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DIESEL COMBI HEATER

INSTALLATION GUIDE



Installation / Parts Verification / Water, Coolant & Air Circuits / Electrical Wiring / Commissioning & Handover

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1. Scope & Critical Safety Requirements

This guide presents the installation requirements in a practical on-site sequence. It covers mounting, clearances, electrical connections, domestic water pressure, coolant circulation, diesel supply, exhaust routing and commissioning.

Installation by unqualified personnel is prohibited. Installation, wiring, and initial commissioning must be performed by qualified technicians or authorized technical personnel. Non-professionals must not attempt installation.

1.1 Pre-Installation Requirements

Table 1.1: Pre-Installation Requirements.

☐	Disconnect the power supply to the vehicle/equipment and shutt of the fuel supply.
☐	Ensure the equipment has completely cooled down before moving, disassembling or assembling it.
☐	Verify that both the vehicle and the product are 12 VDC systems and double-check the product nameplate, wiring harness labels, and positive/negative terminals.
☐	Ensure the installation area is clean and well-ventilated and leave space for maintenance access.

1.2 Location & Environmental Constraints

- **Do not use at or near service stations or fuel dispensing areas.**
- **Do not operate in enclosed indoor spaces such as garages or parking structures and do not use the scheduled start function in such locations.**
- **Do not direct the exhaust outlet toward combustible materials such as hay, leaves, or paper.**
- **Do not install or operate in areas where combustible vapors or dust may be present, such as fuel depots, coal piles, lumber yards, or grain silos.**
- **Do not store items such as oil drums, fuel tanks, aerosol cans, portable gas cylinders, rags, clothing, or paper near the equipment.**
- **Do not direct the hot air outlet at occupants, animals, or heat-sensitive items; do not touch heating components during operation.**

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1.3 Key Safety Points for Installation

- All electrical connections must be reliably grounded; joints must be insulated, with no exposed conductors.
- All water connections must be properly sealed; if leaks are detected, retighten the connections or replace the O-rings/seals.
- Keep away from open flames and prevent fuel spillage when assembling fuel lines; the fuel heater must be kept away from combustible materials.
- Fuel connector specificiations and models must match; inspect for cracks, damage, or deformation before installation.
- Ensure the cold and hot water ports of the plate heat exchanger are oriented correctly.
- Operate the unit only after all access panels, air outlet grilles, or duct covers have been properly installed.

