

**LOW PRESSURE OIL BURNERS
CBW 50 – CBW-150**

OIL BURNERS

LOW PRESSURE, DESIGNED FOR COMBUSTION OF LIGHT FUEL OIL,
MEDIUM FUEL OIL-1P, WASTE OILS.

CBW-50	40÷100 kW
CBW-150	80÷150 kW

THIS TECHNICAL DOCUMENTATION IS FOR INSTALLERS, SERVICE PERSONNEL AND USERS, AND CONTAINS ALL NECESSARY INSTRUCTIONS, DESCRIPTIONS, DIAGRAMS AND INDICATIONS FOR THE CORRECT AND SAFE INSTALLATION, START-UP AND OPERATION OF BURNERS

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TABLE OF CONTENTS

GENERAL INSTRUCTIONS.	2-3
GENERAL SPECIFICATIONS	4
INSTALLATION INSTRUCTIONS	4-8
INSTRUCTION MANUAL	9-11
BURNER INSPECTIONS	11-12
EMERGENCY CONDITIONS	14-17
BOILER INSTALLATION PLATE HOLES AND BURNER DIMENSIONS	18
ELECTRIC CONNECTIONS DIAGRAMS	19

GENERAL INSTRUCTIONS

CAUTION

THIS MANUAL IS SUPPLIED AS AN INTEGRAL PART OF THE PRODUCT AND MUST BE CONVEJED TO THE USER. USERS SHOULD KEEP THIS MANUAL FOR THE ENTIRE BURNER OPERATION PERIOD.

1. GENERAL INFORMATION:

This manual is supplied to the user as an integral part of the burner. A Careful reading of this manual facilitates proper installation, operation, safety and maintenance of the burner. The burner must be installed only by qualified personnel, used according to valid regulations and this manual.

Improper installation may cause injury and damage, for which the supplier takes no responsibility.

Before any maintenance or repairs, it is required to turn off the electrical supply by disconnecting the supply plug.

- Make sure that the burner inlet and outlet louvers are not clogged.
- In case of sale of the burner or the entire device, in which the burner is installed, include also this manual, so the next user or installer may become familiar with it.
- In case of any changes or supplements to the burner equipment, use only original spare parts, supplied by the producer.
- This burner must be used only for purposes, for which it is designed. Any other use will be considered improper, and therefore dangerous. The burner supplier will take no responsibility for damages caused by the improper installation and operation, as well as not following this manual.

2. IMPORTANT INFORMATION ABOUT BURNERS

- The burner should be installed in an appropriate location with ventilation holes, consistent with law requirements and assurance of sufficient air amount for combustion.
- Before connecting the burner, make sure that it is suitable for existing supply conditions (electric energy, fuel).
- Due to safety reasons, the burner must be efficiently grounded, and the electrical installation should be consistent with valid regulations.
- Replacement of the burner control cable is prohibited.
- Before burner start-up and at least once a year, the following activities should be carried out by qualified personnel:
 - a. determine amount of supplied fuel according to burner power

- b. fuel supply system should be inspected for air-tightness and be free of obstructions
- c. determine the amount of supplied combustion air in order to obtain the combustion efficiency for the level required by other regulations
- d. check the burner operation for the combustion quality in order to avoid exceeding the allowed harmful products emission levels to the atmosphere
- e. make sure that the control and protection system work properly
- f. make sure that the exhaust system works properly
- g. make sure that a copy of the burner operation manual is always available in the boiler room.

CAUTION: In case of repeating burner emergency switch-offs, do not continue manual start-up. Contact service personnel in order to remove the failure. Failure to follow this recommendation may cause serious failure of the entire heating device.

