POWERHEAT

POWERHEAT coolant preheater

PH3400-4500

Installation and operation manual

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The POWERHEAT preheater for (diesel) engines is a compact, electrically operated circulation heater. Using a new and innovative heating technique including a large aluminum heating surface, the POWERHEAT preheater protects the engine life and quality of the liquids. The compact and robust design provides a high-quality system that offers high shock resistance. The POWERHEAT preheater is designed for use in a wide range of applications, such as powergen, marine, industry, railroad, automotive, on- and offshore, on- and off-highway, etc.

POWERHEAT coolant heaters
Thanks to its large aluminum heating surface, the compact POWERHEAT coolant heater provides efficient heating. The POWERHEAT heaters use a new way of heating avoiding direct contact between the heating element and the coolant. Avoiding direct contact preserves the quality of the liquids, keeps the system corrosion-free and eliminates the risk of burning the heating element. These are important factors in extending the heater and engine life as well as preserving the liquids' quality.

Benefits of preheating

Preheating your engines provides a number of benefits.

Protects the engine

The moving parts in an engine, like bearings, crankshaft, connecting rods, camshaft, etc., wear out the most when they are cold. This wear is significantly reduced at higher temperatures. Therefore preheating your engine protects the engine from wear.

Increased sustainability

As stated above, preheating your engine minimizes engine wear, which extends the service life of the engine. Preheating also has a positive effect on the life of liquids and batteries. Liquids age quicker at extreme temperatures or extreme temperature differences. Preheating results in a more stable temperature, which makes the liquids last longer. The charging capacity of a battery is also affected by extreme temperatures. When the battery is kept at a constant temperature the charging capacity remains intact longer.

Better for the environment

Next to increased sustainability, preheating results in more environmental benefits. Most fuel is consumed when starting the engine and bringing the engine to operating temperature, and a cold engine emits more harmful substances compared to a warm engine. A preheated engine consumes less fuel and releases less emissions, making preheating beneficial for the environment.

Cost savings

A preheated engine is less sensitive to wear and therefore requires less maintenance, which results in lower maintenance costs. In addition, a warm engine consumes less fuel, which reduces your fuel costs.

Time savings

By preheating your engine you eliminate the engine warm-up time. You can immediately use the full engine power, without the risk of wear. This is essential for e.g. emergency power supplies, sprinkler systems, ambulances, rescue services, etc.

PH3400-4500

Voltage: 400V
Wattage: 4500W

Table of contents

The present user guide contains instructions to be fulfilled during the mounting and the starting stage. Please read carefully for a correct installation and a proper use of the preheater. Keep these instructions after installation.

1 Important safety instructions

Qualified personnel
The mounting and installation of the **POWERHEAT** system should be carried out by a qualified technician only.

Danger in case of non-compliance with the present installation & operation manual
The non-compliance with the present installation & operation manual could have serious consequences for the safety of people and could damage the equipment, thus making the warranty void. The strictest rigor is required for the electrical and mechanical aspects of the mounting.

Safety measures meant for the user
Avoid any risks linked to the mains by strictly observing local safety instructions in force. Check or have checked by an authorized technician that your electrical installation is protected by a differential current system and that the earthing is following the local safety prescriptions.

Modifications to the POWERHEAT system and use of unauthorized parts
Any modification to the **POWERHEAT** system will be made only in agreement with the manufacturer. The use of official spare parts and accessories guarantees your safety. The manufacturer disclaims any liability in case non-original parts are used.

Inappropriate use of the equipment
The equipment supplied with the present installation & operation manual is exclusively meant for the applications described in this manual. The POWERHEAT system is a new and compact electric coolant heater with circulating pump, suitable for all engine related applications / markets.

