

# MONOBLOCK NG SERIES DUAL FUEL (GAS- LIGHT OIL) BURNERS INSTALLATION, OPERATING AND MAINTENANCE MANUAL

## MODULATING OPERATION



ECO 50 NG  
ECO 55 NG  
ECO 60 NG  
ECO 65 NG  
ECO 70 NG  
ECO 75 NG



**DEAR USER,**

**ECOSTAR ECO 50 NG, ECO 55 NG, ECO 60 NG, ECO 65 NG, ECO 70 NG, ECO 75 NG Dual Fuel (Gas-Light Oil)** burners are prepared and manufactured according to the latest technical developments and safety rules. It is easy to use for our customers.

We recommend that you read this manual and safety warnings thoroughly before the use of the device in order to ensure safe, cost effective and environmental-friendly use.

If you encounter any issue that is not explained clearly in this manual or you could not understand, please contact with our service department.

We thank you for choosing ECOSTAR brand.











This Operating Manual is an integral part of the burner and must be maintained in a plastic dossier and hung at a clearly visible place in the burner room.

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## 1. WARNINGS

### 1.1. Warning Symbols and Descriptions

Symbols	Symbol Descriptions
	Important information and useful hints.
	Warning of danger to life or property.
	Warning of electrical voltage.
	Product handling information.
P <sub>F</sub>	Impulse connection detecting combustion chamber pressure
P <sub>L</sub>	Impulse connection detecting combustion air pressure
P <sub>BR</sub>	Impulse connection detecting burner gas head
 CLEAN THE GAS BURNER. CLEAN GAS LINE. ЧИСТАЯ ЛИНИЯ ГАЗ.	"Clean the gas line" warning on gas line.
	Electric motor direction of rotation
   	Carry in an upright position. Fragile Item. Protect against water.

## 1.2. General Safety Rules

- All personnel engaged in installation, disassembly, commissioning, operation, control, maintenance and repair should have received the necessary training, qualified and fully read and understood this manual.
- No changes that might damage the safety of the burner unit must be made by persons and/or organizations on the burner unit.
- All operation, commissioning and installation works (except for burning adjustment) should be carried out when the burner is not operating and after disconnecting the power supply. Noncompliance with these rules may lead to serious bodily injuries and even death by electrical shocks or uncontrolled flame formation.
- Repairs concerned with safety elements should be carried out only by the manufacturing company.
- The device should never be used by children, mentally handicapped and inexperienced persons.
- Children must not be allowed to play with the device.
- Keep the device away from explosive and flammable materials.
- Device must intake air, ventilation and air discharge holes must not be closed.



### **If you sense gas leakage;**

- Shut down valves of all gas devices.
- Open all doors and windows.
- Do not turn on electric devices or do not turn them off if they are working.
- Do not use burner derived tools such as match and lighter.
- Inform the gas company.



Do not store any inflammable materials in boiler room.



Wear hearing protectors if there is noise in boiler room.



### **In case of fire or other emergency;**

- Switch off the main switch
- Close the main fuel shut-off valve outside the plant.
- Take appropriate actions



The burner installation must be carried out in accordance with the instructions. Vibration can damage the burner and its components.



Keep boiler doors closed while starting burner and during burner operation.



Check combustion values to be correct by using flue gas analyzer at the whole adjustment range between minimum, full load, and ignition load.



Use lifting device or belt for lifting fan motor, if necessary



During the first commissioning of the burner or in case of any revision carried out in the electrical system or motor cables by any reason, direction of the fan rotation must certainly be checked by the authorized technical service.



For products that have not been commissioned or started more than 6 months, before activating the servomotor;

In gas, air dampers and oil regulators, servomotor and damper connections must be checked to ensure that they are free running in spite of immobility and oil freezing.



## **BURNER ROOM**

Install the burner in a suitable room/floor with minimum external air openings and sufficient to ensure perfect combustion, in compliance with current regulations.

Never obstruct air openings of the burner room, burner fan intake vents or air ducts in order to prevent:

- a. The build up of toxic / explosive gas mixtures in the burner room,
- b. Combustion with insufficient air, resulting in hazardous, anti-economical and polluting operation.

The burner must be always protected from rain, snow and frost to prevent corrosion and paint deformations.

Keep the burner room clean and free of solid volatile substances, which could be sucked into the fan and clog the internal burner or combustion head air ducts.

## 2. TERMS OF WARRANTY

Main and auxiliary equipment and all components used in Ecostar Dual Fuel (Gas-Light Oil) burners are guaranteed for 1 year by TERMO ISI SİST. A.Ş starting from the date of commissioning under the maintenance, adjustment, operating conditions and relevant mechanic, chemical and thermal effects explained herein.



Please note that this warranty is only valid if the device(s) is commissioned and maintained by our authorized services.



Our company reserves the right to make any modifications on the product and all instructions thereof for improvement purposes.

### 2.1. Out of Warranty Conditions

- Any damage arising out of or in relation to customers' non-compliance to their responsibilities with regards to installation, commissioning, operation and maintenance,
- Any damage arising out of or in relation to commissioning, repairs and maintenance carried out by unauthorized services,
- Any damage that may occur during transportation or storage of the product,
- Not preserving the product in its original packaging until the installation stage,
- Incorrect and poor electrical connections, Failures due to incorrect voltage applications, frequent repetition of voltage fluctuations,
- Any damage that may occur as a result of incorrect fuel usage or, foreign substances in the fuel used or using of the product without any fuel,
- Any damage that may occur due to foreign particles entered into the product during installation and operation,
- Failures due to incorrect device selection,
- Any damage to unit due to natural disasters,
- Devices without any warranty certificates,
- Warranty Certificates without the stamp and signature of the authorized dealer or service,
- Devices with any falsification on the warranty certificate or without an original serial number.
- The risks during transportation of device under the responsibility of customer belong to the customer.
- Presence of misuse faults are indicated in the reports issued by authorized service stations or our authorized agent, dealer, representative or our factory in case of unavailability of authorized service stations.
- Customers may apply consumer protection arbitrator committee with regards to this report and request for an expert report.

### 3. BURNER'S GENERAL FEATURES

ECOSTAR Dual Fuel (Gas-Light Oil) burners are designed and manufactured to work with liquid fuel with max. 2.5- 6 Cst (mm<sup>2</sup>/s) viscosity. and Natural Gas and Liquid Petroleum Gas at gas pressures of min.20 mbar, max.300 mbar and at -%15 to +%10 of nominal voltages, under environmental temperature of max.60°C with rated capacity and burner pressure ranges.

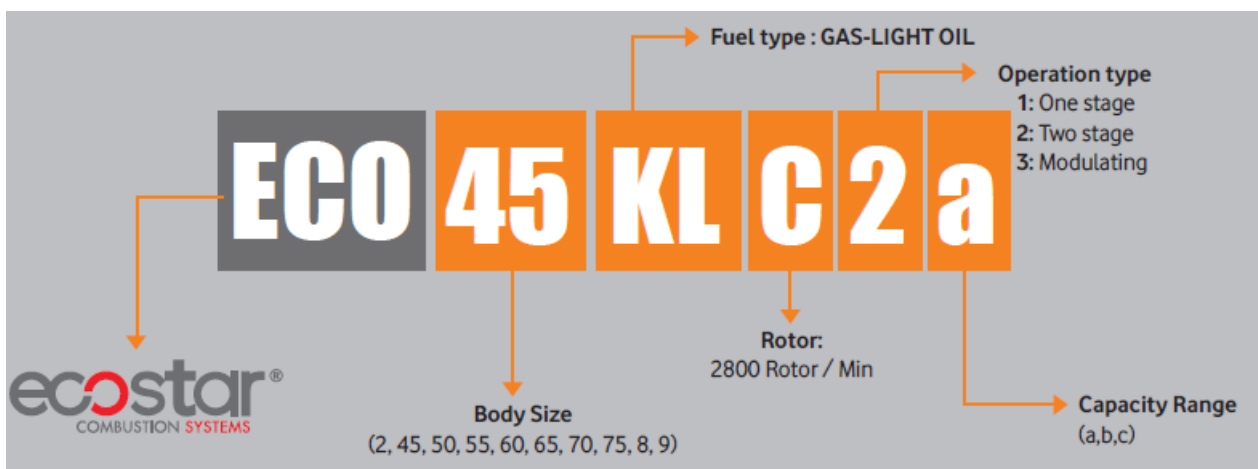
#### 3.1. Purpose of Use and Work Limits of Burners

- This product works at any load value equivalent to its max. capacity or covered by its capacity range;
  - In hot water and steam boilers,
  - In direct and indirect hot air generators,
  - Industrial appliances operating at temperature below 600 °C,
  - -15 °C...+60 °C ambient temperature range,
  - 1N 230 VAC/3N 380VAC /50 Hz feed voltage (-%15...+%10) values,
  - Max. 95% relative humidity,
  - In well-ventilated open and closed spaces compatible with protection class IP 40.

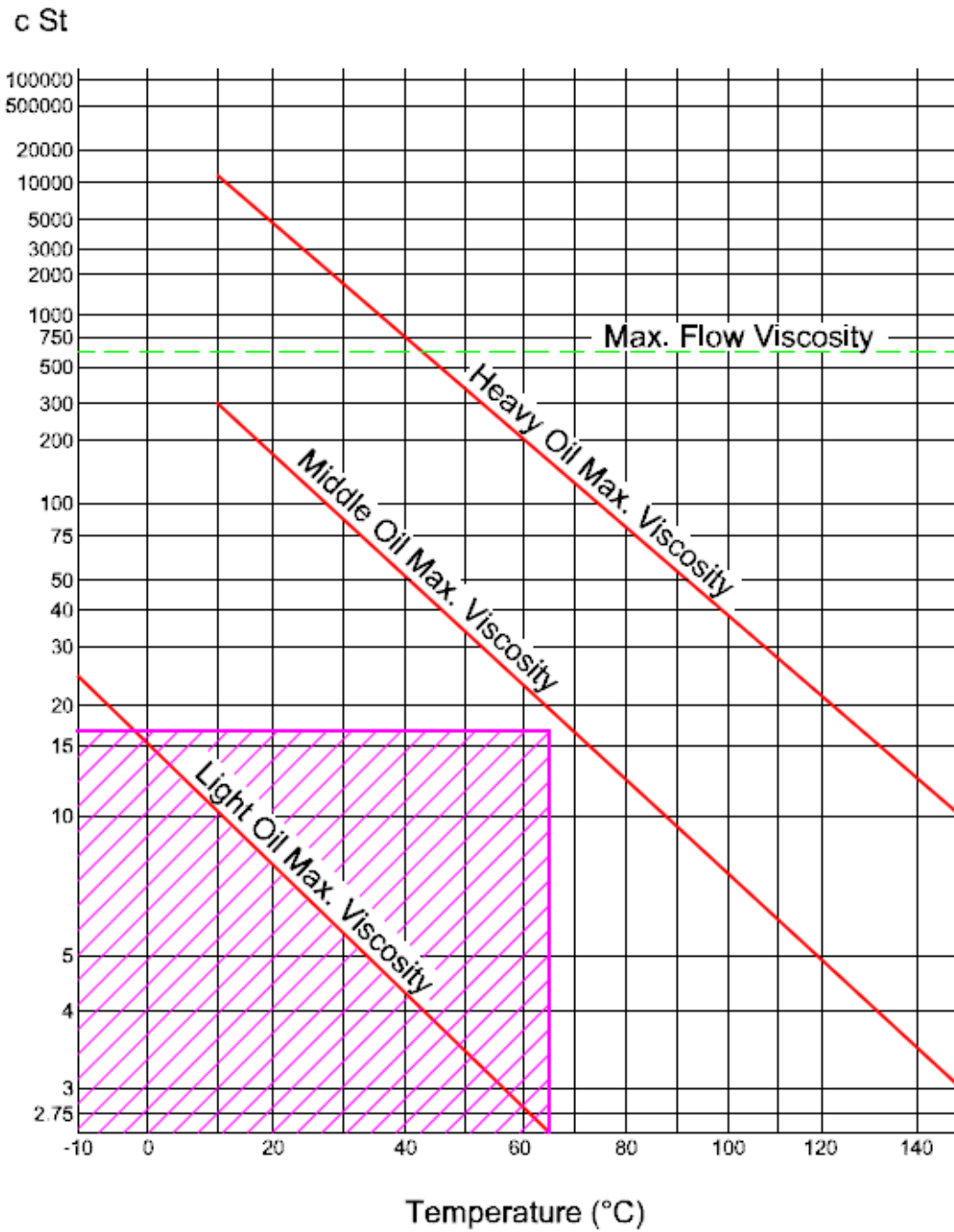


This device must never be operated with open flame!

#### 3.2. Code Key







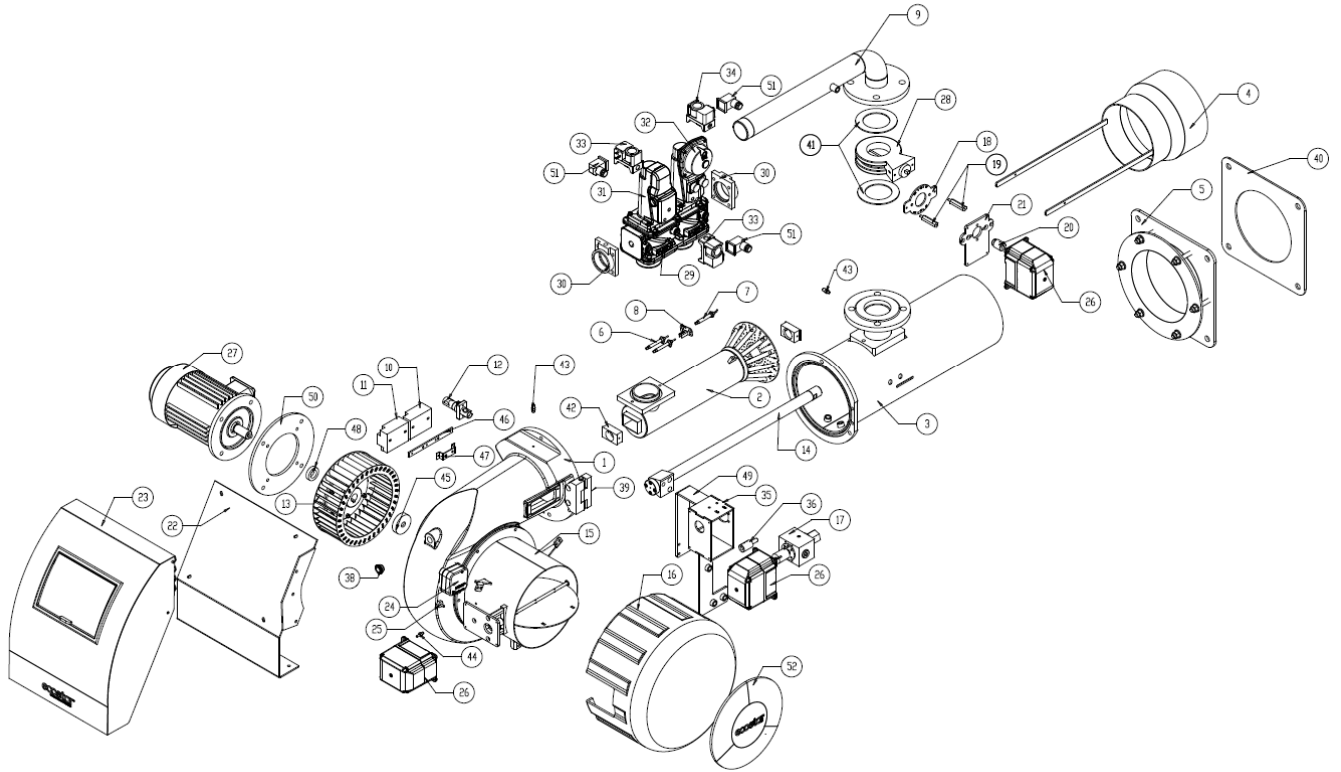
Temperature change of fuel used in ECOSTAR Dual Fuel (Gas-Light Oil) burners dependent on viscosity



