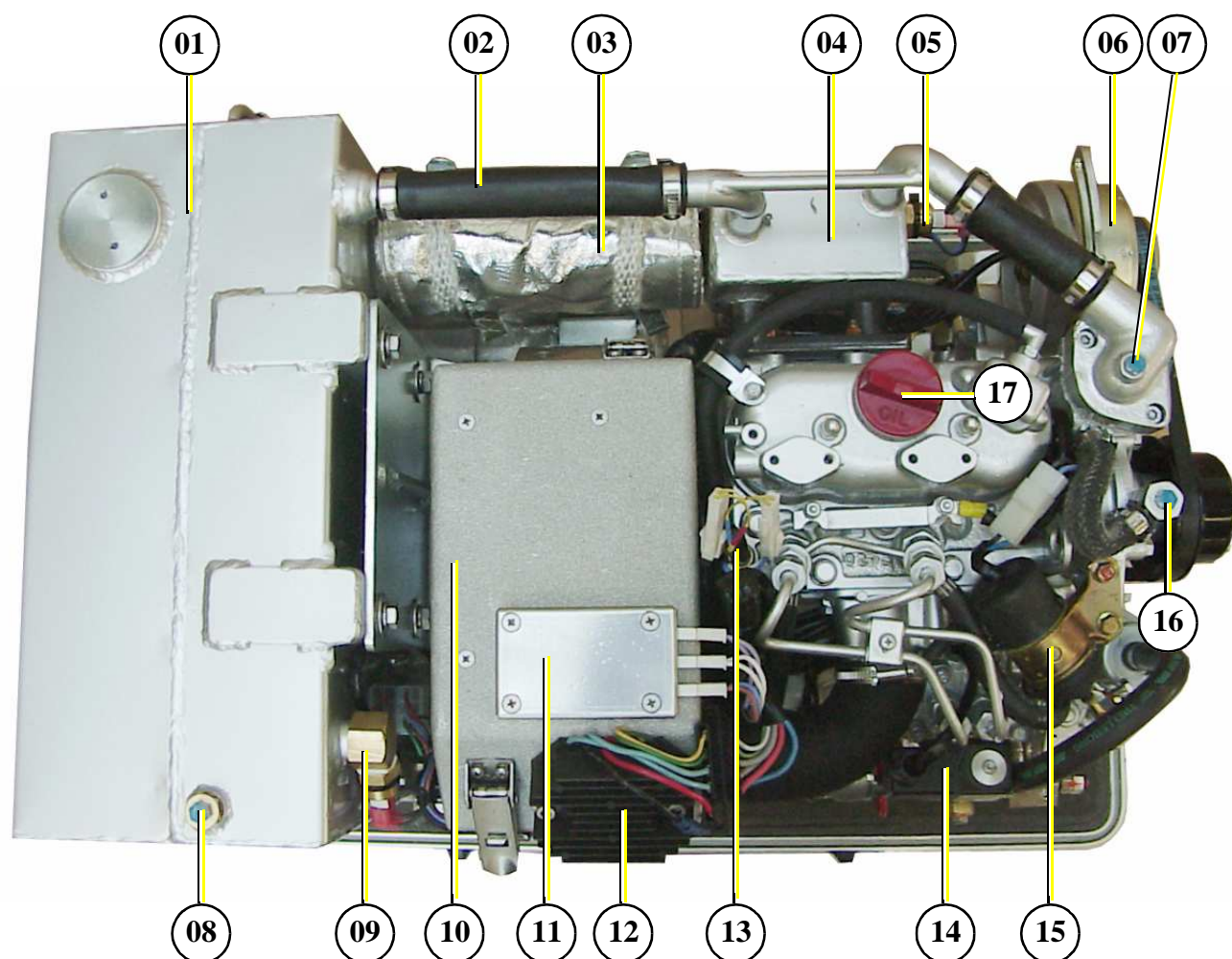


01. Coolant hose for external expansion tank
02. Exhaust output

03. Connection external expansion tank
04. Water-cooled pre-silencer

Fig. A.2.4-1: Back side view

A.2.5 View from above



- 01. Water-cooled pre-silencer
- 02. Coolant hose, exhaust elbow - silencer
- 03. Compensator under heat isolation
- 04. Water-cooled exhaust elbow
- 05. Thermoswitch at exhaust elbow
- 06. DC-alternator
- 07. Ventilation screw thermostat housing
- 08. Ventilation screw pre-silencer
- 09. Thermoswitch at silencer

- 10. Air suction housing with air filter
- 11. Electric starter control unit
- 12. Voltage controller for alternator
- 13. Thermoswitch at cylinder head
- 14. Fuel solenoid valve
- 15. Stop solenoid
- 16. Ventilation screw cooling water pump
- 17. Engine oil filler neck

Fig. A.2.5-1: Top view



A.3 Detailed views of the operation units

A.3.1 Remote control panel - see remote control panel datasheet

The operating by remote control panel belonged to the standard scope of supply and is necessary for the controlling the unit and for the analysis the engine - / generator monitoring. The generator is switched off automatically in the case of deviation of the operational data from the desired values. The operation of the generator without operating by remote control panel is not admissible. As accessories (option) that operating by remote control panel can be equipped with an automatic addition. With this option the generator can be started by external signals (e.g. battery guards).

A.3.2 Components of the cooling system

Coolant intake

This port is to be connected with the external radiator. From here the cold coolant flows to the coolant connection block.

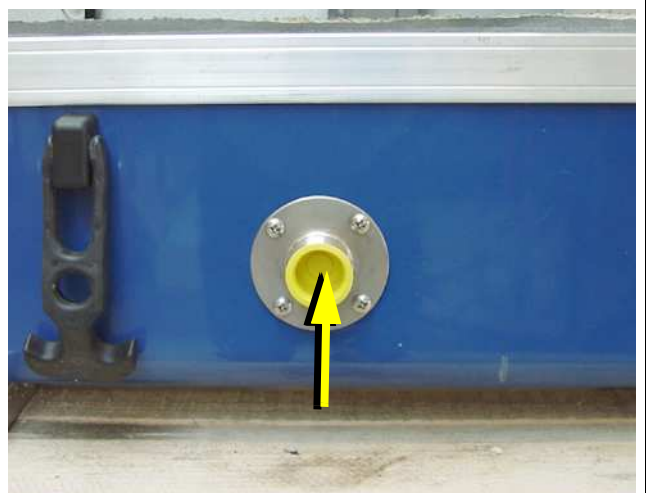


Fig. A.3.2-1: Coolant intake

Coolant connection block

The cooling water connection block cools the diode plate. The cooling water connection block consists of an aluminium alloy, which can behave like a sacrificial anode.

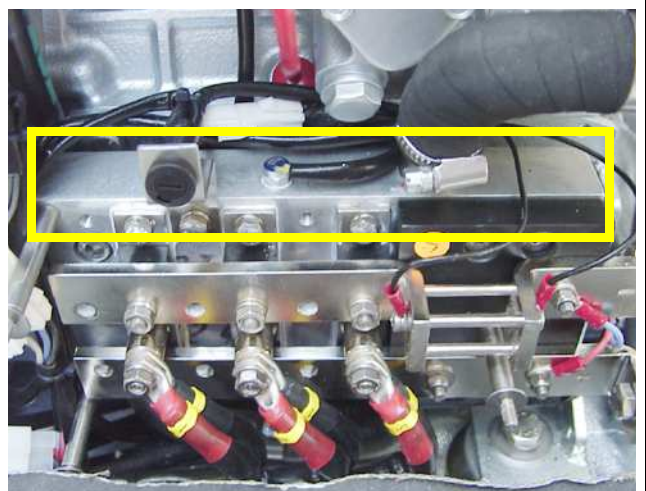


Fig. A.3.2-2: Coolant connection block

Internal cooling water pump

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

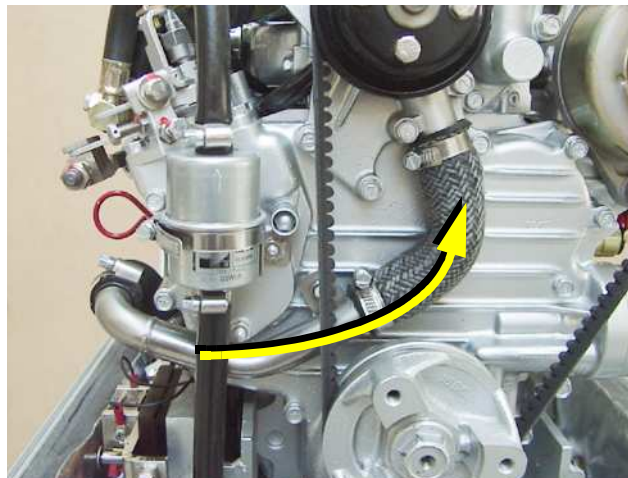


Fig. A.3.2-3: Internal cooling water pump

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. A.3.2-4: 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. A.3.2-5: Ventilation screw thermostat housing

Water-cooled exhaust elbow

The manifold is cooled by means of the internal cooling system.

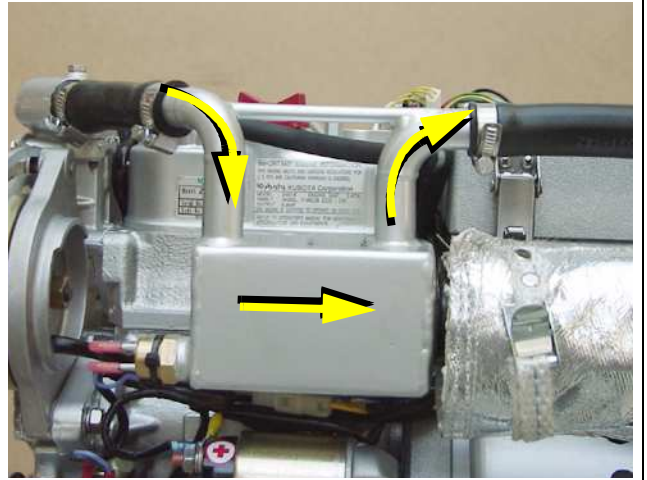


Fig. A.3.2-6: Water-cooled exhaust elbow

Coolant pipe

Coolant pipe from water-cooled exhaust silencer to the water-cooled pre-silencer.

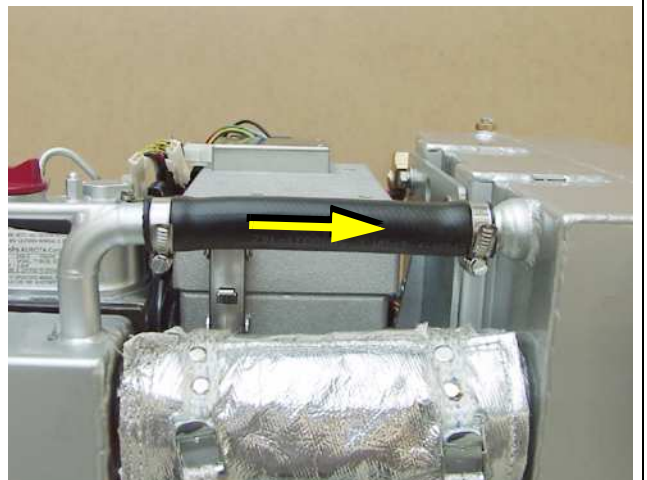


Fig. A.3.2-7: Coolant pipe

Water-cooled pre-silencer

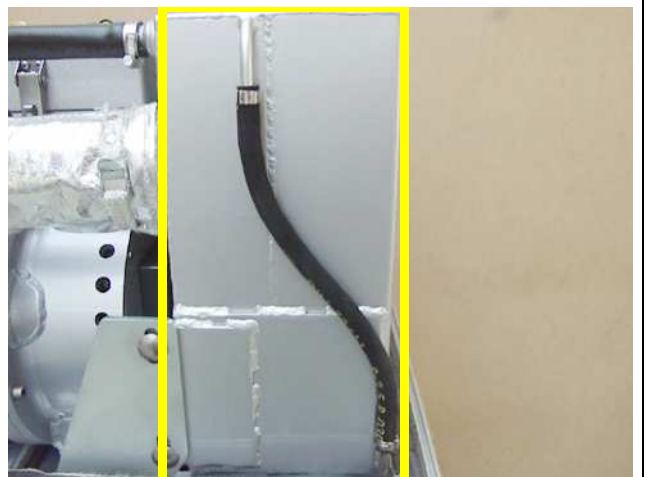


Fig. A.3.2-8: Water-cooled pre-silencer

Ventilation screw silencer

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



Fig. A.3.2-9: Ventilation screw silencer

Return flow expansion tank

The ventilation pipe leads from the water-cooled silencer to the external expansion tank.

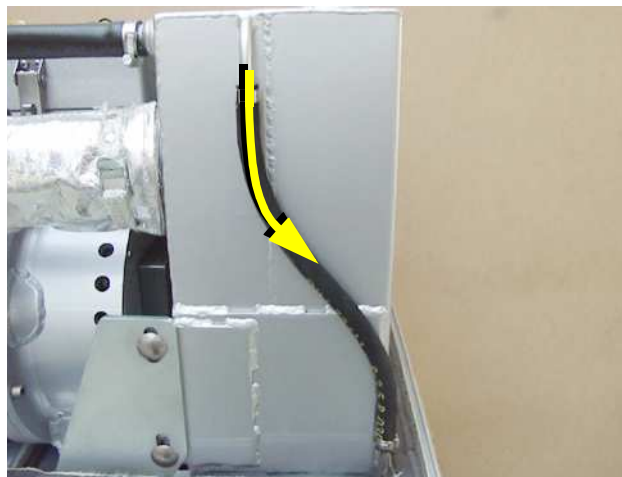


Fig. A.3.2-10: return flow expansion tank

Schlauchanschlusssutzen für externes Ausgleichsgefäß

The external expansion tank is connected here.



Fig. A.3.2-11: Connection external expansion tank

Coolant output

From here the hot coolant flows to the radiator.

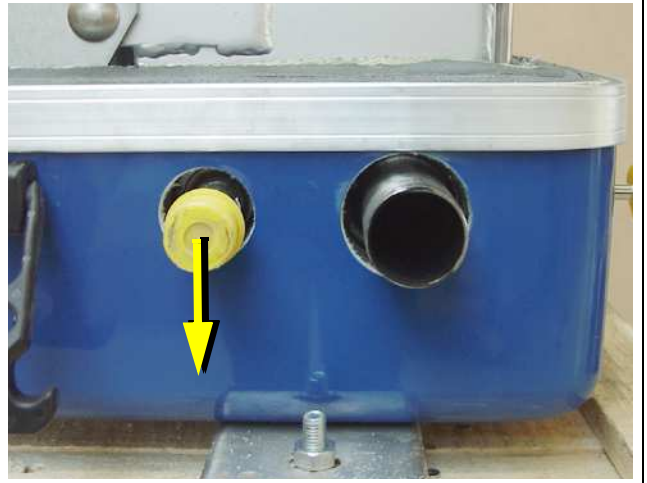


Fig. A.3.2-12: Coolant output

A.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. A.3.3-1: External fuel pump

01. Fuel intake

02. Fuel output

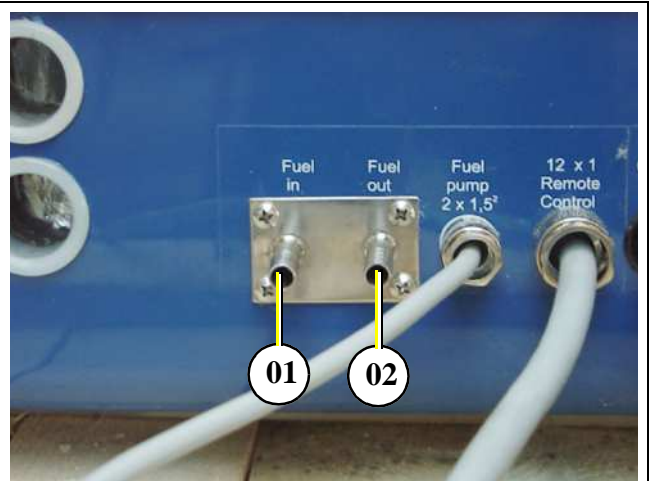


Fig. A.3.3-2: Fuel connections

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.

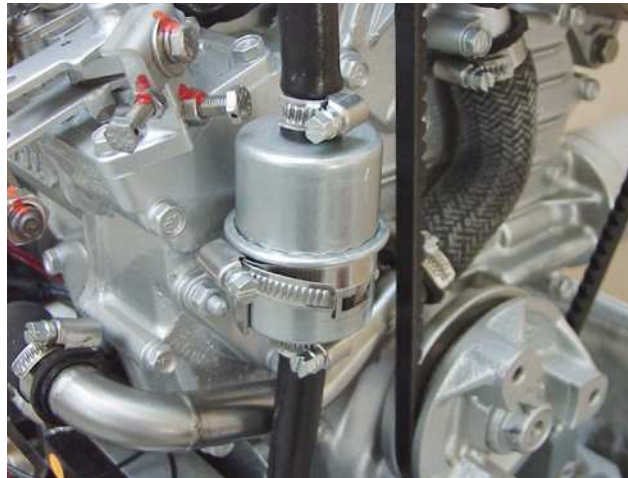


Fig. A.3.3-3: Fuel filter

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.

- 1) Fuel solenoid valve
- 2) Ventilation screw solenoid valve
- 3) Magnetic coil

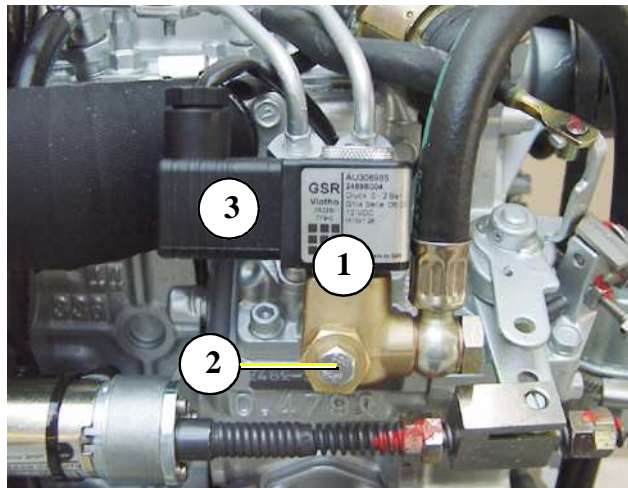


Fig. A.3.3-4: Fuel solenoid valve

Injection nozzles

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

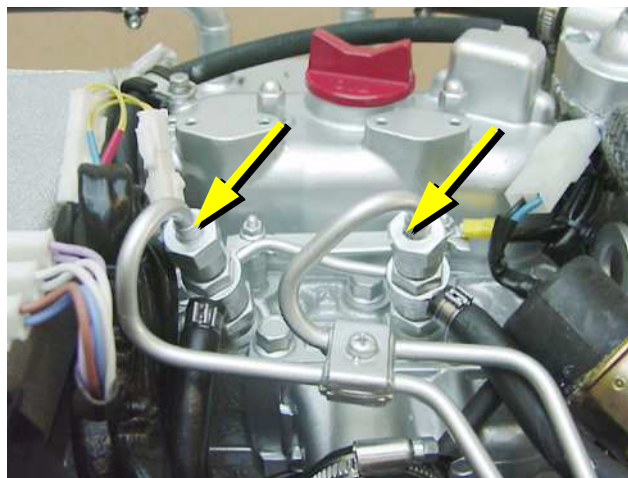


Fig. A.3.3-5: Injection nozzles



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°C. This is practically with each start the case. The heat-treat fixture may be held down also during start and favoured the starting procedure.

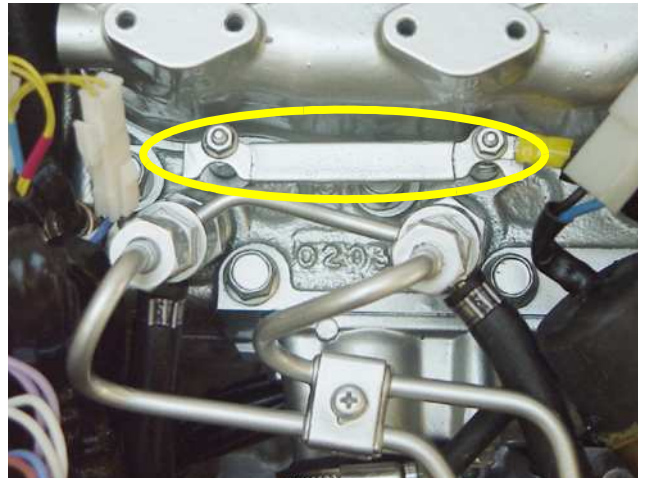


Fig. A.3.3-6: Glow plugs

Stop solenoid for Motorstop

Not at every genset; interrupts the fuel flow by activating the stop lever.



Fig. A.3.3-7: Stop solenoid

A.3.4 Components of the combustion air

Combustion air intake

The sound cover is provided at the lower 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 down no water can arrive into the proximity of these air openings. (minimum distance 150 mm)

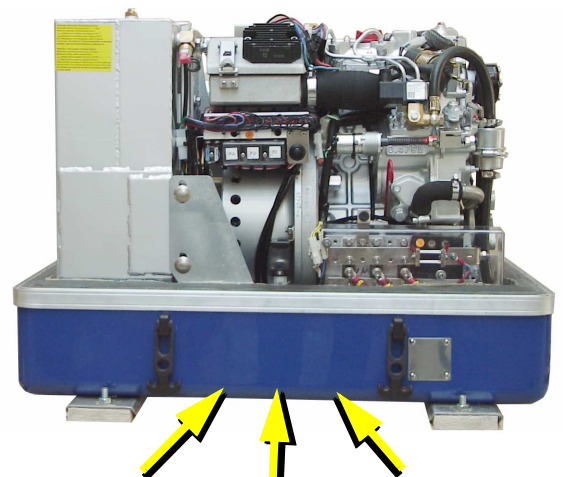


Fig. A.3.4-1: Combustion air intake

Air suction housing

The air suction housing suck air from the capsule.

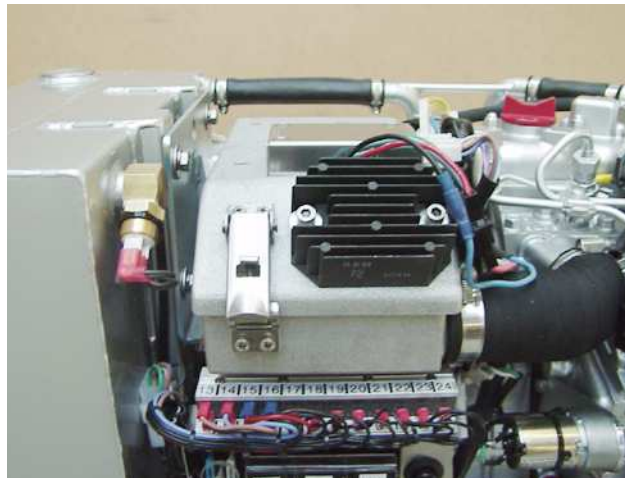


Fig. A.3.4-2: Air suction housing

Air suction housing with air filter

Type: Microstar LX266



Fig. A.3.4-3: Air filter

Combustion chamber intake 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. A.3.4-4: Combustion chamber intake elbow

Water-cooled exhaust elbow

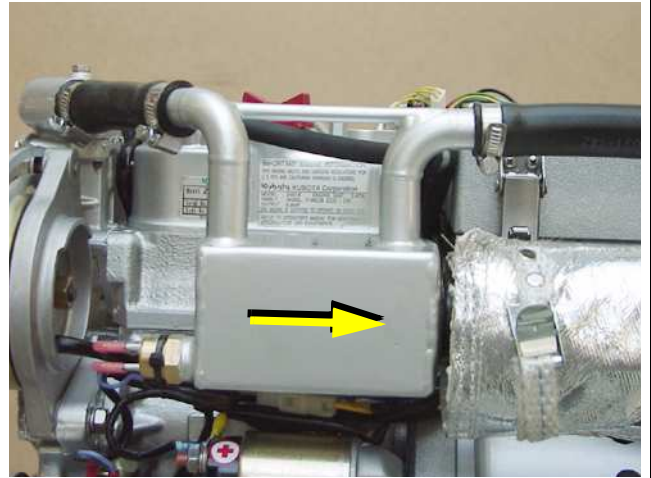


Fig. A.3.4-5: Water-cooled exhaust elbow

Compensator under heat isolation

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

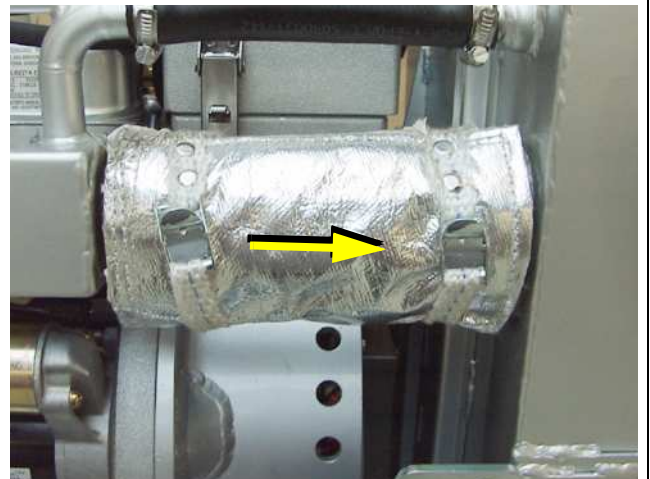


Fig. A.3.4-6: Compensator under heat isolation

Exhaust output

Connect here a muffler.

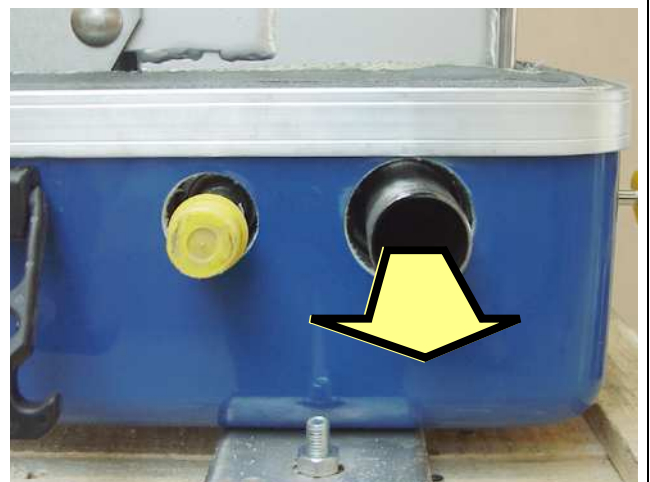


Fig. A.3.4-7: Exhaust output

A.3.5 Components of the electrical system

- 01: Passage for starter battery (plus)
02: Passage for starter battery (minus)

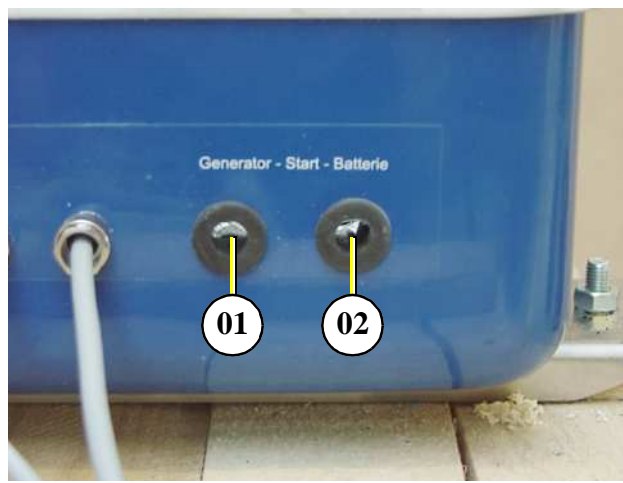


Fig. A.3.5-1: Cable for starter battery

Electrical connections for control

- 01: Cable for fuel pump
02: Cable for remote control panel
03: Cable for VCS
04: Cable for shunt
05: Cable for measuring voltage

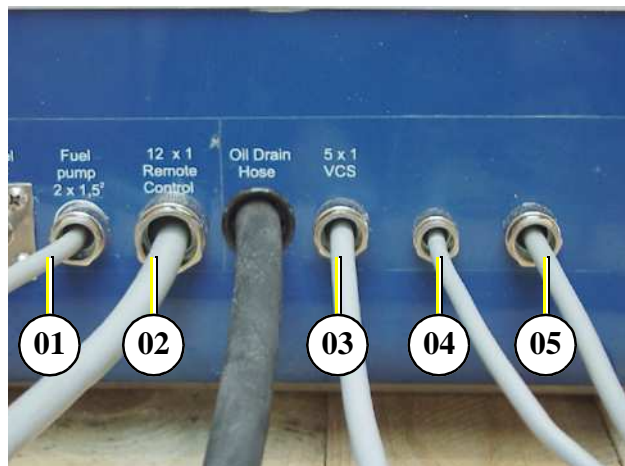


Fig. A.3.5-2: Electrical connections

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.

