

The TopStart is a compact electric coolant heater with circulating pump for marine engines, generating sets and all types of vehicles located inside or outside (protected place only).

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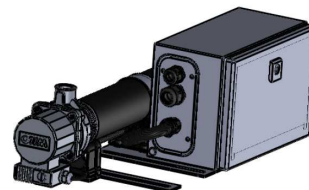
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The present user's guide contains instructions to be fulfilled during the mounting and the starting stage. Please read carefully for a correct installation and a proper use of the heater. Keep these instructions after installation.

1. IMPORTANT SAFETY INSTRUCTIONS



Qualified personnel

The mounting should be carried out by a qualified technician only.

Danger in case of non-compliance with the present guidelines

The non-compliance with present guidelines 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 in compliance with the local safety prescriptions.

Modifications to the heater and use of unauthorized parts

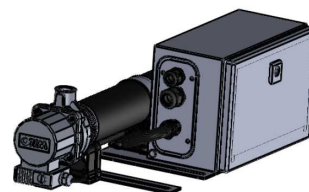
Any modification to the heater will be made only in agreement with the manufacturer. The use of official spare parts and accessories guarantees your safety. The manufacturer disclaims any liability in case non-original parts are used.

Inappropriate use of the equipment

The equipment supplied with the present user guide is exclusively meant for the applications described in this user guide.

The TopStart is a universal and compact electric coolant heater with circulating pump. It can be used to heat engines in marine, industrial applications and all types of vehicles located inside or outside (generating sets).

The Topstart is not made to be installed in an explosive environment.

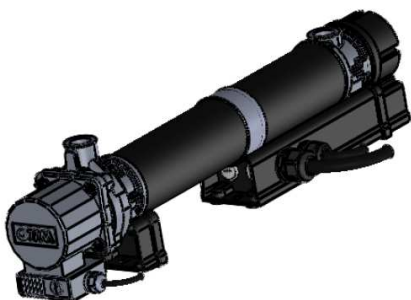
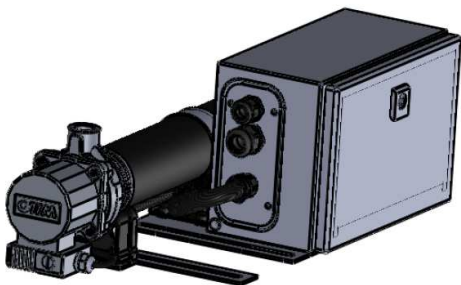


2. SPECIFICATIONS

Technical Characteristics

The TopStart is a universal and compact electric coolant heater with circulating pump. It can be used to heat engines in marine and industrial applications (generating sets) and all types of vehicles located inside or outside. High-quality components and materials are used to guarantee the reliability of the heater. Its compactness makes it easy to install. The heater is made of a heating body, a heating element, an adjustable regulating thermostat, an overheat thermostat with manual reset and a circulating pump.

