FJH series Air Diesel Parking Heater

(2KW, 3KW and 5KW)

Cang Zhou New High Auto Radiator Manufacturing Co.,Ltd

1.Working Principle

FJH series air diesel parking heaters (hereinafter referred to as the heater) are independent to the original engine system. It makes use of 12V or 24V direct current to drive. There are two kinds of control mode of the heater: Automatic control mode and Manual control mode. The heater adopts light diesel which corresponds to the environmental temperature as fuel, and it can be started and operated normally at the temperature of above -40℃. The inhaled fresh air is heated to hot air through heat exchanger by the energy which comes from fuel burning, then blown to where it is needed. This type of heater owns the advantage of compact structure, light weight, high thermal efficiency, economization of electricity and fuel, easy installation.

2. Principal Technical Parameters

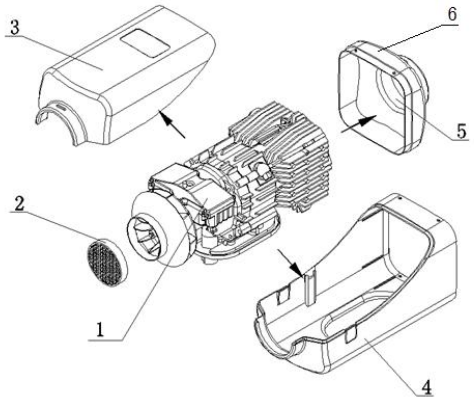
Heater Model	Air heater 2KW	Air heater 3KW	Air heater 5KW
heating medium	air	air	air
Heating power(W)	1000-2000	1000-3000	1000-5000
Hot air outflow(M/H)	83	160	176
Fuel consumption(L/H)	0.2-0.24	0.22-0.36	0.22-0.49
Working electric consumption power	19-39	19-43	19-48

Low-voltage protection limits	10/21.5V		10/21.5V		10/21.5V	
High-voltage protection limits	15/32V		15/32V		15/32V	
Environmental temperature	Working temperature	Storage temperature	Working temperature	Storage temperature	Working temperature	Storage temperature
Heater	-40℃-40℃	-40℃-85℃	-40℃-40℃	-40℃-85℃	-40℃-85℃	-40℃-85℃
Dosage fuel pumps	-40℃-50℃	-40℃-105℃	-40℃-50℃	-40℃-105℃	-40℃-105℃	-40℃-105℃
Hot air inlet temperature	Maximum 40℃	Maximum 40℃	Maximum 40℃	Maximum 40℃	Maximum 40℃	Maximum 40℃
The main body's weight	About 2.63kg		About 3.67kg		About 4.4kg	

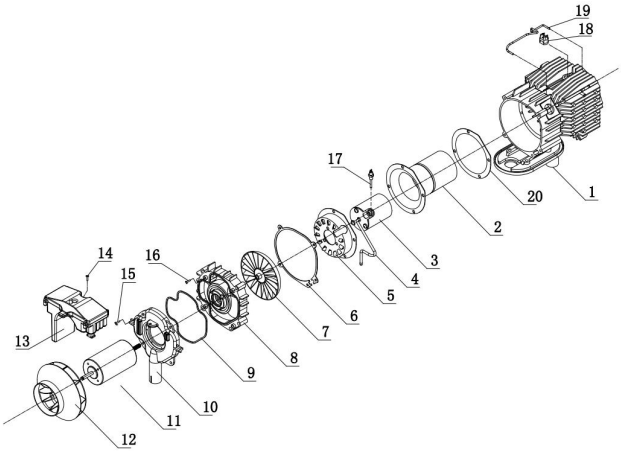
3.Structure and working principle

After the heater starts, the glow plug comes into operation, the magnetic pump begins to supply fuel, combustion-supporting fan inhales combustion-supporting air from outside of car. The fuel generates the heat by burning in combustion chamber, which is taken by aluminum heat exchanger. The inner air pushed by the heat exchange fan brings heat to where it is needed through the surface of heat exchanger. And the combustion emission is discharged through exhaust pipe.