2. System Components & Accessory Kit Verification

2.1 System Overview Diagram

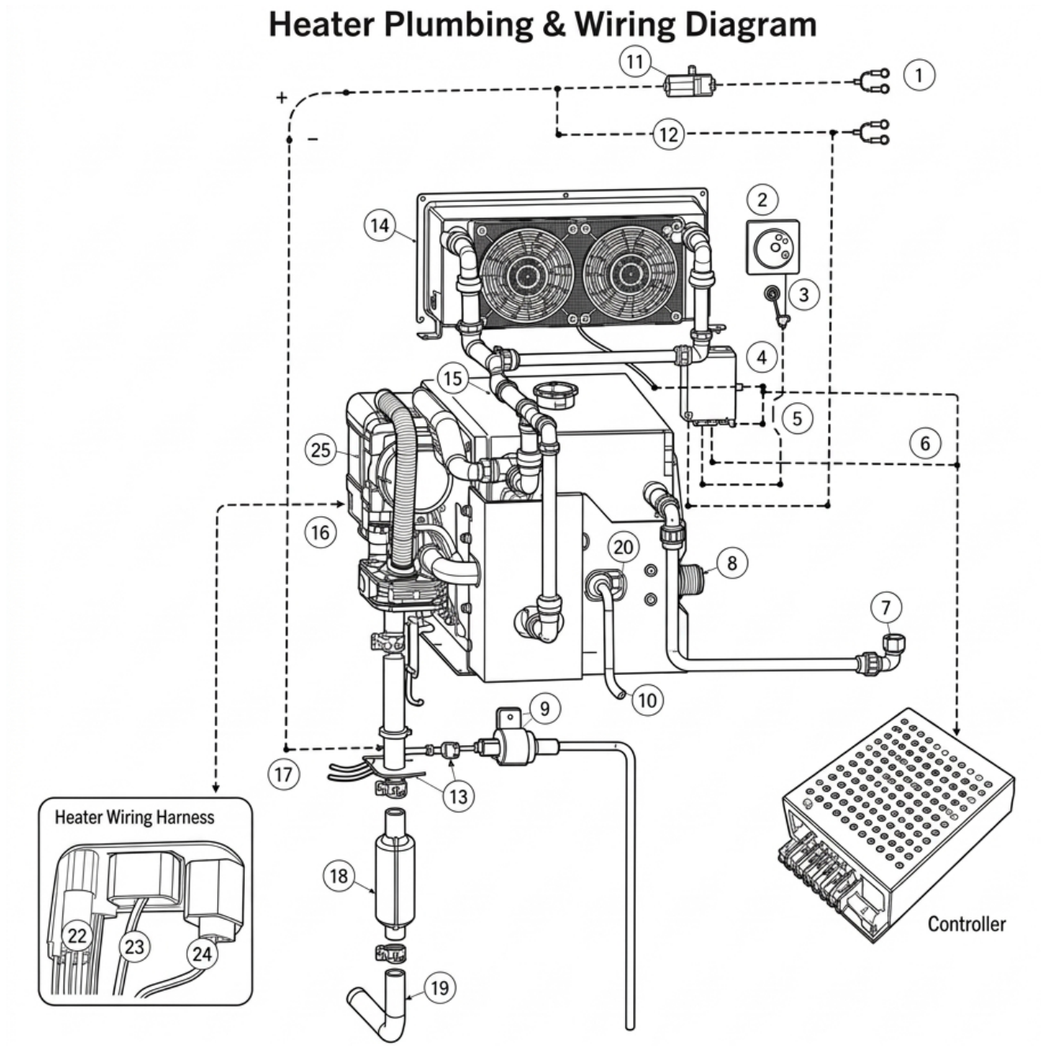


Figure 2.1: Heater Plumbing & Wiring Diagram

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Figure 2.1 Component Reference Numbers

No.	Sort	Description	Verification Points
1	Power Supply Input	Main positive and negative power input.	Confirm Polarity before connection.
2	Control Panel	User Interface, Settings and Display	Connect to control box terminal 7.
3	Temperature Sensor Lead	Measures Ambient Temperature	Connect to the matching control panel/ control box interface.
4	Blower Lead	Powers the Warm-Air Blower	Connect to control box terminals 3 and 4.
5	Display Lead	Displays the Equipment Status	Connect only in accordance with the approved wiring diagram; earlier source descriptions may differ.
6	Sensor Lead	System status and fault sensing.	Connect according to plug labels.
7	Cold Water Inlet	External cold water supply.	Connect to the unit cold water inlet.
8	Thermostatic Mixing Valve	Regulates delivered hot water temperature.	Verify outlet temperature during initial commisioning.
9	Fuel Metering Pump	Meters diesel to the heater.	Connect to the diesel line and lead No.17.
10	Hot Water Outlet	Temperature-regulated hot water outlet.	Secure with the specified hose clamps.
11	Fuse	Circuit over-current protection.	Install in series on the positive supply.
12	Signal Lead	Communication between control box and heater.	Confirm against labels; function is similar to lead No. 23.
13	Hose Clamp	Secures flexible hoses.	Clamp size must match the hose and fitting.
14	Warm-Air Heat Exchanger	Transfers coolant heat to the air stream.	Do not direct hot air at occupants.
15	Flow Control Valve	Regulates coolant flow.	Install in the position shown on the approved piping diagram.

16	Heater Control Lead	Controls heater start, stop and output.	Connect according to the approved wiring diagram.
17	Fuel Pump Lead	Powers the fuel metering pump.	Connect to the fuel pump.
18	Exhaust Silencer	Reduces the exhaust noise.	Connect to the specified exhaust pipe.
19	Exhaust Pipe	Routes combustion gases outside the vehicle.	Connect to the silencer and route fully outside.
20	Heat-Source Connection	Coolant Circuit Connection.	Confirm direction from unit arrows and approved diagram.
21	Heat-Source Connection	Coolant Circuit connection.	Confirm direction from unit arrows and approved diagram.
22	Water Pump Lead	Powers the integrated circulation pump.	Factory connected; confirm connector lock.
23	Signal Lead	Communication box between main unit and control box.	Connect to heater control terminals A and B.
24	Main Power Lead	Main Unit Power Input	Connect to system diagram item 1 and verify polarity/fuse.
25	Heater Core / Main Unit	Provides the system heat source.	Main Heating Assembly.

2.2 Accessory & Unpacking Checklist

Check	Sort	Description	Verification Points
☐	Main Unit	Heater Main Unit, Air-Heating Heat Exchanger/Fan	Check the hosuing, interfaces, fan and mounting points for damage.
☐	Display Controllers (User & Settings Controllers)	Control Panel, Control Box	The control box does not have a seperate part number in the list; it is identified by terminals 1-7.
☐	Sensors	Temperature Sensor Cable, System Sensor Cable	Plug Intact; Cable Free from Crushing damage.
☐	Water Circuit Valves	Cold Water Inlet, Thermostatic Mixing Valve, Hot Water Outlet, Flow Control Valve	Verify flow direction markings, seals, and port sizes.

☐	Fuel Components	Metering Fuel Pump, Fuel Pump Cable	Specifications match; pump body and connectors free from cracks.
☐	Exhaust Components	Exhaust Muffler, Exhaust Pipe	Free from flattening, damage, or foreign objects.
☐	Fasteners	Flexible Hose Clamps	Verify quantity and specifications against actual water/fuel pipe connections.
☐	Power Protection	Main Power Positive/Negative Cables, Fuse/Fuse Holder	Ratings must match the corresponding circuit branch and nameplate.
☐	Control Wiring Harness	Blower Cable, Display Cable, Signal Cable, Heater Control Cable	Labels clear; terminals secure (no looseness).
☐	Main Unit Wiring Harness	Water Pump Cable, A/B Signal Cables, Power Cable	Factory pre-wired; connect A/B signals; connect main power.
☐	Installation Accessories	Water/Fuel Pipes, Filters, Moutning Hardware, Protective Sleeves, Sealing Materials, Grounding Components	Check if included in original manual; assemble according to approved project parts list before installation.