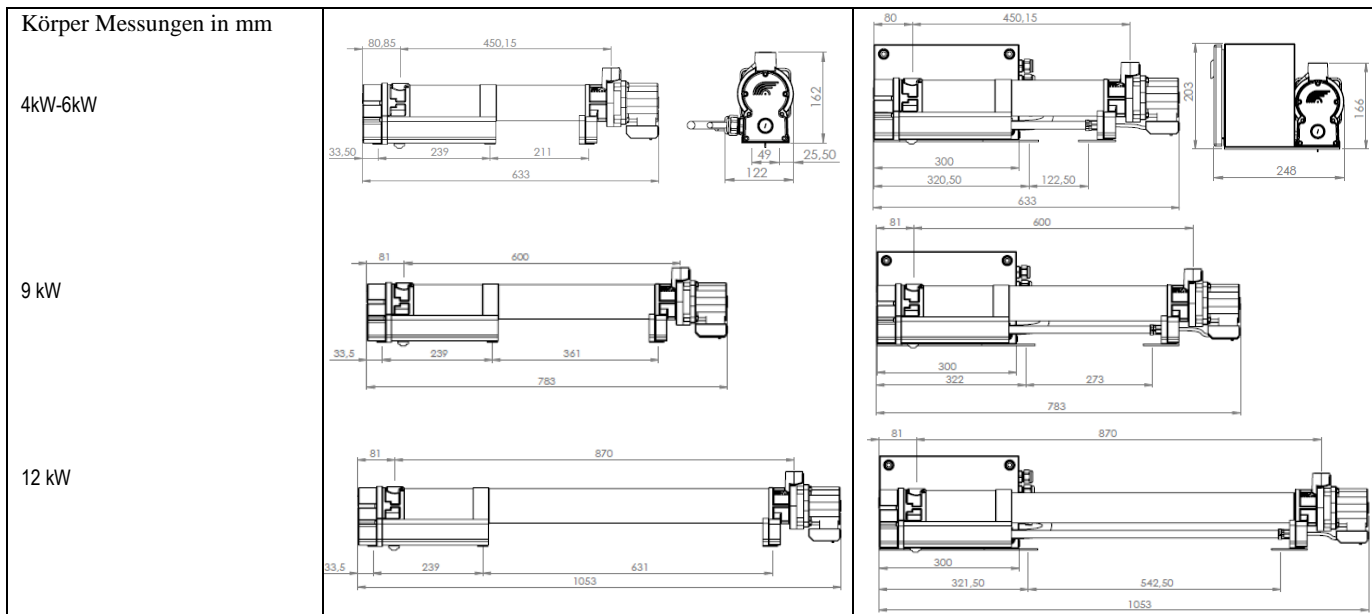
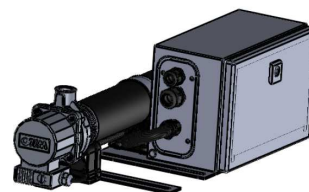
As soon as the heater is plugged in, the coolant of the engine is sucked into the heating body and then expelled by the pump back into the engine. The pump allows a progressive and uniform warming of the engine. The regulating thermostat controls the heating element and the pump. The safety thermostat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

MODEL	TSWRS	TSWRS + CB
Description	TopStart without control box	TopStart with control box
Picture		
Components characteristics		
Heating body	Aluminum	Aluminum
Heating element	INCOLOY 800 @ stainless steel protection sheath.	INCOLOY 800 @ stainless steel protection sheath.
Circulation pump	WILO Star RS 25/6 (230V/50Hz ou 230V/60Hz) WILO Star S 16 U (115V/60Hz CSA/UL)	WILO Star RS 25/6 (230V/50Hz ou 230V/60Hz) WILO Star S 16 U (115V/60Hz CSA/UL)
Temperature control and measurement	Adjustable capillary thermostat 0°-80°C (32°F to 176°F).	Adjustable capillary thermostat 0°-80°C (32°F to 176°F). (Electronic thermostat with PTC sensor on Mod TD01)
Safety thermostat	Capillary thermostat with a limit at 110°C (230°F) and manual reset	Capillary thermostat with a limit at 110°C (230°F) and manual reset
Electrical characteristics		
Rated voltages and frequency	Separate supply for the 3 components	Single supply thanks to a transformer into the control box
➤ Heating element	230VAC, 400VAC, 400VAC+N, 440VAC, 480VAC, 600VAC, 690VAC	230VAC, 400VAC, 400VAC+N, 440VAC, 480VAC, 600VAC, 690VAC
➤ Pump	230VAC/50 or 60 Hz, 115V/60Hz	/
➤ Thermostatic plate	Up to 250 VAC	/
Ingress protection level	IP44	IP44
Available Power	4kW, 6kW, 9kW, 12kW	4kW, 6kW, 9kW, 12kW
Pump power 3 speeds – working temperature	WILO Star RS 25/6 46/67/93W -10°C → 110°C WILO Star S 16 U 42/65/90W -10°C → 110°C Grundfos UPS 15-42 30/40/48W -10°C → 110°C	WILO Star RS 25/6 46/67/93W -10°C → 110°C WILO Star S 16 U 42/65/90W -10°C → 110°C Grundfos UPS 15-42 30/40/48W -10°C → 110°C
Amperage	from 6 to 40 Amp depending models	From 6 to 40 Amp depending models
Working specifications		
Maximum working pressure	10 bars (150psi)	10 bars (150psi)
Maximum working temperature with ambient temperature of 40°C (104°F)	95 °C	95 °C
Temperature range	Adjustable from 0 to 80°C (32°F to 176°F).	Adjustable from 0 to 80°C (32°F to 176°F).
General characteristics		
Weight in kg	4-6kW : 6.5 kg / 9kW : 7.5kg / 12kW 8.5kg	230V or 400+N: 4-6kW: 12 kg / 9kW: 13 kg / 12kW: 14kg 400V – 690V: 4-6kW: 14 kg / 9kW: 15kg / 12kW: 16kg