3.1. The structure of hood-shape case



1-Main engine; 2-Suction hood; 3-Upper hood; 4-Bottom-hood; 5-Air outlet ; 6-Rear hood ;



1.Exhaust tube 2.Combustion pipe 3.Combustion chamber 4.Fuel tube 5.Air inlet distributor 6.Gasket 7.Combustion supporting fan blades 8.Bracket of fan motor 9.Gasket 10.Combustion supporting air inlet 11.Fan motor 12. Blade wheel of heating fan 13.Main control panel 14.Fixing screw 15.Fixing screw 16.Fixing screw 17. Glow plug 18.heat sensor
19. Sensor Fixed bracket

3.3 The controlling unit

The controlling unit is located at the forefront of the heater and the rear part of the heat supply fan wheel. It includes the single microprocessor, the driving electrical circuit, the signal acquisition electrical circuit of the frequency, the rotational speed, the voltage, temperature monitoring electrical circuit. It retains the characteristics of automatic heating process, automatic systematic monitoring and automatic fault processing.

3.3.1 The control of the working process

During the heating process(on-working-off), the heater controls and modulates the rotational speed, the frequency of the fuel pump and the driving of the electric plug by chronically corresponding to these parameters: the expected figure and real figure of the open temperature, the responsive signal of the motor's rotational speed, the fuel pump's frequency, the surface temperature of the heat exchanger.

3.3.2 Malfunction management

When there are phenomena that the heater fails to ignite normally or there is abnormal combustion or there are the open circuit or short circuit with the electric plug, the motor, the fuel pump and the sensor, the heater will automatically lurch to the locking state to protect the heater, which ushers in the imminent conditions that the electric plug stops working, the motor stops rotating and the indicative lights of the controlling switch shines).

3.3.3 Fault display

When there is something wrong with the heater, the indicative light(the green light) will show where the problem is so as to help repair the heater.

During the fault state, the light pipe will shine at different frequencies. The times of the shining will imply different fault codes. Details are seen as follows:

Code number	Fault type	Reasons and dealings
Code 1	Fuel pump problem	Check whether the fuel pump has been connected with the heater or there is the open circuit phenomena or the line circles have been burned
Code 2	Glow plug problem	Check whether the glow plug has been firmly inserted in the heater or the there is the open or short circuit concerning the glow plug or whether there is lots of accumulated carbon

Code 3	Motor problem	Check whether the motor has been connected with the heater or there is the open or short circuit or the motor is stuck with obstacles
Code 4	Sensor problem	Check whether the sensor has been connected with the heater or whether there is the open or short circuit or whether the sensor has fallen off the heater
Code 5	Over-high voltage	Check whether the heater's voltage is in conformity with the vehicle's voltage whether the generator of the vehicles produces voltage over 28V
Code 6	Over-low voltage	Check whether the automotive storage has been lack of electricity, leading to the phenomenon that the voltage has been below 22V
Code 7	Controller problem	Check whether the controller has been connected with the heater or whether there is short or open circuit with the heater
Code 8	The combustion suspension	Check whether there is enough fuel through the fuel route or whether the air inlet has been blocked or whether there is lots of bubble in the fuel pipes(if there is lots of bubble which cannot be emitted, please just change another fuel pump)
Code 9	Motor with fan stopping	Check whether the radiator fan and the combustion impelling fan has been stuck

Code 10	Three times of ignition failure	Check whether there is something wrong with the fuel pump or whether the diesel has been connected with the heater or whether there is blocking phenomena with the fuel route
Code 11	Chip body damage	Check whether radiator fan has been damaged or whether the air inlet has been blocked or whether the air outlet has been blocked
Code 12	The over-high air inlet temperature	The inner cabin temperature has been warm enough and there is no need to use the heater. Check whether the air outlet has been linked to the outside or whether the hot wind has been sucked in by the air inlet
Code 13	Controller failure	Check whether there is unsteady voltage or the controller has been damaged from moisture or whether the positive and negative sides have been linked the other way or the supply voltage does not match with the heater's voltage. If there is this kind of phenomenon, please just change another new one
Code 14	The short circuit of the fuel pump	Check whether there is the short circuit with the pump route and the short circuit of the pump route for a long time shall cause damage to the controller
Code 15	The short circuit of the glow plug	Check whether there is too much accumulated carbon

		on the glow plug. The long-time short circuit shall result in damage
Code 16	The short circuit of motor	Check whether there is damaged line between the motor line and aluminum bracket. The long time short circuit will result in the damage of the controller

3.4 Sensor equipment

3.4.1 carbon monoxide sensor(some low equipped heaters haven't got this function)

The equipment carbon monoxide sensor is installed on the controller to check the concentration of carbon monoxide in the cabin. When the concentration is bigger than the normal figure, the alarm happens.