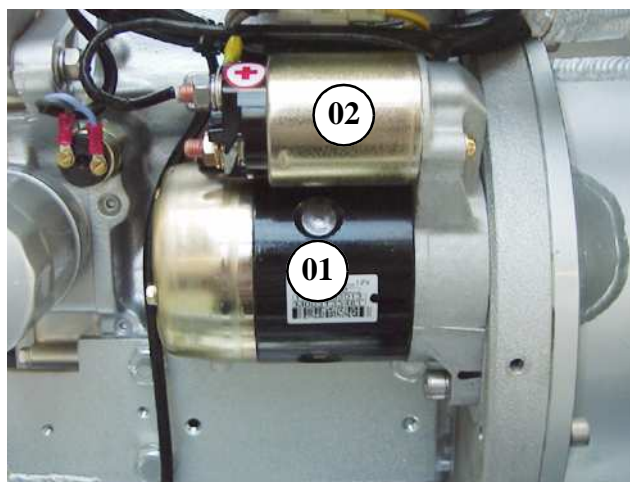


Fig. A.3.5-3: Starter motor



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. A.3.5-4: 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. A.3.5-5: Speed sensor

Stop solenoid for Motorstop

Not at every genset; interrupts the fuel flow by activating the stop lever.



Fig. A.3.5-6: Stop solenoid

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. A.3.5-7: 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.

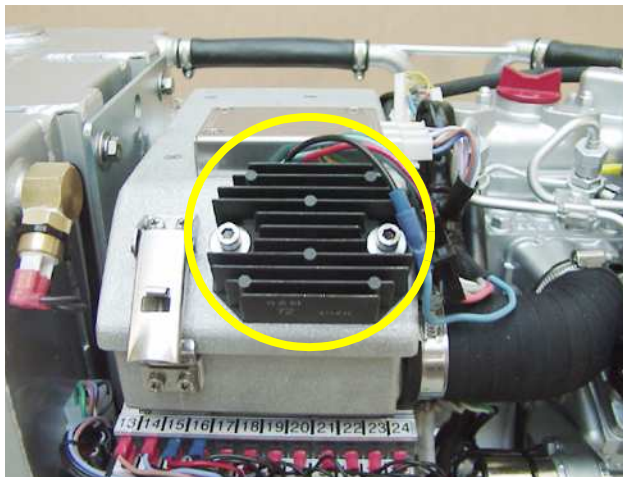


Fig. A.3.5-8: Charge control

Diode plate



Fig. A.3.5-9: Diode plate



Terminal block for remote control cable with fuses and power relays

F1 fuse 15A for DC
F2 fuse 25A for starter
Ks relay for starter
K2 relay for glow plugs
K3 relay for fuel pump

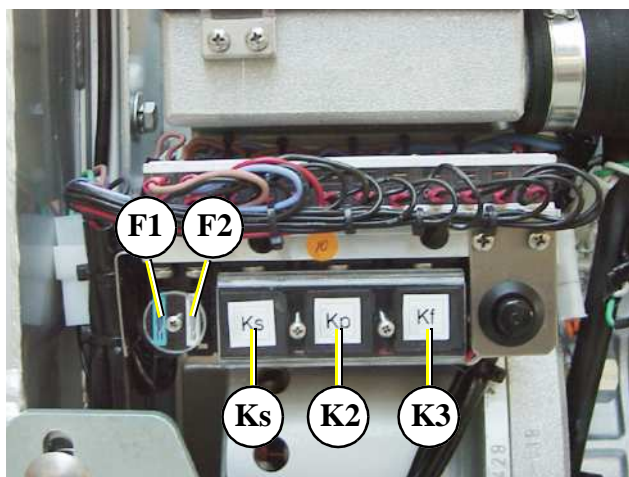


Fig. A.3.5-10: Terminal block

Time relay for stop solenoid



Fig. A.3.5-11: Time relay for stop solenoid

Electric starter control unit

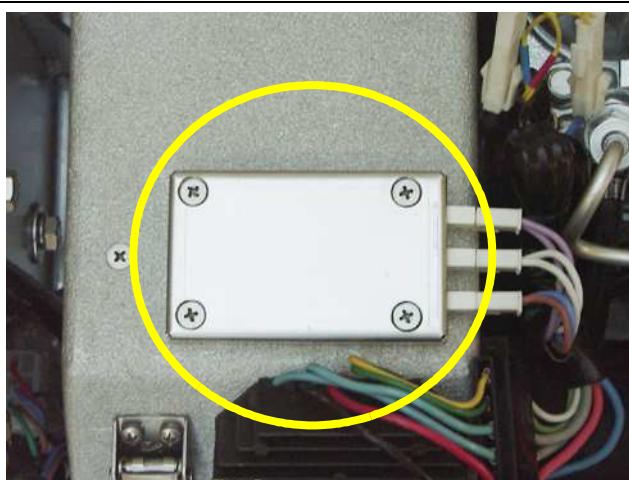


Fig. A.3.5-12: Electric starter control unit

A.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 laid out as "openers".



Fig. A.3.6-1: Thermostat at cylinder head

Thermostat at exhaust elbow

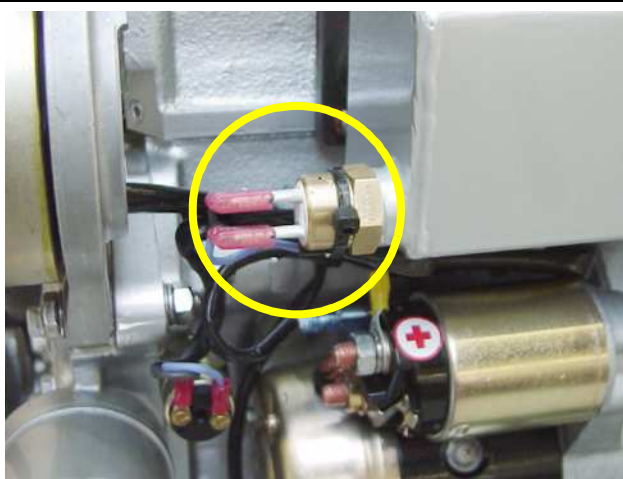


Fig. A.3.6-2: Thermostat at exhaust elbow

Thermostat at silencer

The coolant gets here the highest value.

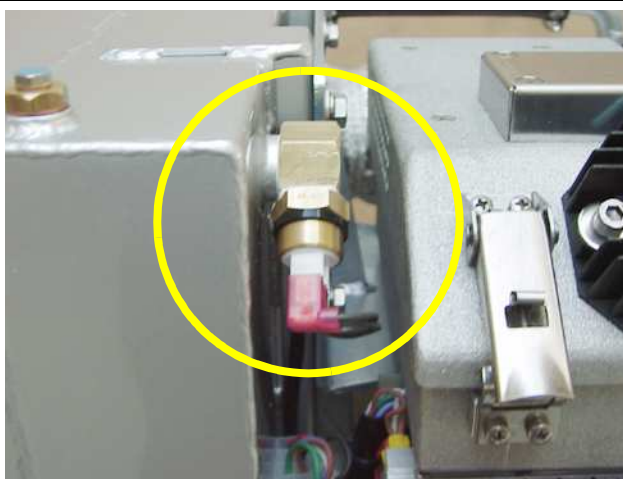


Fig. A.3.6-3: Thermostat at silencer

Thermoswitch at diode plate

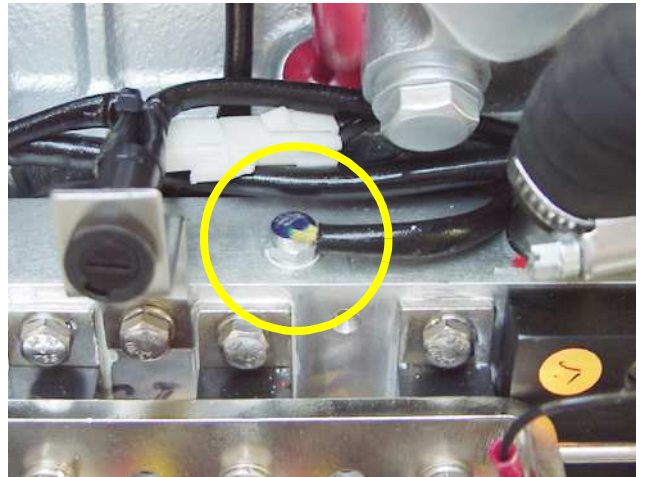


Fig. A.3.6-4: Thermoswitch at diode plate

Oil pressure switch

In order to be able to monitor 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).

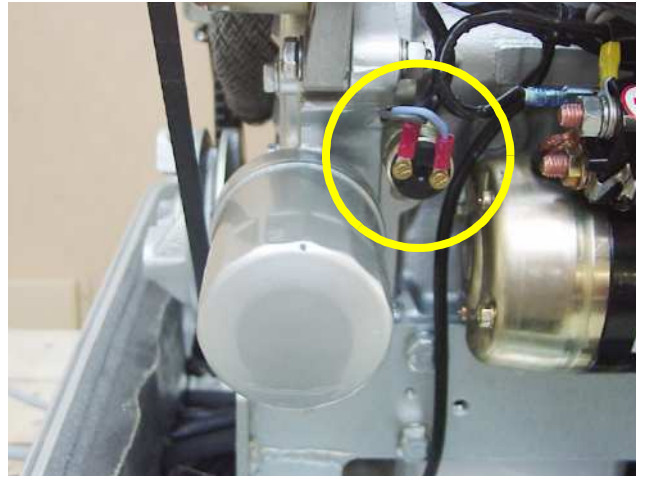


Fig. A.3.6-5: Oil pressure switch

Thermoswitch in the generator coil

- 01. Thermo-switch
- 02. Housing
- 03. Temperatuesensor NTC 981S (für Meßzwecke)

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

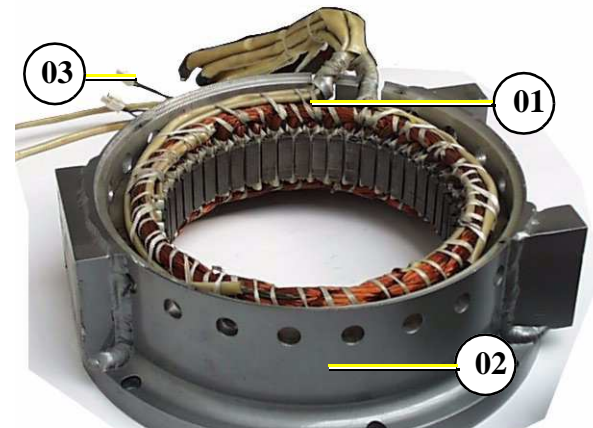


Fig. A.3.6-6: Thermoswitch coil



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.

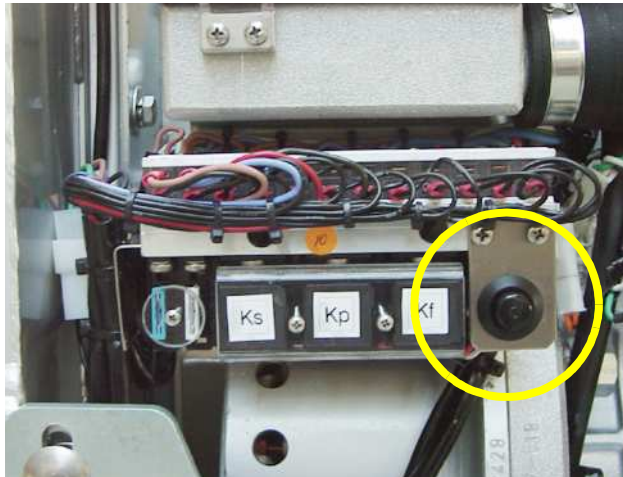


Fig. A.3.6-7: Failure bypass switch

A.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. A.3.7-1: Oil filler neck with cap

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.

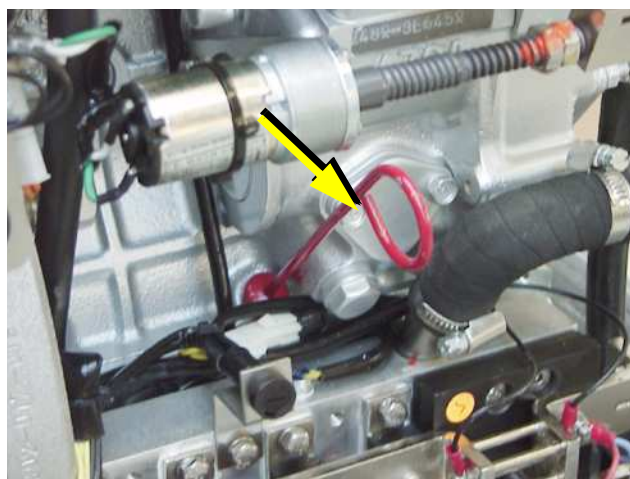


Fig. A.3.7-2: Oil dipstick

Oil filter

The oil filter should be exchanged with an oil change.

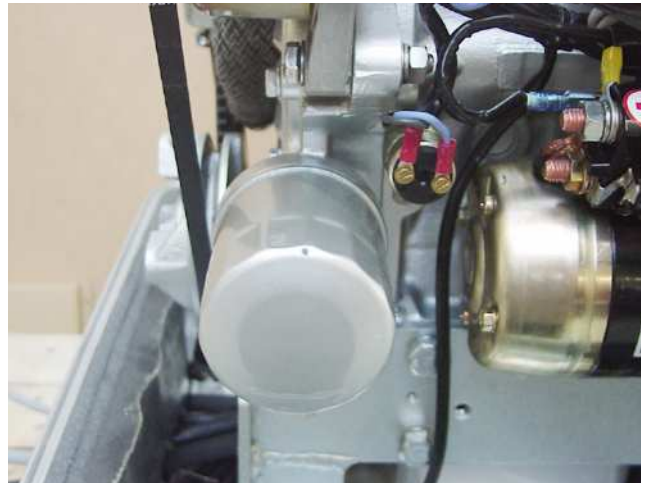


Fig. A.3.7-3: Oil filter

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!

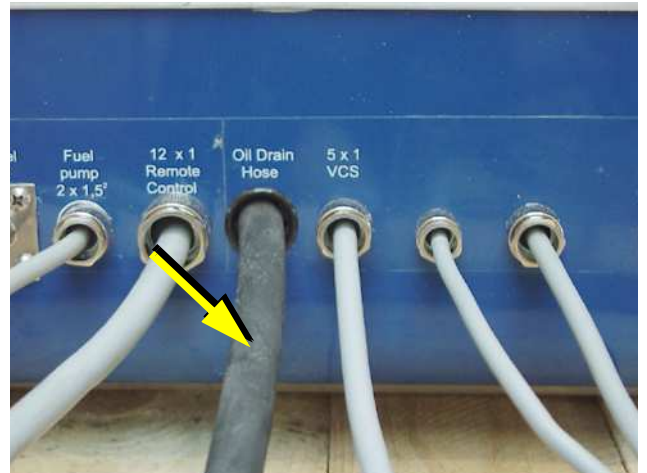


Fig. A.3.7-4: Oil drain hose

A.3.8 Externe Komponenten

Battery monitor

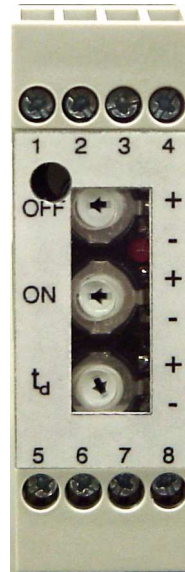


Fig. A.3.8-1: Battery monitor

Voltage control VCS

The control printed board controls the signals which are given for the actuator for speed regulation. On the VCS board are also adjustment possibilities for the control parameters.



Fig. A.3.8-2: VCS

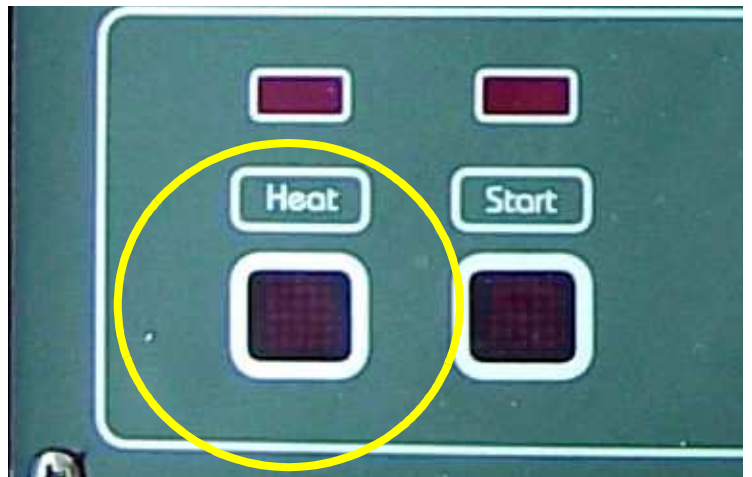


A.4 Operating instructions

A.4.1 Preliminary remark

Pre-heating the diesel motor

The motor must be pre-heated, if the diesel motor is designed as a "pre-combustion chamber motor" for indirect fuel injection. A quick glow fitting is used for all Kubota-diesel motors. This glow fitting may only be used for a maximum of 20 seconds without a pause. A pre-glow period of 5 - 6 seconds suffices for ambient temperatures above 20°C (plus). For lower temperatures the preglow period should be increased.



Tips regarding Starter Battery

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

A.4.2 Daily routine checks before starting

1. Oil Level Control (ideal level: MAX).

ATTENTION! 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 maximum level, if the level drops below the mark between maximum und minimum levels.

You should change the oil, regardless off the ambient temperature. Table E.2.1, "Engine oil," on Page 92. Engine oil amounts Table E.4, "Technical Data Engine," on Page 99.

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. Check all Hose Connections and Hose Clamps are Leakage.

Leaks at hose connections must be immediately repaired, especially the seawater impeller pump. It is certainly possible that the seawater impeller pump will produce leaks, depending upon the situation. (This can be caused by sand particles in the seawater 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.

4. 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.

5. 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.

6. Switch the Land Electricity/Generator Switch to Zero before Starting or Switch Off all the Consumers.

The generator should only be started when all the consumers have been switched off. The excitation of the generator will be suppressed, if the generator is switched off with consumers 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-excited by means of a DC source. If the generator does not excite itself when starting, then excitation by means of DC must be carried out again.

7. 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).





A.4.3 Starting Generator

1. If necessary, open the fuel valve.

2. If necessary, close the main battery switch.

3. Check if all the consumers have been switched off.

The consumers are switched off, before the generator is switched off. The generator is not to be started with consumers connected. If necessary, the main switch or fuse should be switched off or the consumers should be individually switched off.

4. Press „ON“ button.

Control light for "ON" Button must light up.

5. Pre-heat engine.

Pre-heating is necessary for every running temperature. Pre-heating is not necessary, only if the generator has just been run. The heating period should take at least 6 seconds, however, 20 seconds at the maximum. Heating must last for 20 seconds at a temperature of +5°C. If a second attempt is to be made, then a pause of at least 60 seconds is required.

The generator can be started with the assistance of a pre-heating device at temperatures as low as - 20°C. Please note that the generator can only be run at temperatures below -8°C with winter fuel and additional special additives.

6. Press „START“ button.

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 aggregate does not immediately start, then the fuel intake should be checked to ensure it is flowing freely. (For temperatures below - 8°C check whether there is winter fuel)

7. Check circuit-voltmeter, to test whether there is AC-voltage and is within the tolerance range (Frequency and voltage).

The AC voltage should be within a tolerance of ± 3 Volt without load at the nominal voltage. When running without load, the generator frequency should be 4% below the nominal voltage. The generator should be checked, before the consumers are switched on, if the current remain at this level.

8. Switch on consumers.

The consumers should only be switched on if the generator voltage is within the permissible range. Parallel connection of several consumers should be avoided, especially if there are consumers with electric motors, such as air-conditioning units in the system. In this case, the consumers must be connected Step by Step.

A.4.4 Stopping the Generator

1. Switch off consumers.

2. If the load is higher than 70% of the nominal load, the generator temperatures should be stabilised by switching off the consumers for at least 5 minutes.

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

3. Press „OFF“ button and switch off the generator.

4. Activate additional switches (Battery switch, fuel stop valve etc.).



A.4.5 Starting the Generator by a „Failure bypass switch“

There is a "pressure switch" on the operation unit. 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 consumers when over or undervoltage occurs).

This is also the case when the generator is started when consumers are switched on.

Normally the generator will no longer excite 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).





B. Installation Instructions

B.1 Generator Connections



ATTENTION! Before working on the System read the see “Safety Precautions” on page 10.

B.1.1 General Instructions

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

B.1.2 Connections

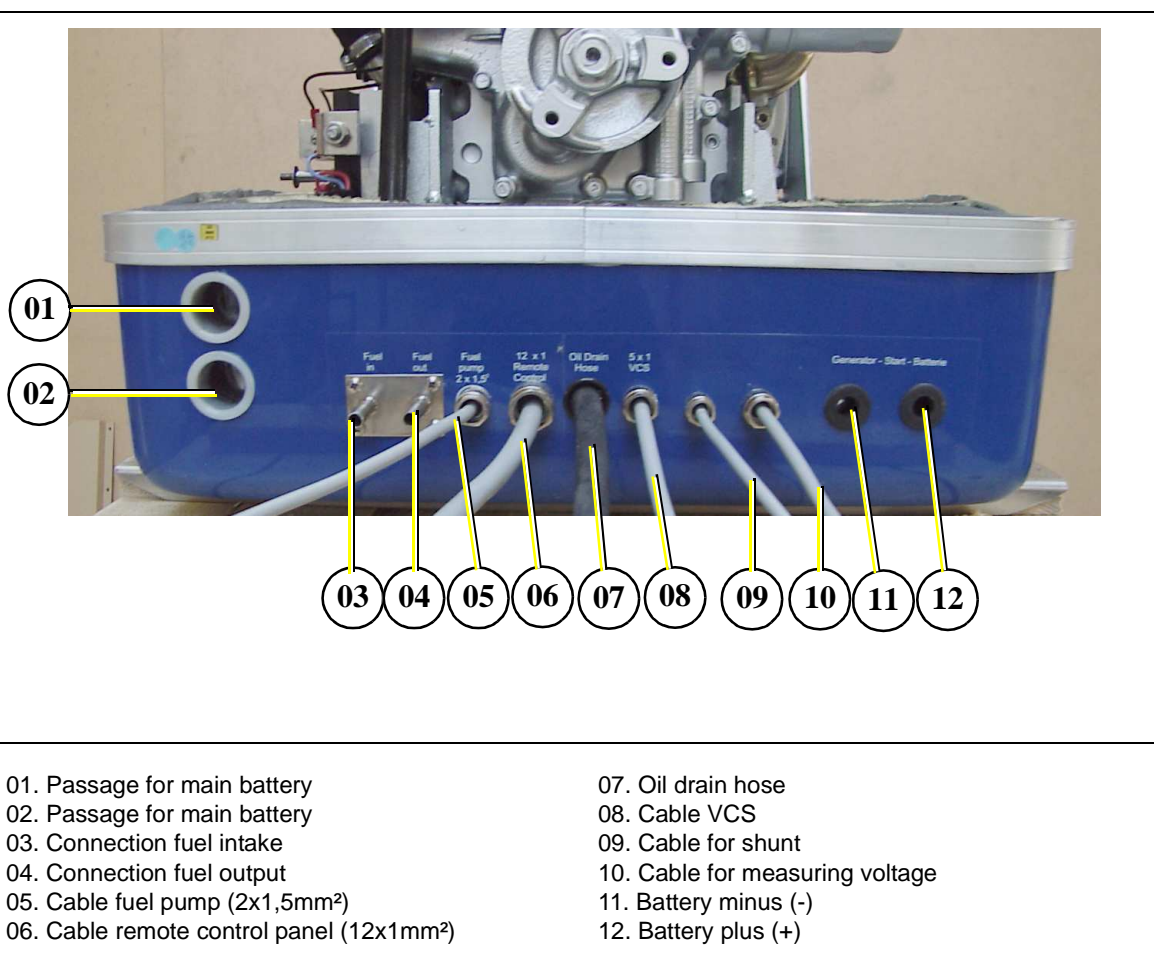


Fig. B.1.2-1: Connections

B.1.3 Fuel System Installation

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

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

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

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

see "De-aerating the fuel system" on page 70.

