

Diagnostic of high pressure heaters – BV and B

Working

Switch on – electric motor start.

Pressure is built on fuel pump – suck fuel from fuel tank. Pressure sensor (inside pump) put the fuel to pipe pump-nozzle when it reaches the setting value.

After define time (set on PC board) electro valve opens and put the fuel to nozzle – ignition starts.

Electrodes are working all time.

Diagnostic:

1. **Fuel work system (circulation):** turn special attention on patency, cleanness and hermetic

- fuel: check quality and type,
- fuel tank: check cleanness and quality of metal plate and copper fuel pipe,
- fuel filter: check cleanness and hermetic on connections and filter housing,
- pipes: check patency and hermetic on all fuel connections,
- fuel pump: check connections with fuel pipes, filter cleanness, „mechanical“ connection with electric motor, measure outside pressure,
- nozzle: check patency and quality of fuel splash.

2. **Ignition work system:**

- transformer: check transformer power supply, measure resistance of primary and secondary coil winding,
- high voltage wires : check conduction, quality control of isolation ,
- electrodes / spark: measure resistance, clean component, check existence of mechanical damages, set distance between electrodes in accordance with instruction manual.

After diagnostic connect electrodes/spark use high voltage wires with transformer, put power supply to transformer – check intensity of lightning between electrodes/spark poles. In case of lightning missing check existence of voltage breakdown on heater metal components.

3. **Protection system:**

- photocell: clean glass surface, connect ohmmeter and check reaction on light,
- cool-off thermostat: in the off mode (normal working) it shouldn't conduct, in the on mode (cooling mode) it should conduct– this component is responsible for cooling combustion chamber
- over-heat thermostat (with blue dot): during work of heater it should conduct, it will disconnect electric circuit when temperature increase above 90 degrees,
- controller (main pc board with reset): we never repair it because this element is responsible for heater and user safety – the best solution is to have this element on stock and put to heater during control time,

- PC board (models BV 70 E and RV 50) – procedure like in controller,
- electro valve: this element is supplied by 230V so we can connect it directly to electrical system than we can check its working; after this procedure when we connect electro valve to electrical heater circuit we should assure that electrical energy is supplying valve (check electrical connections) and next we should check case when safeties (photocell, thermostat) are working – taking off electric power from valve.

4. **Air work system:**

- combustion chamber: always check cleanness level, when element is dirty we can clean it by high pressure hot water (KARCHER), always check presence of mechanical damages (cracks, strains etc.),
- fan: check blade cleanness,

5. **Other electrical components:**

- electric motor: check bearing quality, measure coil winding resistance, measure current during working and check capacitor,
- relay: check presence of mechanical and electrical (by electric arc) damages, put electric power to coil contacts and check working, check conduction on main contacts,
- fuse: check conduction
- power control lamp: put directly to power source
- electrical wires: check electrical connections with electrical schema in instruction manual, check quality of wires,
- power cord: check presence of mechanical damages and wires conduction
- plate and thermostat plug: check presence of electric bridge in thermostat plug - must be on the same contacts like in plate
- switch: check switching possibilities and conduction between main contacts.