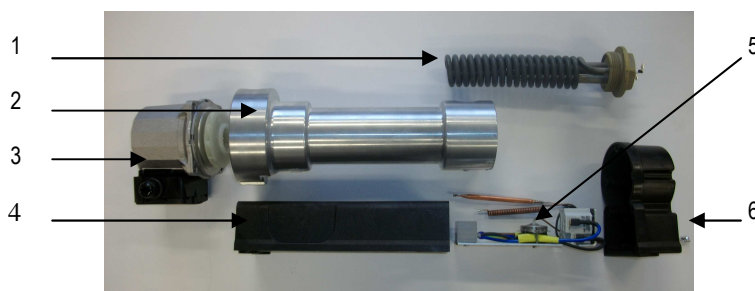


CARLOR
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USER GUIDE ENGLISH TOPSTART Ref. TSWRS 4-12 kW



Exploded view TopStart



1. Heating element

Voltage: 230VAC single-phase or 400VAC, 400VAC+N, 440VAC, 480VAC, 600VAC, 690VAC tri-phase

Power: from 4 to 12kW.

Heating element formed in spiral with ultra low wattage density ($7,5 \text{ W/cm}^2$) and Incoloy 800® stainless steel protection

2. Corps de chauffe en aluminium

3. Wet rotor pump WILO Star RS 25/6

Voltage: 230 VAC, single-phase

Frequency: 50 Hz (CE) or 60Hz

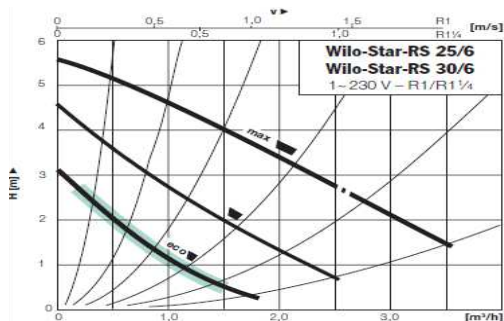
3 running speed.

Flow rate in the enclosed table

Power input speed 1: 46 W

speed 2: 67 W

speed 3: 93 W



Wet rotor pump WILO Star S 16 U (115V/60Hz CSA/UL)

Voltage: 120 VAC, monophasé

Frequency: 60 Hz

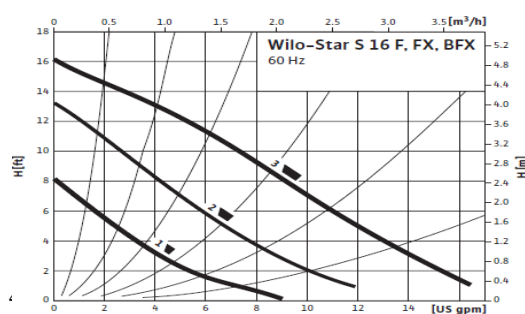
3 running speed.

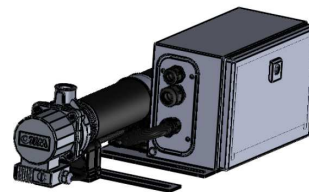
Flow rate in the enclosed table

Power input speed 1: 42 W

speed 2: 65 W

speed 3: 90 W





Exploded view TopStart (cont)

4. **Support base in polyamide**
5. **Thermostatic plate with regulation thermostat and safety thermostat**
Safety thermostat with manual reset, temperature limit at 110°C (230°F) and 25 Amps cutting capacity.

Single phase regulation thermostat with 25A cutting capacity controls the heating element through a contactor (supplied with the control box). The temperature range is between 0 and 80°C (32°F and 176°F). We set the thermostat at the factory on 50°C (122°F).

