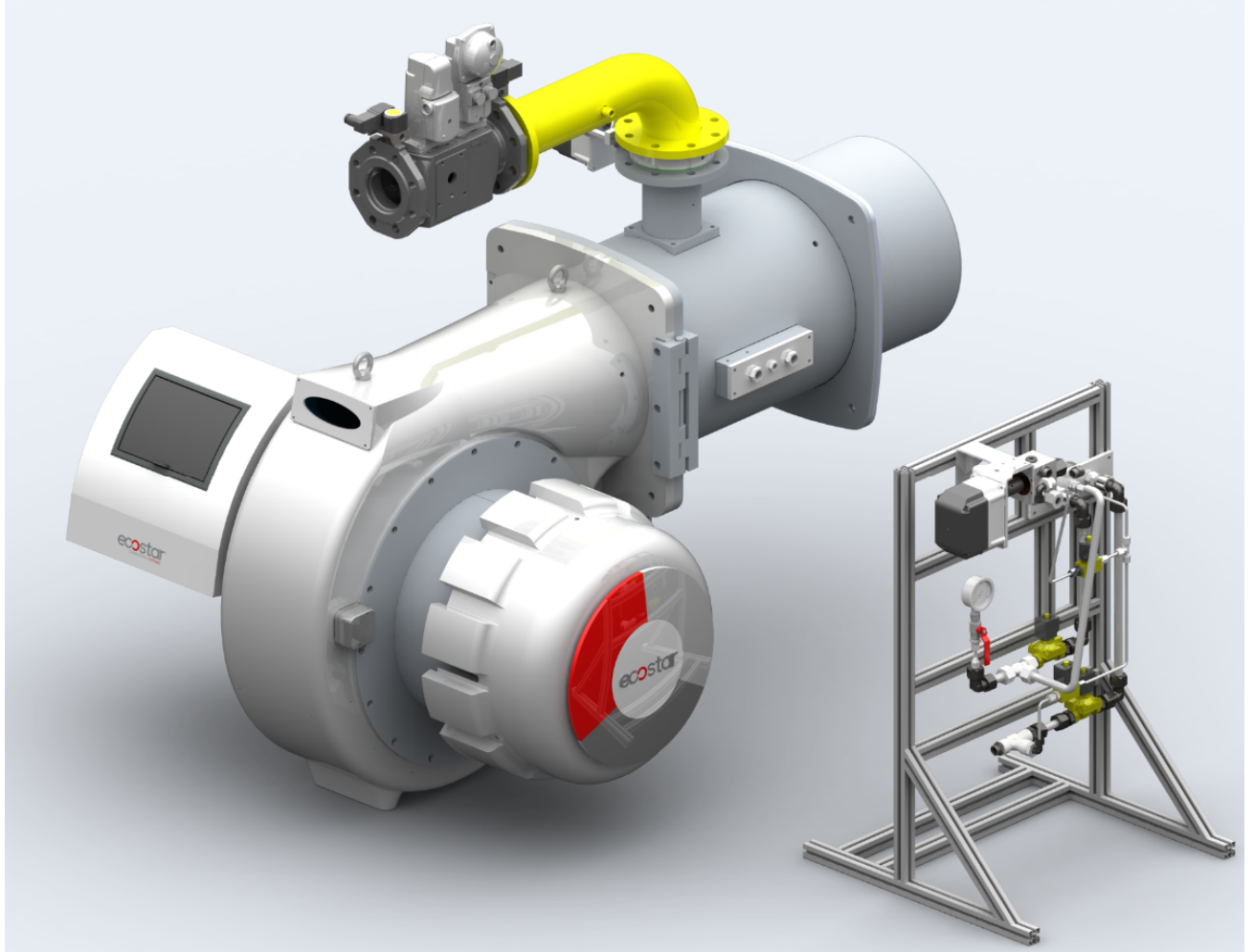


MONOBLOCK NG SERIES DUAL FUEL (GAS- HEAVY OIL) BURNERS INSTALLATION, OPERATING AND MAINTENANCE MANUAL

MODULATING OPERATION



ECO 8 NG
ECO 8,5 NG
ECO 9 NG



DEAR USER,

ECOSTAR **ECO 8, ECO 8,5, ECO 9 Dual Fuel (Gas-Heavy 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.

CONTENTS

1. WARNINGS.....	3
1.1. Warning Symbols and Descriptions.....	3
1.2. General Safety Rules.....	4
2. TERMS OF WARRANTY	6
2.1. Out of Warranty Conditions	6
3. BURNER’S GENERAL FEATURES	7
3.1. Purpose of Use and Work Limits of Burners	7
3.2. Code Key.....	7
3.3. Burner Components	9
4. GAS, FLUE GAS AND HEATING WATER SCHEMA	13
5. TECHNICAL DATA.....	15
5.1. Capacity Table.....	15
5.2. Back Pressure-Capacity Diagrams.....	16
5.3. Burner Dimensions	18
5.4. Gas Hood Pressure Loss Diagram	19
5.5. Flame Length and Diameter	21
6. INSTALLATION	22
6.1. Burner Installation Picture.....	22
6.2. In reverse flame front mirror boilers.....	23
6.3. In cylindrical (straight flame) boilers	23
7. COMMISSIONING	25
7.1. Before Commissioning.....	25
7.2. General Controls.....	25
7.3. Combustion Adjustment.....	27
7.4. Fuel Pumps	27
7.5. Gas Adjustment	37
7.5.1. VGD 40... Series Gas Valve	37
7.6. Air pressure switch adjustment.....	37
7.7. BT 300.....	38
7.7.1. Operating Control and Displays.....	39
7.7.2. Menu Functions.....	40
7.7.3. BT300 Connecting Diagram.....	41
7.8. Leakage Test for Main Gas Valves.....	42
7.9. Servomotors.....	44
7.10. Function Controls and Adjustments.....	45
7.11. Final Checks.....	45
7.12. Pilot Ignition System.....	48
7.13. Emission Measurement.....	48
7.14. Heavy Oil Burner Fuel Ring Line.....	49
7.15. Gas Pass Equipment Required in Gas Line	50
8. MAINTENANCE	51
8.1. Monthly Maintenance	51
8.2. Seasonal Maintenance.....	51
9. FAULT HISTORY.....	52
10. PERIODICAL FLUE GAS MEASUREMENT REPORT.....	53
11. AFTER SALES SERVICES.....	54
12. NOTES	55

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 _F	Impulse connection detecting combustion chamber pressure
P _L	Impulse connection detecting combustion air pressure
P _{BR}	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 scent of gas;

- 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-Heavy 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-Heavy Oil) burners are designed and manufactured to work with liquid fuel with max. 2.5- 20 Cst (mm²/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.