BASIC TECHNICAL DATA

Table no. 1

MODEL		CBW-50	CBW-150
POWER	Min kW	40	80
	Max kW	100	150
FUEL	FUEL OILS 1.5-50 mm ² /s		
	DELIVERY kg/h	3.43÷8.60	8.60÷17.19
POWER SUPPLY	V/Hz	240V/50Hz	
POWER CONSUMPTION	kW	0,9	1,1
FAN MOTOR	0.18kW/2800min ⁻¹ (240V/50Hz)		
PUMP MOTOR	0.18kW/1400 min ⁻¹ (240V/50Hz)		
FUEL HEATER	W	400	700
FUEL PUMP Oil pressure after reducer	DELTA V4LR13U	2÷10 PSI 0.1÷0.7 Bar (nozzle Delavan type SN 30609-5)	2÷5 PSI 0.1÷0.35 Bar (nozzle Delavan type SN 30609-11)

BURNER INSTALLATION

1. Package

The package contains the burner and the following accessories:

Flexible fuel hose 1/4"x3/8"

Burner supply and control socket (7-pin)

Burner fixing flange

Asbestos-free seal

Fixing screws and washers

Fuel pump kit (fuel pump with motor)

Oil filter with connection pipes

Filtering suction head with check valve and connection pipe.

2. Installation on the heating device

The burner should be installed on the boiler or heater front plate using the installation flange. Disconnect the burner pipe from the burner (it is fixed with an M6 screw). Slide the flange on the burner pipe and re-fix the pipe to the burner. The flange should be fixed with 4 screws having the seal positioned under it. Fix the burner pipe by screwing on the upper flange parts. The burner pipe end should be positioned inside the heating device. Connect the fuel hose (port 3/8") to the fuel-line connection (pumping part). Connect the flexible air hose (not supplied with burner) to the pneumatic solenoid valve (port with standard "male" quick-joint).

3. Electrical connections

The burner connections are prepared in the factory as single socket on the burner housing. The burner is supplied with a 7-pin "male" plug, suitable for the socket.

SOCKET – on the burner housing this is a black – brown control and supply socket (7-pin). The individual connections and symbols on the socket, which allows service personnel to connect the burner control cable, are presented in the diagram below: see Fig 1.

SOCKET

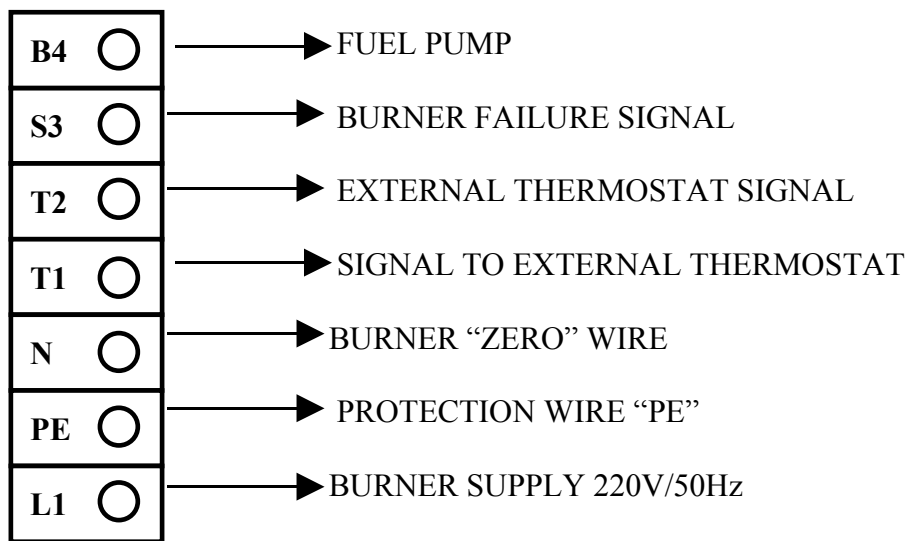


Fig. 1

The burner should be protected with a 10 Amp over-current safety switch.

4. Fuel line connections

The fuel line should be "soft" copper pipe, minimum 15 mm in diameter. Avoid creating "air-traps", where air may accumulate. The fuel line from the pump to the burner should be designed in a way to ensure constant ascent, which protects against air accumulation in the pipes.

