DONG-A

FAR INFRARED RAYS HEATER SERVICE MENUAL

(BTS-120/150/200/250)

DONG-A TECH CO.,LTD

Structure& Performance

Disassembly Instruction

For Control Circuit

Structure & Performance

1.SPECIFICATION

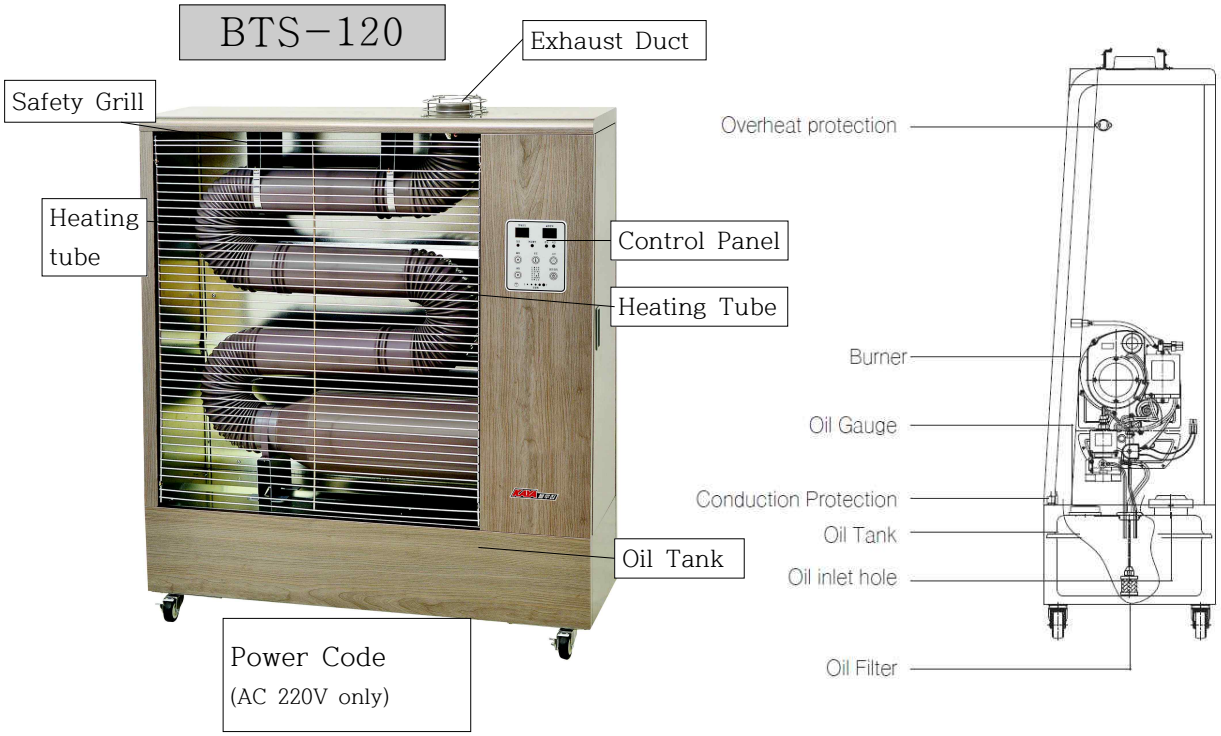
NO	ITEM	SPECIFICATION
1	Burner Type	Electronic Pump (pressurized spray type)
2	Ignition Type	High-Tension Discharge Ignition
3	FUEL	Diesel
4	Overheating Sensor	(Automatic Return) 95℃
5	Power Supply	AC 220V 50Hz 1Ph
6	FUSE	250V 3A(1ea)
7	Anti-Trip Safety Device	CONTACT
8	Safety Device	Overheating sensor, Auto misfire detection,Excessive shock/Tilt sensor, Fuel shortage Alarm

Item / Model	BTS-120	BTS-150	BTS-200	BTS-250
Capacity(W)	14,200	17,500	20,500	23,000
Fuel Consumption(l/h)	1.45	1.80	2.10	2.35
Input Power(W)	55	55	65	70
Fuel Tank Volume(l)	30	40	40	70
Product Size WxDxH(mm)	940x320x1100	1160x320x1100	1160x320x1270	1160x370x1520
Weight(kg)	43	53	65	82

2.STRUCTURE & DESCRIPTION

1) Structure & Description

BTS-120



BTS-150

BTS-200

BTS-250

The structure and description be changed without any notice for improvement of quality and performance.

2)CONTROLLER

❶ **Temperature/Setting Temperature**
Indication of setting temperature and now temperature.

❷ **Checking Lamp**
When occur problem, It will flicker.

❸ **Off.(Rev.) Lamp**
When make reservation off by remote control, It will on when operation.
and It will stop automatically after reservation time.

❹ **Time setting Lamp**
It will be On when you set operation mode.

❺ **Temperature setting Lamp**
When you set indoor temperature, It will be On.

❻ **Power Button**
You can use for Heater On and Off.

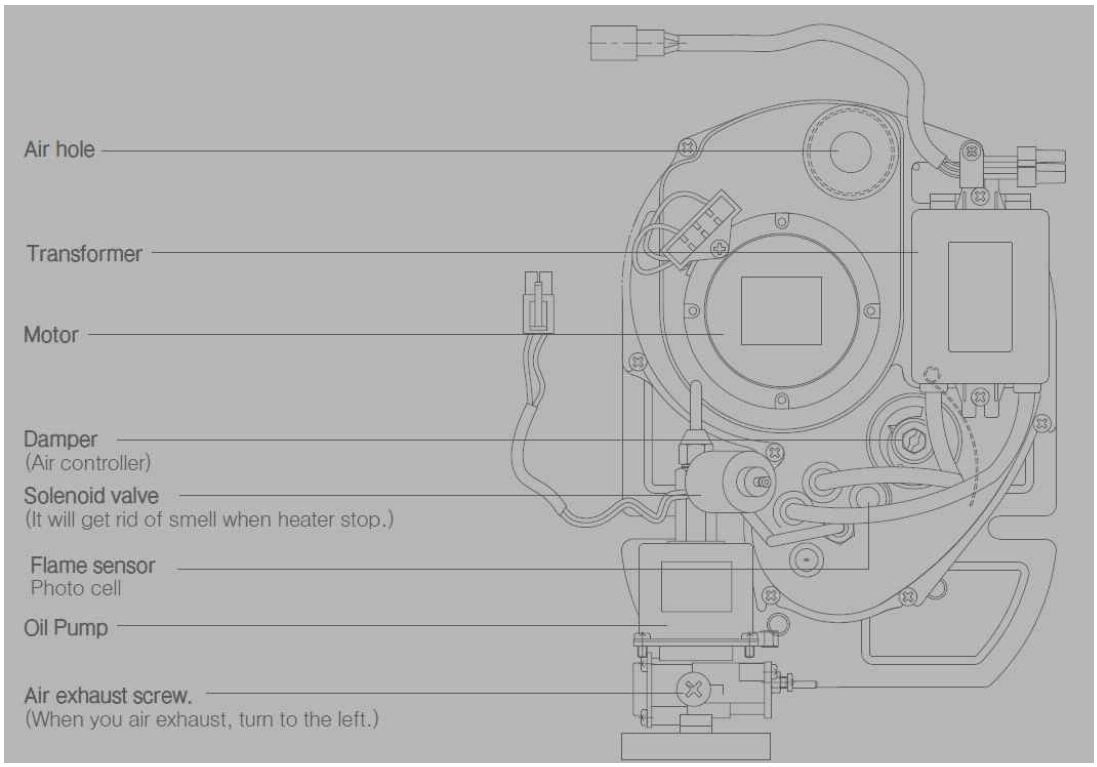
❼ **Oil mark Lamp**
It indicates oil quantity of oil tank. in case of E mark, operation will stop.

❽ **Temp/Time choice Button**
Push when you set repeatability of indoor temperature with operation mode.Temperature 0~40C, every 1C unit and time will be 10~25min. every 5min. setting.

❾ **Temp/Time setting Button**
Push when you set time or Temp. setting.

❿ **Off (Rev.) Button**
Push when you want Off (Rev.) you can control from 1 hour to 12 hours and every 1 hour unit.

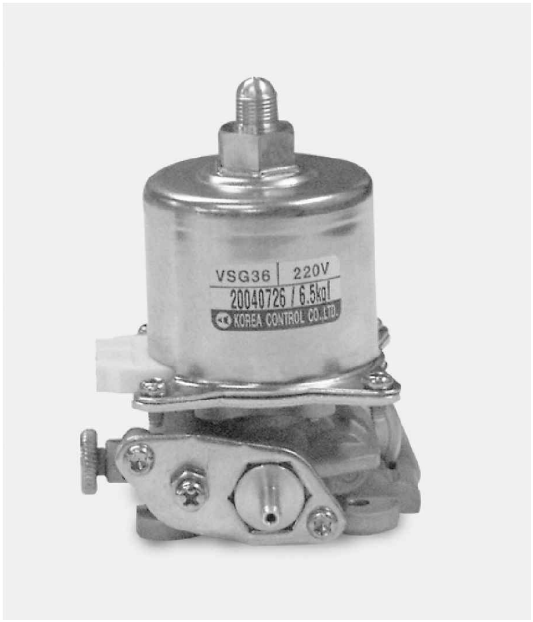
3) OIL BURNER



3. PARTS SPECIFICATION

PARTS NAME	SPECIFICATION		
ELECTRONIC FUEL PUMP	TYPE	Electronic pump (pressurized spray type)	
	POWER SUPPLY	AC 220V 50Hz	
IGNTION TRANSFORMER	RATING VOLTAGE	AC 220V 50Hz	
	OUTPUT	16.5kvp 25mA	
FAN MOTOR	TYPE	CONDENSER RUN INDUCTION	
	POWER SUPPLY	A.C 220V, 50Hz	
SOLENOID VALVE	TYPE	MAGNETIC	
	POWER SUPPLY	AC 220V 50Hz	
PCB TRANSFORMER	INPUT VOLTAGE	AC 220V 50Hz	
	OUTPUT VOLTAGE	AC 14.9V	
FLOW METER	TYPE	FLOAT TYPE	
	RESISTANCE VALUE	0Ω ~ 5kΩ	
AUTOMATIC ANTI-OVERHEATING THERMOSTAT	OPERATING POINT	OPEN	CLOSE
		95±5℃	80±5℃
CDS	RESISTANCE	LIGHT	DARK
		7~23kΩ	Min. 0.5MΩ
TEMPERATURE SENSOR	TYPE	THEMISTER	
	RESISTANCE VALUE	25℃ : 5kΩ±3%	
ANTI-TRIP SAFITY DEVICE	TYPE	CONTACT	
	OPERATING ANGLE	20° ~ 50°	
HARNESS	FUSE CAPACITY	AC 250V 3A(1EA)	
	FUSE HOLDER		

ELECTRONIC FUEL PUMP



1)SPECIFICATION

MODEL	BTS-120	BTS-150	BTS-200	BTS-250
TYPE	ELECTRONIC PUMP (PRESSURIZED SPRAY TYPE)			
POWER SUPPLY	AC 220V 50Hz			
NOZZLE SIZE	0.3G/h 60°S	0.3G/h 60°S	0.4G/h 60°S	0.5G/h 60°S
PUMP PRESSURE	10.0kgf/㎠	8.0kgf/㎠	10.0kgf/㎠	10.0kgf/㎠

2)TEST METHOD

The resistance measured with the tester at the both ends of electronic pump should be 376Ω.