2 Specifications

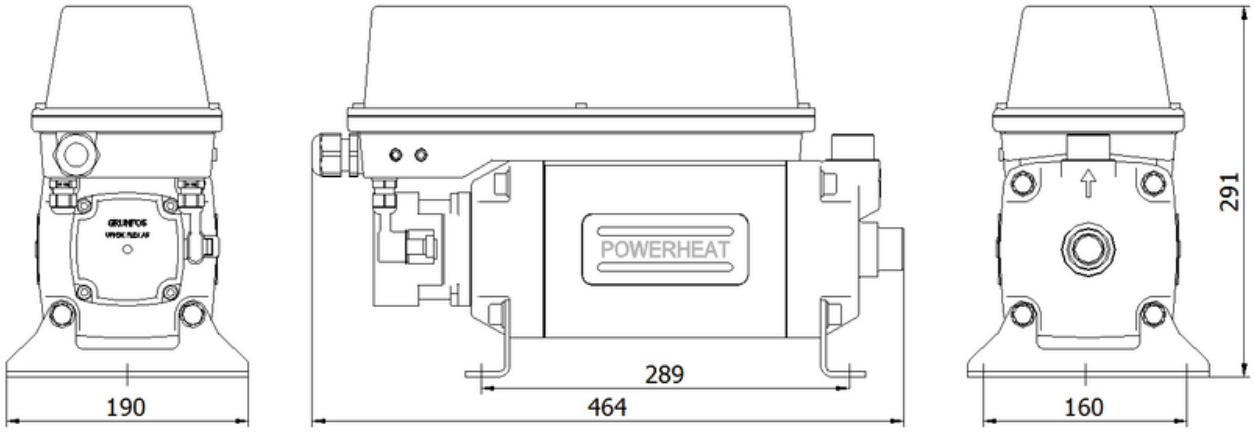
POWERHEAT is the new style (engine) preheater. The compact design, in combination with the chosen materials, integrated pump, adjustable thermostat and all required control and safety features, makes it an exceptional high quality heater. The heat exchanger is based on a die-cast tubular component in aluminum with a large heating surface. The heating element is embedded in aluminum during the die-casting process so therefore completely corrosion proof and not in direct contact with the coolant or liquids. This means a more effective heating and no negative side effects for the coolant or liquids. In addition, the Aluminum AS13 is finished with a Teflon coating.

As soon as the heater is connected to the power source, the coolant of the engine is sucked into the heating body and then expelled by the pump back into the engine. The pump allows a progressive and uniform warming of the engine. The regulating thermostat controls the heating element. The safety thermostat protects against overheating.

2.1 Technical details

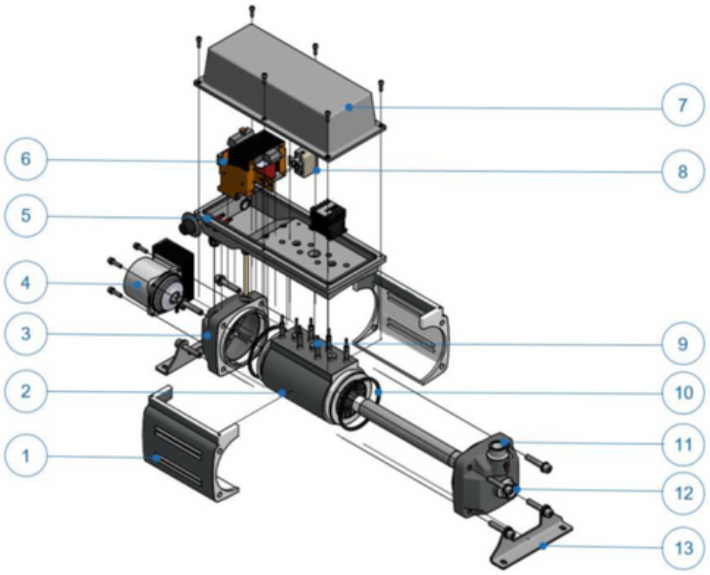
	PH3400-4500
Voltage	400V, 50-60 Hz, 3 Ph
Heat power	4500W
Thermostat	20-90°C (rated 25 A)
Safety thermostat	120°C
Max. operating pressure	10 bar
Surface load	4 W/cm2
Water inlet and outlet	2 x 1” (25,4 mm)
Box ingress protection	IP67
Pump power range	52 W, 230V, 50-60 Hz
Pump flow rate	2,8m3/h @ 3 m
Pump ingress protection	IP44
Weight	19,6 kg
Dimensions (LxWxH)	464 x 190 x 291 mm