6. **Protection cap in polyamide**

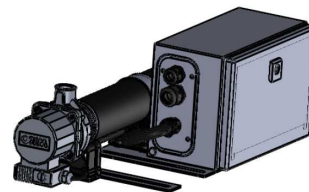
3. MOUNTING INSTRUCTIONS

Unpacking and installation preparation

Make sure you have the following components and accessories before disposing of the packaging material:
For a correct installation use the spare parts and accessories delivered with the TopStart.

1. TopStart heater
2. Fixation kit (only for Topstart without control box)
 - 6 silent blocks
 - 3 mounting braces
 - 6 screws M 8 x 20
 - 6 screws M8
 - 6 nuts M6 base groove
3. Connection kit
 - 2 brass threaded connection 3/4" male x 18mm diameter





Précautions

The installation has to be made by an authorized technician in strict compliance with the instructions of the manufacturer. Do not connect to the mains before having followed the present instructions. Do not connect the heater to the mains if you are not sure that it is filled with coolant.

Installation instructions

- ✓ The TopStart should be mounted in horizontal position. In no circumstances should the axis of the pump be placed in a vertical position.
- ✓ Fix the heater as low as possible. The heater should be below the lowest level of the water jacket and the coolant inlet must be below the point of removal of the coolant from the engine.
- ✓ Fix the TopStart to the chassis or any other suitable place with the fixation kit supplied with the heater. If you don't use fixation kit supplied, the support for the fixing of the heater should be rigid enough. If the heater is mounted on the engine chassis, it is necessary to use the supplied silent-blocks in order to reduce vibrations to the heater.
- ✓ Be careful not to mount the heater, the hoses or the power cord close to the engine exhaust.

Connecting the coolant circuit

Drain off completely the coolant circuit.

Before placing the heater, it is imperative to drain the coolant circuit. Unscrew the drain plug or disconnect the lower hose in order to completely drain off the coolant circuit.

Connecting the heater inlet.

The heater inlet and outlet are meant for hoses (not supplied) with an internal diameter of 11/16" (17 mm). For engines equipped with a drain plug, replace the plug by a hose connector with an internal diameter of 18 mm in order 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.

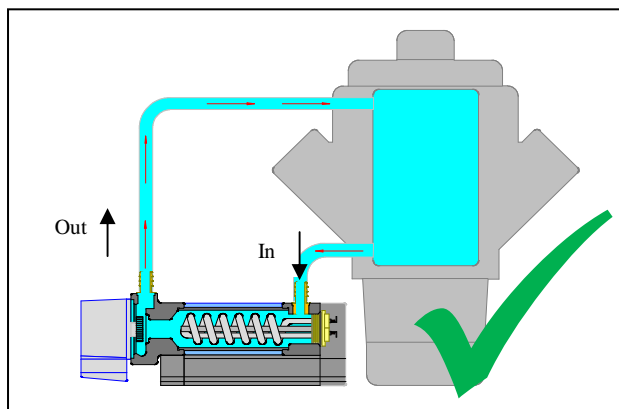
Connecting the heater outlet.

In order 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.

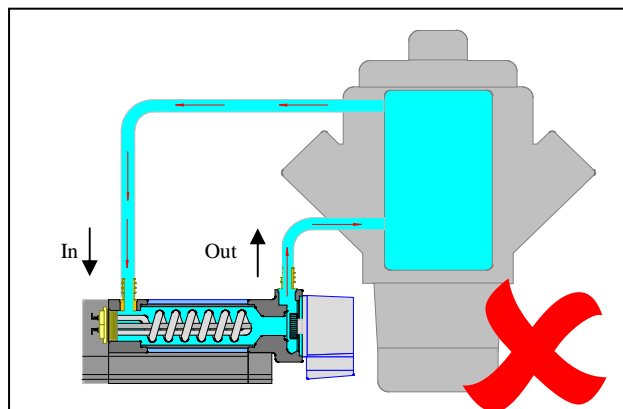
Checking and re-filling the coolant circuit

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. In order 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.

