

INDUSTRIAL DIESEL INFRARED HEATER

USER'S MANUAL

MODEL: NDH-13/NDH-16

- ▶ Thank you for purchasing our far infrared rays (FIR) heater.

Please read this user's manual carefully before you operate this heater.

- ▶ It is recommended to put this manual where it can be found easily.
- ▶ It is obligatory that the user read the "Notice for Safety" carefully before using, and should be aware of this notice whenever using this heater.
- ▶ This heater is designed for your country only. If you use it in another country you have to check the electricity first, and if the electricity condition is same you can use it.
- ▶ The contents (features & specifications) in this manual are subject to change without notice.



NOTICE FOR SAFETY

This is for protecting the user's safety, and preventing any property damage, please read carefully and follow the instruction on this manual.

- It is classified as "Warning", and "Caution" by the contents.



WARNING: In case of misuse, it may cause a serious wounds or death.



CAUTION: In case of misuse, it may cause a slight injury or property damage.

Meaning of symbol



Forbidden



Obligatory



Use AC 220-240V power supply only. (Otherwise it may cause a fire or an electric shock.)



Put a plug into the outlet tightly after removing any dirt on the plug.
(It may begin emitting smoke or a fire by electrical short.)



Do not use a damaged power cord or plug, and a loose outlet.
(It may cause short, fire, a shock.)



Use the proper form of fuse.
(Otherwise it may cause malfunctioning or a fire.)



Do not take out the plug by holding the cord or with wet hands. (It may cause a fire or an electric shock)



Do not fold the power cord forcefully, or put a heavy material on it.
(It may be damaged on the covering material which might cause a fire, or an electric shock.)



Do not extend the power cord by connecting another cable in the middle. (It may cause a fire or an electric shock)



Put a plug into the outlet tightly with Earth(-) only. (It may cause an electric shock)



While cleaning you must take out the plug from the outlet and wait until the heated furnace is cooled down sufficiently. (Otherwise, it may cause an electric shock or a burn)



It is dangerous to turn OFF this heater by taking out the power plug.
(it may cause a malfunction or electrical shock. Please turn OFF using RUN/STOP button.)



Do not place or use anything flammable near the heater including fuel, gas, thinner, benzene, spray, solvents, volatile organic compounds, etc.
(It is exposed to danger of fire or explosion.)



Please turn OFF using RUN/STOP button.) Do not place any flammable material near the heater including curtain, carpet, paper, matches, clothes, etc.
(It is exposed to danger of fire.)

NOTICE FOR SAFETY

-  It is dangerous to put your hands or any other thing into the grill or furnace, or to apply a considerable shock or force to the heater.
(It is exposed to fire, burning, or electric shock.)
-  Do not place any electrical item or heavy material on top of heater.
(It may cause malfunctioning or electrical shock, or if the heavy material falls the user can be injured.)
-  Do not move or transport during operation.
(It may cause fires or burns)
(In case of moving this heater you must turn it OFF and take out power plug before you move it.)
-  The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
-  Children being supervised must not play with the appliance.
-  You must ventilate well while you are using the heater, and do not use it in a stuffy area where ventilation is not possible.
(You need to ventilate with fresh air 6 times per hour.)
(In case of incomplete combustion due to the lack of oxygen, carbon monoxide levels can increase and lead to poisoning.)
-  When cleaning you must take out the plug from the outlet and wait until the heated furnace is cooled down sufficiently.
(Otherwise, it may cause an electric shock or a burn)
-  Do not use this heater for another purpose other than heating.
(Do not use this heater for drying clothes because it may cause a fire.)
(Do not use this heater for keeping a pet animal or plants warm.)
-  Do not operate this heater while you are sleeping.
(Due to no ventilation while you are sleeping the room easily loses oxygen.)
-  Do not place any flammable vinyl or plastic goods on top of heater, or cover the heater grill with clothes. (It is exposed to fire or burning.)
-  It is dangerous to use this heater for a long time in a closed room or around children, the old and the weak. (It is recommended that the user open the windows to let fresh air into the room if the room is stuffy.)
-  Do not touch any of the hot surfaces such as the grill, furnace, etc. while the heater is operating or after extinguishing the heating process. Especially pay attention to keep children away from the hot surfaces as they may cause burns.
-  It is recommended not to use this heater in highly elevated areas.
Do not use this heater in the areas higher than 1,500m above sea level. Frequent ventilation is needed in the areas of 700-1,500m above sea level.
Due to the lack of oxygen, carbon monoxide levels can rise and increase the risk of carbon monoxide poisoning.
-  It is dangerous to turn OFF this heater by taking out the power plug.
(It may cause a malfunction or electrical shock. Please turn OFF using RUN/STOP button.)
-  Do not expose the heater to water during cleaning.
(It may cause a fire or electric shock.)
-  The appliance is not to be used in a space of less than 80 m² in size.
-  Do not use this heater on the unstable places. (Do not use this heater on an inclined surface or a shaking support.)
(The heater may fall down, which can cause a fire or malfunction.)