IGNITION TRANSFORMER

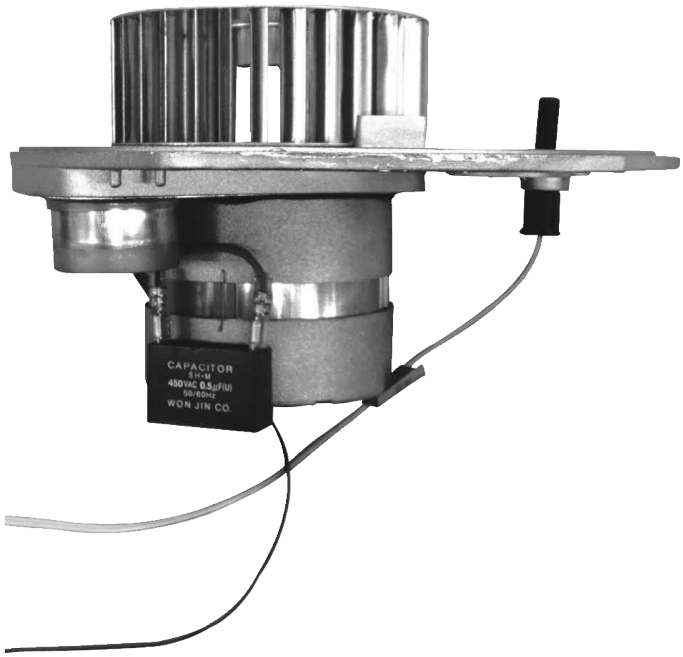
1).SPECIFICATION

DIVISION	BTS-120/150/200/250
POWER SUPPLY	A.C 220V 50/60Hz
OUTPUT	16.5kvp 24mA

2).TEST METHOD

The resistance measured with the tester at black~red of the burner – motor - side 6P housing should be 5.6MΩ.

VENTILATION MOTOR



1).SPECIFICATION

DISIVION	BTS-120/150/200/250
TYPE	CONDENSER RUN INDUCTION
POWER SUPPLY	A.C. 220V 50Hz
CONDENSER	1.0μF 450VAC
NUMBER OF ELECTRODES	ELECTRODES

2).TEST METHOD

The resistance measured with the tester at black and brown of the burner – motor - side 6P housing should be 344MΩ.

SOLENOID VALVE

1).SPECIFICATION

DIVISION	BTS-120/150/200/250
POWER SUPPLY	A.C. 220V 50Hz
TYPE	MAGNETIC

2).TEST METHOD

Check any disconnection with the tester, at the both ends of the solenoid.

PCB TRANSFORMER

1).SPECIFICATION

DIVISION	BTS-120/150/200/250
INPUT VOLTAGE	A.C. 220V 50Hz
OUT VOLTAGE	A.C. 14.9V

2).TEST METHOD

When measuring a single item, primary resistance value should be approx. 5.4Ω and the secondary resistance value should approx. 1.58kΩ.

FLOWMETER

1).SPECIFICATOIN

DIVISION	BTS-120/150/200/250
TYPE	FLOAT TYPE
RESISTANCE VALUE	0Ω ~ 5KΩ

2).TEST METHOD

Measurement with tester

· Shortage : 0Ω · First(Fuel supplement) : 1KΩ

· Second : 2KΩ · Third : 3KΩ

· Fourth : 4KΩ · Full : should be 5KΩ.

AUTOMATIC ANTI-OVERHEATING THERMOSTAT

1).SPECIFICATION

DIVISION	BTS-120/150/200/250	
OPERATING POINT	OPEN	CLOSE
	95±5℃	80±5℃

2).TEST METHOD

★The resistance measured from a single item should be 0Ω, at the temperature of 85℃ or lower.

★For products of 2009 which have no secodary overheating sensors, YELLOW wire of pins should be connected to each other.

PHOTOTUBE

1).SPECIFICATION

DIVISION	BTS-120/150/200/250	
TYPE	CDS PHOTO CELL	
RESISTANCE	LIGHT	DARK
	10 ~ 23KΩ	Min. 0.5KΩ

2).TEST METHOD

It should be 10~23KΩ when it detects the light, and min. 0.5MΩ when it doesn't detect the light.

TEMPERATURE SENSOR

1).SPECIFICATION

DIVISION	BTS-120/150/200/250
TYPE	THERMISTER, CHIP TYPE
TEMPERATURE SENSOR	25℃ : 5KΩ ± 3%

2).TEST METHOD

The measured resistance should approx. 5kΩ with the ambient temperature of 25℃.

ANTI-TRIP SAFETY DEVICE

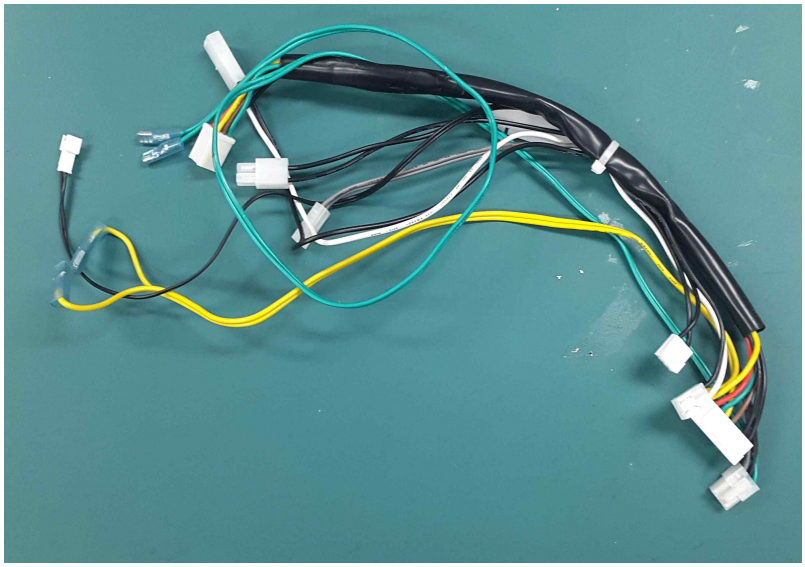
1).SPECIFICATION

DIVISION	BTS-120/150/200/250
TYPE	CONTACT
OPERATING ANGLE	20° ~ 50°

2).TEST METHOD

Based on the horizontal state, the measured resistance should be 0Ω, between 20° and 50°

HARNESS



1).SPECIFICATION

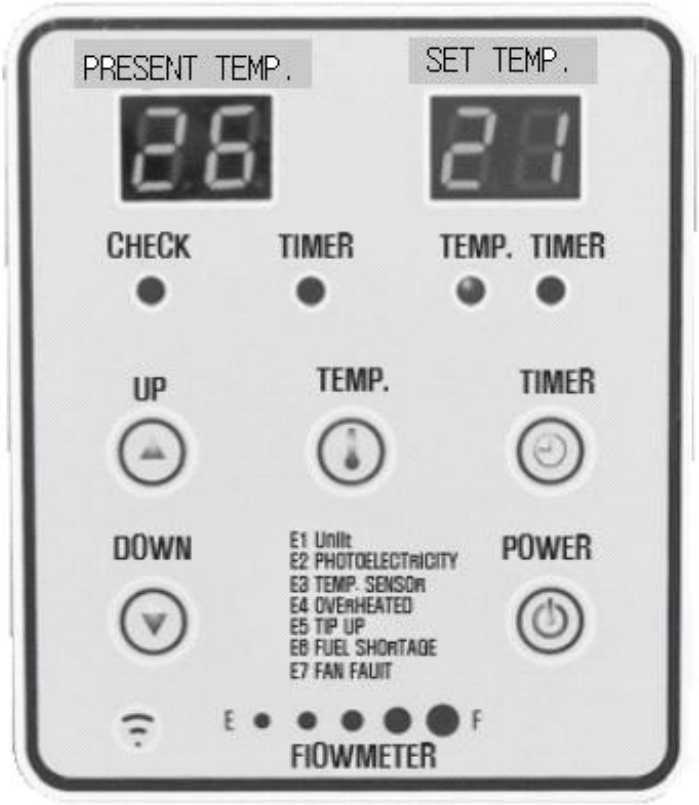
DIVISION	BTS-120/150/200/250
FUSE CAPACITY	A.C. 250V 3A(1ea)