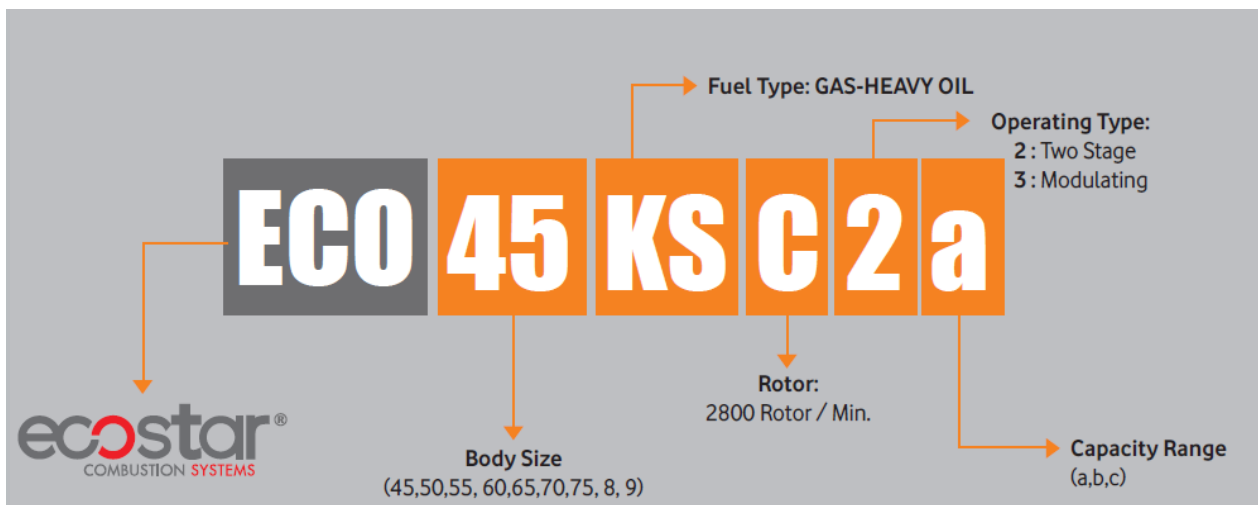
3.1. Purpose of Use and Work Limits of Burners

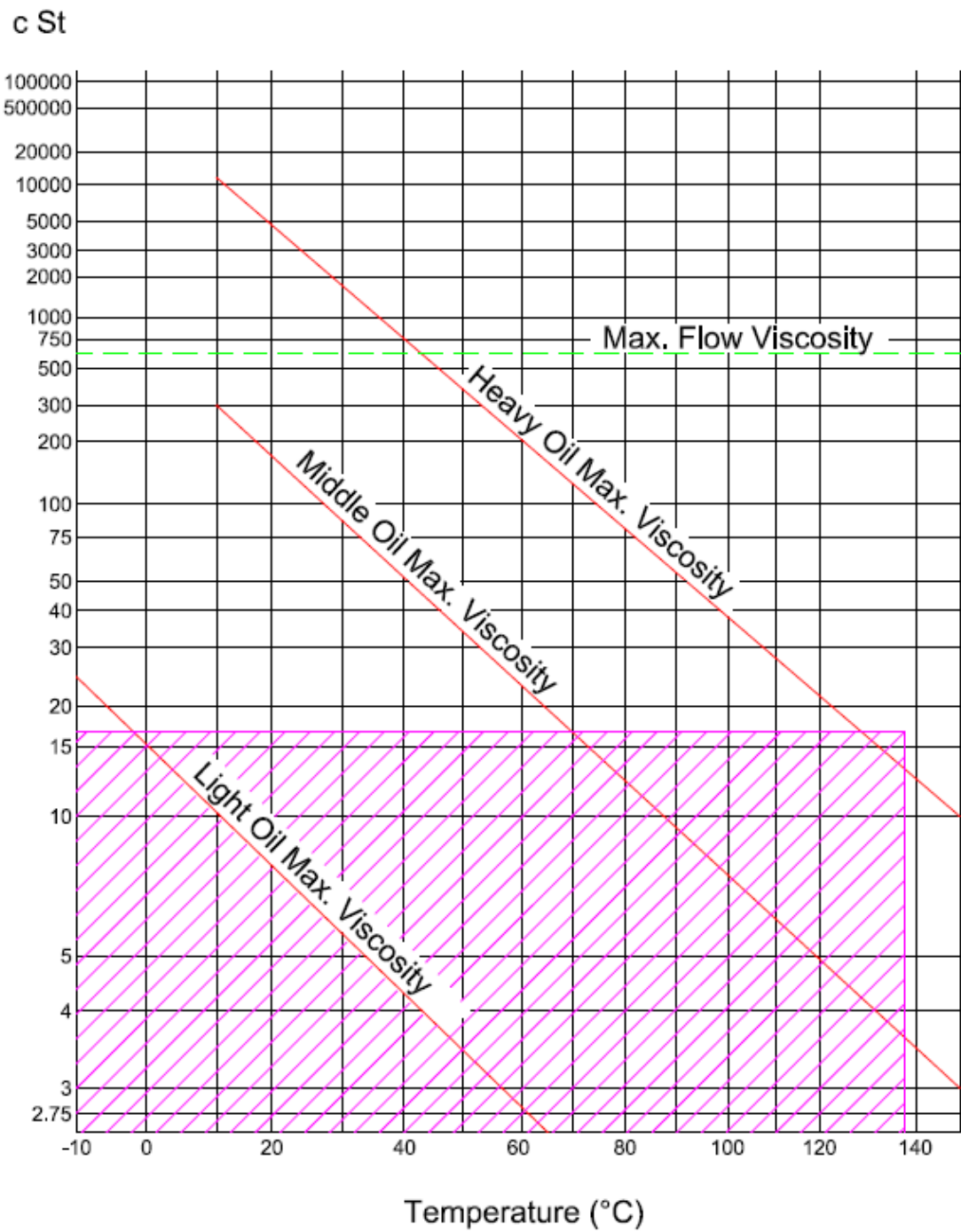
- This product works at any load value equivalent to its max. capacity or covered by its capacity range;
 - In hot water and steam boilers,
 - In direct and indirect hot air generators,
 - Industrial appliances operating at temperature below 600 °C,
 - -15 °C...+60 °C ambient temperature range,
 - 1N 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





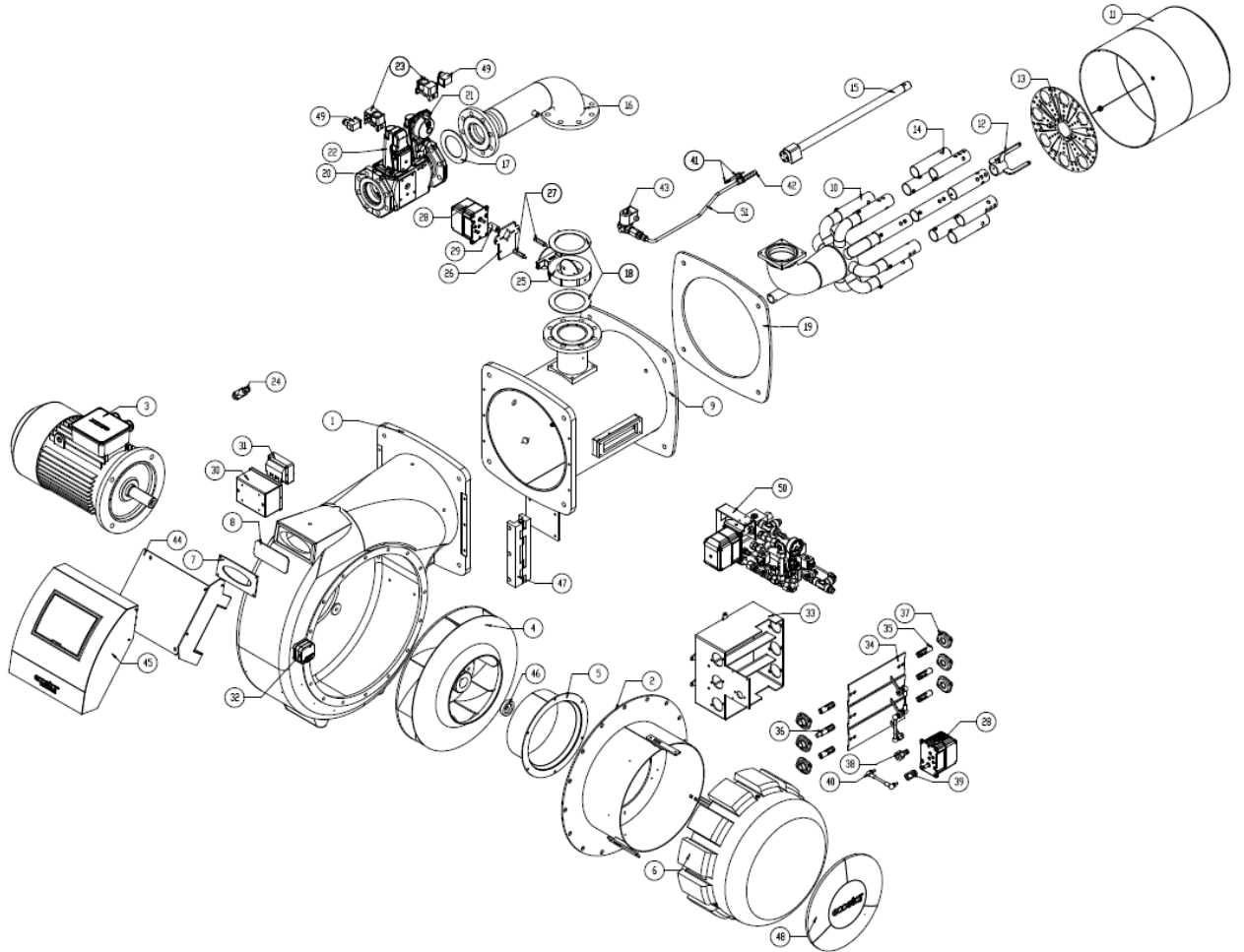
Temperature change of fuel used in ECOSTAR Dual Fuel (Gas-Heavy Oil) burners dependent on viscosity



