



MV Hydro 5

Diesel Powered Water Heater Instruction Manual

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Preface

Thank you for purchasing the MV Hydro 5 Water heater. This instruction book describes the structures, working principles, installation and operation of the MV Hydro 5. For correct use of the heater please, please read this instruction book carefully before installation and use. The instruction book should be saved in a convenient place for later reference.

Attention

- This instruction book is subject to revision without notice, but the instruction book is in conformity to the purchased product.
- Our effort is to explain all questions the user may have through this instruction manual. If you have any doubts or find anything incorrect in this manual, please contact the company directly.
- Check the heater for any damage when unpacking and contact the dealer immediately if any damage is found.
- If any troubles arise during application, please contact MV Heating or other customer service stations authorized by this company. We shall do our best to provide service to you.

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1. Introduction

The MV Hydro 5 is a 5kW modulating diesel fired water heater, which is suitable for providing hot water for heating purposes via radiators or matrix heaters and also domestic hot water via a calorifier. The MV Hydro 5 is fully automatic in operation featuring low energy glow pin ignition and microprocessor control for full temperature regulation.

Very low servicing costs due to modular construction. Simple wiring means a variety of controls are available to operate this heater

It can be applied to various heating purposes, whether its hot water heating for easier living or engine pre-heating and demisting.

For both vehicle and marine markets the Hydro 5 is a great way to efficiently meet your heating needs.

This kit includes everything necessary for installation excluding plumbing to the radiators and calorifier.



2. Technical Data

| Parameter | Coolant | |
|---|--|----------------------------|
| Thermal Power (W) | High power operation: 5000W | |
| | Low Power operation: 1500W | Low power operation: 2400W |
| Fuel | Petrol | Diesel |
| Fuel consumption (l/h) | High power operation: 0.69 | High power operation: 0.62 |
| | Low Power operation: 0.2 | Low power operation: 0.27 |
| Power Supply (Common battery for the engine) | DC12V | DC12/24V |
| Power consumption (W) | <100 at starting 37 for high power operation and 10 for low power | |
| Working pressure (Mpa) | 0.25 | |
| Lowest working temperature | -40°C | |
| Net weight (heater only) | 4.8Kg | |
| Mobile phone control (Optional) | No limitation | |
| Remote control (optional) | Without obstacles ≤800m | |
| Temperature of coolant when warm blower is started | 45°C | |

Structure and Working Principle

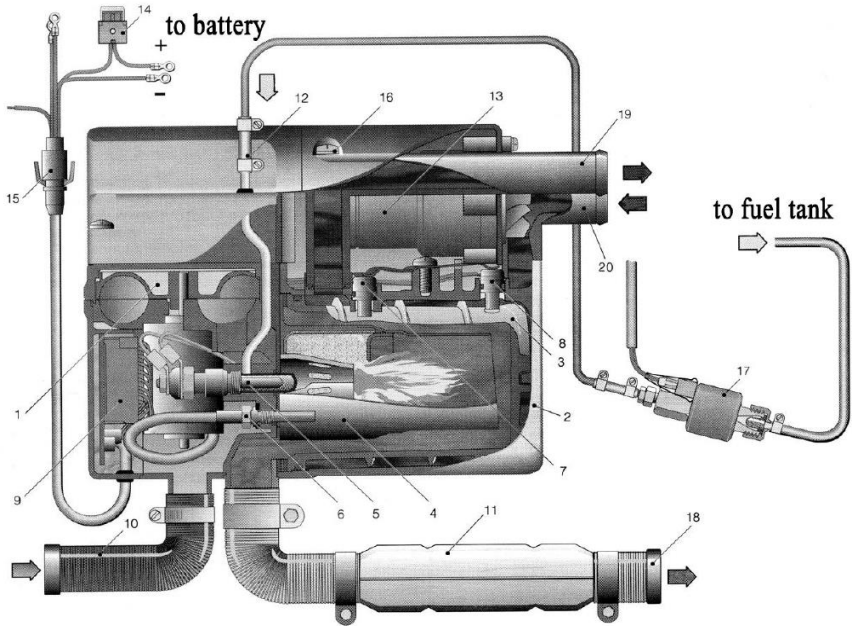


Figure I

- | | |
|------------------------------|------------------------|
| 1. Combustion supporting fan | 2. Heat Exchanger |
| 3. Furnace inner casing | 4. Combustion chamber |
| 5. Glow pin | 6. Flame sensor |
| 7. Water temperature sensor | 8. Overheating sensor |
| 9. ECU | 10. Air inlet pipe |
| 11. Exhaust Muffler | 12. Fuel pipe |
| 13. Water pump | 14. Fuse |
| 15. Main wire harness | 16. Air bleeding screw |
| 17. Fuel pump | 18. Exhaust pipe |
| 19. Water outlet pipe | 20. Water inlet pipe |

The main body of the furnace consists of the outer and inner casing, the combustion chamber etc.