2).TEST METHOD

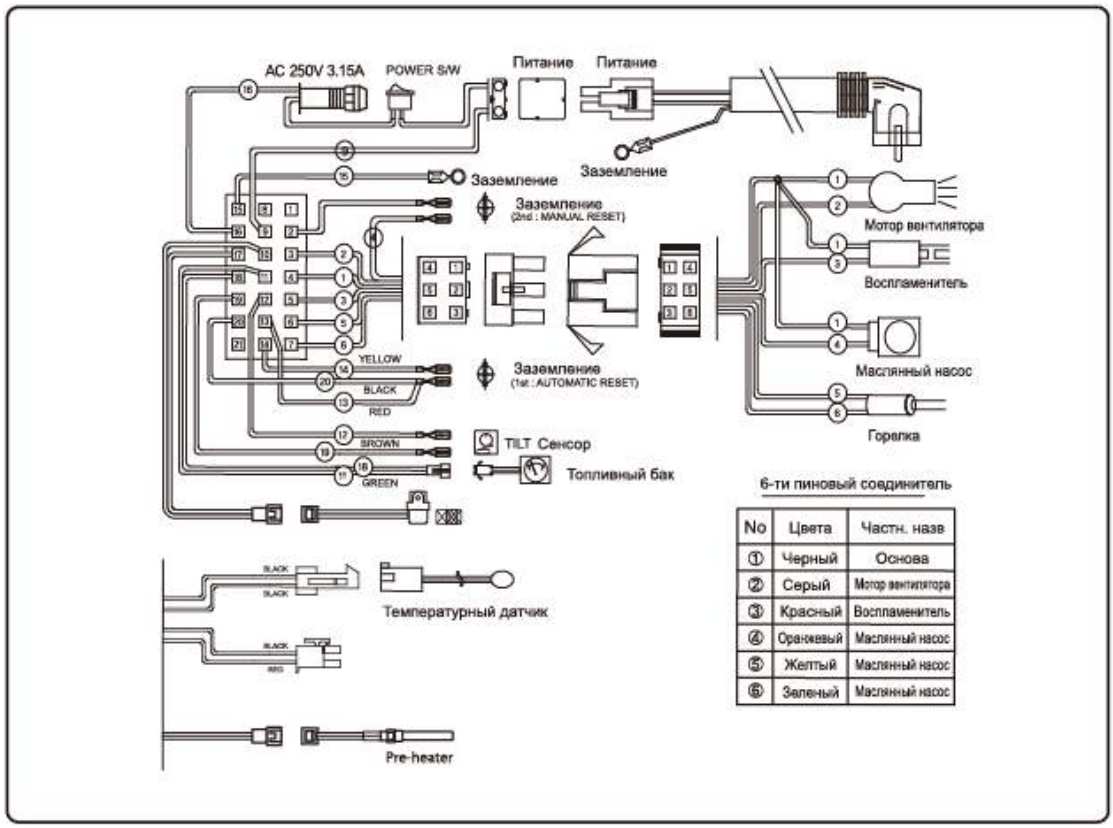
★Check fuse disconnection with eye and tester.

Controller

BTS-120/150/200/250

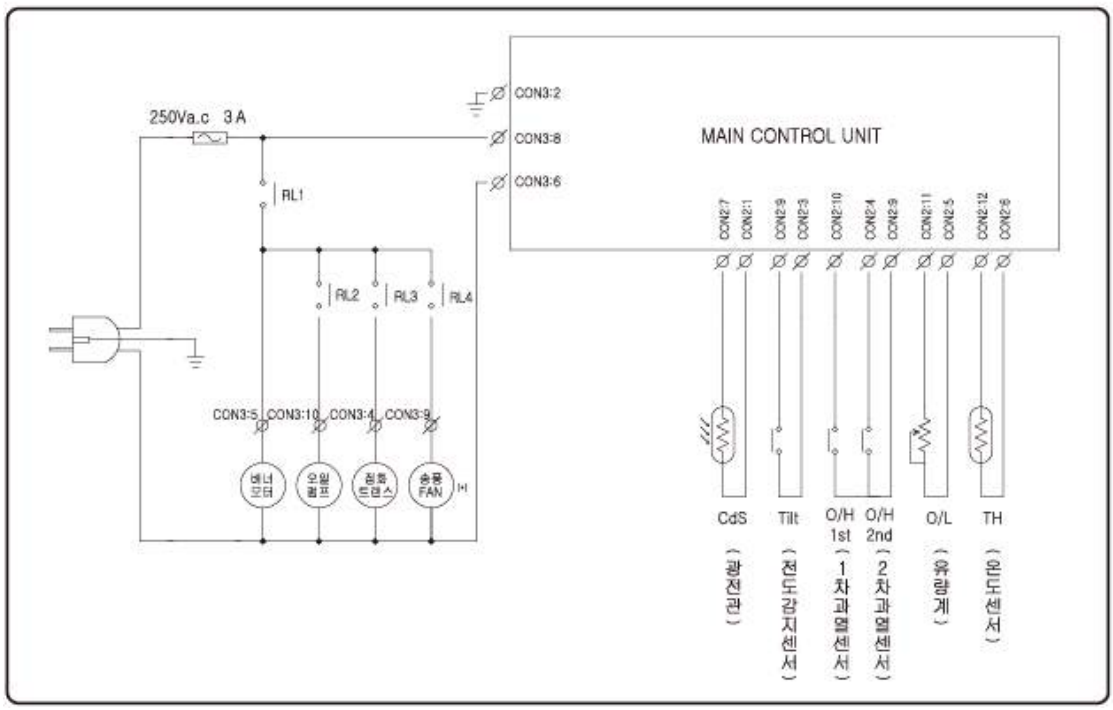


4.WIRING DIAGRAM



6-ти пиновый соединитель

No	Цвета	Частн. назв
①	Черный	Основа
②	Серый	Мотор вентилятора
③	Красный	Воспламенитель
④	Оранжевый	Масляный насос
⑤	Желтый	Масляный насос
⑥	Зеленый	Масляный насос



5.HOW TO CONTROL FLAME

For the burner used for kaya heater,the flame control is already finished beforeshipment, according to the burner specifications.
If there is something wrong with burner flame or ignition, check the air inflow amount.

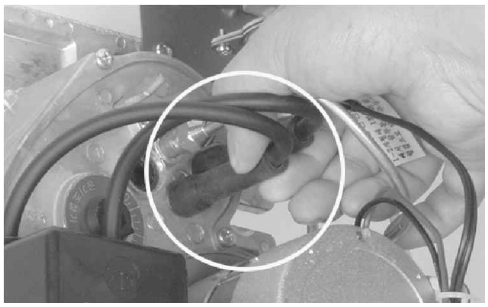
※AIR CONTROL FOR EACH MODEL

MODEL \ ITEM	DAMPERING SIZE	BURNER CLASSFICATION MARK	NOZZLE SPECIFICATIONS
BTS-120	∅22 / NO 1.5	GPM2-S115	0.3G/h 60˚S 10.0kgf/cm²
BTS-150	∅28 / NO 2.5	GPM2-S155	0.3G/h 60˚S 8.0kgf/cm²
BTS-200	∅28 / NO 2.5	GPM2-S205	0.4G/h 60˚S 10.0kgf/cm²
BTS-250	OPEN/ NO 2.0	GPM2-S255	0.5G/h 60˚S 10.0kgf/cm²

※NOZZLE SPECIFICATIONS(-2Ø, -1Ø, +1Ø)
AIR INFLOW AMOUNT CONTROL with the dampering withen the product.

6. CAUTIONS FOR SERVICE

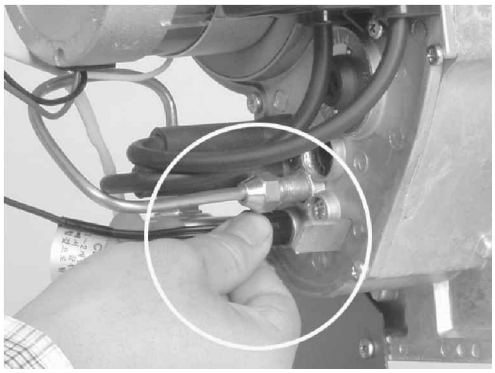
1.When connecting ignition transformer with electrode bar, the insulation rubber should be assembled to cover the electrode-bar terminal.



2.When adjusting the distance of electrode bar after replacing the nozzle, it should be positioned between the nozzle and diffuser without touching them. Nozzle position can be adjusted with nozzle rod and electrode-bar distance should be adjusted to 3 ~ 4 mm. When there is high voltage in ignition transformer with electrode bar getting close to nozzle or diffuser, the high voltage moves to the burner and causes malfunction.

3.For phototube cleaning or assembly after replacing, it should be fixed to phototube fixing hole.

For abnormal combustion of phototube, there can be an error because the flame condition can't be exactly checked.



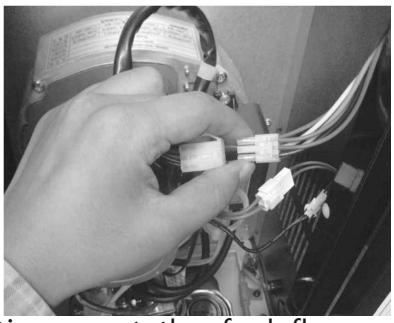
4. Make sure that the oil hose is connected to oil pump when replacing the burner. The air inside the oil pump can cause ignition problem or incomplete combustion.

DISASSEMBLY INSTRUCTION

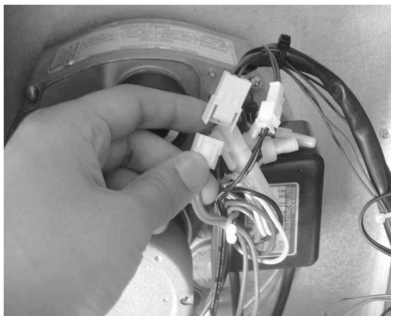
7. DISASSEMBLEY INSTRUCTION

HOW TO DISASSEMBLE BURNER

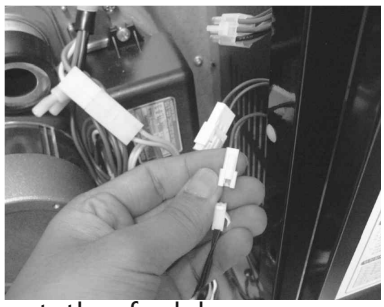
1. Disconnect the 6P connector connected to the burner. connector.



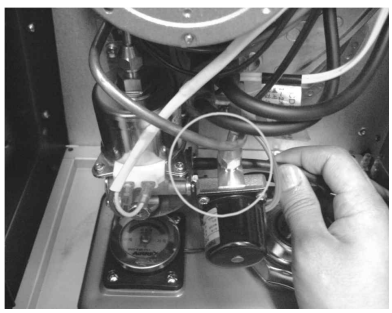
1-2. Disconnect the smell reduction device (solenoid)



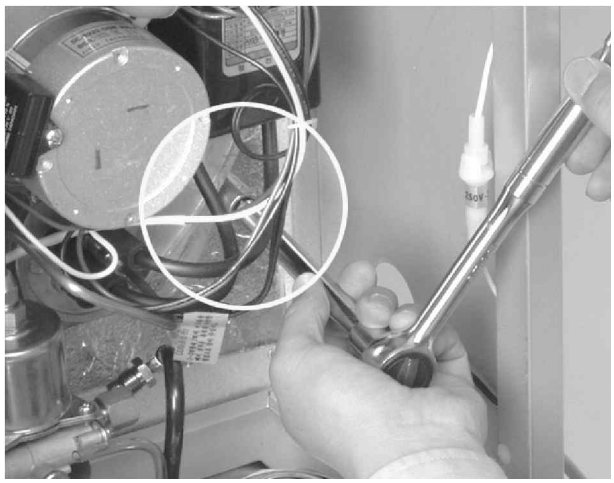
1-3. Disconnect the fuel flowmeter connector.