3.4.2 Temperature sensor

The temperature sensor is located in the hot air intake to monitor its air temperature. The controller can change the working state of the burner and modulate the heat output according to the monitored figure.

3.4.3 Outer equipped inner cabin temperature sensor

This kind of sensor is customer-oriented. Some kinds of heaters have not got this function.

3.4.4 Power supply

The heater's power supply must use 12V/24V storage battery and have one independent safety control. When the power supply voltage is smaller than the limit or bigger than the limit, the heater will come automatically into the locking state and

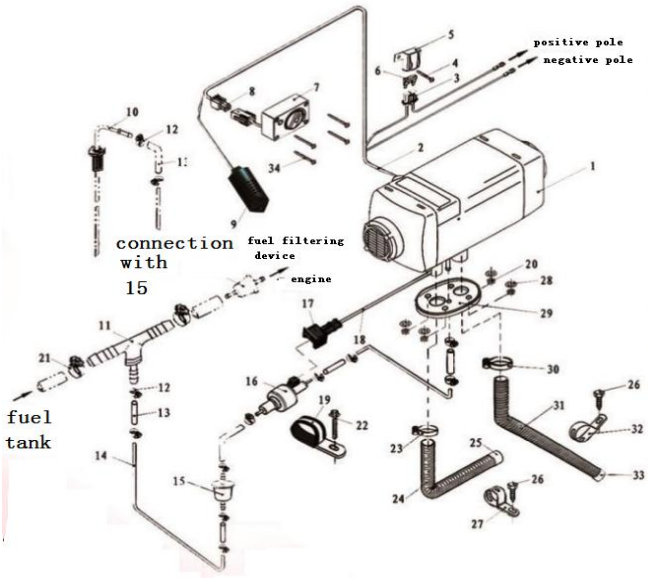
there are the fault codes on the screen.

3.4.5 Fuel supply

The heater can get the fuel supply from the fuel tank of the vehicle or the independent fuel tank. The transmission and dosage of the fuel supply can be modulated through the special fuel tank.

4. The installation of the heater

The heater installation must be done with special equipment. The installation details can be seen as follows the view 7. The precise position of various equipment, fixing ways may vary according



1-main body 2-main harness 3-fuse socket 4-self-tapping screw 5-fuse case cap 6-blade fuse 7-controller 8-controller connector X9 9- externally equipped inner cabin temperature sensor 10-fuel intake pipe 11- T piece 12-fuel pipe clip 13-fuel pipe contact 14-fuel conveying pipe 15-fuel filtering device 16-fuel pump 17-fuel pump connector 18-fuel pump extended line 19-fuel pump shakeproof bracket 20-M6 nut 22- fuel fixing screw 23- air inlet pipe clip 24-air inlet pipe 26-self-tapping screw 27-air inlet pipe fixing clip 28-gasket 29- sealing gasket 30-exhaust pipe clip 1-exhaust pipe 32-exhaust pipe fixing clip 34-power fixing screw

to different kinds of vehicles or it will influence the heater's workings or even bring harm to the person's safety.

4.1 The requirement of the heater installation and using places.

4.1.1 There is no allowing of using the heater close to the combustible gas or flour.

4.1.2 There is no allowing of using the heater in the closed space(such as the garage, repairing garage with no ventilation equipment) in case there should be phenomena of

poison.

Attention: Under the above circumstances, even though the heater stays at the locking state no operating like that

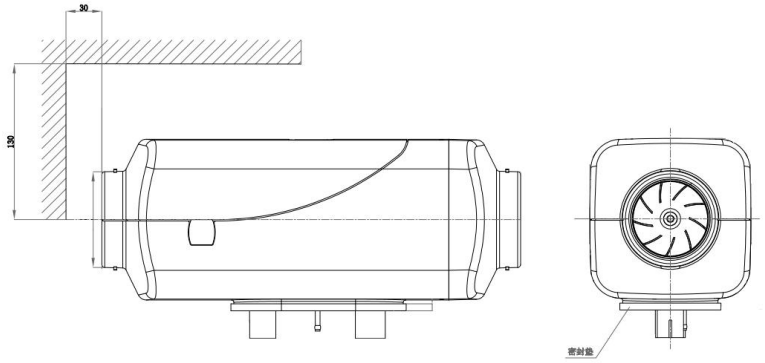
4.1.3 There is no allowing of using the heater in the bedroom.