Operating Range

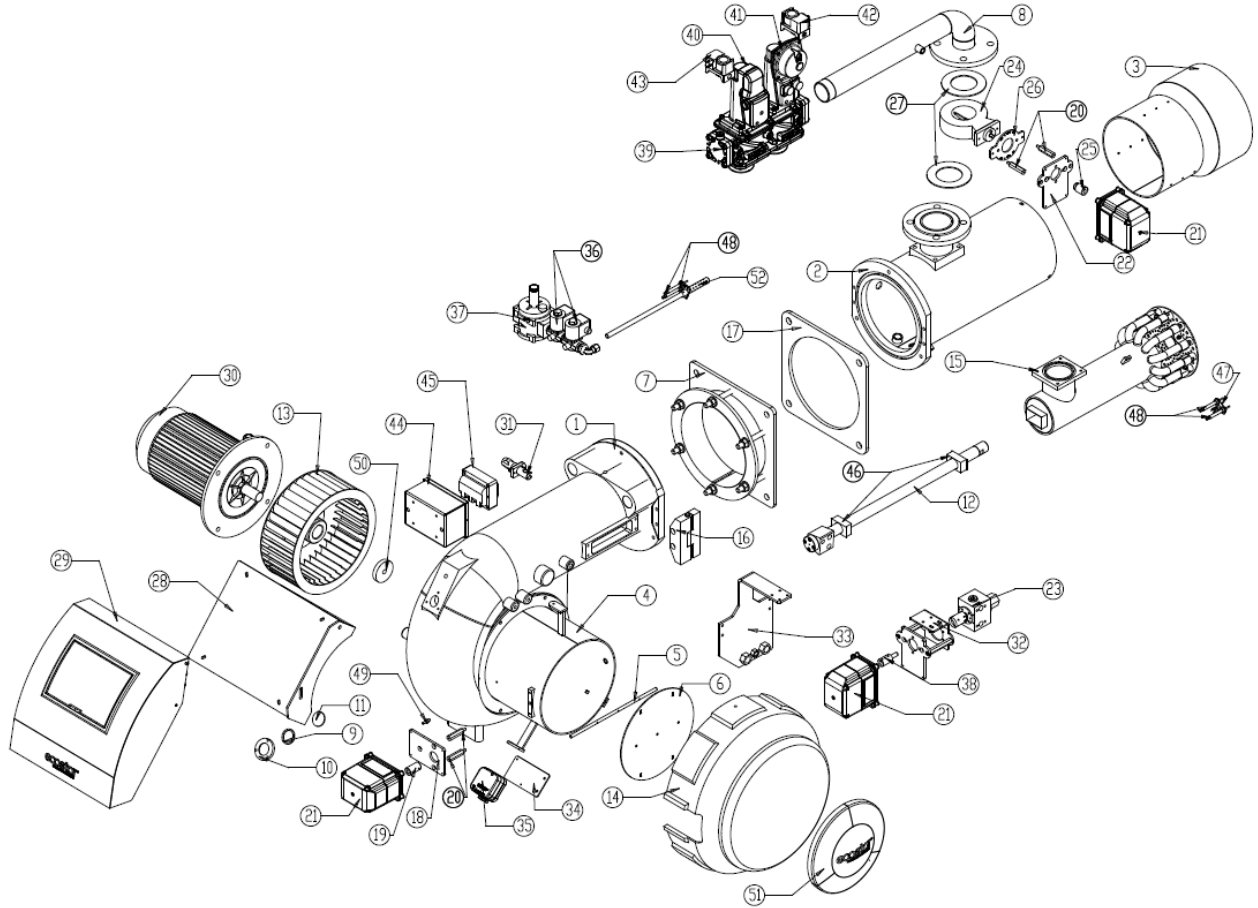
### 3.3. Burner Components

ECO 50 NG, ECO 55 NG



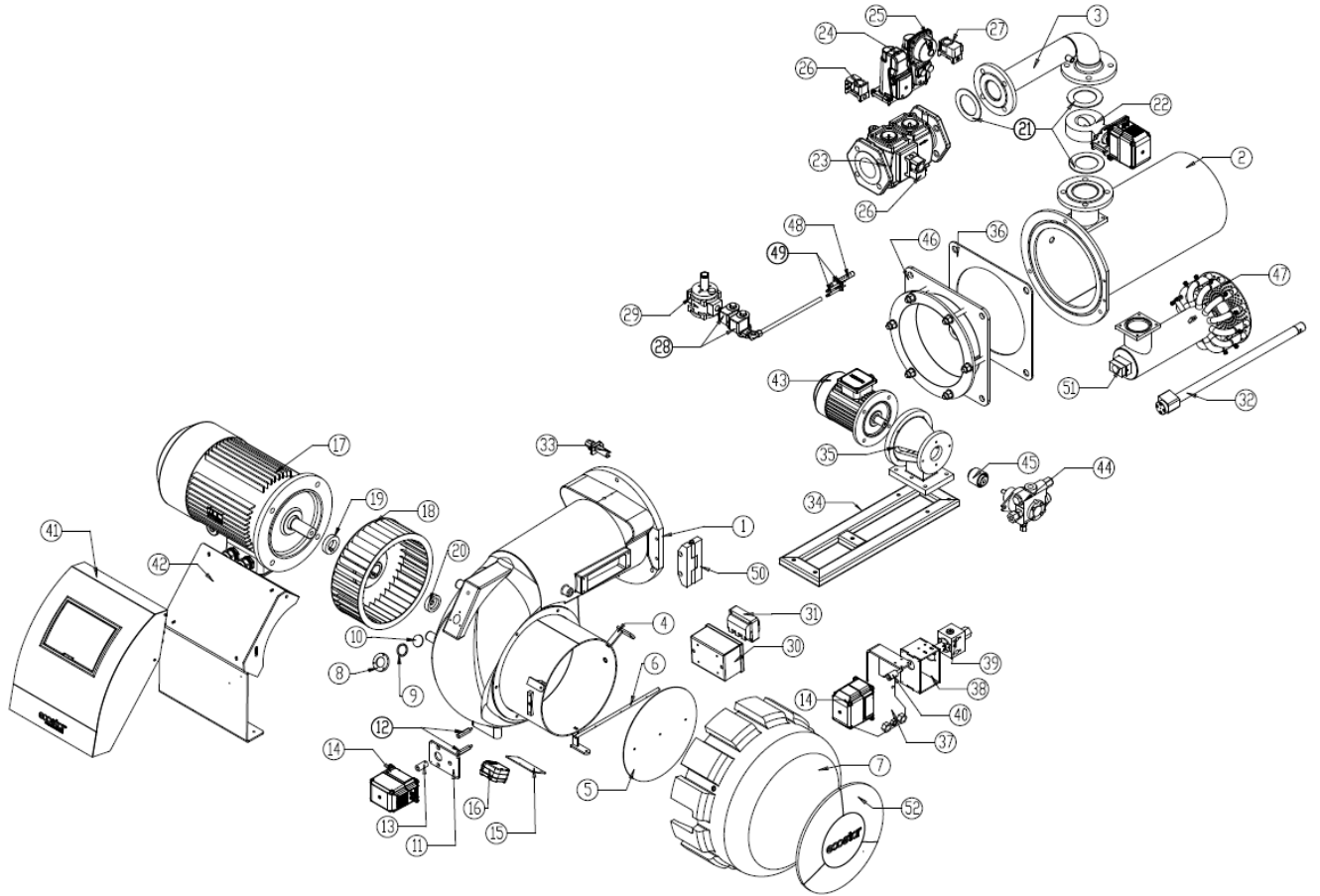
ASSEMBLY NO.	DESCRIPTION
1	BODY
2	GAS HEAD
3	COMBUSTION HEAD
4	FLAME PIPE EXTENSION
5	BOILER CONNECTION FLANGE
6	IGNITION ELECTRODE LIQUID FUEL
7	IGNITION ELECTRODE
8	ELECTRODE MOUNTING SHEET
9	GAS INLET PIPE
10	TRANSFORMER
11	TRANSFORMER
12	FLAME DETECTOR
13	FAN
14	FUEL LANCE
15	SILENCER GROUP
16	SILENCER
17	OIL BRAKE VALVE
18	LOCATION INDICATOR SHEET
19	SERVOMOTOR CONNECTION SHAFT
20	COUPLING
21	SERVOMOTOR CONNECTION SHEET
22	PANEL CONNECTION PLATE
23	ELECTRICAL PANEL
24	AIR SWITCH
25	AIR SWITCH ADAPTER
26	SERVOMOTOR
27	MOTOR
28	BUTTERFLY VALVE
29	VALVE
30	FLANGE
31	ACTUATOR
32	ACTUATOR
33	GAS SWITCH
34	GAS SWITCH
35	OIL BRAKE VALVE CONSOLE
36	COUPLING
37	KLINGRITE GASKET
38	OBSERVATION GLASS
39	HINGE
40	GASKET
41	KLINGRITE GASKET
42	CENTERING WEDGE
43	PURGER
44	AIR SWITCH PURGER
45	FAN CONNECTION WASHER
46	TRANSFORMER CONNECTION SHEET
47	TRANSFORMER CONNECTION SHEET
48	FAN WASHER
49	LIQUID FUEL CONSOLE
50	MOTOR CONNECTION FLANGE
51	GREY SOCKET
52	PAN LABEL

**ECO 60 NG-ECO 65 NG-ECO 70 NG**



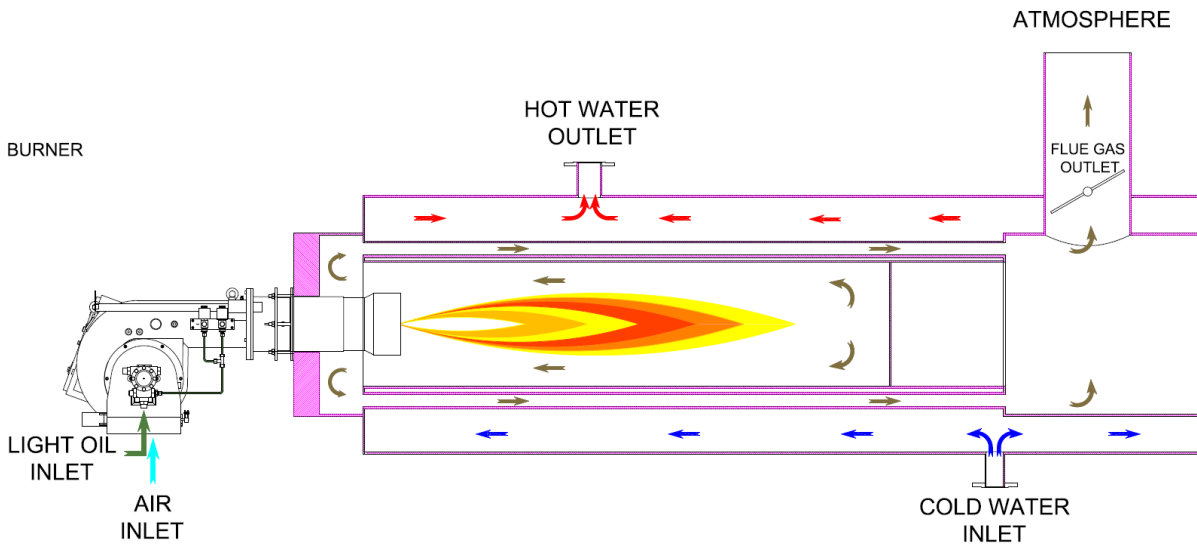
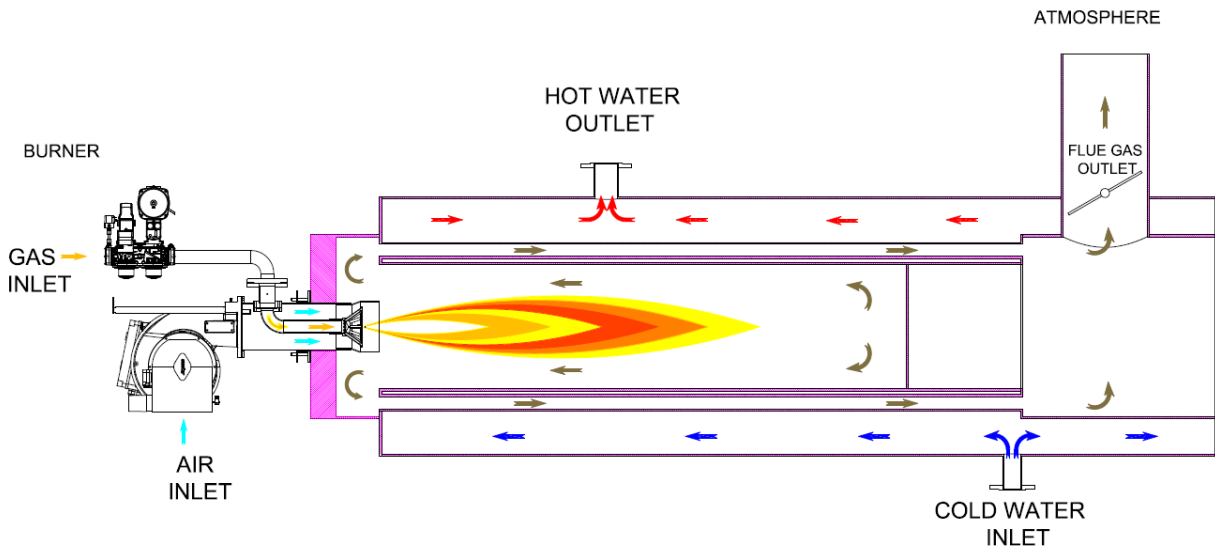
ASSEMBLY NO.	DESCRIPTION
1	BODY
2	COMBUSTION HEAD
3	FLAME PIPE EXTENSION
4	AIR DAMPER
5	AIR DAMPER SHAFT
6	AIR DAMPER SHEET
7	BOILER CONNECTION FLANGE
8	GAS INLET PIPE
9	OBSERVATION GLASS GASKET
10	OBSERVATION GLASS PLATE
11	OBSERVATION GLASS
12	LANCE
13	FAN
14	SILENCER
15	GAS HEAD
16	HINGE
17	GASKET
18	SERVOMOTOR CONNECTION SHEET
19	COUPLING
20	SERVOMOTOR CONNECTION SHAFT
21	SERVOMOTOR
22	SERVOMOTOR CONNECTION SHEET
23	OIL BRAKE VALVE
24	BUTTERFLY VALVE
25	COUPLING
26	LOCATION INDICATOR SHEET
27	KLINGRITE GASKET
28	PANEL CONNECTION PLATE
29	ELECTRICAL PANEL
30	MOTOR
31	FLAME DETECTOR
32	OIL BRAKE VALVE CONSOLE
33	LIQUID FUEL CONSOLE
34	AIR SWITCH CONNECTION SHEET
35	AIR SWITCH
36	VALVE
37	REGULATOR
38	COUPLING
39	VALVE
40	ACTUATOR
41	ACTUATOR
42	GAS SWITCH
43	GAS SWITCH
44	TRANSFORMER BOX
45	TRANSFORMER
46	CENTERING WEDGE
47	ELECTRODE CONNECTION SHEET
48	IGNITION ELECTRODE
49	AIR SWITCH PURGER
50	FAN FIXING WASHER
51	PAN LABEL
52	PILOT IGNITION NOZZLE

ECO 75 NG



ASSEMBLY NO.	DESCRIPTION
1	BODY
2	COMBUSTION HEAD
3	GAS INLET PIPE
4	AIR DAMPER MOUNTING FLANGE
5	AIR DAMPER-PLATE
6	AIR DAMPER-SHAFT
7	SILENCER
8	OBSERVATION GLASS PLATE
9	OBSERVATION GLASS GASKET
10	OBSERVATION GLASS
11	SERVOMOTOR CONNECTION PLATE
12	SERVOMOTOR MOUNTING SHAFT
13	COUPLING
14	SERVOMOTOR
15	AIR SWITCH MOUNTING SHEET
16	AIR SWITCH
17	MOTOR
18	FAN
19	FAN WASHER
20	FAN FIXING WASHER
21	KLINGRITE GASKET
22	GAS VALVE GROUP
23	VALVE
24	ACTUATOR
25	ACTUATOR
26	GAS SWITCH
27	GAS SWITCH
28	VALVE
29	REGULATOR
30	TRASFORMER BOX
31	TRANSFORMER
32	FUEL LANCE
33	FLAME DETECTOR
34	MOTOR PUMP STAND
35	MOTOR PUMP CONSOLE
36	GASKET
37	LIQUID FUEL CONSOLE
38	OIL BRAKE VALVE CONSOLE SHEET
39	OIL BRAKE VALVE
40	COUPLING
41	ELECTRICAL PANEL
42	PANEL CONNECTION PLATE
43	MOTOR
44	PUMP
45	GEAR COUPLING
46	BOILER CONNECTION FLANGE
47	GAS HEAD
48	PILOT IGNITION NOZZLE
49	PILOT IGNITION ELECTRODE
50	HINGE
51	CENTERING WEDGE
52	PAN LABEL