2.3 Confirmed Installation Parameters

Item	Parameter	Installation Note
Domestic Water Inlet Pressure	≤350 kPa (3.5 bar), including static pressure, pump-off pressure, and transient pressure.	If pressure exceeds the limit, a pressure-reducing valve must be installed at the cold water inlet.
Unit Rated Power Supply	12 VDC (12 V systems only)	Strictly prohibited to connect the unit or any 12 V components to a 24 V power supply.
Control Component Rating	Control box: +9-30 VDC; 15 A fuse in series on the positive line.	Refers only to the component's input range; the timer's wide-voltage rating does not imply the entire unit is compatible with 24 V.
Circulation Pump TA50E	12 V; 19 W; approx. 900 L/h (0.14 bar resistance)	Main Unit Water Circulation
Reservoir	18 L; SUS304; Rated Pressure relief limit 0.5 MPa	Not equivalent to the permissible pressure on the mains water side.
Air Heater Fan	12 VDC; 0.5 A; 6 W	120 x 120 x 25.4 mm
Air Heater Control Panel	9-30 VDC; max. continuous current 12 A	Temperature settings: 16-30-HI

3. Overview of the Installation Process

Follow the installation sequence below to reduce duplicated work and avoid rework. Complete the required inspection at the end of each stage before proceeding.

1. Verify the installation location, maintenance clearance, ventilation conditions, and exhaust outlet area.
2. Secure the main unit, air-heating exchanger, control box, control panel, and sensors.
3. Connect the cold/hot water and coolant circulation lines; install valved, clamps and seals.
4. Connect the fuel supply, metering fuel pump, exhaust pipe, and muffler.
5. Connect the fan, control panel, temperature probe, A/B signal lines, and main unit wiring harness.
6. Fill with coolant/antifreeze, bleed air from the system, and perform static leak testing as well as insulation and polarity checks.
7. Power on and test the unit; check ignition, circulation, hot water/air output, exhaust, and fault codes; then complete the commissioning record.

3.1 Main Unit & Component Positioning

Check	
☐	Keep the installation area clean and well-ventilated; do not store flammable or explosive materials nearby.
☐	Position the main unit near a load-bearing structural part of the vehicle, avoiding cantilevered areas at the front or rear; the installation compartment must be accessible for maintenance.
☐	Keep the main unit and feul system components away from combustible materials, heat sources, and areas prone to water accumulation.
☐	Install the control box in a dry, accessible location, ensuring sufficient clearance around the terminal area for connection and tightening components.
☐	Mount the control panel inside the vehicle, in a position that is easy to view and operate.
☐	Install the temperature sensor in a location that accurately reflects the ambient temperature, avoiding direct exposure to hot airflows or localized heat sources.
☐	Position the hot air outlet so that it does not blow directly onto occupants or direct hot air toward flammable materials.
☐	Locate the exhaust outlet in a safe area outside the vehicle, away from doors, windows, vents, and combustible material.

3.2 Main Unit Mounting Method

The approved mounting information shows the main unit placed horizontally on a rigid metal tray or base, which is then secured to the enclose structure. On-site installation must adhere to the same load-bearing principle: the weight of the unit is supported by the base, while hoses, exhaust pipes, and wiring harnesses serve only as connections and must not bear any weight or restrict the unit's vibration.

