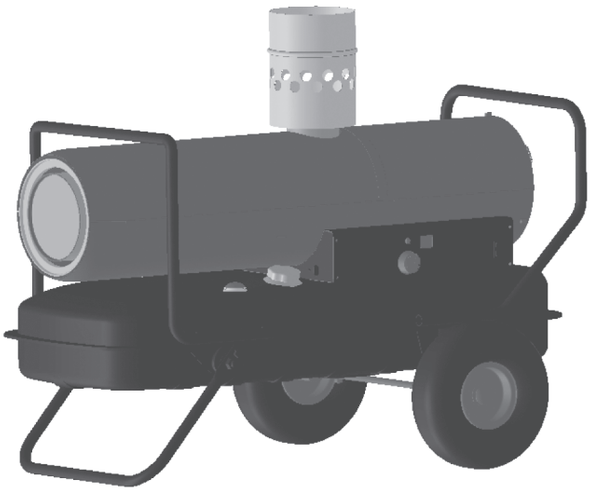
Indirect
Air Forced Heater

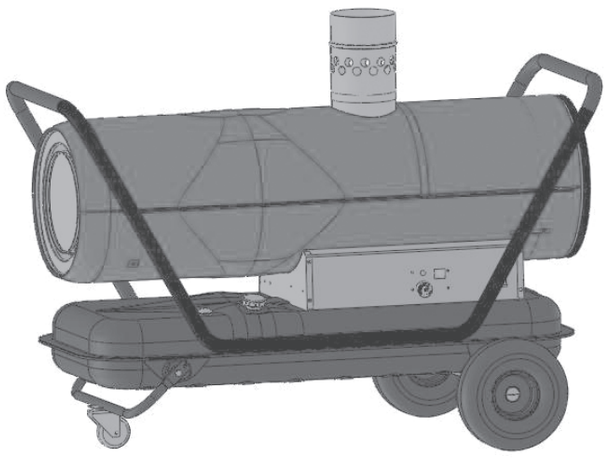
USER MANUAL

Portable Heater

Z Fire



ZF-80ID



ZF-170ID
ZF-240ID

Key Instruction

Before you disassemble, assemble or start this equipment, read the instructions and measures of this manual and completely understand them. Improper use of this heater can cause serious problem. And keep this manual until you use this equipment.

⚠ Warning for Danger

Follow the instructions and warnings in the manual provided with this heater, or you can get serious damage or property loss or even can be dead by burning gas, explosion or fire. Be sure to let only those who understand and follow this instruction use or disassemble this equipment.
Contact with the manufacture for any other information than in the manufacturing description or sticker label.

DONGIL PRECISION INDUSTRIAL CO., LTD.

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⚠ Warning

Keep away from the flammable materials like construction materials such as wood according to the instructions of this manual due to the problems of fire, toxic gas and danger of explosion in burning.

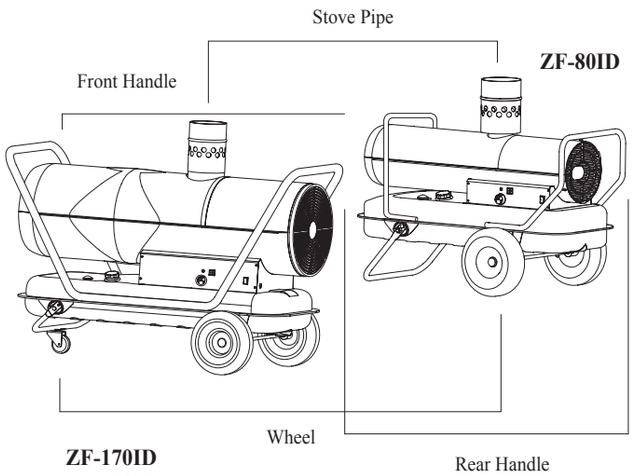
⚠ Warning

You need to prepare for the ventilation for proper burning and exhaust when this heater is operated in the place where ventilation equipment is not installed. Please refer to the ventilation instruction on the page 6.

⚠ Warning

Operate this heater after reading safety and operation instruction in this manual and understand them completely.
In case you do not abide by the instruction and precautions in the provided manual, you may get damages such as death, serious burning or property loss due to fire, explosion, burning gas, suffocation and carbon monoxide.
Only those who have read this manual and understood it completely could use and repair this product.
Do not use this equipment at home or any other closed space having no outdoor duct facility.

