

ATS

Installation and Maintenance Manual

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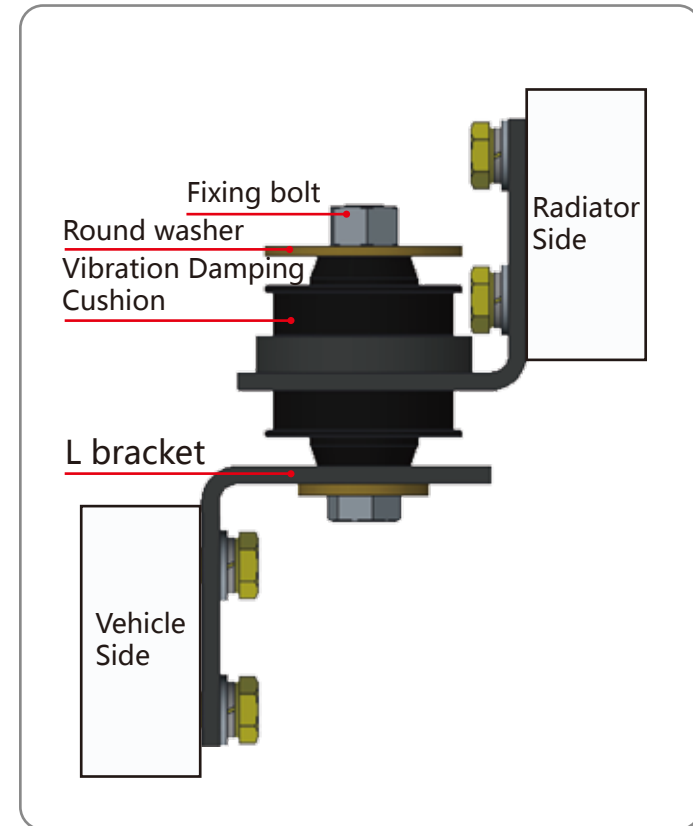
Mechanical Part Installation

► 1. Installation check of suspension bracket and suspension pad.

(1) Make sure the fixing bolt of 'L' bracket is tightened, and suspension pad is at the right place.

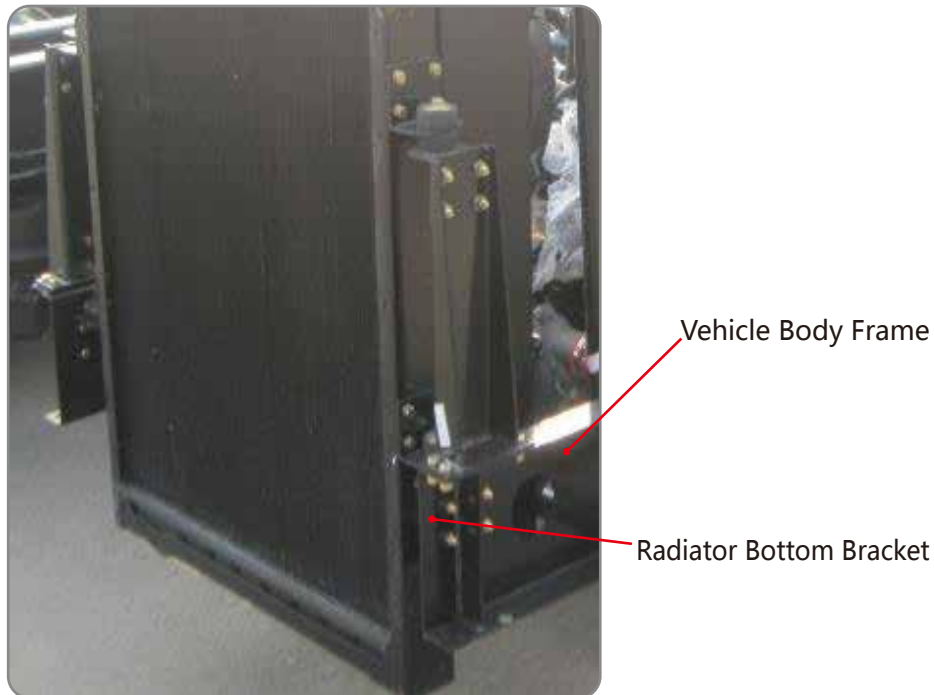


★ Tolerance between the left two suspension brackets' bolt holes central distance is $\pm 1\text{mm}$



Standard suspension assembly instruction picture

(2) Bottom Bracket Installation: Fix the bottom bracket on the vehicle frame (slot-hole side is upward), the fixing place is decided by the vehicle situation. Welding operation is suggested and welding must be firmly enough to stand the weight of radiator, and the upper bracket must be weld on the same beam to prevent leakage caused by pressure imbalance. Reference picture is as follows:



▶▶ 2. Vehicle cabin door's Air Inlet, Air Outlet and Seal Inspection.