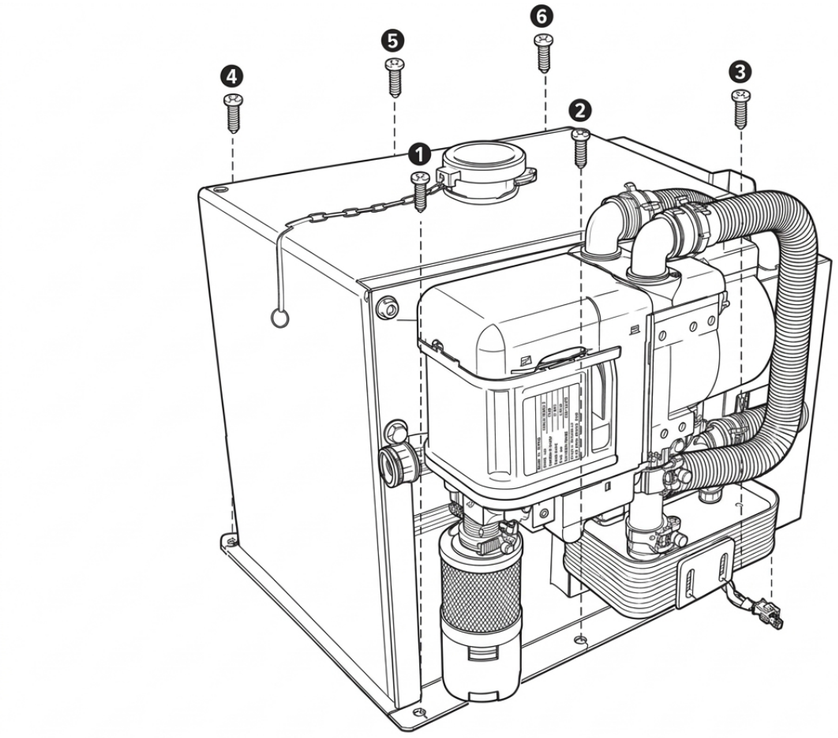


Figure 3.2 Main Unit Diagram

- Install the main unit horizontally with its base facing down, as shown in the approved mounting diagram; inverted, sideways, or suspended mounting is prohibited unless authorised by technical drawings.
- Secure the unit using all six designated mounting holes (three at the front and three at the rear); do not omit any mounting points. It is recommended to use a mounting tray or intermediate bracket made of 1.5–3.0 mm steel plate, or a metal structure of proven equivalent strength.
- For all six mounting holes, use through-bolts or rivet nuts of equivalent strength that match the hole diameter and installation specifications; equip them with large flat washers and locking nuts. Do not rely solely on self-tapping screws, wood screws, or adhesives for mounting.
- If mounting on sandwich panels or wooden flooring, a metal backing plate or structural reinforcement must be added; fastening force must not be applied solely to the thin surface skin of the panel.

- The mounting surface must be flat; do not force-tighten fasteners in a way that distorts the unit's housing or chassis. After fastening, ensure all connected lines and hoses sit in a natural position without tension, compression, or excessively tight bend radius.
- Re-inspect mounting bolts, pipe clamps, and wiring harness anchor points after the vehicle's first 100 km of operation; thereafter, perform checks according to the scheduled maintenance cycle to ensure there is no loosening, cracking, or metal fatigue.

3.3 Installation Space & Ventilation Requirements

The following values represent the minimum clearances required by this guideline. If product installation drawings, vehicle manufacturer specifications, or local regulations require greater clearances, the larger values must be used. Measurements must account for pipe fittings, clamps, wiring harness connectors, hood/panel opening, and component removal paths.

Location	Minimum Clearance	Installation Requirements
Unit Casing & Adjacent Side Walls	≥50mm	No contact with furniture, soundproofing material, wiring harnesses, or hoses on any side.
Top of Main Unit	≥50mm	Ensure adequate heat dissipation and access for inspection and top cover removal.
Connector / Electronic Control Access Side	≥100mm	Allow space for connecting/disconnecting plugs, tightening clamps, and using standard tools.
Unit Removal Path	Must not be obstructed by structural components.	The unit must be removable without damaging furniture or the vehicle body.
Exhaust Pipe vs. Heat-Sensitive / Flammable Components	≥50mm	If clearance is insufficient, a metal heat shield and high-temperature resistant sleeve must be installed.
Air Intake, Return Air Inlet, & Hot Air Outlet	Full cross-sectional clearance	No luggage, fabrics, or soundproofing materials stacked in front.

- The installation compartment must not be completely sealed and must allow for continuous ventilation; the access door, when closed, must not obstruct the main unit's air return, combustion air intake, or hot air passages.
- Combustion air must not be drawn directly from the passenger compartment. The intake must be located outside the vehicle in a clean area protected from water spray and debris/luggage obstruction, and positioned above the vehicle's wading line.
- Surfaces surrounding the main unit must be made of heat-resistant, non-combustible materials. Adequate clearance or thermal insulation must be provided between hightemperature exhaust components and items such as cables, brake lines, plastic parts, and interior trim.
- The nameplate, fuse holder, drainage/pressure relief device, control box, and reset/maintenance access points must remain visible and accessible.

4. Installation of Water, Fuel, Exhaust & Warm-Air Systems

4.1 Domestic Water Supply Lines (Cold/Hot)

1. Connect the external cold water supply to the cold water inlet (No. 7).
2. The cold water inlet pressure must be maintained at or below 350 kPa (3.5 bar); this limit accounts for static pressure, pump cut-off pressure, and transient water hammer pressure. Verify and record the actual pressure using a pressure gauge after installation.
3. If the maximum pressure from the onboard water pump, municipal water connection, or external pump could exceed 350 kPa, a pressure-reducing valve must be installed upstream of the cold water inlet (No. 7); ensure no overpressure occurs downstream of the pressure-reducing valve.
4. Confirm the correct orientation of the cold and hot water connections on the plate heat exchanger; do not reverse the connections.
5. The thermostatic mixing valve (No. 8) is used to regulate the outlet water temperature; the hot water outlet (No. 10) delivers the temperature-regulated water.
6. It is recommended to install a check valve at the cold water inlet. The pressure relief valve/drain outlet must remain unobstructed; the drain pipe must slope continuously downwards to a safe discharge point outside the vehicle. Blocking, installing additional valves, or capping the outlet is strictly prohibited.
7. Use piping and seals of the correct specifications that are heat-resistant, pressureresistant, and suitable for potable water; secure hoses using the provided clamps (No. 13).
8. After introducing water, inspect all connections, valve bodies, the heat exchanger, and the hot water outlet point-by-point to ensure there are no leaks. Ensure the pressure does not exceed 350 kPa during the leak test.