Suggested fuel lines diameters on the pumping side:

- ø 15 mm for line length up to 15 m
- ø 18 mm for line length over 15 m

SUCTION LINE REQUIRED PARAMETERS

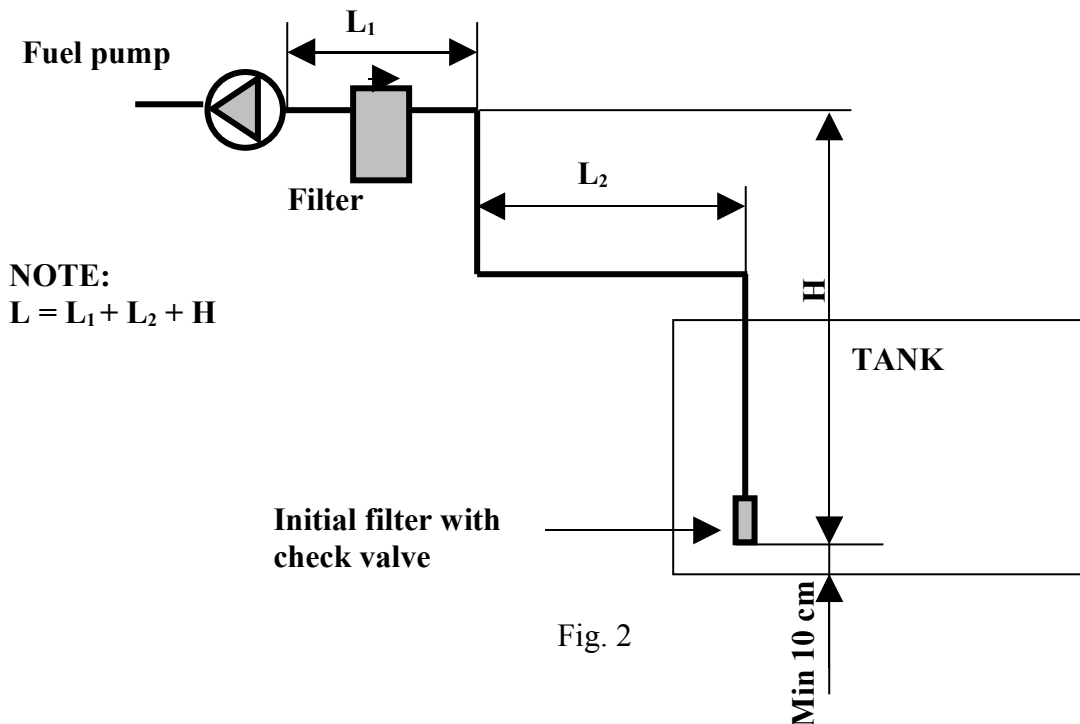
1. The system has very strict limitations of the suction-line length as well as the distance between suction level in the tank and the pump.
They are:

The height from the initial filter bottom (suction head) to the fuel pump should not exceed $H = 3$ m.

The total length of the suction line must not exceed $L = 5$ m.

The suction line should be made of $\varnothing 16$ mm pipe.

We suggest using oil-resistant hoses with an internal diameter of 16mm. The burner is supplied with appropriate connection pipes for that diameter.



NOTE:

$$L = L_1 + L_2 + H$$

5. Compressed air line connections

Compressed air is absolutely necessary for proper burner operation. In order to stop burner operation in case of compressed air failure, the burner on the compressed air line is equipped with a pressure switch which controls the fuel pump operation. Lack of pressure in the compressed air circuit switches off the fuel pump.

The compressed air line is connected to the burner by a flexible hose, ended by a “female” pneumatic quick-joint with a cut-off valve. Remember that the burner has its own compressed air reduction valve, and the maximum pressure on the valve input must not exceed 10 Bar.