Product Drawing

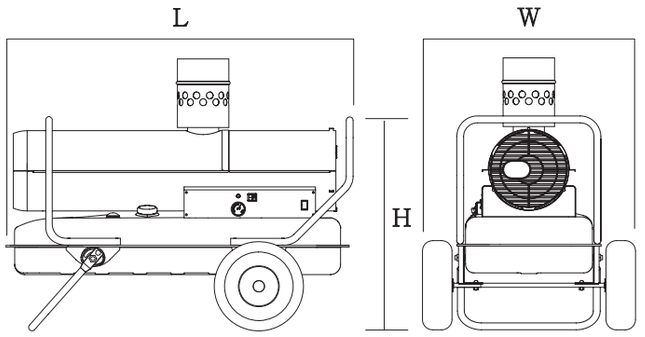


ZF-170ID
ZF-240ID

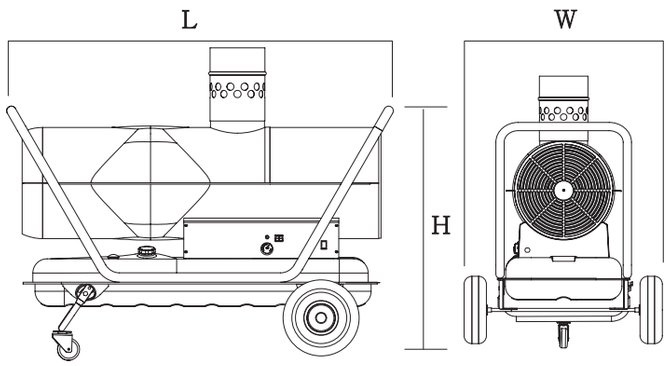
Specification

Specifiction			
Model name	ZF-80ID	TK-170ID	TK240ID
Heating Power (kcal/hr)	Max.17,500	Max.35,000	Max.50,000
Fuel consumption per hour (l/hr)	2	4	5.7
Fuel Tank (litter)	50	80	80
Working Hour (hour)	25	20	14
Heating Area m^2	115	230	330
Overheat Safety	ok	ok	ok
Size (L×W×H) mm	1020×590×670	1215×685×860	1215×685×860
Weight (kg)	36	64.7	64.7

Size

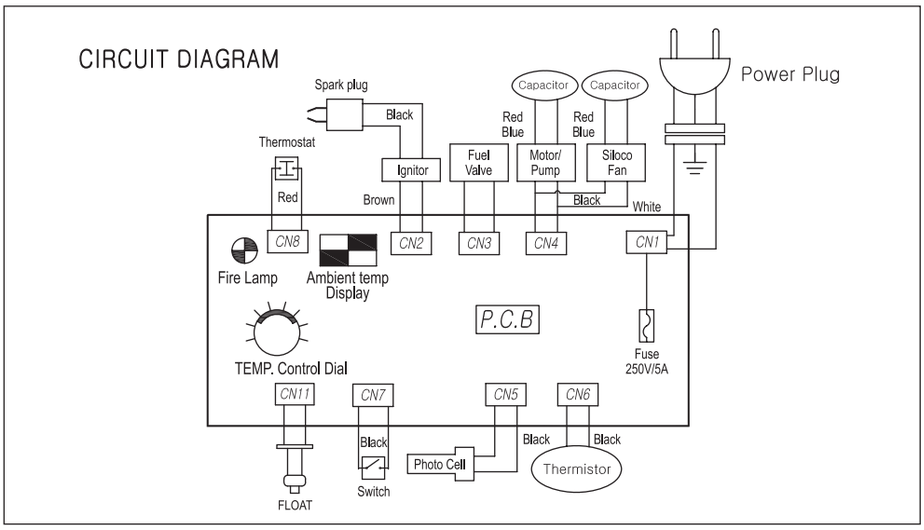


ZF-80ID



ZF-170ID
ZF-240ID

Electric Circuit Drawing



Safety Information

⚠ Danger : Toxicity of carbon monoxide may cause death!

This heater is an indirect air heating equipment which heats the heat exchanger by burning kerosene/diesel and delivers heat through this. This heater is used where burned gas doesn't reach such as indoor work places or green houses. So carbon monoxide and any harmful gas are not delivered to where heated air reaches. But, exhaust gas from a ventilation outlet from ventilation pipe can be harmful to human. So proper arrangement is necessary for this. If exhaust gas is used without ventilation process, you can have damage or even can be dead in the worst case by carbon monoxide poisoning. Early symptom of carbon monoxide poisoning is similar with flue. "You may get headache, dizziness, tears, snot, mouth dry or sore throat". If this heater is used where more than two persons are in presence, this safety measure, operation instruction and risk of accident should be noted. Especially, pregnant women, cardiac and lung patients, anemia patients, alcoholic and acrophobia patients should be more careful because they may be exposed to carbon monoxide more sensitively.

Be sure to abide by following the instructions.

- Check carefully if the heater got impact from outside. Don't use the product which got impact.
- Don't amend this product as you like. And don't use the product which is amended as you like.
- Only use kerosene or diesel. If you use diesel, the product may not work properly in some specific condition.
- Never use highly volatile fuels such as gasoline, naphtha, thinner and alcohol because they have danger of explosion.
- Be sure to provide good outdoor ventilation for the ventilation pipe when it is used indoor.
  Be careful not to block ventilation if you use extended stovepipe.
  Please be prepared for the case that it can't be ignited if air supply is not sufficient due to lack of indoor ventilation. .
- Don't use it in residential area.
- Don't use it where product is exposed to water, rain or spray liquid.
- Keep away from the place where flammable material such as gasoline, thinner, volatile steam or liquid exist.
  Minimum distance: Top surface:3m, Side;2m, Front:5m
- Use it in the flat and stable place
- Do not block inhale and exhaust side of the heater.
- Do not leave the place with the heater turned on
- Keep away from children and animal.
  Handle the heated heater wearing gloves to avoid burn. Don't handle it when it is working.

Operational Principle

How to supply fuel

DLT-IFA180K(260K): This model pumps fuel with motor -driven rotating fuel pump and push it to nozzle through the pipe with high pressure (7~12kg/cm2), and then the nozzle sprays fuel in the form of micro-particles into the combustion chamber mixed with air with the constant spray angle.

DLT-IFA90K: This model pushes air in the nozzle with motor-driven rotating air pump and pull the fuel at the low pressure by the air generated by fast flow of air, and then sprays fuel in the form of micro-particles into the combustion chamber mixed with air with the constant spray angle.

Instantaneous Ignition Process

If the voltage and current for house use flows in the transformer installed in the heater, igniter transform it into high voltage(16.5kV) current and makes high voltage discharge spark in the terminal of ignition plug. This spark oxidizes the fuel particles sprayed in the combustion chamber and ignites. High voltage discharge stops after 20 seconds and combustion continues until fuel spray stops due to the heat in the combustion chamber.