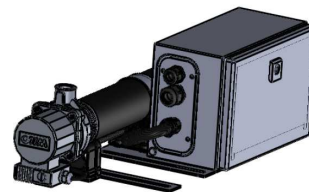
Examples of Correct / Incorrect Mounting



Examples of correct mounting
 Suction from low point.
 Heater installed horizontally



Examples of incorrect mounting
 Suction from high point



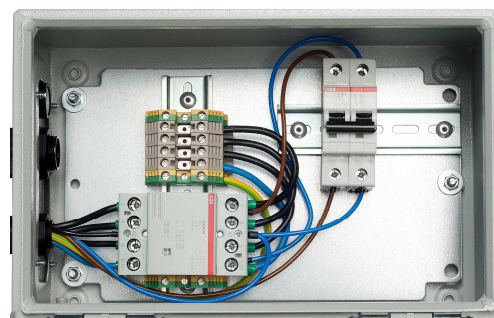
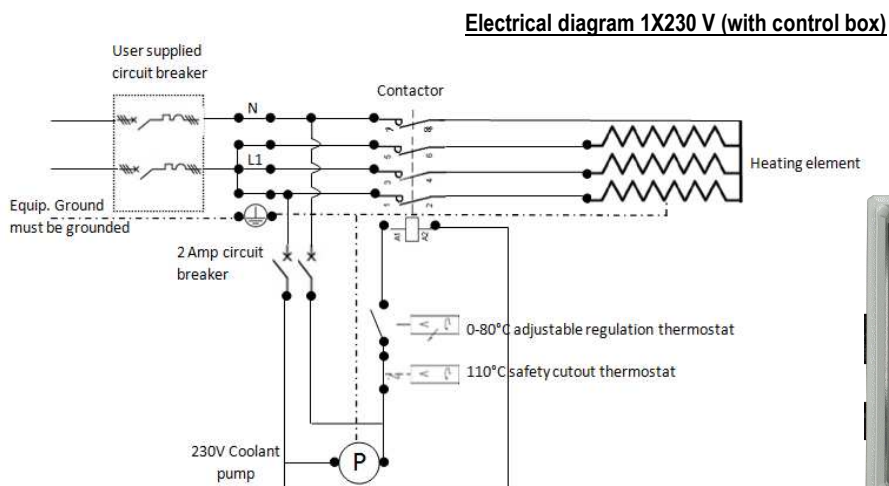
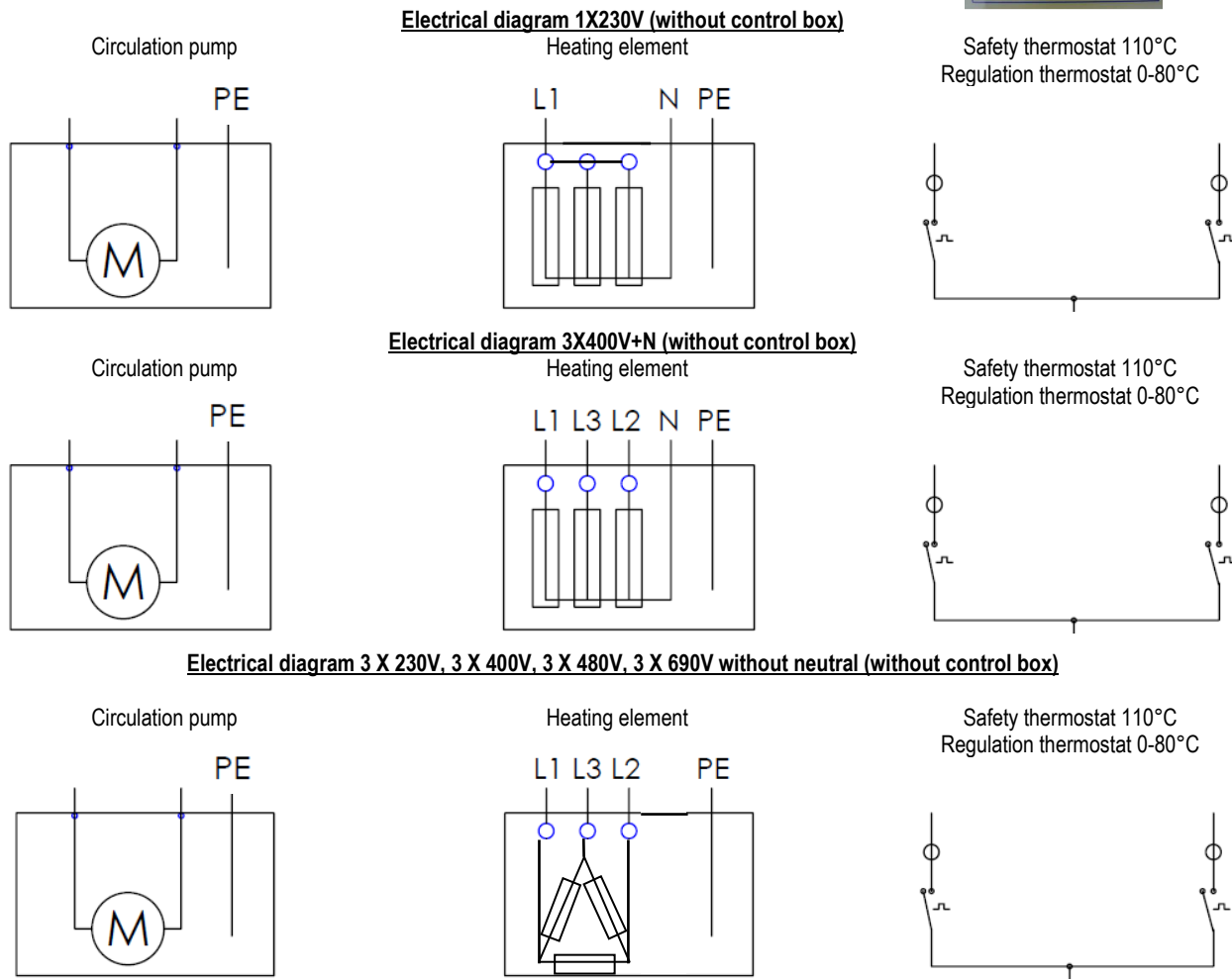
Electrical connections