(1) Air Inlet: The net air inlet area of vehicle side cabin door shouldn't be less than the front area of radiator (No less than 90% at limit state). As follows:

a. Louver cabin door: We suggest using vertical louver grille (no folding on outside-blade or it will affect the air inlet area), mesh type honeycomb grille, or the forward upwind model (to produce the positive pressure when the bus is running forward).



b. Honeycomb cabin door and Screen cabin door: we suggest using “Rectangular wave cross section” model for both.



Honeycomb cabin door



Screen cabin door

(2) Air Outlet: No high backpressure for radiator of ATS. Please make sure the ‘Hot air reflow’ avoiding arrangements are well done. Be sure there are no obstacles behind the fan within 20cm, or it might affect cooling performance because of high backpressure.

(3) Seal: “Bus body sealing” is available. Sealing board should be designed around the radiator core. Seal the radiator and the bus body completely and ensure the radiator air inlet is working well and the air inlet area of cabin grille door shouldn't be less than the front area of radiator (no less than 90% at limit state). Reference picture is as follows:



ATS Pulling Type Seal



ATS Pushing Type Seal

☆Typical ATS radiator seal method: To avoid hot-wind backflow caused by air leakage, no any gap allowed between the seal board and the body.

“Cabin door seal method” (available for unitary body vehicle): Seal washer is arranged on the inner plate of cabin door. See pictures below:



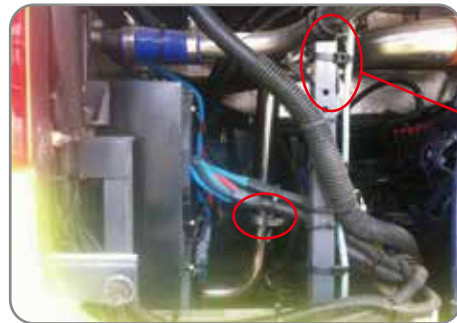
▶▶ 3. Announcements:

Three-way catalyst converter, Silencer and Exhaust pipes are suggested to use asbestos layers as thermal insulation arrangements to protect the nearby fan and lower the temperature of engine cabin.

Coolant Pipe and Air Pipe Installation

▶▶ 1. Installation principle of metal coolant pipe and metal air pipe.

The steel coolant pipe and steel air pipe which is nearest to the top tube of radiator and intercooler must be fixed on the immobile part of bus body to avoid the unnecessary damage caused by engine vibration which transferred to radiator through pipes.



Fix the pipes on bus frame

▶▶ 2. Installation principle of rubber coolant pipe and rubber air pipe.

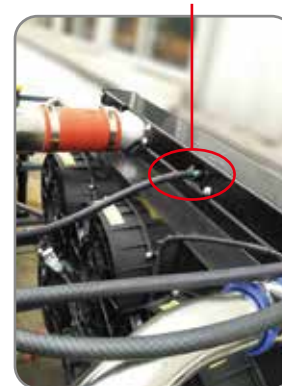
Rubber Coolant Pipe: There should be at least two 90° bent hoses between the engine and radiator, and the second part of hose should keep parallel with engine axis to reduce the swing through self-characteristic of two bent hoses, and ensure the engine vibration will not affect radiator.



▶▶ 3. Installation Principle of exhaust hose.

To make sure it can exhaust completely, the exhaust hose of engine and radiator (new exhaust pipe should be increased at the peak point of water supply pipe when it is higher than engine and radiator) should be connected to the top of coolant tank upwardly, and the place of coolant tank should be higher than the radiator's water supply container.

Exhaust Hose Joint



Electric System Installation

► 1.Installation requirements

(1) ECU Installation Environment Requirements: It should be installed in the adiabatic, waterproof, ventilated and corrosion resistant electrical cabin, and the ambient temperature should below 60°C .

(2) ECU Installation Announcements:

a. Vehicle general power should be cut off before connecting the ECU wiring harness.

b. Must follow the instruction of English tag to connect the plugs and connectors.

c. Cut off the vehicle general power and disconnect all wiring connectors before welding operation begins.