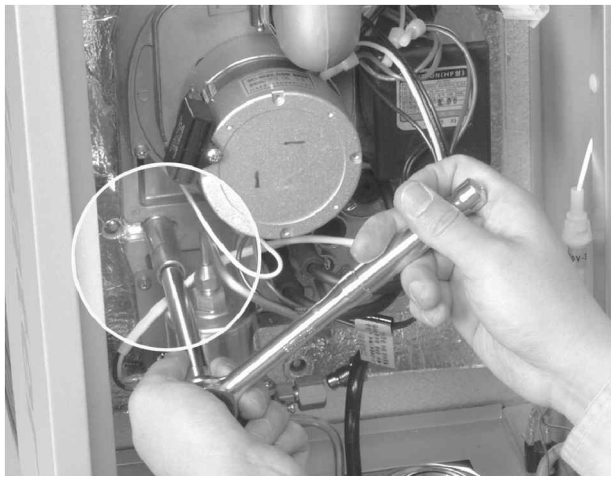
2. Disconnect the fuel hose connected to the oil pump.



3. Release the burner-fixing nuts (2 hexagonal nuts) with 12mm box.



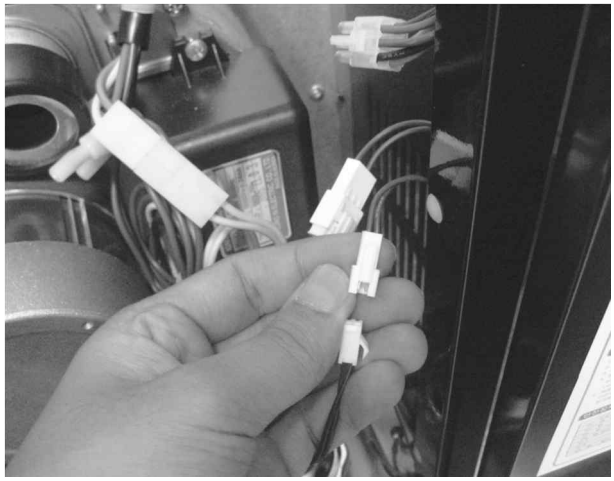
4.



5. Disassemble and take out the burner from combustion chamber. (Be careful not to damage gasket while disassembling.)

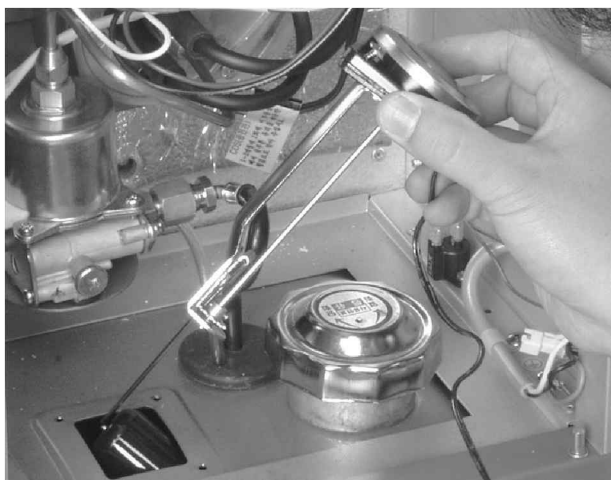
HOW TO DISASSEMBLE FLOWMETER

1. Disconnect the flowmeter 2P connector.



2. Release the fixing bolts of flowmeter.

3. Disconnect the flowmeter from the tank.



HOW TO DISASSEMBLE ANTI-TRIP SAFETY DEVICE

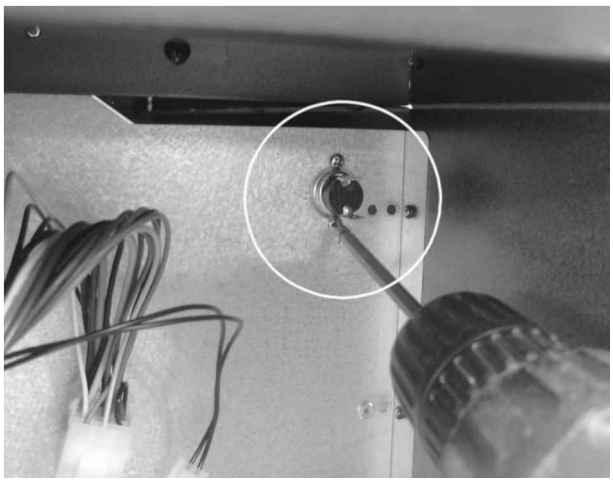
1. Disconnect the connector.

2. Release the fixing nuts (+2 ea) to disconnect it.

HOW TO REPLACE OVERHEATING SENSOR

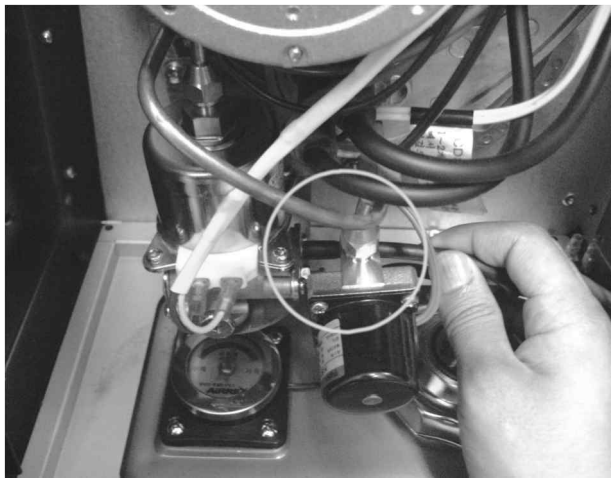
1. Disconnect the connector.

2. Release the fixing screws (+2 ea) to disconnect it

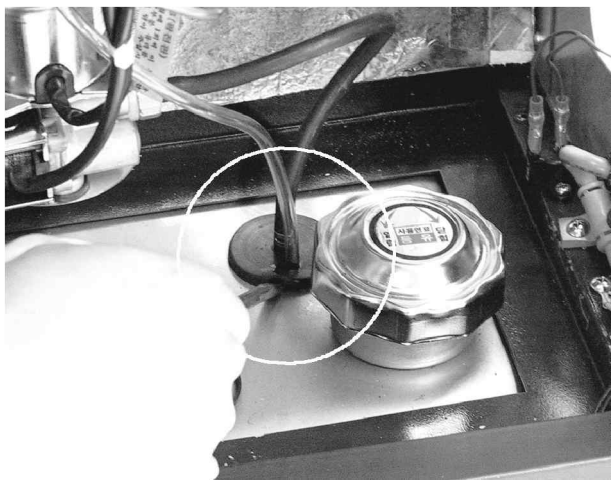


HOW TO DISASSEMBLE FUEL FILTER

1.Disconnect the hose from the oil pump. (Be careful not to damage the hose.)



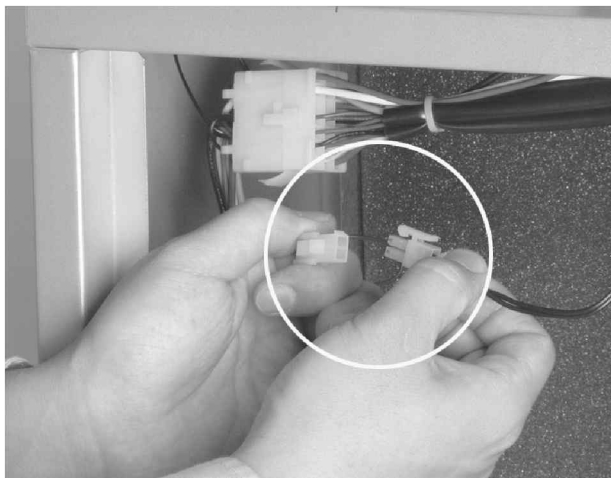
2. Use flat - head driver to lift rubber packing fixed to fuel tank and to disconnect it.



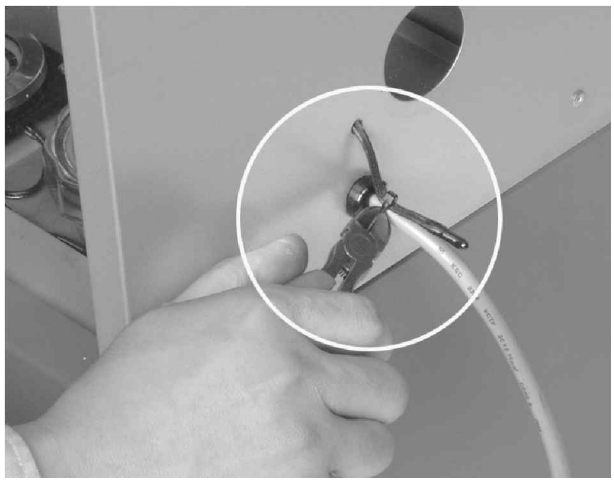
3. Lift up the filter from the fuel tank.

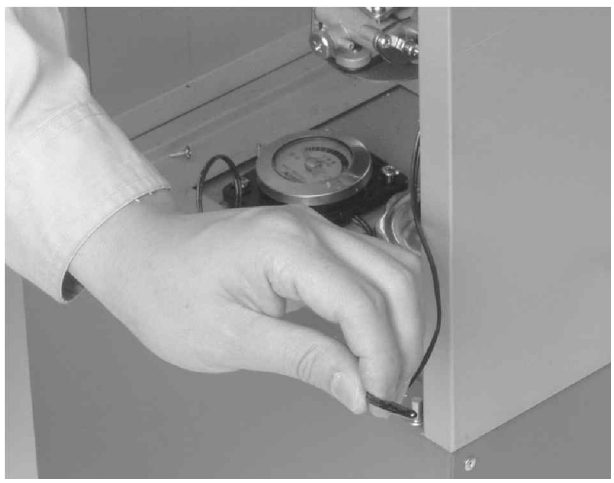
HOW TO DISASSEMBLE TEMPERATURE SENSOR

1. Disconnect the 2P connector.



2.Remove the cable tie assembled with power cord and disassemble it.