Cooling and Air Blowing Process

Heater needs a lot of air (oxygen) in burning fuel in the combustion chamber. So air from the air blowing fan makes proper combustion process. If the air from this air blowing fan to the combustion chamber is too much, blue slat can be generated and the ignition may be failed. On the contrary, if the air is less, yellow salt can be generated, nauseating smell and soot can become serious by imperfect combustion.
In addition, if the heat in the combustion chamber goes up due to the ignition, cooling fan and air blowing fan start operating to protect overheating.

Protection of Electric Circuit

This heater equips with a fuse to protect it from overvoltage. But momentary high voltage or lightening can't be covered by this fuse. If this product doesn't work totally after supplying power, please first check the fuse in PCB.

Flame Detector

This heater equips with a photo-electric tube which detects flame to check continues combustion when burning. So this flame detector senses and makes combustion stop, and send error signal to the dashboard when flame goes out or is not safe.

Over-heat Protection Sensor

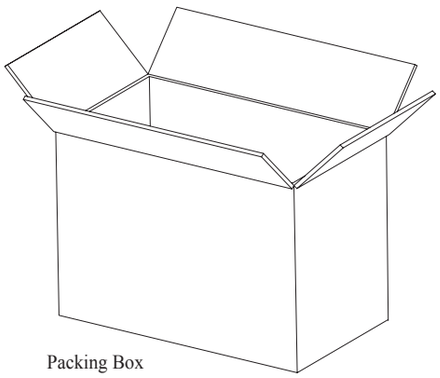
This heater equips with an over-heat protecting system to check the unusual over heating which may occur in combustion. Over-heating protection device senses and send error signal to the dashboard when temperature in the heater (except combustion chamber) is over 80 ~ 100 C.

Set-up Temperature Control Function

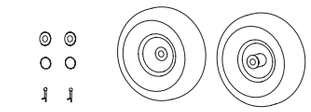
This product has the feature of setting up the desired temperature with temperature control knob, and the heater operates until the current temperature checked by temperature sensor and displayed on the display panel reaches at the set-up temperature. The heater doesn't work if the set-up temperature is lower than the current temperature.

UNPACKING

Open the box and check the heater, parts and user manual. Refer to the figure for the contents.
Caution: Do not waste the packing box and other packing materials for the use in storage.

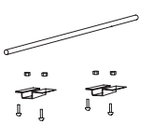


Packing Box



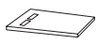
Wheel Fixing Piece

Wheel Assembly



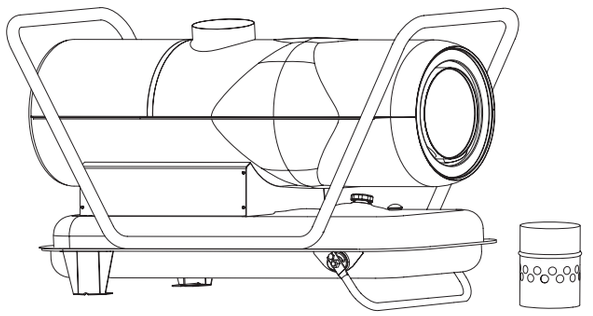
Shaft

Rotating Caster
(for only ZF-240ID ZF-170ID)