Place this manual noticeably near the heater so that it may be easily found when needed.

NOTICE FOR SAFETYCAUTION



Do not put this heater on an unstable surface, such as an uneven or inclined ground.
(The heater may not work properly.)



Do not put an excessive physical shock to the remote controller, nor disassemble it arbitrarily.
(it arbitrarily.)



Do not operate this heater in the place where it gets wet by the humidity such as the bathroom.
(It may cause an electrical short circuit or an electrical shock accident.)



When storing this heater, be sure that it is stored in dry indoor places instead of hot and humid environment. (Otherwise, it gets rusty or begins to have issues.)



You must take out the plug from the outlet, if there is a flash of lightening or thunder or you don't use it for a long time. (Otherwise, it is exposed to the danger of electrical shock, short circuit or a fire.)



Do not directly expose the heater to water, nor use benzene, thinner, alcohol for cleaning.
(Otherwise, it is exposed to the danger of electrical shock, short circuit or a fire.)



Call your local after sales service agent in case the power cord is damaged. (Otherwise, it is exposed to the danger of electrical shock, short circuit or a fire.)



If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or similarly qualified person in order to avoid a hazard.

TIPS BEFORE INSTALLATION....

1. Make sure the place where you wish to use this heater is safe.

► The ground surface and surroundings should be plain, non-flammable, and solid.

► You need to have sufficient space surrounding the heater at least 15cm from the wall and the left & right side, at least 1m distance from the ceiling and the front side without any obstacles.

► You need to use an exhaust duct while operating in small spaces.

Recommended Duct specification :100mm

Ø (Diameter) x 5 meter long-aluminum duct

There must not be rain drops in the exhaust duct end.

You must ventilate frequently with fresh air by opening a window or using a fan.

► You must put an extinguisher beside the heater.

► There must not be direct sun light or excessive heat near the heater.

► After you fix the installation, lock the caster to avoid unexpected movement.

► Do not use this heater near fabric curtains, carpets or plastic or vinyl curtains which may cover the heater if they fall down by wind or any physical force, which may cause a fire.

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► After you fix the installation, lock the caster for avoiding unexpected movement.

► Do not use this heater near fabric curtains, carpets or plastic or vinyl curtains which may cover the heater if they fall down by wind or any physical force, which may cause a fire.

The heater must not be located immediately below a socket-outlet.

► Positioned so that the plug is accessible.

2. You must use Diesel or kerosene as fuel.

► If you use other fuel, it may cause an excessive soot or trouble of malfunction.