(3) ECU main Wiring Harness Installation :

Connectors of main wiring harness should be connected with ECU ASSY (including two tiny connectors), and tightened.

Power wires: All power wire lugs should be intensively connected to the negative side of battery main switch.

Ground wires: All ground wire lugs should be independent of other systems and intensively make the ground connection.

(4) Radiator Fans and Sensor Wiring Harness Installation

a. Order of fans installation: the Fan No.1 # plug on wiring harness should be connected to radiator coolant inlet fan first, and then connect with fan

No.2,3,4 etc.(coolant outlet fan) flatly.

b. Definition of radiator sensor Assy. installation The connectors of radiator inlet sensor on the wiring harness should be connected to radiator inlet sensor.

The connectors of radiator outlet sensor on the wiring harness should be connected to radiator outlet sensor.

Notes: Make sure the connection is reliable when connecting the sensor to the wiring harness.

(5) Intercooler Fan and Sensor Wiring Harness Installation

a. Order of fans installation: the fan No.1# plug on wiring harness should be connected to intercooler inlet fan firstly, and then connect successively.

b. Definition of Intercooler Sensor Installation

Connect the 'Intercooler Outlet Sensor' connector to 'Intercooler Outlet Sensor' .

Notes: Make sure the connection is reliable when connecting the sensor to the wiring harness.

(6) Connection of the displaying module

The display module should be fixed within the hole of dash board. The display wiring harness will be directed to electrical cabin from dash board firstly, and then connect to 'display connectors' of main wiring harness. Make sure the connection of connectors is reliable and wiring

harness is fastened.

(7) Instructions of wiring harness
 Brushless system.



Radiator inlet sensor



Radiator outlet sensor



Intercooler sensor



Motor sensor



Fan Wiring Harness



ECU Power/ Fan Power



Alternator Signal Cable: Connect to Alternator W side, if no W, connect to the side of 24V.

(8) Connectors Instruction

Connectors of brushless system are 34Pin integrated weld waterproof connectors. Fire resistance class: UL94V0. Connectors have fool-proof design, it is impossible to insert oppositely. Because the connectors are designed precisely, and the connection is very tight, so the pull and inserting needs some skills, violent operation is forbidden. Follows is reference pictures for the right operation:

a. Wiring harness 34Pin female connector and ECU 34Pin male connector should keep upward together.



b. As the yellow part of following picture, make sure the male connector and female connector to be connected well and the fastener must be fastened completely and firmly.



c. Disassembling-Hold the ECU with one hand and press the snap ring with the thumb of the other hand, ensure the fastener is totally out of the frame, and then pull the wiring harness out STRAIGHTLY at the same time, until the wiring harness is completely separated from ECU.

Note : To avoid any damage caused for connectors and plugs,

do not pull the wire forcibly, neither pull it to left nor right sides.



▶▶ 2. Announcements

- (1) Aluminum radiator requires to use the special aluminum radiator coolant (P-value: 7.0~9.0), otherwise the warranty will be invalid.
- (2) Do not cut off the main power when ECU is power on and engine is working.
- (3) ECU cannot be put into electromagnetic environment which is above 50W.

(4) Wiring harness must be fastened tightly to prevent damage caused by rubbing against other parts.

(5) Make sure the intercooler sensor is fixed at the intercooler outlet end (If not, the client can adjust it by self).

(6) The wiring harness must be connected following instruction, and wiring harness cannot be changed without authorization.

(7) Before moving the bus temporarily, it needs to make sure the system is installed completely and connection is reliable, and avoids the damage caused by rain in the open air.

(8) Water heating and vent valve of defroster must be open before filling the coolant and also make sure the air in system is drained completely.

(9) Please notice to avoid the welding spark following on the radiator core and cause for scrap.

(10) ECU controller of brushless system has the function of "dedusting by reversing rotation". Brushless fan will rotate reversely for a while when ATS is power on, please pay attention to it and avoid any dangerous activities.

Products Debug and Check

▶▶ 1.Initial inspection of ATS

After making sure the wiring connection of the whole vehicle is correct, and then switch on the general power, ATS will be at the standby state, and then begin the 'Three Inspection.'

(1) Inspect ECU: Three display lights should all be on (See from right to the left, it is Red light, Yellow light and Green light.)

(2) Inspect displaying module: LCD screen will show "88" first, then show the temperature that tested by sensor.