Table from instruction manual

TROUBLESHOOTING

Observed fault	Possible cause	Solution
The fan does not come on and the flame does not light	1. No electric current 2. Incorrect setting on the control mechanism (if fitted) 3. Faulty control mechanism 4. Motor winding burnt out or broken	1a Check the characteristics of the electrical system (230V - 1~ - 50 Hz) 1b Check that the switch works and is in the correct position 1c Check that the fuse has not blown 2 Check that the control mechanism setting is correct (e.g.the temperature setting on the thermostat must be higher than the ambient temperature) 3 Replace the control mechanism 4 Replace the motor
The fan comes on but the flame does not light or does not remain lit	1. Ignitor is not functioning 2. Faulty flame cut out mechanism 3. Non-functioning photoelectric cell 4. Fuel is not reaching the burner or a sufficient amount is not arriving 5. Electric valve is not functioning	1a Check the connections of the ignition cables to the electrodes and transformer 1b Check the position of the electrodes and the distance between them, in accordance with the diagram 1c Check that the electrodes are clean 1d Replace the ignition transformer 2 Replace the mechanism 3 Clean or replace the photoelectric cell 4a Check that the connection between the pump and the motor is intact 4b Check that air has not filtered into the fuel circuit, checking the tubes and the filter seal 4c Clean or, if necessary, replace the nozzle 5a Check the electrical connection 5b Check the LI thermostat 5c Clean or, if necessary, replace the electricvalve
The fan comes on and the flame lights, but produces smoke	1 Insufficient air for combustion 2 Too much air for combustion 3 Fuel is dirty or contains water 4 Air has filtered into the fuel circuit 5 Inadequate quantity of fuel in burner 6 Too much fuel in burner	1a Remove anything blocking or obstructing the aspiration and/or airflow ducts 1b Check the position of the air regulation ring 1c Clean the burner disc 2 Check the position of the air regulation ring 3a Replace the fuel with clean fuel 3b Clean the fuel filter 4 Check the condition of the tubes and the seal of the fuel filter 5a Check the pump pressure 5b Clean or replace the nozzle 6a Check the pump pressure 6b Replace the nozzle
The heater does not switch off	1. Defective electric valve seal	1. Replace the electric valve part
The fan does not switch off	1. Faulty fan thermostat	2. Replace the FA thermostat

Stationery heaters

Working

Switch on – burner is starting

Oil burner – operation like in BV and B heaters with one difference before normal working the burner ventilates combustion chamber.

Gas burner – gas path put gas to burner (checking gas pressure) – ventilation combustion chamber – ignition.

Combustion chamber temperature increase to set value on fan thermostat – main fan start – normal working.

Diagnostic:

1. Check thermostats and electric motor.
2. Check fan safeties.
3. Check heater electrical connections.

Diagnostic of gas and oil burner realize directly with burners technical documentation.

Diagnostic of low pressure heaters – CED and CEL

CEL

Switch on – position “1”

Main PC board supplies igniter, when temperature on this element is correct electric motor is starts. Air pump built pressure and put it to nozzle, fuel is sucked from fuel tank. Air-fuel mixture is injected to combustion chamber – ignition – working.

CED

Switch on – position “1”

Electric motor and spark working immediately => air pump.....(rest like in CEL)

Spark is working all time.

Diagnostic:

1. Fuel work system (circulation): turn special attention on patency, cleanness

- fuel: check quality and type,
- fuel tank: check cleanness and quality of metal plate and fuel line,
- fuel filter: check cleanness; don't clean fuel filter in B100/150, possible to clean fuel filter in B35/70.
- nozzle: check patency and quality of fuel splash.

2. Ignition work system:

a) CED

- transformer: check transformer power supply, measure resistance of primary and secondary coil winding,
- high voltage wires : check conduction, quality control of isolation ,
- spark: measure resistance, clean component, check existence of mechanical damages, set distance between electrodes in accordance with instruction manual.

After diagnostic connect electrodes/spark use high voltage wires with transformer, put power supply to transformer – check intensity of lightning between spark poles. In case of lightning missing check existence of voltage breakdown on heater metal components.