Burner hydraulic diagram

Single-pipe system

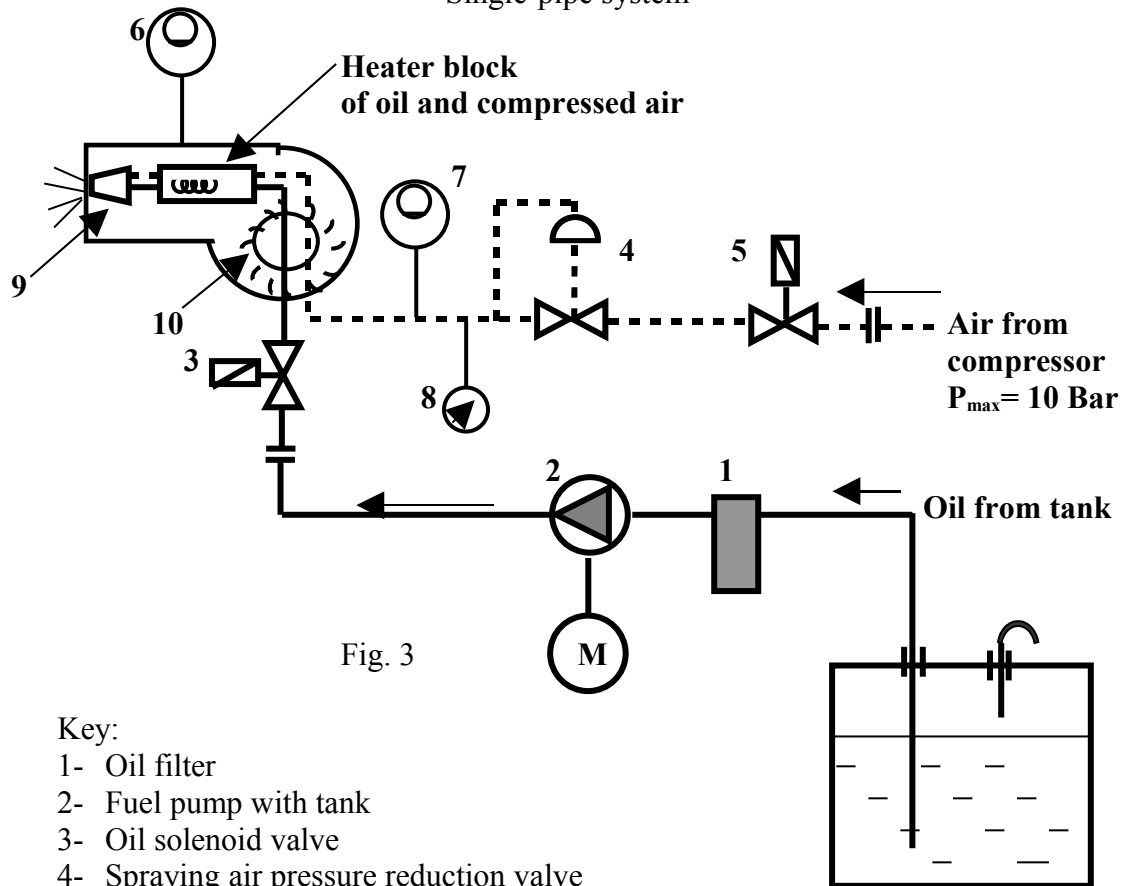


Fig. 3

Key:

- 1- Oil filter
- 2- Fuel pump with tank
- 3- Oil solenoid valve
- 4- Spraying air pressure reduction valve
- 5- Air solenoid valve
- 6- Air pressure switch (air turbine operation sensor)
- 7- Air pressure switch (spraying air minimum pressure sensor)
- 8- Manometer 0÷4 bar
- 9- Spraying nozzle
- 10- Burner fan, supplying combustion air

ADJUSTMENT OF NOZZLE AND IGNITION ELECTRODES IN RELATION TO BAFFLE PLATE

Correct ignition and combustion process of fuel and air mix is influenced by the mutual positioning of ignition electrodes, fuel nozzle and baffle plate. Such positioning should prevent covering the plate and electrodes with sprayed mix, and the electric arc column during the flame initiation should be located in the mix combustibility point.