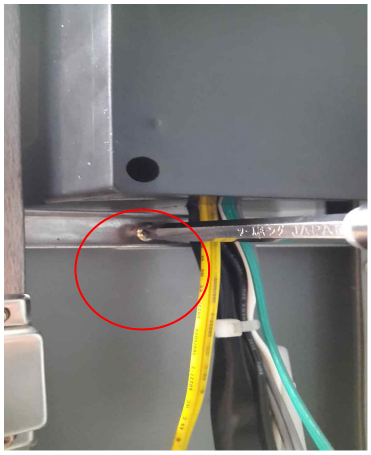




HOW TO REPLACE THE CONTROLLER

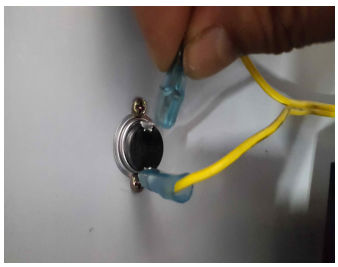
1. Disconnect the controller attached on the front by releasing the fixing screws

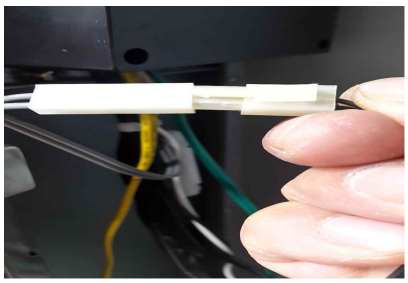
(upper 1ea)

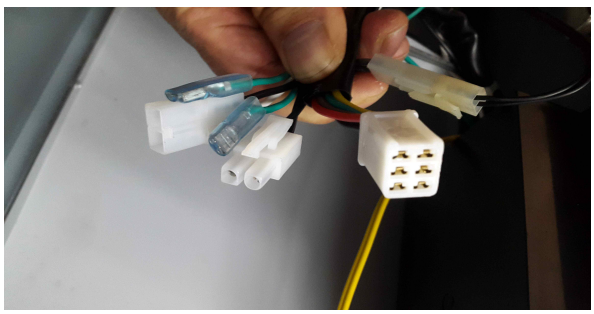


(lower 1ea)

2. Disconnect the connectors.







HOW TO REPLACE FUSE

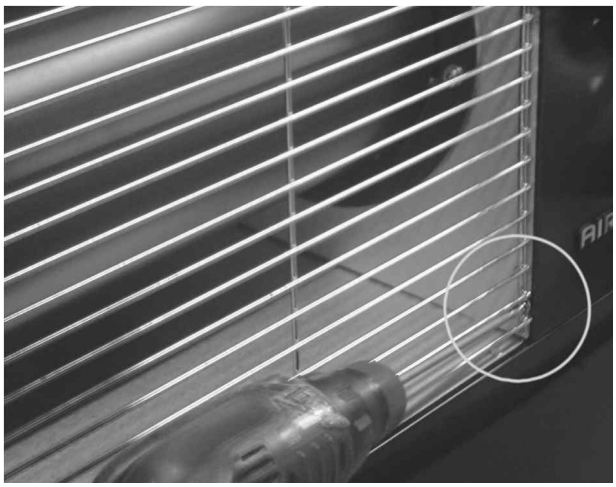
1.Open fuse holder positioned on harness line and remove the fuse.

2. Assemble fuse holder after replacing with new fuse.

※ Fuse specifications

HOW TO REPLACE GRILL

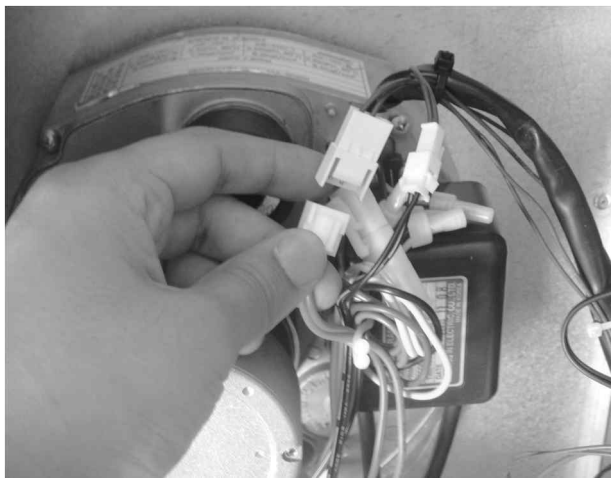
1.Release the grill-fixing bolts (4 ea).



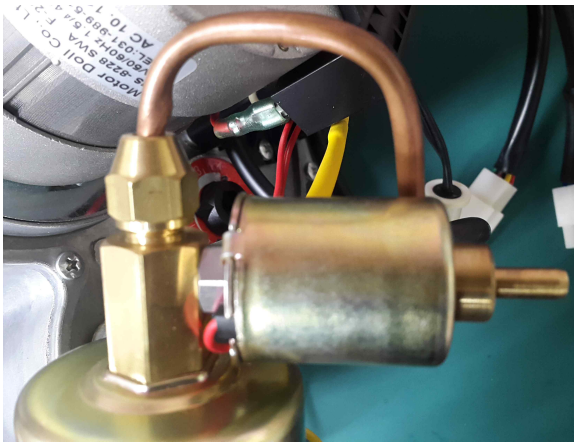
2. Disconnect the grill by pulling out.

HOW TO DISCONNECT REMAINING FUEL COLLECTOR

1. . Disconnect the 2P connector.



2. Release the nipple with 13-mm spanner.

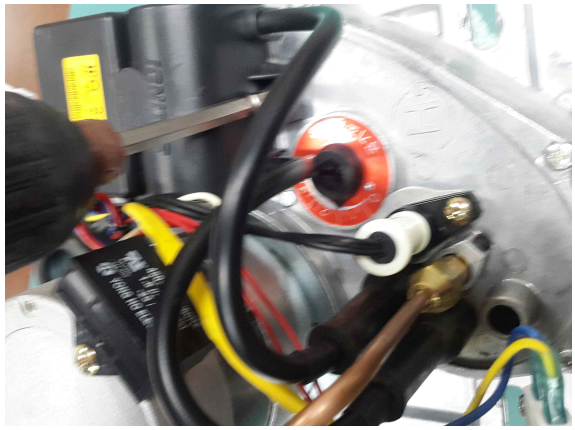


3. Disconnect it from the main body.

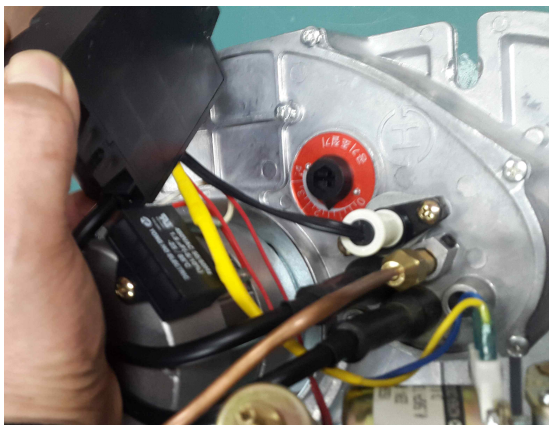
HOW TO DISASSEMBLE U

1. Disconnect the ignition transformer

1)Release the fixing bolts (+2 ea).



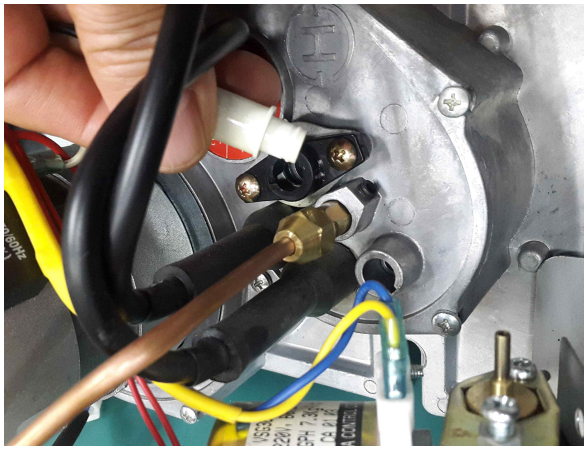
2)Disconnect the ignition transformer from the main body.



3)Disconnect the high-voltage tube connected to electrode bar.

2. Disconnect the phototube
Disconnect phototube by pulling it out with hand.

※ Cautions
Make sure that the insert hole of phototube and the insert hole of main body meet together while assembling

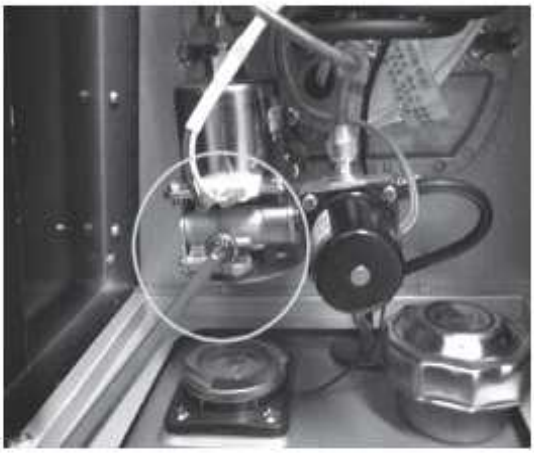


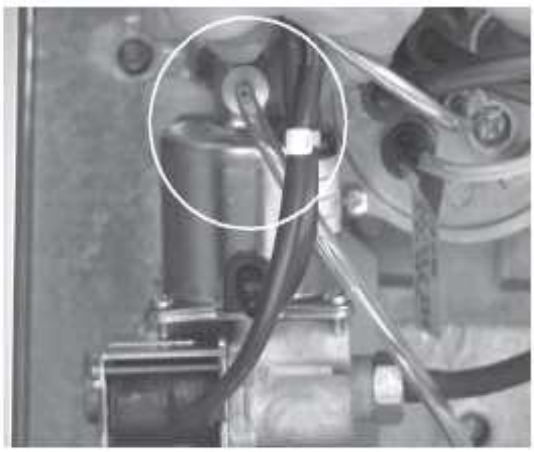
HOW TO BLEED AIR WITH FUEL HOSE

Remove the air in the hose after refueling once the fuel tank is empty.

Through 1st combustion operation with air bleeding screw rotated 1 rotation counterclockwise, the air is removed and then tighten the screw clockwise when the electronic pump stops.

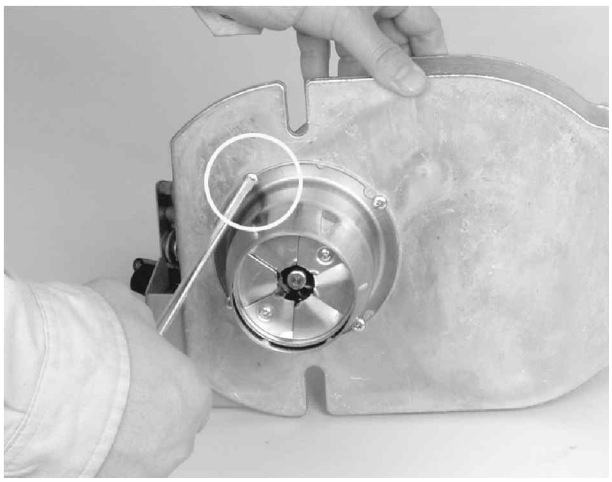
For current products, repeated operations of 2~3 times can remove the air.