Spark position – straight electrode should be near nozzle.

b) CEL

- igniter – check resistance, it should be higher than 850Ω ; check existence of mechanical damages
- pc board - check existence of mechanical damages, check outside voltage on igniter connectors

3. Protection system:

- photocell: clean glass surface, connect ohmmeter and check reaction on light,
- controller (pc board): we never repair it because this element is responsible for heater and user safety – the best solution is to have this element on stock and put to heater during control time;

check outside voltage on electric motor connectors, check inside voltage on power supply connectors

In models B35/70 we can bore photocell hole drill number Ø13

4. **Air work system:**

- combustion chamber: always check cleanness level, when element is dirty we can clean it by high pressure hot water (KARCHER), always check presence of mechanical damages (cracks, strains etc.),
- fan: check blade cleanness and fan strains,
- air pump- check rotary air pump (air space between rotor and pump body – it should be about paper page thickness, check condition of blades and rotor);
- pressure measure (plug on end cover),
- check end cover (cracks, use up of screws, check spring etc..) – any pump damages can be reason of uncorrected heater working – unstable pressure,
- check patency air line,
- fan guard should not be damaged,
- don't clean output filter, possible to clean intake and lint filter.

5. **Other components:**

- electric motor: measure coil winding resistance, measure current during working and check capacitor,
- fuse: check conduction
- electrical wires: check electrical connections with electrical schema in instruction manual, check quality of wires,
- power cord: check presence of mechanical damages and wires conduction
- switch: check switching possibilities and conduction between main contacts.


Tables from instruction manual

CEL

TROUBLESHOOTING


Continued

FAULT CONDITION	POSSIBLE CAUSE	REMEDY
Motor starts and runs but heater does not ignite (ON/OFF switch light remains on)	<ol style="list-style-type: none"> 1. No fuel in tank 2. Pump pressure incorrect 3. Dirty fuel filter 4. Obstruction in nozzle assembly 5. Water in fuel tank 	<ol style="list-style-type: none"> 1. Fill tank with kerosene 2. See <i>Pump Pressure Adjustment</i>, page 10 3. See <i>Fuel Filter</i>, page 8 4. See <i>Nozzle Assembly</i>, page 11 5. Drain and flush fuel tank with clean kerosene. See <i>Storing, Transporting, or Shipping</i>, page 6

 **WARNING: High voltage!**

	<ol style="list-style-type: none"> 6. Bad electrical connection between ignitor and ignition control assembly 7. Defective ignitor 8. Defective ignition control assembly 	<ol style="list-style-type: none"> 6. Check electrical connections. See <i>Wiring Diagram</i>, page 23 7. Replace ignitor, see page 9 8. Replace ignition control assembly
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Heater ignites but ignition control assembly shuts heater off after a short period of time (ON/OFF switch light remains on)	<ol style="list-style-type: none"> 1. Pump pressure incorrect 2. Dirty air intake, air output, and/or lint filter 3. Dirty fuel filter 4. Obstruction in nozzle assembly 5. Photocell assembly not properly installed (not seeing the flame) 	<ol style="list-style-type: none"> 1. See <i>Pump Pressure Adjustment</i>, page 10 2. See <i>Air Output, Air Intake, and Lint Filters</i>, page 10 3. See <i>Fuel Filter</i>, page 8 4. See <i>Nozzle Assembly</i>, page 11 5. Make sure photocell boot is properly seated in bracket
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 **WARNING: High voltage!**


	<ol style="list-style-type: none"> 6. Dirty photocell lens 7. Bad electrical connection between photocell and ignition control assembly 8. Defective photocell 9. Defective ignition control assembly 	<ol style="list-style-type: none"> 6. Clean photocell lens 7. Check electrical connections. See <i>Wiring Diagram</i>, page 23 8. Replace photocell 9. Replace ignition control assembly
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HEATER WITH NON-FUSED IGNITION CONTROL ASSEMBLY ONLY

ATTENTION: The ignition control has built-in protection against current overloads.


Use the light in the ON/OFF switch to troubleshoot the fault condition.