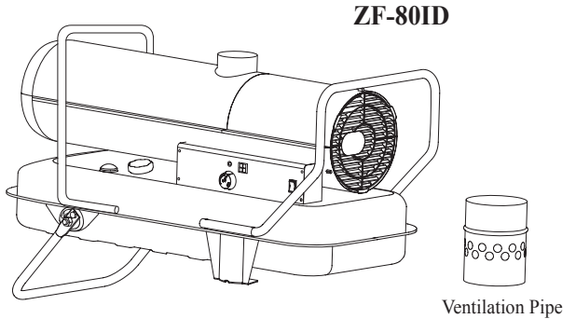
User Manual

ZF-170ID
ZF-240ID



Ventilation Pipe

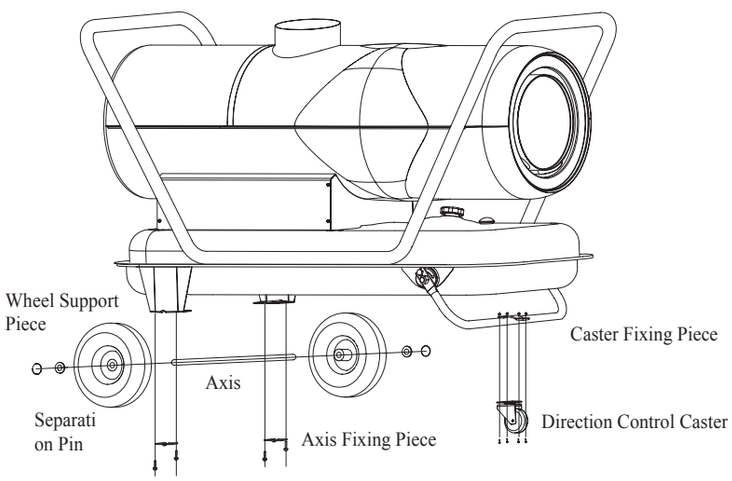
ZF-80ID

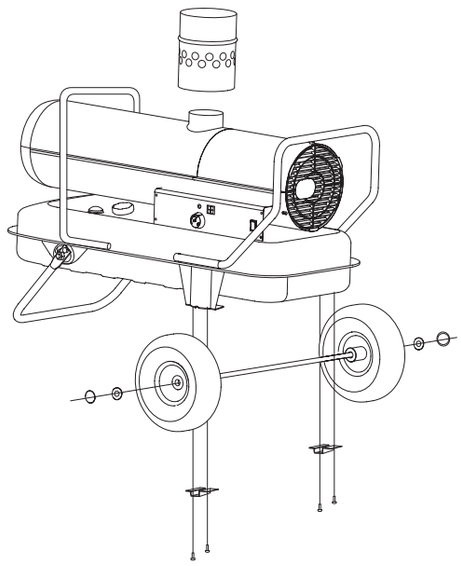


Ventilation Pipe

How to Assemble

ZF-80ID / TK-170ID / TK-240ID Wheel and Caster Assembly Drawing





FUEL

Kerosene oil is recommended as the fuel for this heater (Diesel may be used depending on the situation). Of course, kerosene is better than diesel for the operating condition.
Generally speaking, diesel is higher in the heat value than kerosene, but has low efficiency in the aspect of maintenance due to nozzle clogging or hardening at the extremely low temperature. So we recommend you to use kerosene.
Take care of followings in using fuel.
Never store the fuel in the residential area.
Store the fuel in the well-ventilated outdoor space.
Never store the fuel under the direct sunlight or in front of the heater in burning.
Never use the fuel stored over 1 year.
It may cause trouble in the heater to use the fuel stored for a long time in the tank.
The long-stored fuel does not burn normally.

⚠Warning! Never use highly volatile fuels such as gasoline, benzene, alcohol, paint and thinner. They may cause explosion or any unexpected results.

In filling up the fuel, do it in the outdoor place, not in indoor place. And fill up the fuel, taking care not to overflow, in the flat place. When you operate it first time after purchase, it is better to operate it for minimum 10 minutes because the remaining oil in the manufacturing process may be emitted for a while, being turned into the toxic gas.

⚠Warning! Never fill up the fuel when the heater is very hot or in the operation. It may explode.

How to operate

Starting

1. Fill up the fuel until the needle of the flow meter indicates “F”.
2. Be sure to close the fuel tank cap after refueling.
3. Plug it in to the outlet and turn the temperature control knob anticlockwise until the end.
4. Press the power switch on, and it is displayed on the temperature display window. After a while, the current temperature is indicated.
5. Turn the temperature control knob to the desired temperature and the heater is turned on and start operating.

The set-up temperature is displayed at first, and after 2 seconds, the current temperature is displayed on the temperature display window.
Caution: A fuse is installed on the electronic circuit board of the product to protect electronic equipment. Please check the fuse if the temperature display window or indicator lamp is not turned on even if there is no problem in the power supply.

Extinguishing the heater

1. Place the power switch on “OFF”, and the burning stops. Fan rotates for 3~4 minutes further after the heater stops operating to cool the heater.
2. When the fan stops rotating, take the plug out from the outlet.

⚠Warning! Do not take the plug out from the outlet when the cooling fan is in operation.
If the heater is not cooled after heating, it may cause troubles. The problems in the heater caused by this will not be repaired for free.

Ventilation

⚠Warning! For providing sufficient air to this product, minimum 2m2 of open space is needed per each product.

Maintenance and Repair

⚠Warning! Do not maintain or repair the product when the heater is hot or the power is connected.

If you use the parts not supplied by the manufacturer in replacing the parts, it may cause dangerous results. The problems in the heater caused by this will not be repaired for free.

Please abide by following maintenance and repair instructions.

Fuel Tank

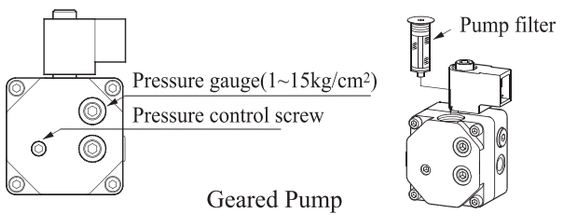
Clean the tank every 200 hours or at any time necessary. Do not use water in the cleaning, but use gasoline or kerosene. Use the heater after drying the tank completely after cleaning.

Filter

There are two filters. One is refueling filter at the fuel inlet, and the other is the pump filter (or oil filter) in the way of fuel to pump. Clean the filters more than twice per year by rinsing them with kerosene or gasoline.
If you used contaminated fuel, please clean the filters immediately.

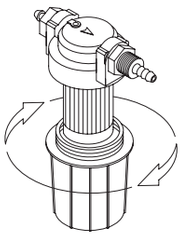
Geared Pump

Clean the filter in the pump every 200 hours or at any necessary time. You may adjust the pressure of the pump by a wrench. But the pressure is set at the factory and do not adjust it as you like. If you want to adjust the pressure, please install the oil pressure gauge and set to keep the pressure between 7~10/kg/cm.



Fuel Filter

Fuel filter can be disassembled by turning clockwise as shown in figure.
Fuel filter is installed outside of heater, the status of filter can be easily seen. When filter is contaminated, it needs to be cleaned by gasoline or kerosene.
After it is cleaned, reinstall filter in the heater. If there is leakage of air, fuel supply may be in trouble.



Nozzle

Nozzle should be cleaned or replaced at least once a year. If contaminated fuel is used, the nozzle should be replaced immediately. To clean the nozzle, take it out from the burner, disassemble it, put it in the thinner or gasoline for a while and carefully assemble it.

Ignition Plug

Ignition plug should be cleaned or the gap between the electrodes should be adjusted every 600 hours or at any necessary time. Take it out from the burner and clean it with steel brush. The gap between the electrodes should be kept 3.5mm~3.7mm.