Operating Range

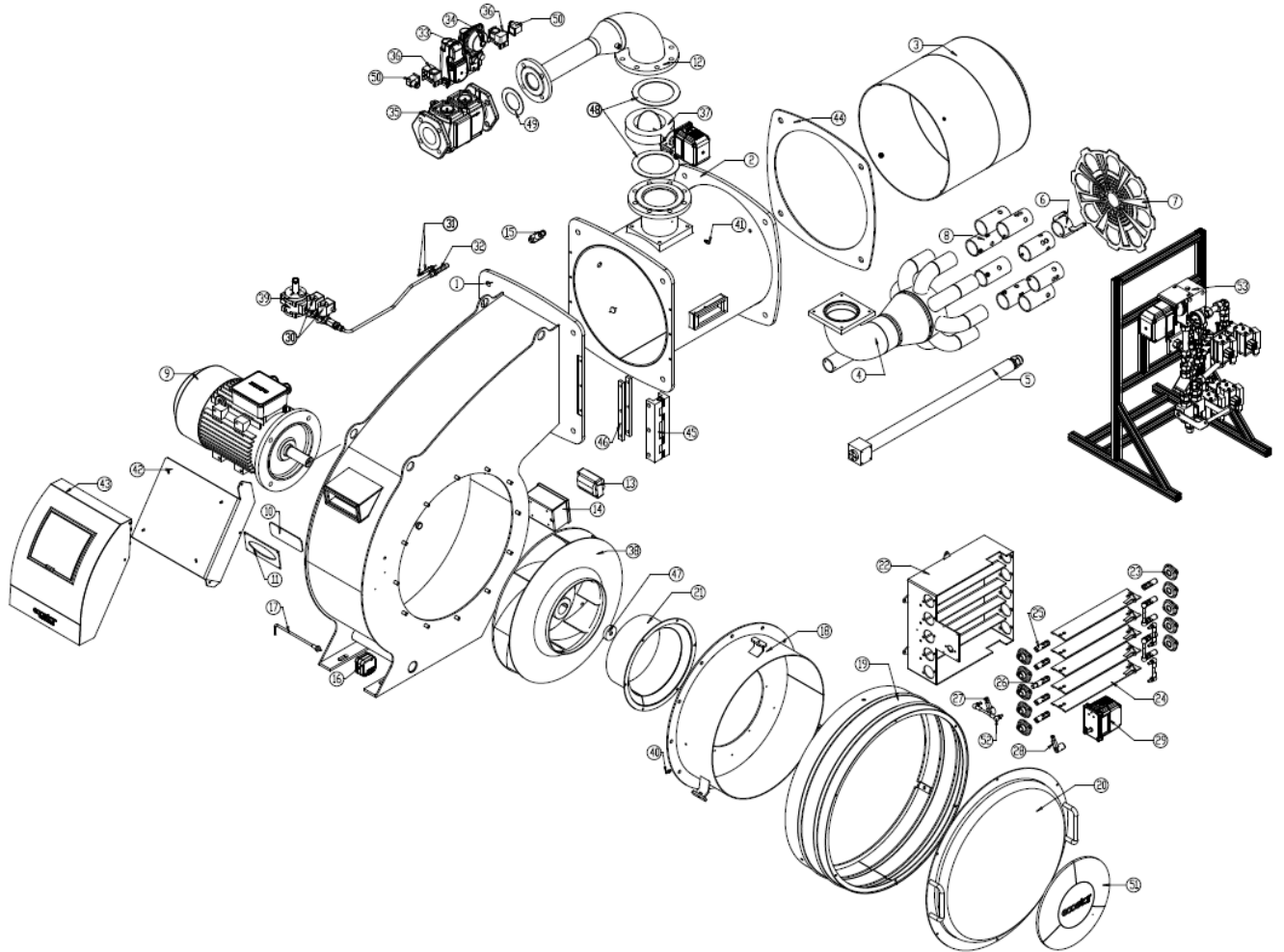
3.3. Burner Components

ECO 8 NG



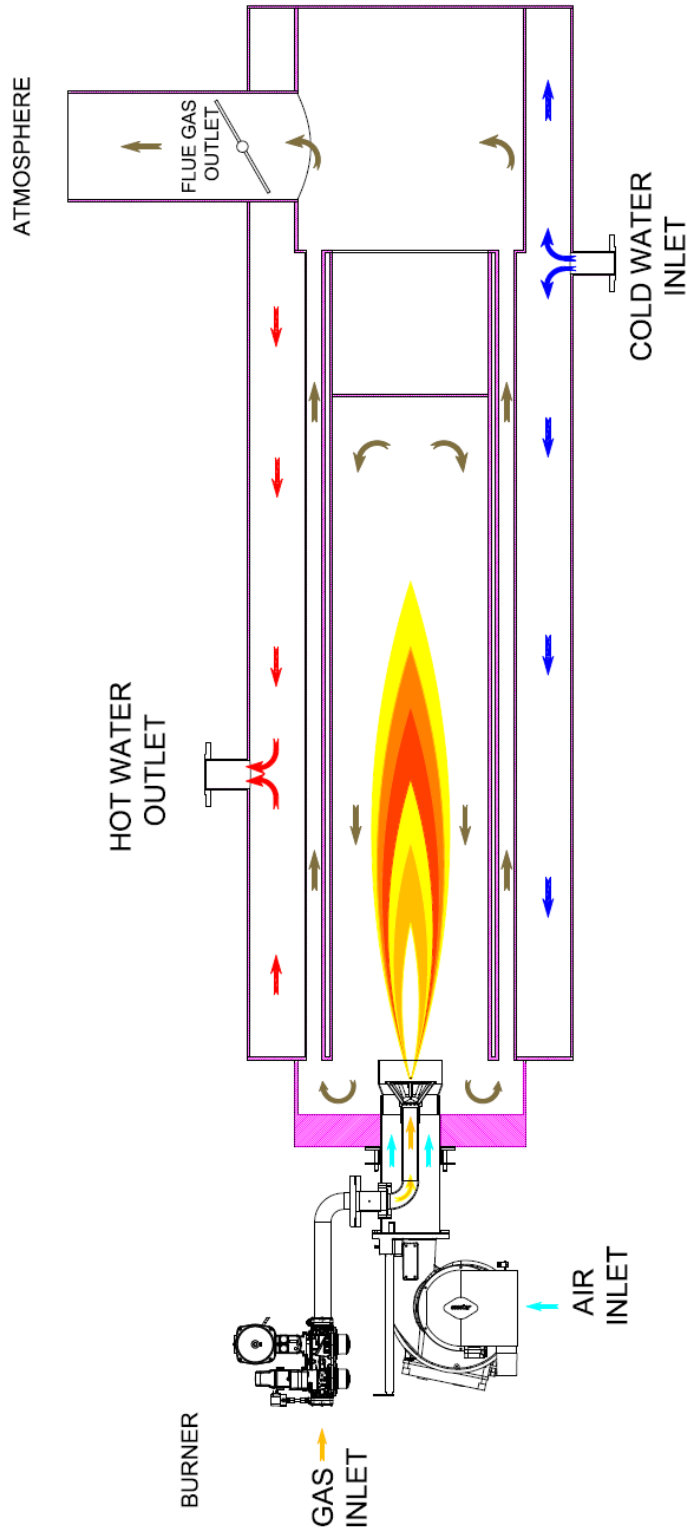
ASSEMBLY NO.	DESCRIPTION
1	BODY
2	AIR DAMPER MOUNTING FLANGE
3	MOTOR
4	FAN
5	AIR INLER CONE
6	SILENCER
7	OBSERVATION GLASS PLATE
8	OBSERVATION GLASS
9	COMBUSTION HEAD
10	GAS HEAD
11	FLAME PIPE
12	TURBULATOR CENTERING PART
13	TURBULATOR
14	GAS NOZZLE
15	LANCE
16	GAS INLET PIPE
17	KLINGRITE GASKET
18	KLINGRITE GASKET
19	GASKET
20	VALVE
21	ACTUATOR
22	ACTUATOR
23	GAS SWITCH
24	FLAME DETECTOR
25	BUTTERFLY VALVE
26	SERVOMOTOR CONNECTION SHEET
27	SERVOMOTOR CONNECTION SHAFT
28	SERVOMOTOR
29	COUPLING
30	TRANSFORMER BOX
31	TRANSFORMER
32	AIR SWITCH
33	AIR DAMPER MOUNTING PLATE
34	AIR DAMPER-PLATE
35	AIR DAMPER-PLATE MOUNTING SHAFT(SHORT)
36	AIR DAMPER-PLATE MOUNTING SHAFT(LONG)
37	BEARING
38	AIR DAMPER-PLATE MOTION ROD
39	COUPLING
40	BALL JOINT
41	PILOT IGNITION ELECTRODE
42	PILOT IGNITION NOZZLE
43	VALVE
44	PANEL CONNECTION PLATE
45	ELECTRICAL PANEL
46	FAN CONNECTION WASHER
47	HINGE
48	PAN LABEL
49	GREY SOCKET
50	LIQUID FUEL INSTALLATION
51	IGNITION GROUP