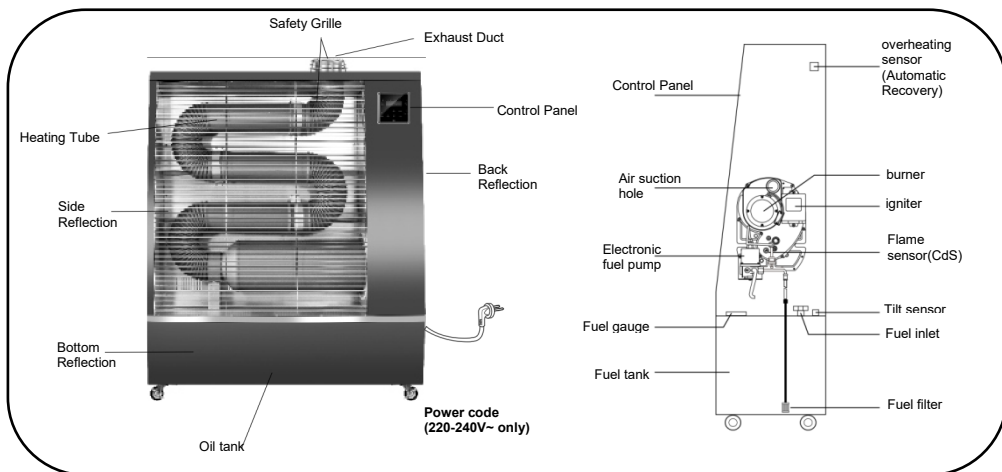
► The heater must be turned OFF while refueling.

► To be made by the manufacturer or his service agent who should be contacted if there is an oil leakage.

► Regulations concerning the disposal of oil when scrapping the appliance have to be followed.

3. The proper electricity is AC220-240V, 50Hz. It will be applied and adjusted as per customer's request. You must supply power as per its requirement only only it is adjusted.

STRUCTURE & DESCRIPTION



CONTROLLER

The controller panel features a digital display showing '23 25' and various control buttons. The numbered callouts are as follows:

- 1. LED DISPLAY: It displays the status of temperature, time, operation, and error, etc.
- 2. TEMPERATURE CONTROL MODE: It is lit during temperature control mode.
- 3. TIME CONTROL MODE: It is lit during time control mode.
- 4. IR RECEIVER FOR REMOTE CONTROLLER
- 5. ON/OFF: Run and stop button
- 6. TEMP/TIME SELECTION BUTTON: To select temperature or time control mode.
- 7. UP/DOWN: To set or change the temperature or time.
- 8. LOCK: If you push this lock button for 3sec, the controller is locked. And if you push again for 3sec, this function is released.
- 9. LOCK LED
- 10. TIMER: To select whether off timer mode is operated or not.
- 11. MISFIRE: To show whether off timer mode is operating.
- 12. OPERATION LAMP: It is lit during operation.
- 13. FUEL GAUGE DISPLAY: It displays fuel remain in 3 steps.
- 14. OVERHEATING: It shows overheating status if the temperature goes up to 105°C.
- 15. TILT SENSOR: It is turned on in case of inclination over 30deg. or an excessive motion is detected.
- 16. LACK OF FUEL: It shows the remaining fuel amount.
- 17. LOCK LED: When the machine is in lock mode, the LED of this LOCK is lit.

Remote control



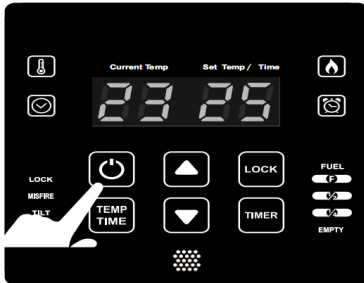
ON/OFF		Turn the heater on and off.
Temperature	+ or	Select environment Temperature: 0-40°C
Time control	+ or	Select desired repetition time: 5-55 min
Timer	+ or	Select timer : 30min - 24 Hour

HOW TO USE

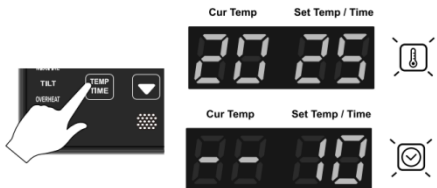
OPERATION & STOP

1. START WITH PRESSING "ON/OFF" SWITCH.

- Heater will be turned ON with a "beep" sound, and automatically operated.
- If you wish to stop the unit press "ON/OFF" switch one more time.