(3) Inspect the fan: (Do not start the engine, and the ECU signal wire must be disconnected at the same time) Press the red self-inspection button in the front of ECU, then system will start the fan in order. Begin with motor fan, and then radiator fan, intercooler fan, each of them will keep rotating for about 10 seconds.

Note: If the actual situation is different with above description, it means the system may be abnormal; please follow the troubleshooting method to inspect it.

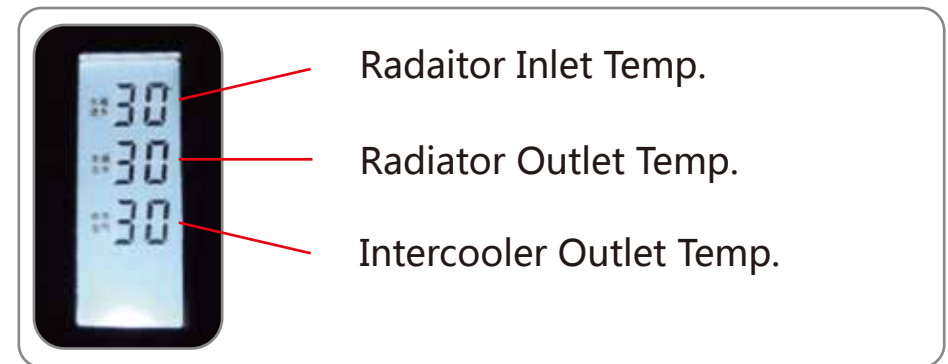


▶▶ 2.Test of ATS

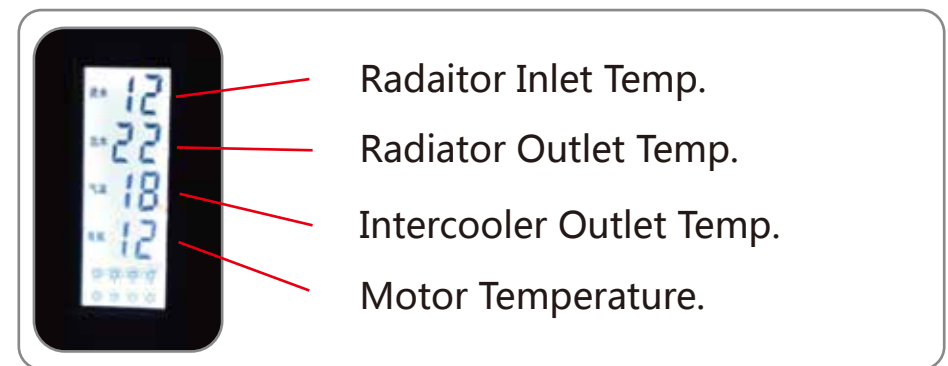
The Blue indicator light of ECU will be on after start engine (It means ATS is at standby state), and the display module should be normal.

- (1) The displaying temperature should be almost same and close to the ambient temperature if it' s the first time to start ECU at the same day.
- (2) Normally the temperature of intercooler should be below 43°C and the temperature of radiator outlet should be below 83°C when the engine is idling.
- (3) When intercooler temperature reaches to 40~45°C and the engine coolant temperature reaches to 85~90°C (initial temperature varies from engine to engine) ,ECU will control the fans to work. After fans

start to work, temperature showing on displaying module will keep stable.



LCD THREE-SECTION SCREEN



LCD FOUR-SECTION SCREEN

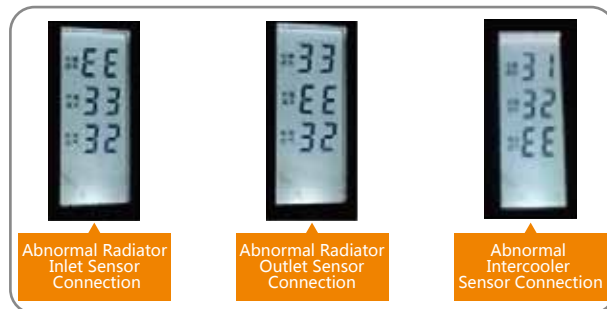
Fault Display and Troubleshooting

▶▶ 1. Abnormally Display

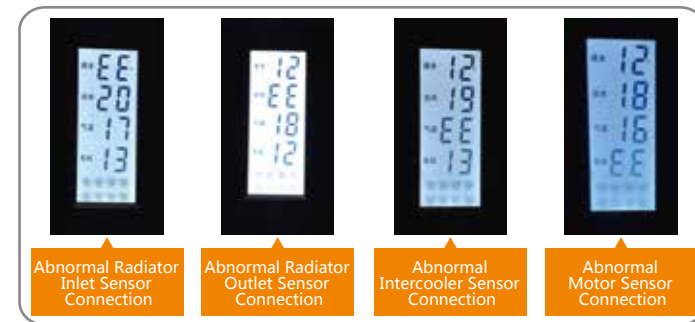
LCD Screen

(1) When LCD screen shows "EE", it means the corresponding sensor connection is wrong, please check the sensor wiring harness and connectors. If everything is ok, it might be the fault of corresponding sensor. Then replace the sensor.