The following components must be installed:

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

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

Connection of the fuel system

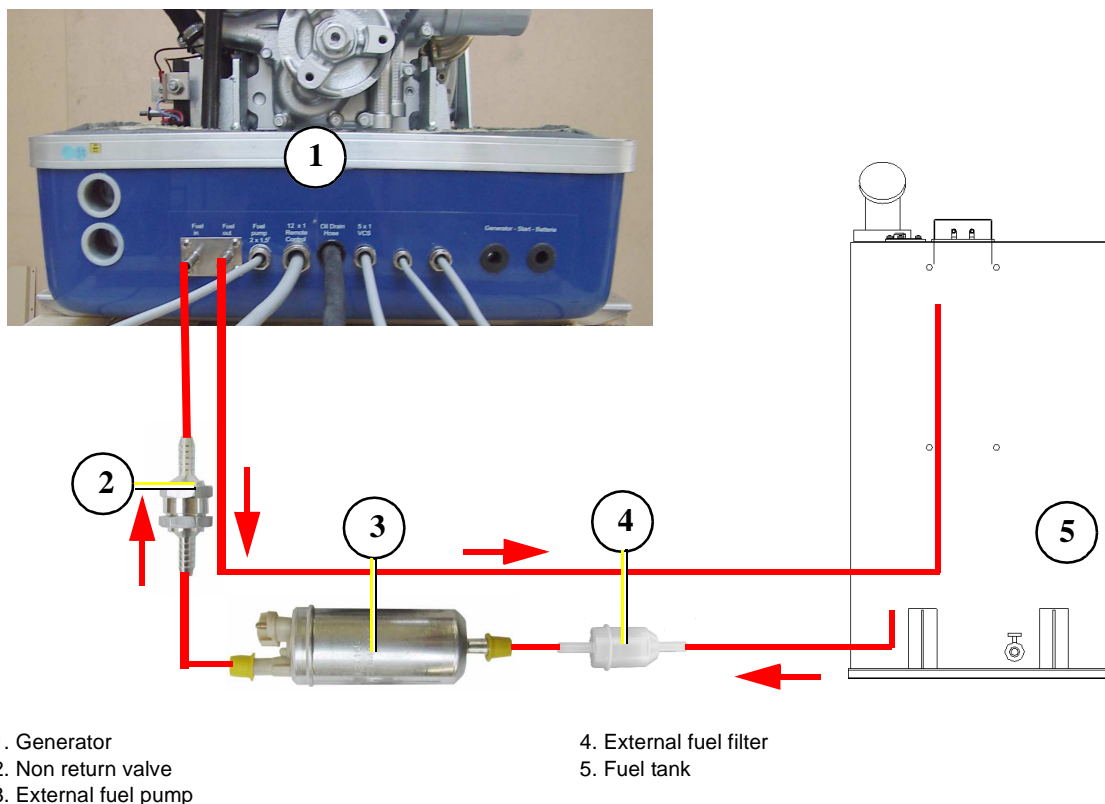


Fig. B.1.3-1: Fuel connection - Schema



B.2 Generator DC System-Installation

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 lightning conductor, personal protection switch etc.



B.2.1 Installation Panda AGT 12 V System

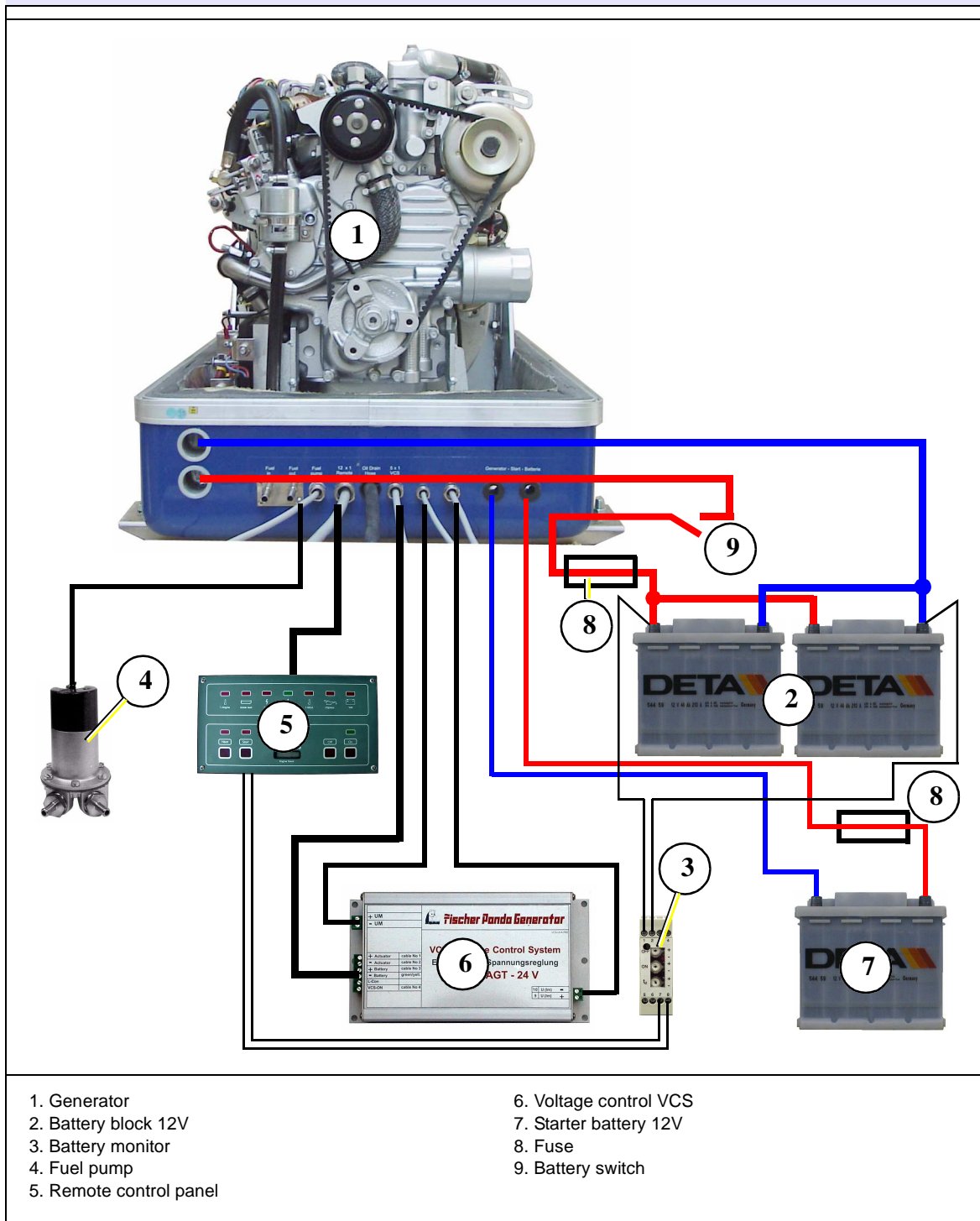


Fig. B.2.1-1: Installation Panda AGT 12 V System - Schema

All electrical safety installations have to be made on board.

B.2.2 Installation Panda AGT 24 V-system - Optional

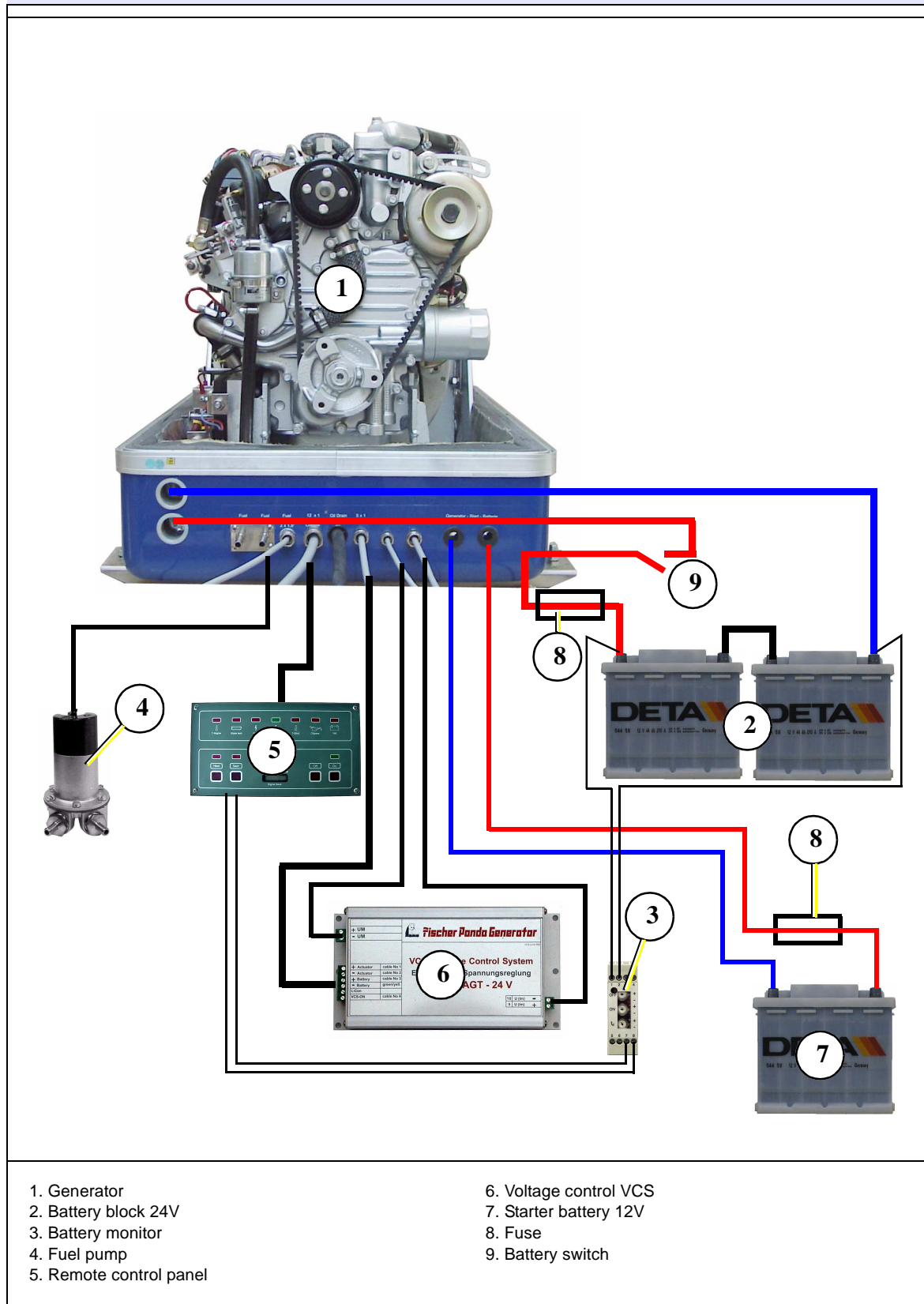


Fig. B.2.2-1: Installation Panda AGT 24 V System - Schema



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 Table 3, "Cable cross section," on page I)

B.3 Connection to Starter Battery-Block



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

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

ATTENTION!

It must be guaranteed that first the cables are attached at the generator and then at the battery. To avoid large voltage drops the battery should be installed as near as possible to the generator. The positive terminal of the battery is attached at the red cable, the negative pole at the blue cable.

ATTENTION!

The positive cable of the starter battery and of the battery bank must be secured with a battery main switch and a suitable fuse



B.4 Remote control Panel - see remote control panel datasheet

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.

B.4.1 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.

B.5 Voltage Control System - see VCS datasheet

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

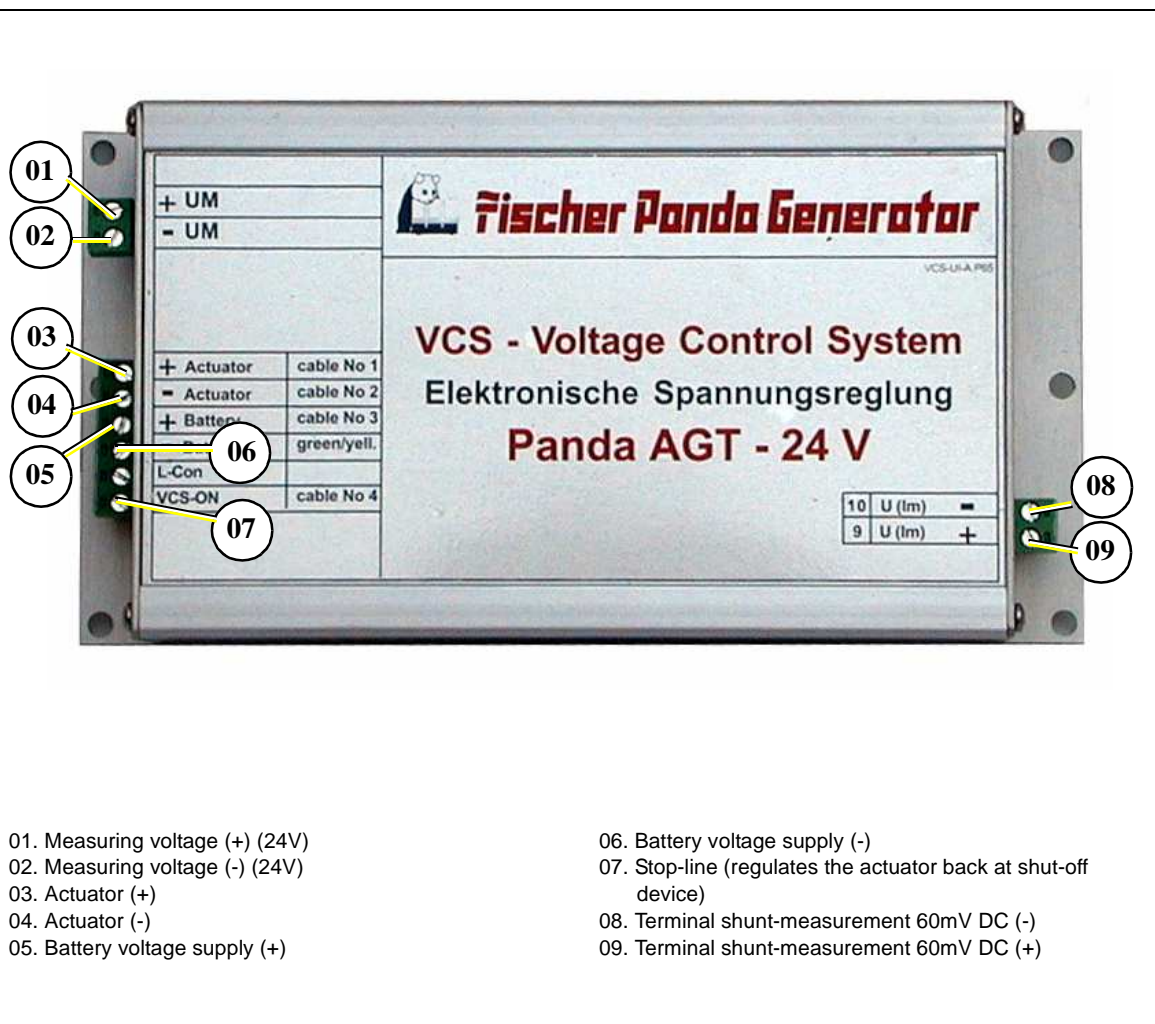


Fig. B.5-1: Electronic Voltage Control VCS

ATTENTION!

The cable for the measuring voltage must be attached directly at the battery, and may not be attached to the output of the electric rectifier.

By the voltage drop between generator and battery the accurate voltage can only be received directly at the battery. A false link can lead to damage the battery!





B.6 The Battery Monitor - see battery monitor datasheet

For the automatic start of the "AGT" generator a battery monitor is necessary.

This battery monitor ensures that the unit starts automatically when the battery voltage drops below a pre-set level. If the battery voltage exceeds the adjusted value, then the unit is stopped automatically. The two contacts of the battery monitor (7+ & 8 -) must be connected with the appropriate clamps of the automatic control panel (14+ & 13 -).

Responding the battery monitor is indicated by a red light emitting diode. That means if the battery voltage dropped below the adjustable threshold value, an internal relay is switched on. The connection occurs with a time delay from approx. 1-3 minutes, voltage drops are ignored e.g. starting currents.

ATTENTION: - The shut down voltage depends on the battery type and on the battery temperature. Consider notes or technical data of the respective battery type.

ATTENTION: - Furthermore attention must be paid that the battery shut down voltage of the battery monitor lies below the synchronised voltage of VCS electronics. The generator runs constantly and cannot be automatically stopped if the synchronised voltage should be less than the battery shut down voltage.

The battery monitor may only be connected directly to the terminals of the battery and not to the output of the generator for example.

B.7 The fan control - see fan control datasheet

Temperature controlled adjustable speed control for one or two stage DC Fan.

The fan regulator must be mounted in a dry and well-ventilated location. Ensure it is assembled vertically.

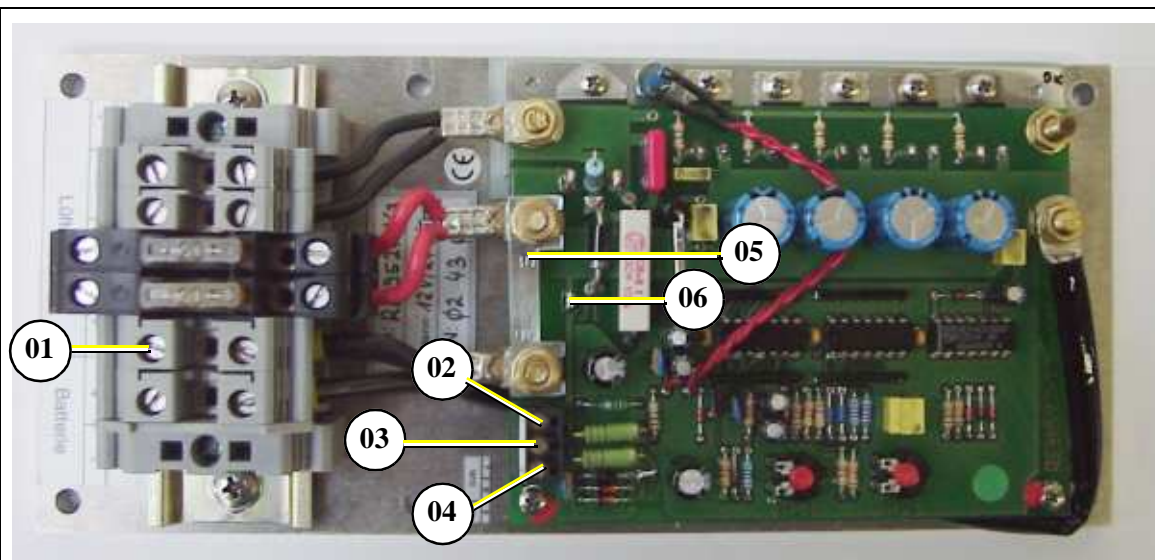
The speed adjustment of the fan is determined by the Running Voltage Pulse/Pause modulation. The Pulse/pause-ratio is governed by the cooling water temperature via an external NTC-gauge (terminal 7 and 8). An NTC-resistor reduces its resistor value if the temperature is rising. This NTC-gauge has the value 100kOhm at 25°C (57°F) and 7kOhm at 70°C (102°F). The full running voltage is sent to the fan when the upper temperature has been reached.

The fan regulator can be switched on or off by the connection „ON“ (terminal 9). The fan control is switched on, if there is the same voltage to „ON“ as „Battery (+)“. If no current flows to „ON“, the fan control has been switched off. If this option is not required, the circuit board connection „ON“ can be connected directly to „Battery (+)“, via the solder bridge J1.

J1 closed : Fan control continually running

J1 open : Fan control only working if current flows to connection „ON“.

The solder bridge J1 is located directly behind the circuit board fuse when viewed from the main connection.



01. Connection „Battery (+)“
02. Terminal 7
03. Terminal 8

04. Terminal 9
05. Internal fuse
06. Solder bridge J1

B.8 Insulation test

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



- 1.) Switch off all on-board electrical devices.
- 2.) Start the generator..
- 3.) Measure the AC-voltage with a voltmeter (adjust to Volt/AC) between:
 - a) generator housing and AC-Control box
 - b) generator housing and ground.

The measured voltage must not exceed 50mV (millivolts).

4.) Once the safety systems have been installed, they must be checked. If a leakage current relay has been installed, it also has to be tested. In order to ensure that the leakage voltage relay functions properly, the individual generated phases from the generator must be checked between each other, between phase and ground, (the single phase or 4th phase also needs to be checked in this fashion).

5.) If the generator is protected by a ground connection, then **ALL** electrical devices, must also be connected to this "common" ground (usu. ground contacts are attached to the devices' metallic housings).

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

In addition to a proper circuit diagrams, terminal points, connections, electrical devices, etc. should also be labelled with stickers or signs

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

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

B.9 Cooling system

General instructions

The PANDA vehicle generator is supplied as standard without a radiator. Various radiators are available according to the customer's requirements; these can be chosen according to the appropriate operating and installation situation. The cooling system can also be assembled together with a normal commercial vehicle radiator.

B.9.1 Connection of the external radiator

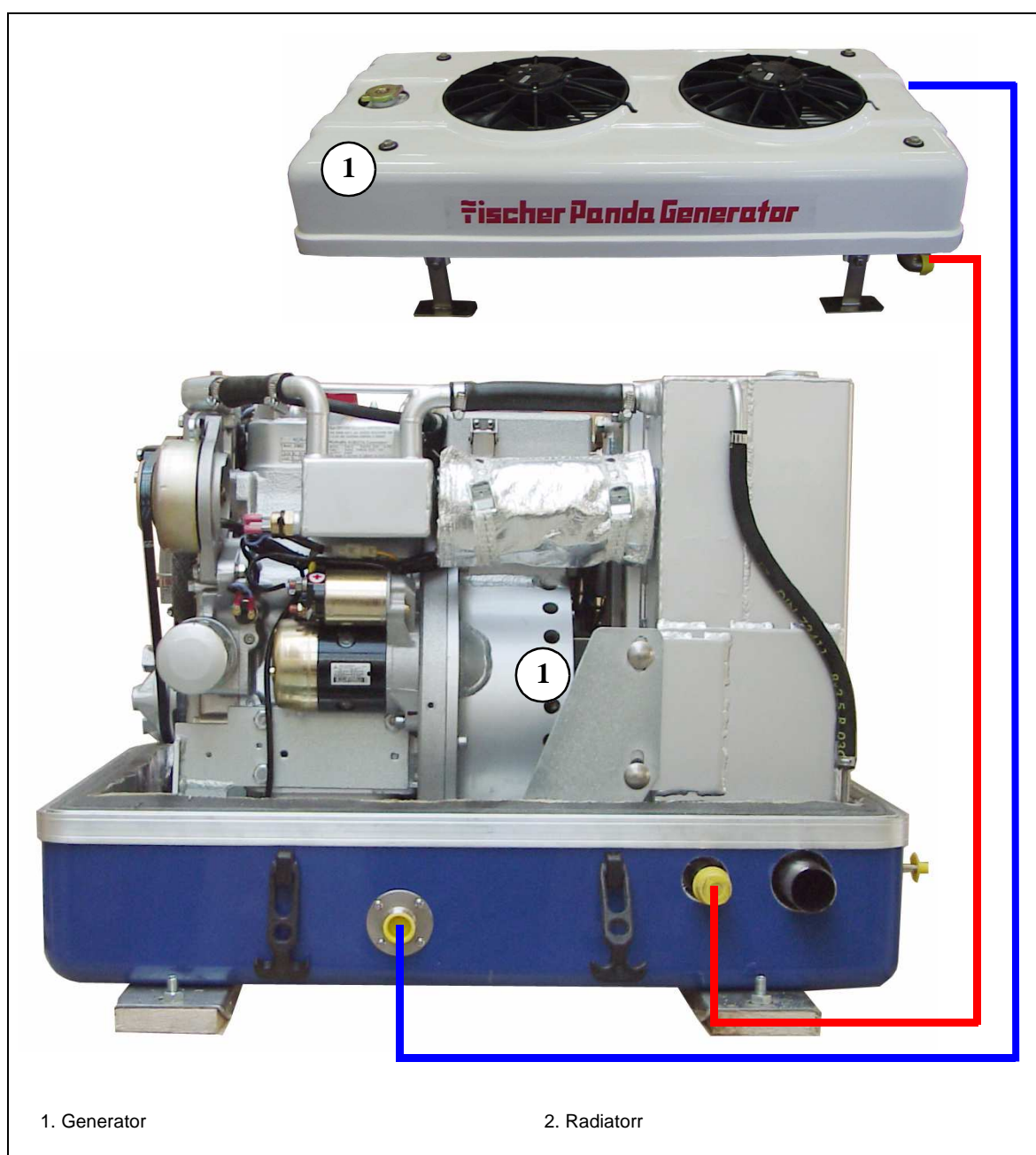


Fig. B.9.1-1: ERadiator connection - Schema

Determining the size of the radiator

Consideration must be paid to the total heat load when determining the size of the unit. This equates to the generator nominal performance without the water-cooled pre-silencer. The heat resistance is 1.8 times the generator nominal capacity, when the water-cooled pre-silencer is used (i.e. Panda 12000 PVMV-N has a total heat capacity of approx. 18kW). The radiator can be serviced by any usual radiator servicing agency. It should, however, be pointed out that the radiator possesses high safety levels. The radiator is often manufactured too small. Fischer Panda also has various radiators available (for horizontal and vertical installation) as standard generator components.

Radiator position

The place and fitting position of the radiator must be carefully considered. It is especially important that the warm air can escape. For this reason, the best place for the radiator is in a vertical position on the vehicle roof (if one take into account that an obstruction could arise in narrow entrances).

The manufacturer is only too happy to give suggestions on how to install the radiator. It must, however, be expressively pointed out that all recommendations of this type are **not binding**. It continually occurs that special influencing factors are not recognised from the start. The customer or the technician making the installation must always take changes to the position or radiator's place of installation into consideration. The manufacturer cannot accept liability for the recommendations given to the best of his knowledge. As a precaution, attention should always be paid that the air outlet for escaping warm **is as large as possible**. The vehicle paint sprayer is often not in agreement with this, but the person making the installation must make the aim clear. **The fitter** must make his position clear.

Radiators which are installed vertically, and the warm air is blown **downwards**, must be twice the size of such radiators, by which the warm air rises through its own thermal energy. It must also be considered that a build up of heat results through the emission of warm air in the direction of the ground, whereby the warm air is once again forced to rise to the area of the radiator. Freely escaping warm air cannot be guaranteed in this case. Additional ventilators may be necessary should the warm air need to be channelled through pipes.

It must be ensured that warm air is extracted out of the radiator.

Permitted coolant temperatures

The performance of the radiator must be so measured that the coolant temperature of the Panda generator does not exceed more than 70°C. The coolant intake must be fitted direct to the coolant pump.

There must be a large amount of water circulating to ensure that the difference in temperature when compared to the temperature of the water leaving the generator (full load) does not exceed 12°C. The difference may also amount to 17K if a pre-silencer is installed.

The hoses must be so laid out that knots and other obstructions are avoided. If necessary, the amount of coolant must be measured. As a minimum the following values are necessary:

Essential coolant amounts:

Panda 4500 min. ca. 10 l/min

Panda 8000 - 9000approx. 16 bis 22 l/min

Panda 12000 - 14000approx. 24 bis 28 l/min

Panda 18 - 24 approx. 32 bis 38 l/min

Panda 30 - 32 approx. 40 bis 45 l/min

Panda 42 - 65 approx. 50 bis 60 l/min

The greater the amount of coolant circulating, the lower the difference in temperature. If the necessary cooling performance cannot be achieved, the amount circulating can be increased by adjusting the pulley on the pump and thereby raising the performance.