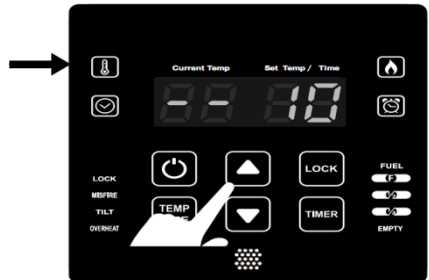
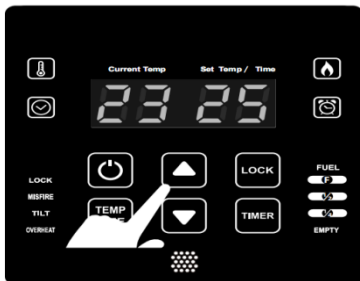


2. SELECT THE DESIRED OPERATION TYPE USING "TEMP/TIME" SWITCH.



3. Set the time or temperature by pressing ▲ ▼ switch.

- You can set the desired temperature between "0~40°C".
- Set the desired time limit between 5min ~ UP →ON



Tip

- In order to be operated, the setting temperature should be higher than current temperature.
- After power On, the default mode is temperature control mode.
- If you push the On/Off button during operation, the heater is stopped and the off timer function is canceled.

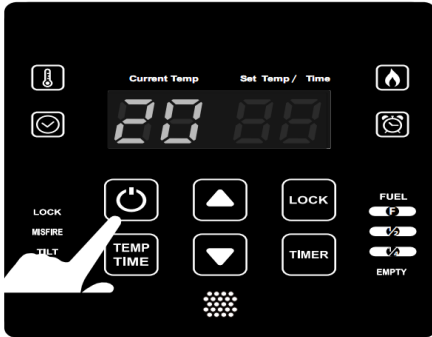
The model is equipped with a solenoid valve (by-pass device) which makes the remaining oil return to the oil tank. For 10 sec. from the time of burner powering off, the solenoid valve is in operation, which makes remaining oil return to the oil tank, and by this device, the smell caused by unburned gas is remarkably reduced.

HOW TO USE

TEMPERATURE CONTROL

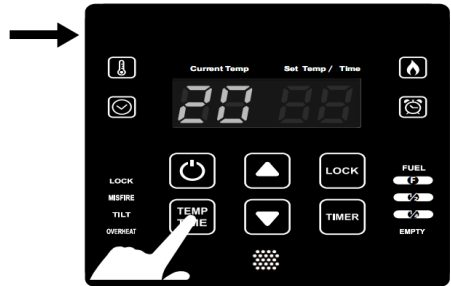
This mode enables the user set the desired temperature, and once it is fixed this heater works automatically with running and stopping repeatedly to meet this temperature. If power ON and Heater starts operation, the temperature control mode will be operated as default.

1. Push On/Off button.



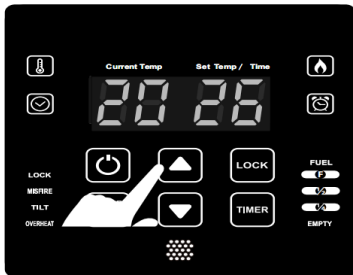
2. By pushing Temp/Time button, please select Temperature control mode.

• At that time, Temperature control lamp is lit.

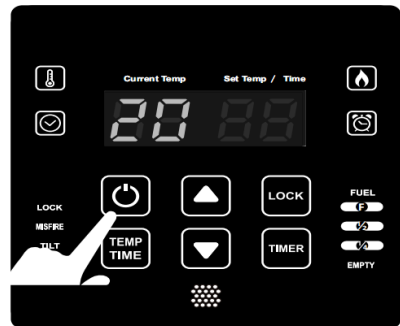


3. By pushing '▼ ▲' button, please select desire temperature.

- The setting range : 0~40°C
- The default value : 25°C
- During the time you push ▼ or ▲, the setting temperature is increased/decreased very fast.
- The range of current temp display : -9~50°C

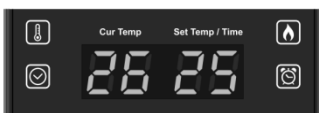


4. During operation, the current temp, and setting temp. both are displayed, and if you push On/Off button and make the operation stop, only current temp, is shown.



5. When the setting temp, is higher 2°C than current temp., it starts operation, and the setting temp, is less than 1 °C than current temp., the operation is stopped.