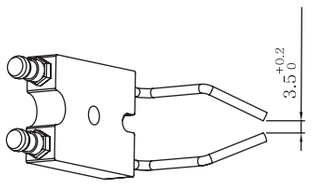
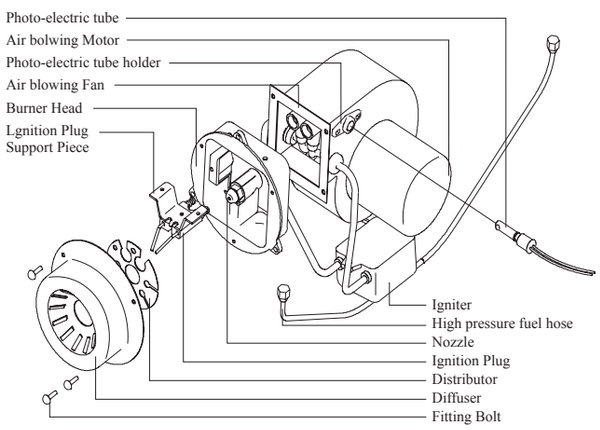
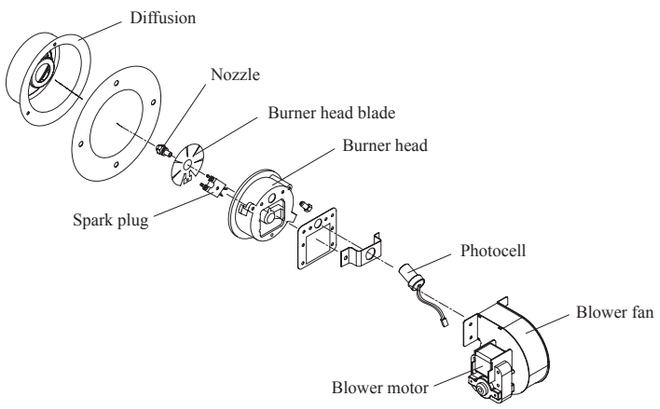


Photo-electric tube

Photo-electric tube should be cleaned once a year or at any necessary time. Clean the photo-electric surface with some cotton cloth dipped in the water or alcohol.



ZF-170ID
ZF-240ID



ZF-80ID

Long-Time Storage

1. Open the fuel tank cap.
2. Remove the fuel with a bellow.
3. Clean the inside of the tank with some kerosene, gasoline or thinner. Never use water at this time because rust may be fatal.
4. Dry the tank completely.

Never pass the season with the fuel in the tank. Old fuel may give damage to the product.

Store the product at the dry and well-ventilated area.
Store the product at the place of no dust and moisture in the original packing box.
Keep the user manual at the place close at hand.

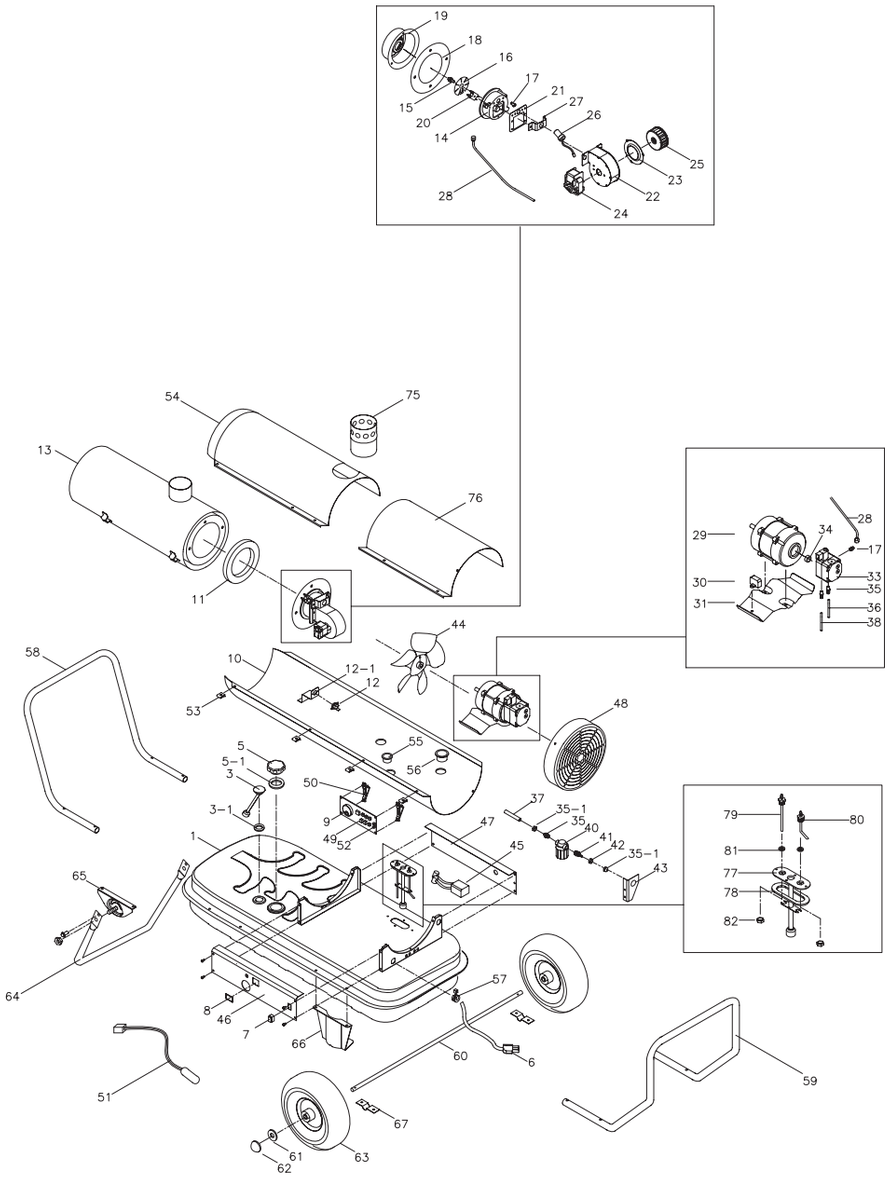
First-Aid Measure

(Measure to the error codes displayed on the temperature display window)