#### 4. GAS, FLUE GAS AND HEATING WATER SCHEMA





## 5. TECHNICAL DATA

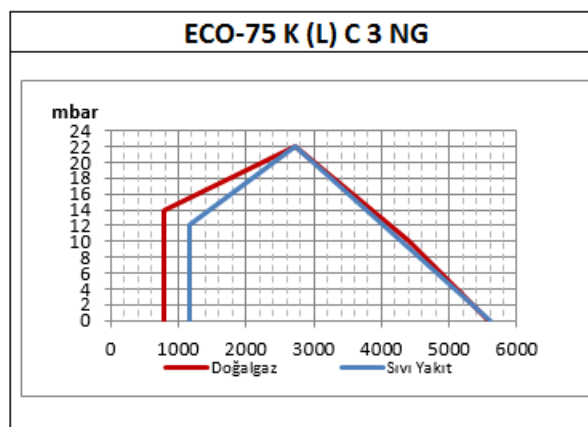
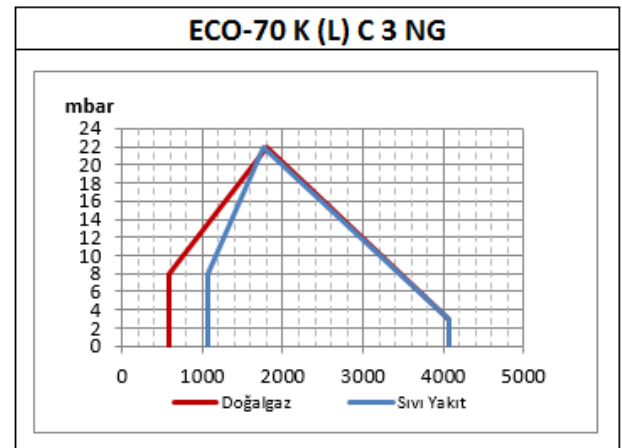
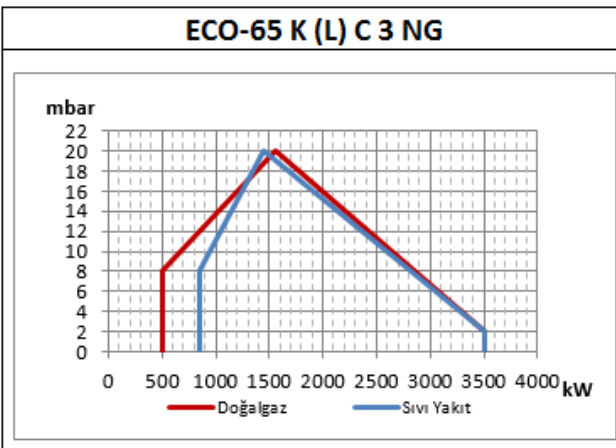
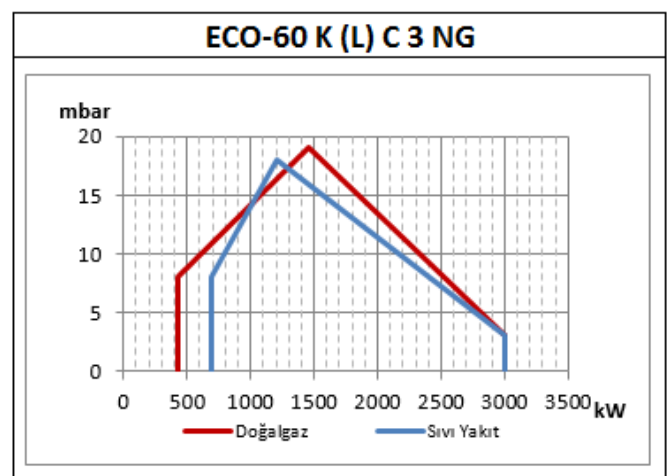
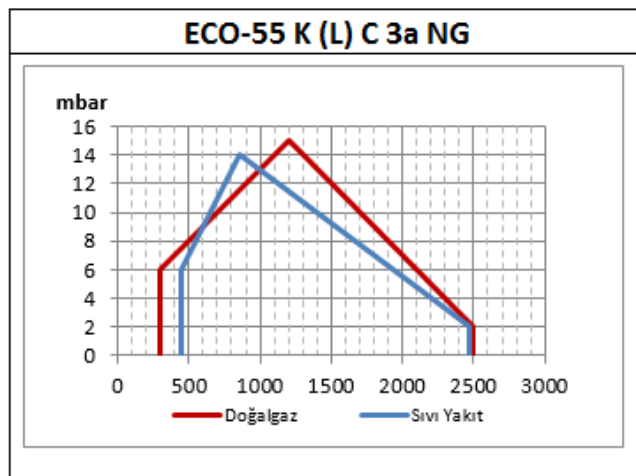
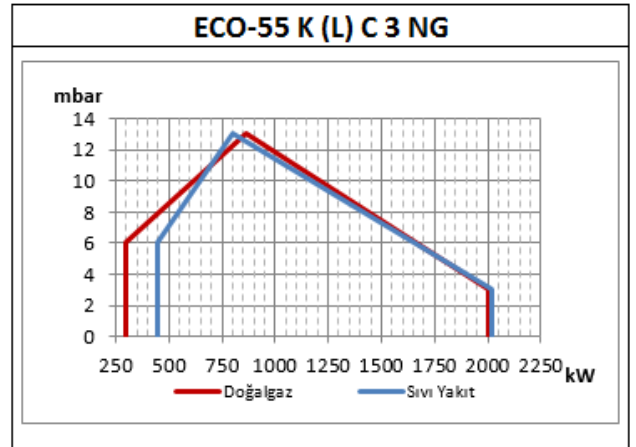
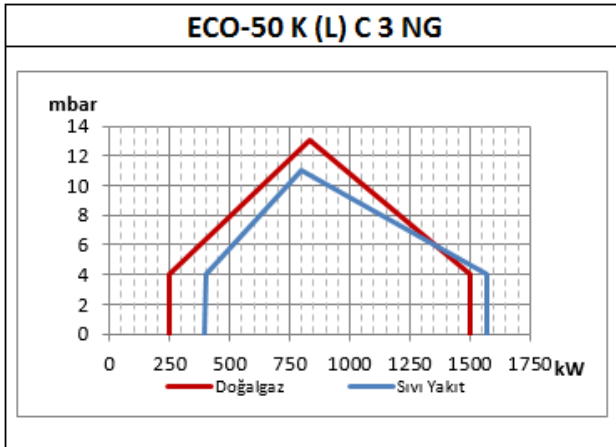
### 5.1. Capacity Table

NEW GENERATION MODULATING GAS-LIGHT OIL BURNERS CAPACITY TABLE															
BURNER TYPE	NATURAL GAS CAPACITY		NATURAL GAS CAPACITY		NATURAL GAS CONSUMPTION		LIGHT OIL CAPACITY		LIGHT OIL CAPACITY		LIGHT OIL CONSUMPTION		FAN MOTOR POWER	FUEL HEATER	MAIN SUPPLY
	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. Nm <sup>3</sup> /h	Max. Nm <sup>3</sup> /h	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. kg/h	Max. kg/h	kW	kW	VAC
ECO 50 K (L) C 3 NG	215.000	1.290.000	250	1500	26,1	156,4	337.980	1.351.060	393	1571	33,1	132,5	2,2	-	3N 400
ECO 55 K (L) C 3 NG	258.000	1.720.000	300	2000	31,3	208,5	386.140	1.737.200	449	2020	37,9	170,3	3	-	3N 400
ECO 55 K (L) C 3a NG	258.000	2.150.000	300	2500	31,3	260,6	386.140	2.123.340	449	2469	37,9	208,2	3	-	3N 400
ECO 60 K (L) C 3 NG	369.800	2.580.000	430	3000	44,8	312,7	598.560	2.580.000	696	3000	58,7	252,9	4	1,1	3N 400
ECO 65 K (L) C 3 NG	430.000	3.010.000	500	3500	52,1	364,8	733.580	3.010.000	853	3500	71,9	295,1	5,5	1,5	3N 400
ECO 70 K (L) C 3 NG	498.800	3.500.200	580	4070	60,5	424,3	916.760	3.500.200	1066	4070	89,9	343,2	7,5	1,5	3N 400
ECO 75 K (L) C 3 NG	686.280	4.800.000	798	5581	83,2	581,8	1.003.620	4.824.600	1167	5610	98,4	473,0	11	1,5	3N 400

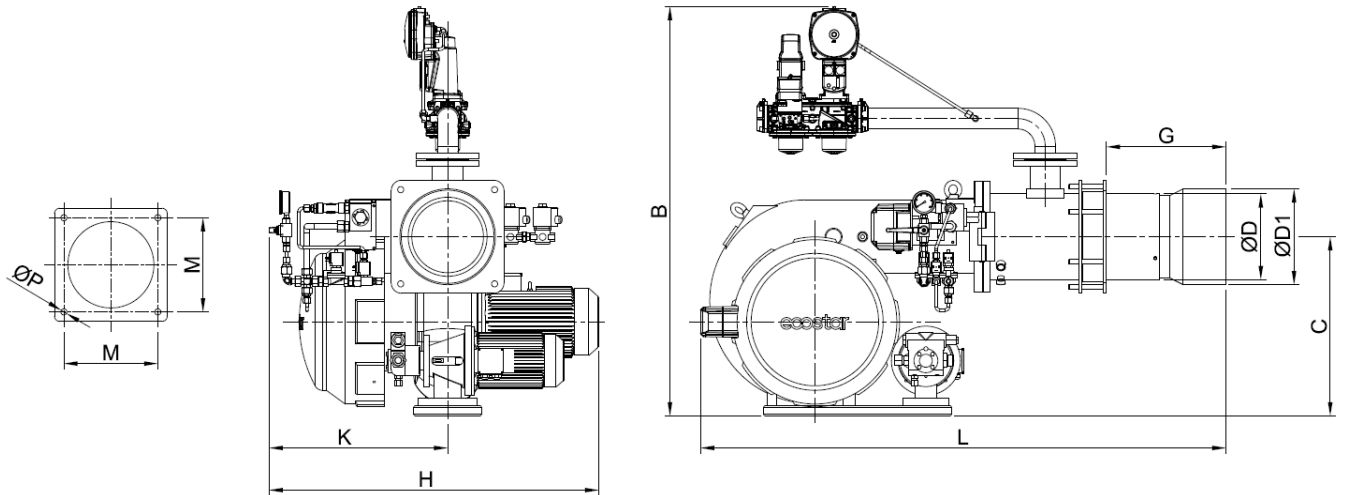
$H_u$  Natural Gas = 8250 kcal/Nm<sup>3</sup>

$H_u$  Light Oil (L) = 10200 Kcal/kg

## 5.2. Back Pressure-Capacity Diagrams



### 5.3. Burner Dimensions



	L	Gmin	Gmax	H	K	B	C	ØP	M	ØD	ØD1
ECO 50 KLC3 NG	1470	280	440	930	450	1075	440	18	275	218	236
ECO 55 KLC3 NG	1470	280	440	930	450	1075	440	18	275	218	236
ECO 60 KLC3 NG	1550	200	335	980	450	1180	500	18	275	240	268
ECO 65 KLC3 NG	1650	200	440	980	450	1185	500	18	275	250	280
ECO 70 KLC3 NG	1650	200	440	980	450	1185	500	18	275	250	280
ECO 75 KLC3 NG	1600	200	340	1160	600	1300	580	22	335	300	-

## 5.4. Gas Hood Pressure Loss Diagram



Gas hood pressure loss measurements are conducted in atmospheric pressure. Consider the below data while conducting measurement in counter pressure boilers.

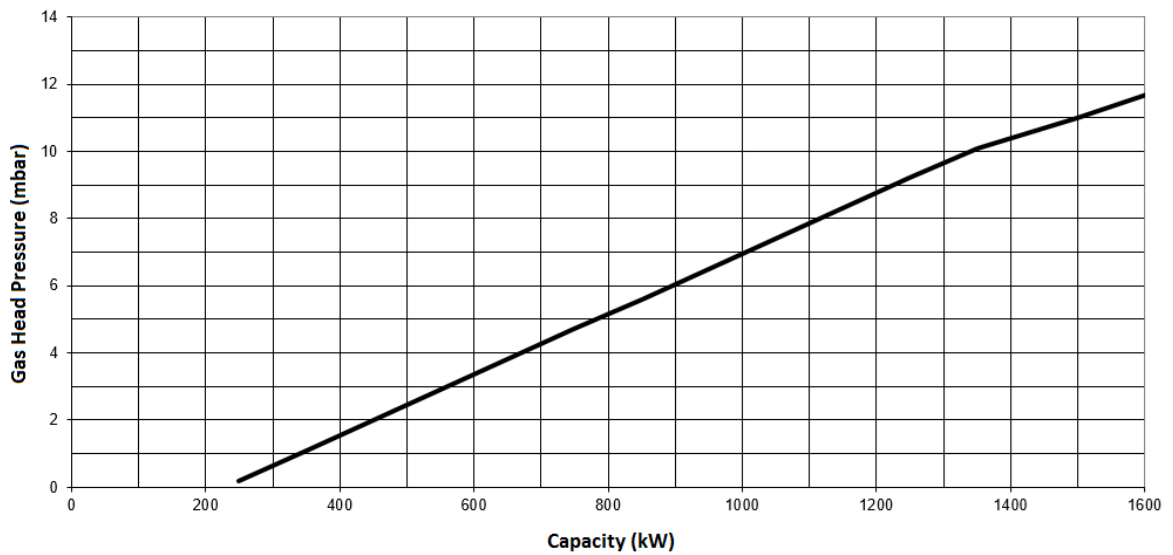
$P_m$ : Gas hood pressure while burner is connected to the boiler and working