2.2 General arrangement drawing PH3400-4500



Width: 190 mm | Length: 464 mm | Mounting hole distance: 289 mm | Height: 291 mm

2.3 Exploded view



1 Side cover	2 Heat exchanger	3 Rear cover	4 Pump	5 Base plate
6 Transformer	7 Top cover	8 Thermostat	9 Heating element	10 Seal
11 Fluid OUT	12 Fluid IN	13 Support		

3 Mounting instructions

3.1 Unpacking and installation preparation

The **POWERHEAT** preheater comes without accessories for installation, mounting and electrical connections.

3.2 Precautions

The installation must be made by an authorized technician in strict compliance with the instructions of the manufacturer.

3.3 Installation instructions

- The **POWERHEAT** preheater must be mounted in a horizontal position only!
- The axis of the circulation pump must be in all circumstances placed in a horizontal position!
- Mount the **POWERHEAT** preheater to the chassis or frame using the build in support of the device.
- Make sure that the attachment is stable enough.
- Mount the **POWERHEAT** preheater preferably at the lowest level of the cooling system.
- Fill up the (engine) system and heater with coolant; make sure no air is left in the system.
- Please observe a sufficient safety distance of all connections and lines to the exhaust system of the engine.

3.4 Connecting the preheating coolant circuit

IMPORTANT: Drain off the coolant circuit completely before placing and mounting!
Before placing the **POWERHEAT** preheater device it is imperative to completely drain the coolant circuit. Unscrew the drain plug or disconnect the lower hose to completely drain off the coolant circuit.

3.5 Connecting the heater inlet

The heater inlet and outlet are meant for hoses with a diameter of 1” (25,4 mm). For engines equipped with a drain plug, replace the plug by a hose connector with a diameter of 1” to make the connection to the heater inlet. If the heater is connected to a rigid pipe, use a piece of flexible radiator hose that is long enough to prevent engine vibrations being transmitted to the heater.

3.6 Connecting the heater outlet

To guarantee an optimum heating of the engine the coolant return hose from the heater to the engine should be placed at the highest possible point on the engine and as far as possible from the suction port to enhance heat distribution throughout the engine. Use any available coolant jacket opening and install a connector for the outlet hose.