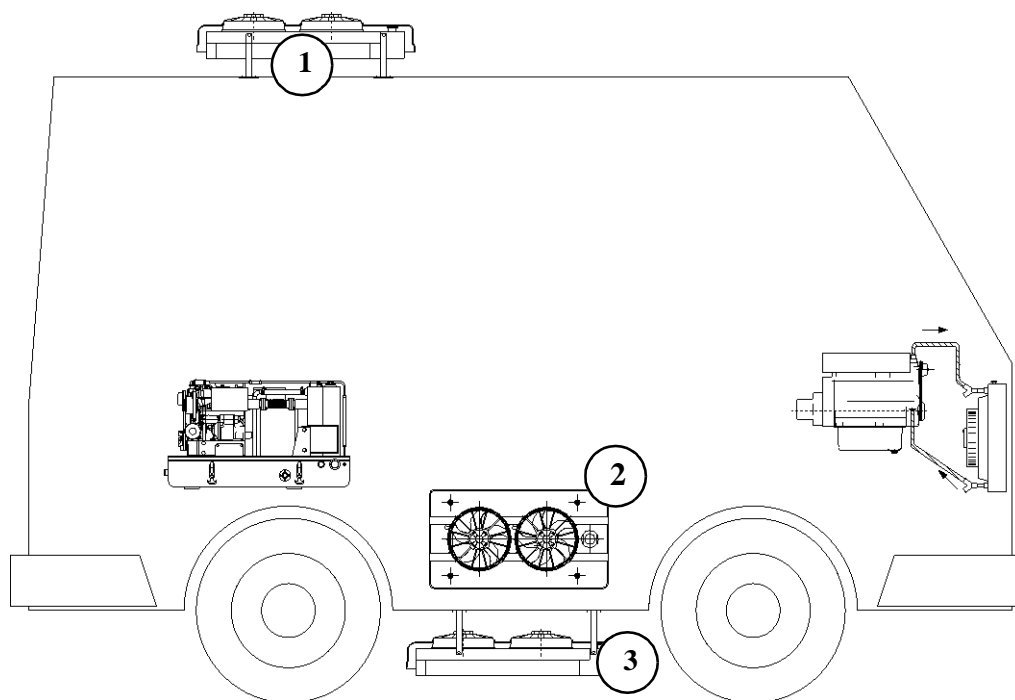
ATTENTION! The coolant pressure may, however, not exceed 0.7 bar!

Construction and position of the radiator

The radiator can be assembled away from the generator in a well ventilated position. Attention must be paid that the radiator emission direction is completely free of obstruction. Turbulence is to be avoided. There is often a clash between the streamline appearance of the chassis and the technical requirements.

The radiator can be installed (vertically) or (horizontally). Consideration must be given to the fact that air is drawn in via a fan motor.

The best result is achieved if the radiator is fitted vertically on the vehicle roof.

Possible positioning of the external radiator


1. Radiator on the roof

2. Radiator vertical

3. Radiator under the vehicle



Pay attention to the following item at the horizontal assembly of the radiator:

To avoid damages of the fan motor please bore some holes on the backside of the fan (diameter approx 4mm). Because water can enter the fan (rainwater, condenswater, sweatwater etc.). The water can run out through these holes. (see below 02) Generally a fan is a wearing part and should be changed one time a year.

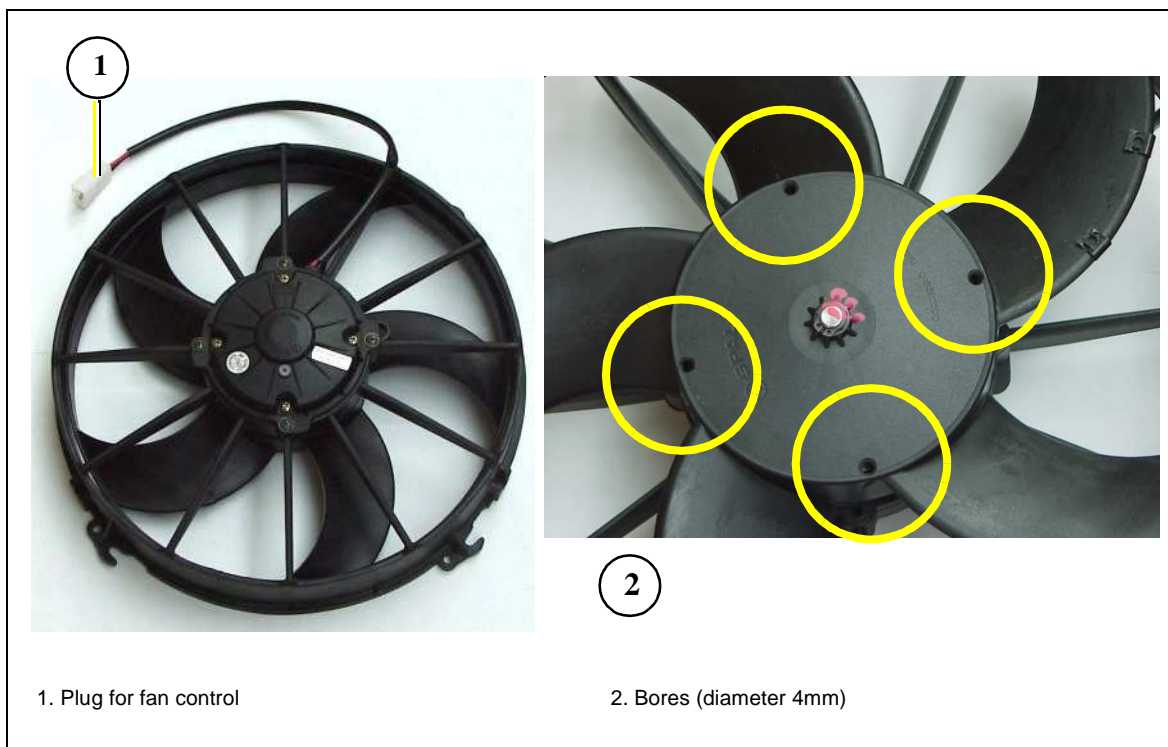


Fig. B.9.1-2: Radiator fan

Distance from the radiator to the unit

The coolant water pump mounted on the generator is so laid out that a distance of up to 7 mtrs length from the radiator is possible. The hose cross-section must be laid out accordingly. The minimal internal diameter amounts to 18mm (Panda 4500). A hose must be used for both sides (forward and back flow) which is resilient to pressure and high temperatures (at least 120°C).

Minimum hose diameter for cooling lines:

Panda 04 - 10 kW	Ø18mm (¾")
Panda 12 - 20 kW	Ø25mm (1")
Panda 25 - 30 kW	Ø32mm (1¼")
Panda 40 - 50 kW	Ø38mm (1½")
Panda 50 - 60 kW	Ø44mm (1¾")

Coolant expansion tank

It is absolutely essential, that a expansion tank, that can be aerated, is fitted adjacent to the radiator. The ventilation pipe should, if possible, be fitted to the radiator's highest position. For this, a pipe with a maximum diameter of 10mm suffices, which must be fed to the expansion tank. A further pipe, which must be fitted to the floor of the expansion tank, can be fitted to the cooling system in any desired place (i.e. T-piece). Frequently a connection is provided on the radiator itself. The coolant expansion tank is not normally supplied by Fischer Panda. For this a standard vehicle expansion tank is the most suitable. Vehicle accessory range is the most suitable.

Coolant Pump

This is normally equipped with a independent impeller suction pump. This pump suffices if the cooling water pipes etc equate to the normal standard. Fischer Panda can give no guaranty. It must be determined whether the amount of cooling water circulating is sufficient. Consideration must always be given to the fact that the water flow is supported by an external pump.

Antifreeze

The **antifreeze** concentration must be regularly checked in the interests of safety. The antifreeze solution supplied from the factory provides protection to -15°C. If lower temperatures are occasioned during transportation or storage, then the coolant must be drained. The cooling system is, however, so arranged that the draining of the coolant is only possible in the assembled state, when air under pressure is blown into the system. Air pressure of approx. 0.5b suffices, in order to blow out the water.

Suction filter as a source of noise

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

Vehicle Generator with Centrifugal Coolant Pump

An impeller pump can also be provided if the radiator, for technical reasons, is to be installed relatively distant from the radiator and additionally requires a number of changes to the direction of the pipe. This coolant impeller pump is mounted on the generator as an additional pump, and is driven by pulleys. The pump action is carried out by a "rubber impeller".

ATTENTION! Temperature restriction!

This pump may only be used if it is ensured that the temperature of the coolant entering the pump does not exceed 70°C during continual duty. 75°C is permissible for short periods. These may, however, in no case be for longer periods. If the coolant temperature exceeds the permissible rate, this can lead to the impeller blades being torn off. The advantage of this impeller pump is that this pump, as a "positive displacement pump", is self-suctioning and is therefore very sensitive to air bubbles etc.

Ventilating the cooling system with the aid of a self suction impeller pump is very simple. In some cases the pump is additionally installed for this reason alone. Unfortunately the operating noise of these pumps is very loud.

In spite of this attention must be paid that a zone is available at a high point, where the air bubbles in the coolant are able to escape to. As a rule, this is the expansion tank, as long as this is connected direct to the tank. If the coolant expansion tank is, however, so integrated in the system that it cannot be reached by circulating water, then an air release valve must be fitted in the circulation pipe at a place of your own choice, which can then also be connected to the expansion tank (see next page).

In case of doubt, you should send a diagram of the required coolant system to Fischer Panda and let this be checked there.

Installation with special air separator

An "air separator" must be fitted at all critical places in the circulation system, in case a perfect automatic ventilation on account of obstacles in the pipe passage cannot be achieved. A self-actuating ventilation valve must be fitted to each air separator.

Monitoring the Temperature

You are expressively advised to measure the temperature of the circulating coolant after installation. Two remote thermometers must be used for this. A connection must be fitted to the motor coolant inlet; the second on the coolant outlet. After a short warming-up period, the generator must have a load of at least 75% of the nominal capacity placed on it. The coolant circulating is to be checked. The values must lie within the following limits:

1. Coolant inlet, max 70°C during constant duty at maximum load
2. Coolant outlet, max 85°C during constant duty
3. Difference of both values: This point is especially important and gives an indication of the coolant circulating. The difference should amount to a maximum of 17°C for a water-cooled system with an integrated water-cooled pre-silencer, as a rule it should, however, lie between 10 - 12°C.

The circulating coolant is not sufficient, if the difference amounts to more than 15°C, and the amount of water circulating must be increased. This can be solved, for example, if the pipe passage is improved or the pulley diameter is reduced. It is absolutely essential to measure the performance of the cooling system after installation of the generator. The above named values should be considered as the maximum permissible values. They are also valid for operation at high temperatures. During constant duty at normal temperatures (20°C), the values should be well below the above named data.

Installing a Coolant Temperature Display

A remote display unit for coolant temperatures should be installed, when fitting sensitive systems (i.e. Television broadcasting vehicles, ambulances or other vehicles) with sensitive measuring instruments. In this case a standard coolant **display device** with remote thermometer can be used. It is absolutely essential that two display instruments are installed:

1. Cooling water **inlet**
2. Cooling water **outlet**

It does not matter at which place the measurement is made. T-pieces for hose elements can be obtained from Fischer Panda into which the usual trade sensors can be installed.

Monitoring of temperature:

1. Temperature at the cylinder head
2. Temperature at the manifold
3. Temperature in the generator winding area (only Panda 8000 upwards)

The winding temperature monitor is not fitted with a special display unit. The fuel solenoid valve is switched on as a circuit breaker for the motor stop solenoid or the fuel pump. If the generator switches off because the winding overheats, nothing is displayed. In this case a long period of waiting can, in circumstances, be necessary. This can be bridged by using the switch. This must be carried out by an electrician who should use the circuit diagram for this. It suffices in this case when the plug which leads to the gauge wire is opened and both conductors in the plug are bridged. This shut down should, however, be a last resort! It is only applicable, if the generator temperature exceeds the permissible value on account of inaccessible working conditions. It must then be explained which measures are necessary to restore normal operating conditions.

Recording the temperature values

Installation records are delivered with every handbook, which must be completed after installation and returned to the manufacturer (Copy). The generator should be tested at 70% of its maximum performance. The temperature values must be checked at the maximum possible performance. The external temperature must be taken into consideration when doing this check. The values for T1 (see additional installation record for the vehicle version) may not exceed 85°C, even at high external temperatures and maximum load. If necessary the maximum permissible performance must be reduced (i.e. by the use of fuses).

Connection of the Generator to the Vehicle Cooling System

The Panda can in many cases be connected to the original vehicle system (vehicle-drive motor), without a problem. The amount of time required to do this is minimal, if the vehicle radiator is fitted with an electric fan. Should that not be the case, an electric fan is to be additionally placed in front of the radiator, which is monitored by a thermostat. The coolant pipes are connected directly with the pipes leading from the motor to the radiator. This installation is comparable with the installation of an additional hot water heating system, as long as this includes the motor cooling system. The manufacturer should be consulted in cases of doubt. The generator can be fitted to the vehicle cooling system via a heat exchanger, should there be any objections.

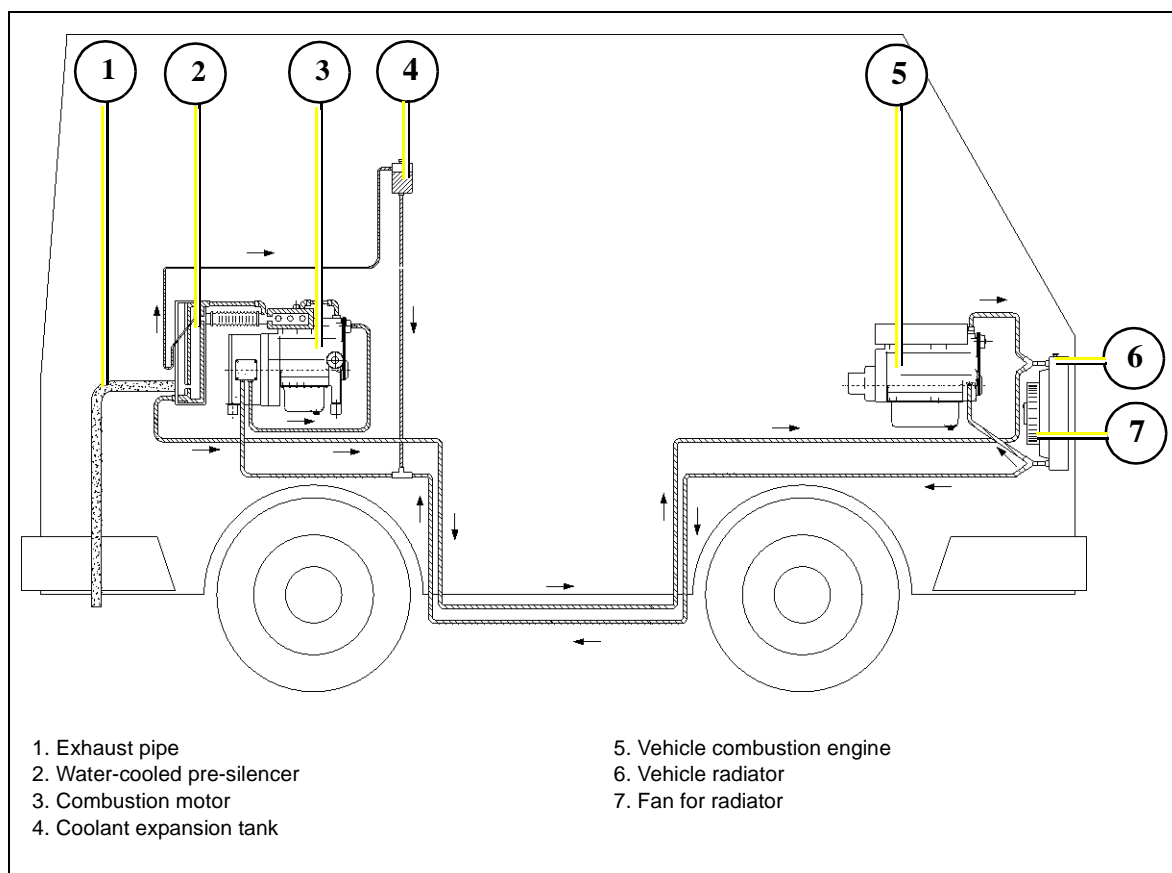


Fig. B.9.1-3: Connection of the Generator to the Vehicle Cooling System

Connecting the Generator Cooling System with the Vehicle Cooling System can bring the following advantages:

1. Pre-warming of the vehicle motor in winter (The generator can also be automatically started via a time switch).
2. Exploitation of the generator heat for vehicle heating systems (i.e. buses, conference vehicles, promotion vehicles etc.).
3. Otherwise saves the required space and the cost for an additional generator radiator.

We must, however, point out that connection of the vehicle cooling system to the motor cooling system requires a relative amount of experience of vehicle cooling systems. Various requirements must be considered. For example, it must be considered that the system acts as a "Bypass" when opening the cooling system thermostat. In some cases heating systems are connected to the system, which can then also operate as a "Bypass".

No liability is assumed, when a recommendation is made by the generator manufacturer to connect the generator to the motor cooling system. The person making the installation must also ensure in this case that all conditions of this type are considered.

It should also be considered that the vehicle thermostat or the thermo switch must be adjusted to the starting point for the radiator fan. In certain circumstances it is also essential to use additional thermostats for switching on the fan, which are installed in the generator's coolant pipes.

Fischer Panda can accept no liability if the cooling system does not function correctly.

Chassis construction companies and companies manufacturing vehicle assemblies should be aware that there could be problems with the motor or vehicle manufacturer regarding the guaranty, if consequential damage occurs to the motor because of coolant pipe leaks. Fischer Panda will not accept any liability, if further units (i.e. vehicle motor) are damaged, when a part of the generator cooling system itself breaks down.



External radiator should be installed when initially being put into operation or after repairs

A ventilating valve is fitted, as a rule, to all units manufactured since the Spring 1995. A hose must be placed on the connecting nozzle ventilation valve to aerate the unit (nominal width 6-8mm). A transparent hose is recommended, since the ventilation process is easy to observe. The hose is to be fixed with light hose clips to the connecting nozzle. The hose must be sufficiently long to be able to feed the other end into the open coolant expansion tank during operation.

The coolant expansion tank is initially filled with coolant. The air valve must be completely opened before the following procedure is carried out. You should assure yourself whether the connecting pipe has been connected correctly to the coolant backflow pipe by means of a T-piece. This pipe should have an internal diameter of 12mm. Since the coolant pipes, for technical reasons, can only be gradually laid out with difficulty, resistance builds up during refilling, which can only be displaced with difficulty by the air in the generator or motor. This process can be made easier by producing excess pressure by means of the above mentioned ventilation pipe. The process is eased considerably, in that a transparent ventilation hose draws in air (this can also be carried out by mouth, if done cautiously). Meanwhile the coolant expansion tank should, at the same time, be refilled with water. The generator can be started as soon as the drawn in water is seen in the ventilation pipe (all other measures must, of course, be considered, for example, checking whether the motor oil has been topped up etc., as stipulated in the generator operating instructions).

During the starting process, the coolant expansion tank must be continually refilled with coolant so that no further air can force its way into the system from above. The other end of the ventilation pipe should be laid in the open coolant expansion tank filling opening, so that outflowing coolant runs back into the tank.

During the starting process the open coolant expansion tank must continually be filled with coolant so that no further air can force its way into the system. The ventilation pipe should be laid in the open filler cap of the coolant expansion tank during the starting procedure, so that escaping coolant runs back into the tank.

Decisive for the success of this procedure is that sufficient water enters to internal coolant pump, so that the coolant pump can function. The coolant pump cannot draw water as long as there is air in the casing.