$P_F$ : Combustion chamber pressure

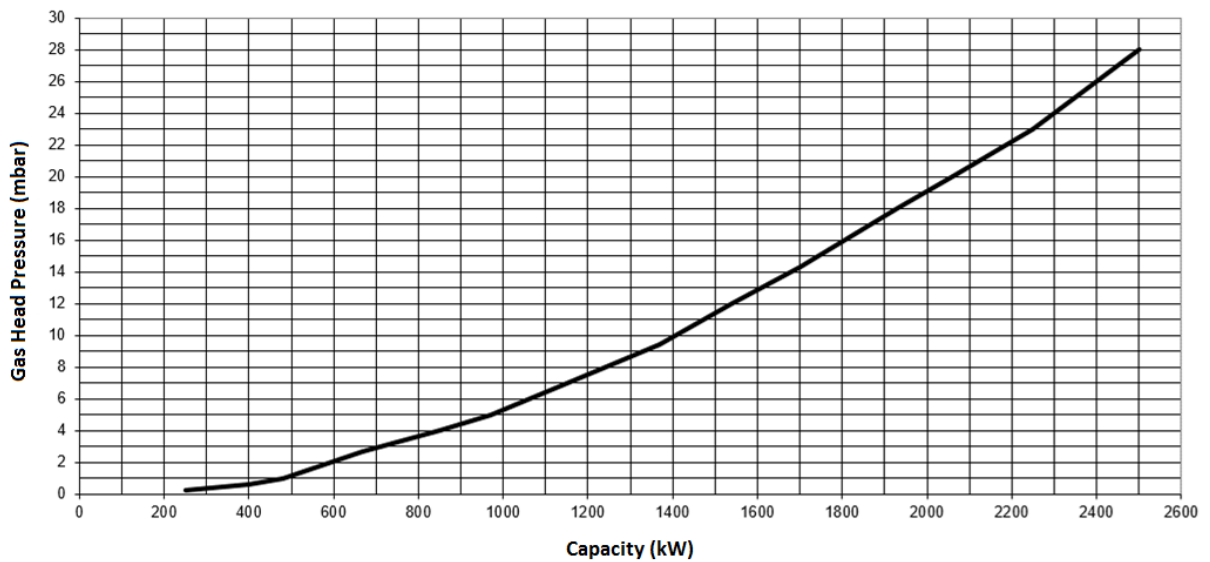
$P_{Br}$ : Burner net gas hood pressure

$$P_{Br} = P_m - P_F$$

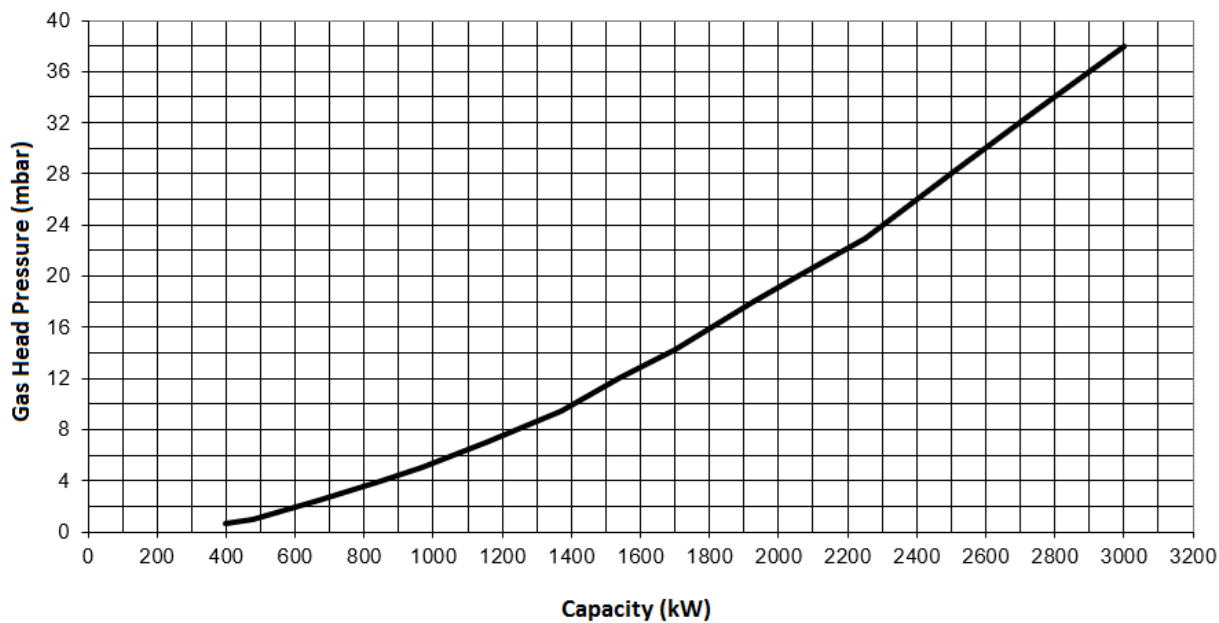
### ECO 50



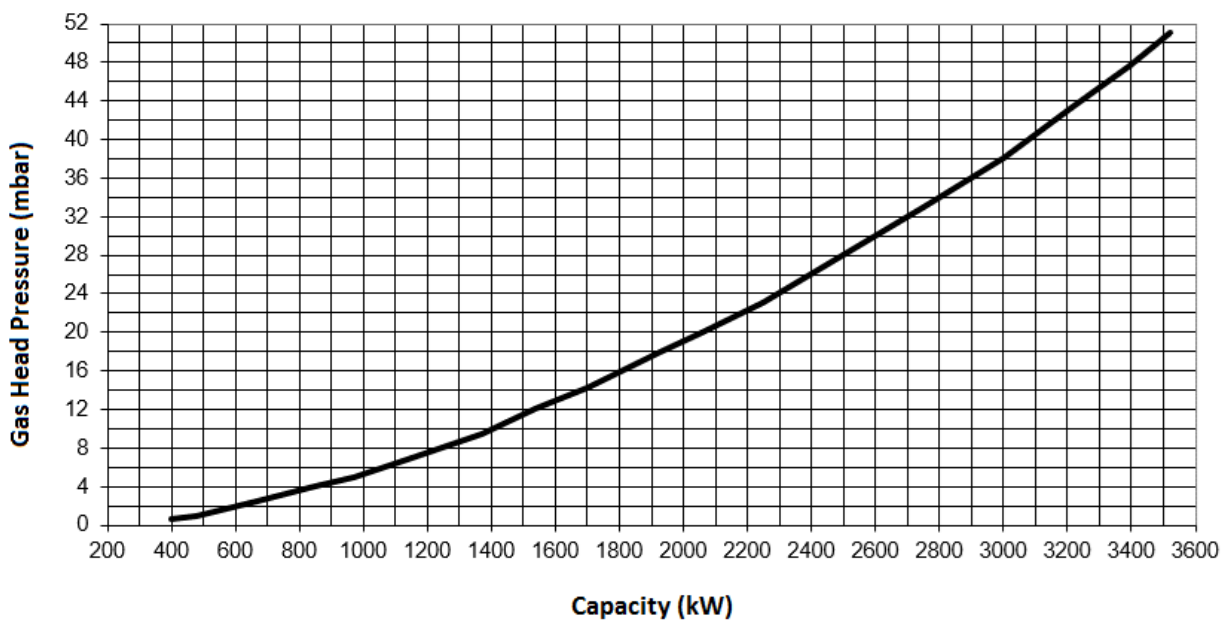
### ECO 55



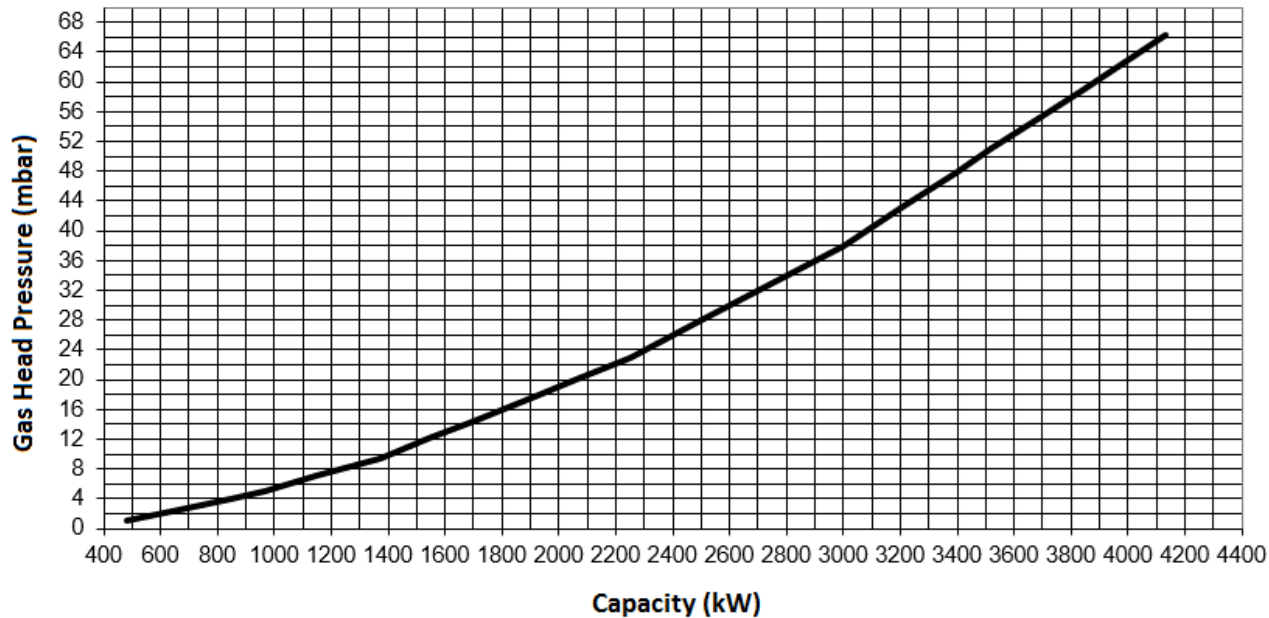
## ECO 60



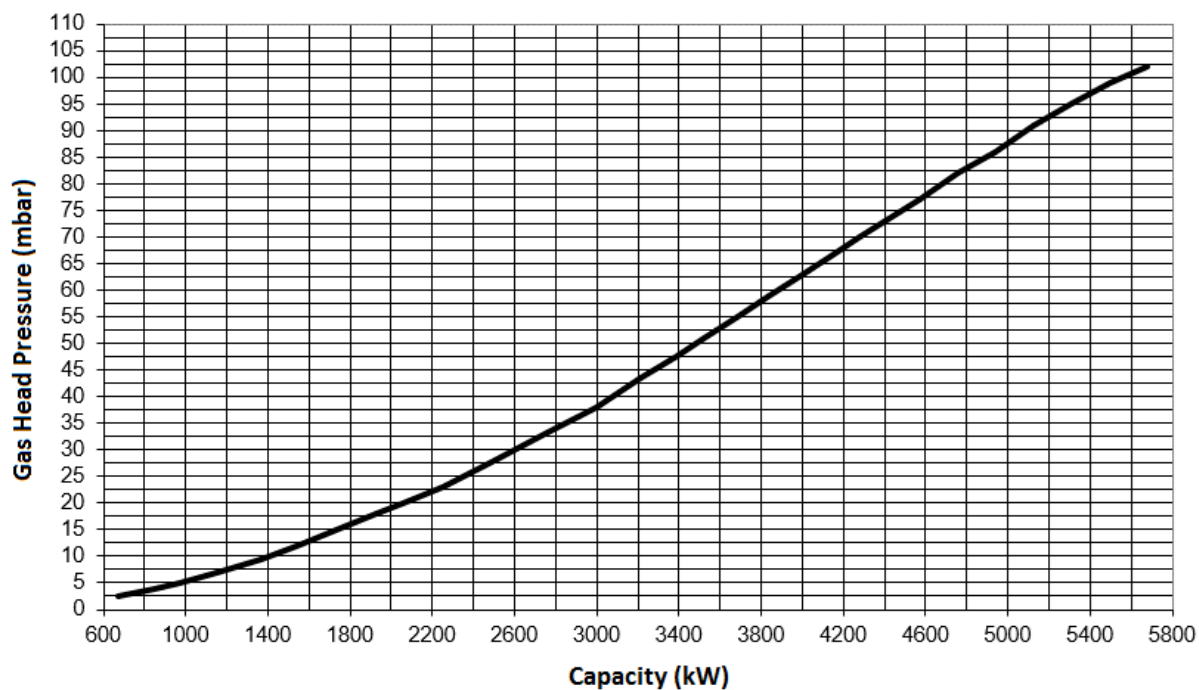
## ECO 65



## ECO 70

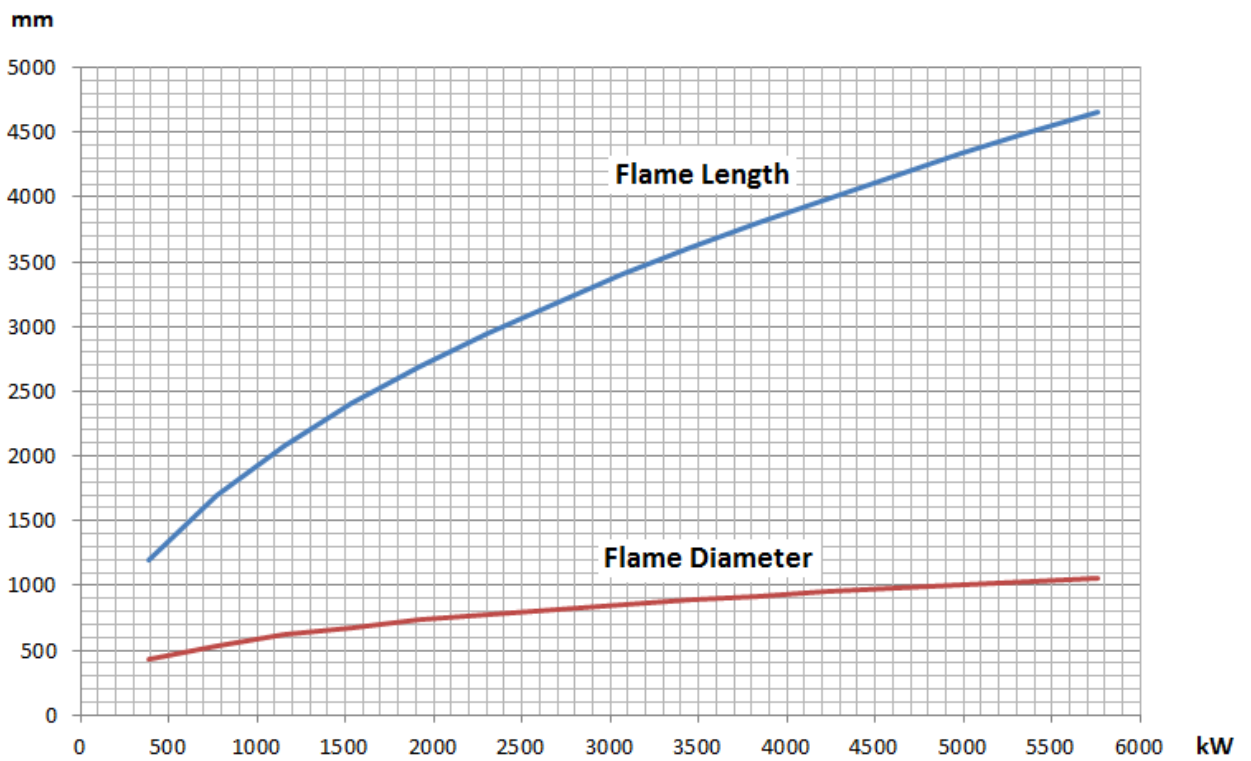


## ECO 75

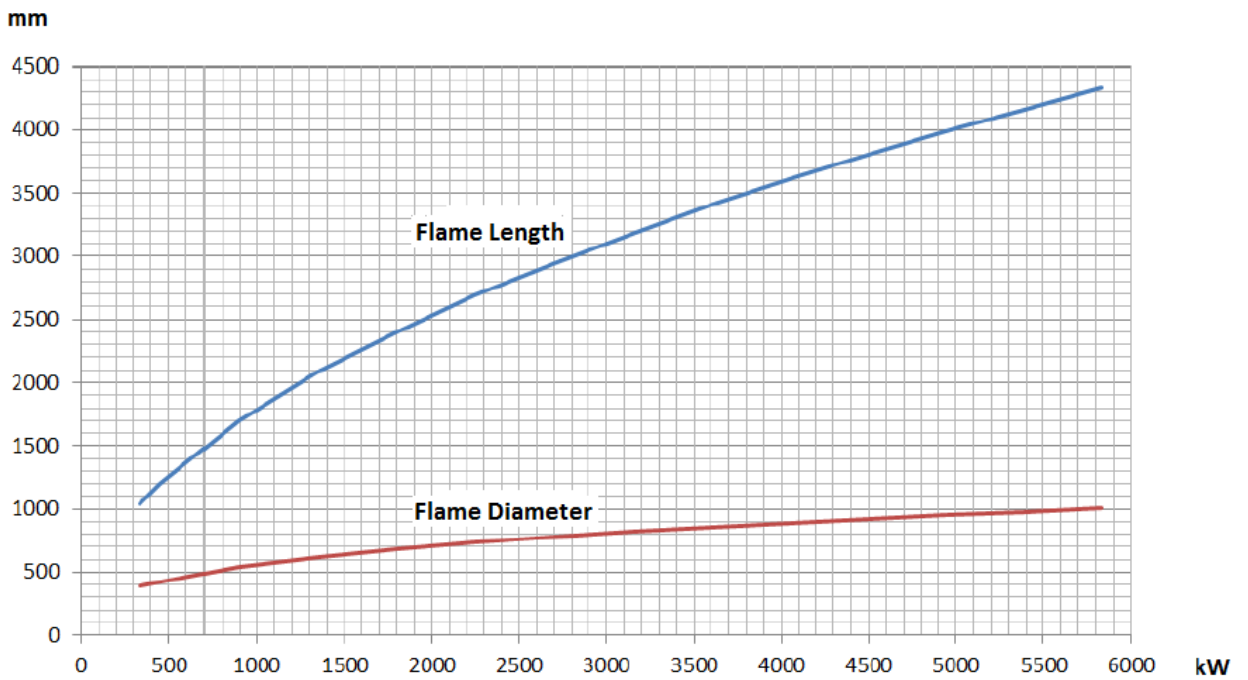


### 5.5. Flame Length and Diameter

#### Natural Gas



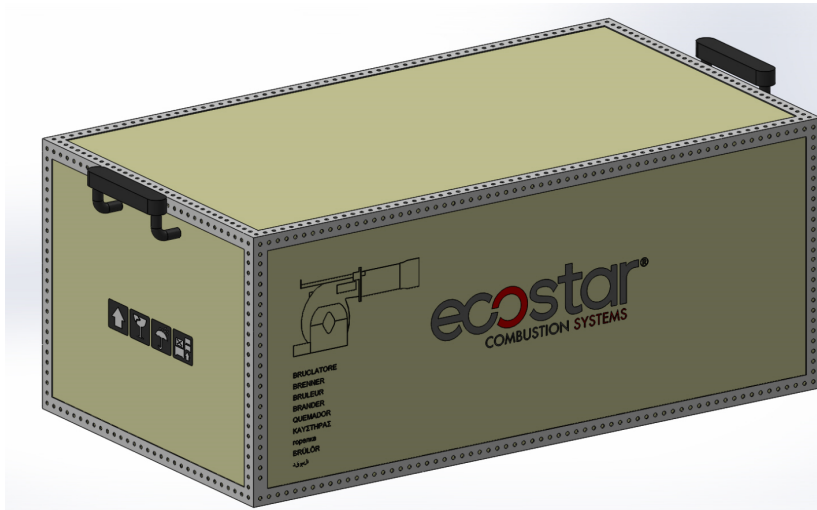
#### Light Oil



### 5.6. Noise Level

Product operates within the range of 75 decibels max. and 85 decibels.

## 6. BURNER HANDLING INFORMATION



- Lift the product by holding the handles as seen in the picture.
- Prevent strong impacts on top of the product and vibration while handling the product.
- Do not leave the product in wet environment.



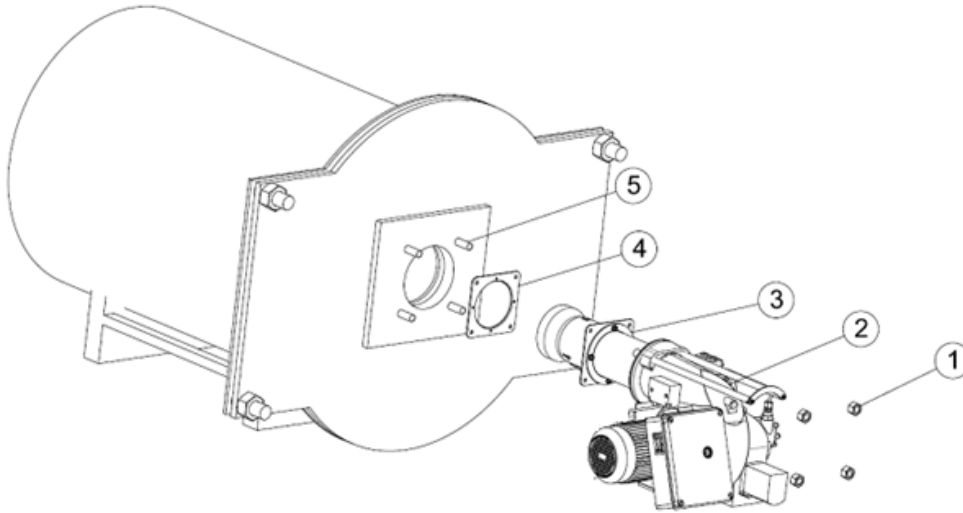
Dimensions of the box used for handling

<b>Burner</b>	<b>L x W x H (cm)</b>	<b>Weight (kg)</b>
ECO 50 KLC3 NG	160 X 100 X 80	130
ECO 55 KLC3 NG	160 X 100 X 80	170
ECO 55 KLC3a NG	160 X 100 X 80	170
ECO 60 KLC3 NG	160 X 115 X 74	195
ECO 65 KLC3 NG	170 X 115 X 74	200
ECO 70 KLC3 NG	170 X 115 X 74	180
ECO 75 KLC3 NG	190 X 120 X 85	270



## 7. INSTALLATION

### 7.1. Burner Installation Picture



- 1- Drift Bolts
- 2- Burner
- 3- Boiler Connection Flange
- 4- Gasket
- 5- Boiler Studs

- In the installation of the burner, use the installation materials supplied with the burner.
- Secure the burner connection flange onto the burner cover by 4 bolts. Gasket must be connected such that it will remain between connecting flange and boiler cap.

#### **After completing the installation of the burner on the boiler:**

- Connect the oil feed pipes.
- Connect the burner panel to the mains by a cable suitable for the rated power.



Device must be shipped in original packaging!

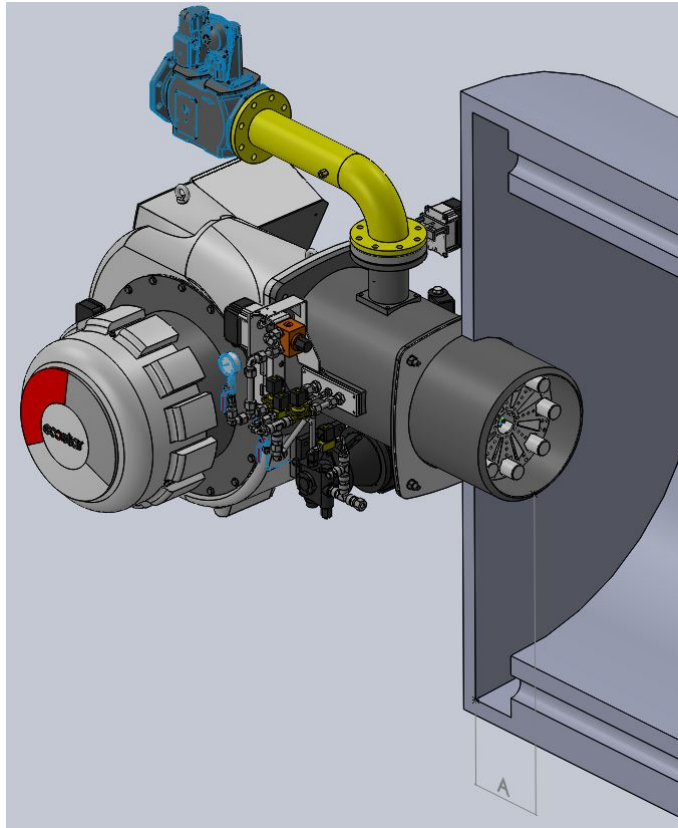


Do not lift the device holding from servomotor, gas valve, impulse pipes or pressure switch during installation!