The burner head position change influences the flame shape and size in the combustion chamber.

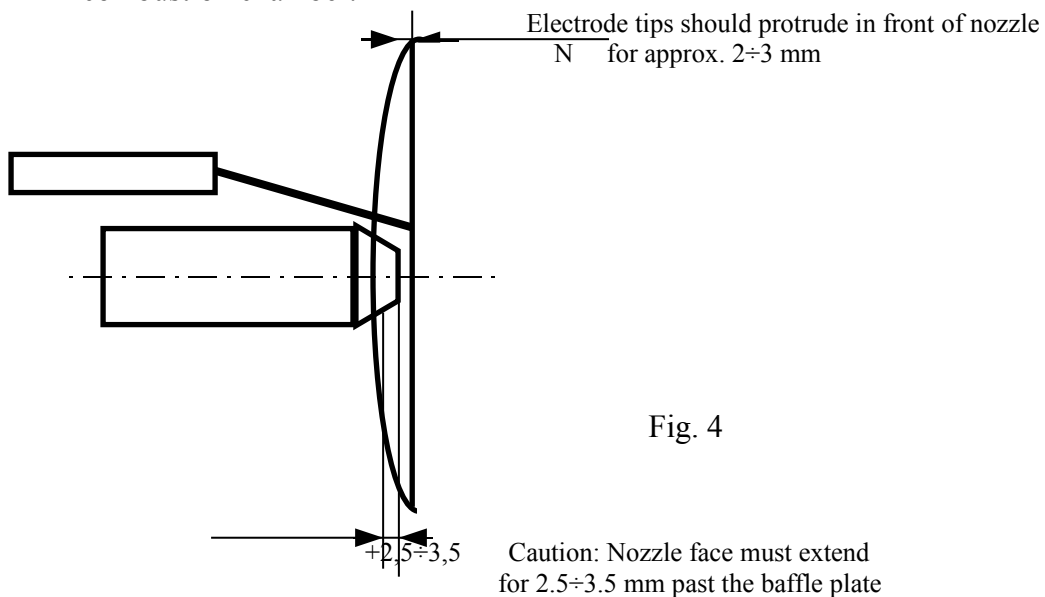


Fig. 4

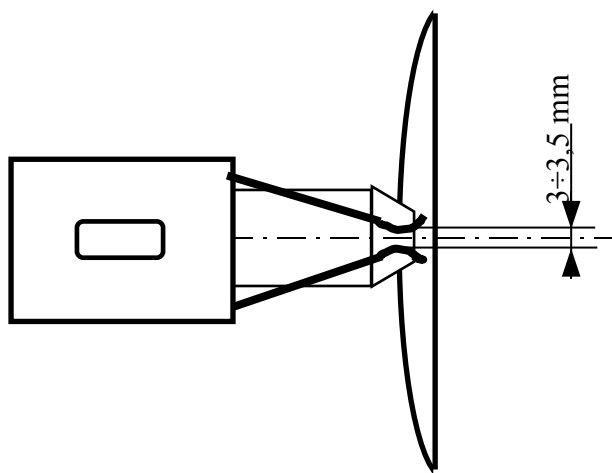


Fig. 5

BURNER OPERATION MANUAL

1. Initial adjustment before the burner start-up

Before burner start-up, initial adjustment must be performed. It includes:

- Fuel system venting and fuel pump speed adjustment
- Adjustment of air pressure, spraying fuel in nozzle
- Adjustment of air throttle opening in burner throat, which adjusts amount of combustion air
- **Burner must be connected to the electrical power supply a minimum of 5 minutes before start-up. The heater block must reach the proper temperature.**

a. Oil pressure adjustment

Once the fuel line is constructed according to recommendations in the previous section, it should be flushed-out. To do this, start the burner using the external thermostat in the room or on the boiler. The start-up phase begins. After the venting phase, the pneumatic solenoid valve opens and the oil pump starts. Then remove the photo resistor from its socket and subject it to the light, which simulates the presence of the flame and maintains the burner fuel pump operation. When the fuel pump starts, wait until the fuel appears at the end of fuel line (it should be disconnected from the flexible fuel hose). Air accumulated in the empty fuel system will escape with the flowing fuel. Continue venting for a few minutes until the “bubbling” stops. This allows for complete air removal and flushing the fuel line. After venting and flushing, turn the burner off with the thermostat, replace the photo resistor and connect the fuel hose to the fuel line, then start the burner. Pay special attention to the fuel pressure value on the oil pressure regulator gauge. The fuel pressure may be adjusted only during burner operation. It is initially set to 0.2 Bar (3.0 psi), which allows for burner operation. After the mix ignition, set the fuel pressure according to Table 2 below.

REDUCER PRESSURE VALUE FOR VARIOUS FUELS AND POWERS

**CBW50 nozzle Delavan type SN30609-5,
CBW150 nozzle Delavan type SN30609-9**

Table no. 2

POWER / FUEL TYPE	40 kW	80 kW	100 kW	150 kW
Light fuel oil	0.07 bar (1 psi)	0.2 bar (3 psi)	0.3 bar (4.5 psi)	0.14 bar (2 psi)
Medium fuel oil 1P	0.2 bar (3 psi)	0.3 bar (4.5 psi)	0.36 bar (5.5 psi)	0.2 bar (3 psi)
Vegetable oil	0.2 bar (3 psi)	0.3 bar (4.5 psi)	0.36 bar (5.5 psi)	0.2 bar (3 psi)
Used engine oil	0.3 bar (4.5 psi)	0.55 bar (8 psi)	0.7 bar (10 psi)	0.35 bar (5 psi)

Above data is for reference only.

b. Adjustment of air pressure in nozzle

Compressed air pressure is initially set at the regulator at 1.0 Bar.

This value allows for smooth ignition during the first burner start-up. Due to various pressure values in existing compressed air systems, having achieved the burner start-up, adjust pressure to the proper value, i.e. for burners power 40÷100 kW set at 1.0 Bar, and for power 110÷150 kW, set at 1.2 Bar.

c. Adjustment of combustion air-throttle setting

This adjustment is performed using the adjustment throttle, located in front of the burner under the burner tube. It is a dial with a scale.

In position “0”, the secondary air gap (for combustion) is closed. In position “13”, it is fully opened.

Table 3 below is a guide for initial throttle setting.

INITIAL AIR THROTTLE SETTING

Table no. 3

POWER / BURNER	CBW-50	CBW-150
45 kW	1	—————
80 kW	2	—————
100 kW	2.5	2.5
150 kW	—————	3-3.5

CAUTION: Given parameters of throttle setting are for reference only and are used for the first burner start-up. After burner start-up, stabilizing the flame and checking that combustion takes place only in the combustion chamber, it is absolutely necessary to perform the analysis of exhaust gases. Precise adjustment

of the burner is necessary in order to avoid exceeding of allowable emission levels to the atmosphere.

Composition of exhaust gases, emitted to the atmosphere should be checked two times during the heating season or every 1000 hours of burner operation.

d. Adjustment of thermostats in the heater block

Thermostats are set in the factory and generally should not be adjusted.

In the burner there are three thermostats, controlling the heaters block operation.

After removing the burner housing, three thermostat dials are visible on the left side of the burner.

Looking from the left:

- the first thermostat controls the operation of the heater, located in the nozzle block (set to 55°C by default)
- the second thermostat controls the operation of the heater, located in the oil and compressed air heating block (set to 60°C by default)
- the third thermostat inhibits the burner operation before the heater block reaches appropriate temperature (set to 55°C by default).

Adjustment of thermostats is performed using a flat screwdriver.