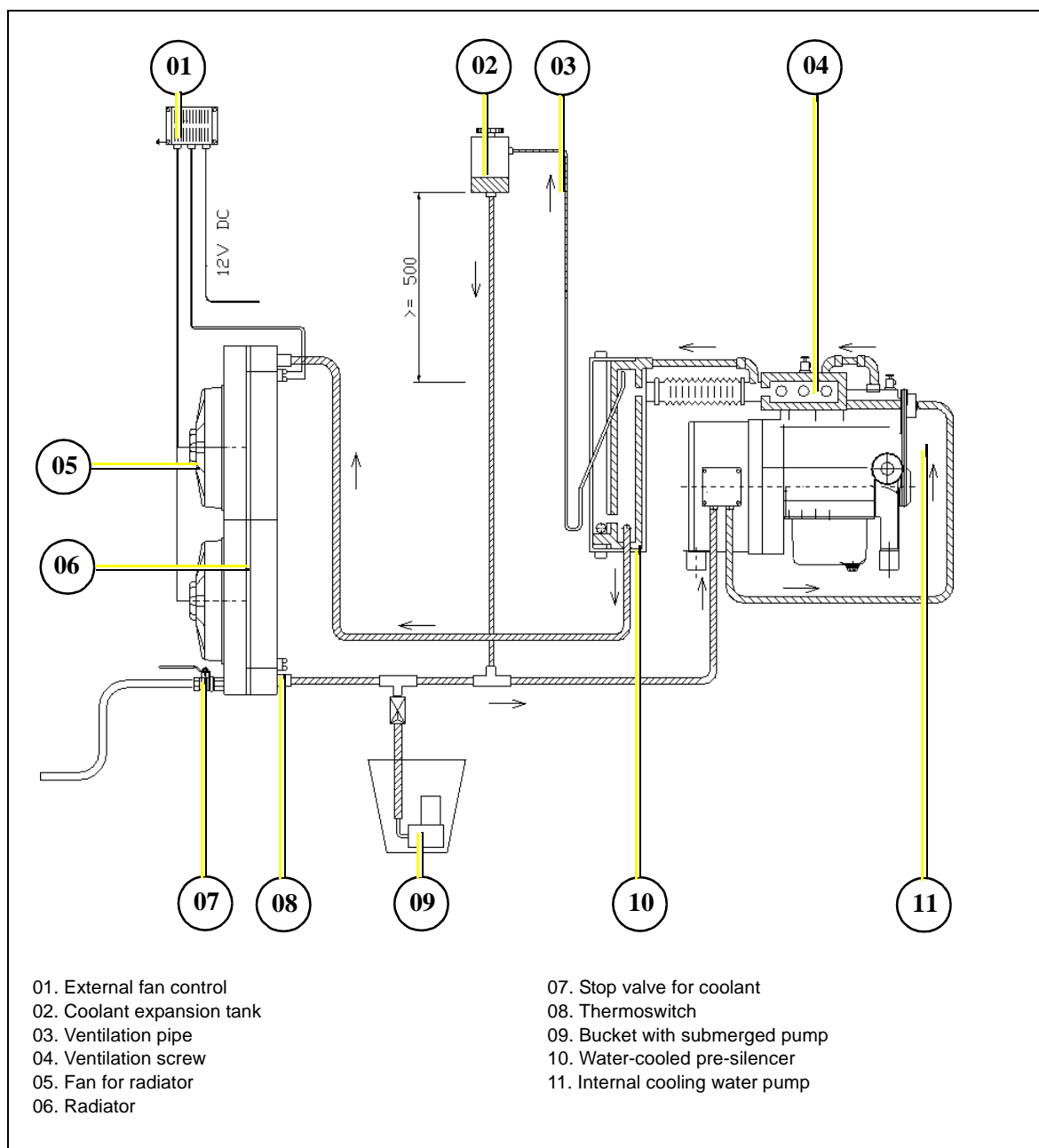


Fig. B.9.1-4: Installation diagram for vertical radiator

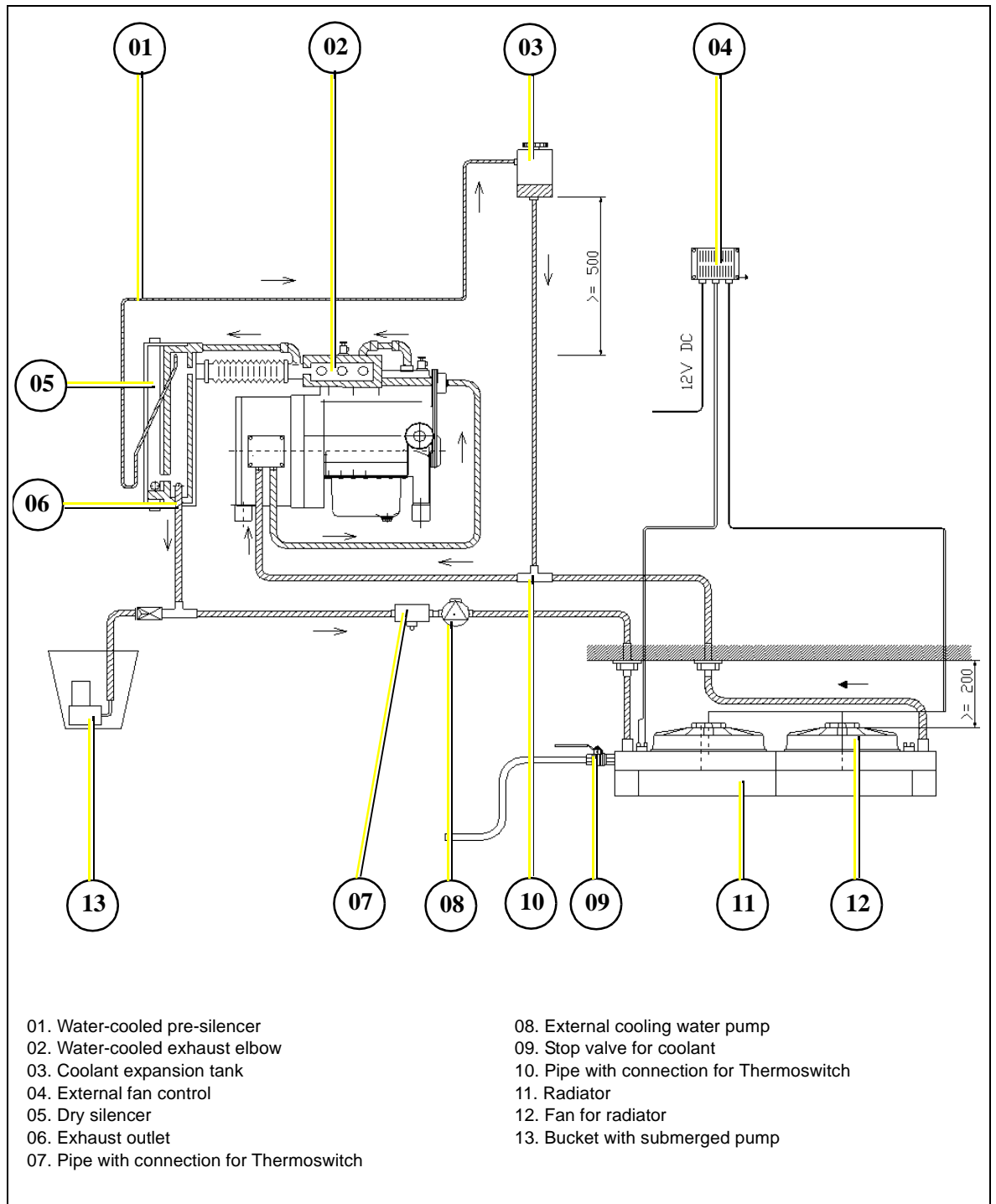


Fig. B.9.1-5: Installation diagram for underneath the vehicle

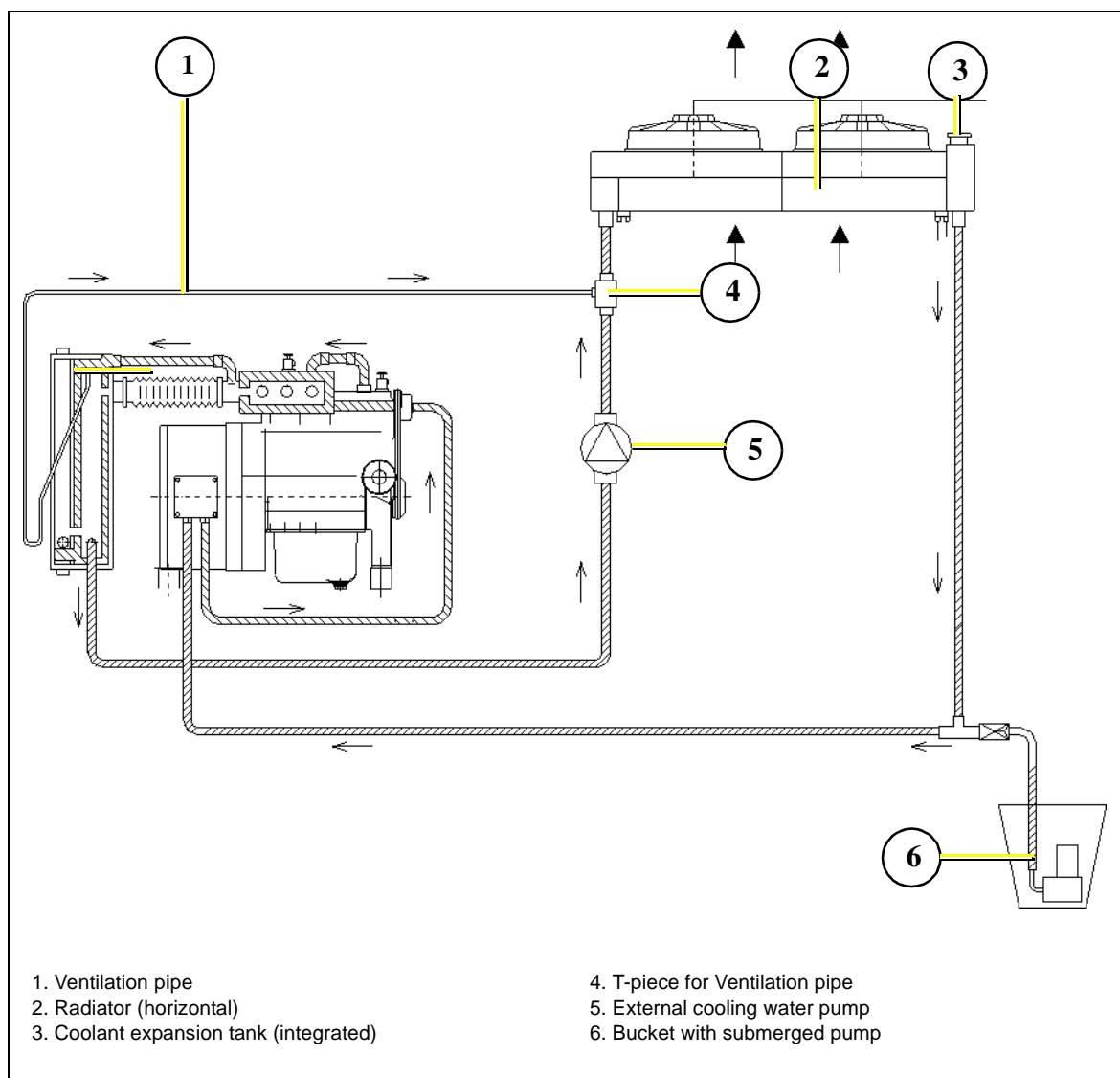


Fig. B.9.1-6: Installation diagram for radiator on the roof

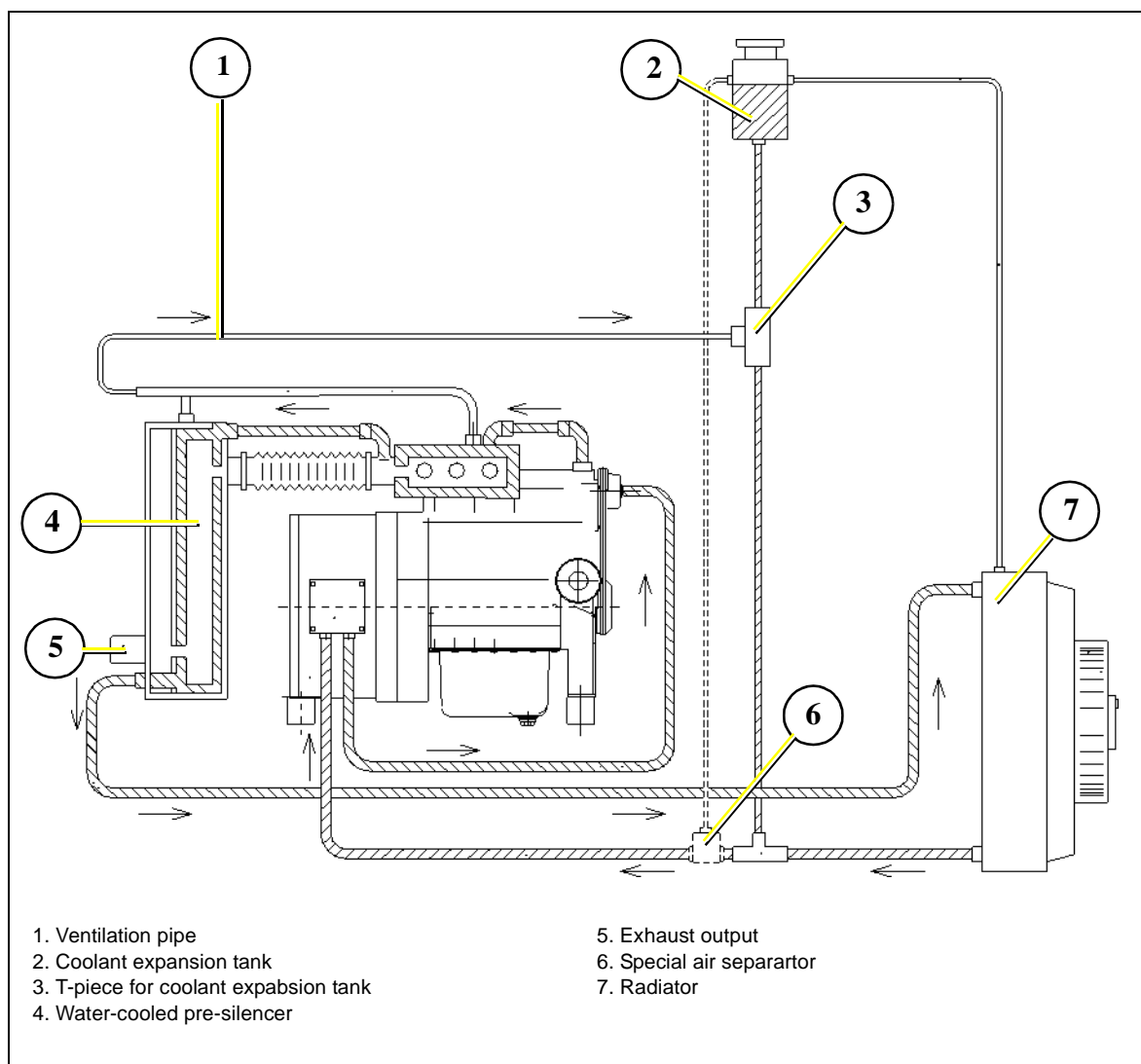
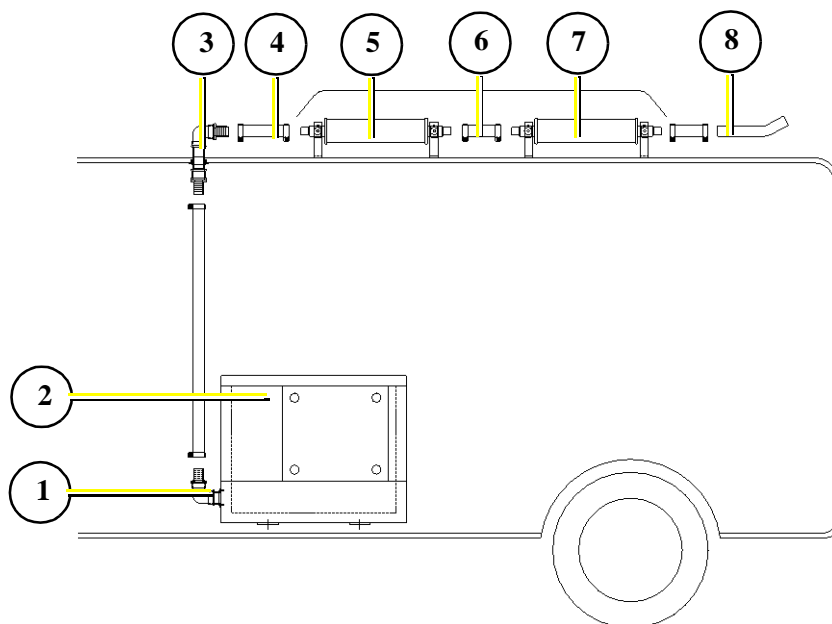


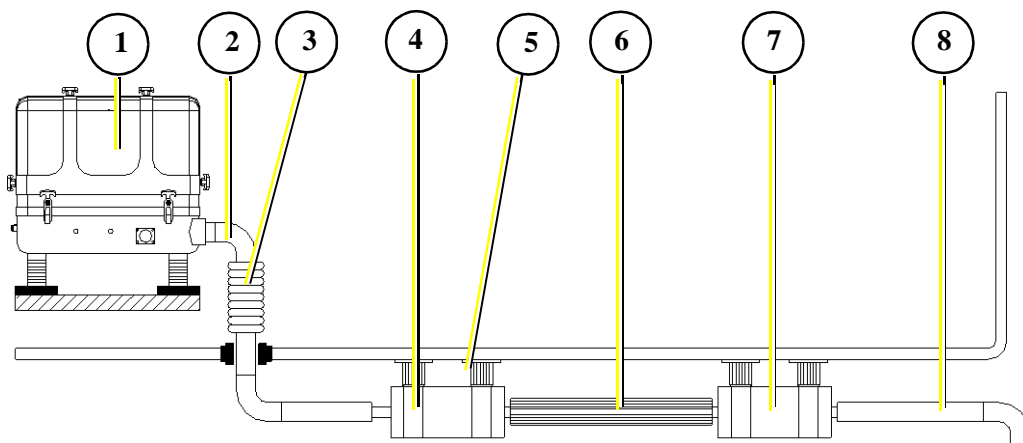
Fig. B.9.1-7: Installation diagram with special air separator

B.10 Exhaust Installation



- | | |
|---------------------------------|--------------------------|
| 1. Exhaust port | 5. External pre-silencer |
| 2. Generator | 6. Connection pipe |
| 3. Roof outlet for exhaust pipe | 7. External silencer |
| 4. Shock absorber | 8. Exhaust pipe |

Fig. B.10-1: Exhaust connection for roof outlet



- | | |
|--------------------------|----------------------|
| 1. Generator | 5. Shock absorber |
| 2. Exhaust port | 6. Connection pipe |
| 3. Compensator | 7. External silencer |
| 4. External pre-silencer | 8. Exhaust pipe |

Fig. B.10-2: Exhaust connection for mounting below the vehicle



C. Maintenance Instructions

C.1 Maintenance Requirements

Control before starting

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

Once a month

- Lubrication of actuator-trapezoid thread spindle

For Maintenance Intervalls see “Maintenance Intervalls” on page 91.

C.2 Oil Circuit Maintenance

The laid down intervals must be heeded in order to avoid serious damage to the motor!

The first oil change should be carried out 35 hours after running time. Thereafter every 100 hours. SAE 30 is to be used for temperatures over 20°C and SEA 20 for temperatures between 5°C and 20°C. Viscosity SAE 10W or 10W-30 is laid down for temperatures below 5°C.

Required oil:

See Table E.2, “Operating Resources,” on Page 92 and Table E.4, “Technical Data Engine,” on Page 99

An oil drainage hose is fitted in the sound cover for changing the oil. This is fed through the capsule to the outside.

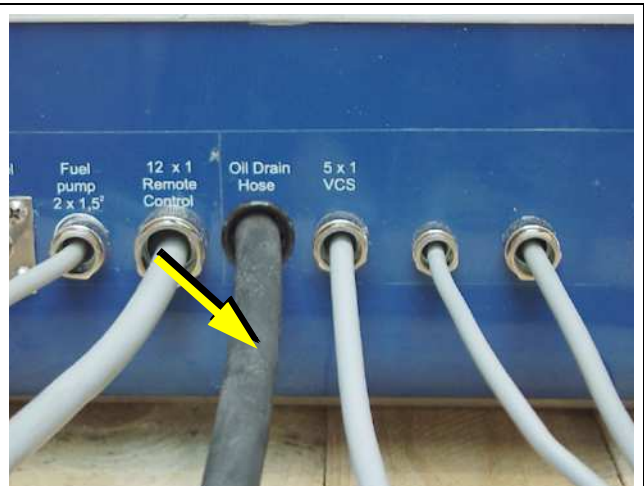


Fig. C.2-1: Oil drainage hose

Oil drain screw

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

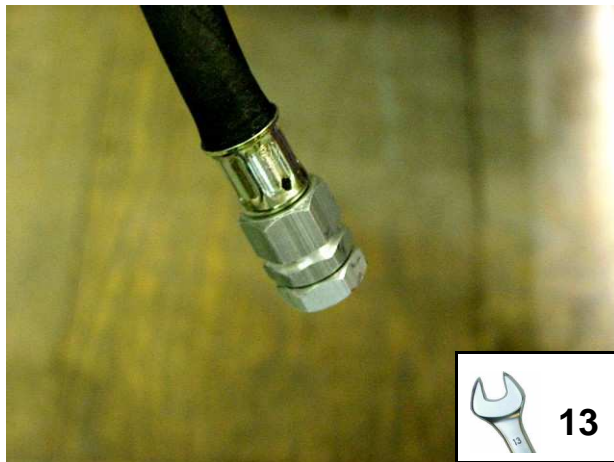


Fig. C.2-2: Oil drain screw

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. C.2-3: Oil drain pump

Oil filter change

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

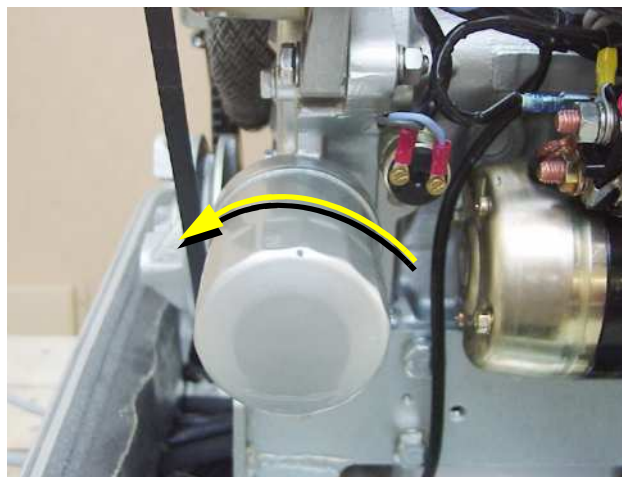


Fig. C.2-4: Oil filter



Oil filter gasket

Before the insertion of the new oil filter the gasket should be coated with some-thing oil. Tighten the oil filter only by hand.



Fig. C.2-5: Oil filter gasket



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.

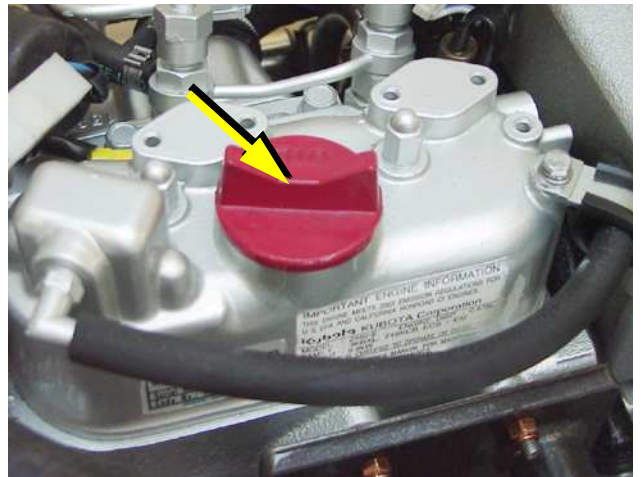


Fig. C.2-6: Oil filler neck

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.

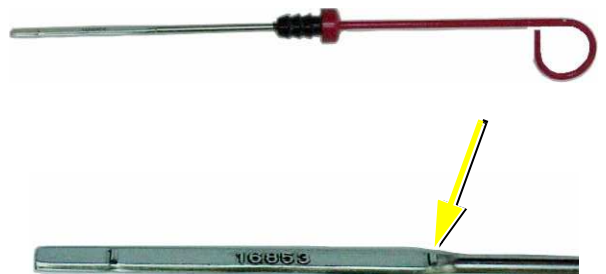


Fig. C.2-7: Oil dip stick

C.3 De-aerating 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 de-aerated after some time automatically. It is nevertheless essential to bleed the system as follows prior to the first operation (as all hoses are empty):

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

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).

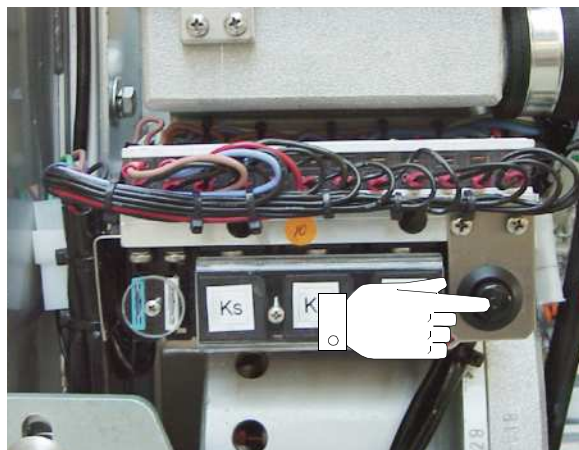


Fig. C.3-1: Failure bypass switch

After the fuel pump has been running 3 to 4 minutes because the failure bypass switch has been pushed down the bleeding 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 air bleeding screw can be screwed in again. Now stop pushing the failure bypass switch.

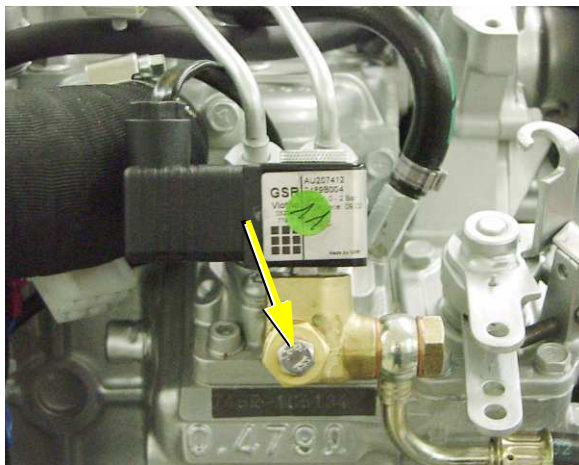


Fig. C.3-2: Fuel stop solenoid



Now the unit can be started by pushing the "START"-button. The unit should start after a short while. Should the unit not start the pipe union nuts of the injection nozzles has to be loosen and lift the injection pipe a few millimeter. Try again to start the unit. After the unit has started the pipe union nut has to be tightened again.

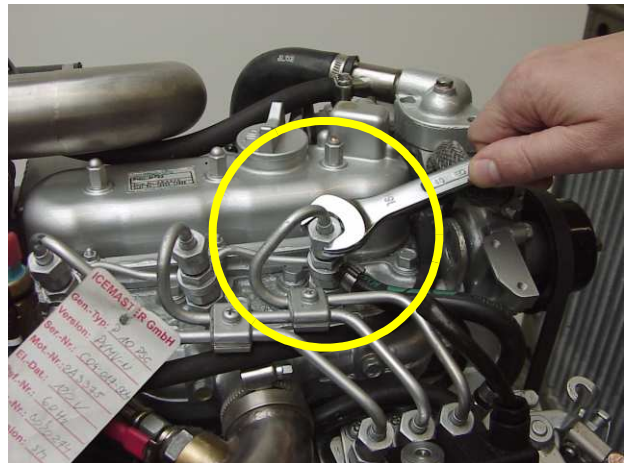


Fig. C.3-3: Injection nozzle

The injection line must be raised some millimeters.

Main power switch "OFF".



Fig. C.3-4: Injection nozzle

C.3.1 Exchange of the fuel filter

The exchange of the filter depends on the contamination of the fuel, should take place at least all 300 operation hours. Before the exchange 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. C.3-1: Fuel filter

C.4 Ventilation of the coolant circuit

Particular hints for the ventilation of the cooling system

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

Open ventilation screw at the internal cooling water pump.



Fig. C.4-1: Ventilation screw

Open ventilation screw at the thermostat housing.



Fig. C.4-2: ventilation screw



Open ventilation screw at the water-cooled silencer.



Fig. C.4-3: ventilation screw

Pour in coolant through the cooling water filler cap. The coolant flows in very slow. (External Radiator)

If you notice that the coolant level don't falls anymore, close bleed screws and start the generator.



Fig. C.4-4: External radiator

The generator should operate up to 60 Seconds.

Switch generator OFF.

Open coolant filler cap again and the bleed screw at the same time.

Pour in coolant again



Fig. C.4-5: Cooling water filler neck

Repeat this process several times.

The generator can be started for 5 minutes, if there is no change in coolant level. Bleeding must be then repeated two or three times.

It makes sense to repeat the process of ventilation after a couple of days to ensure that eventually remaining bubbles be removed out from the system

If the radiator should be vertically installed, or even under the vehicle floor, so that an external balance container is used, filling up may only happen over this balance container, and not over the radiator.

Now the cooling water is only filled over the external expansion tank.

This is connected by a hose with the gen-set. 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.



Fig. C.4-6: External expansion tank

C.5 Exchange the air filter

Open the closure at the housing front side.

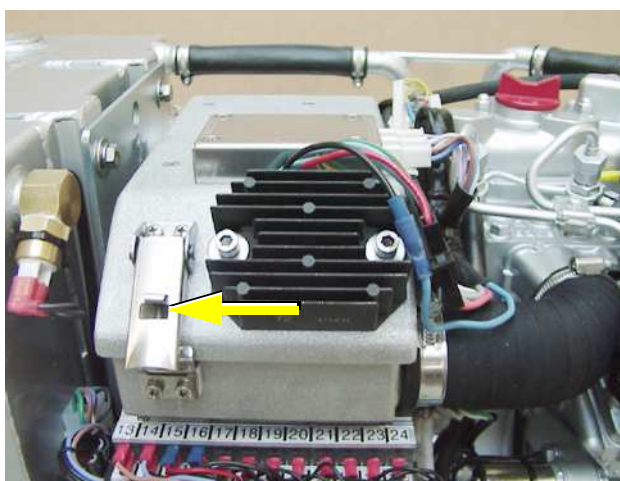


Fig. C.5-1: Air filter



Open the closure at the housing back side.



Fig. C.5-2: Airfilter

Loose the wing bolt inside the housing and lift the frame that holds the air filter (Microstar LX 152).



Fig. C.5-3: Air filter mat

C.6 Exchange of the V-belt

The relative high ambient temperature in the closed sound insulated capsule (about 85°C) can be a reason for a reduced lifespan of the v-belts. It is possible that the "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-pocket.

Loose the attachment screw at the clamping device of the DC-alternator.

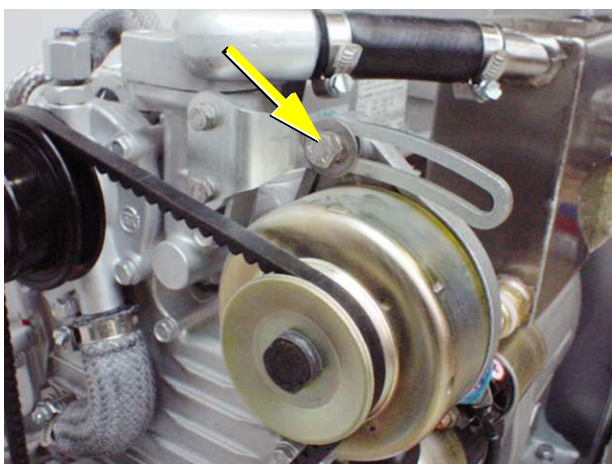


Fig. C.6-1: Alternator 12V

Loose the attachment screw below the DC-alternator

Press the alternator to the direction of the thermostat housing.

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

Stretch the v-belt by pulling the return pulley back.

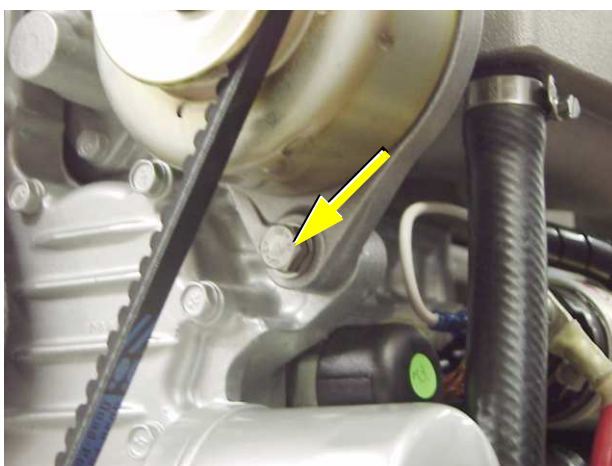


Fig. C.6-2: Alternator 12V

The drive belt should be able to be pressed approx. 10mm with the thumb.

Tighten the fixing screws above and below the return pulley.

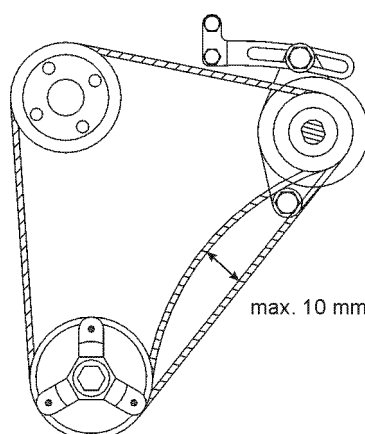


Fig. C.1: V-Belt

For all maintenance and service requirements see the checklist in the „Installation Inspections“.

D. Generator Failure

D.1 Overloading the Generators

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

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

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

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

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

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

Effects of Short Circuiting and Overloading on the Generator

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

Overloading the Generator with Electric Motors

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

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

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



D.1.1 Automatic Voltage Monitoring and Auto-Shut Down

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

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

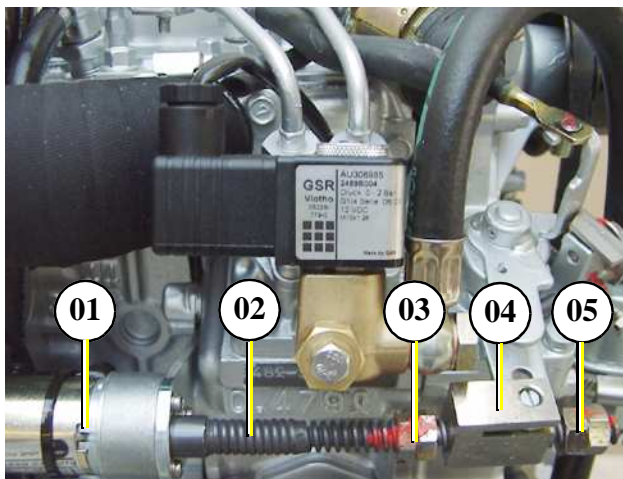
D.1.2 Adjusting Instructions for the Spindle of the actuator

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

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

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

ATTENTION! Special caution, rotary sections can be touched.