To prevent scalding, the initial comissioning must begin at the low-temperature setting, and the temperature must be verified using a thermometer before handover. It is strictly prohibited to remove pressure-reducing, check, or pressure-relief protection mechanisms in order to increase flow rate.

4.2 Coolant / Heat Source Circulation

1. The circulation pump drives coolant from the reservoir into the heater; after absorbing heat, the coolant supplies heat to the plate heat exchanger or airheating heat exchanger before returning to the reservoir.
2. Ports 20 and 21 form the supply and return connections for the air-heating heat exchanger. Before connecting hoses, identify the flow direction from the arrows and labels on the actual unit and the approved piping diagram supplied with that unit. Do not proceed if the labels and diagram do not agree; contact Aufocus Technical Support for written confirmation.
3. Flow control valve No. 15 regulates coolant flow. Install it in the position shown on the approved piping diagram supplied with the unit. Do not rely on an earlier parts-list description where it conflicts with the final approved diagram.

4. Avoid sharp bends, crushing, or abrasion of any hoses; hose clamps must be positioned over the effective sealing section of the fittings.
5. The reservoir capacity is 18 L. Fill the system to the normal level with coolant/antifreeze that meets project specifications, and bleed air from the system.

Preventing E-15 AIr Locks: Filling and Air Purging must be completed before the initial startup. An E-15 error indicates low water flow or an air lock; priority should be given to checking fluid levels, valves, the circulation pump, hose kinks, and trapped air in the system.

4.3 Diesel Fuel Supply

1. Diesel flows from the tank through a filter and is delivered to the combustionb chamber by the metering diesel pump (Item 9); Item 17 is the power cable for the diesel pump.
2. Open flames are strictly prohibited in the work area; have a container ready to catch diesel and prevent dripping or spillage.
3. Verify that the diesel lines, fittings, and diesel pump specifications match the equipment; inspect for cracks, damage, or deformation prior to installation.
4. Check the condition of all fittings and valves after completing the connections. Upon initial startup, the system will activate the metering pump to draw in diesel.

4.4 Exhaust & Warm Air Heating

1. Use only the specific exhaust pipe (No. 19), muffler (No. 18), clamps, and end components compatible with this unit; do not reduce the pipe diameter, substitute with ordinary plastic/rubber hoses, or omit the muffler.
2. The exhaust must be routed entirely outside the vehicle; ensure connections are fully inserted and secured with high-temperature clamps. The exhaust pipe must be securely fastened to maintain safe clearance during vehicle vibration.
3. The exhaust outlet must be at least 500 mm away from fuel filler necks, fuel tank vents, or fuel system breathers, and at least 300 mm away from openable doors/windows, living area vents, or hot air intakes.
4. The exhaust outlet must not be located near awnings/tents, areas exposed to wheel spray (water/mud), enclosed chassis beam cavities, or positions prone to blockage by snow, mud, or luggage.
5. The outlet must not face the direction of vehicle travel; it should point vertically downward or be angled toward the rear by no more than 20°. It must not point directly at tires, brake lines, cables, plastic parts, or other vehicle components.

6. Keep the exhaust pipe as short and straight as possible with minimal bends, maintaining a slope toward the outlet to prevent condensate pooling. Use metal sleeves, high-temperature seals, and heat shields where the pipe passes through the floor or sidewall.
7. Maintain a clearance of at least 50 mm between the exhaust pipe/muffler and heat-sensitive or combustible components; if this is not possible, install a metal heat shield, but do not completely wrap the exhaust pipe in insulation material.
8. The independent combustion air intake must not be located in an exhaust recirculation zone. If airflow patterns are uncertain, maintain a separation of at least 500 mm from the exhaust outlet; if using an OEM coaxial terminal, install it according to the terminal's specific requirements.
9. Install the air-heating heat exchanger (No. 14) and connect the heat source water circuit; connect the blower wiring (No. 4) to the blower terminals on the control box.
10. Air ducts must not be reduced in diameter, flattened, or sharply bent; ensure the full crosssection of air intake/return vents and hot air outlets remains unobstructed. Do not direct hot air at people, animals, or heat-sensitive items.
11. Reinstall all access panels, discharge grilles, or duct covers before test-running the unit.

5. Control Box & Electrical Wiring

Disconnect all power sources before wiring; verify each connection against the wiring harness labels and terminal numbers. Ensure all connections are securely grounded and properly insulated, with no exposed conductors.