2. Burner inspections

CBW burners are devices designed for continuous work during the whole year, and do not require daily operation. However, like every mechanical device, they are subjected to wear, contamination, etc. Due to these common operational phenomena and in order to maintain failure-free operation for many years, they should be serviced at least once a year before the heating season. In case of burners operating for the whole year, without the seasonal break, it is required to perform the burner servicing after maximum 2500 hours of operation.

The fuel system requires servicing to clean filters, located in the fuel tank, to thoroughly clean filter, located just before the fuel pump, and the filter in the fuel pump head. Cleaning frequency depends on the fuel type used for combustion. In case of light fuel oils (no. 2 type) or medium oils (for this oil use of heater in the fuel filter is recommended), that time may be prolonged even up to a few heating seasons. However the producer recommends to clean filters before each heating season. In case of using used oils, either mineral or vegetable, it is recommended to clean filters every 700 hours of operation. Pay attention to the condition of used vegetable oils, especially the content of solid fractions, as their excessive amount may significantly reduce time between filters servicing. In such case it is recommended to install the vacuum meter on the fuel filter “clean” side, which allows for identification of filters contamination state and avoiding emergency burner stop due to lack of fuel. Such device may be purchased in the burners sale network or directly from the exclusive distributor.

Current operation activities include also inspection of combustion chamber condition in the heating device. Chamber condition allows to determine if the combustion process is correct. It is not possible to adjust the burner upon the basis of flame observation and chamber condition. As mentioned above, it is realized with use of exhaust gases analyser. Observation of combustion chamber allows only to determine, if after previous precise adjustment of combustion process parameters no sudden deterioration of

burner operation conditions took place. It may be indicated by wet combustion chamber, dark chamber with excessive amount of black soot, too small or too big flame, smokiness of combustion chamber or visible blue or black smoke from the chimney; these symptoms may indicate the improper operation of burner or any of its elements. In such case it is required to immediately contact the service company or seller in order to determine the failure reasons and undertake the necessary corrective actions.

DIAGNOSTIC TABLE

AUTOMATIC FAILURE DISPLAYING

Pressing the burner control system emergency button for over 5 seconds allows to enter the diagnostic function. Failure reason is displayed with use of flashes, repeated every 2 seconds.

FLASHES	SYMPTOMS	REASONS	REPAIR METHOD
2 flashes ••	Fire in combustion chamber during blow cycle	Ignited oil Defective photocell	Check Replace
3 flashes •••	No flame after 10 seconds of control system safety time	No fuel Clogged fuel line Clogged fuel filters Air pockets in fuel line Clogged nozzle Defective oil solenoid valve or oil pump Ignition electrodes in wrong position or damaged Defective ignition transformer Defective control system	Refill tank Check Clean Check Clean or replace Replace Adjust or replace Replace Replace
4 flashes ••••	No flame during burner operation	Dirty or defective photocell Burner flame is fading	Clean or replace Check oil and air pressure, verify settings, clean or replace nozzle

In order to exit the burner diagnostic function, press red button for over 5 seconds.

Caution! Burner may be reset only after exiting the diagnostic function.

Press the button (red lamp) on the control system to reset the burner.

EMERGENCY CONDITIONS cont.

SYMPTOMS	REASONS	REPAIR METHOD
Burner is not starting, no failure signal	Damaged burner automatics No supply on burner socket	Replace burner automatics Replace fuse or damaged pins
Fan is not rotating during start-up cycle	Damaged burner automatics Damaged motor capacitor or fan motor	Replace
Fan is rotating, burner blocks in venting phase	Damaged burner automatics or photo resistor Damaged photo resistor wires	Replace
No fuel ignition after start-up cycle, no electric arc	No ignition transformer supply Defective transformer Interruption or short circuit in ignition wires Damaged insulators or dirty electrodes Incorrect electrodes adjustment	Replace Adjust electrodes acc. to fig. 8 and 9
No fuel ignition after start-up cycle with electric arc (No fuel in nozzle, fuel pump is not rotating)	Too low pressure of spraying compressed air, below 0.7 Bar No compressed air pressure (compressor failure, closed cut-off valve) Pneumatic solenoid valve failure	Adjust air pressure after reduction valve acc. to page 12, section B Check compressed air line Replace