The engine coolant flows through the water inlet pipe, around the furnace cavity between the furnace inner casting and outer casting and then exits out the outlet pipe, making a full loop of the circulation system.

The water pump forces the circulation, because of this the coolant can be heated again and again in the furnace and it ensures a gentle rise in temperature.

The flame sensor is used to judge if the combustion chamber has been ignited and if it keeps burning after ignition.

The overheat sensor is used to measure the temperature of the furnace inner casing. The heater will shut down automatically in case of overheating due to inadequate water in the furnace cavity or other troubles.

The fuel pump draws fuel from the fuel tank and sends it to the combustion chamber where it mixes with the combustion supporting air. The mixture then gets ignited by the glow pin. The fresh air taken from outside the vehicle by the air inlet pipe and is blown into the combustion chamber by the fan. The exhaust then releases the fumes safely outside of the vehicle.

The controller is powered by a single-chip microprocessor and monitors the workings of the heater. It constantly examines:

- The supplied power voltage and whether it meets the correct margins
- Any open or short circuit trouble with the glow pin, flame sensor, overheating sensor, etc.
- The glow pin conduction and duration times
- Measures the rotation speed of the combustion fan in different stages of operation
- The adjustment of the feeding rate of fuel in different stages of operation
- The working conditions of the heater based on the flame sensor, overheat sensor, etc.
- Working conditions of the water pump
- When troubles arise to switch off the heater automatically and send out the relevant fault code to the timer control

After installation the vehicle should be started for a complete circulation. An air bleed screw is installed on the water outlet pipe for eliminating air bubbles.