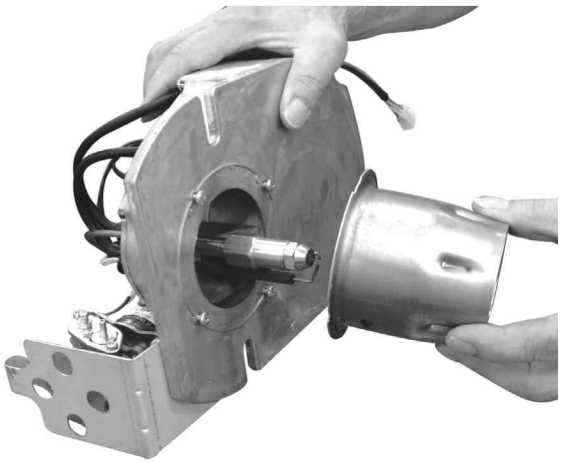


3. How to disconnect nozzle

①Release the fixing bolts (+4 ea).



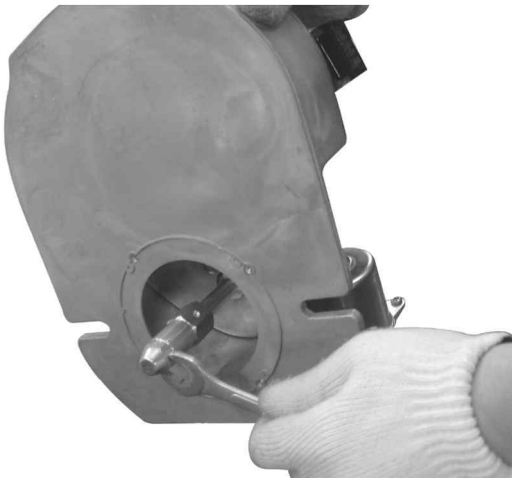
②Disconnect the burner tube.



③Release the fixing bolts (+1 ea) for igniting bar ass'y.

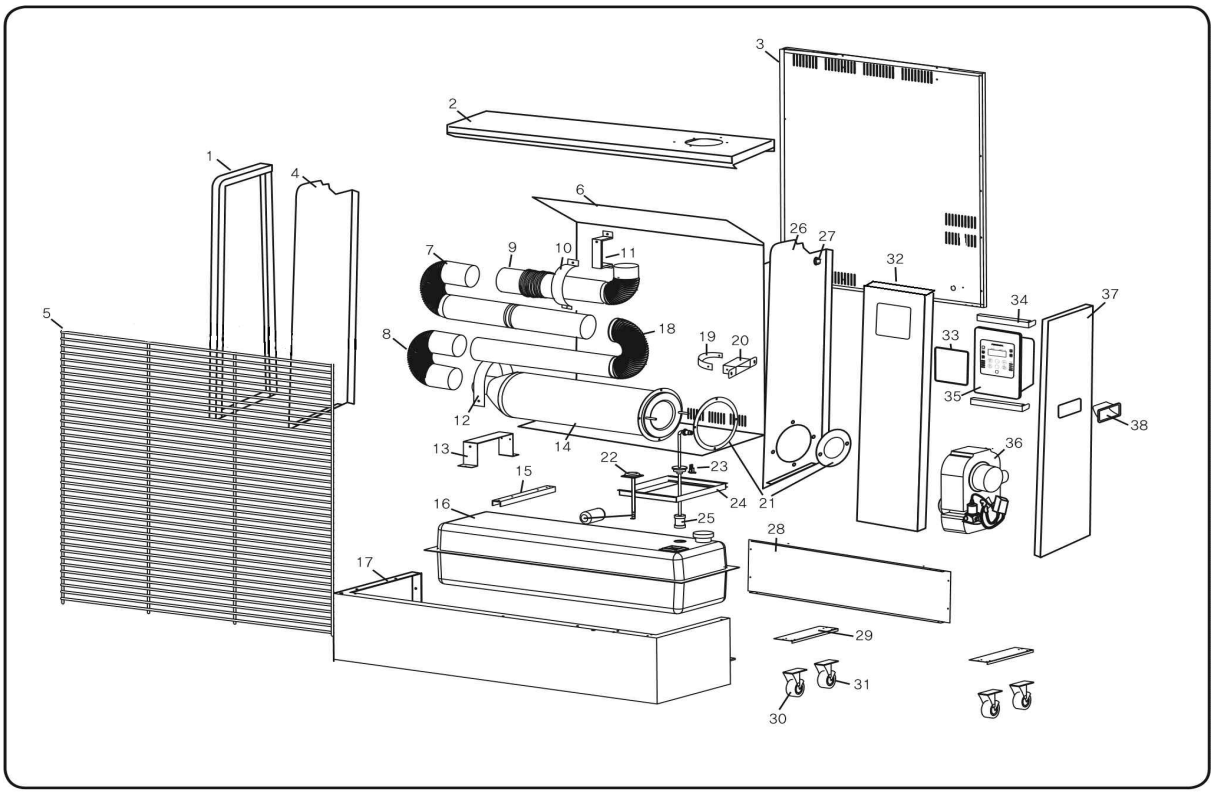
④ Disconnect igniting bar ass'y from main body.

⑤ Use 14mm and 17mm spanners to release the nozzle.



⑥ Disconnect the nozzle.

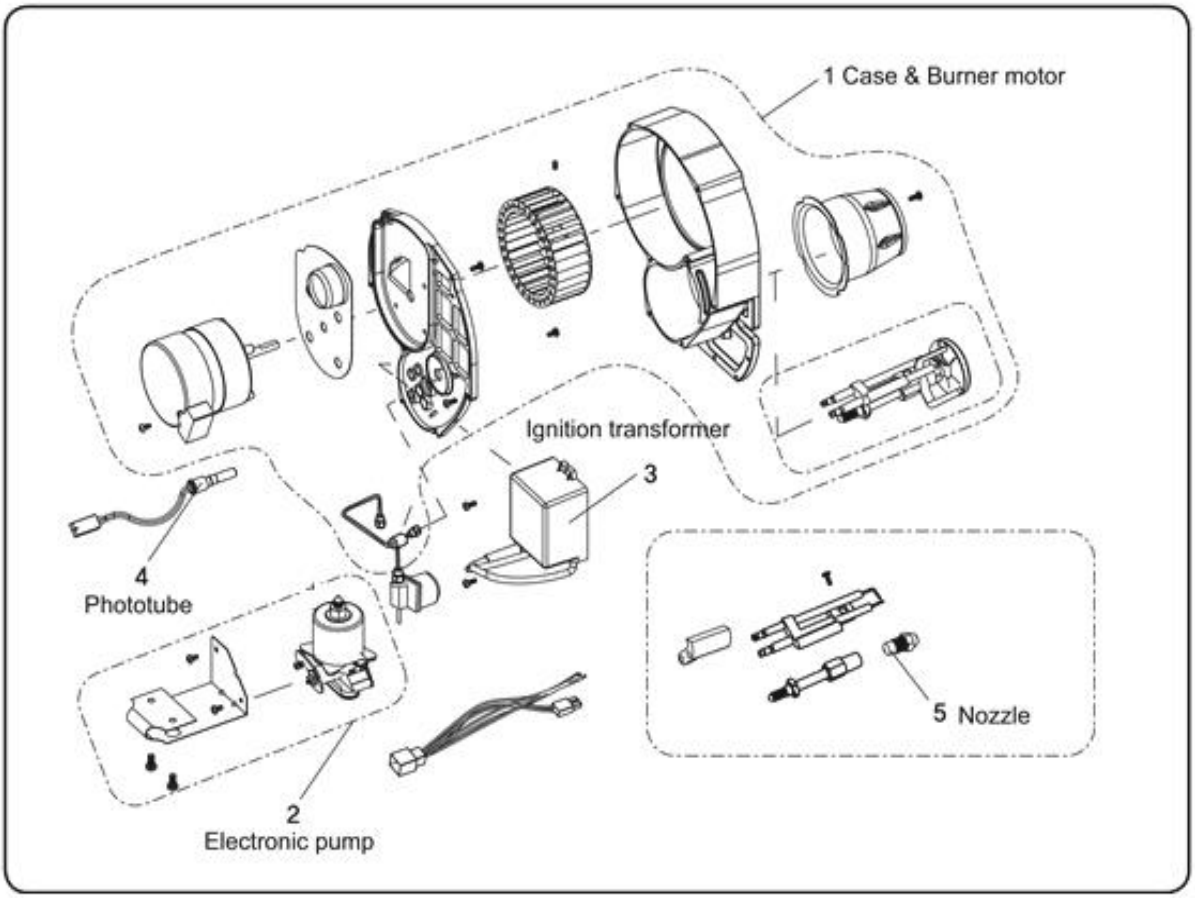
8. DISASSEMBlY DIAGRAM & PARTS



no	Material name	
1	CAB.I. LF	
2	CABI. TOP	
3	CAB.I BACK	
4	CABI. REF. LF	
5	GRILL FRONT	
6	CABI. REF. BACK	
7	HEAT TUBE "J"	
8	HEAT TUBE "C"	
9	HEAT TUBE "I"	
10	HEAT TUBE BAND "S"	
11	HEAT TUBE B/K "SB"	
12	HEAT TUBE BAND "L"	
13	HEAT TUBE B/K :LB"	
14	BURNER FURNACE	
15	TANK B/K	
16	OIL TANK ASS`Y	
17	CABI LOW FRONT	
18	HEAT TUBE "J"	
19	SIDE B/K BAND	
20	SIDE B/K	
21	INSU GASKET	

no	Material name	
22	OIL GAUGE	
23	TILT TIP S/W UG-7 20~30°	
24	CABI B/K TANK	
25	OIL FILTER	
26	CABI REF.RH	
27	OVER HEAT S/W	
28	CABI LOWER REAR	
29	CASTER B/K	
30	CASTER LOCK	
31	CASTER UN LOCK	
32	CABI FRONT	
33	CONTROLLER INLAY	
34	CONTROLLER B/K	
35	MAIN PCB	
36	BURNER	
37	CABI DOOR	
38	HANDLE	

BURNER ASSEMBLY & DISASSEMBLY DIAGRAM



Services

Q. I'm trying to run the heater for winter, which was stored during the summer, but there is a bad smell and serious soot.
1.This is a symptom when the gas is spoiled in the fuel tank.
2.Remove the spoiled gas and put the new one. Then the symptom will be gone.