4.1.4 Heaters installed in the special used vehicles should obey specific rules.

4.1.5 There should be avoidance of gas container. Compressor pipes, extinguishers, clothing, paper and so on must not be closed to the heater or the heater's hot air outlet.

4.2 The main body's installation

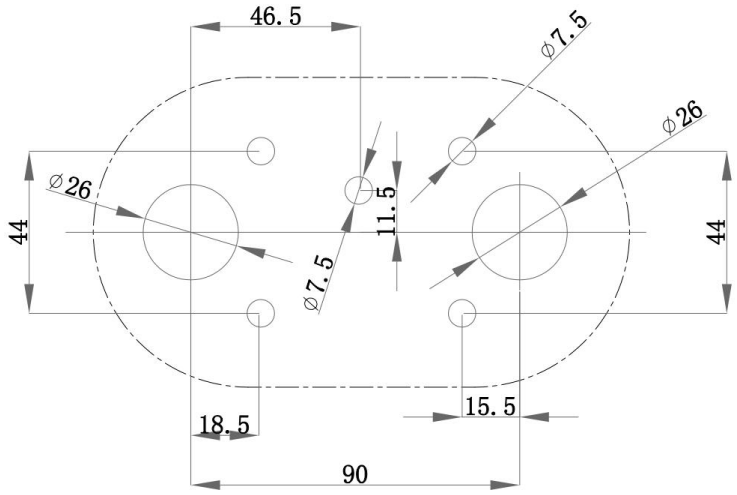
The main body of the heater can be installed within or outside the vehicle. When the heater is installed outside the vehicle, there should be strengthened installations of protection cap(offered by dealers). The heater cannot be dipping into water or for a long time. If the heater is soaked in water for a long time, only when the heater is dry can it be checked and connect electricity.



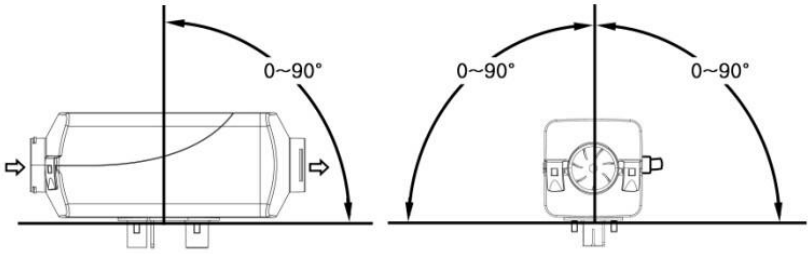
In order to keep the air flow and give easier installations and maintenance, the installation positions should have enough space. The various installation sizes of the heater can be viewed as picture 8 the referred range of the double wires two-dot chain line.

Good sealing is necessary between the main heater and the installation surface on the vehicle.The special gasket supplied by the manufacturer must inserted in.And the installation surface must be even.Its parts at the installation bases of the main heater should have unevenness less than1mm.After drilling installation holes, evenness must be improved according to this requirement.At installation, please rotate the four M6 nuts tight, which are provided by the manufacturer.

For re-installation of the main heater, a new gasket must be used to replace the old one.



Attention must be paid to that the inclination angle shall not exceed the limit, or normal operation will be affected. Direction for installation of the main heater is shown in the following picture.



After installation of the main heater,please check and make sure that there is no contact or friction between the blade wheel of fan and other nearby parts to avoid non-smooth operation.

4.3 Installation of Air Heating System

The air heating system of the heater should not be connected with the air channel of the vehicle.Either independent outer circulation or inner circulation mode can be adopted.

When an external heating air tube is attached to the heater, the tube diameter should not be smaller than 85mm.Its material should be capable to resist temperature

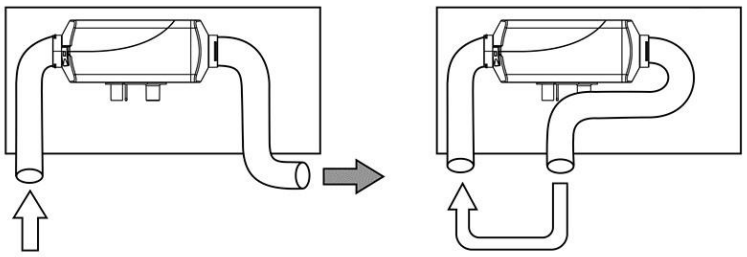
of 130℃。

The maximum pressure drop between the air inlet side and outlet side of the air heating system should not be higher than 0.15kPa.