- Current temp. < Setting temp.... Operation (+2°C)
- Current temp. > Setting temp.... Operation stop (-1°C)



♣Tips

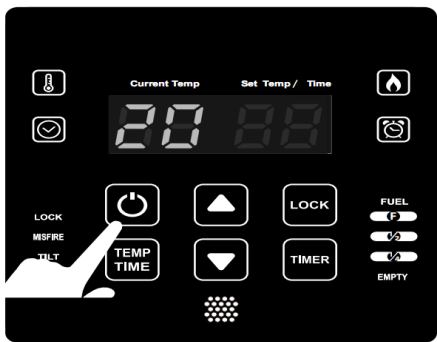
- The current temp is less than -9°C(16°F), the display of the temp, is 'LO', and more than 50°C(99°F) it displays as 'HI' (50°C is not same value as 99°F, actually 37°C is same value as 99°F)
- The setting temperature is increased/decreased 1°C by pushing of (▲/▼) button, if you push the button more than for 2sec.

The value is increased/decreased 1 °C in 0.2 sec.

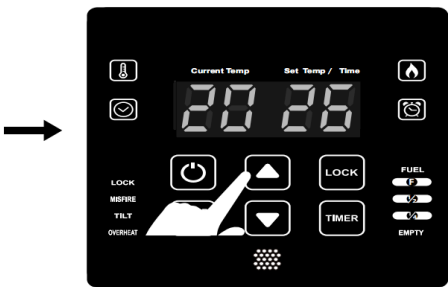
HOW TO USE

TIME CONTROL

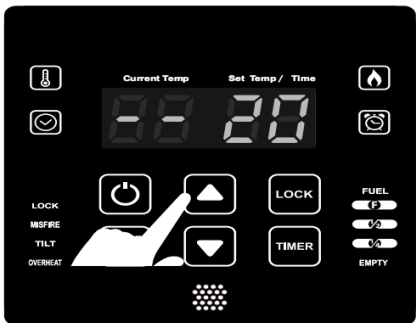
1. Push On/Off button.



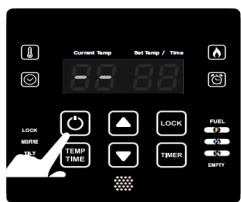
2. By pushing Temp/Time button, please select Time control mode. At that time, Time control lamp is lit.



3. By pushing "▼/▲" button, please select desired repetition time. When you increase or decrease the repetition time by pushing "▼/▲" button, the time is blinking, and if you don't push button for 3sec., this displayed blinking time is set as 'Repetition time'. At that time, the former Repetition time is automatically erased.

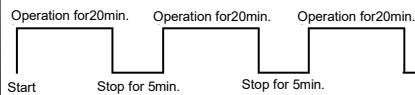


4. At the operation mode, the operation symbol and repetition time both are displayed, and when you turn it off by pushing On/Off button, STOP symbol (--) only displayed. When the heater is in Interval Pause Time1, STOP symbol (--) and repetition time both displayed.



Repetition time of 20 refers to a 5-minute pause every 20 minutes of work

5. The repetition time can be set from 5 min. to 55min. The operation is as much as setting time, and 5min. pause time, which is repeated. When you increase one more from max. time 55min. It goes to 'Constant operation'. This means, without pause time, the operation is constantly made.



Repetition time cycle can be set from 5 min. to 55min.



In case of setting the repetition time as 20min.



Constant operation status

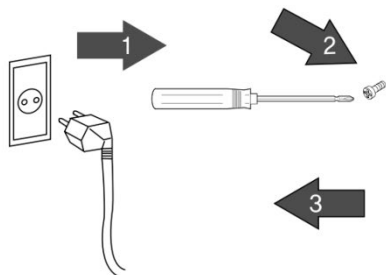
HOW TO USE

TROUBLE SHOOTING

Display	Cause	Solution (check list)
Er01	Temperature sensor open or error	Secure tight connection
Er02	Tip over	Product has fallen. Disconnect the power supply
Er04	Fire sensors detect the light before ignition. Poor connection.	Check connection
Er05 + MISFIRE	Air flowed in diesel line	Restart
	No diesel	Check the diesel quantity
	Diesel filter clogged	Change the diesel filter
	Burn motor failure	Contact dealer
	Igniter does not work	
	Diesel pump failure	
Er06	Temperature limiter action	Whether the device is covered
Er09	Diesel level sensor fault	Check connection
OVERHEAT	Setting temperature is below current temperature	Adjusting to a higher temperature ("Burn" lamp will turn on)

HOW TO USE

CLEANING & MAINTENANCE



Raise the front grille a little to pull it out.
Assembly is the opposite way.