Display Window	Cause	Measure
EO	Power switch handling error	
	Power is supplied when the switch is on.	After plugging it out and turning the switch off, plug it in and turn on the switch.
E1	Flame Detector (Photo-electric tube error)	
	1.Photo-electric tube defect	1.Replacement of Photo-electric tube
	3.Incomplete Combustion	2.Replacement to clean fuel
	3.Contamination of photo-electric tube	3.Cleaning of photo-electric tube
	4.Contamination of fuel filter	4.Cleaning of fuel filter
	-Ignition trouble	1.Checking the igniter wire
		2.Cleaning or replacement of ignition plug
E2	Temperature sensor error	
	1.Temperature sensor separation	1.Re-connection of the sensor
	2.Sensor Defect	Replacement of temperature sensor
E3	Anti-overheating Sensor Defect	
	Unusual internal overheating	-Re-operating after cooling
E6	Float Sensor	
	Shortage of Fuel	Fuel Supply
LO	In case of below 9 C	Normal
Hi	Incase of over 50 C	Normal
Blinking	Electronic Circuit Board Defect	1.Checking the circuit 2.Re-operating after reset

Parts Disassembly Drawing

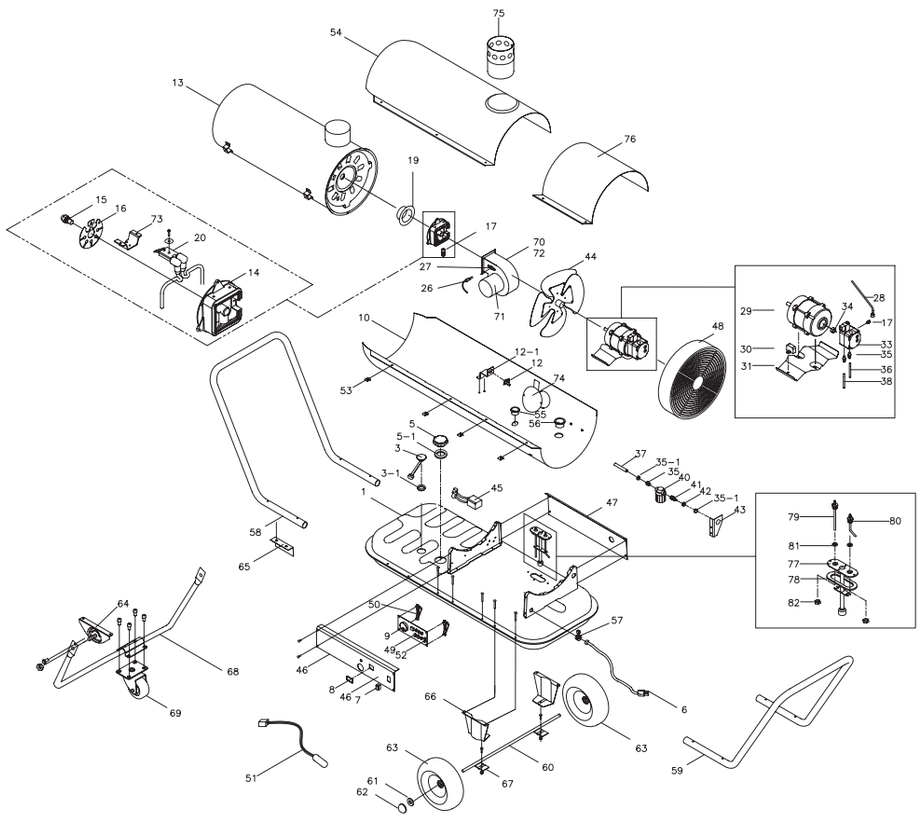
ZF-80ID



NO.	PART NAME	PART NO.
1	Fuel Tank	TK13-008-001
2		
3	Fuel Gauge	TK8-003-003
3-1	Fuel Gauge Packing	TK8-003-003-1
4	Pumping Pipe	
4-1	Pumping Pipe Packing	
5	Fuel Cap	TK13-000-005
5-1	Fuel Cap Packing	TK8-000-005-1
6	Power Cord	TK8-002-006
7	Power Switch	TK8-000-007
8	Window Display	TK8-000-008
9	Thermostat Control Knob	TK8-000-009
10	Lower shell	TK13-008-010
11	Gasket	TK12-008-011
12	Thermostat Lilmit Control	TK8-010-012
12-1	Thermostat Bracket	TK8-002-012-1
13	Combustion Chabmer	TK12-008-013
14	Burner Head	R20-15046
15	Nozzle	0460S
16	Burner Head Blade	R20-15039
17	Nipple	R20-15084
18	Insulator Plate	TK12-008-018
19	Diffusion	TK12-008-019
20	Spark Plug	R20-15026
21	Blower Casing Fix Plate	TK12-008-021
22	Blower Casing	R20-15043
23	Inlet	R20-15042
24	Blower Motor	TK12-008-024
25	Blower Fan	R20-15030
26	Photocell	TK12-008-026
27	Photocell B/K	R20-15047
28	Geard Pump Pipe	TK12-008-028
29	Motor	TK13-008-029
30	Capacitor	TK13-008-030
31	Motor B/K	TK8-003-025-1
32	Motor Fix Band	
33	Geard Pump	TK12-008-033
34	Couple Ring	TK12-008-034
35	Nipple	TK13-008-035
35-1	Hex nut	TK13-008-035-1
36	Fuel Hose-A	TK13-008-036
37	Fuel Hose-B	TK13-008-037
38	Return Hose	TK13-008-038
39	Return Pipe	
40	Fuel Filter	TK12-008-040
41	Nipple	TK13-008-041
42	Nut	M12
43	Fuel Filter Bracket	TK12-008-043
44	Fan Ass'y	TK8-007-040
45	Ignitor	TK8-010-041
46	Right Side Cover	TK12-008-046
47	Left Side Cover	TK12-008-043
48	Fan Guard(Steel)	TK12-008-048
49	P.C.B	TK13-008-049
50	P.C.B Bracket	TK8-002-045-1
51	Thermistor	TK8-002-045-2
52	Fuse	TK8-000-046
53	Clip Nut	TK8-000-047
54	Upper shell	TK13-008-054
55	Bushing Grommet(S)	TK8-000-050
56	Bushing Grommet(L)	TK8-000-050-1
57	Cord Bushing	TK8-002-053
58	Front Handle	TK13-005-056-2
59	Rear Handle	TK8-005-057-1
60	Wheel Axle	TK8-005-059
61	Washer	TK8-003-059-1
62	Wheel Cap	TK13-003-059-2
63	Wheel	TK13-000-060
64	Adjustable Pipe Support	TK8-005-063
65	Pipe Support Bracket	TK8-000-064
66	Wheel Support Bracket	TK8-000-065
67	Shaft Fix Bracket	TK8-000-066
68		
69		
70		
71		
72		
73		
74		
75	Smoke Pipe	TK12-008-079
76	Upper Cover	TK13-008-077
77	Float Sensor	TK13-008-078
78	Float Sensor Packing	TK13-008-079
79	Fuel Pipe	TK13-008-080
80	Return Pipe	TK13-008-081
81	Pipe Packing	TK13-008-082
82	Nut	TK13-008-083