Q. There is soot.
1. Check the flame to see whether the air is enough. 2. Clean the combustion tube.
3. Nozzle may have effects on the soot, so the nozzle should be replaced in principle. (There should be partial blockage.)

Q. There is E1 error with ignition-failure lamp and the buzzer turned on.
1. Check whether the phototube is well installed. 2. Clean the front of sensor with a cloth.
3. If there remains E1 error and ignition failure after the measure, replace the C.D.S.

Q. There is E3 error with overheating lamp and the buzzer turned on. (Overheating sensor senses the temperature of 105C° or higher.)
1.Check if the temperature of installed location is 105C° or higher. (If so, the heating sensor is functioning).
2.Check if the error is erased by making short circuit the brown and yellow lines of overheating sensor and pressing Run button.
3.If the error message is erased, the sensor should be replaced because the sensor is faulty.

Q. In the controller, ignition-failure lamp is on and there is an error message. : There is a problem with the ignition.
1.Check if there is some foreign materials or water in the fuel tank and remove any foreign materials or use new gas.
2.Check the igniter function and nozzle condition. Mostly the problem is caused by the nozzle.
3.Check the electronic pump function.
4.Check if the burner motor is functioning. Unstable motor function leads to ignition failure.

Q. Right after ignition, it is turned off with a bad smell.
1. Check the fuel tank, fuel filter, and nozzle condition. 2. If the phototube fails to sense the ignition, replace it.

Q. There is a bad smell. (smarting smell)
1. Check the damper amount. 2. If the oil is old and bad, the smell is worse.
3. Bad nozzle condition also can have an effect, and replace it.

Q. There is noise.
1. Check the noise source. Adjust the bracket for electronic pump vibration. 2. Check if the noise is from the ventilation fan.

Q. while operating new product, gas drop is found on the floor.
1.Check if there is any leakage in the joints of copper tube for oil pump. If so, release the nipple and tighten it.
2.Replace the burner copper tube if the leakage remains even after taking the measure.

Q. while operating new product, various error messages are found.
Check all the pins are correctly connected to the harness connector. There can be contact failure with harness housing pins.

Q. During the initial operation of new product, the fuse is repeatedly cut.
1. Check the controller. 2. Check the igniter gap. (3mm of gap is appropriate.)
3. For old product, check sheath damage on the wiring and take measures if the fuse is cut.

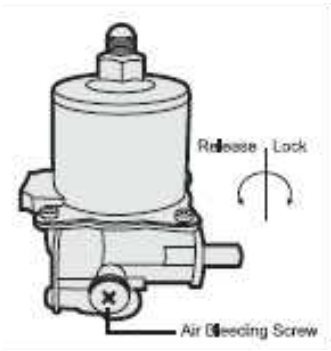
Q. There is an explosion during ignition.
1. Check the gap of igniter with diffuser and nozzle. 2. Also check if the main combustion furnace is filled with oil.

Q. while operating the burner, there is noise. But the noise is not consistently found.
1. Check the noise comes from the burner itself or the fan. 2. Replace the motor if the motor makes noise.
3. Adjust the fan position if the fan makes noise.

Q. It is suddenly turned off during operation.
1.Check if the oil is not supplied well due to oil filter blockage. 2.Check if there is foreign materials or water in the oil tank.
3. Check the phototube. 4.If nothing is found with the checks, it is the controller problem. Check the controller and replace it.

Q. Even with the operation button pressed, it doesn't start and there is LOCK message.
It is remote-controller-only mode. Press Operation and UP buttons together for 5 seconds.

Q. The temperature is displayed as 70C°.
The temperature unit may have been changed into Fahrenheit. Press UP and DOWN buttons together for 5 seconds to change it to Celsius.



Air Bleeding

* If the heater stops with ignition failure and serious noise from the electronic pump, there is a fuel supply problem with air in it.
* Certain level of fuel tank must be remained to prevent air from coming in.
* How to Bleed Air1. Operate the heater.

1. While the electronic pump works during the combustion, turn the screw 2 or 3 times in counter clock wise. And wait until the oil comes out after air.
2. If oil comes out, turn the screw in clock wise to lock.
(If there is a lot of air inside, repeat the process 2 or 3 times.)

* This product is designed to work properly without air bleeding after gas supply.

FOR CONTROL CIRCUIT

1.FlOW CHART

1. FOR NORMAL OPERATION

1. Initial operation

When start/stop switch is pressed, there is 'beep' sound; operation LED is turned on; and burner motor starts to run.

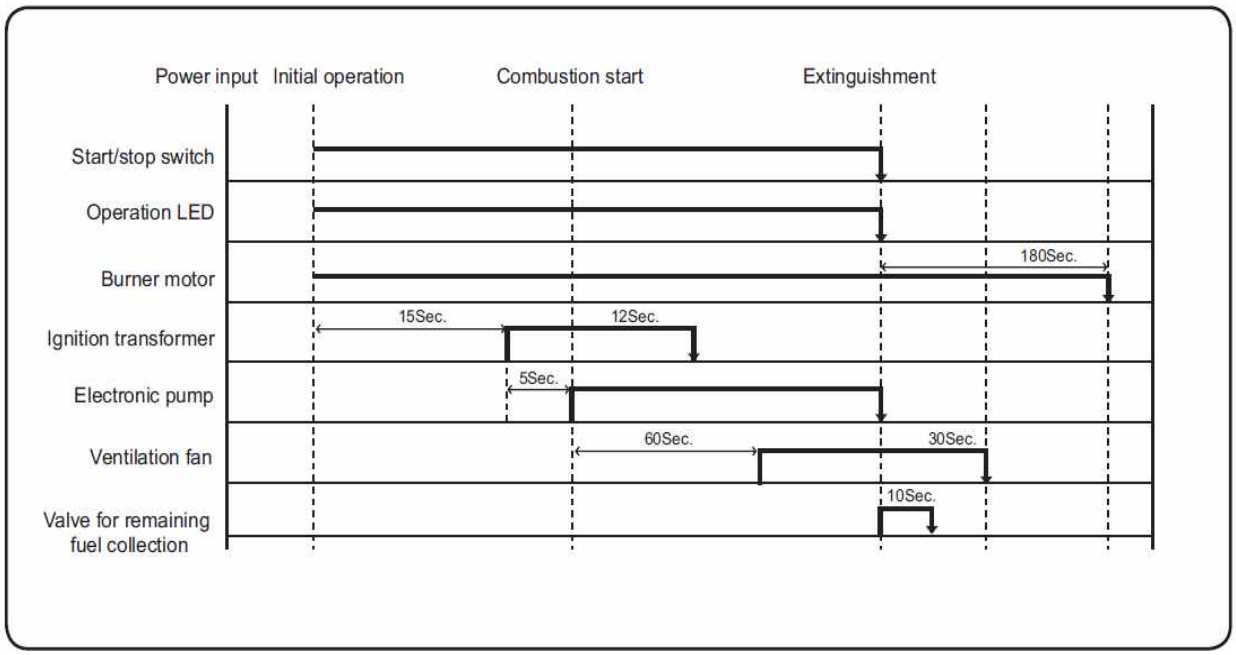
2. Combustion

Operation LED is turn on; burner motor starts to run; ignition transformer discharges in 15 sec; electronic pump starts to operate; and combustion is started. (With fuel saving mode, the fuel pump operates in 'High' mode for the first 30 sec and in 'Low' mode after that.)

3. Extinguishment

If start/stop switch is pressed during combustion, operation LED is turned off and electronic pump is stopped. At the moment, burner motor remains its operation for 180 sec to remove remained gas; ventilation fan operates 30 sec; and remaining fuel collector operates for 10 sec.

NORMAL OPERATION DIAGRAM



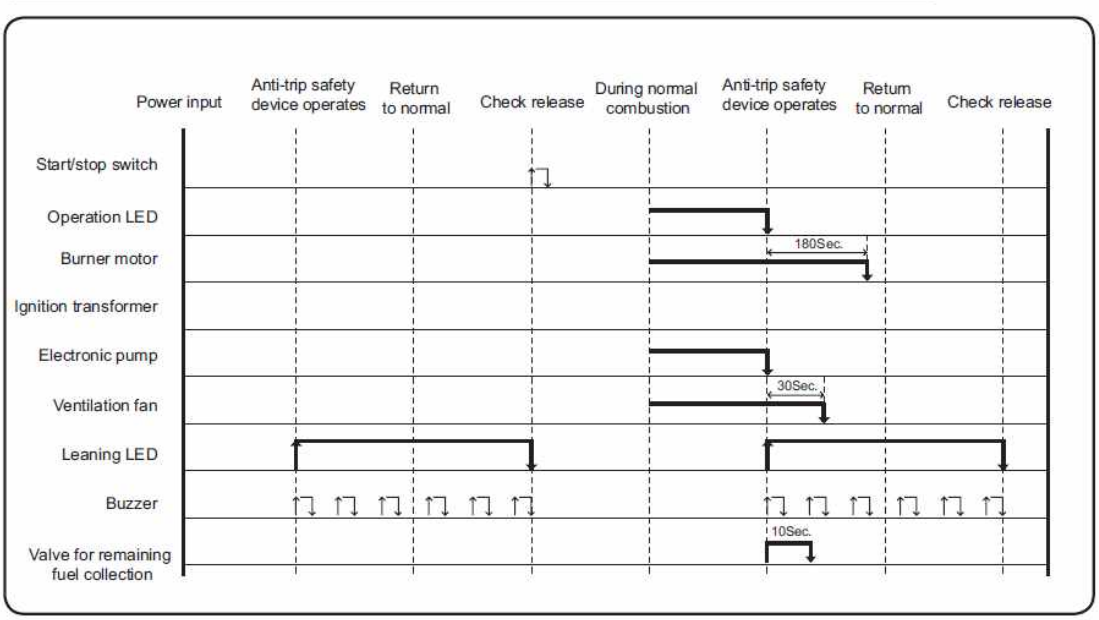
2.WHEN ANTI-TRIP SAFETY DEVICE OPERATES

1. When anti-trip safety device operates because the heater falls down, leaning LED is turned on; the buzzer rings; and 'Err' is turned on. Press start/stop switch to release it after returning to normal.

2. When anti-trip safety device operates during combustion, leaning LED is turned on; the buzzer rings; and 'Err' is turned on. At the moment, electronic pump stops; ventilation fan stops in 30 sec.; burner motor stops in 180 sec.; and valve for remaining fuel collection operates for 10 sec.