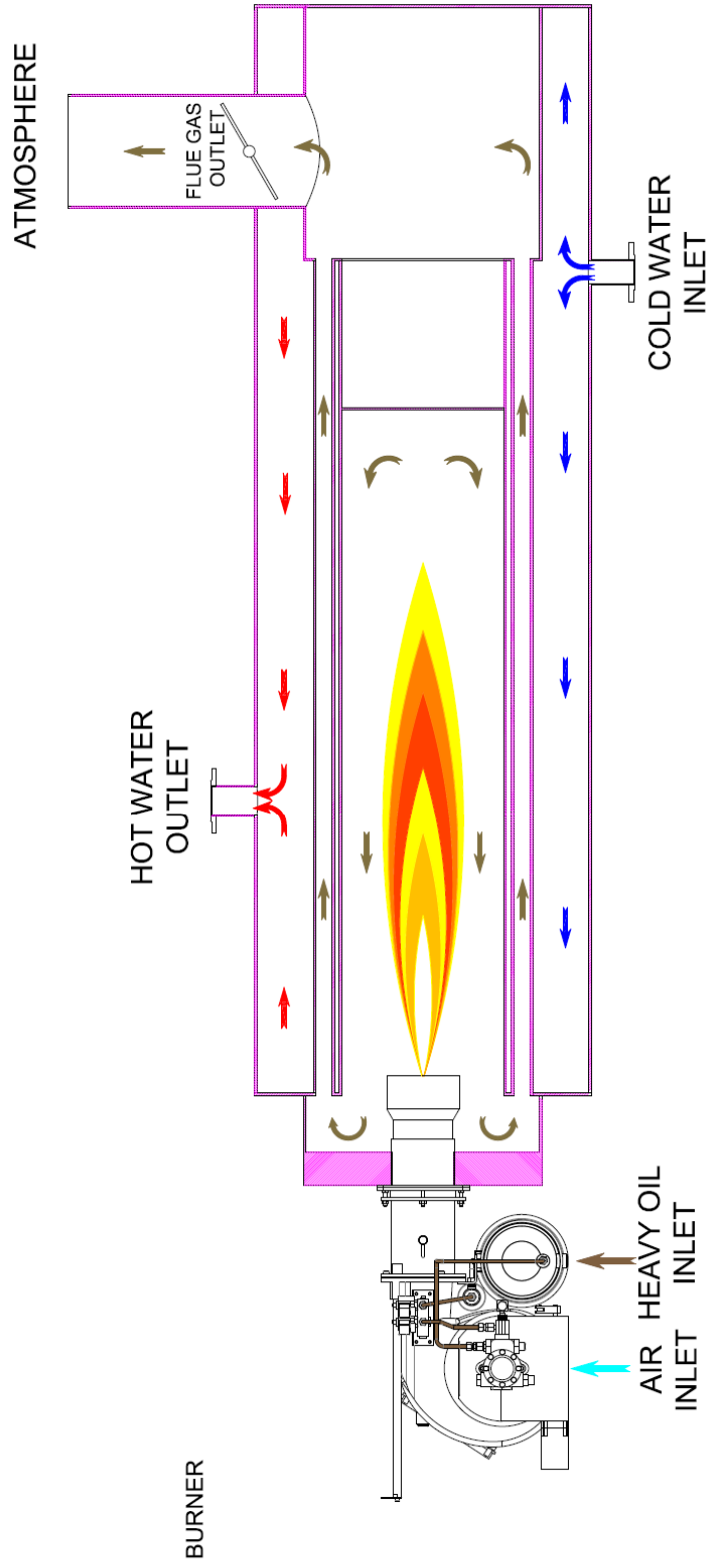
ECO 8,5 NG-ECO 9 NG



ASSEMBLY NO.	DESCRIPTION
1	BODY
2	COMBUSTION HEAD
3	FLAME PIPE
4	GAS HEAD
5	FUEL LANCE
6	TURBULATOR CENTERING PART
7	TURBULATOR
8	NOZZLE
9	MOTOR
10	OBSERVATION GLASS
11	OBSERVATION GLASS PLATE
12	GAS INLET PIPE
13	TRANSFORMER
14	TRANSFORMER BOX
15	FLAME DETECTOR
16	AIR SWITCH
17	AIR SWITCH ADAPTER
18	AIR DAMPER MOUNTING FLANGE
19	SILENCER
20	SILENCER COVER
21	AIR INLER CONE
22	AIR DAMPER MOUNTING PLATE
23	BEARING
24	AIR DAMPER-PLATE
25	AIR DAMPER-PLATE MOUNTING SHAFT(SHORT)
26	AIR DAMPER-PLATE MOUNTING SHAFT(LONG)
27	SERVOMOTOR MOTION ROD
28	COUPLING
29	SERVOMOTOR
30	VALVE
31	PILOT IGNITION ELECTRODE
32	PILOT IGNITION NOZZLE
33	ACTUATOR
34	ACTUATOR
35	VALVE
36	GAS SWITCH
37	GAS VALVE GROUP
38	FAN
39	REGULATOR
40	AIR SWITCH PURGER
41	PUGER
42	PANEL CONNECTION PLATE
43	ELECTRICAL PANEL
44	GASKET
45	HINGE
46	HINGE ADDITIONAL SHEET
47	FAN CONNECTION WASHER
48	KLINGRITE GASKET
49	KLINGRITE GASKET
50	GREY SOCKET
51	PAN LABEL
52	BALL JOINT
53	LIQUID FUEL GROUP

4. GAS, FLUE GAS AND HEATING WATER SCHEMA





5. TECHNICAL DATA

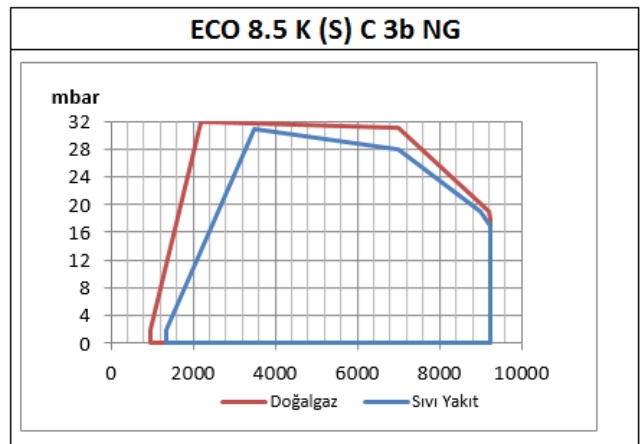
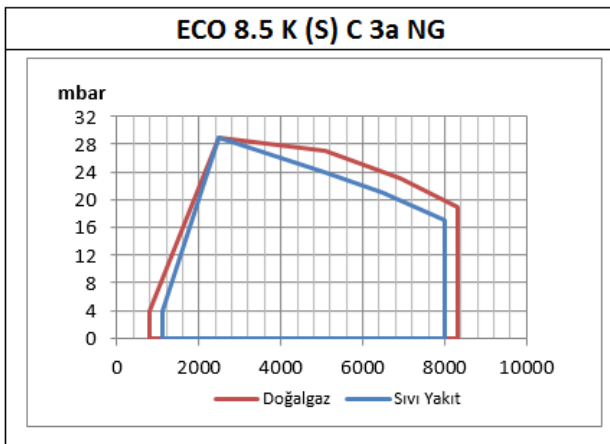
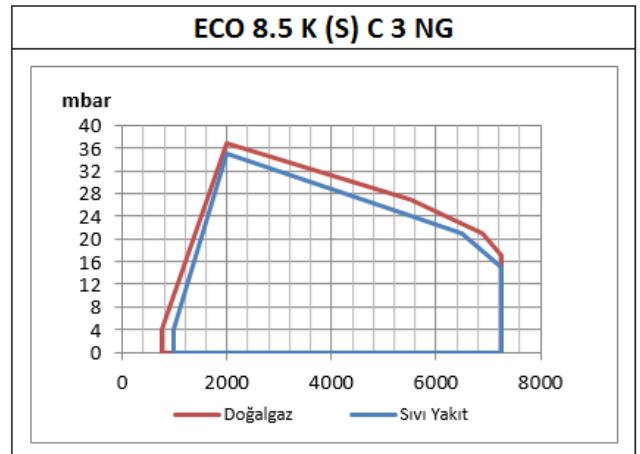
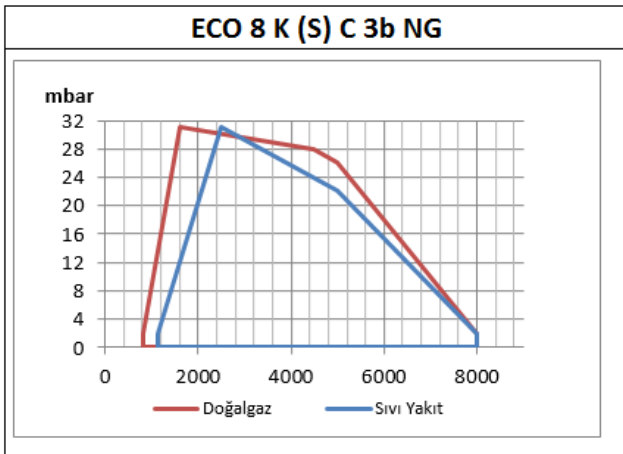
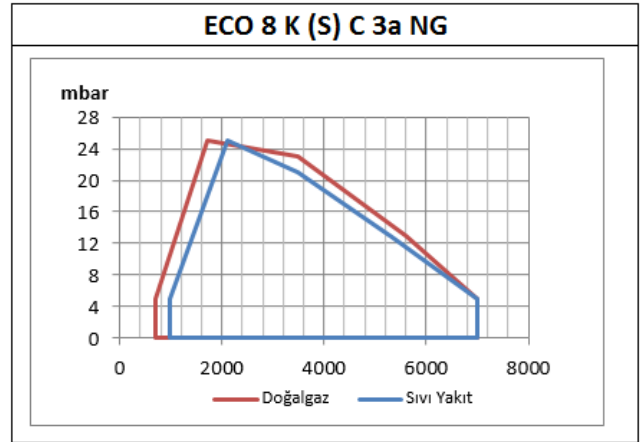
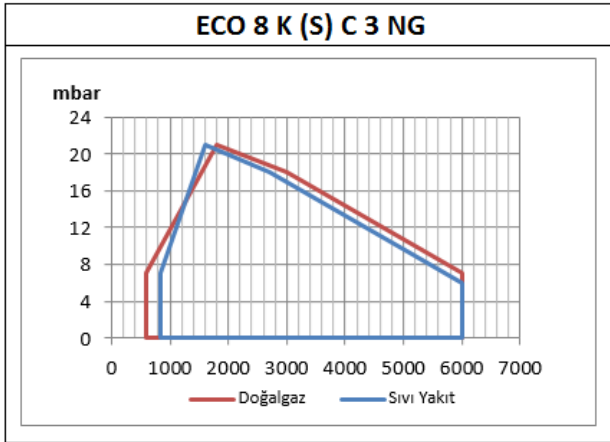
5.1. Capacity Table