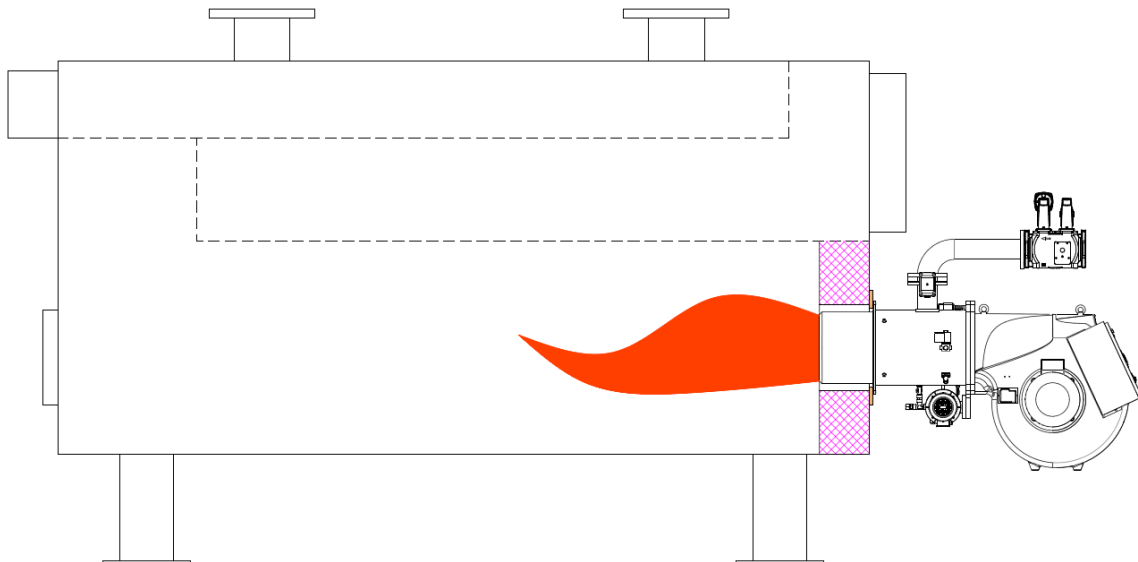
Clean the inside of fuel line thoroughly before installing the burner to the fuel line. Any damage that may occur due to solid objects and metal particles from the fuel line shall not be covered by our company.

## 7.2. In reverse flame front mirror boilers



While installing the burner in reverse flame front mirror boilers, flame tube tip must be adjusted such that it gets inside by 50 mm-100 mm from flue pipes ( $50\text{mm} \leq A \leq 100\text{mm}$ ). Otherwise flue gas temperature will rise and fuel consumption will increase.

## 7.3. In cylindrical (straight flame) boilers



## 8. COMMISSIONING

### 8.1. Before Commissioning



#### Electrical Connection

Perform electrical connections according to the diagram provided with the burner. Follow general security rules during installation of electric wiring and making connections. Connect the earthing terminal in electric panel to the earthing installation.

### 8.2. General Controls



Make sure to perform the following controls before commissioning the burner.

- Installation of the burner to the boiler is checked.
- Check the fuel line (are the pipe diameters and the pipe installation correct?).
- Check energy input cables and voltages.
- Check the boiler safety thermostats and, if it is a two-stage burner, then make sure that there are two thermostats.
- Check the fuel nozzles according to the boiler capacity.
- Prior to operating the burner, control the boiler water level.
- Make sure water circulation system is turned on, and steam boiler and water feed pumps and boiler inlet - outlets are open.
- Is there electricity current?
- Is there gas?
- Has the boiler explosion lid been controlled?
- Is there sufficient air in boiler room (ventilation section  $\text{cm}^2 = \text{boiler capacity kW} \times 7$ )
- Has the air of the gas line been removed? Has a sealing test been made?

### Commissioning order

#### Operating with Light Oil ;

- After performing the above mentioned controls, open the fuel tank valve.
- Open the valve upstream of the fuel filter.
- Check direction of motor rotation.
- Open the pump's vent plug and place the manometer (0-40 bar).
- Turn on the burner switch (turn to position 1).
- When the burner starts up, the motor is activated and turns the pump at the same time.
- The pump filter should be cleaned frequently (every 30 minutes) during the first commissioning, and please ensure that the fuel reaches the pump without interruption.
- It actuates pre-purge and discharges the residual gases remaining in the boiler from the funnel.
- After the pre-purge, fuel is delivered from the nozzle. The fuel meets the flame from the ignition electrodes and the combustion starts.
- After combustion of the burner, the pump pressure is adjusted (light oil: modulating; 25 bar).
- The boiler thermostat is adjusted as desired (70-90°C for central heating boilers).
- For the safety of the system, check the boiler thermostats and observe the deactivation of the burner.

## **Operating with Gas ;**

### **Operation of a modulating burner**

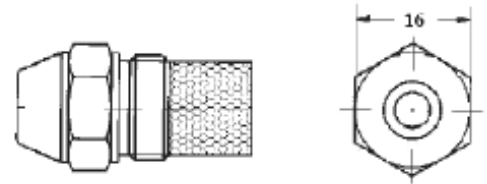
- Open the main gas valve; check max 300 mbar gas pressure from the manometer.
- Open operating switch on the burner panel.
- Switch on the modulating control switch.
- Switch automatic-hand switch to automatic.
- Check the temperature and pressure set values from the modulating control unit.
- Ignition will take place at the end of pre-purge process.
- 3 sec. later, the gas valve will be opened and combustion will occur.
- Flame control system (ionization) will start flame control.
- In modulating burner, the burner goes into max. capacity according to the signal from the modulating control unit.
- When the boiler water temperature or steam pressure increase, the modulating control unit will cause burner to run with min. capacity.
- If the boiler water temperature or steam pressure increases despite the operation of burner with min. capacity, the modulating control unit will stop the burner.

### 8.3. Combustion Adjustment

#### ➤ Fuel nozzle

Use proper wrench in installation and dismantle of the fuel nozzle.

Use diesel oil to clean the fuel nozzle. Do not use thinner and its derivatives.



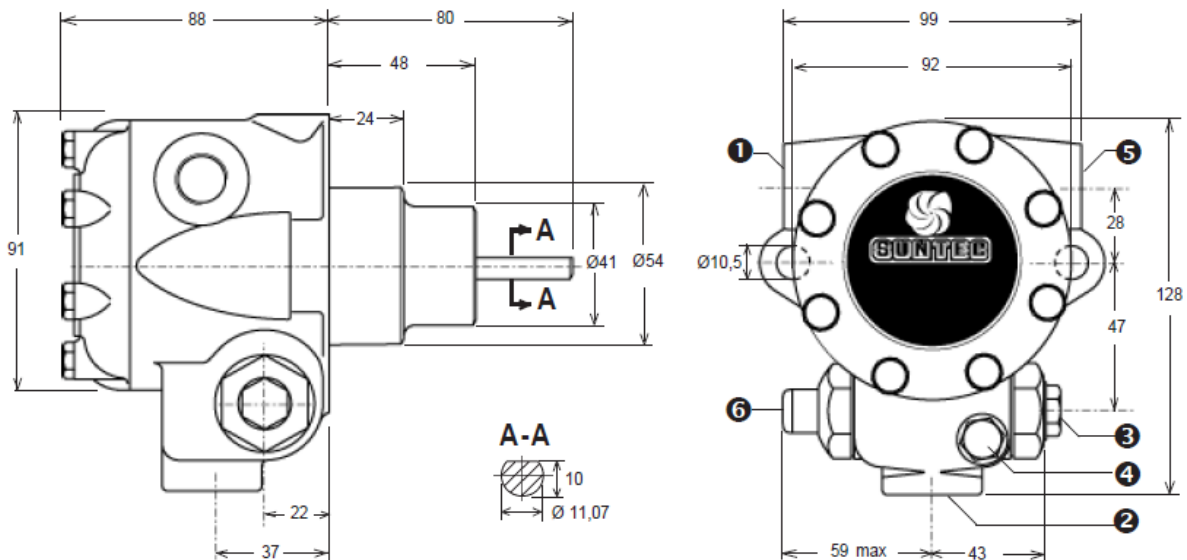
#### ➤ Photocell

Check the photocell weekly. Clean the dust or fume stains on the glass of photocell by a dry cloth.



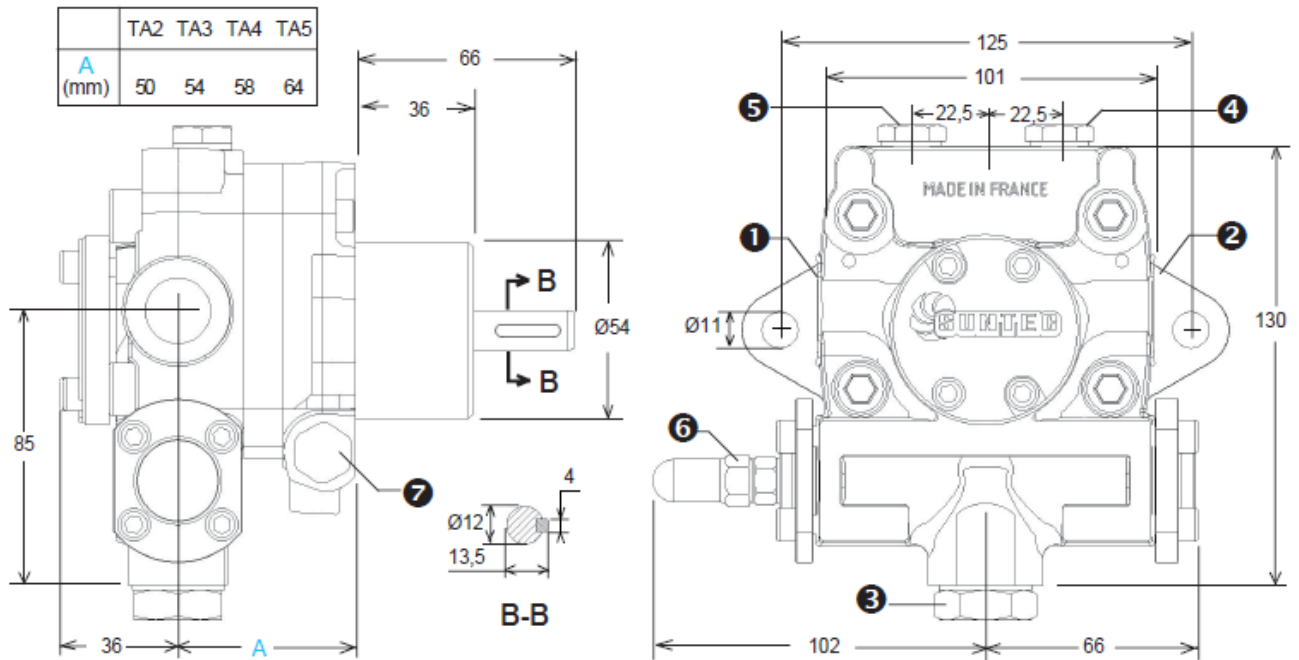
### 8.4. Fuel Pumps

#### E Type



- 1- Suction or vacuum manometer connection
- 2- Return and internal bypass
- 3- Nozzle outlet
- 4- Manometer connection
- 5- Vacuum manometer connection
- 6- Pressure adjustment

## TA Type



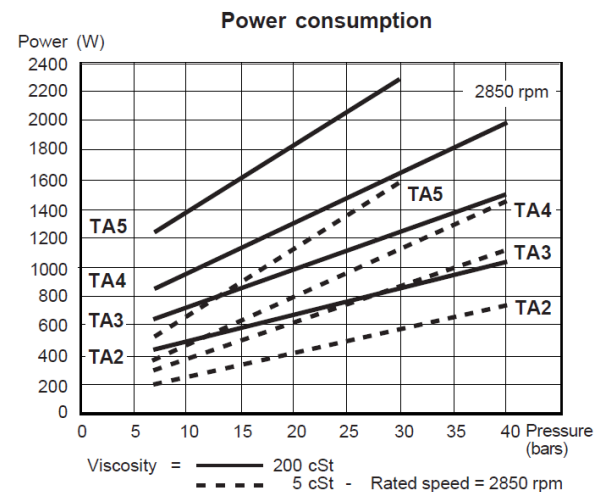
- 1-Suction
- 2-Nozzle outlet
- 3-Return
- 4-Manometer inlet
- 5-Vacuum or inlet manometer and internal return inlet
- 6-Pressure adjustment
- 7-Pre heater location

## Application Limits

Delivery pressure setting	30 bars
Operating viscosity	4 - 450 cSt
Oil temperature	0 - 140°C max. in the pump
Inlet pressure	light oil : 0,45 bars max. Vacuum to prevent air separation from oil heavy oil : 5 bars max.
Return pressure	light oil : 5 bars max. heavy oil : 5 bars max.
Rated speed	3600 rpm max.
Starting torque	0,3 N.m

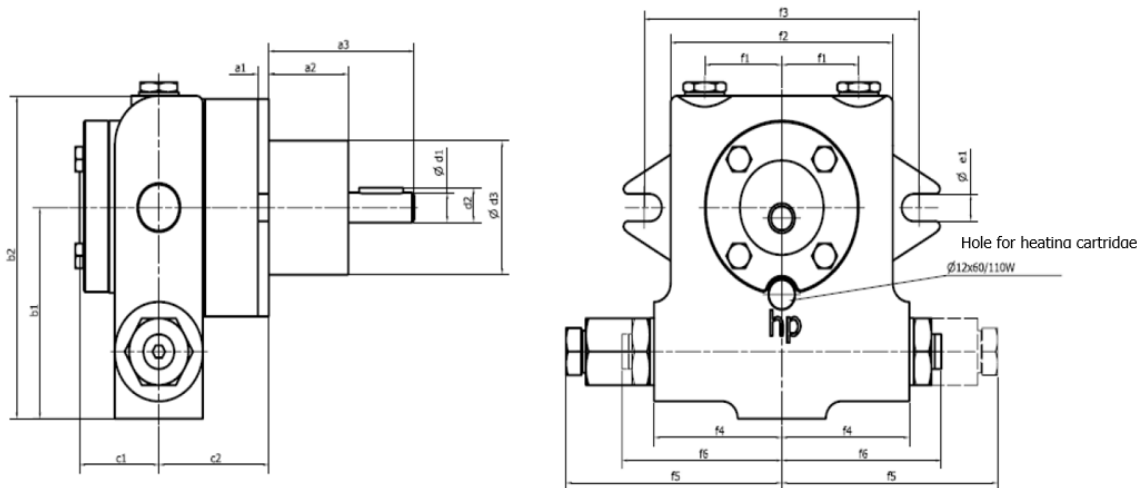
## Choice of heater

Cartridge	Ø 12 mm
Fitting according to	NFC 68190 (N°9 elec.)
DIN 40430,	
Rating	80-100 W



## HP-UHE

### Main Dimensions



Typ	a1	a2	a3	b1	b2	c1	c2	d1	d2	d3
UHE-A2-PZ	5	36	66	85	130	36	50	12	13,5	54
UHE-A3-P	5	36	66	85	130	36	54	12	13,5	54
UHE-A4-M	5	36	66	85	130	36	58	12	13,5	54
UHE-A5-GZ	5	36	66	85	130	36	64	12	13,5	54

Typ	e1	f1	f2	f3	f4	f5	f6	S; A; R	M1; M2	M3
UHE-A2-PZ	11	35	101	125	58	98	72,5	1/2"	1/4"	1/8"
UHE-A3-P	11	35	101	125	58	98	72,5	1/2"	1/4"	1/8"
UHE-A4-M	11	35	101	125	58	98	72,5	1/2"	1/4"	1/8"
UHE-A5-GZ	11	35	101	125	58	98	72,5	1/2"	1/4"	1/8"

### Inspection and Maintenance

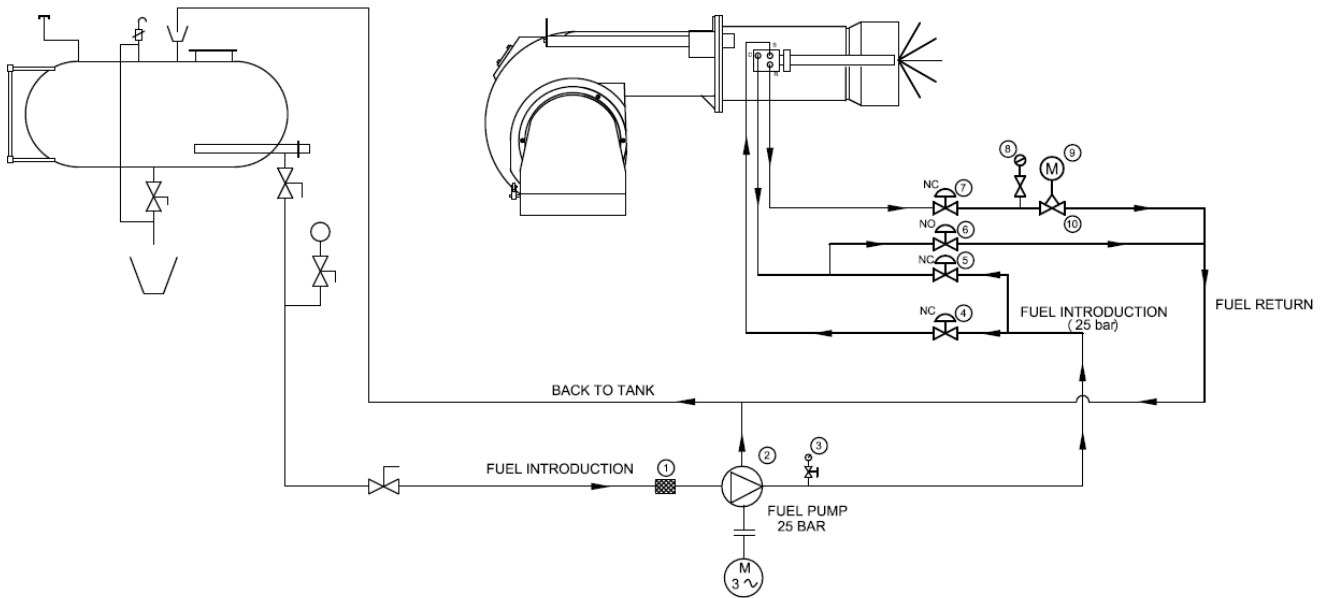
- The pump or motor-pump group is maintenance-free.
- Every pump requires a suction filter on the suction side. The suction filter of the system must be open regularly. Soiling and leaks are checked. The mesh size of heating oil should be 80 to 100 microns. In the case of heavy oil, a mesh size of 540 microns must be provided because of the fibrous components. However, it is recommended, because of welded pipes at the beginning over a period of 1 - 2 Months also to drive with a mesh size of approx. 100 microns, until all scale and other Welding residues are filtered out. After this period has passed, filter with a mesh size of approx. 540 microns be changed.
- Make sure that the suction connection of the pump (measured at the connection for the vacuum meter - see fig.) no vacuum greater than -0.4 bar occurs.
- If the pump is operated with inlet pressure, this must **not exceed 5 bar**