SYMPTOMS	REASONS	REPAIR METHOD
No fuel ignition after start-up cycle with electric arc (No fuel in nozzle, fuel pump is rotating)	No fuel in tank Clogged initial cleaning filter Clogged thorough cleaning filter Clogged mesh filter in pump head Air pockets in suction system Oil solenoid valve failure Clogged nozzle Clogged oil channel in heaters block Pump failure	Check fuel level Check and clean fuel filters Vent fuel pump. Locate and remove leak. Replace valve Remove and clean nozzle Burner service Replace
No fuel ignition after start-up cycle with electric arc (Fuel is sprayed into combustion chamber)	Non-flammable product in fuel (e.g. water or coolant) Incorrectly adjusted or dirty ignition electrodes Too low oil temperature on nozzle exit Incorrect composition of fuel – air mix	Check fuel Adjust Sprawdzić i wymienić termostat „TC” Regulacja palnika
Explosive mix ignition	Incorrect composition of fuel – air mix Incorrectly adjusted or dirty ignition electrodes	Adjust burner
Pulsatory burner operation (flame is fading and reigniting)	Clogged or blocked with air fuel system	Clean, vent, seal or replace fuel system elements

SYMPTOMS	REASONS	REPAIR METHOD
<p>After start-up and ignition burner switches off, successive start-up attempts</p>	<p>Too weak photo resistor signal</p> <p>Incorrect burner adjustment:</p> <ul style="list-style-type: none"> • Insufficient air amount (smoking flame) • Too much spraying flame (flame extinguished) • Too much combustion air (flame separation from plate) <p>Irregular flame shape</p>	<p>Clean or replace photo resistor</p> <p>Adjust burner, check CO and CO₂ levels</p> <p>Clean or replace nozzle, clean baffle plate</p>

CAUTION: Locating and removing burner failures is very important for users health and safety. Operation safety rules must be absolutely followed, and burner after repair must be completely operational, checked and safe.

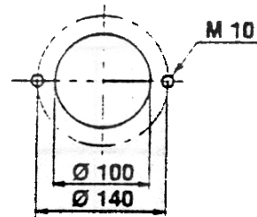
In case of any doubts send burner to the producer for inspection and repair.

BOILER INSTALLATION PLATE HOLES AND BURNER DIMENSIONS

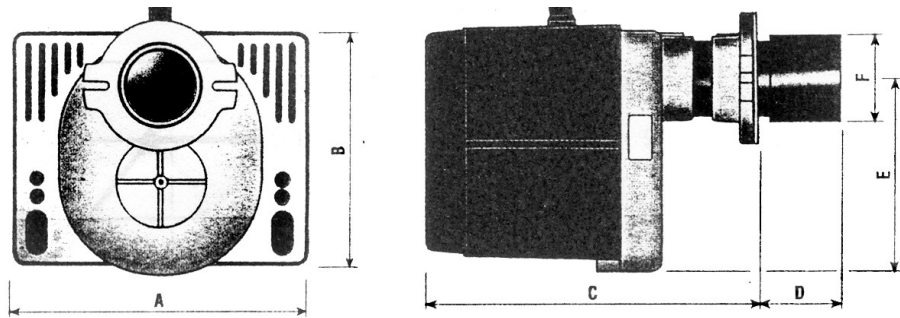
Burners:

CBW-50

CBW-150



CBW-150



DIMENSIONS

Type	A	B	C	D	E	F
CBW-50	346	285	min. 350 max. 360	min. 120 max. 130	220	98
CBW-150						

CBW BURNER ELECTRIC DIAGRAM