Parts Disassembly Drawing

ZF-170ID



NO.	PART NAME	PART NO.
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2		
3	Fuel Gauge	TK8-003-003
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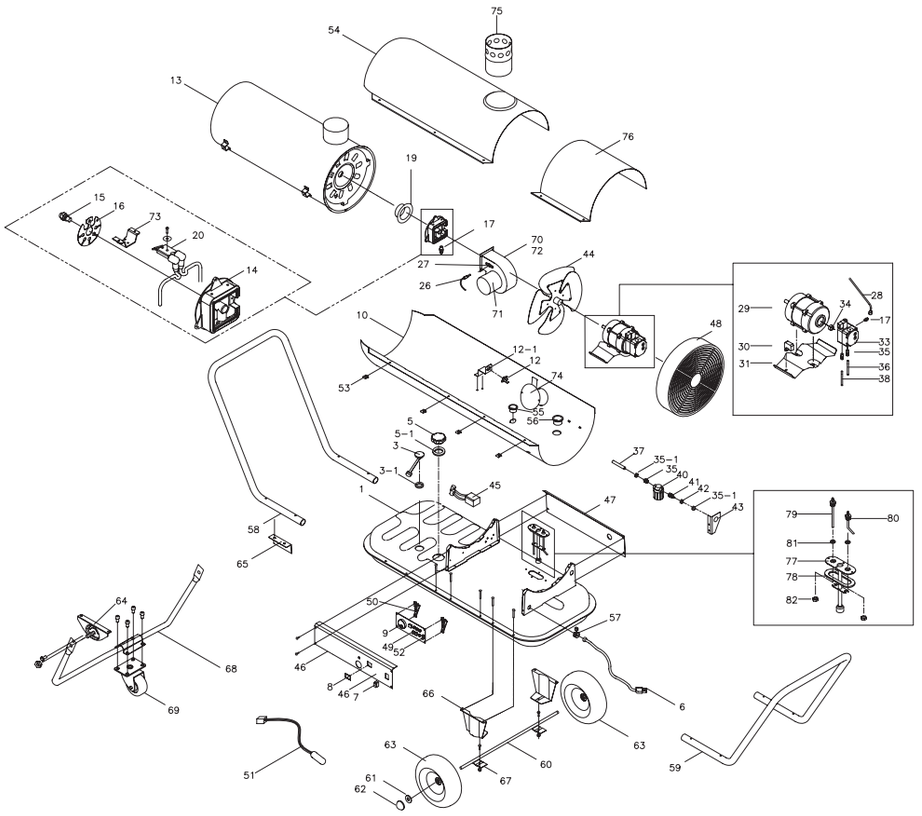
4	Pumping Pipe	
4-1	Pumping Pipe Packing	
5	Fuel Cap	TK13-000-005
5-1	Fuel Cap Packing	TK8-000-005-1
6	Power Cord	TK8-010-006
7	Power Switch	TK8-000-007
8	Window Display	TK8-000-008
9	Thermostat Control Knob	TK8-000-009
10	Lower shell	TK13-017-010
11	Gasket	
12	Thermostat Lilmit Control	TK8-010-012
12-1	Thermostat Bracket	TK8-002-012-1
13	Combustion Chabmer	TK12-017-013
14	Burner Head	TK8-010-022
15	Nozzle	1060S
16	Burner Head Blade	TK12-024-016
17	Nipple	R20-15084
18	Insulator Plate	
19	Diffusion	TK8-010-075
20	Spark Plug	TK8-000-023
21	Blower Casing Fix Plate	
22	Blower Casing	
23	Inlet	
24	Blower Motor	
25	Blower Fan	
26	Photocell	TK8-010-015
27	Photocell B/K	TK8-010-016
28	Geard Pump Pipe	TK12-017-028
29	Motor	TK13-024-029
30	Capacitor	TK13-024-030
31	Motor B/K	TK13-024-031
32	Motor Fix Band	
33	Geard Pump	TK12-008-033
34	Couple Ring	TK12-008-034
35	Nipple	TK13-008-035
35-1	Hex nut	TK13-008-035-1
36	Fuel Hose-A	TK13-017-036
37	Fuel Hose-B	TK13-017-037
38	Return Hose	TK13-017-038
39	Return Pipe	
40	Fuel Filter	TK12-008-040
41	Nipple	TK13-008-041
42	Nut	M12
43	Fuel Filter Bracket	TK12-008-043
44	Fan Ass'y	TK12-024-040
45	Ignitor	TK8-010-041
46	Right Side Cover	TK12-010-042
47	Left Side Cover	TK12-024-043
48	Fan Guard(Steel)	TK8-010-044
49	P.C.B	TK13-008-049
50	P.C.B Bracket	TK8-002-045-1
51	Thermistor	TK8-002-045-2
52	Fuse	TK8-000-046
53	Clip Nut	TK8-000-047
54	Upper shell	TK13-017-054
55	Bushing Grommet(S)	TK8-000-050
56	Bushing Grommet(L)	TK8-000-050-1
57	Cord Bushing	TK8-002-053
58	Front Handle	TK8-005-056
59	Rear Handle	TK8-005-057
60	Wheel Axle	TK8-005-059
61	Washer	TK8-003-059-1
62	Wheel Cap	TK13-003-059-2
63	Wheel	TK13-000-060
64	Adjustable Pipe Support	TK8-010-063
65	Pipe Support Bracket	TK8-000-064
66	Wheel Support Bracket	TK8-000-065
67	Shaft Fix Bracket	TK8-000-066
68	Caster Support Pipe	TK8-010-067
69	Swivel Caster	TK8-010-068
70	Siloco Fan Ass'y	TK8-017-071
71	Siloco Motor Ass'y	TK8-010-071-1
72	Siloco Fan	TK8-010-071-2
73	Spark Plug Bracket	TK12-010-073
74	Wind plate	TK12-010-074
75	Smoke Pipe	TK12-024-079
76	Upper Cover	TK13-024-076
77	Float Sensor	TK13-008-077
78	Float Sensor Packing	TK13-008-078
79	Fuel Pipe	TK13-008-079
80	Return Pipe	TK13-008-080
81	Pipe Packing	TK13-008-081
82	Nut	TK13-008-082