NEW GENERATION MODULATING GAS-HEAVY-OIL BURNERS CAPACITY TABLE																
BURNER TYPE	NATURAL GAS CAPACITY		NATURAL GAS CAPACITY		NATURAL GAS CONSUMPTION		HEAVY OIL CAPACITY		HEAVY OIL CAPACITY		HEAVY OIL CONSUMPTION		FAN MOTOR POWER	FUEL PUMP POWER	FUEL HEATER	MAIN SUPPLY
	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. Nm ³ /h	Max. Nm ³ /h	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. kg/h	Max. kg/h	kW	kW	kW	VAC
ECO 8 K(S) C 3 NG	516.000	5.160.000	600	6000	62.5	625.5	722.400	5.160.000	840	6000	74,9	534,7	11	2,2	2 x 14,0	3N 400
ECO 8 K(S) C 3 a NG	602.000	6.020.000	700	7000	73.0	729,7	842.800	6.020.000	980	7000	87,3	623,8	11	2,2	2 x 16,0	3N 400
ECO 8 K(S) C 3 b NG	688.000	6.880.000	800	8000	83.4	833,9	963.200	6.880.000	1120	8000	99,8	713,0	15	2,2	2 x 16,0	3N 400
ECO 8.5 K(S) C 3 NG	645.000	6.235.000	750	7250	78,2	755,8	851.400	6.235.000	990	7250	88,2	646,1	18,5	2,2	2 x 16,0	3N 400
ECO 8.5 K(S) C 3a NG	688.000	7.138.000	800	8300	83,4	865,2	963.200	6.880.000	1120	8000	99,8	713,0	22	2,2	2 x 16,0	3N 400
ECO 8.5 K(S) C 3b NG	817.000	7.955.000	950	9250	99,0	964,2	1.143.800	7.955.000	1330	9250	118,5	824,4	22	2,2	2 x 16,0	3N 400
ECO 9 K(S) C 3 NG	731.000	7.310.000	850	8500	88,6	886,1	1.023.400	7.310.000	1190	8500	106,1	757,5	18,5	4	37,0	3N 400
ECO 9 K(S) C 3a NG	774.000	7.740.000	900	9000	93,8	938,2	1.083.600	7.740.000	1260	9000	112,3	802,1	22	4	37,0	3N 400
ECO 9 K(S) C 3b NG	946.000	9.030.000	1100	10500	114,7	1094,5	1.324.400	9.030.000	1540	10500	137,2	935,8	22	4	37,0	3N 400
ECO 9 K(S) C 3c NG	1.290.000	10.320.000	1500	12000	156,4	1250,9	1.806.000	10.320.000	2100	12000	187,2	1069,4	22	4	37,0	3N 400

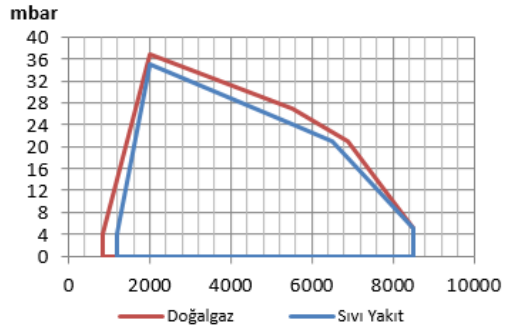
H_u Natural Gas = 8250 Kcal/m³

H_u Heavy Oil (S) = 9650 Kcal/kg

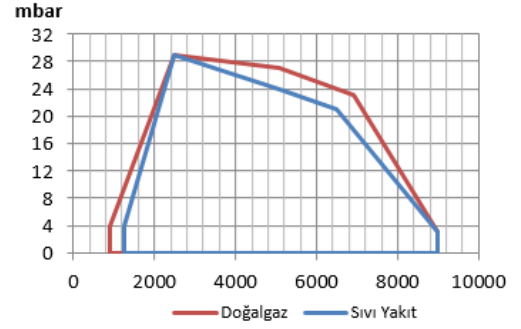
5.2. Back Pressure-Capacity Diagrams



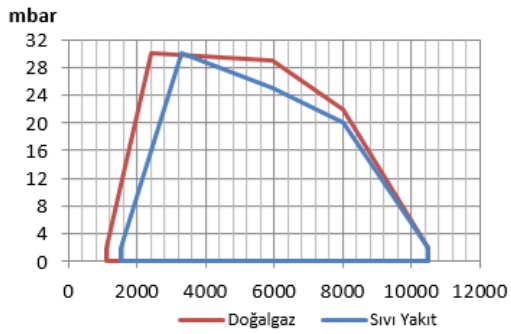
ECO 9 K (S) C 3 NG



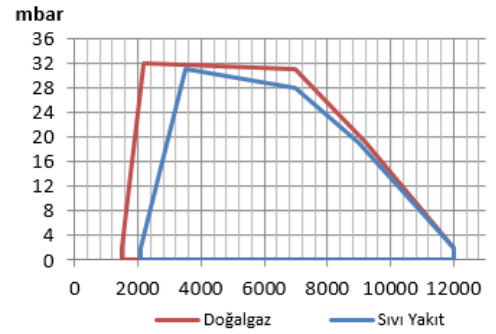
ECO 9 K (S) C 3a NG



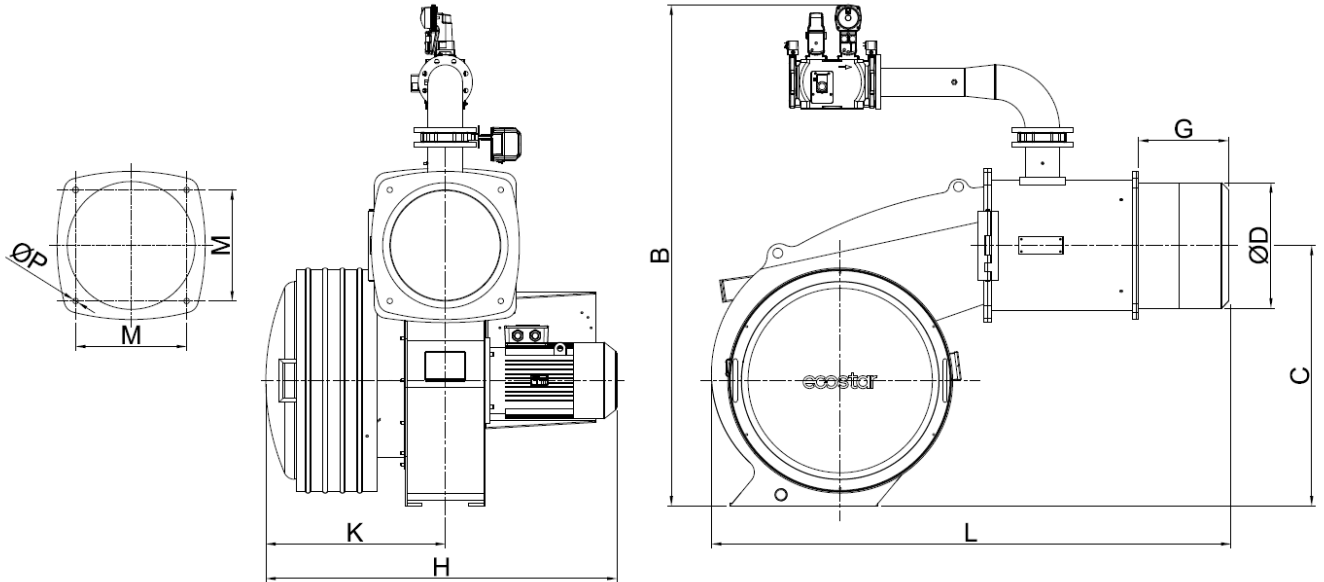
ECO 9 K (S) C 3b NG



ECO 9 K (S) C 3c NG



5.3. Burner Dimensions



	L	G	H	K	B	C	ØP	M	ØD
ECO 8 KSC3 NG	1830	300	1320	720	1600	695	18	400	408
ECO 8.5 KSC3 NG	2110	375	1450	750	2030	1055	22	450	508
ECO 9 KSC3 NG	2110	375	1450	750	2030	1055	22	450	508

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.