- 01. Actuator
- 02. Spiral thread spindle
- 03. Regulating nuts max. revolution
- 04. Spindle nut with rev regulator lever
- 05. Regulating nuts min. revolution

Fig. D.1.2-1: Actuator

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

D.1.3 Adjustment of the maximum upper revolution

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

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

01. Countering nut
02. Adjusting screw for upper limitation
03. Speed regulator lever

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

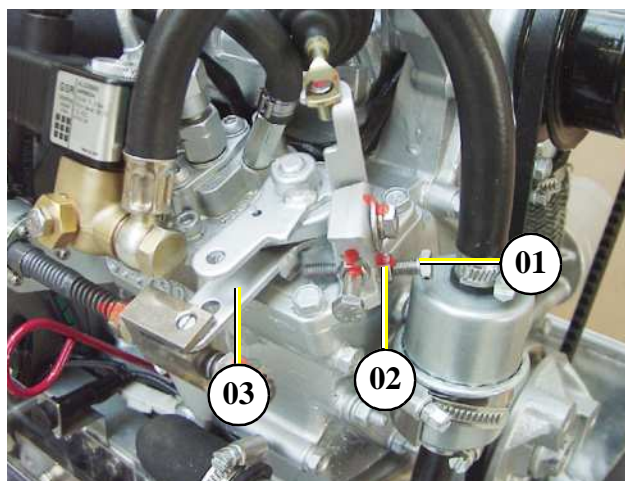


Fig. D.1.3-1: revolution



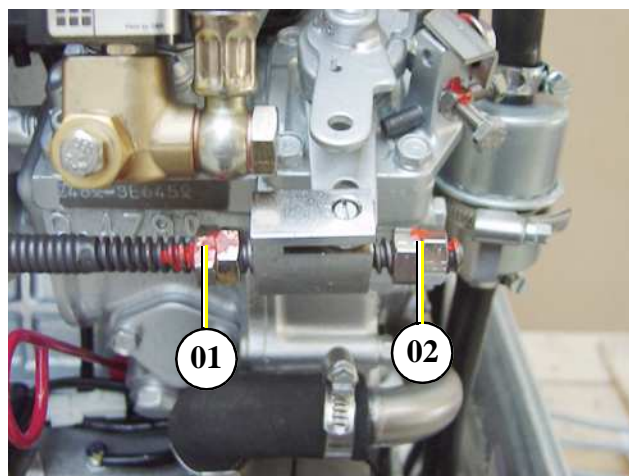
D.1.4 Adjustment of the normal rev limitation

Adjusting the lower limitation:

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

Adjusting the upper limitation:

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



01. Adjusting nut for upper rev limitation
02. Adjusting nut for bottom rev limitation

Fig. D.1.4-1: Normal rev setup

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

D.1.5 Lubrication of the spiral thread spindle



The spiral thread spindle must be lubricated carefully and regularly. Please only use a temperature independence lubricant (up to 100°C) which is also equipped with "emergency run qualities".

Spread also lubricant to the end of the nuts.

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

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

01. Rev actuator

02. Spiral thread spindle

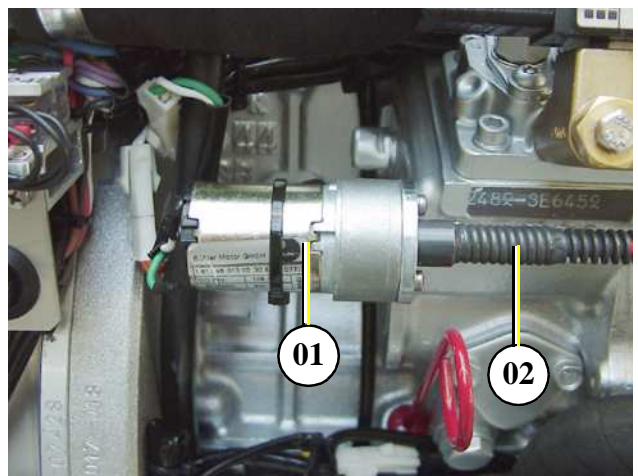


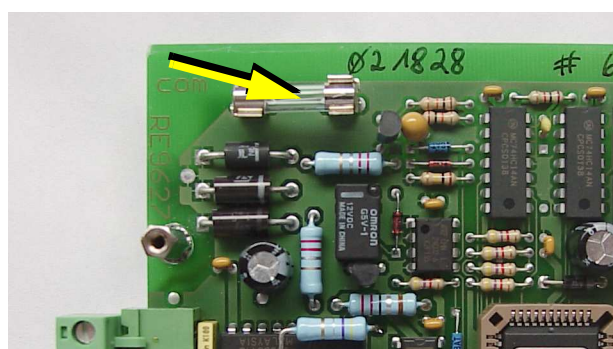
Fig. D.1.5-1: Actuator

D.1.6 Effects of a longer overload of the generator to the actuator

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

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

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



Change fuse here
(1,6A slow to blow)

Fig. D.1.6-1: VC- fuse

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

Possible disturbances in the area of the rev regulation "VCS"

Failure	Cause
The spindle of the actuator jams	<ul style="list-style-type: none">• not regularly lubricated.• surface is mechanical damaged.• actuator is defect (short of winding).• defect of the VCS control.• signal DC missing.• limiting nut jams the spindle.
Fuse on the printed circuit board of the VCS control is melted.	<ul style="list-style-type: none">• constant overload of the generator.

Steps to check the voltage control by a disturbance:

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

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

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

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

1. The motor turns only weak:
 - The actuator has shorts in the winding and must be changed. (pay attention that the generator is not overloaded anymore.)
2. The actuator does not move but the spindle can be turned manually:
 - Disconnect the plug of the actuator. Connect provisional an external voltage source 12V-DC to the motor. If the actuator with the external voltage supply does not turn likewise, the actuator is defective. Exchange actuator.

The actuator don't turns	The actuator is defect and have to be changed.
The actuator turns and works faultless:	<ol style="list-style-type: none"> 1. Check the fuse on the VCS printed circuit board. 2. Check if the sense voltage is wired to the VCS circuit board. 3. Check if the VCS supply voltage is wired to the VCS. 4. Check if the VCS outlet signal for the actuator is wired.

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

Check the limitation of the generator voltage

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

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

D.1.7 Low Generator Output Voltage



ATTENTION! Before working on the system read the see "Safety Precautions" on page 10.

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

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

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



D.2 Testing Generator Stator Windings

ATTENTION! Before working on the system read the see "Safety Precautions" on page 10.



D.2.1 Testing Generator Stator Winding for "Shorts" to Ground

The generator stator windings can be tested as follows:

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

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

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

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



Rectifier at the Panda generator

Fig. D.2.1-1: Rectifier

Wiring diagram

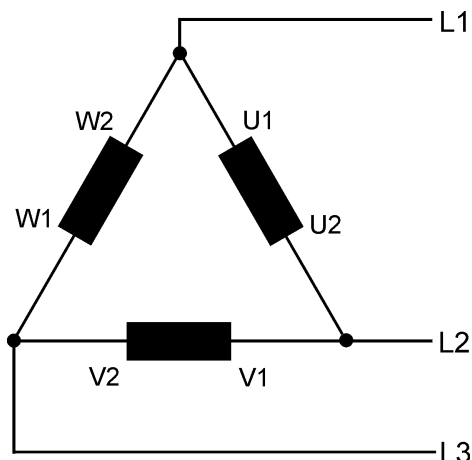


Fig. D.2.1-2: Wiring diagram

D.2.2 Coil Resistance Measurements in Stator Windings

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

U1-U2, V1-V2, W1-W2

Checking windings.

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

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

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

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



D.2.3 Measuring the Coil Inductive Resistance

Leider erlaubt die Überprüfung des Ohmschen Widerstandes einer Wicklung noch keine zuverlässige Aussage über den Zustand der Wicklung. Wenn jedoch bei den ohmschen Widerstandswerten Ungleichheiten zwischen den Wicklungsteilen auftreten, ist das ein sicheres Zeichen dafür, daß die Wicklung defekt ist. Man kann aber nicht den Gegenschuß daraus ziehen, dazu müßte dann noch der induktive Widerstand der Wicklung gemessen werden. Hierzu ist ein Spezialmeßgerät erforderlich, mit dem die Induktivität einer Wicklung gemessen werden kann.

Die Induktivität wird in der gleichen Weise gemessen wie auch der Ohmsche Widerstand, d.h. es werden die Wicklungsteile verglichen. Der Wert wird in mH (milli Henry) angegeben.

Beachte: Diese Werte hängen stark von der Messmethode ab (z.B. Qualität des Messgerätes)

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

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

U1-U2, V1-V2, W1-W2

D.3 Starting Problems

D.3.1 Fuel Solenoid Valve and Hubmagnet

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

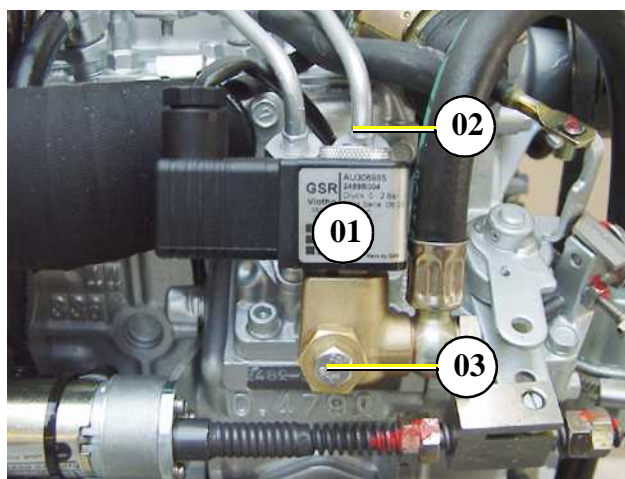


Fig. D.3.1-1: Fuel solonoid valve

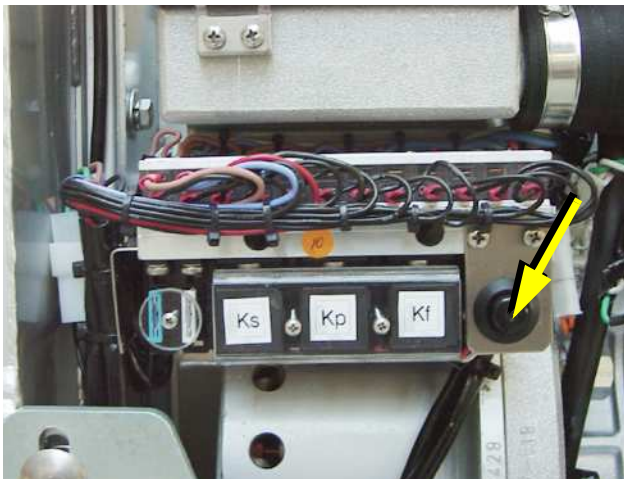


Stop solenoid for engine stop

Fig. D.3.1-2: Stop solenoid

D.3.2 Failure Bypass Switch

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



Failure bypass switch

Fig. D.3.2-1: Failure bypass switch



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

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

BEWARE:

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

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

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

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

D.4 Troubleshooting Table

For Troubleshooting see Table E.3, "Troubleshooting," on Page 94



E. Appendix

E.1 Maintenance Intervalls

After operating hours:	35-50h	100h	200h	300h	400h	500h	600h	700h	800h	900h	1000h
Check all coolant and water hoses	X	X	X	X	X	X	X	X	X	X	X
Check waterpump	X	X	X	X	X	X	X	X	X	X	X
Empty water separator/fuel pre-filter (if present)	X	X	X	X	X	X	X	X	X	X	X
Change motor oil and oil filter		X	X	X	X	X	X	X	X	X	X
Check air intake suction & flow, air filter, intake manifold, etc.	X	X	X	X	X	X	X	X	X	X	X
Check fuel lines	X	X	X	X	X	X	X	X	X	X	X
Readjust valve clearance (every 500 h only)	X					X*)					X*)
Replace valve cover gasket (every 500 h only)	X					X*)					X*)
Check all sensors & switches a) Coolant temperature sensor b) Exhaust temperature sensor c) Oil pressure sensor	X	X	X	X	X	X	X	X	X	X	X
Check all securing and fastening screws: a) All base mount screws b) Exhaust manifold screws c) Starter fixing d) Connection screws generator/engine	X	X	X	X	X	X	X	X	X	X	X
Check all electrical cables	X	X	X	X	X	X	X	X	X	X	X
Check battery	X	X	X	X	X	X	X	X	X	X	X
Idle run voltage (Volts)	X	X	X	X	X	X	X	X	X	X	X
Voltage with load (Volts)	X	X	X	X	X	X	X	X	X	X	X
Current with load (Amperes)	X	X	X	X	X	X	X	X	X	X	X
Engine speed (rpm) or frequency (Hz)	X	X	X	X	X	X	X	X	X	X	X
Change of the fuel filter	X	X	X	X	X	X	X	X	X	X	X
Change of the air filter	X		X*)		X*)		X*)		X*)		X*)
Cooler fan under load at bridged temperature sensor/ temperature switch	X	X	X	X	X	X	X	X	X	X	X
Uptake of the ambient temperature	X	X	X	X	X	X	X	X	X	X	X

After operating hours:	35-50h	100h	200h	300h	400h	500h	600h	700h	800h	900h	1000h
Temperature switch / watertemperature IN/OUT, at full load and max. speed of cooler, bridged temperature sensor / temperature switch	X	X	X	X	X	X	X	X	X	X	X
Actuate all ventilation valves -screws	X	X	X	X	X	X	X	X	X	X	X
With actuate the failure bypass switch check if the waterpump works faultless (only at gents without v-belt driven waterpump)	X	X	X	X	X	X	X	X	X	X	X
Check v-belt	X	X	X	X	X	X	X	X	X	X	X
Pressure test the injection nozzle (every 2000 h)											

*) or every 12 month

The motor manufacturer's regulations and instructions must be observed, especially operating and inspection instructions ! (See the motor manufacturer's operating instructions.)

E.2 Operating Resources

E.2.1 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 für Diesel-motoren.

Examples for diesel engine oil:

API CC Engine oil for small demands

API CG Engine oil for highest demands, turbo-tested

Fischer Panda recommend the API-class CF !



Motorenölsorte	
über 25°C	SAE30 oder SAE10W-30 SAE10W-40
0°C bis 25°C	SAE20 oder SAE10W-30 SAE10W-40
unter 0°C	SAE10W oder SAE10W-30 SAE10W-40

E.2.2 Coolant specification

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

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

Engine coolant automotive industry Product description		
Product name	GLYSANTIN ® PROTECT PLUS / G48	
Chemical nature	Monoethylenglykol with inhibitors	
Physical form	Liquid	
Chemical and physical properties		
Reserve alkalinity of 10ml	ASTM D 1121	13 – 15 ml HCl 01 mol/l
Density, 20°C	DIN 51 757 procedure 4	1,121 – 1,123 g/cm ³
Water content	DIN 51 777 part 1	max. 3,5 %
pH-value undiluted	AST M D 1287	7,1 – 7,3

Mixture ratio coolant/antifreeze G48	
Water/antifreeze	Temperature
70:30	-20°C
65:35	-25°C
60:40	-30°C
55:45	-35°C
50:50	-40°C

E.3 Troubleshooting

GENERATOR OUTPUT VOLTAGE TOO LOW

If the generator delivers less than 80V current ("undervoltage"), there can be various reasons for this:

Cause	Solution
Generator is overloaded.	Reduce the electrical load. (Switch off consumers)
Motor is not reaching the rated rpm.	Refer to "motor faults" section.
Actuator is not in maximum position.	Check actuator resp. renew.
VCS-voltage controller defective or wrong adjusted.	Check resp. renew.

GENERATOR VOLTAGE TOO HIGH (MORE THAN 80V)

The following reasons may be the cause, if the generator delivers more than 80V ("overvoltage"):

Cause	Solution
The engine is running at the wrong speed.	Check the speed of the motor with a rev or frequency counter, set the correct speed.
VCS-voltage controller defective or wrong adjusted.	Check resp. renew.
Actuator defective.	Check resp. renew.

GENERATOR VOLTAGE FLUCTUATES

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

MOTOR DOES NOT TURN OVER WHEN STARTING

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

MOTOR TURNS OVER BUT DOES NOT START	
Cause	Solution
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.	<ol style="list-style-type: none"> 1. Turn generator "OFF" at control panel. 2. Remove the glow plug (see Kubota-manual). 3. Rotate the motor by hand carefully. 4. Check if there is water in the oil and change both oil and filter if necessary. 5. Determine cause for excess water in the combustion chamber. The excess water can be caused by a defective air vent in the cooling water system, which should be checked and cleaned, or replaced if faulty.

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

DROP IN THE SPEED OF THE MOTOR	
Cause	Solution
Too much oil.	Drain oil.

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

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

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

SOOTY, BLACK EXHAUST	
Cause	Solution
Generator is overloaded.	Check electrical load and switch off unnecessary consumers.
Insufficient intake air.	Check intake air filter; clean if necessary.
Fuel injector nozzles faulty.	Replace injector nozzles.



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

GENERATOR MUST BE SHUT OFF IMMEDIATELY IF:	
Cause	Solution
<ul style="list-style-type: none"> - 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 (\pm). Check connection to VCS.
If the VCS electronics are faulty, the generator can still run by over-riding the system. To override the VCS, disconnect the plug and jumper the contacts. Loosen the connecting rods motor from the injection pump regulator and turn screw to a max. voltage of 33V.	





E.4 Technical Data Engine

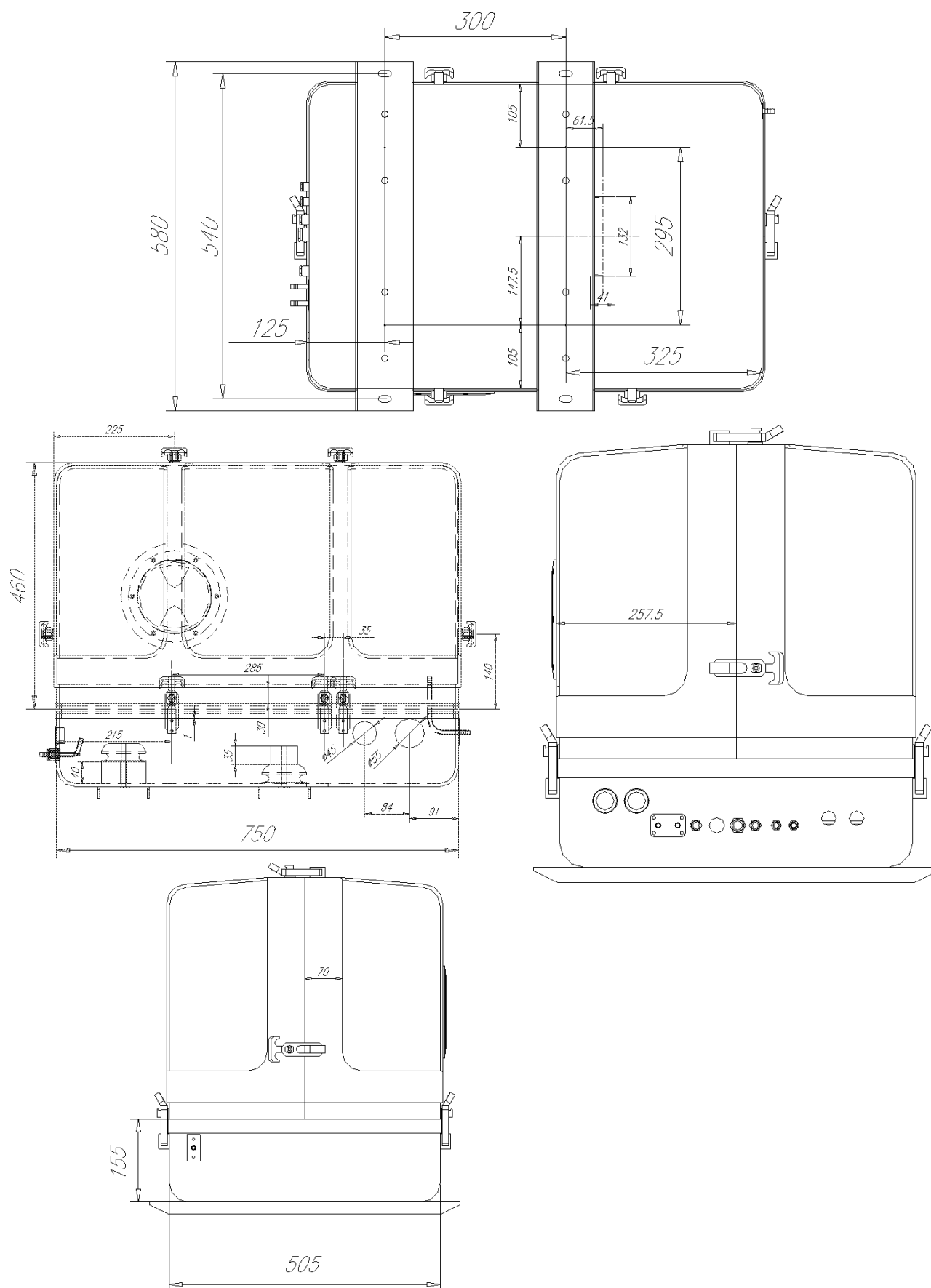
Generator	Panda AGT 6000 PVMV-N
Type	Kubota Z 482
Governor	mechanisch + VCS
Automatic Startbooster	nein
No. cylinders	2
Bore	67 mm
Stroke	68 mm
Stroke volume	479 ccm
max. Power (DIN 6271-NB) at 3000rpm	9,32 kW
Rated speed at 28,8V, 200A	2800 UpM
Valve clearance (engine cold)	0,2 mm
Cylinder head nut torque	42 Nm
Compression ratio	23:1
Lubrication oil capacity	2,5 l
Fuel consumption ^a	ca. 0,63 - 1,687 l
Oil consumption	max. 1% vom Kraftstoffverbrauch
Permissible max. permanent tilt of engine	a) 25° quer zur Längsachse b) 20° in Längsrichtung

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

E.5 Technical Data Generator

Generator	Panda AGT 6000 PVMV-N
Permanent output power	6 kW , 3000mtr alt., 50°C
Output voltage	24 V
Output current	200 A
Frequency	2800 UpM
Stator Da	240 mm
Stator Di	170 mm
Rotor Lfe	40 mm


E.6 Capsule Measurements



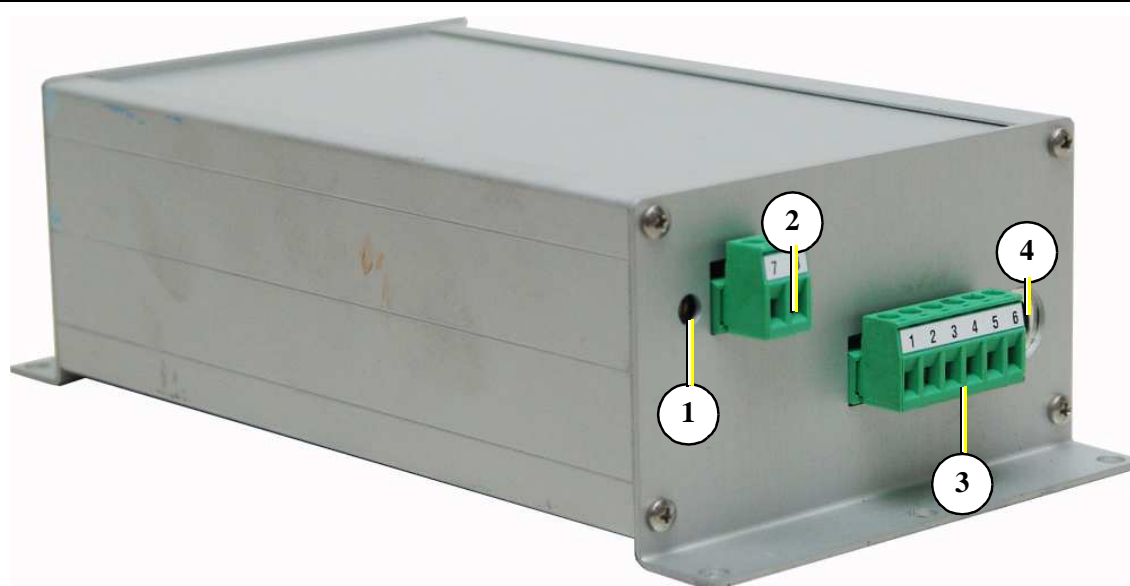
Fischer Panda Datasheet

A. VCS-AGT-U/I

A.1 VCS-AGT-U/I Versions

Art. Nr. 	Set point	Art. Name
F1RORE9627-012-212	12V	VCS-AGT-U/I 12V= @60mV
F1RORE9627-024-212	24V	VCS-AGT-U/I 24V= @60mV
F1RORE9627-036	36V	VCS-AGT-U/I 36V= @60mV
F1RORE9627-048	48V	VCS-AGT-U/I 48V= @60mV
F1RORE9627-012-212	72V	VCS-AGT-U/I 72V= @60mV
F1RORE9627-012-212	80V	VCS-AGT-U/I 80V= @60mV
auf Anfrage / on request	96V	VCS-AGT-U/I 96V= @60mV
auf Anfrage / on request	115V	VCS-AGT-U/I 115V= @60mV
F1RORE9627-120	120V	VCS-AGT-U/I 120V= @60mV
F1RORE9627-144	144V	VCS-AGT-U/I 144V= @60mV
F1RORE9627-180	180V	VCS-AGT-U/I 180V= @60mV
auf Anfrage / on request	300V	VCS-AGT-U/I 300V= @60mV
auf Anfrage / on request	320V	VCS-AGT-U/I 320V= @60mV
auf Anfrage / on request	336V	VCS-AGT-U/I 336V= @60mV

A.2 Voltage control system

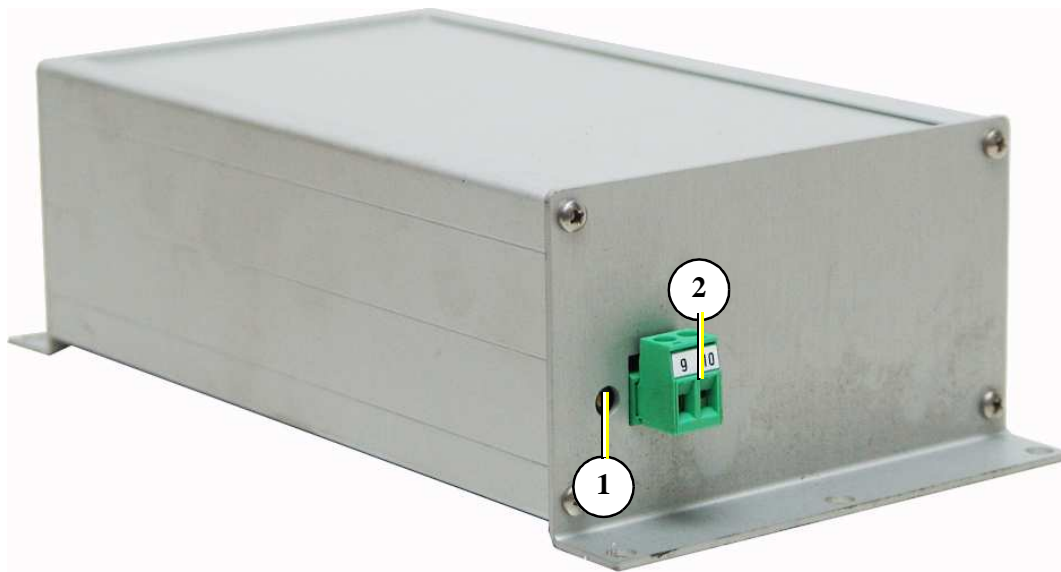


1. Clamp 14-16
2. Potentiometer for the voltage

3. Clamp1-6
4. Programming



Fischer Panda Datasheet



1. Clamp 9/10

2. Potentiometer for the Current

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

Nr.	Kurzbezeichnung	E/A	Benennung / Funktionsbeschreibung
1	+ Actuaror	A	Out (+) for actuator
2	- Actuator	A	Out (-) for actuator
3	+12V	E	Operation voltage(+); 12V-Automotive
4	0V	E	Operation voltage(-); 12V-Automotive
5	AC Controllamp	A	to 0V - Optional
6	VCS on	E	12V: VCS is on / open : VCS is off
7	Mesurement voltage +	E	Mesurement voltage (+) from the generator
8	Mesurement voltage -	E	Mesurement voltage (-) from the generator
9	Mesurement current +	E	Mesurement current (+) from the generator
10	Mesurement current -	E	Mesurement voltage (-) from the generator

Fig. A.2-1: Clamps of the VCS

The poti next to clamp 7/8 is needed for adustment of the mesurement voltage and should be done by an service technican only

The poti next to clamp 9/10 is needed for adustment of the mesurement current and should be done by an service technican only

A.2.1 Gernal working of the VCS

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

The mesurement voltage is taken from the generator by an shunt which has 60mV nominal.