Control Box:

①.Power supply negative
②.Power supply positive
③.Fan positive
④.Fan negative
⑤.Heater control A
⑥.Heater control B
⑦.Control panel connection terminal

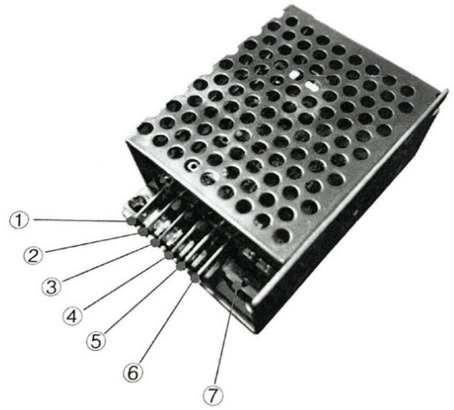


Figure 5: Control Box Diagram

Terminal	Function	Installation / Connection
1	Power Negative	Connect to DC power negative/ground; ensure reliable grounding.
2	Power Positive	Connect via a fuse in series on the positive line; original diagram specifies 15 A.
3	Fan Positive	Connect to air heater fan positive terminal.
4	Fan Negative	Connect to air heater fan negative terminal.
5	Heater Control A	Connect to main unit signal wire A (Pin 23)
6	Heater Control B	Connect to main unit signal wire B (Pin 23)
7	Control Panel Interface	Connect to control panel multi-core cable; original diagram specifies 8 x 24 AWG

Do not confuse the two “1”s: the label ① on the system schematic indicates the main power input for the equipment, whereas terminal 1 on the control box represents the negative power terminal. These belong to different numbering systems; you must distinguish between them based on the context of the drawings during wiring.

5.1 Wiring Diagrams & Cable Identification

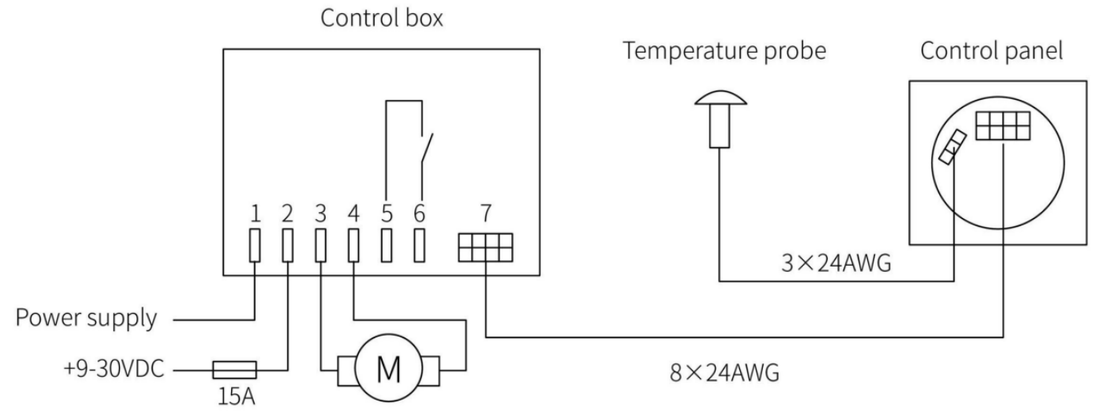


Figure 5.1: Wiring Diagram

Control box power supply +9-30 VDC; 15 A Fuse in series on the positive line; temperature probe cable 3 x 24 AWG; control panel cable 8 x 24 AWG.

Wiring Sequence

1. Check the system voltage and polarity; verify that the rated voltages of the control box, main unit, and peripheral devices are compatible.
2. Connect the negative terminal to control box terminal 1 and the positive terminal to terminal 2; install a 15 A fuse in series on the positive branch circuit, as shown in the original diagram.
3. Connect the fan’s positive and negative leads to terminals 3 and 4, respectively.
4. Connect the main unit’s No. 23 A/B signal wires to terminals 5 and 6; do not guess the connections if the A and B wires are not color-coded.
5. Connect the control panel’s multi-pin plug to terminal 7, and connect the temperature probe to the control panel according to the original diagram.
6. Connect the main power supply only after verifying there are no short circuits, reverse polarity connections, loose connections, or exposed wires.

5.2 Voltage & Power Supply Branch Requirements

The entire unit is restricted to 12 V operation. The unit is rated for a 12 V DC power supply and is suitable only for 12 V systems. The +9–30 V DC rating for the control box and the 9–32 V rating for the timer refer only to the input ranges of the individual components; they do not indicate that the entire unit supports 24 V operation. Connecting the unit or any of its 12 V components to a 24 V power source is strictly prohibited.

Item	Specification/Value	Installation Requirements
System Rated Power Supply	12 VDC (12 V only)	Verify the vehicle power supply is 12 V before installation; do not connect to a 24 V power supply.
Control Box Input	+9-30 VDC (as marked on the unit)	Connect only to a 12V system; Terminal 1 is negative, Terminal 2 is positive.
Control Box Fuse	15 A	Install in series on the positive line, as close to the power source as possible; recommended distance from battery/busbar ≤200 mm.
Main Unit / Pump / Fan	Operate on 12 V systems only	Do not infer system-wide compatibility based on the control box's wide input voltage range.
Allowable Voltage Drop	≤0.5 V at full load	Measure the actual voltage at the power terminals during main unit startup/preheating and when the fan is running at maximum speed.