### Application limits

Delivery rate	375 ± 25 l / h
Max. Pressure (adjustable on the integrated overflow valve)	up to 25 bar
Min. Admissible pre-pressure	- 0.4 bar
Max. Admissible pre-pressure	5.0 bar
Max. permissible pump speed	2800 min <sup>-1</sup> at 50 Hz
Breakaway torque	1.6 Nm
Temperature	up to 150 ° C
Perm. Test pressure for approvals	Max. 45 bar with the shaft seal removed (Shaft sealing area locked with a bush)



➤ **Modulating Light Oil Burner Fuel Circuit**



1	FILTER
2	PUMP
3	MANOMETER
4	INPUT VALVE
5	HYDRAULIC CONTROL VALVE
6	DRAINING THE HYDRAULIC CONTROL VALVE
7	OUTPUT VALVE
8	MANOMETER
9	SERVOMOTOR
10	OIL ADJUSTMENT VALVE



**Fuel return line should be non-pressured line.**

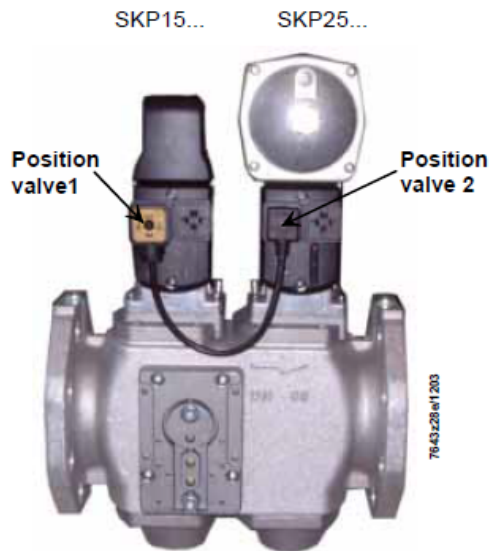


**CAUTION!**

- **End of the line to the main tank must be open to the atmosphere and line pressure must be zero, otherwise no healthy modulating operation can be ensured since the pressure, which is to form in return, will also affect nozzle pressure. Fuel may drop from nozzle end during stops.**
- **For good pulverization, periodically check durability of the o-ring. In the event of earing of the o-ring, fuel to the nozzle can by-pass and go directly to the return and reduces the working performance of the nozzle.**
- **Maximum operating pressure of the nozzle is 30 bars. This value should not be exceeded during working. Even if these out of control value are exceeded, nozzle must be taken to emergency maintenance and all O-rings must be replaced.**
- **Do not use solvent based materials (thinner and derivatives) during cleaning of the fuel nozzle; clean with gas oil or diesel oil. Fuel nozzle inner kit is very sensitive and even invisible deformations can reduce working performance; dismantling-installing work must be performed only by trained personnel.**
- **Spring has lost its function if dropping from fuel nozzle or fuel exit at large scale is observed when the nozzle performs circulation. It must be checked and replaced if necessary.**
- **During fuel supply, the pressure at the burner fuel pump must be max. 0,40 +0,05 bar for light oil . When the burner is not operating or operating at the maximum fuel flow required, fuel supply pressure value should not changed in the burner pump.**

## 8.5. Gas Adjustment

### 8.5.1. VGD 40... Series Gas Valve



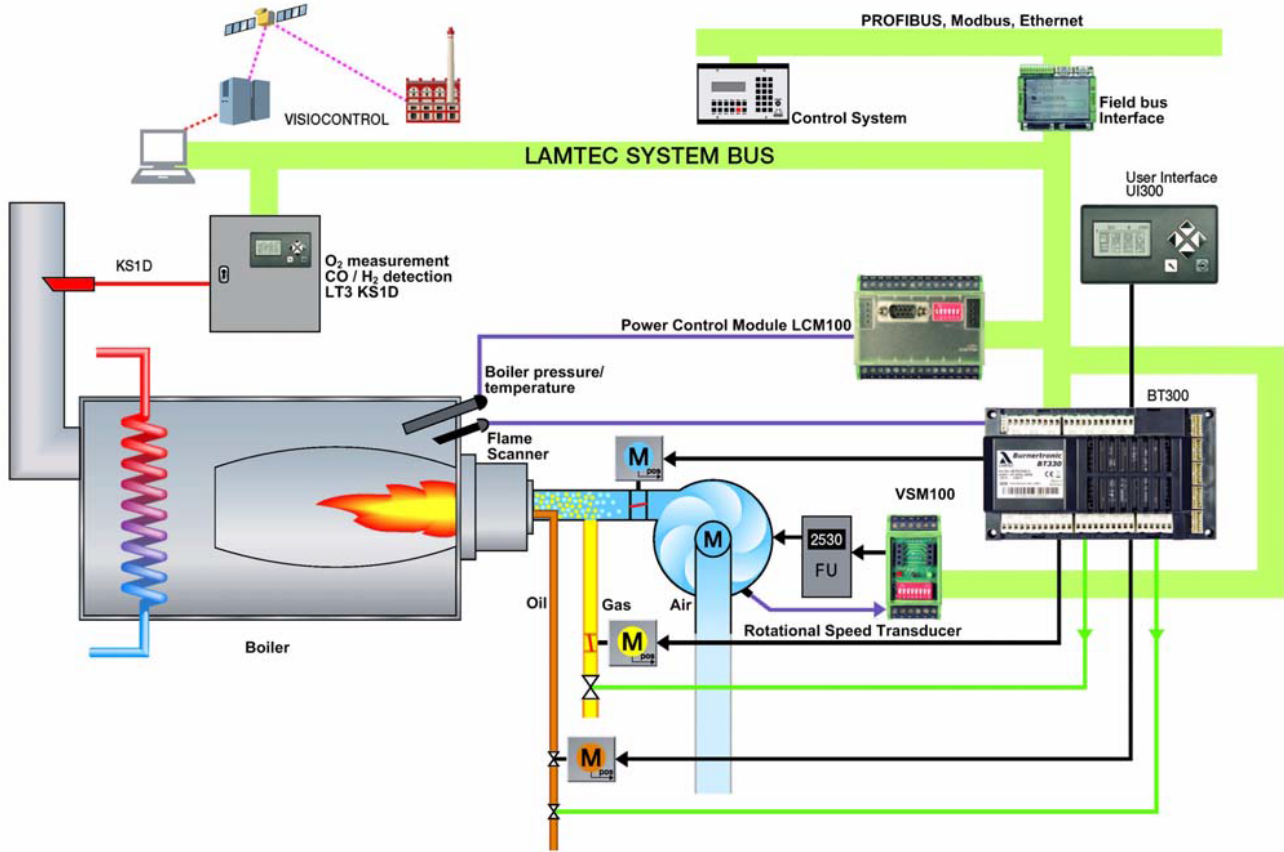
## 8.6. Air Pressure Switch Adjustment

While the burner is working without any problem, the air pressure switch is adjusted to desired minimum pressure as follows.

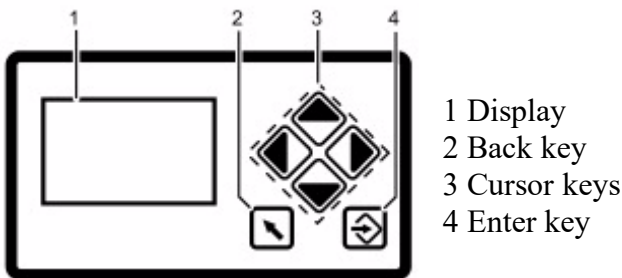
- Unscrew the screw of the transparent cover and remove the cover.
- Turn the adjustment wheel in the direction to increase the pressure, note the pressure value at which the burner is failed.
- Set the pressure switch to a value 1 mbar lower than the pressure value at which the burner failed and close the pressure switch lid.
- It is recommended that this adjustment is carried out when the burner is at minimum load.



**8.7. BT 300**



### 8.7.1. Operating Control and Displays



**Display:** The display shows in pictograms:

- 1 - the menu structure
- 2 - operating status
- 3 - parameters
- 4 - error messages



**Back key:** Jump to previous window.



**Cursor keys:** You navigate in the menu using the cursor keys. You use the "left" and "right" keys to move step by step to the selected row. At the end of the selected row, the cursor jumps to the next row down, if possible. If the menu has multiple rows, you can use the "up" and "down" keys to switch rows. To display the parameters, switch between the individual fields.



**Enter key:** Press ENTER to call up the menu on the start screen. You open the selected submenu from a menu window. By pressing the ENTER key, you transfer the setting values from a parameter window.

### 8.7.2. Menu Functions

The menu is divided into three paths:



INFO



MANUAL



SETTINGS

#### INFO



Select the INFO path for information about the following:

- the burner
- errors that have occurred
- the software version
- display of check sums
- the serial number
- actuating drive positions (current damper position for each channel)
- digital inputs/outputs

#### MANUAL



Select the MANUAL to

- start and stop the burner manually
- adjust the internal burner firing-rate

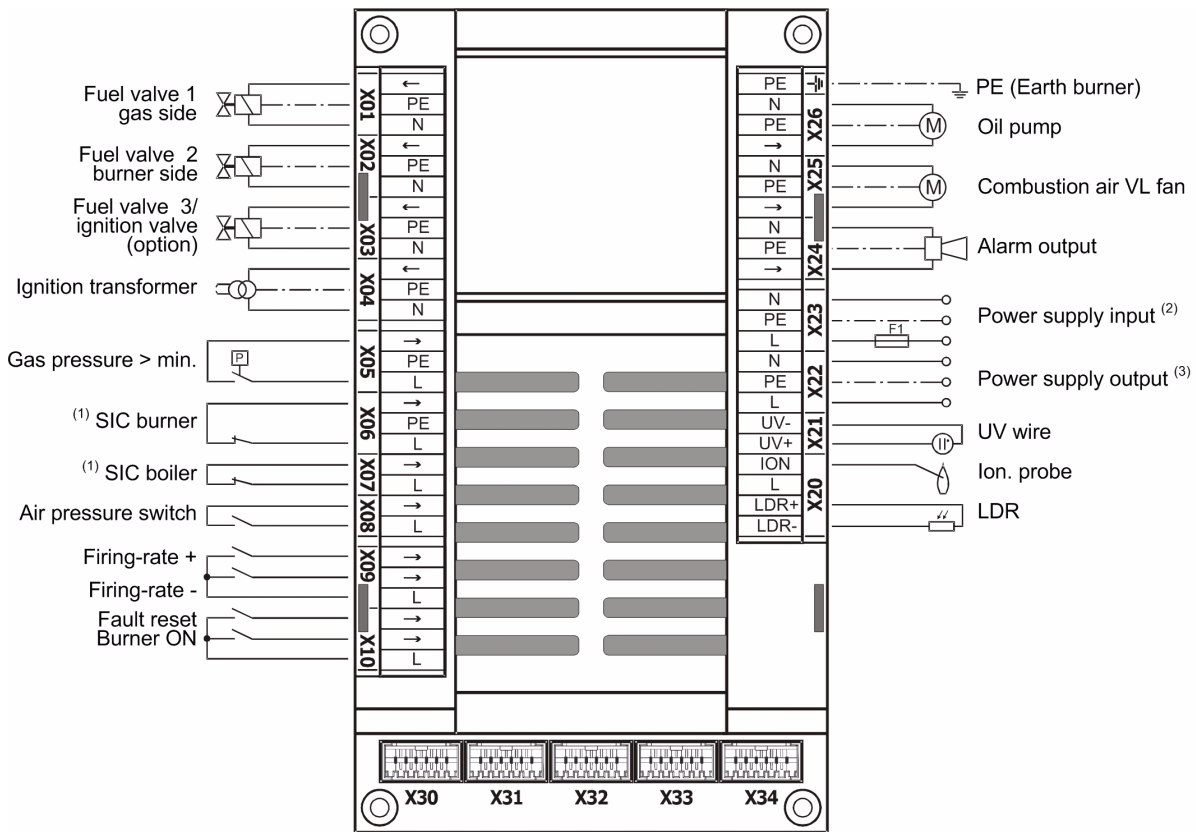
#### SETTINGS



Select the SETTINGS path for information on, and to make settings for, the following:

- the password
- the burner settings (display and settings)
- the actuator device settings (display)
- the air/fuel control system
- the "delete" curve
- the display settings

### 8.7.3. BT300 Connecting Diagram



**X30** = User Interface UI 300

**X31** = LSB Option

**X32** = continuous output 1, e.g. air damper

**X33** = continuous output 2, e.g. gas damper

**X34** = continuous output 3 (optional)

(1) SIC = safety interlock chain

(2) 230V AC 47 - 63Hz external fuse protection required (max 10A slow-blow)