FAULT CONDITION	POSSIBLE CAUSE	REMEDY
ON/OFF switch light does not come on when switch is turned to the ON (I) position and heater does not start	<ol style="list-style-type: none"> 1. No power to heater 	<ol style="list-style-type: none"> 1. Verify that power cord is plugged into an electrical outlet and that the circuit breaker in the electrical panel is reset

 **WARNING: High voltage!**

	<ol style="list-style-type: none"> 2. Bad electrical connections 3. Electrical short in ignitor 	<ol style="list-style-type: none"> 2. Check electrical wiring and connections. See <i>Wiring Diagram</i>, page 23 3. Check ignitor wiring. If no problems are found, replace ignitor (see page 9)
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ON/OFF switch light comes on when switch is turned to the ON (I) Position but turns off after five seconds	<ol style="list-style-type: none"> 1. Electrical short in motor 	<ol style="list-style-type: none"> 1. Check motor wiring. If no problems are found, replace motor
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 **WARNING: High voltage!**

TROUBLESHOOTING

⚠ WARNING: Never service heater while it is plugged in, operating, or hot. Severe burns and electrical shock can occur.

OBSERVED FAULT	POSSIBLE CAUSE	REMEDY
Heater ignites, but flame-out control shuts off heater after a short period of time	<ol style="list-style-type: none"> 1. Wrong pump pressure 2. Dirty air output, air intake, and lint filters 3. Dirty fuel filter 4. Dirt in nozzle 5. Dirty photocell lens 6. Bad flame-out control 	<ol style="list-style-type: none"> 1. See <i>Pump Pressure Adjustment</i>, page 10. 2. See <i>Air Output, Air Intake and Lint Filters</i>, page 10 3. See <i>Fuel Filter</i>, page 8 4. See <i>Nozzle</i>, page 11 5. Clean photocell lens 6. Replace flame-out control
Heater will not ignite, but motor runs for a short period of time	<ol style="list-style-type: none"> 1. Wrong pump pressure 2. Carbon deposits on spark plug and/or improper gap 3. Dirty fuel filter 4. Dirt in nozzle 5. Water in fuel tank 	<ol style="list-style-type: none"> 1. See <i>Pump Pressure Adjustment</i>, page 10 2. See <i>Spark Plug</i>, page 9 3. See <i>Fuel Filter</i>, page 8 4. See <i>Nozzle</i>, page 11 5. Drain and flush fuel tank with clean kerosene. See <i>Storing, Transporting, or Shipping</i>, page 5
	<ol style="list-style-type: none"> 6. Electronic ignitor not grounded (earthed) 7. Bad electronic ignitor 	<ol style="list-style-type: none"> 6. Make sure electronic ignitor mounting is tight 7. Replace electronic ignitor
Motor does not start when heater is plugged in, fan rotates slowly or does not turn	<ol style="list-style-type: none"> 1. Flame-out control not reset 2. Binding pump rotor 	<ol style="list-style-type: none"> 1. Reset flame-out control button, see Figures 5 and 6, page 5 2. If fan is hard to turn, see <i>Pump Rotor</i>, page 12

⚠ WARNING: High voltage!

Always change complete air pump (rotor+blades+insert)

Gas heaters

Manual

Starting procedure in accordance with instruction manual (handwheel on gas bottle => cock on reducer => main switch => safety gas valve => piezo igniter => keep about 15s => working)

Diagnostic

Don't support flame

1. Broken interrupted thermocouple (measure voltage about....., visual inspection)
2. Broken safety gas valve – check conduction of coil winding
3. Check overheat thermostat - during work of heater it should be compact (conduction)
4. Check connections quality between overheat thermostat-interrupted thermocouple-gas safety valve.

Don't start:

1. Damaged safety gas valve or electro valve.
2. No ignition (none or weakly flash) – change position of ignition electrode, check piezo igniter (its connections with ground and piezo itself).
3. Check switch and other electric components.

Electronic

Starting procedure agreement with instruction manual (handwheel on gas bottle => cock on reducer => main switch => working)

Diagnostic

Don't support flame:

1. Change position of phase (L) and neutral (N) wire
2. Broken ionization electrode (flame control) – check wire conduction, direct electrode closer burner, check current value.