Recommended branch circuit wire guage for 15 A control box

- For a one-way cable run from the power source to the control box of ≤3 m: the copper conductor cross-sectional area must be at least 2.5 mm^2.
- For a one-way run >3 m and ≤6 m: the copper conductor cross-sectional area must be at least
- 4.0 mm^2.
- Increase the wire gauge if required by vehicle standards, ambient temperature, bundled routing, or measured voltage drop; the fuse rating must not exceed the conductor's permissible current-carrying capacity.
- For the main unit's No. 24 power wire, use the supplied wiring harness or the wire gauge and fuse specified in the official electrical schematic; do not substitute it with the wire gauge used for control box branch circuits.
- Route positive and negative wires as a pair and connect directly to a reliable power source; do not rely on unreliable metal furniture components or thin vehicle body grounding points for the return circuit.
- Install protective grommets where cables pass through metal panels; route cables through corrugated tubing or abrasion-resistant sleeves, securing them at intervals; avoid exhaust systems, sharp edges, moving parts, and areas prone to water accumulation.

Power-on sequence: Connect the 12V main power supply only after all checks regarding water circuits, fuel system, exhaust, grounding, and polarity have been completed. If error code E-03 or E-04 appears, check for over-voltage (sustained voltage above 16V) or under-voltage (sustained voltage below 10V), respectively, as well as voltage drop across the cables.

6. Main Unit Wiring Harnesses & Initial Commissioning

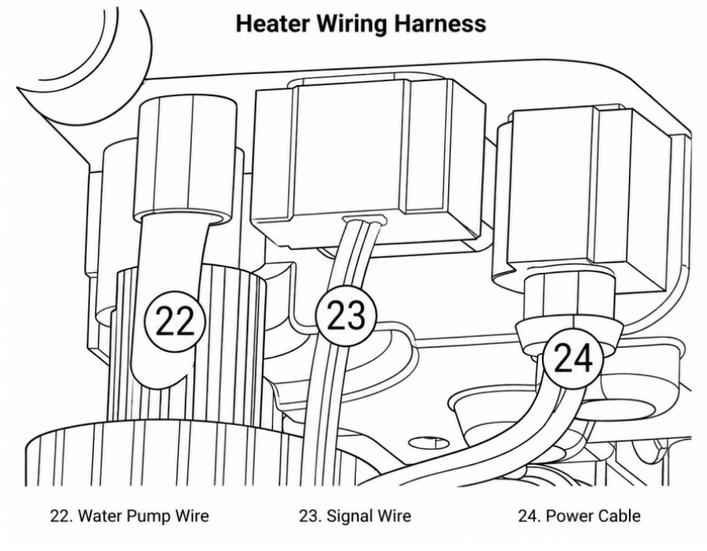


Figure 6: Main Heater Wiring Harness

No.	Name	Connection Point	Inspection Focus
22	Water Pump Cable	Connects to the all-in-one unit's water pump; factory pre-connected per manual.	Check that the connector is securely locked; do not force a position change.
23	Signal Cable	Connects to heater control terminals A/B on the control box.	Corresponds to terminals 5/6; verify A/B based on labels.
24	Main Unit Power Cable	Connects to the system's main power input (System Diagram No.1)	Verify red/black polarity and the specifications of the dedicated fuse.

6.1 Pre-Start Inspection (Power Disconnected)

Check	
☐	All components are securely mounted; hoses and wiring harnesses are free from pinching or abrasion and are not routed near the hot exhaust.
☐	Cold water; hot water, coolant, fuel, and exhaust connections are correctly oriented, and clamps/fittings are tightened.
☐	Coolant has been filled to the proper level, valves are open, and the system has been bled of air.

☐	Power polarity, grounding, fuse ratings, and terminal numbering have been verified as correct.
☐	Cpnnectors for the control box, control panel, temperature probe, fan, and main unit harness are securely locked in place.
☐	The exhaust outlet is positioned safely outside the vehicle, and a grille or duct cover is installed on the hot air outlet.

6.2 Commissioning Test Run

1. Connect the power supply and verify that the control system powers up correctly without triggering immediate alarms.
2. Start the unit; the system initiates the fuel metering pump to draw fuel while the glow plug begins preheating.
3. Once combustion is established, the circulation pump drives coolant flow, and the plate heat exchanger and air-heating heat exchanger begin to receive heat.
4. Inspect the fuel, coolant, domestic water, and exhaust connections in sequence; ensure there are no leaks, unusual odours, or abnormal vibrations.
5. Verify the operation of the hot water outlet and hot air supply; ensure the hot air does not blow directly onto occupants.
6. Monitor water temperature regulation: according to the manual, the system automatically switches to constant-temperature/low-fire mode when the temperature exceeds 70°C and increases combustion intensity when it falls below 70°C.
7. After shutdown, confirm the unit cools down according to the standard procedure, and re-check fluid levels, connections, and for any temperature rise in the wiring harnesses.