The hot air from the heating system should not erupt onto such parts which are unable to resist heat.In passenger vehicles,the hot air vent should not be blocked by passengers.A self-provided protective net can be installed if necessary.

For heater working in external circulation mode,the position of air inlet port should be proper to guaranteed that under normal operation no splash of water can be sucked into the heater the no exhaust from the engine can be sucked in.

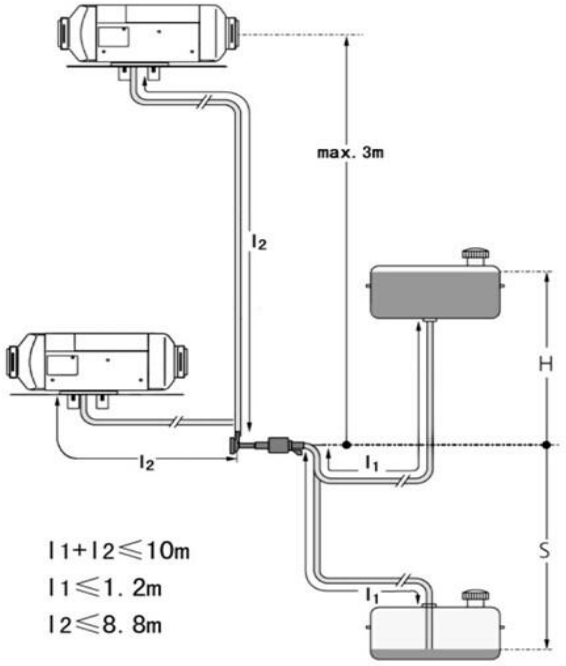
For heater working in internal circulation,measures should be taken to avoid re-entering of the supplied hot air into the air inlet port.If no air inlet tube is attached in this mode,an air inlet hood with grids must be installed at the air inlet port of the main heater.The inlet air should be drawn from the cold area of the compartment,such as under the seats or berths.



4.4Installation of Fuel Supply System

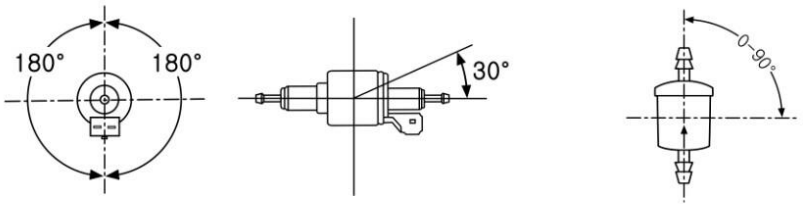
Fuel for the heater can be supplied from the fuel tank of the vehicle or an additional independent fuel tank. It is not allowed to install the fuel tank in the cab or passenger compartment or any region that is possibly to cause fire if an independent fuel tank is used.

The elevation difference between the heater and fuel pump, and between the fuel pump and the fuel pump produces pressure from fuel to the fuel pump.The inner diameter and length of the fuel tube is related to the resistance of the fuel route.Please consider such factors for installation.



4.4.1 Fuel pump installation

The fuel pump should be installed in places that can avoid heat radiant from the vehicle parts that can emit heat and in places with cool air.Its ambient temperature should not exceed 20℃. Directions of installation of the fuel pump are shown in the following picture. When installing the fuel pump, please use the fuel pump holder supplied with the heater to hold the pump tight. The pump is fixed with the shock-reducing tightening piece.



4.4.2 Fuel Filter installation

The fuel filter device should be installed before the fuel inlet port.Please make

sure that the fuel flow is correctly followed. Its position shall be in conformity with the above picture.

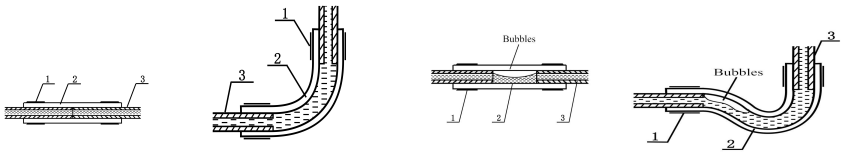
4.4.3 Installation of Fuel Tube

Only the flexible nylon tube, which has good light-resistance and thermal stability ,supplied with the heater can be used as the fuel tube. The inner diameter of the tube is Ø2mm.

The position of fuel tube should be against flying stones and be away from any heat emitting parts of the vehicle. Protective device can b installed if necessary.