3A. Installation

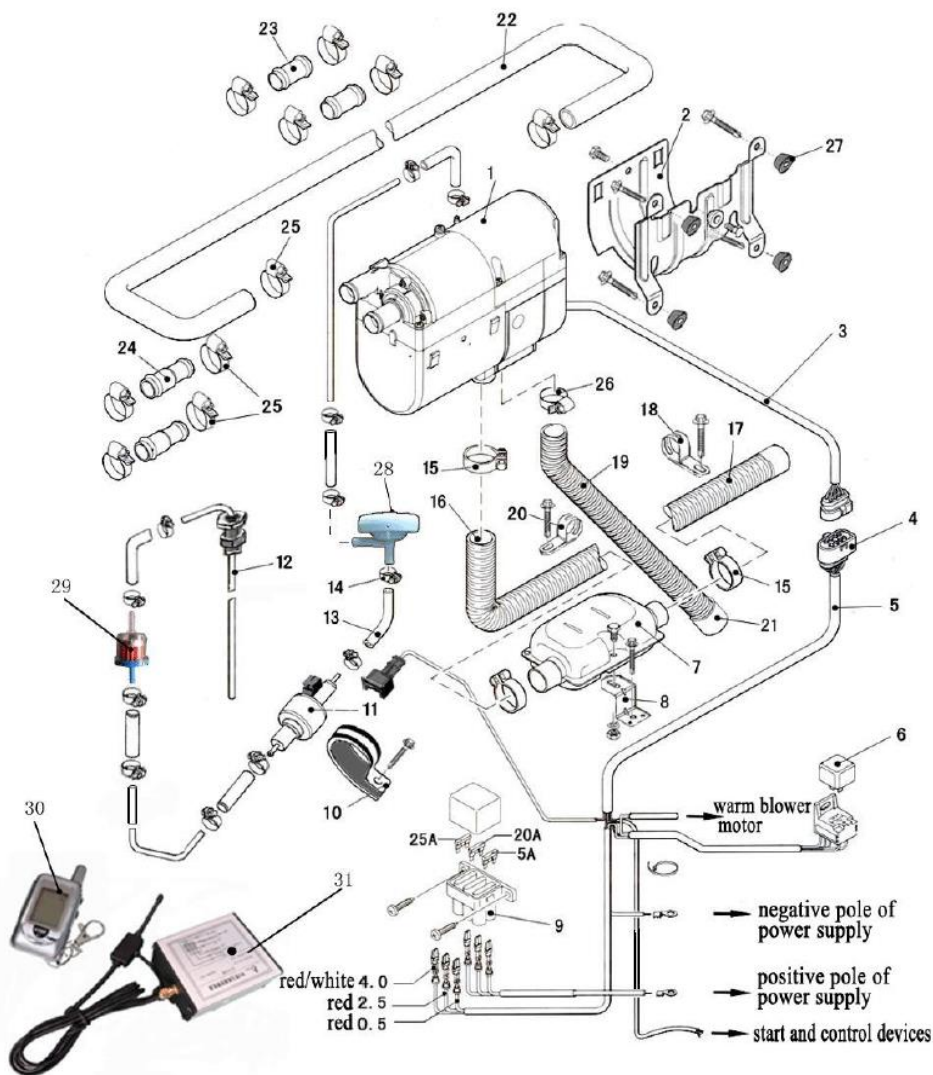


Figure II



- | | |
|---|---|
| 1. Heater | 2. Heater Bracket |
| 3. Connecting cable | 4. Main wiring harness connector |
| 5. Main wiring harness | 6. Relay for warm blower motor |
| 7. Muffler | 8. Muffler holder |
| 9. Fuse holder | 10. Fuel pump clamp |
| 11. Fuel pump | 12. Fuel suction pipe |
| 13. Fuel pipe | 14. Fuel pipe clamp |
| 15. Exhaust pipe clamp | 16. Exhaust pipe |
| 17. Exhaust tail pipe | 18. Exhaust pipe fixing clamp |
| 19. Air inlet pipe | 20. Air inlet pipe |
| 21. Exhaust end cap | 22. Water pipe |
| 23. Water pipe joint | 24. Special water pipe joint |
| 25. Water pipe clamp | 26. Air inlet pipe clamp |
| 27. Anti-Vibration mounts | 28. Damper |
| 29. Filter | 30. Remote control |
| 31. Remote control or GSM receiver | |

Do not install the heater anywhere near flammable sources, including the fuel tank, in closed spaces without ventilation or exposed in the proximity of people without a heat shield.