6.3 Installation Troubleshooting Guide

Code	Meaning	Priority Checks
E-01	Ignition Fault	Check the fuel lines, air intake, and exhaust systems.
E-02	Flameout during Operation	Check the fuel supply and for leaks/blockages at connections.
E-03	Over-Voltage	Voltage remains above 16 V for approx. 5 seconds; check power supply system.
E-04	Under-Voltage	Voltage remains below 10 V for approx. 20 seconds; check battery, wire guage, and voltage drop at connections.
E-05	Water Temperature Sensor	Sensor is broken or short circuited; check sensor.
E-06	Overheat Sensor	Sensor is broken or short circuited; check sensor.
E-07	Fuel Pump Failure	Check fuel pump wiring, connectors, and for open circuits.
E-08	Fan Failure	Check terminals 3/4, blower wiring, and for blower rotor blockage.
E-09	Ignition Failure	Indication of faulty glow plug.
E-10	Glow Plug	The ignition plug heat did not reach the set value.
E-11	Heater Overheating	Water circulation blockage or lack of coolant, temperature above 120 degrees.
E-12	Overheat Lockout	Three consecutive overheating failures.
E-13	Ignition Failure Lockout	The heater failed twice E-01 and locked the machine.
E-14	Water Pump Failure	Check wire #22, for water pump short circuits, and power supply.
E-15	Airlock Failure	Check fluid level, air venting, valves, flow valve, hose kinks, and circulation pump.
E-16	Flame Over, Temperature Fault	Hot water has exceeded safe temperatures.
E-17	Plate Temperature , Over Temperature Fault	Exceeded its safe maximum operating temperature, triggering safety shut off.
E-18	Flame Sensor	Sensor is faulty.

7. Installation & Commissioning Checklist

7.1 Functional & Safety Checks

Check	
☐	The equipment installation location complies with environmental restrictions; there are no combustible materials nearby, and adequate space for maintenance is available.
☐	The main unit is mounted horizontally on a rigid metal tray/base, with all six mounting points (three at the front and three at the rear) fully secured; a backing plate and anti-loosening hardware are installed, and the piping and wiring harnesses do not bear the weight of the unit
☐	Clearances are maintained as follows: ≥50 mm at the sides, ≥50 mm at the top, and ≥100 mm on the maintenance side; air intake, return air, and hot air outlets are unobstructed.
☐	All components are securely fastened, with no abnormal noise, vibration, or friction during operation; a label indicates a re-inspection is required after the first 100 km of travel.
☐	There are no leaks in the fuel system, the fuel pump operates correctly, and ignition and combustion are stable.
☐	Exhaust is vented entirely outside the vehicle; the exhaust outlet is positioned ≥500 mm from the fuel tank vent and ≥300 mm from doors, windows, or living area vents, ensuring no exhaust fumes or fuel odours inside the vehicle.
☐	The measured pressure at the domestic water inlet is ≤350 kPa; pressure-reducing, check, pressure-relief and drainage devices are correctly oriented and unobstructed.
☐	There are no leaks in the domestic water and coolant circuits; fluid levels remain stable, and no E-15 airlock faults have occurred.
☐	Hot water temperature is controllable; the mixing valve has undergone on-site verification, and there is no risk of scalding.
☐	Forced-air heating operates normally, with outlets positioned to avoid blowing directly onto personnel or fragile items.
☐	The unit's power supply is confirmed to be 12 VDC only, with no 24 V connection; control box terminals, A/B signals, power polarity, grounding, and fuses have all been re-checked.
☐	All exposed contacts are insulated, and wire harnesses are secured away from high-temperature areas, sharp edges, and moving parts.
☐	The shutdown cooling process proceeds normally; a follow-up inspection is conducted after shutdown to check for leaks, fluid levels, and temperature rise at connectors.

7.2 Installation & Commissioning Record

Unit Model / Serial No.	_____ _____	Vehicle / Project	_____ _____
Main Power Supply	12 VDC (12 V Only)	Control Box Fuse	_____ A
Domestic Water Inlet Pressure	_____ kPa (≤350 Required)	Pressure Reducing Valve	☐ Installed ☐ Not Required
Mounting Holes	☐ 3 Front Holes ☐ 3 Rear Holes	Mounting Re-check	☐ After 100 km
Side/Top/Service Clearance	_____ / _____ / _____ mm	Service Space	☐ Adequate
Exhaust Distance to Fuel Inlet/ Doors & Windows	_____ / _____ mm	Exhaust Direction	☐ Downward ☐ Rearward (Offset _____°)
Coolant Type / Concentration	_____ _____	Fill Volume	_____ L
Measured Hot Water Temp.	_____ °C	Ambient Temp.	_____ °C
Installer	_____ _____	Date	_____ / _____ / _____ (YYYY/MM/DD)


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