The fuel tube from the fuel pump to the main heater should be in any directions other than downward direction. The fuel tube shall be tied in some proper location to make it fixed. The distance between two ties shall be less than 50cm.

The fuel tube fittings supplied with the heater should be used for connections between fuel tube and fuel pump,fuel tube and heater,fuel tube and sucking tube of fuel tank and fuel tube and reducing T.The fuel tube should tie with fuel tube clamps.Bubbles should be eliminated from the connecting places.



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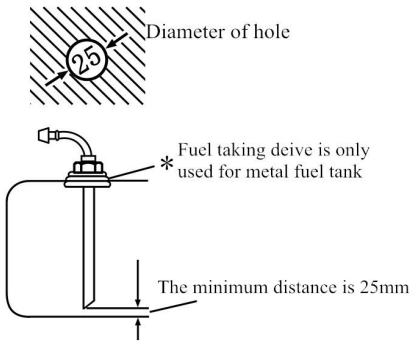
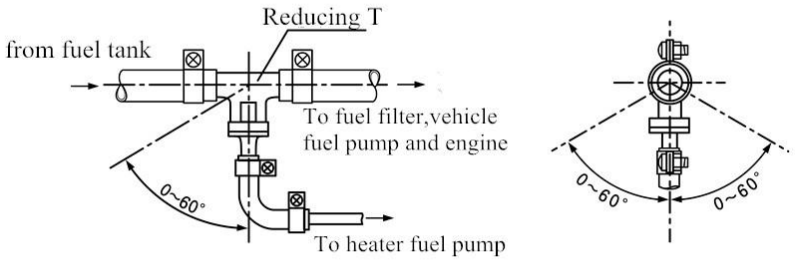
4.5 Installation of Fuel Taking Device

The openings on the fuel tank (or tank cover)for installation should be appropriate in size,with trimmed brim and with good eveness around the opening.Good sealing is necessary for the base of the fuel taking tube.The bottom end of the fuel taking tube should be 30mm-40mm from the bottom of fuel tank to suck enough fuel and at the same time to avoid sucking in impurities sediment on the bottom of fuel tank.



If fuel is taken from the fuel pipe to the engine,the fuel pipe from the fuel tank to the fuel filter should be disconnected and re-connected with the thicker pipes of the reducing T.And the thinner pipe of the reducing T should connect the fuel pump of the heater via fuel tube fitting and tube. The angle of installation must in conformity with following picture, or normal work of the heater will be affected.

After installation, the vehicle engine shall be started and then turned off after one minute's work to eliminate air trapped in the fuel sucking pipe.



4.6 Installation of Combustion Supporting Air Sucking Tube and Exhaust Discharge Tube

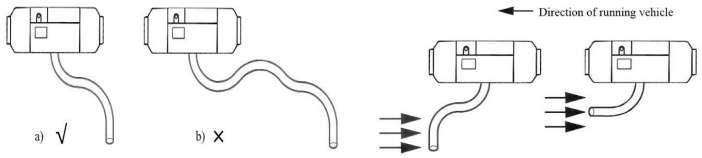
The combustion supporting air must be sucked in from external fresh air outside the vehicle.The exhaust from combustion must be discharged into the air through exhaust tube. Measures must be taken to avoid the exhaust from re-entering he vehicle.

The tubes go through the outer wall or holes on the bottom of vehicle.Measures

must be taken to prevent entering of splash water. The tubes must be protected and can resist shock permanently.

Only the air inlet tube and exhaust tube provided with the heater can be used. The air inlet tube is a corrugated pipe made of a aluminum tube that it's surface is covered by plastic and paper: The exhaust tube is corrugated stainless steel tube. Please identify them and do not make mistake st installation. To connect them with heater, please use the supplied clamps to fix them tightly on the combustion supporting air inlet and exhaust tube vent respectively. The protective hood on the vents of the air inlet tube and exhaust tube must be kept in good condition. Do not damage them or remove them.

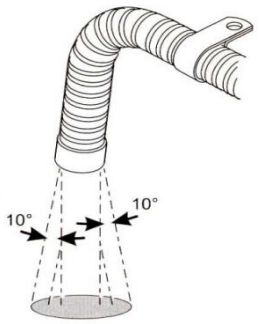
Both the air inlet tube the exhaust tube should come outwards and downwards from the heater, otherwise a Ø4mm hole shall be prepared at the bottom of the tube for discharge of condensation water. If the tube need curve, the radius cannot be smaller than 50mm.Also, the sum of all curve angles for each tube shall not exceed 270℃.