Fischer Panda Datasheet

A.2.2 Safety instructions for the voltage control

- A broken Cable in the measurement line will be notice by the VCS and the generator will slow down and stop.
- A short circiut in the measurement line or a wrong pol connection is not noticed by the VCS (its like that there is no voltage). The voltage control in this vase ist out of funktion. It is necessary at the installation to check the right working of the VCS and a second overvoltage protection must be installed.
- For the measurement voltage a shieldet cable is needet, it must be less than 3 mtr long. The shield should be connected to ground at one side.

Note the safety instruction in the generator manual

Please Note

- Run the generator with closed sound cover only
- Recommend: install a smoke connection.
- Ask for regular service





Fischer Panda Datasheet

blank



Fischer Panda Datenblatt/Datasheet

A. Battery monitor in DIN-tracks housing (RE9517)

 Fischer Panda	Art Nr..	see technical data
 Fischer Panda	Bez.	Batterymonitor

	Document	Hardware	Software
Actual:	Rev.2.0_05.06.2007	Rev.1.2_24.02.2004	?
Replace:	Rev.1.0_24.02.2004	Rev.1.2_24.02.2004	?
Replaced by:	-----	-----	-----

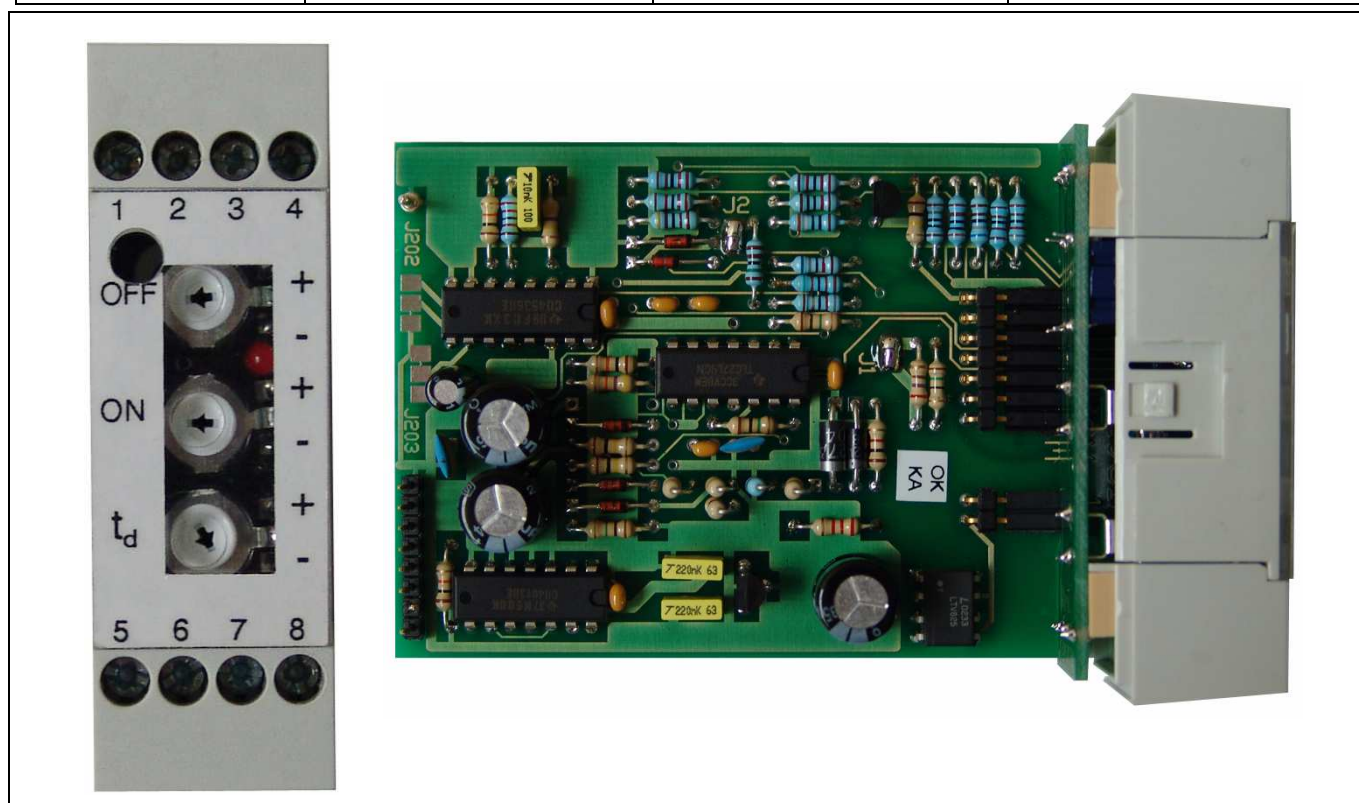


Fig. A.1: Battery monitor

A.1 Safety instructions

See the safety instruction of your Generator and all other parts of your system

Electrical power: DANGER TO LIVE!

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.





Fischer Panda Datenblatt/Datasheet

A.2 Brief description

Automatic monitoring of a battery voltage. If the adjusted threshold for battery undervoltage is fallen below, then (e.g. over the AGT panel RE9513) a battery charge generator is started. If the adjusted threshold for charge voltage is crossed, then the generator - at expiration of an adjustable deceleration time - is stopped.

A.3 Function

Battery undervoltage, charge voltage and delay time can be stopped over potentiometers. If battery undervoltage was recognized, this is indicated over an LED. Threshold excesses and falling below must line up min. 40s, so that a shifting process can be released. The battery monitor supplies itself from the battery which can be supervised. The exit is electrically isolated by an opto coupler from this electric circuit. As output logic element the output transistor of the optocoupler is used. Thus the output signal is polarized and the exit must be attached correctly. A wrong polarity of the exit can lead to the destruction of the battery guard, as well as attached devices!

A.4 Technical data and settings

The battery monitor is setup for a defined voltage. (i.e. 24V or 36V). It is not possible to change these voltage.

Art. No.	Art. Name	Nominal Voltage	Mesuring Voltage cont./short time Clamp1(+) Clamp2(-)
F1RORE9517-012	Batterymonitor typ RE9517 12V-DC	12 Volt	25 V DC / 27V DC
F1RORE9517-024	Batterymonitor typ RE9517 24V-DC	24 Volt	32 V DC / 35 V DC
F1RORE9517-036	Batterymonitor typ RE9517 36V-DC	36 Volt	56 V DC / 60 V DC
F1RORE9517-048	Batterymonitor typ RE9517 48V-DC	48 Volt	86 V DC / 95 V DC
F1RORE9517-072	Batterymonitor typ RE9517 72V-DC	72 Volt	110 V DC / 120 V DC
F1RORE9517-080	Batterymonitor typ RE9517 80V-DC	80 Volt	
F1RORE9517-120	Batterymonitor typ RE9517 120V-DC	120 Volt	
F1RORE9517-144	Batterymonitor typ RE9517 144V-DC	144 Volt	

- charging rate : max 7mADC
- output (clamp 7 = positive [+], clamp 8 = negative [-])
 - max operation voltage: 35VDC
 - max backward voltage: -4VDC
 - max operation current: 10mADC
 - output is electrically isolated from the measuring input
- setting ranges:
 - charge conclusion voltage: 2.25V - 2.42V per cell
 - battery base voltage: 1.83V - 2.04V per cell
 - tolerance of the range limits: $\pm 2,5\%$
 - tolerance of the operation points: $\pm 1\%$



Fischer Panda Datenblatt/Datasheet

- charge conclusion delay time: 10min - 2h
- tolerance of the delay time: $\pm 20\%$

The adjusted value for charge conclusion voltage can be based on the clamp 3 against clamp 2 (minus). The adjusted value for battery undervoltage can be based on the clamp 4 against clamp 2 (minus). In each case the operation voltage per cell is measured. Absolute operation voltage can be determined, by multiplying measured voltage with the number of cells. For the measurement use only a multimeter with an impedance $\geq 10\text{M}\Omega$, since otherwise substantial measuring errors arise.

Direction of rotation of the trimmers: Turn in the clockwise direction = larger value

By a drilling below clamp 1 is accessible with a small screwdriver a tracer, which makes it possible, for test purposes, to switch between the two switching status back and forth. This functioned however only if the battery voltage is within the adjusted borders. Outside of the limit values the battery guard cannot be affected by the tracer.

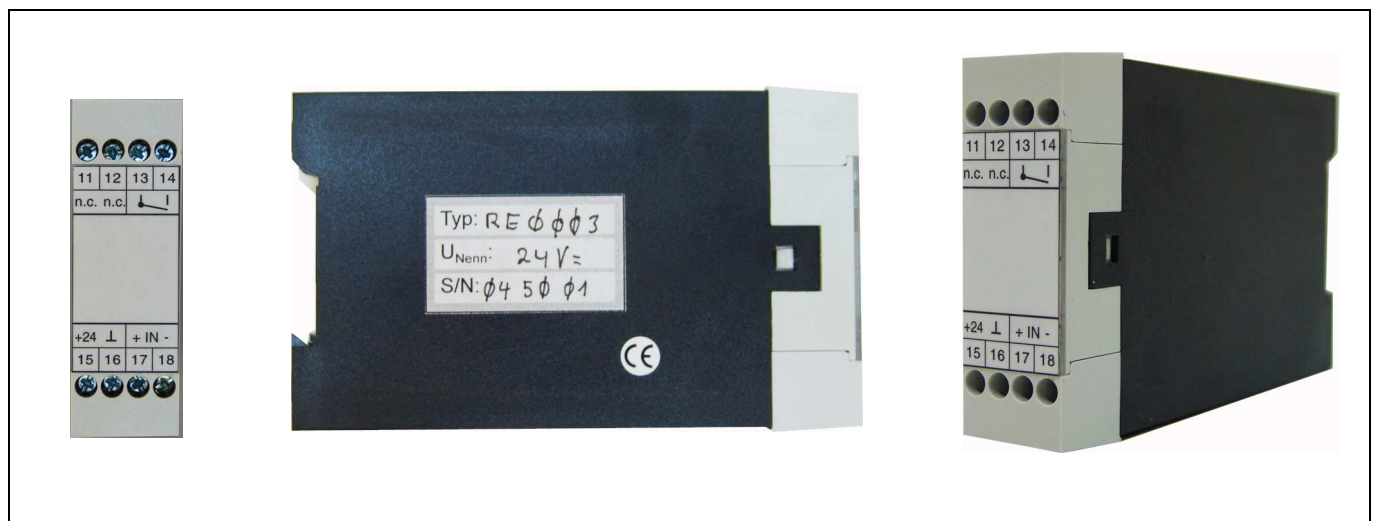
Connction examples: Connection to AGT-Panel

	Battery monitor	AGT-Panel
Output +	clamp 7	clamp 14
Output -	clamp 8	clamp 13

The cable connection between battery monitor and control panel must be implemented as twisted or shielded cable.

A.5 Additional products

Relay switch RE0003 for Batterymonitor Fischer Panda Art.No.: F1RORE0003

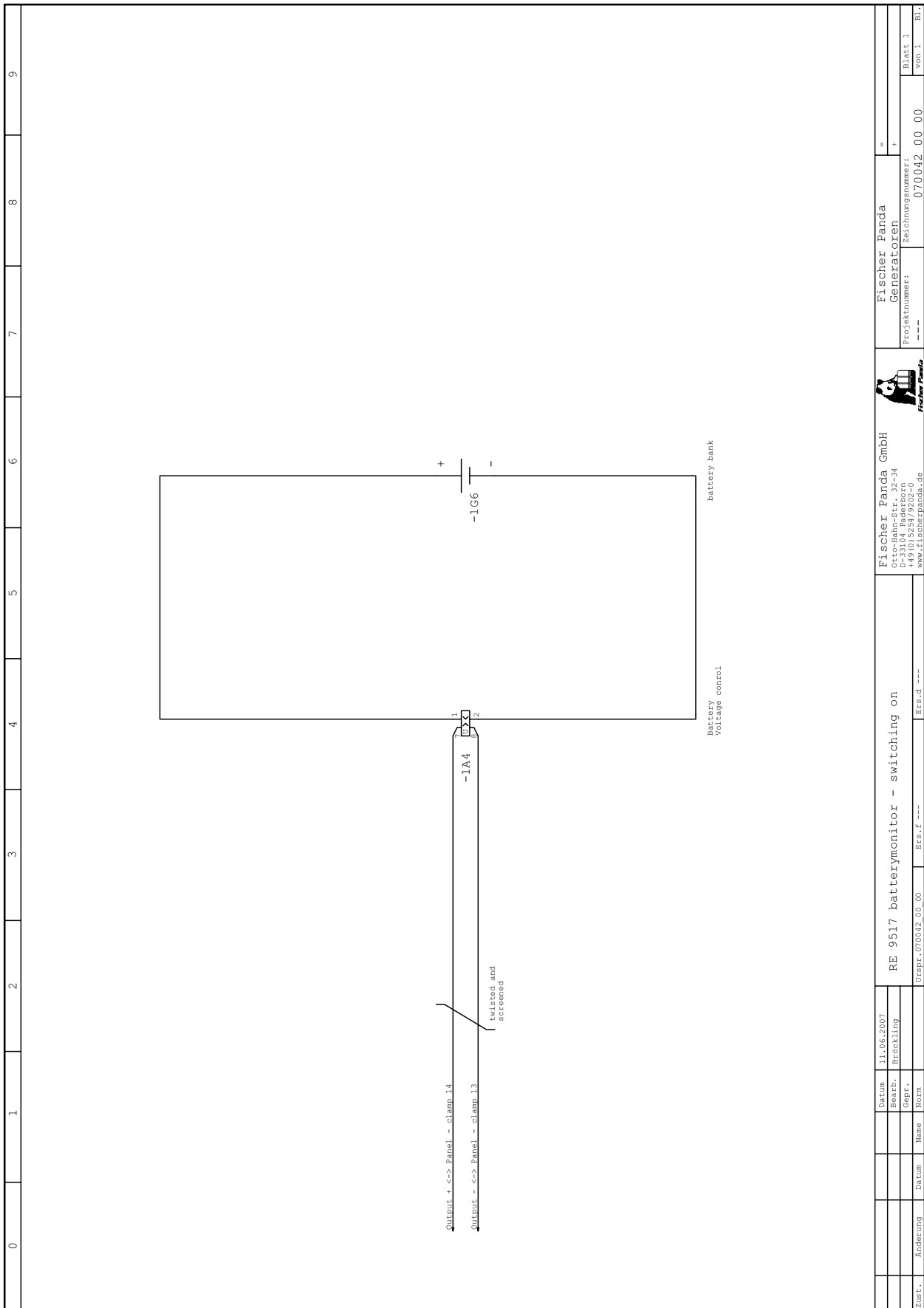


Ad-on for the Batterymonitor RE9517 (with transistor out) to get a Relayswitch

If the Batterymonitor recognise Bat-Low (LED turn on) the Relay switch close. For additional information see RE0003 Datasheet





Fischer Panda Datenblatt/Datasheet





Fischer Panda Datenblatt/Datasheet

A. Intelligent stepless automatic controller for DC-fan

 Fischer Panda	Art Nr..	F1RORE0201V11
 Fischer Panda	Bez.	Intelligent stepless automatic controller for DC-fan

	Document	Hardware	Software
Actual:	Rev.2.1_23.04.2007		
Replace:	Rev.01_07.04.2004	-----	-----

23.04.2007: New layout of the Datasheet

I





Fischer Panda Datenblatt/Datasheet

A.1 Brief description

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

A.1.1 Function

The speed regulation of the fan is made by pulse tracing modulation (PWM) of the operating voltage. Pulse/no pulse ratio becomes over an external temperature sensor (NTC resistance to attach at clamp 7 and 8) dependent on the coolant temperature. Between the lower limit temperature (starting temperature) and the upper limit temperature the fan is controlled with 30 to 100% of the available operating voltage (PWM = 30% to 100%).

Potentiometer for adjustment concerning temperature and PWM behavior

Poti Start:	Adjusting the starting temperature (fan start-up). The start temperature is with left stop 60°C and with right stop 80°C. Ex factory a starting temperature of 70°C is adjusted (potentiometer position: In the middle).
Poti Window:	Adjusting the temperature window: With the potentiometer "Window" the size of the window between starting temperature and temperature for full number of revolutions (upper limit temperature) can be adjusted. The temperature window can be adjusted from 5°C to 20°C. Is the starting temperature adjusted to 70°C and the temperature window to 10°C thus the fan start-up with 70°C and reaches the maximum speed with 80°C (upper limit temperature). Ex factory a temperature window of 12,5°C is adjusted (potentiometer position: In the middle).
Poti Freq:	Adjusting of the PWM frequency. Desired to many customers a potentiometer was added for changing the PWM frequency. A selection of the frequency between approx.. 1,7 and 3,5kHz is possible, which can serve for the avoidance of unwanted oscillation/resonances. Ex factory a PWM frequency of 2 kHz is adjusted.

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

extern:	Over this temperature sensor the coolant temperature is collected. The starting temperature (fan start-up) and the upper limit temperature can be adjusted by means of potentiometers present at the plate. The PWM ratio starts with the exceeding of the starting temperature with approx. 40% (for 2 seconds), so that the fan starts reliably. According to expiration of the 2 seconds the PWM ratio is determined by coolant temperature and potentiometer adjust. Since the coolant temperature will not continue to rise in the 2 seconds, the PWM ratio will jump back to the minimum value of 30%. At, from here, far rising coolant temperature, the PWM ratio will then rise linear with the temperature. If the upper limit temperature is nearly reached, the PWM ratio rose to 85%. By 85% to 100% PWM ratio with reaching the upper limit temperature switchching over is made by one step, in order to avoid very short turn-off times. Likewise switch-back is made with falling coolant temperature of 100% to 85% PWM ratio. If the coolant temperature falls under the starting temperature, the minimum PWM ratio is not fallen below of 30%, but remains constant. If the coolant temperature sinks approx. 3°C under the starting temperature, then the fan is switched off completely. All data exclusively apply on use of the temperature sensor type S891-100k of the manufacturer Epcos.
----------------	---



Fischer Panda Datenblatt/Datasheet

intern:	Over this temperature sensor the temperature of the output stage is collected. If the temperature of the output stage rises over 85°C, the PWM ratio, independently of the coolant temperature, is set to 100%, in order to avoid the switching losses and cool the output stage down again. If the temperature of the output stage continues to rise nevertheless and beyond 90°C, the fan controller switches itself off. NOTE: The cooling of the generator is not ensured anymore. If the output stage temperature sinks again under 85°C, the fan controller restarts itself. Such output stage temperatures cannot occur however with intended use of the equipment.
----------------	---

Light emitting diodes: The 3 light emitting diodes (LED's) indicate the operating condition of the fan controller and have the following meaning:	
LED (green):	Shines with normal operation. After the self check and successful recognizing of the sensors the fan controller jumps into the normal operating condition, in which the fan regulates, if the temperature lies in the appropriate range.
LED (yellow):	Shines if the fan controller is in slave-mode.
LED (red):	Shines with the occurrence of the following errors: <ol style="list-style-type: none"> 1. Incorrect external temperature sensor. If the temperature sensor for the cooling water is defective or the feeder line to it interrupted (cable break), then the fan is accessed with 100% PWM. 2. Incorrect internal temperature sensor. If the temperature sensor for the output stage is defective or the feeder line to it interrupted (cable break), then this is indicated over the LED. The fan controller continues working normally. 3. Overheating of the output stage. If the output stage of the fan controller becomes too hot, then this switches itself off. Please read in addition the description of the function of the internal temperature sensor.

A.1.2 Master - Slave - Operation

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

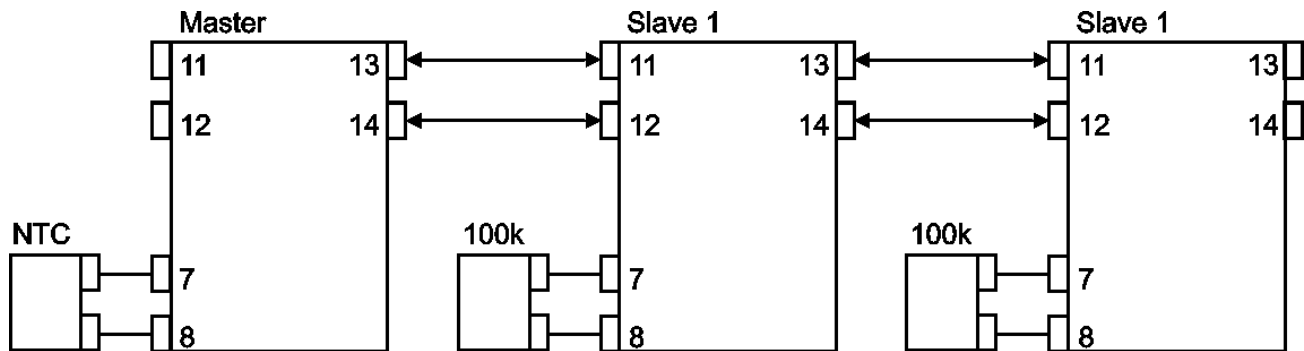
On the connection between master and slave the PWM signal of the masters will transfer. The slave takes over of it the PWM ratio and the frequency. The slave spends its PWM impulse only then if that of the masters is terminated. Thus even load of the current supply is reached. The second slave (if available)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

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

The pluggable plug-in for the master-slave-connection and the 100k fixed resistor belong not to the normal scope of supply and must be ordered separately.



Fischer Panda Datenblatt/Datasheet



A.1.3 Function of the clamps for the Master-Slave-Operation

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

A.1.4 Remote controlled switching on and off of the fan controller

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

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

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



Fischer Panda Datenblatt/Datasheet

A.1.5 12V / 24V - Operation

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

Main fuse (flat fuse on the printed circuit board):

12V-operation: 50A flat fuse

24V-operation: 30A flat fuse

Output fuse (plug fuse on the terminal block, each two pieces):

12V-operation: 25A plug fuse

24V-operation: 20A plug fuse

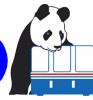
A.2 Technical Data

Characteristics	
closed current (electronics off)	0,5mA
closed current (electronics on)	10 - 15mA
Benchmark figure of the temperature control:	
fan start-up	60°C - 80°C
max. number of revolution	65°C - 100°C
tolerance of the temperatures	± 5%
Maximum ratings	
maximum ambient temperature (for operation)	50°C
Maximum ratings: Battetry operation 12V	
nominal load operating voltage (continuity)	11 VDC - 14.4 VDC
load operating voltage (15min)	- 16.0 VDC
maximum idle speed operating voltage (3 sec)	17 VDC
nominal load current (continuity)	40 A
maximum load current (3 sec)	44 A
nominal valtage fan	12 VDC
Maximum ratings: Battery operation 24V	

**Fischer Panda Datenblatt/Datasheet**

nominal load operating voltage (continuity)	18 VDC - 28.0 VDC
load operating voltage (15min)	- 28.8 VDC
maximum load operating voltage (3 sec)	30 VDC
idle speed voltage (continuity)	34 VDC
maximum idle speed operating voltage (3 sec)	36 A
nominal load current (continuity)	20 A
maximum load current (3 sec)	22 A
nominal voltage fan	24 VDC
Maximum ratings: Transformer operation 12V	
sieving in the power supply	$\geq 10000\mu\text{F}$ 63V (denpending on the load current)
data for secondary winding after rectification/sieving	
nominal load operating voltage (continuity)	11 VDC - 14.4 VDC
load operating voltage (15min)	- 16.0 VDC
maximum load operating voltage (3 sec)	17 VDC
idle speed operating voltage (continuity)	28 VDC
maximum idle speed operating voltage (3 sec)	30 VDC
nominal load current (continuity)	40 A
maximum load current (3 sec)	44 A
nominal voltage fan	12 VDC
Maximum ratings: Transformer operatinn 24V	
sieving in the power supply	$\geq 10000\mu\text{F}$ 63V (denpending on the load current)
data for secondary winding after rectfication/sieving	
Vollast-Betriebsspannung (15min)	18 VDC - 28.0 VDC
load operating voltage (15min)	- 28.8 VDC
maximum full load operating voltage (3 sec)	30.0 VDC
maximum partial load operating voltage	36.0 VDC
idle speed operating voltage (continuity)	39.0 VDC
maximum idle speed operating voltage (3 sec)	40.0 VDC
maximum input peak voltage	44.0 VDC *1)
maximum output peak voltage	44.0 VDC *1)
nominal load current (continuity)	24 A
maximum load current (3 sec)	28 A
nominal voltage fan	24 VDC

*1) The maximum input and/or output peak voltage is measured over the appropriate clamps of the fan controller. It may be exceeded at no time. This applies independently of whether a voltage increased height was possibly caused by the fan controller or an external component. To this belong the switch off-transient of the fan (pulse width modulation = fan will be 2000 times per second switched on and off), and by outside switching operation caused glitches.



Fischer Panda Datenblatt/Datasheet

Configuration at delivery for 24V-operation:

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



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



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

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

Subject to change without prior notice.









Fischer Panda Datasheet

A. Remote Control Panda 6-50

 Fischer Panda	Art Nr..	F1WT1-95E730
 Fischer Panda	Bez.	Remote Control Panel for Panda 6-50

	Dokument	Hardware	Software
Aktuell:	R02 02.07.2007		-----
Replace:	R1 15.05.07		-----



Fig. A.0-1: Remote control panel

Fischer Panda Datasheet

A.1 Cleaning and replacement of parts at the generator



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

Note the safety instruction in the generator manual.

The raw water valve must be shut (marine version).