If you keep the heater in operation for a long time and you want to keep it clean, power off and cool down the heater, and pull out the plug as pictured above and clean according to the following instructions.

- Please pull out the front grille by raising it and pull it out to the front.
- Please clean the heating reflection which is in the back side of heater and burner area.
(The burning pipe is coated by ceramic material so please clean carefully to avoid damaging the coating.)
- ※DO NOT DISASSEMBLE THE BURNING PARTS.**
- Wipe the front controller area with a soft cloth.
- After cleaning is finished, assemble the front grille to the heater.

STORING

To store the heater, cool down and unplug the heater and wrap it in a plastic cover and keep it in a well-ventilated area. It is better to not leave any oil inside.



CAUTION

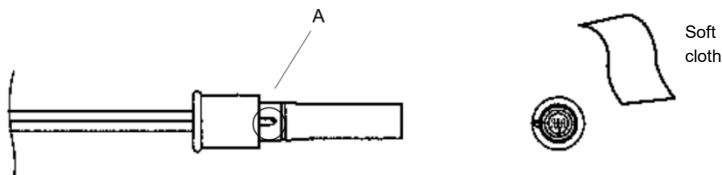
Storing the heater outdoors or in a humid place can cause major issues.

DAILY CHECK POINTS & ADJUSTMENT

CLEANING OF FLAME SENSOR

■ CLEAN OF FLAME SENSOR (CdS)

- If the detection part of CdS is contaminated by soot or other dirt, the performance can be lowered and it may cause a problem.
- Take out the CdS which is placed in the lower part of the burner carefully.
- Clean the detection part of CdS with a soft cloth.
- Make sure the CdS is inserted correctly. (Mark "A" should be inserted fully.)



■ CHANGE OF COMPONENTS

- In case you need to change components, please contact us.
- In case repair or exchange of components, please contact the service center operated by our distributor or head office
- Do not try to repair this heater by non-licensed service personnel, because It may cause a worse condition. Instead contact your local service center, or a distributor that is designated by our company.

DAILY CHECK POINTS & ADJUSTMENT

ADJUSTMENT

■ IN CASE OF SUDDEN STOP DURING OPERATION

- Please check if it is currently operating in the time control operation. If so, the heater can rest for 5min.
- Please check if the set temperature is less than the current temperature.
- Please check if the heater has stopped by pressing On/Off switch by remote controller or front controller.
- Please check if the heater has stopped by sleep timer function.
- Please check if the heater has stopped by auto-self-checking.

■ AIR FLOW-OUT

If the electric pump is noisy and the burner has no ignition, this is caused by air flow into the electric pump and no oil distribution. If oil is completely used without any remaining in the tank, air can flow into the electric pump.

■ BLACK SMOKE

In order to adapt to the difference between users at different latitudes and fuel quality, if the combustion is not sufficient and black smoke is discharged from the exhaust port, please adjust the following:

1. Adjust the pressure of the electronic pump. Counterclockwise to reduce the fuel injection volume.

2. Adjust the air suction hole. Increase inlet ring size, increase the air intake.

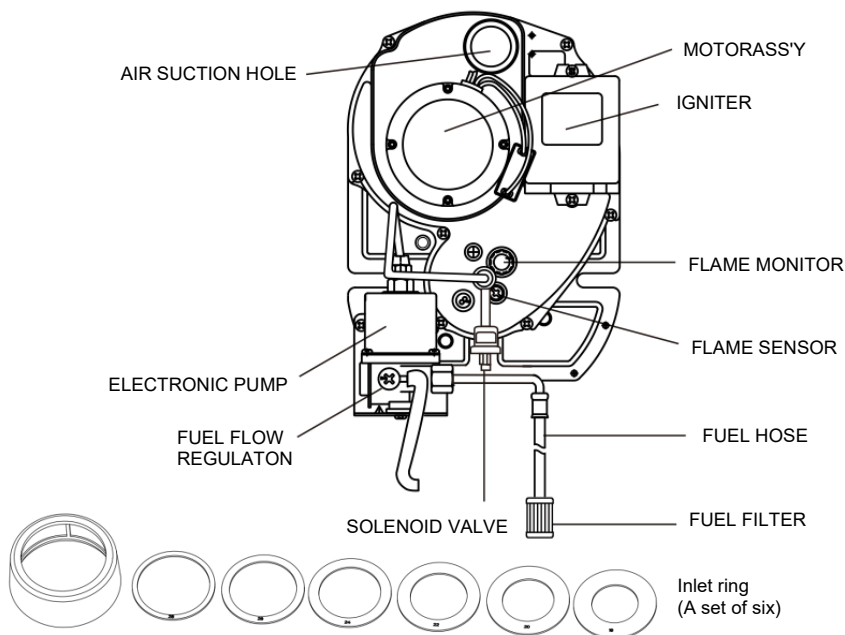
In order to adapt to the difference between users at different latitudes and fuel quality, if the combustion is not sufficient and black smoke is discharged from the exhaust port, please adjust the following methods:

1. Adjust the pressure of the electronic pump. Counterclockwise to reduce the fuel injection volume.

2. Adjust the air suction hole. Increase inlet ring size, increase the air intake.

■DETAIL OF BURNER STRUCTURE

When you contact a service person with a problem, please refer the detail structure of the burner pictured below.



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1. Adjust the pressure of the electronic pump. Counterclockwise to reduce the fuel injection volume.
2. Adjust the air suction hole. Increase inlet ring size, increase the air intake.

Oil Drain System (ODS)

Before long-distance transport or long-term storage of the heater, the oil tank must be emptied. There are two options: automatic and manual.

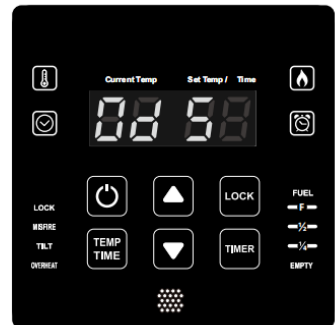
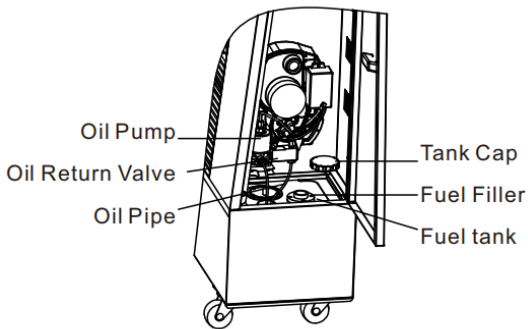
Automatic:

1. Disconnect the fuel return line, replace it with the long oil line (supplied in the accessory pack with the heater), and then place the other end of the line in a drum/container/loose tank.
2. Switch on the device and leave it in standby mode. Press the "TEMP TIME" button three times to initiate connection, then press the "TIMER" button another three times. The display will show "ODS" (Oil Drain System), which activates the oil pump's drain program.
3. Tilt the device, repeat step 2, and try to empty the fuel tank as much as possible until the oil pump produces a loud noise — this indicates that the oil has been fully drained.

Note: Press the "POWER" button to exit the ODS mode.

Manual:

Remove the fuel tank cap, use a screwdriver to remove the oil filter screen, and use the external oil pump to extract the oil. This enables a quick and complete drainage of the fuel tank.



TROUBLESHOOTING

Please check below points before you think trouble has occurred.



Is Power ON?



Is Fuel enough?



Is Flame sensor clean?