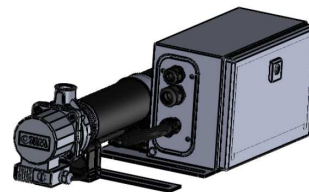
Fixing the power supply cord.

Fix the cord with clamp collars in order to avoid any contact with hot or moving parts. It is recommended to use a protection sheath for the cord.

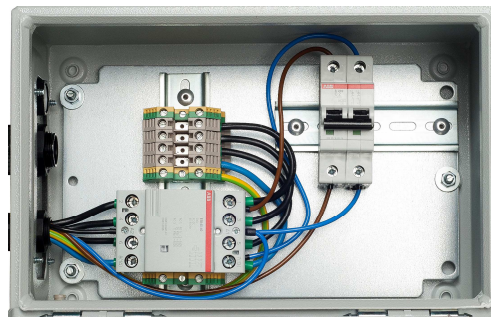
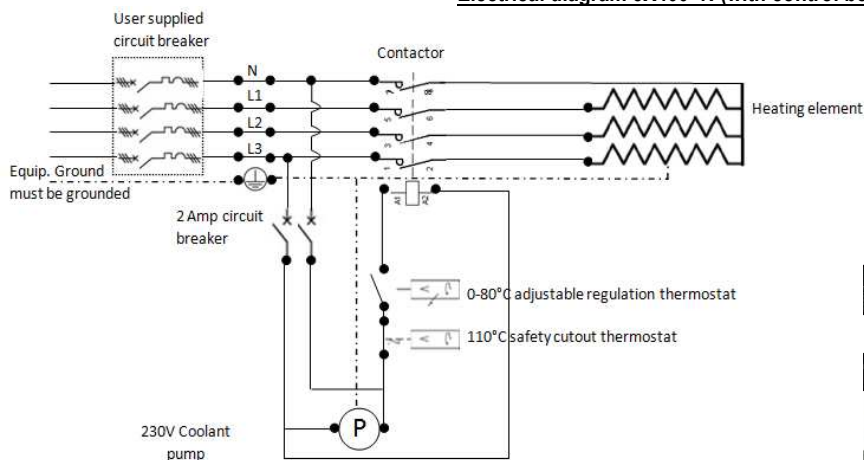
Checking the installation before connecting the heater to electricity.