Don't start:

1. Check electro valve
2. Check overheat thermostat
3. Check ignition electrode (wire conduction, space between electrode and burner)

Work systems in gas heaters:

Gas system (reducer, gas hose, safety gas valve, electro valve, gas nozzle, burner)

Ignition system (piezo igniter, electrode)

Air system – fan with electric motor

TROUBLESHOOTING

PROBLEM	CAUSE	REMEDY
The motor does not turn on	1.Faulty mains cable 2.Faulty fan 3.Faulty switch	1.Replace or repair 2.Replace or repair 3.Replace or repair
The flame does not ignite	1.Excessive distance between electrode and burner 2.Lack of gas 3.Faulty gas valve 4.Excess gas flow	1.Adjust distance 2.Replace cylinder 3.Specialized work needed 4.Reset gas regulator, Fig. 11.
The flame goes out after a few seconds of ignition	1.Excessive distance between the temperature sensor and the burner 2.Gas button released after a too short time 3.Faulty safety chain 4.Appliance is overheated	1.Adjust distance 2.Keep the button pressed a little longer (max 20 seconds) 3.Specialized work needed 4.Safety thermostat must cool. Wait 5 minutes and re-start
The flame has a white luminous outline	1.Air fault in the burner 2.Excess of gas in the burner	1.Clean air inlet 2.Adjust pressure and/or replace nozzle

Gas infrared heaters

Starting procedure in accordance with instruction manual (handwheel on gas bottle => gas valve tap => piezo igniter => keep about 15s => working)

FAULT FINDING CHART

SYMPTOMS	FAULT	REMEDY
1. Pilot will not light automatically	No spark across electrode gap.	Ensure that piezo-electric switch is functioning correctly Check electrical lead connections Check that electrical lead is not damaged Check that the spark plug is satisfactory Check that spark is passing to the earth electrode or thermocouple but not to the grid
2. Pilot will not light automatically but points (a) to (e) are satisfactory and the pilot will light with a match	Incorrect position of spark in relation to pilot gas flow	Reposition spark plug so that spark jumps across gas flow.
3. Heater will not remain alight when pressure is released from ignition button	Electro-magnetic valve closes whilst heater is alight	Ensure that thermocouple probe is located in pilot flame Ensure good connection between thermocouple and valve Check thermocouple Check electromagnetic valve
4. After changing to maximum position with all three plaques alight, one or more plaques appear below normal intensively	Blocked jets Partially blocked supply tube	Remove and clean blocked jet Remove supply tube, remove jet and blow through the tube
5. Difficulty in crosslighting from position 1 to position 2 or 3.	Air draught directed away from 1 st plaque Position of the pilot flame	Change the location of the appliance so that it is not adversely affected by air draught. Position pilot so that flame impinges across bottom corner of 2 nd plaque as well as 1 st plaque

Electric heaters

Starting procedure – switch on chosen power

Thermo elements power:

-B 2 EPA – 2*1000W

-B 3 EPA – 2*1666W

-B 5 EPA – 3*1666W

-B 9 EPA – 3*3000W

-B 15 EPA – 6*2500W

-B 22 EPA – 6*3666W

Diagnose electric components like in other heaters (switch, thermostats, relays etc.)

10. TROUBLESHOOTING

PROBLEM	REASON	SOLUTION
The motor operates while the appliance does not heat.	Thermal circuit breaker is active. Thermostat has been damaged. Relay has been damaged. Heating element has been damaged.	Let the heater cool down and push the "RESET" button . Replace the thermostat. Replace the relay (400 V models). Replace the heating element.
The motor does not operate while the heating elements are hot.	Motor has been damaged. Fan has been stopped. Switch has been damaged.	Replace the motor. Unlock / clean the fan. Replace the switch.
The whole appliance does not operate.	Electric circuit open. Switch has been damaged.	Check power supply connection. Replace the switch.
Reduced air flow.	Foul air duct. Motor has been damaged.	Open the air duct. Replace the motor.