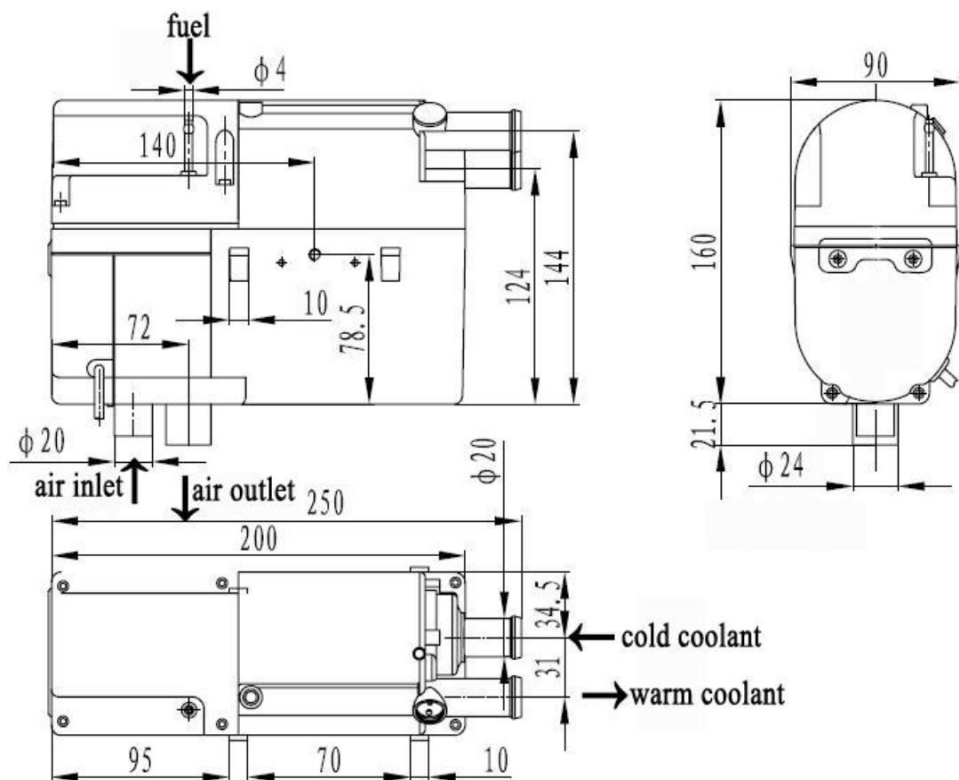


Figure III

The heater should ideally be installed in the engine room where the bleed screw at the top of the heater can be easily accessed.

The main heater body is mounted on the vehicle with a bracket. Ensure it is lined up with all relevant holes in the correct position and then secure it in place with two M6X10 screws.

Figure IV shows the maximum degree the heater can be installed at if an incline is required.

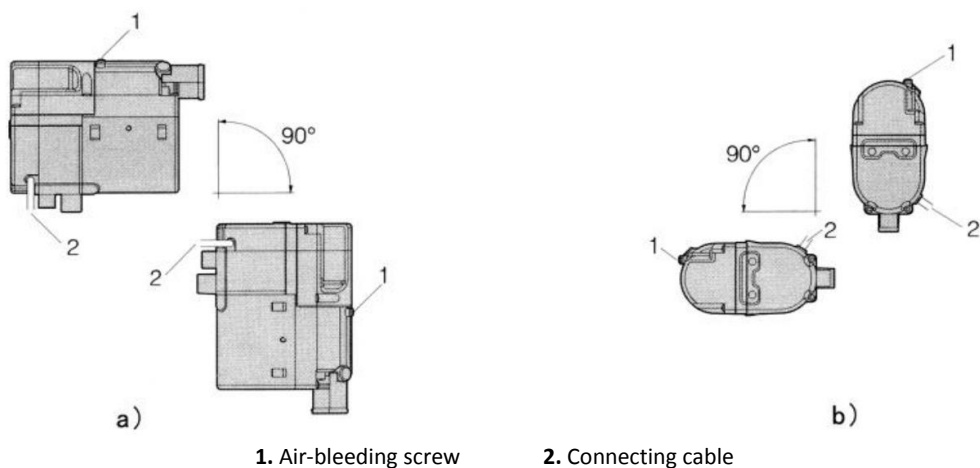
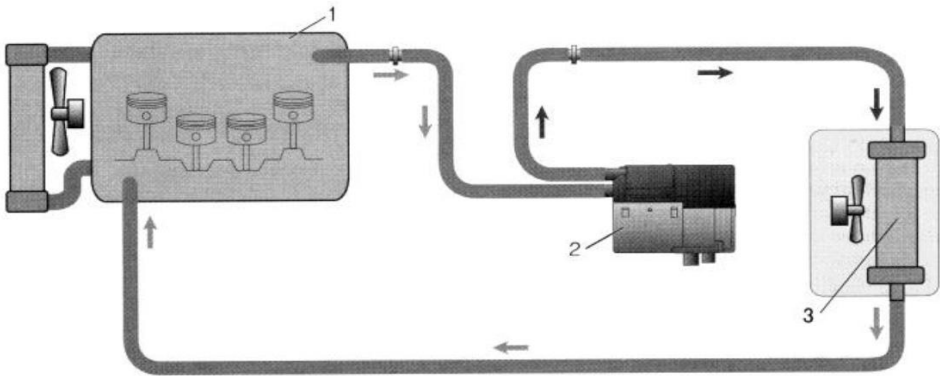


Figure IV



- 1. Engine
- 2. The Heater
- 3. Hot air exchanger

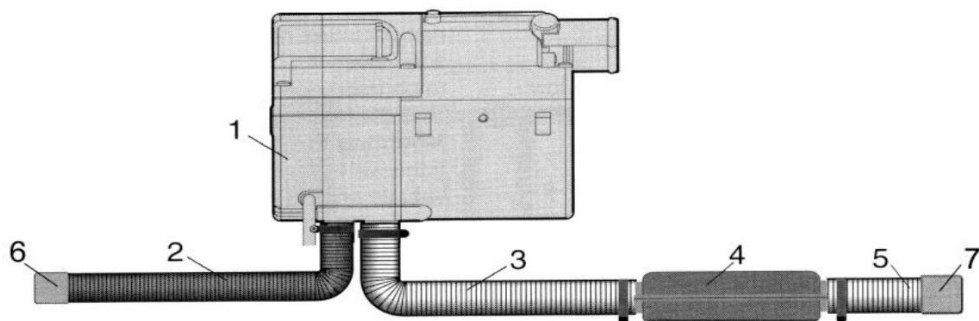
Figure V

Figure V shows the installation of the cooling liquid, circulation system. Use the coolant hose and clamps provided for the installation.