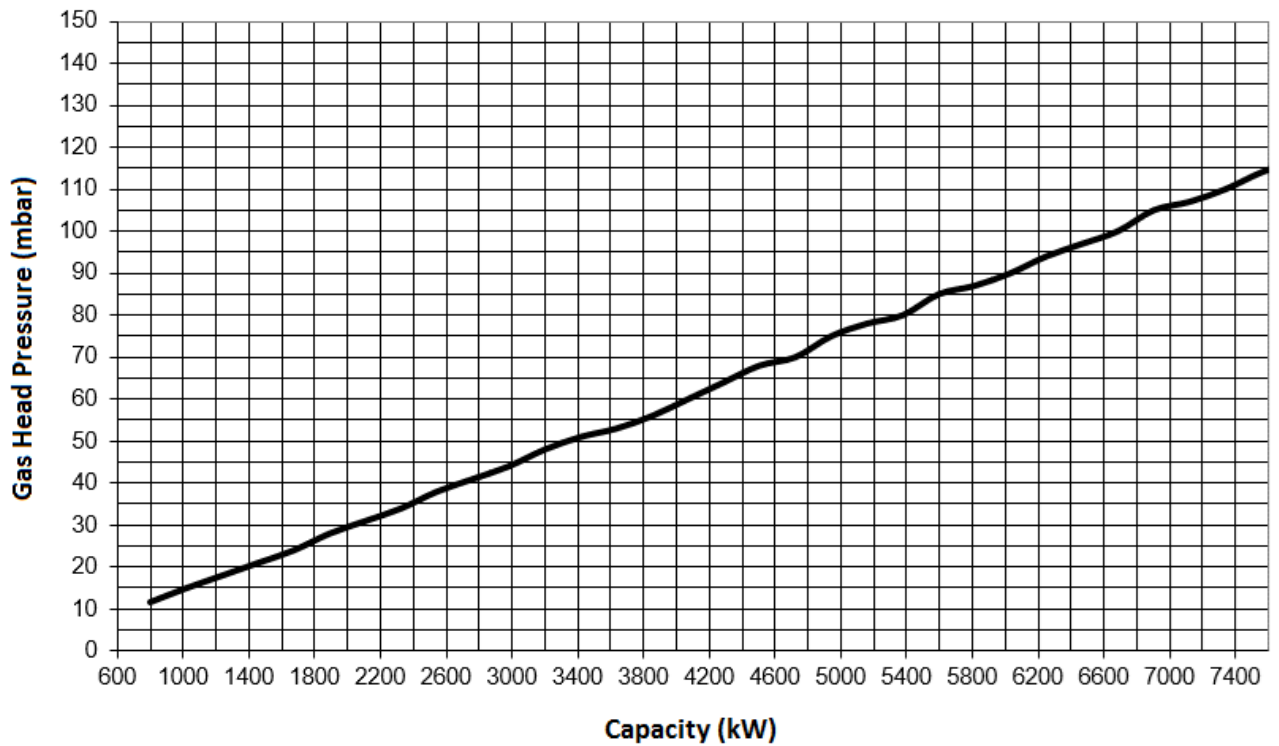
P_m : Gas hood pressure while burner is connected to the boiler and working