(2) When LCD screen show "EE" or "00" occasionally, it might be the loose or wrong connection of connectors, then change the connectors or cleaning them with alcohol.



LCD three-section display module



LCD four-section display module

▶▶ 2. Non-stop Rotation of Fans

(1) Several or all fans keep rotating after engine stops, it's because ECU starts the 'E-home' emergency model. When this happens, it only needs to replace ECU.

(2) Please check if the LCD display is normal, does it reach to the working temperature and if there is any fault code.

P.S: Common ATS fault codes are: EE, C7, 85, 00, and 99. Corresponding fault display and handling methods are as follows:

Fault Code	Fault Phenomenon	Handling Methods
EE	Half of corresponding radiator fans always keep rotating (radiator inlet sensor or radiator outlet sensor shows 'EE', if radiator has 4 fans, 2 of them keeps rotating; if radiator has 5 fans, 3 of them keeps rotating) Rotating fans QTY= Total QTY of radiator fans/2(Rounding off and take integer)	1. Replace the fault sensor; 2. Check if the signal wire of the fault sensor's wiring harness (the blue one) is broken or not. 3. Check if the ground wire of the fault sensor's wiring harness (the black one) is broken or not (Do not mix ground wire with shielded wire. The black wire has smooth surface, the shielded wire is covered by heat shrink tubing with wrinkles) 4. Check if there is a short circuit existing between the fault sensor's signal wire and ground wire
E7	All the corresponding radiator fans keep non-stop rotation at Max. speed	Replace the corresponding fault sensor
B5	All the corresponding radiator fans keep non-stop rotation at Max. speed	1. Replace the corresponding fault sensor. 2. Check if the power wire (the brown one) of fault sensor's wiring harness is broken or not.
00	None of the corresponding radiator fans rotate and leads to the high temperature of vehicle.	1. Replace the corresponding fault sensor; 2. Cut off the power and restart the bus.
99	All the corresponding radiator fans keep non-stop rotating at Max. speed	1. Replace the corresponding fault sensor; 2. Cut off the power and restart the bus; 3. Check if there is a short circuit existing between the signal wire, power wire and ground wire of corresponding fault sensor.

(3) Check if there is a short circuit between the signal wire (the purple one) and the power wire (the red one) of fault fan's wiring harness.

▶▶ 3.High Temperature and Radiator Boiling

Once it alarms because of high temperature when engine is working, the driver must stop the bus to do inspection. Inspection procedure is as follows (First please exclude the possibilities of faults like waterways blocking and thermostat can't open).

(1) Check whether the "No Electric Indicator Light" on the dashboard is on or not. If the light is on, then check whether the alternator needs to be replaced or not.

(2) Check whether the signal light of alternator is on or not when engine starts temporarily. If the light is not on, then check whether the signal wire of alternator is disconnected or not.

(3) Check whether the 3 indicator lights are all on or not. If any one of them is off, ECU needs to be replaced.

(4) Stop the engine, and press the ECU self-inspection button to inspect whether the fans can rotate or not (when all 3 EUC indicator lights are on). If not, please check whether the corresponding fan's fuse is normal or not.

▶▶ 4.Daily Maintenance of ATS

(1) Inspect the appearance of radiator and intercooler irregularly and

check whether there are any pipe damage or leakage and radiator fin is fallen or not (repair it if pipe is leaking, and straighten it up by hand if radiator fin is fallen).

(2) If there are any things like dust, catkin or leaves stacking on the radiator core, please blow them away with high-pressure gas, but needs to prevent radiator fin from falling. Water flushing is NOT suggested.

(3) ECU must be disconnected before vehicle welding operation begins. Restores it after welding work is finished.

(4) All the connectors of ATS have waterproof function, it' s same to ECU, but not 100% waterproof, and so, during the daily maintenance and driving, it needs to prevent ECU from immersing in water which might lead to short circuit.

► 5. Workflow of ATS