To bleed the system, simply add cooling fluid to the system while the bleed screw located at the top of the heater is loose. When the liquid begins to overflow from the bleed screw the system should be bled correctly.

During installation any existing coolant in the system should be flushed out with clean water and then re-filled with new coolant.

Ensure you use the right coolant specified for your vehicle.



- | | |
|----------------------|-------------------------|
| 1. Heater | 2. Air inlet pipe |
| 3. Exhaust pipe | 4. Muffler |
| 5. Exhaust tail pipe | 6 & 7. Protective hoods |

Figure VI

Figure VI shows the installation of the air intake and exhaust. Make sure you only use the appropriate pipes provided and use the clamps to secure them in position.

The air inlet pipe is used to bring in combustion supporting air into the furnace of the heater from outside of the vehicle and in the opposite direction of travel to ensure that the air is clean and doesn't clog up the pipe with dirt and dust.

Also make sure that the exhaust and any other parts that become hot during the operation of the heater are away from anything damaged by a high heat like wires or plastics.

Make sure that the exhaust **does not** exit in such a way that the fumes are re-circulated by the air inlet pipe.

3B. Installation of Fuel Lines

Figure VII shows the fuel supply for the heater.

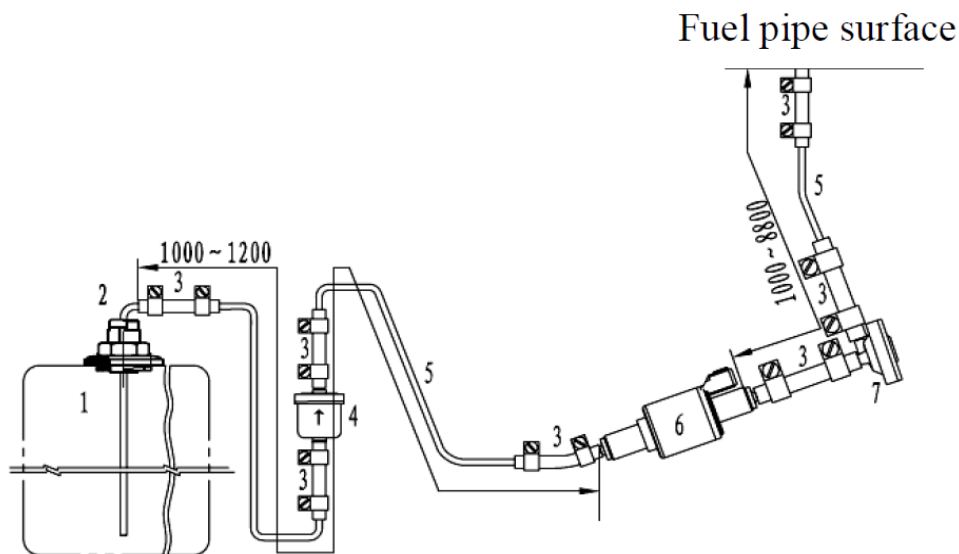


Figure VII

- | | |
|------------------------|-------------------|
| 1. Fuel tank | 2. Fuel extractor |
| 3. Fuel pipe connector | 4. Filter |
| 5. Fuel pipe | 6. Fuel pump |
| 7. Damper | |

The fuel pump should be installed on its anti-vibration mount. It should ideally tilt upward to ensure correct bleeding at an angle of between 13° - 35° , as shown in figure VIII.

When conditions allow the fuel pipe between the fuel pump and the heater should gradually go up.