P_F : Combustion chamber pressure

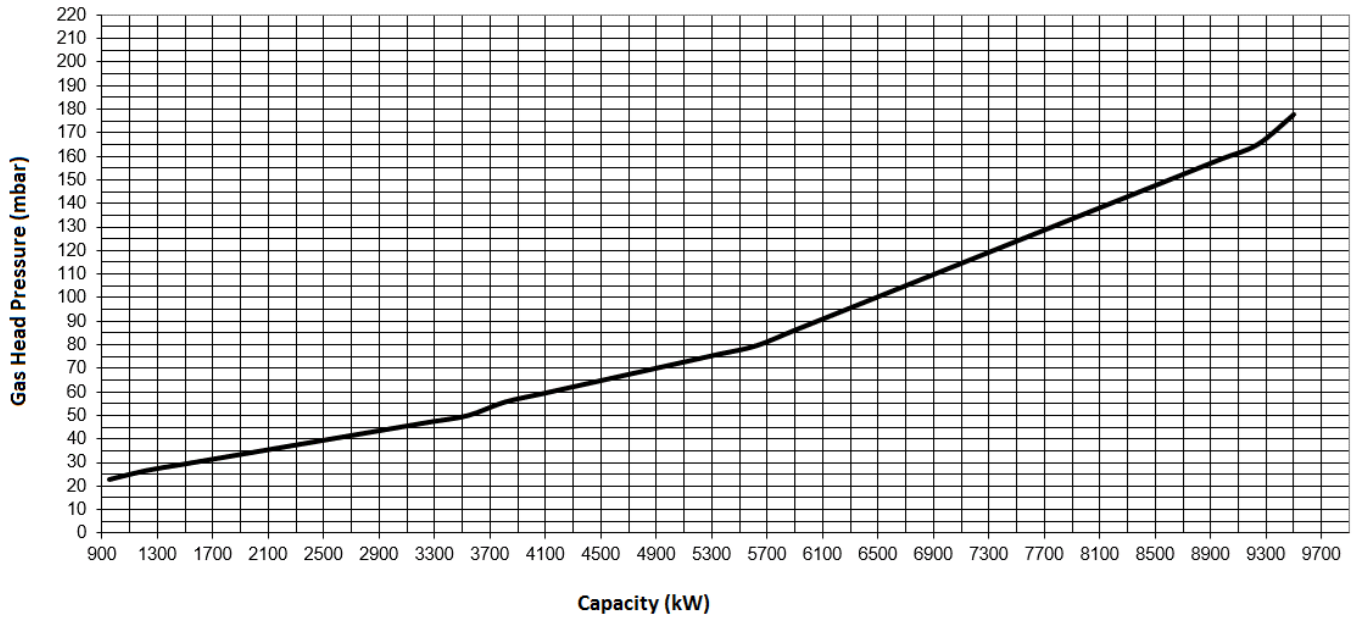
P_{Br} : Burner net gas hood pressure

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