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

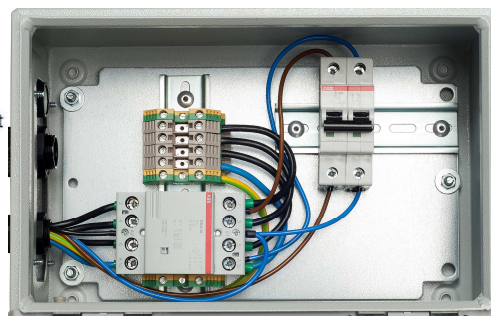
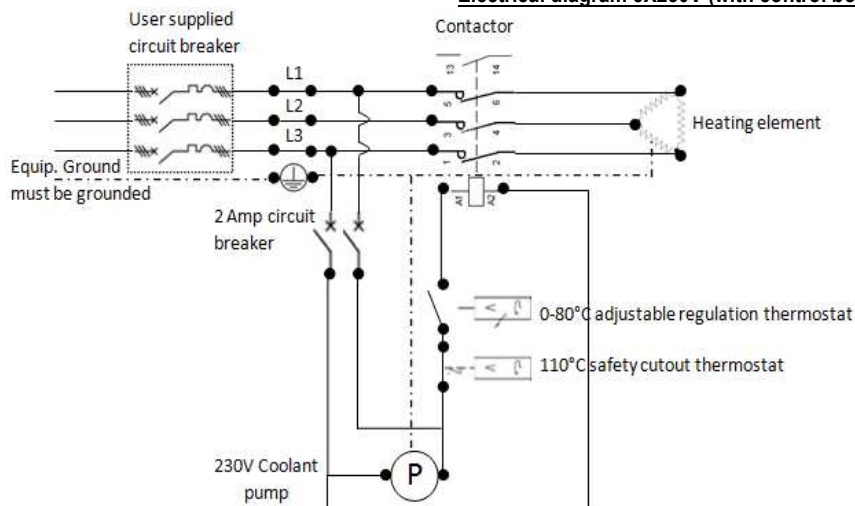




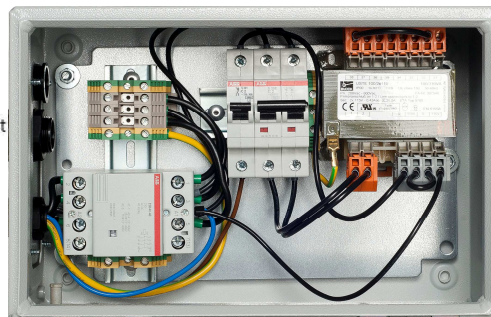
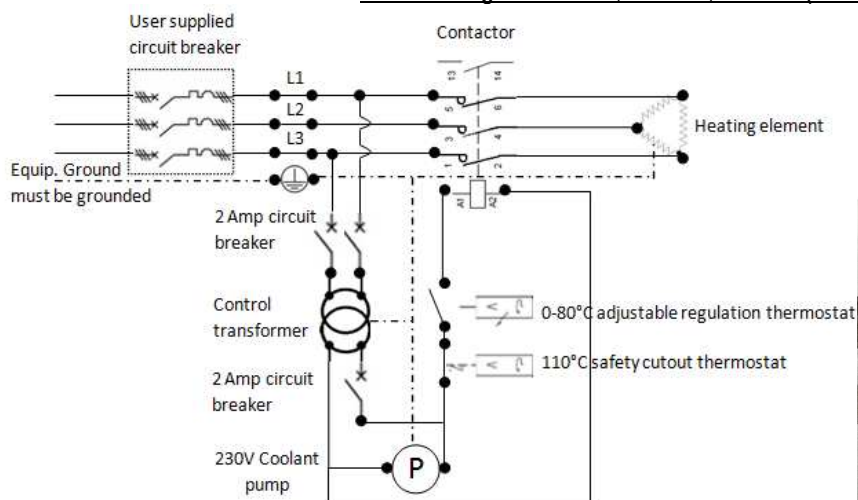
Electrical diagram 3X400+N (with control box)



Electrical diagram 3X230V (with control box)

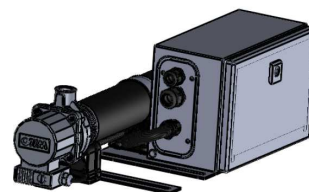


Electrical diagram 3 X 400V, 3 X 480V, 3 X 690V (with control box)



Caution:

- ✓ All wire must be rated to highest voltage in box.
- ✓ Use supply conductors suitable for 105°C.
- ✓ All connections in the control box should be checked during installation. Vibration during shipment can cause screws to loosen. Then control the connections at regular intervals.