※ At the moment, start/stop switch should be pressed to release it, otherwise the check state is remained even after returning to normal.

ANTI-TRIP SAFETY DEVICE OPERATION DIAGRAM



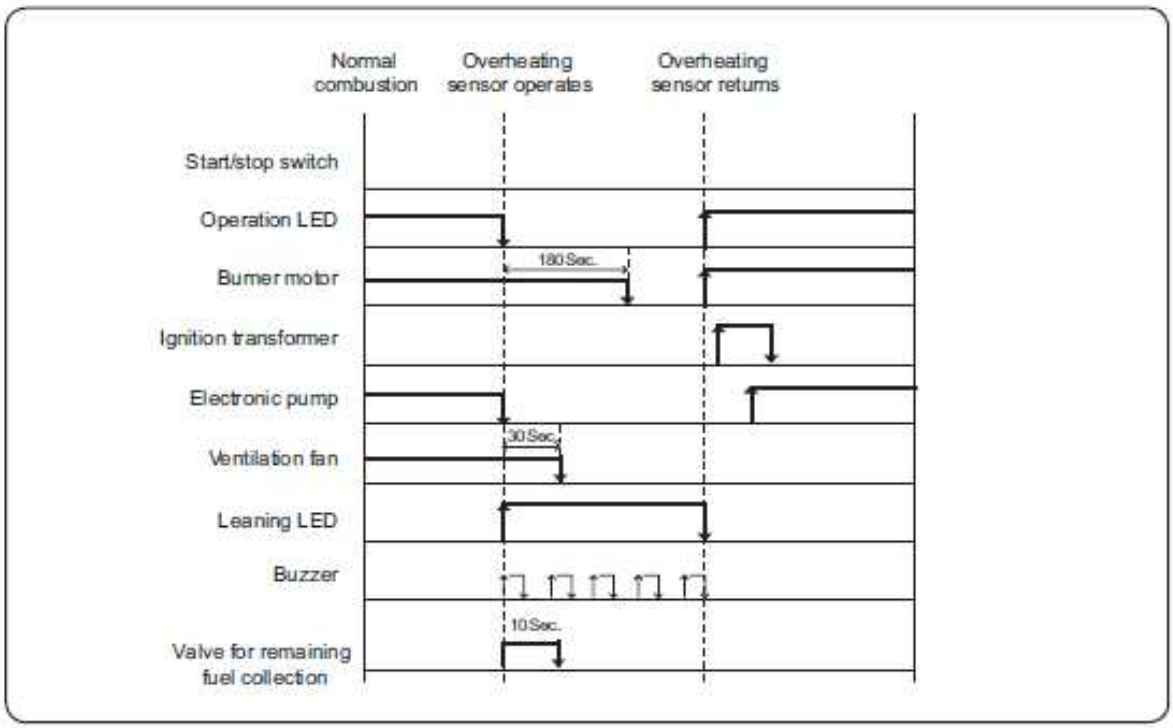
3. WHEN OVERHEATING SENSOR OPERATES

1. During combustion, operation LED is turned off; overheating LED is turned on; buzzer rings; and'Err' is displayed. At the moment, electronic pump stops; burner motor stops after 180 sec.; ventilation fan stops after 30 sec.; and valve for remaining fuel collection operates for 10 sec.

When heater temperature decreases, overheating sensor returns to normal automatically and the heater restarts.

At the moment, electronic pump stops; burner motor stops after 180 sec.; ventilation stops after 30 sec.; and valve for remaining fuel collection operates for 10 sec. When heater temperature decreases, overheating sensor returns to normal automatically and the heater restarts.

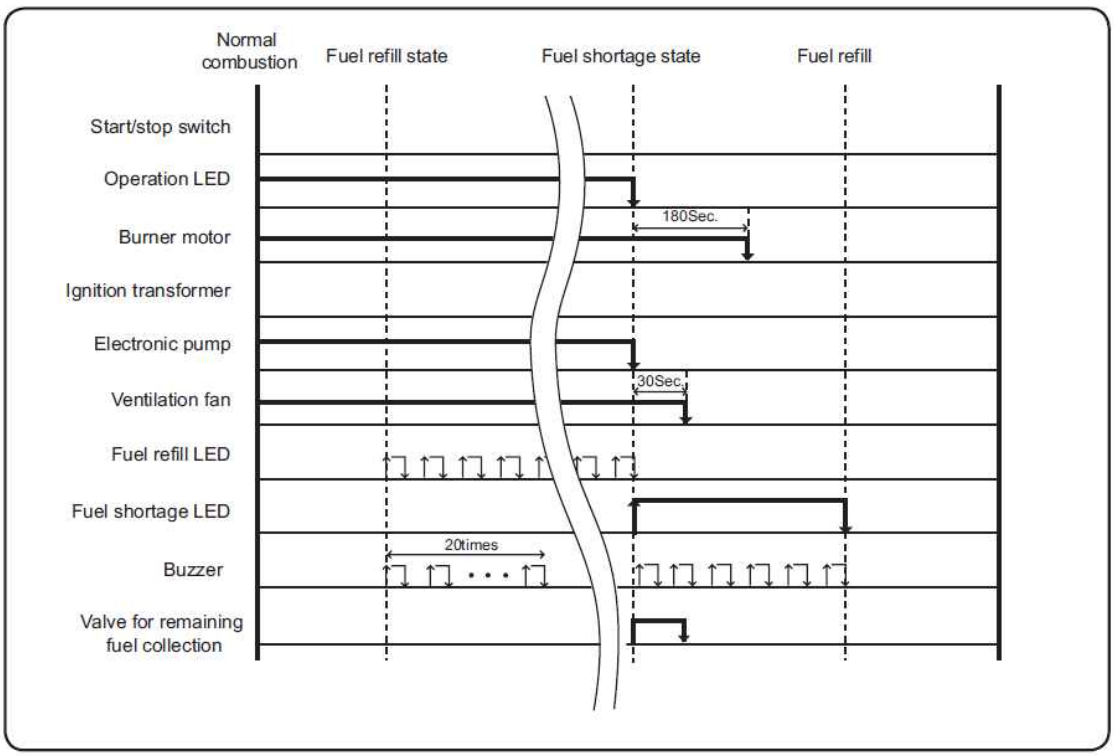
OVERHEATING SENSOR OPERATION DIAGRAM



4.WHEN FUEL IS REFILLED OR SHORT

When fuel is not enough, fuel shortage lamp is turned on and buzzer rings 20 times.
If fuel level is min. because the fuel was not refilled even with fuel alarm activated, fuel shortage lamp is turned on; buzzer rings;
And 'OIL' is displayed on the display. At the moment, burner motor stops after 180 sec.; ventilation motor stops after 30 sec.; and valve for remaining fuel collection operates for 10 sec.

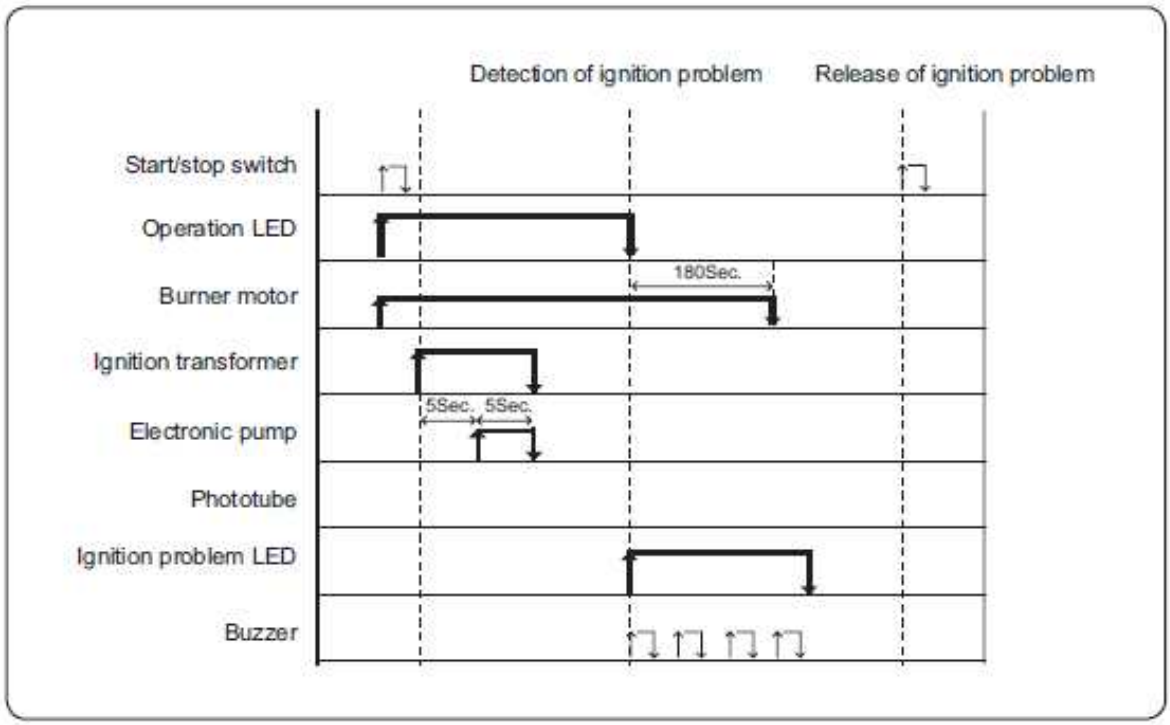
FUEL REFILL & SHORTAGE DIAGRAM



5.WHEN IGNITION PROBLEM IS DETECTED

If there is ignition problem due to ignition transformer or electronic pump problem during initial combustion or faulty ignition problem is detected due to malfunctioning phototube, ignition problem lamp is turned on; buzzer rings; 'Err' blinks; and burner motor stops after 180 sec.

DIAGRAM WHEN IGNITION PROBLEM IS DETECTED



6. WHEN FLAME IS DETECTED BEFORE COMBUSTION

If light is detected before combustion by phototube because the phototube is departed from burner ass' y or excessive light penetrates the view cell, 'Er1' is displayed; buzzer rings; and burner motor stops after 180 sec.

7. TEMPERATURE SENSOR DISCONNECTION

If temperature sensor is disconnected during stop statu ‘Er2’ is displayed and buzzer rings. Press start/stop switch to release the buzzer. If‘Er2’is displayed and buzzer rings during operation, electronic pump stops; burner motor stops after 180 sec.; ventilation fan stops after 30 sec.; and valve for remaining fuel collection operates for 10 sec.

TEMPERATURE SENSOR DISCONNECTION DIAGRAM