The opening of the tubes should not be opposite to the direction of the running vehicle.

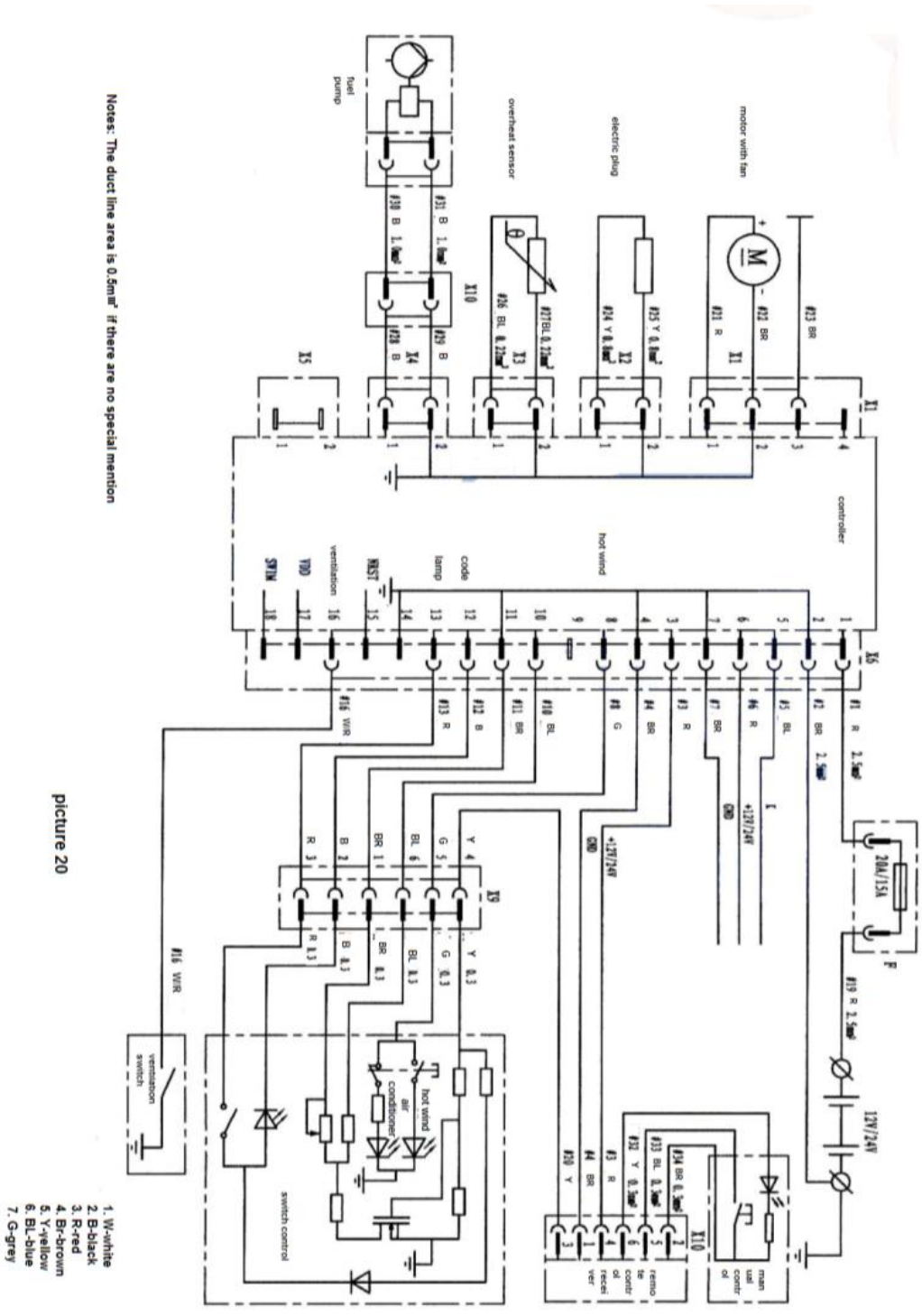
The tube openings should not be blocked by slurry,rain and snow or other dirt.

The exhaust tube should be installed in far distance from the plastic parts or other objects with poor thermal resistance of the vehicle body.The exhaust tube should be properly fixed.The exhaust vent should be downwards,perpendicular to road surface with angle of 90° ±10° .To ensure such an angle,the fixing clip for the exhaust tube should be within 150mm from the tube end.