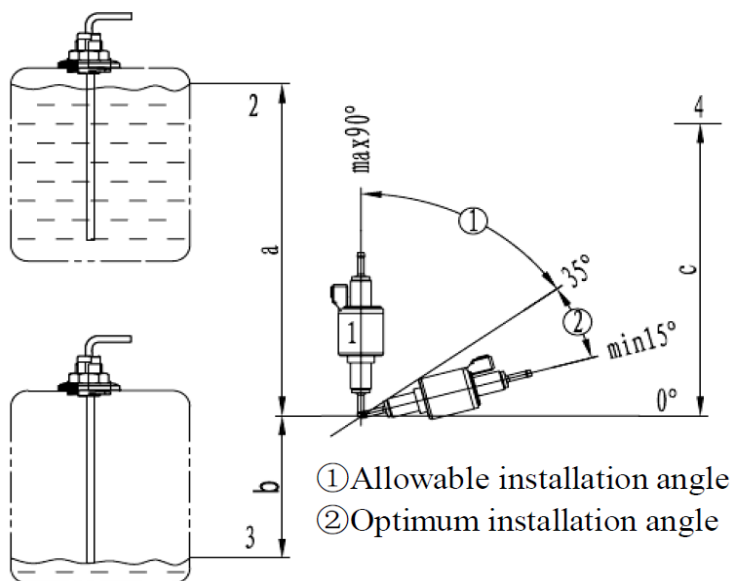


Figure VIII

- | | |
|-----------------------|-----------------------|
| 1. Fuel pump | 2. Maximum fuel level |
| 3. Minimum fuel level | 4. Fuel inlet level |

The lowest point of the fuel drawing pipe should be about 30-40mm from the bottom of the fuel tank. This will prevent the pipe from sucking up any sediment or impurities from the bottom of the tank (Figure VIII).

Differences in elevation between the level of fuel and the fuel pump, as well as the difference in elevation between the fuel pump and the fuel feeding port of the main equipment can produce pressure (or suction) in the fuel pipeline. These dimensions should ensure no suction:

$a \leq 3\text{m}$

$b \leq 0.5\text{m}$

(Or **$b \leq 15\text{m}$** to avoid negative pressure in a sealed tank)

$c \leq 2\text{m}$

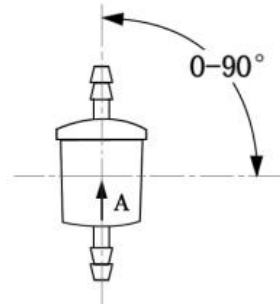


Figure IX

A fuel filter should be installed before the fuel inlet of the fuel pump. 'A' shows the direction of fuel flow. The position of installation of the fuel filter should coincide with figure IX.

Note: The fuel filter, pipe and clamps should be replaced after 2 years.

Connect the fuel pipe, fuel pump, fuel inlet of the heater and fuel extractor with a pipe joint, making sure the connection is pushed tightly together, as shown in figure X.

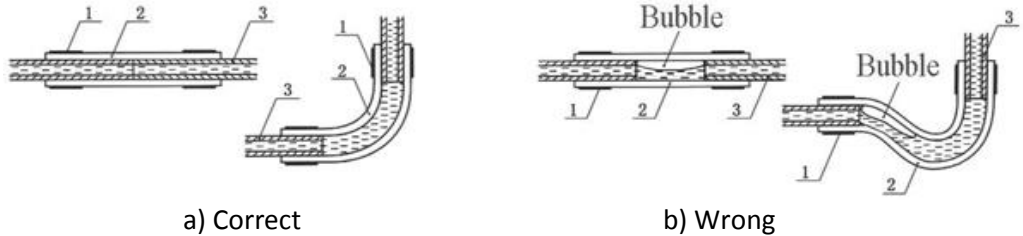


Figure X

Connections should not be made on the fuel pipe from the fuel pump to the heater.

Secure the pipes in position with clamps and the distance between two clamps should be no greater than 500mm.

The fuel pump and pipes should be kept away from any heat source like the exhaust pipe. If it cannot be helped then the fuel pipe must be protected by a heat shield.