3.7 Checking and refilling the coolant cicuit

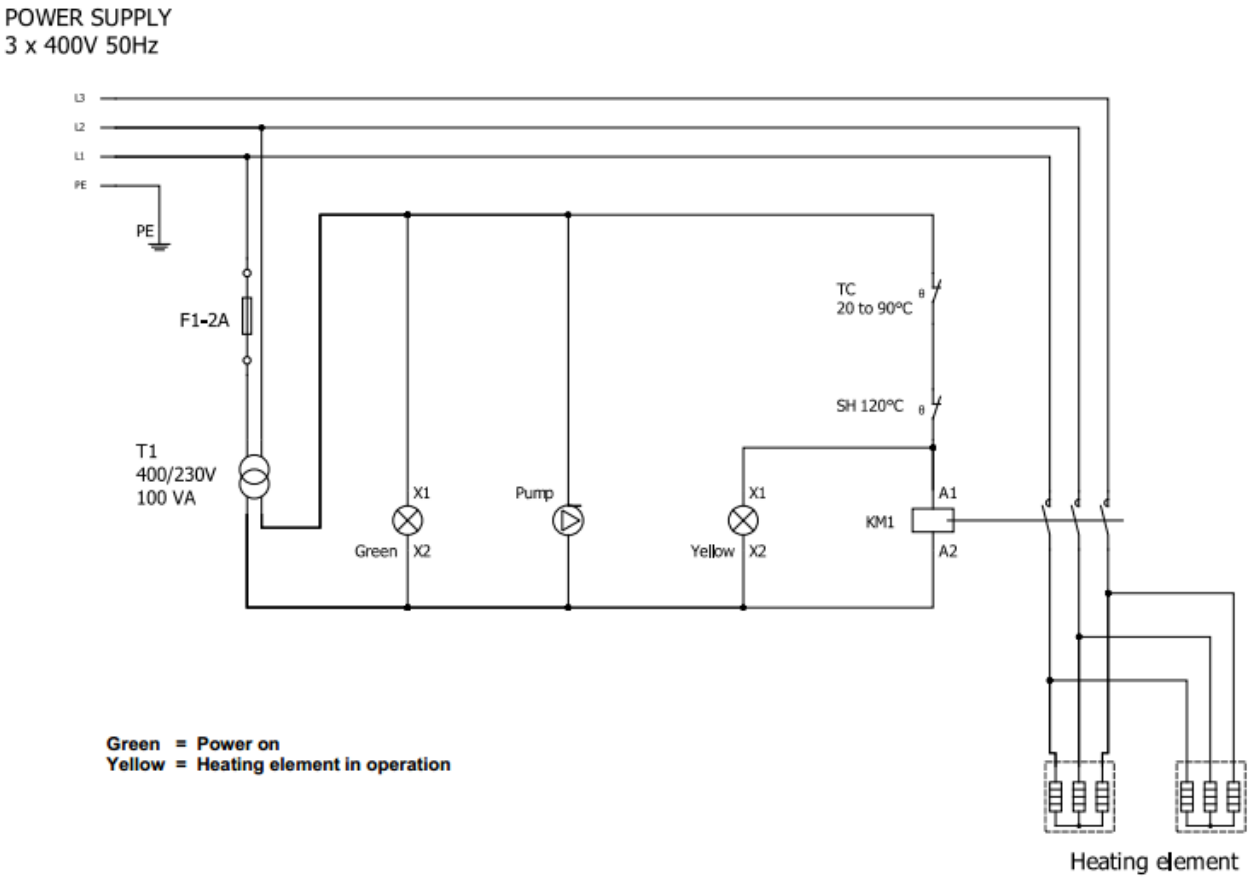
Make sure that the hose clamp collars are properly tightened. Fill the coolant circuit with a high quality and clean mixture glycol/water without impurities and without exceeding the recommended proportion 50% glycol / 50% water. It is necessary to check its quality frequently to ensure that the heater is not dirty, has no grimes and does not suffer from deterioration. The life and the proper functioning of the heater depend on it. To eliminate air pockets and obtain a good circulation, run the engine a few minutes. Then shut off the engine and check that the water circuit is properly flushed. Check that all connections are watertight and that hose clamps are properly tightened. When the engine has cooled down, check the level of coolant in the circuit and adjust if necessary.

3.8 Electrical connections

IMPORTANT: Fixing of the power supply cord
Fix the cord with clamp collars to avoid any contact with hot or moving parts. It is recommended to use a protection sheath for the cord.

Checking the installation before connecting the heater to electricity
Check the information regarding voltage and power on the heater label before connecting the heater to electricity. An improper connection to the mains could irremediably damage your heater. Make sure that the voltage is correct, and the earthing is in compliance with local rules.

Electrical diagram



4 Directions for use

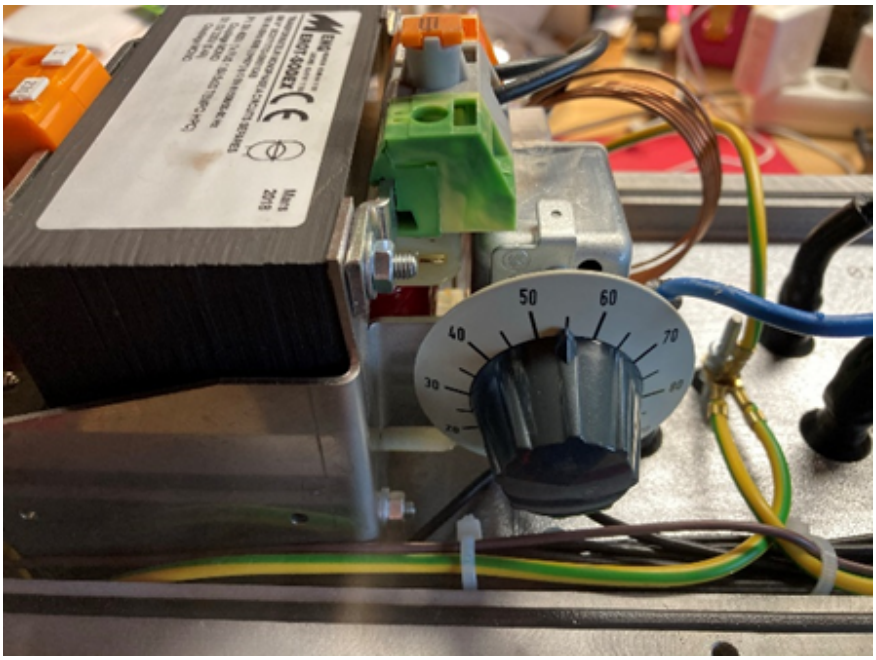
4.1 Putting the POWERHEAT preheater into service