4.7 The installation of electrical equipment

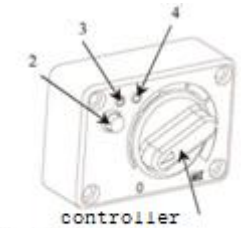
4.7.1 The linking harness can be seen below picture 20.


Notes: The duct line area is 0.5mm² if there are no special mention
fuel pump
overheat sensor
electric plug
motor with fan
controller
hot wind
code lamp
ventilation
switch control
ventilation switch
air conditioner
hot wind
20A/15A
12V/24V
1. W-white
2. B-black
3. R-red
4. Br-brown
5. Y-yellow
6. BL-blue
7. G-grey

picture 20

1-positive pole 2. negative pole 3. fuel pump 4- fuel flow direction 5-fuel socket 6-power switch 7-power connector 8-main harness connector 9-fuse holder and safety lever 10 the body

5 How to use the controller



controller

1. controlling knob
2. mode switch button
3. pattern indication light
4. working signal light

To operate by using this controller

5.1 Turn the knob clockwise and connect the power supply of the controller and then the signal light is on. At this time, the heater starts working. The controller will carry out the working procedures according to the set target by the knob position. During the starting stage, it takes 45S to link the controller with the fuel pump.

5.2 When the heater starts working, if you want to modulate the temperature and power of the heater, just turn the controller

5.2.1 If the mode switch stays at the releasing state(air conditioning pattern) the pattern signal light turns red. If you want to modulate the heating temperature, please just turn the knob. Press the pattern transfer switch and the pattern signal light will turn red, which indicates the transference into the ventilation pattern.

5.2.2 If the mode switch stays at the ventilation pattern, the indicative light will turn green. If you want to modulate the power, just turn the controller. Release the mode switch and the indicative light will turn red, which shows that the heater will switch into the air conditioning pattern.

5.2.3 If there is need to turn off the heater manually, turn the knob to “0” anti-clockwise. After 3 seconds, the working signal light will become dark. If the fuel pump stays at the working state before the , the heater will stop working immediately and the fan will continue to run for 180 seconds and then just stop.

6.General maintenance

Circuit troubles of heater may be caused by following reasons, such as corrosion of connectors, poor contact of connectors, wrong connection of wires,corrosion of wires or fuse, corrosion of battery poles,etc. Users need to check the prevent above

troubles and offer good maintenance.

The trial operation is necessary for the heater before it is put into normal use. At trial operation,you have to check leakage from all connections and all safety issues.If discharge of dense smoke is observed or irregular combustion noise or fuel smell is sensed,the heater must be turned off.Please take out the fuse ,making the heater unable to operate.The heater can only be put into use after it is tested by qualified professionals.

Before each heating season,check shall be performed by qualified professionals for maintenance works,details as follows:

A)Check air inlet and air outlet to find any pollution or foreign matters;

B)Clean the external of the heater;

C)Check if there is any corrosion or loose connection for electric contacts;

D)Check to find any clogging and damage to the air inlet tube and exhaust tube;

E)Check to find any leakage on the fuel tube.

If the heater will not work for a long time,you'd better run it once every four weeks and let in run for 10 minutes at least to prevent malfunction of mechanical parts.

The air inlet port and air outlet vent of the heater must be kept clean and unblocked to provide smooth route for air flow, so as to prevent overheating.

If the fuel is replaced by low-temperature fuel,run the heater for at least 15 minutes to fill new fuel into the fuel tube and fuel pump.

The heat exchanger of heater can not work for longer than 10 years. When it has worked for ten years, it must be replaced with a qualified one. The replace work shall be performed by heater manufacturer or its authorized agent. At this time, the overheating sensor shall be also replaced.

The exhaust tube of heater for discharge of waste gas after combustion, if arranged in an area with passengers, shall be replaced with qualified one when it has worked for 10 years.

If electric welding is performed to the vehicle, please detach the positive wire of power supply of the heater from the battery and connect it to earth to protect the

controller from any damage.

The ambient temperature shall be in the range of -40℃~85℃ for transport and storage of the heater to avoid any damage to its electronic elements and components.

Only authorized customer service stations are allowed to provide repair and installation for the heater. It is prohibited to make repair by yourself or use non-manufacturer's parts or components so as to avoid danger.

The manufacturer shall not be responsible for any damage to the heater if the heater is opened without authorization or such damage is caused due to installation or operation with violation against the regulations.