(3) 230V AC for power supply to external devices

#### Maximum Cable Length:

**X01-X10:** 10m

**X30:** 1m

**X20-X21:** 3m

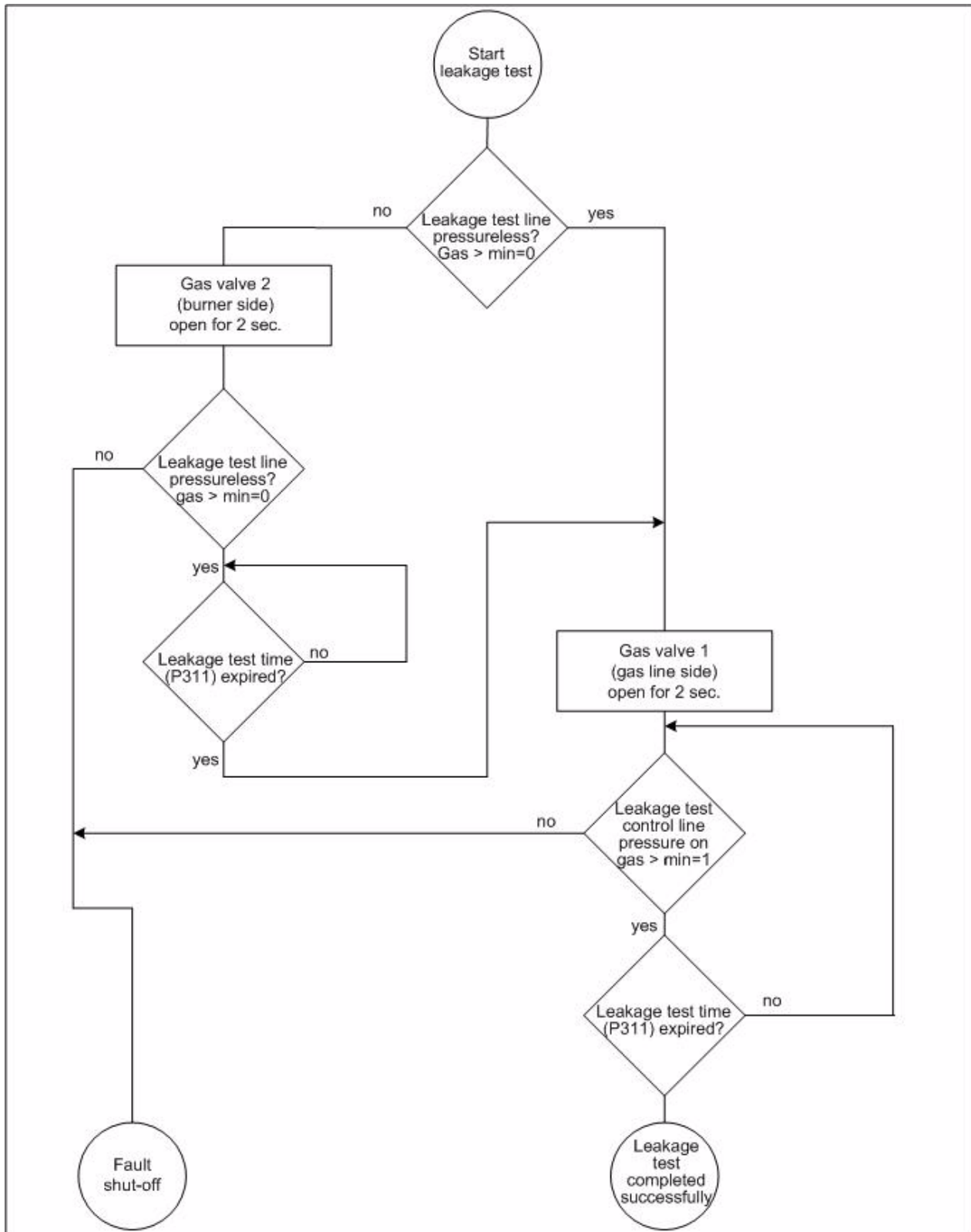
**X31:** 1m

**X22-X23:** unlimited

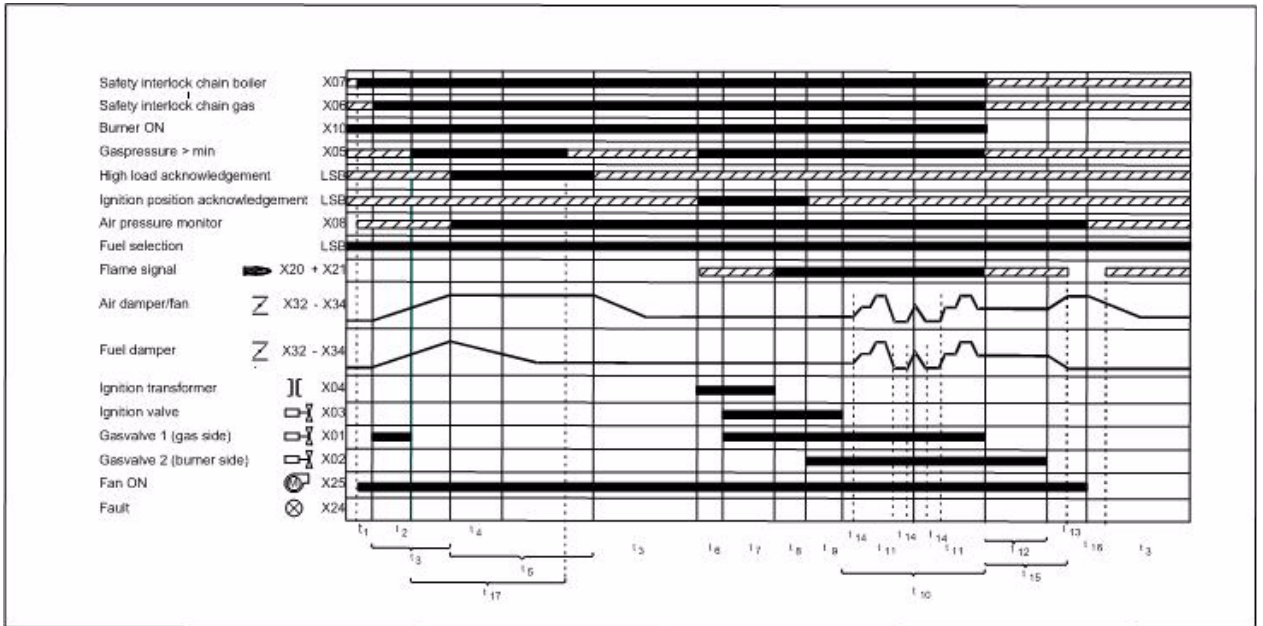
**X32-X34:** 3m

**X24-X26:** 10m

### 8.8. Leakage Test for Main Gas Valves

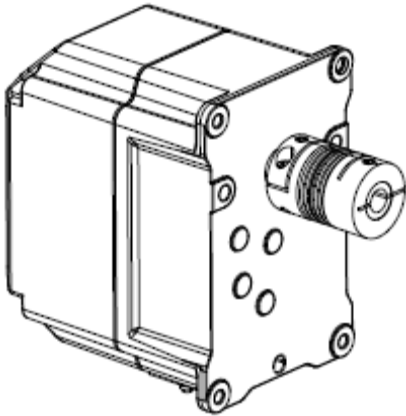






Gas with pilot burner and leakage test BT300

## 8.9. Servomotors



Lamtec motor ver. 2

Servomotors drive air dampers, gas butterfly valve and oil regulator. With the help of servomotors electronic air and fuel ratio control is carried out, controlled by burner control.



- Static electricity can damage servomotor.
- Do not open servomotor. Do not interfere with or modify unit or equipment connected to it. It may damage servomotor or change burner settings.
- Completely isolate equipment from the main supply before performing any wiring changes in servomotor connection area.
- Check that wiring is in an orderly state.
- Protect equipment from condensation, water and ice.
- Fall or shock can adversely affect safety functions. Such servomotors may not be put into operation.



Do not open servomotor. Do not interfere with. It may damage servomotor or change burner settings.

## **8.10. Function Controls and Adjustments**

The BT300 combines the benefits of an electronic fuel-air ratio control system with up to three motorised actuating devices and an optional modules like an analogue output for speed control of the combustion air fan with an electronic burner control unit. The leakage test, flame monitoring system, power control unit and (optional) CO/O<sub>2</sub> controller for control and optimisation of an oil or gas-fired forced-draught burner are all integrated. The BT300 is suitable for virtually all combustion plants. Safety interlock chains, monitors (e.g. gas and air pressure) and sensors are wired directly to the BT300. This greatly reduces the cost of additional relays and wiring. The BT300 was designed to be attached to the burner. The short wiring paths also save money. As a result, the BT300 is particularly suitable as standard equipment for monoblock burners. The compact design of the BT300 burner control system also has its advantages during commissioning. Standardising the wiring and the unified operator interface minimises sources of errors from the start, while intelligent information in the display makes searching for errors much easier.

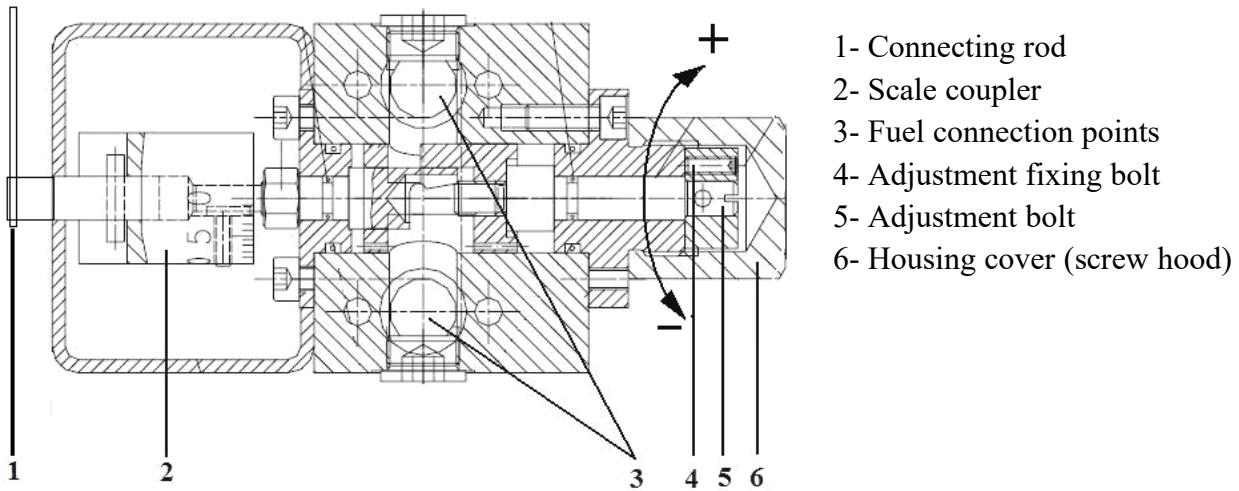


**Magnetic valves must not be energized during pre-purge. Check if valves are in closed position!**

## **8.11. Final Checks**

- Switch of all purges after completion of all necessary measurements.
- Start and stop the burner at least 3 times to check the operation of the program.
- Make sure that all safety circuits on the burner and boiler operate properly before leaving the installation site.

➤ **Oil adjustment regulator**



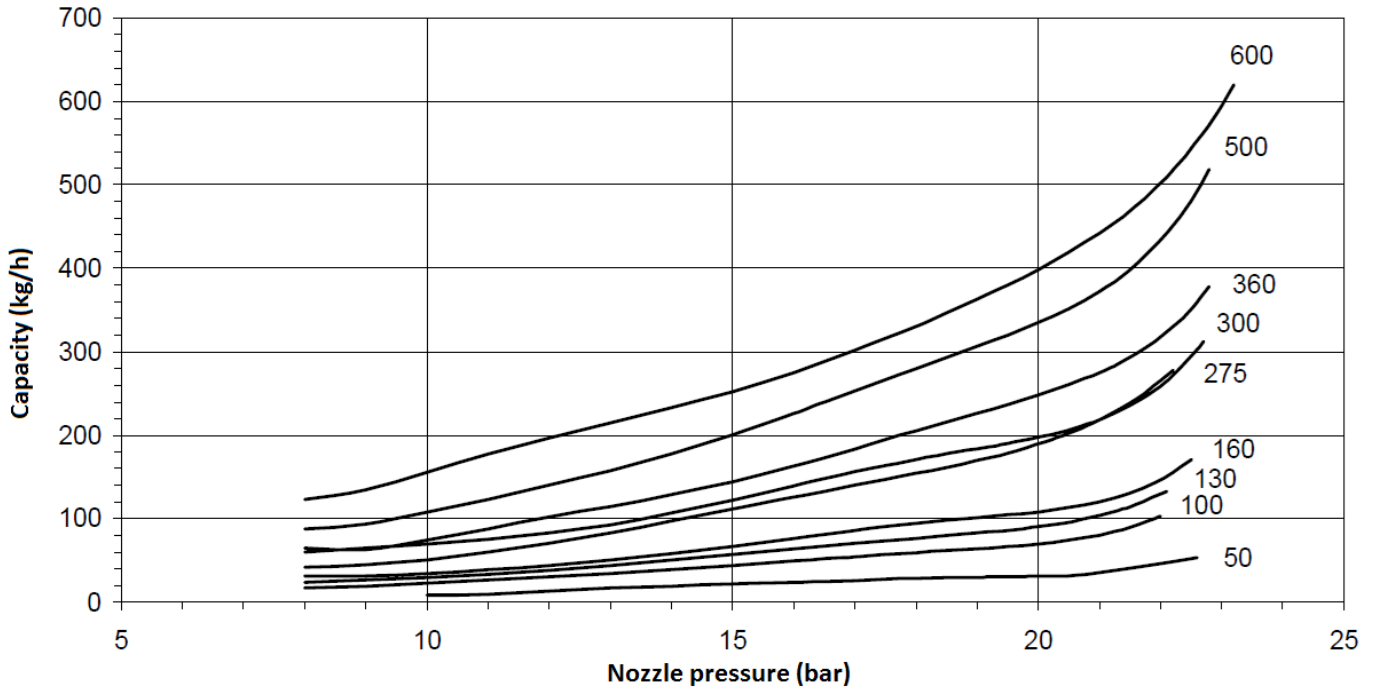
- 1- Connecting rod
- 2- Scale coupler
- 3- Fuel connection points
- 4- Adjustment fixing bolt
- 5- Adjustment bolt
- 6- Housing cover (screw hood)

**Fuel regulator adjustment**

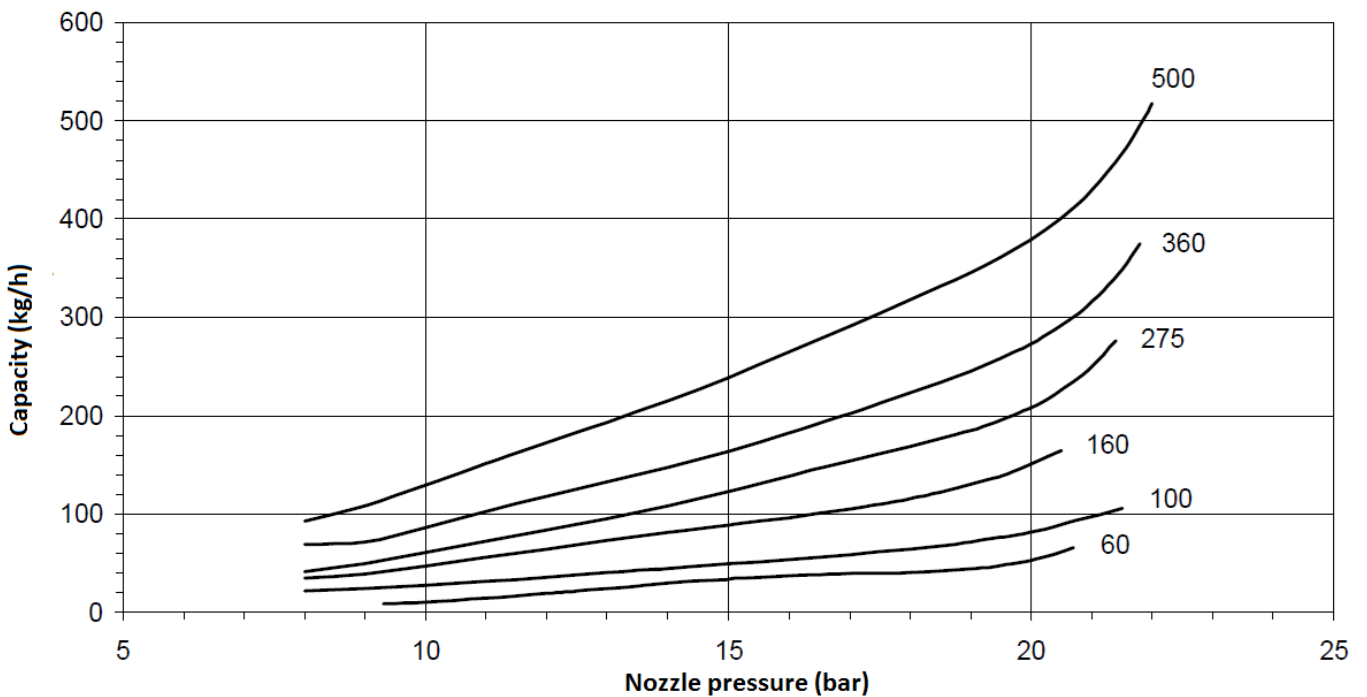
- 1- Remove the housing cover number 6
- 2- Loosen the fixing bolt number 4
- 3- When you rotate the shaft number 5 (when looked from the shaft end) clockwise, the pressure value you observe from return manometer will increase, and burner consumption will also increase since nozzle pressure increases.
- 4- When you rotate the shaft number 5 (when looked from the shaft end) anti-clockwise, the pressure value you observe from return manometer will decrease, and burner consumption will also decrease since nozzle pressure decreases.
- 5- When the adjustment is completed, make sure that the adjustment you have made is permanent by tightening the fixing bolt number 4.
- 6- Place the housing cover number 6.

- Set the burner to the correct capacity required by the boiler by considering the below nozzle pressure and consumption values.

**Diagram valid for fuel nozzles having 45° spraying angle**

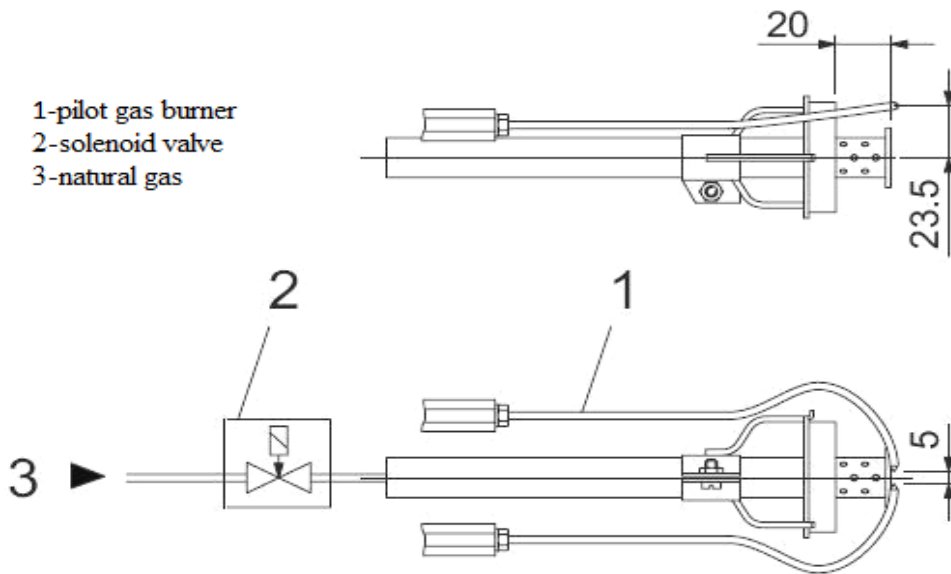


**Diagram valid for fuel nozzles having 60° spraying angle**



- Once the burner modulating adjustment is completed, set modulating control device to automatic position, change set values and observe capacity changes. Air and fuel will increase and decrease simultaneously according to the adjustment you previously made.

### 8.12. Pilot Ignition System



Pilot gas burner inlet pressure  $P_{max} = 200$  mbar

### 8.13. Emission Measurement

In emission measurements, the following values are accepted as reference according to TS EN 676 +A2 standard.

- $CO < 100$  mg/ kWh
- $\%3 \leq O_2 \leq \%5$
- $NO_x < 170$  mg/ kWh
- Excess air ratio  $1,2 \leq \lambda \leq 1,3$

In emission measurements, the following values are accepted as reference according to TS EN 267 standard.