3C. Installation of Electrics

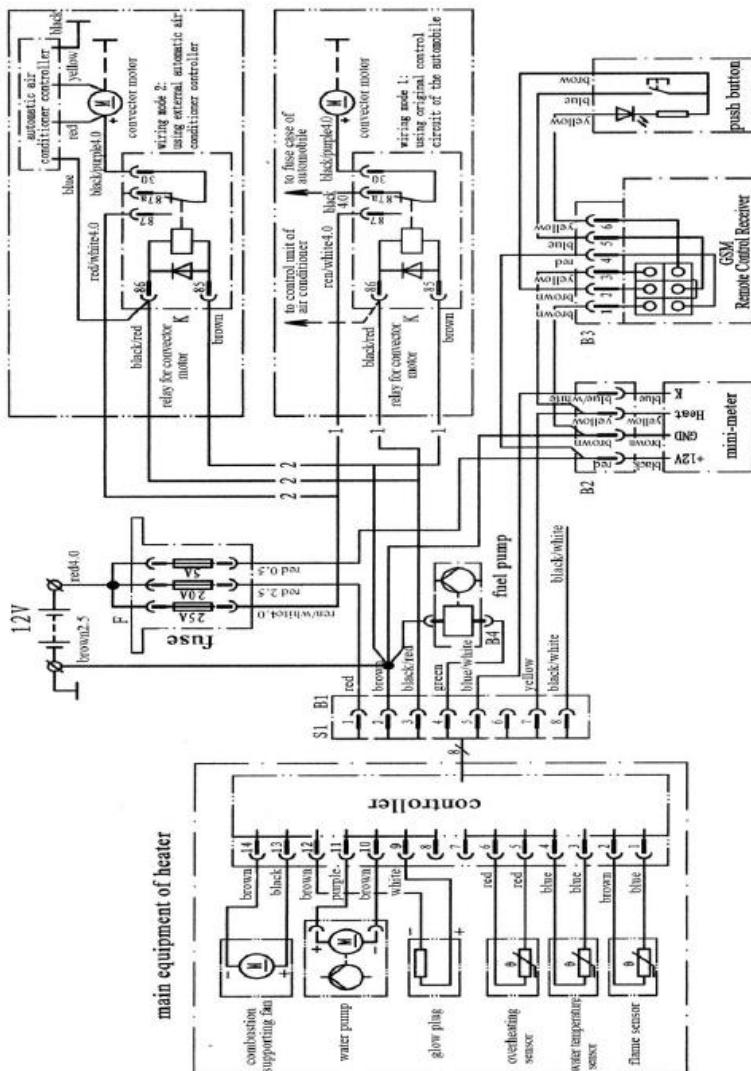


Figure XI



Note: When fitting the electrics, make sure any exposed wiring outside of the vehicle is well protected from damage or heat.

Attach the positive line (4mm² red) to the positive terminal of the vehicle's battery and the negative (2.5mm² brown) to the negative terminal.

The black wire (4mm²) of the matrix heater's relay should be connected to the vehicle's fuse box. The black/purple wire (4mm²) should be connected to the positive terminal of the matrix heater.

All electrical components of the heater should join to the main wiring harness according to the corresponding connections.

Note: All terminals should be connected, even if not in use to prevent short circuiting.

4. Operating Instructions

The heater is operated by a timer or by a remote control unit. The timer should be installed in the cab, for easy access. The remote control unit consists of two parts: the remote control receiver and remote controller (or mobile phone). The receiver should be installed inside the vehicle. The controller is carried by the user for remote operation within the correct range.

The main modes of control on the heater are:

- Manual power on and off
- Manual power on and automatic power off (when working time has come to the end of a preset length)
- Automatic power on at a preset time and automatic power off when the working time has come to a preset stop

Timer Instructions



Key P: Switching between functions

Key  : To confirm or cancel settings

And for Immediate power on/off

Keys  and  : To increase or decrease time

And to increase or decrease display's brightness

Note: When the power is switched on to the heater, the timer will display:



This will remain unchanged if no other operation is given. During this time the arrow keys can be used to adjust the brightness on the display.

Presetting the time

Press the '**P**' key and the screen will display 12:00. Pressing the arrow keys will adjust the brightness. By pressing **P** again the hour time will start to blink. This can now be adjusted using the arrow keys. By pressing the **P** key a final time the minute section will blink, again enabling you to adjust it with the arrow keys.

Presetting the automatic power on times

Press the **P** key until the little number '1' flashes on the display. This is the first automatic power on time. The hour and minutes can then be adjusted in the same way as the preset time was done.

Then press the confirmation key (a solid, black circle will appear on the top right of the display) to confirm the times.