Follow the procedure described hereafter:

- Connect the **POWERHEAT** to the power source.
- The regulating thermostat is adjusted at 45°C at the factory.
- Fill the heater with coolant before running the system and the pump.
- Touch the heater inlet and outlet hoses at regular intervals for one hour. If the heater works correctly, the outlet hose should be warm and the inlet hose relatively lower temperature. If the inlet hose becomes very hot before the outlet hose, the circulation is not good.
- After checking that the circulation through the heating body and the engine is correct and the air has been properly purged, adjust the regulating thermostat on the required temperature.

4.2 Adjusting the regulating thermostat

The **POWERHEAT** preheater can work either on a stand-by basis 24 hours a day or be put into service at the desired time with a timer. The regulating thermostat temperature is set on 45°C at the factory. It is possible to modify this temperature between 20°C and 90°C.



5 Troubleshooting

Before contacting the technical service, please check the following table for causes and remedies:

- Contaminated cooling circuit
- Air pocket caused by a curve in the hoses
- Engine temperature higher than the thermostat set temperature.

Type of problem	Possible causes	Control and remedies
The pump doesn't work. The heating body of the heater and the engine remain cold.	The heater is not connected to the mains.	1. Check that the supplying cable is connected to the mains; the green led light at the front side of the heater should be activated as soon as power has been connected. 2. Check the fuses in the mains distribution box.
The pump works properly but the heating body of the heater and the engine remain cold.	Failure of the regulating thermostat.	1. Check if the yellow led light as front side of the heater is activated. 2. If not, put the heater out of service and call the technical service.
The connection to the mains is correct and the circuit is correctly purged. The heating body of the heater is hot, but the engine remains cold.	Bad circulation. Pump blocked with impurities. The pump is not working.	1. Unblock the pump. (Unscrew the 4 bolts and electric contact, take of and clean the impeller) 2. If unsuccessful, put the heater out of service and call the technical service.
The fuse or the circuit breaker in the distribution box is engaged.	Electrical breakdown.	1. Put the heater out of service and call the technical service.

6 Total quality

Each **POWERHEAT** preheater assembled by **POWERHEAT B.V.** is controlled and tested before leaving the factory. For this reason, it is possible to find residual water in the heating body.

POWERHEAT B.V. runs the following test on each **POWERHEAT** preheater:

- Test of electrical insulation
- Test of heating capacity
- Test of the circulating pump
- Water tightness pressure test of the heating body
- Test of the regulating thermostat

7 Warranty

All our devices are guaranteed against all manufacturing errors over a 2 year period, starting at the invoice date and following general sales conditions. This warranty is voided in each of the following situations:

- The device was transformed or modified without permission of **POWERHEAT B.V.**
- Installation und use are against the guidelines of **POWERHEAT B.V.**
- The heater is damaged by impurities or grimes.

Our warranty covers exclusively the changing of the standard installation or replacement of the damaged parts. Are not taken under warranty: wrong installation or use, costs for assembling and disassembling the heater, costs for assembling or disassembling the installation, shipment costs.
In case a warranty claim is accepted; the old defect unit will be repaired and returned to customer without cost calculation.

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