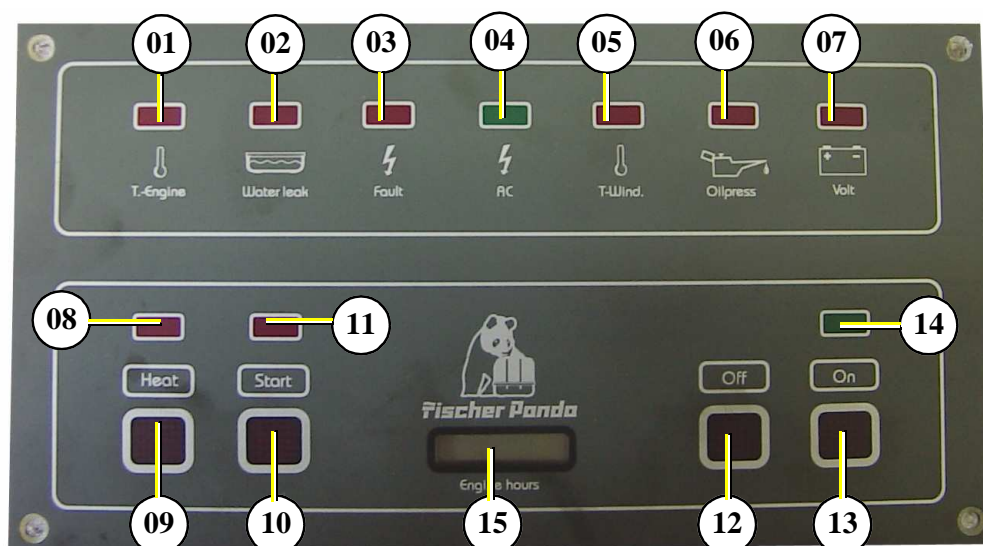
Attention!!! Parts of the generator and the cooling water may be hot after operation
!!!DANGER!!!

A.2 General information

The Panda generator is supplied with an external remote control panel. The remote control panel is necessary to control the generator and to evaluate the motor/generator properties. Generator control includes, on switch, pre-heat, starting and stopping generator functions.

The remote control panel is equipped with some new monitoring functions, which increase the operational safety of the generator. A failure message is shown over contacts which are normally closed. If a connection is intermitted, a failure message is triggered.

The generator may not be run without the remote control panel.



- 01. Warning light for cooling water temperature
- 02. Warning light for water leak (sensor optional)
- 03. Warning light for AC fault (optional)
- 04. AC voltage control light
- 05. Warning light for winding temperature
- 06. Warning light for oil pressure
- 07. Battery charge voltage 12 V - DC control lamp
- 08. LED display for pre-glow

- 09. Pre-glow button (Heat)
- 10. Generator „START“-button
- 11. Control light for Generator-Start
- 12. Generator „Off“ button
- 13. Generator „On“ button
- 14. Generator „stand by“ control light
- 15. Running hours counter

Fig. A.2-1: Remote Control Panel



Fischer Panda Datasheet

Automatic Start Option

An automatic start option is available as an accessory. This includes a separate control board, which is connected to the main remote control board panel. The Automatic Start Option allows the generator to be started by means of an external signal (i.e Battery Monitor). A speed gauge and a sensor for speed pick-up are additionally necessary in addition to the automatic start option. (See Component Automatic Start)

A.3 Operation instructions

A.3.1 Preliminary remark

Pre-heating the diesel motor

The motor must be pre-heated, if the diesel motor is designed as a "pre-combustion chamber motor" for indirect fuel injection. A quick glow fitting is used for all Kubota-diesel motors. This glow fitting may only be used for a maximum of 20 seconds without a pause. A pre-glow period of 5 - 6 seconds suffices for ambient temperatures above 20°C (plus). For lower temperatures the preglow period should be increased.

Heat button

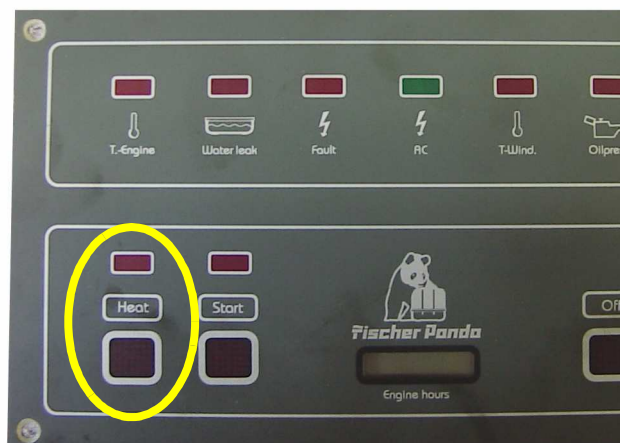


Fig. A.3.1-1: Heat button



Fischer Panda Datasheet

A.3.2 Daily routine checks before starting

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

ATTENTION! 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.

The oil level of the oil cooled bearing must be checked at every operation day before the first starting - see inspection hose at the generator backend. Service interval 1000hrs.



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 has 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-excited by means of a DC source. If the generator does not excite 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).



Fischer Panda Datasheet

A.3.3 Starting Generator

1. If necessary, open the fuel valve.

2. If necessary, close the main battery switch.

3. Check if all the load has been switched off.

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

4. Press „ON“ button.

NOTE: If the red control light for oil pressure illuminates if the panel is switched on, this is an sign that the panel has an error. In this case the generator can not stop automatically if there is a disturbance.

Control light for "ON" Button must light up.

5. Pre-heat engine.

Pre-heating is necessary for every running temperature. Pre-heating is not necessary, only if the generator has just been run. The heating period should take at least 6 seconds, however, 20 seconds at the maximum. Heating must last for 20 seconds at a temperature of +5°C. If a second attempt is to be made, then a pause of at least 60 seconds is required.

The generator can be started with the assistance of a pre-heating device at temperatures as low as - 20°C. Please note that the generator can only be run at temperatures below -8°C with winter fuel and additional special additives.

6. Press „START“ button.

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 gen-set does not immediately start, then the fuel intake should be checked to ensure it is flowing freely. (For temperatures below - 8°C check whether there is winter fuel)

7. Check circuit-voltmeter, to test whether there is AC-voltage and is within the tolerance rage (Frequency and voltage).

The AC voltage should be within a tolerance of ± 3 Volt without load at the nominal voltage. When running without load, the generator frequency should be 4% below the nominal voltage. The generator should be checked, before the load is switched on, if the current remain at this level.

8. Switch on load.

The load should only be switched on if the generator voltage is within the permissible range. Parallel connection of several load should be avoided, especially if there are load with electric motors, such as air-conditioning units in the system. In this case, the load must be connected Step by Step.

Fischer Panda Datasheet

A.3.4 Stopping the Generator

1. Switch off load.
2. If the load is higher than 70% of the nominal load, the generator temperatures should be stabilised by switching off the load for at least 5 minutes.

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

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

NOTE: Never switch off the battery until the generator has stopped.

5. If necessary, close sea cock.

A.3.5 Starting the Generator by a „Failure bypass switch“

See also Generator manual

There is a "pressure switch" on the operation unit. Faults (e.g. caused by overheating) can be manually overcome by means of this switch. Using the remote control panel can start the generator. 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 consumers when over or under voltage occurs).

This is also the case when the generator is started when consumers are switched on.

Normally the generators will no longer excite 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 correct 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).



Fischer Panda Datasheet

A.3.6 Installation of the Remote Control Panel

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

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

1. Connector number
2. Cable number

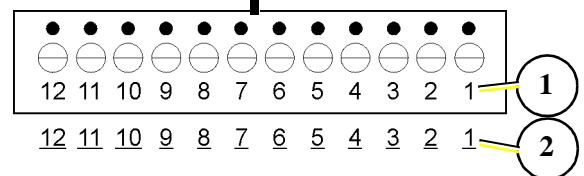
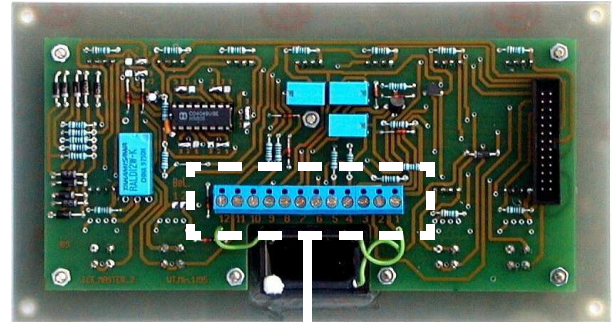


Fig. A.3.6-1: Remote control panel - back side

A.3.7 Fuse on control panel board

It is possible, that the fuse on the control panel board is defective. Change the fuse if it is defective.

1. Fuse on the control panel board (630 mA, slow to blow)

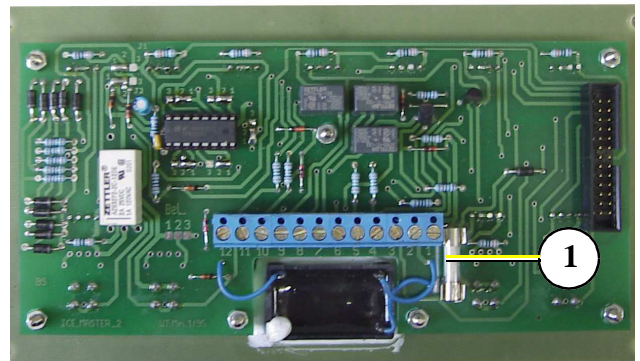


Fig. A.3.7-1: Remote control panel - back side

A.3.8 Installation assembly kit automatic start - optional - F1WT5-95702

An automatic feature can be supplied as an accessory for all Panda generators (Panda 8000 upwards). This automatic feature consists of an additional board which can be installed into the back of the remote panel with little problem. By installing this component the generator is started by means of a single contact (closer), i.e. pre-warming and starting are carried out automatically.

The normal switch functions of the remote control panel are thereby fully maintained. For example, it is possible to start the generator by using a time switch, thermo-switch or similar remote instrument. The generator switches on again after the contact has opened. A starter safeguard lock is absolutely necessary for operating the automatic feature. This can either be an integral part, or the complete component can be ordered from Fischer Panda GmbH.



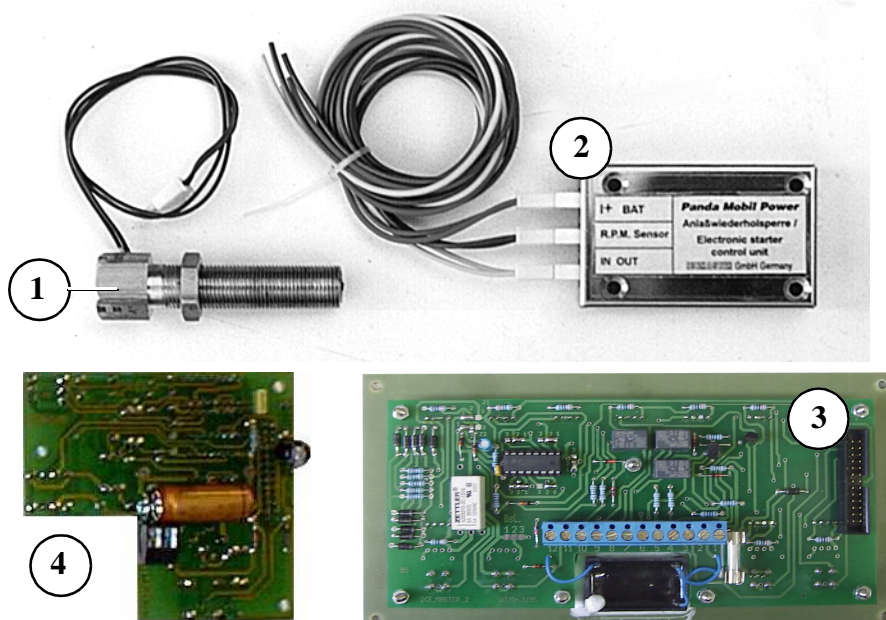
Fischer Panda Datasheet

Automatic Feature Assembly

The following elements are necessary to operate the automatic feature:

- Standard remote control panel
- Board with electronic control
- Rev sensor
- Starter safeguard lock

Should a starter safeguard lock have already been installed, then it simply suffices to fit the automatic feature to the remote control panel.



1. Speed sensor

2. Electronic starter control unit

3. Remote control panel

4. Automatic feature (board)

Fig. A.3.8-1: Automatic start assembly kit

Automatic Feature Assembly

Assembling the automatic feature can be carried out by simply attaching the additional board to the standard remote control panel. Attention must be paid that the standard plug forms a correct connection (Ensure that the plug is centrally placed in the socket). The board is then fixed to the remote control panel with the separating bus-hes that are supplied.

The connection of the external closer to the screw contacts of the automatic feature then occurs.



Fischer Panda Datasheet

A.3.9 Mounting of the circuit board on the remote control panel

1. Standard plug on the remote control panel
2. Standard socket on the automatic feature
3. Screw connections for contact

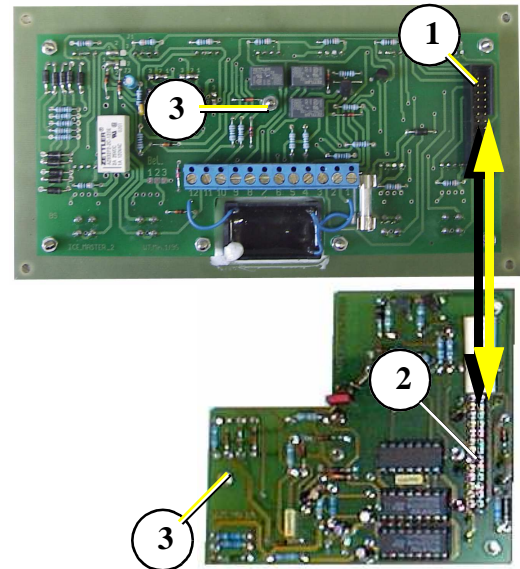


Fig. A.3.9-1: Mounting automatic start kit

Important information!

The generator can only be re-started after 45 sec., if the generator is stopped by means of the remote panel automatic stop control. If the generator prematurely starts, the motor is again stopped after 10 sec. running time.

The automatic starting process is disregarded, if an automatic start is required and the remote control functions are switched off. An automatic start is only possible when the automatic starting process occurs after the remote control panel has been switched on.

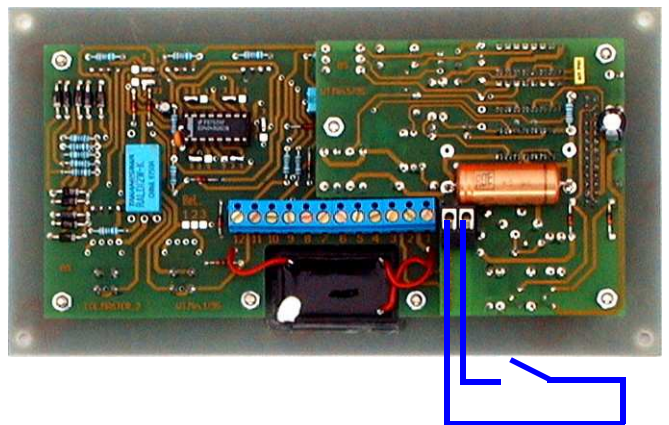


Fig. A.3.9-2: Mounting automatic start kit



Fischer Panda Datasheet

A.3.10 The speed sensor

Speed sensor mounting hole example Panda 8000

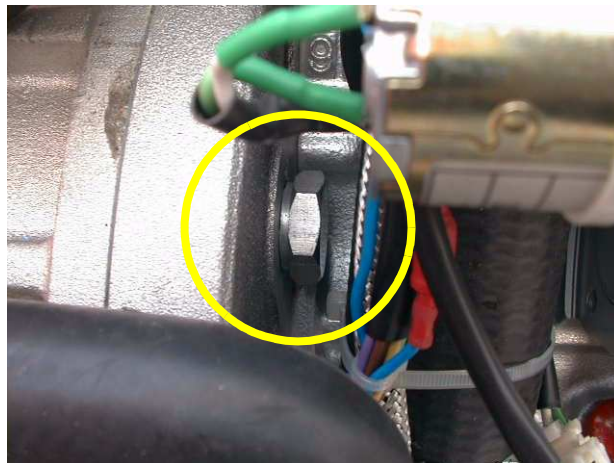
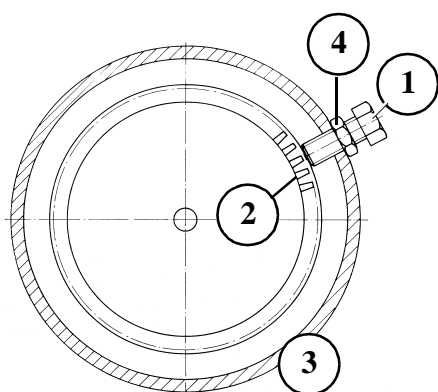


Fig. A.3.10-1: Speed sensor

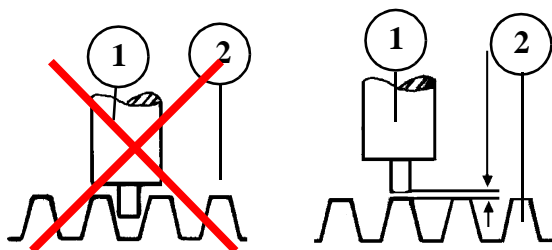
Installation of the speed sensor

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

ATTENTION! For Panda 8000 and Panda 9000 the speed sensor has to be mounted in axial direction.



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

ATTENTION! For Panda 8000 and Panda 9000 the speed sensor has to be mounted in axial direction.

Fig. A.3.10-2: Speed sensor



Fischer Panda Datasheet

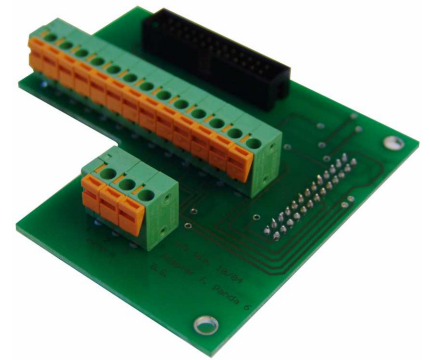
A.3.11 Requirement for Automatic Start

If there is an automatic starting requirement and if the remote control panel is switched off, this automatic starting requirement will be ignored. Automatic starting is only possible, after the remote control panel had been switched on.

A.4 Slave Panel - optional

The Slave Panel has the same buttons and function as the main panel.

To connect the slave panel with the main panel use the small adapter board delivered together with the slave panel.



For more details see slave panel datasheet.

Fig. A.4-1: Slave panel

A.5 Slave panel and automatik start together - optional

To use the automatik start option together with the Slave Panel option, you must use the Combo adapter board Fischer Panda Art. Nr. 21.02.02.01H.

It is the combined adapter board of both options.

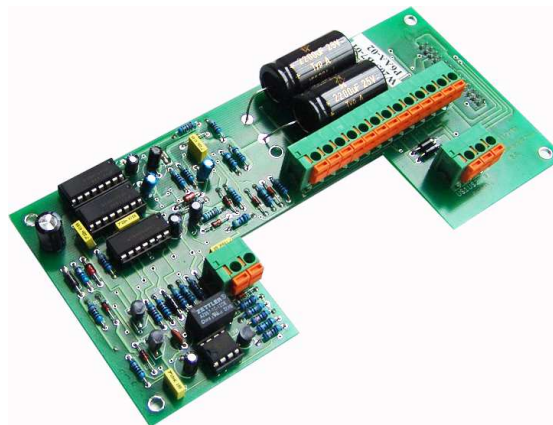


Fig. A.5-1: Slave panel and automatic start

Fischer Panda Datasheet

A.6 Wiring diagrams

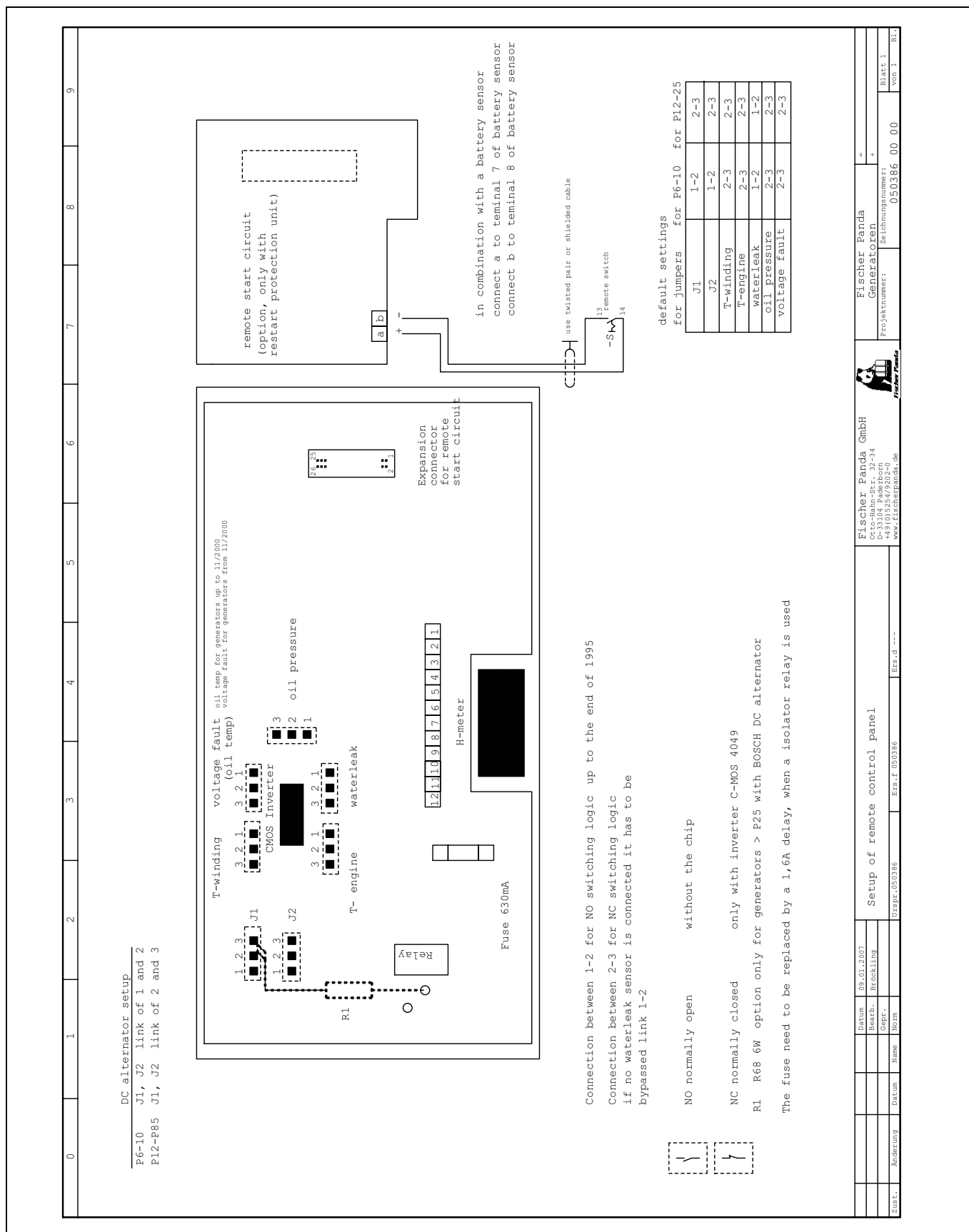


Fig. A.6-1: Wiring diagram



Fischer Panda Datasheet

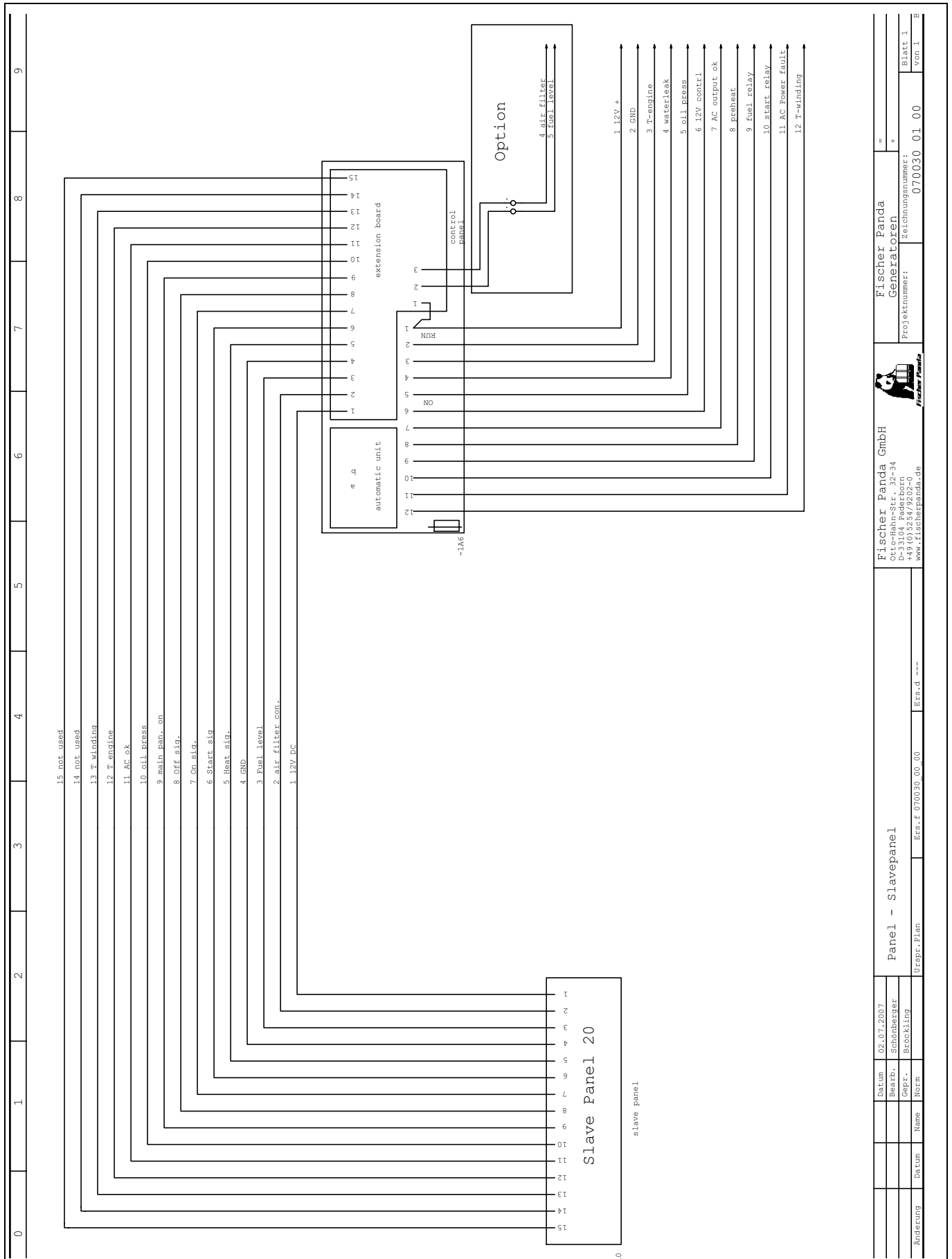


Fig. A.6-2: Wiring diagram



Fischer Panda Datasheet

Intentionally Blank