PROBLEM		CAUSE	SOLUTION
NO OPERATION	No Power supply?		Check that the power supply is appropriate. (ex.220-240VAC 50Hz)
	Check power plug is disconnected		Power plug into the outlet
NO FAN MOTOR OPERATION.	"Lack of Fuel" light ON?	Lack of Fuel	Fill it up with Kerosene or Diesel ♣ Do not mix or use these different fuels together.
	Is the set temp lower than current temp?		Set the temp as higher than current temp.
	Misfire lamp ON?	Air in the electric pump.	Remove the air in the electric pump.
	Overheating Lamp ON?	Under operation of overheating prevention	Ventilate with fresh air in the room, and turn the heater OFF for a while.
	Inclination display lamp ON?	Ground surface is inclined or not flat.	Place the heater on flat ground.
	Can you see "Er2" Error on on the display?	Temperature sensor	Select Timer control operation from Temperature control mode.
NO IGNITION ON BURNER	Is fuel filter stuffy?	Filter is contaminated	Clean the filter with compressed air, or replace with new one.
	Is air suction valve adjusted excessively or too small?		Call after sales service agent.
	Voltage is low?	In case of low voltage	Burner will not work properly, so use a booster to elevate voltage. (A/S)

TROUBLESHOOTING

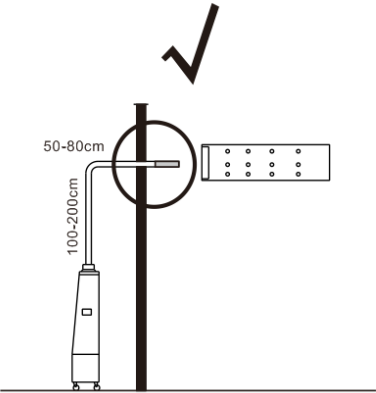
PROBLEM		CAUSE	SOLUTION
IMMEDIATE STOP JUST AFTER IGNITION	"Lack of Fuel" light ON?	Running out of fuel	Fill up the fuel.
	Check if the fuel is Diesel or kerosene	It may cause worse performance & trouble.	Drain the existing fuel, and fill with Diesel or kerosene only.
	Water or any other impurities on fuel?	It may cause worse performance & trouble.	Replace the fuel with good quality fuel.
	Is the flame sensor located well?	In a different position, it causes an error.	Place the sensor in its original location.
	Is flame sensor dirty?	Error because of soot or dirt	Call after sales service agent
	Noise in fuel pump?	Excessive air in the pump and nozzle.	Remove the air in the electric pump.
EXCESSIVE SOOT IS GENERATED.	Check if the fuel is Diesel or kerosene	It may cause worse performance & trouble.	Drain the existing fuel, and fill with Diesel or kerosene only.
	Water or any other impurity in fuel?	It may cause worse performance & trouble.	Replace the fuel with good quality one.
	Is air suction valve adjusted excessively or too small?	Error on Temperature sensor	Call after sales service agent.
	Is tube clogged?	Smoke may flow backward	Clean the tube by removing soot inside of tube or replace with new one.
NOISE IN BURNER	Is Fuel filter stuffy?	Dirty filter with impurities and contamination.	Clean or replace with new one
	Noise in fuel pump?	Excessive air in the pump and nozzle.	Remove the air in the electric pump.

SPECIFICATION & ELECTRICAL WIRING DIAGRAM

ITEM \ MODEL	OBH-13	OBH-16	OBH-20
CALORIC VALUE	13kW 11180Kcal/h	16kW 13760Kcal/h	20kW 17200Kcal/h
FUEL CONSUMPTION	0.95-1.14L/h	1.18-1.45L/h	1.40-1.60L/h
BURNER TYPE	electronic pump (pressurized spray type)		
POWER SUPPLY	220-240V~ 50Hz		
ELECTRIC POWER CONSUMPTION	80W	80W	80W
FUEL TANK SIZE	50L	50L	70L
PRODUCT SIZE (WxDxH)	950*305*925mm	950*305*1100mm	1150*305*1100mm
WEIGHT	45Kg	50Kg	65Kg
SAFETY DEVICE	Dual step overheating prevention, auto misfire detection, Excessive shock/Inclination sensor, Fuel shortage		
CONTROL METHOD	Digital MICOM controller		

Do not use the heater at less than -20°C or more than 60°C, as it may cause a misfire from the ignition step.
The structure and description can be changed without any notice for improvement of quality and performance.

Proper installation of smoke exhaust pipe



Wrong installation of smoke exhaust pipe