4. DIRECTIONS FOR USE

Putting the heater into service

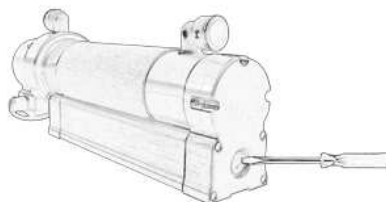
BEWARE: DON'T START THE HEATER IF NOT FILLED WITH COOLANT AND NEVER RUN THE PUMP WITHOUT LIQUID

Follow the procedure described hereafter:

- Connect the plug.
- The regulating thermostat is adjusted on 50°C (122°F) at the factory.
- Touch the heater inlet and outlet hoses at regular intervals during one hour. If the heater works correctly, the outlet hose should be warm and the inlet hose relatively cold. 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.

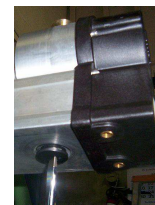
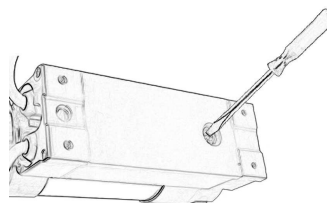
Adjusting the Regulating Thermostat

The Carlor's heating TopStart 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 50°C (122°F) at the factory. It is possible to modify this temperature between 0 and 80°C (32°F and 176°F). To do this, unscrew the threaded cap on the side of the heater. Use a screwdriver to set the thermostat on the desired temperature. It is imperative to fix again the protection cap after adjusting the thermostat



Resetting the overheat thermostat

In case of overheating (due for example to a lack of water in the circuit), the overheat thermostat cuts the electric supply to the pump and the heating element. After checking the heater, the thermostat has to be reset manually. To do this, unscrew the threaded cap under the support base of the heater and push the manual reset button.



5. TROUBLESHOOTING

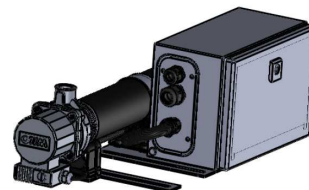
Before contacting the technical service, please check the following table for causes and remedies:

- 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.	<ol style="list-style-type: none"> 1. Check that the supplying cable is connected to the mains. 2. Check that the supply to the mains is correct. 3. Check the fuses in the mains distribution box.
The pump works properly but the heating body of the heater and the engine remain cold	The overheat thermostat has been switched on. ⇒ Lack of water into the heater	<ol style="list-style-type: none"> 1. Disconnect the supplying cable from the mains. 2. Reset the overheat thermostat (see above) 3. Check the level of water in the circuit. 4. Adjust the level if necessary. 5. Turn the engine on for 10 minutes. 6. Reconnect the supplying cable to the mains
The pump works properly but the heating body of the heater and the engine remain cold	Failure of the heating element. Failure of the regulating thermostat.	<ol style="list-style-type: none"> 1. 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.	<ol style="list-style-type: none"> 1. Unblock the pump. (Unscrew the threaded cap and turn the pump axle with a screwdriver). 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.	<ol style="list-style-type: none"> 1. Put the heater out of service and call the technical service.



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6. INSTRUCTIONS FOR THE PROTECTION OF THE ENVIRONMENT

Recuperation of raw materials rather than elimination of waste. Machines, as well as their accessories and packaging, should be recycled in an appropriate way. Our spare parts can be recycled selectively depending on the type of material. Carlor Engineering S.A. commits itself to recycle the different components of the TopStart. Each TopStart will be either reconditioned or recycled selectively at the Customer's request.

7. TOTAL QUALITY

Each TopStart assembled by Carlor Engineering is controlled and tested before leaving the factory. For this reason, it is possible to find residual water in the heating body.

Carlor Engineering runs the following test on each TopStart:

- 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

You will find in the packaging a check list of all the tests undergone on your TopStart. Keep this list carefully.

8. WARRANTY

All our devices TopStart are guaranteed against all manufacturing errors over a 2 years 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 Carlor Engineering
- Installation and use are against the guidelines of TopStart
- 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.

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