Parts Disassembly Drawing

ZF-240ID



NO.	PART NAME	PART NO.
1	Fuel Tank	TK13-010-001
2		
3	Fuel Gauge	TK8-003-003
3-1	Fuel Gauge Packing	TK8-003-003-1
4	Pumping Pipe	
4-1	Pumping Pipe Packing	
5	Fuel Cap	TK13-000-005
5-1	Fuel Cap Packing	TK8-000-005-1
6	Power Cord	TK8-010-006
7	Power Switch	TK8-000-007
8	Window Display	TK8-000-008
9	Thermostat Control Knob	TK8-000-009
10	Lower shell	TK13-024-010
11	Gasket	
12	Thermostat Lilmit Control	TK8-010-012
12-1	Thermostat Bracket	TK8-002-012-1
13	Combustion Chabmer	TK12-024-013
14	Burner Head	TK8-010-022
15	Nozzle	1256S
16	Burner Head Blade	TK12-024-016
17	Nipple	R20-15084
18	Insulator Plate	
19	Diffusion	TK8-010-075
20	Spark Plug	TK8-000-023
21	Blower Casing Fix Plate	
22	Blower Casing	
23	Inlet	
24	Blower Motor	
25	Blower Fan	
26	Photocell	TK8-010-015
27	Photocell B/K	TK8-010-016
28	Geard Pump Pipe	TK12-024-028
29	Motor	TK13-024-029
30	Capacitor	TK13-024-030
31	Motor B/K	TK13-024-031
32	Motor Fix Band	
33	Geard Pump	TK12-008-033
34	Couple Ring	TK12-008-034
35	Nipple	TK13-008-035
35-1	Hex nut	TK13-008-035-1
36	Fuel Hose-A	TK13-017-036
37	Fuel Hose-B	TK13-017-037
38	Return Hose	TK13-017-038
39	Return Pipe	
40	Fuel Filter	TK12-008-040
41	Nipple	TK13-008-041
42	Nut	M12
43	Fuel Filter Bracket	TK12-008-043
44	Fan Ass'y	TK12-024-040
45	Ignitor	TK8-010-041
46	Right Side Cover	TK12-010-042
47	Left Side Cover	TK12-024-043
48	Fan Guard(Steel)	TK12-024-048
49	P.C.B	TK13-008-049
50	P.C.B Bracket	TK8-002-045-1
51	Thermistor	TK8-002-045-2
52	Fuse	TK8-000-046
53	Clip Nut	TK8-000-047
54	Upper shell	TK13-017-054
55	Bushing Grommet(S)	TK8-000-050
56	Bushing Grommet(L)	TK8-000-050-1
57	Cord Bushing	TK8-010-053
58	Front Handle	TK8-010-056
59	Rear Handle	TK8-010-057
60	Wheel Axle	TK8-010-059
61	Washer	TK8-003-059-1
62	Wheel Cap	TK13-003-059-2
63	Wheel	TK13-000-060
64	Adjustable Pipe Support	TK8-010-063
65	Pipe Support Bracket	TK8-000-064
66	Wheel Support Bracket	TK8-000-065
67	Shaft Fix Bracket	TK8-000-066
68	Caster Support Pipe	TK8-010-067
69	Swivel Caster	TK8-010-068
70	Siloco Fan Ass'y	TK8-017-071
71	Siloco Motor Ass'y	TK8-010-071-1
72	Siloco Fan	TK8-010-071-2
73	Spark Plug Bracket	TK12-010-073
74	Wind plate	TK12-010-074
75	Smoke Pipe	TK12-024-079
76	Upper Cover	TK13-024-076
77	Float Sensor	TK13-008-077
78	Float Sensor Packing	TK13-008-078
79	Fuel Pipe	TK13-008-079
80	Return Pipe	TK13-008-080
81	Pipe Packing	TK13-008-081
82	Nut	TK13-008-082