Pressing the **P** key until the '2' and '3' flash will allow you to adjust the second and third automatic start up time for the second and third time respectively in the same way as the first.



Presetting heating times

Heating times can be set between 1 minute and 1 hour 59 minutes.

Press the **P** key until the display shows 0:30 with a small, black, triangle at the bottom right corner of the display. This is then adjusted using the arrow keys in the same way presetting times was done.

Pressing **P** again and the present time will be displayed on screen along with the three small 1, 2, and 3 digits indicating that the three automatic start-up times have been set.

Immediate power on and off

To start the heater immediately, simply press the far right button and the screen will display 0:30 with the small black triangle. This means the heater has started. The operation time can be adjusted to run between 1 minute and 1 hour 59 minutes instantly. The timer will then run down on the screen until it reaches zero and switches itself off.

If you wish to turn the heater off manually, simply press the far right button again and the heater will shut off returning the display to show the present time.

5A. Maintenance

Once the heater is installed, it should ideally be turned on a few times to remove any air trapped in the fuel lines. Also ensure there is no leaking from the lines and that all electric terminals fit securely together.

You should also regularly:

- Check the air inlet and outlet for any pollution or foreign matters
- Clean the externals of the heater
- Check for corrosion or loose connections of the circuits
- Check the combustion air inlet and exhaust pipe for damage and clogs
- Check the fuel line for leaks

To ensure a long life of the heater it is advised that you run it for at least 10 minutes every month, to prevent malfunction of mechanical parts.

After 10 years the heat exchanger, overheat sensor and exhaust should be replaced by a professional.

If any welding is being attempted on the vehicle, please remove the positive power supply wire and earth it to protect the controller from any damage.

5B. Fault Finding

Fault codes will be displayed on the timer.

| CODE | FAULT |
|------|--|
| 10 | Voltage too high >15 (for 12v) >29 (for 24v) |
| 11 | Voltage too low <10.2 (for 12v) <20.5 (for 24v) |
| 12 | The software temperature is too high |
| 13 | Second start failure |
| 14 | The coolant or overheat sensor temperature is too high |
| 15 | The heater is in a dead lock (overheated more than 10 times) |
| 17 | The temperature of the hardware is too high |
| 20 | Glow plug: Broken circuit |
| 21 | Glowplug: Short circuit |
| 30 | The fan's rotating speed is too low |
| 31 | Fan: Broken circuit |
| 32 | Fan: Short circuit |
| 33 | The fan's speed is too low |
| 38 | Warm air blower: Broken circuit |
| 39 | Warm air blower: Short circuit |
| 41 | Water pump: Broken circuit |
| 42 | Water pump: Short circuit |
| 47 | Oil pump: Short circuit |
| 48 | Oil pump: Broken circuit |
| 50 | The heater is in a dead lock (twice failure to start more than 10 times) |
| 51 | Flame sensor check. Overhigh temperature during start time |
| 52 | Combustion interrupted |
| 60 | Temperature sensor: Broken circuit |
| 61 | Temperature sensor: Short circuit |
| 62 | Water temperature is too high during the self-checking time |
| 64 | Flame sensor: Broken circuit |
| 65 | Flame sensor: Short circuit |
| 71 | Overheat sensor: Broken circuit |
| 72 | Overheat sensor: Short circuit |



Press the **P** key in the heating mode. The fault code will be displayed as XEXX, where X is the breakdown number and XX is the fault code (see previous page). Use the arrow keys to view the breakdown information.

To eliminate the failure information; hold down the **P** key and press the far right button. The information will now be cleared. Press the far right button again to display the current time.

Treatment of usual troubles

If the heater is switched on but does not work correctly, the following methods can be used for treatment.

- Turn off the heater and re-start. Do not however re-start more than twice
- Check that the fuse connection between the battery and the heater is correct

| Protected Circuit | Rated current of fuse DC12V | Rated current of fuse DC24V |
|-------------------------------|-----------------------------|-----------------------------|
| Warm air blower motor circuit | 25A | 25A |
| Main circuit of heater | 20A | 15A |
| Operation circuit of heater | 5A | 5A |

- Wait for the coolant temperature to cool down before attempting a re-start (if above 70°C)
- Ensure that there is sufficient coolant in the system before starting-up and never start the heater if the coolant is frozen