- $CO < 110$  mg/ kWh
- $\%3 \leq O_2 \leq \%5$
- $NO_x < 250$  mg/ kWh
- Excess air ratio  $1,2 \leq \lambda \leq 1,3$



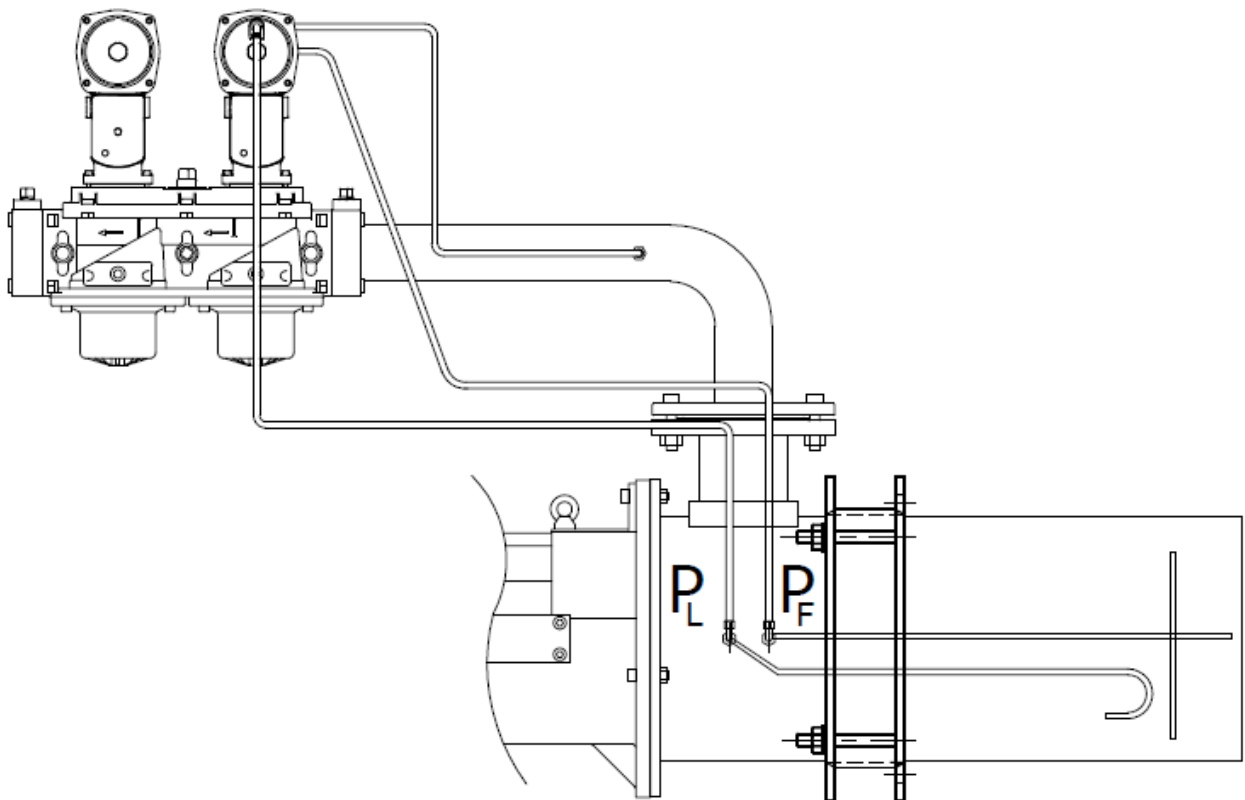
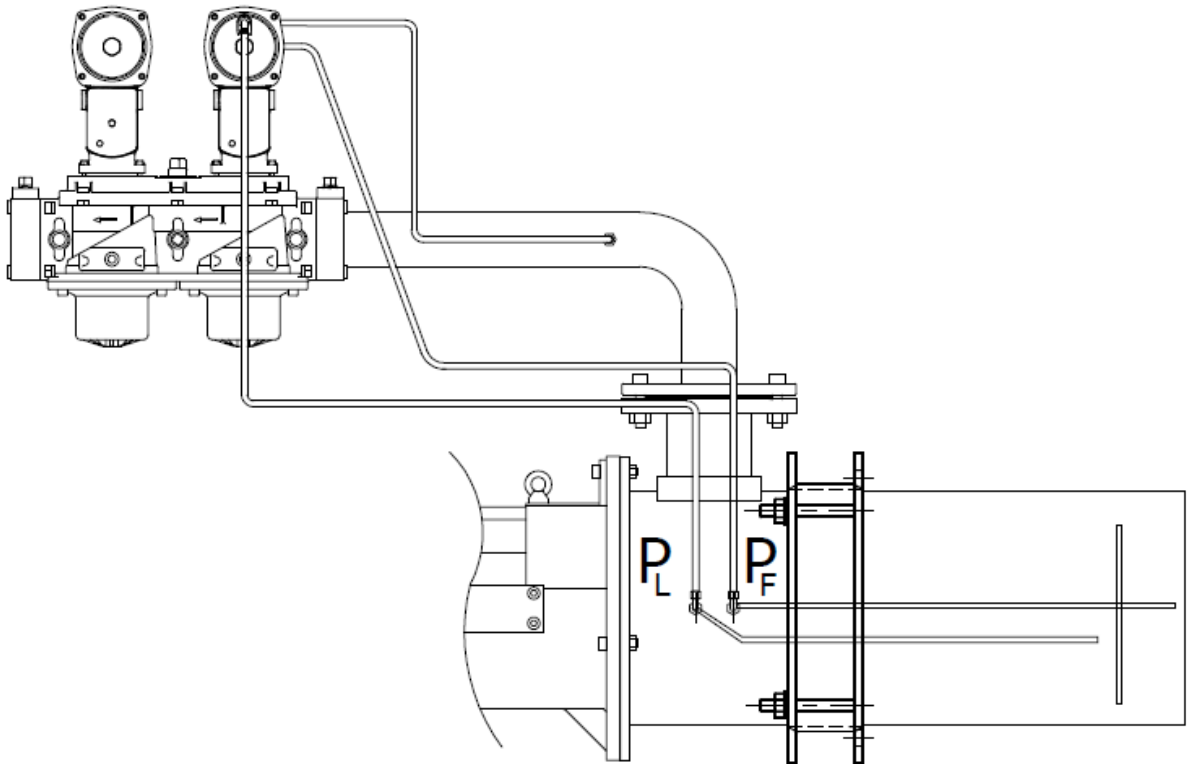
It is important for the boiler to be sealed in order to avoid incorrect measurements during emission measurements.



Boiler temperature must be between  $40\text{ C}^\circ$  and  $80\text{ C}^\circ$  while making emission measurement in hot water boilers.

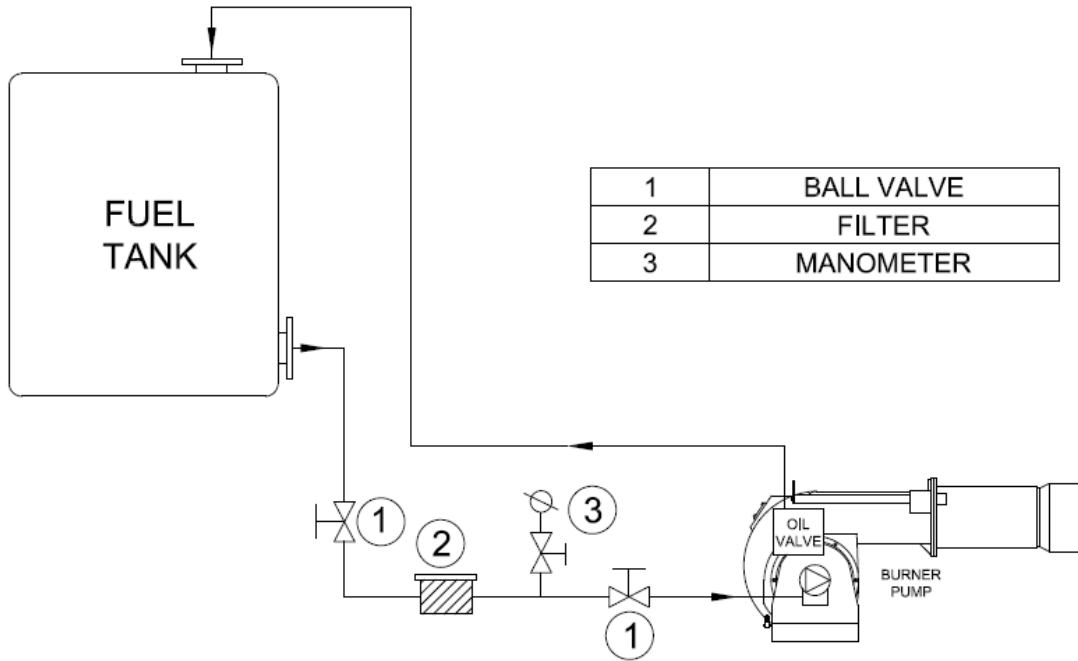


If the value measure from PL point is below 0.5 bar, set the impulse pipe as follows.

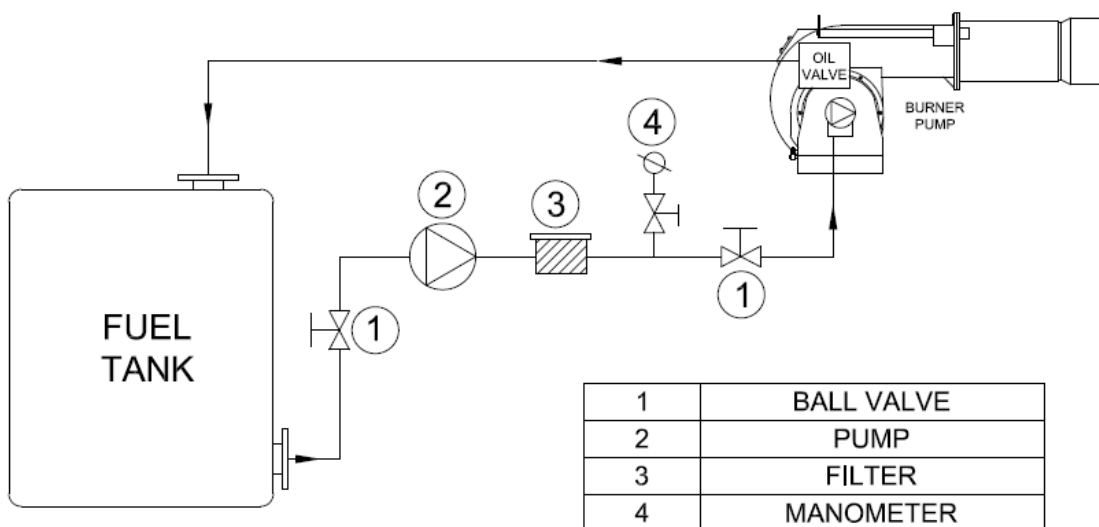


**8.14. Light Oil Burner Fuel Ring Line**

Tank is above the burner level.

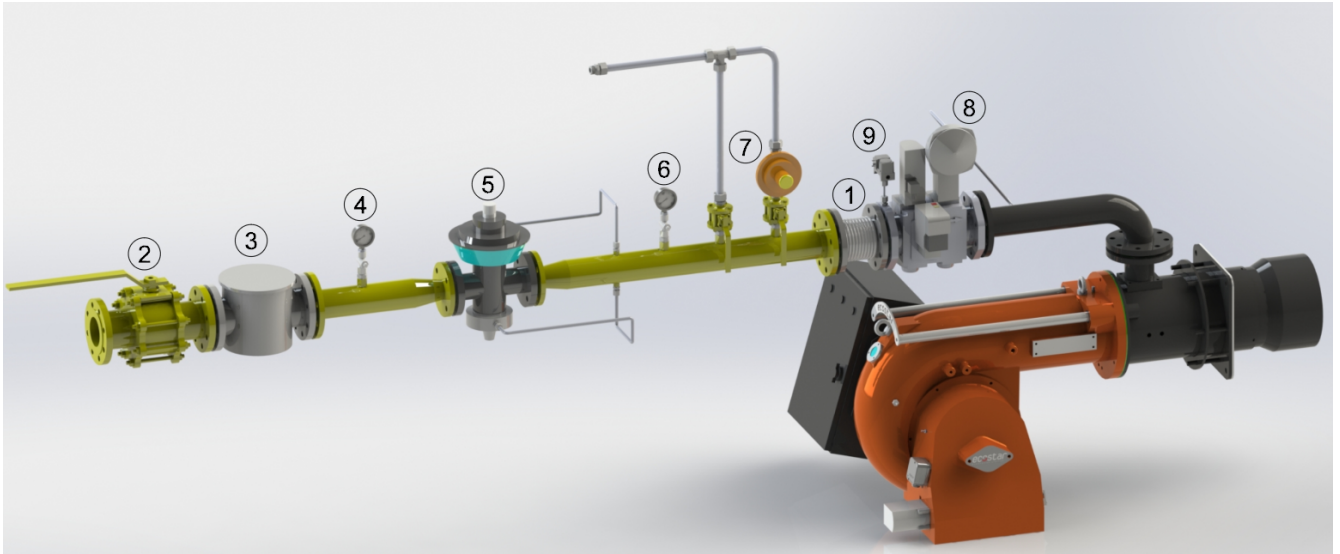


Tank is below the burner level.





### 8.15. Gas Pass Equipment Required in Gas Line



<b>Pe &lt; 300 mbar Q&lt;1200kW</b>	<b>Pe &gt; 300 mbar Q&lt;1200kW</b>	<b>Pe &lt; 300 mbar Q&gt;1200kW</b>	<b>Pe &gt; 300 mbar Q&gt;1200kW</b>
1- Compensator	1- Compensator	1- Compensator	1- Compensator
2- Ball valve	2- Ball valve	2- Ball valve	2- Ball valve
3- Gas filter	3- Gas filter	3- Gas filter	3- Gas filter
4- Inlet manometer + valve	4- Inlet manometer + valve	4- Inlet manometer + valve	4- Inlet manometer + valve
8 – Multi-block (safety and operation solenoids)	5- Regulator	8 – Multi-block (safety and operation solenoids))	5- Regulator
9- Sealing Control Set	6- Outlet manometer + valve	9- Sealing Control Set	6- Outlet manometer + valve
	7- Safety discharge valve		7- Safety discharge valve
	8 – Multi-block (safety and operation solenoids)		8 – Multi-block (safety and operation solenoids)
	9- Sealing Control Set		9- Sealing Control Set



Threaded and flanged connections may vary depending on the gas pressure and consumption.

## 9. MAINTENANCE

### 9.1. Weekly Maintenance

Weekly maintenance is a routine cleaning and adjustment procedure which is performed to ensure smooth and continuous operation of the system. Burner components must be adjusted after each maintenance work in accordance with the instructions. Otherwise, the burner cannot be operated efficiently.

- Clean all filters in fuel ring system.
- Clean fuel nozzle of the burner.
- If the fin spaces and surface of the diffuser are covered with particles and formed a layer, clean it with a wire brush.
- Clean heads of ignition electrodes. Check by performing manual ignition, adjust the distance between the ignition electrode and diffuser according to the adjustment instructions.

### 9.2. Monthly Maintenance

Monthly maintenance is a more comprehensive maintenance compared to weekly maintenance, where general checks of burner and peripheral components are performed to prevent possible faults. After completion of maintenance and adjustment processes, make sure to perform a combustion analysis.

- Clean the filters on the fuel line to the burner.
- Clean fuel nozzle of the burner.
- Clean the surface of the diffuser.
- Clean flame pipe.
- Check all wiring points. Tighten loose connections.
- Clean the solenoid valves.
- Clean the photocell.
- Clean the dust and layers accumulated on the fan and air valves.
- Check pump pressure. Check if necessary (Light Oil: Modulating; 25 bar)
- Check ignition electrodes. Adjust it if necessary. Check ignition cables and sockets.
- Perform cleanliness control of inside panel. Clean if necessary.
- Check all bolts of the burner. Tighten loose bolts.
- Clean the filters on the main line and multiblock.
- Check the burner gas tip.
- Check gas line pressure, it must be the same with the first adjusted pressure, otherwise burner load and emission values will also have changed.
- After starting the burner and adjusting air klappe, perform flue gas analysis and check if there is an ideal combustion.

### **9.3. Seasonal Maintenance**

Comprehensive maintenance work when the burner is re-started after long periods of shut-down or interruptions. After completion of maintenance and adjustment processes, make sure to perform a combustion analysis.

- Check insulation resistance of electric motor.
- Make surface cleaning of ignition electrodes and porcelains. Replace cracked or broken porcelains.
- Clean air fan and clamps.
- Check the operating function.
- Check cleanliness of the nozzle. Replace it if necessary.
- Clean the N.C. solenoid valve. Measure the coil winding resistance.
- Clean the strainer (filter) under the pump cover.
- Clean the photocell.
- Clean fuel filter. Replace it if necessary.
- Check boiler thermostats.
- Check cleanliness of boiler inside and clean if necessary.

## 10. TROUBLESHOOTING

Problem	Cause	Explanation-Suggestion
Burner cannot be commissioned	Light Oil or Gas is cut or does not come	Light Oil or Gas valve might be closed. Open the valve.
	Fuse failure	Check burner power supply. The fuse on the main panel or the fuse on the burner might be tripped.
	Relay failure	Reset the thermal relay. Check adjustment of the thermal relay according to the current in motor label. If the failure is not removed, replace the thermal relay.
	Boiler thermostat, pressure switch failure	If there is a problem with the burner thermostats, pressure switches and steam tank this may be due to an unadjusted or faulty water level device; adjust it and if broken, replace it.
Flame appears and goes into failure mode.	Light Oil or Gas pressure error	Circuit light oil or gas pressure might have dropped.
	Photocell failure	Photocell may be faulty or contaminated. Remove and clean..
	Program relay failure	Replace it with a new one.
Burner starts up, but fails after 10 seconds.	Program relay failure	Replace it with a new one.
	Air pressure switch adjustment	Air pressure switch might be adjusted to a high value. There may be dirt in the air pressure switch. Air pressure switch might be broken.
	Fan motor failure	Check fan motor coils, motor contactor and outlet from program relay.
Burner starts up, but fails after 30 seconds.	Light Oil or Gas valve, fuel oil or gas pressure drop	Light Oil or Gas valve might be closed. Circuit fuel oil or gas pressure might have dropped. Check Light Oil or Gas inlet manometer.
	Ignition electrode failure	Ignition electrodes might be misadjusted or ignition cables might have come out of their terminals. Adjust ignition electrodes with a distance of 3-5 mm. between them.
Boiler cover is overheating.	Sealing problem	Ensure sealing between the boiler cover and burner. If required, use insulating material between the boiler connecting flange and boiler cover.



## 12. AFTER SALES SERVICES

Dear Customer,

We believe that providing a good service is as important as providing a good product. Therefore, we continue offering wide range of comprehensive services to our conscious customers.

For your suggestions, complaints and service requests  
**Esentepe Mah. Milangaz Cad. No:75 K:3**  
**Kartal Monumento Plaza**  
**KARTAL/İSTANBUL/TÜRKİYE**  
**Tel: 444 8 326**  
**Fax: +90 216 370 45 03**

Factory Contact Details  
**Türkgücü OSB**  
**Bülent Ecevit Bulvarı No:11**  
**ÇORLU/TEKİRDAĞ/TÜRKİYE**  
**Tel: +90 282 685 44 80-81**  
**Fax: +90 282 685 42 09**

Also you can contact with us:  
**Web site : [www.ecostar.com.tr](http://www.ecostar.com.tr)**  
**E - mail : [servis@ecostar.com.tr](mailto:servis@ecostar.com.tr)**



Please observe the following recommendations.

- Use the product in accordance with the principles of this manual.
- For any service demands regarding the product, please contact our Service Center from the abovementioned phone numbers.
- Upon your purchase, register your warranty certificate during installation.