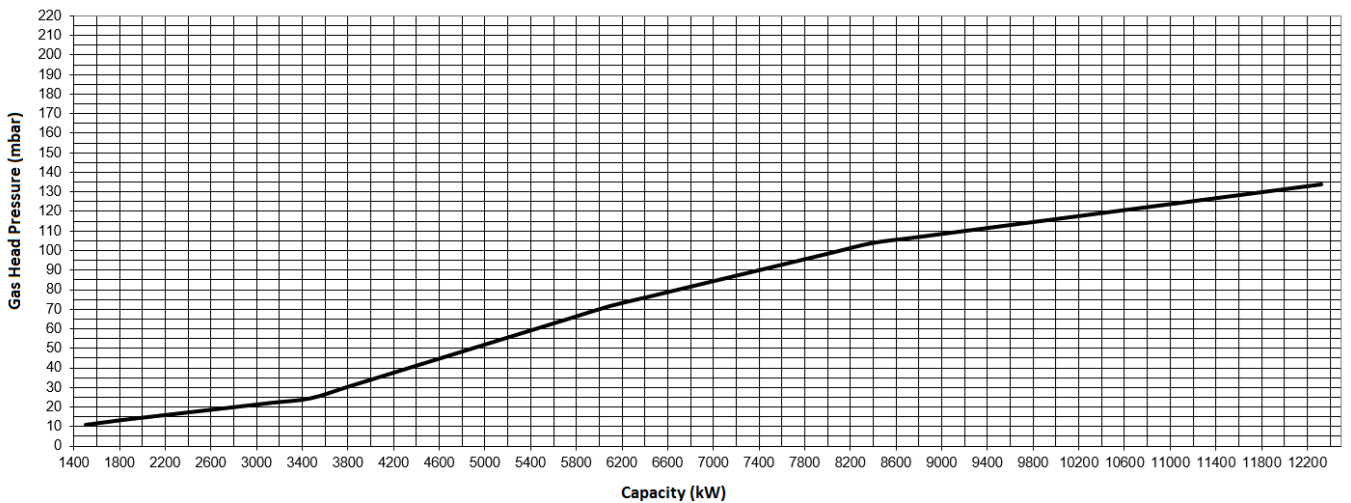
ECO 8



ECO 8,5

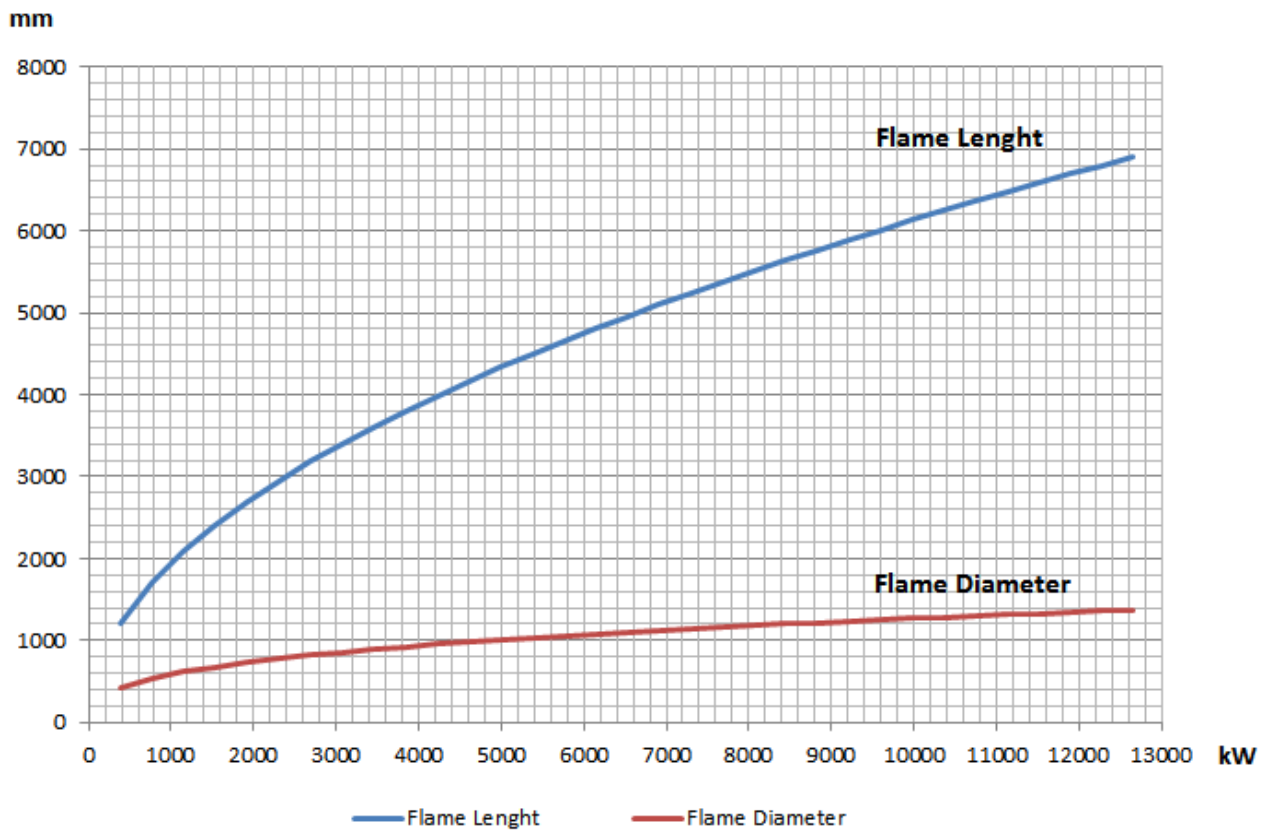


ECO 9

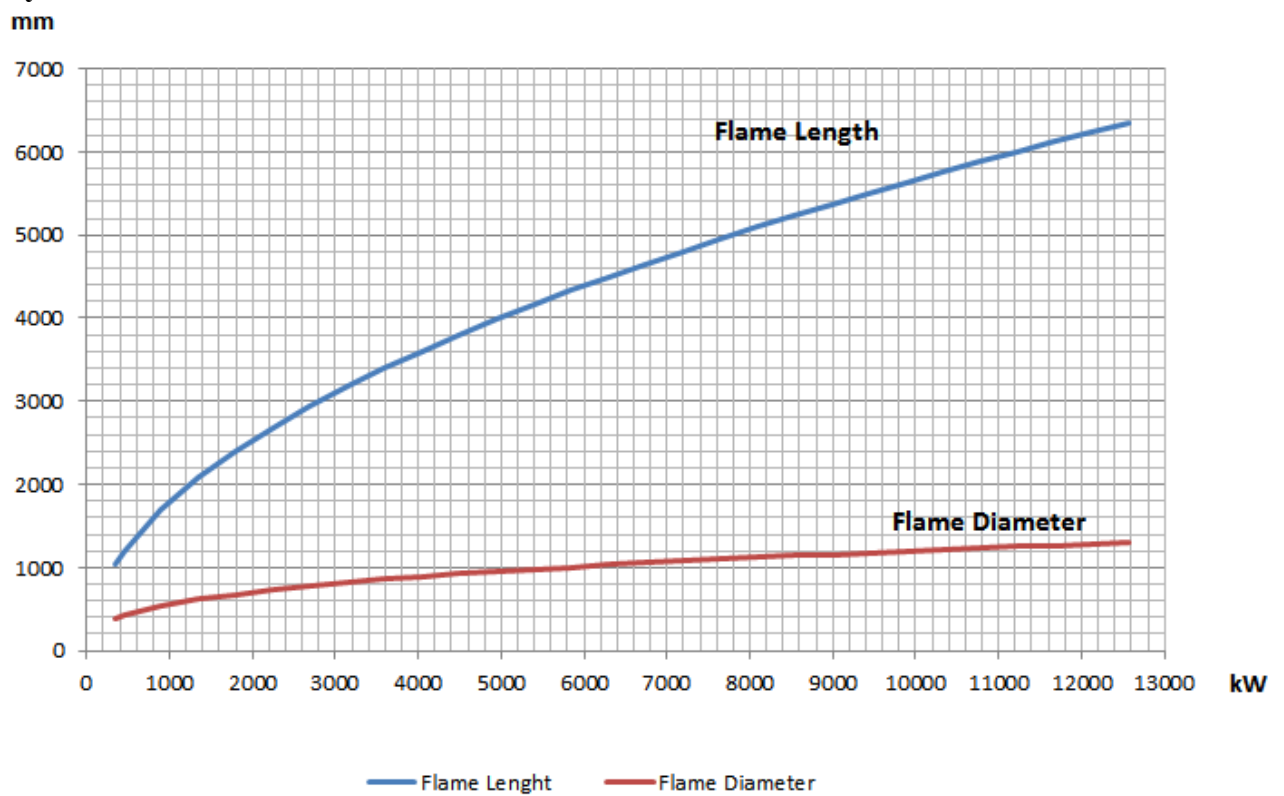


5.5. Flame Length and Diameter

Natural Gas

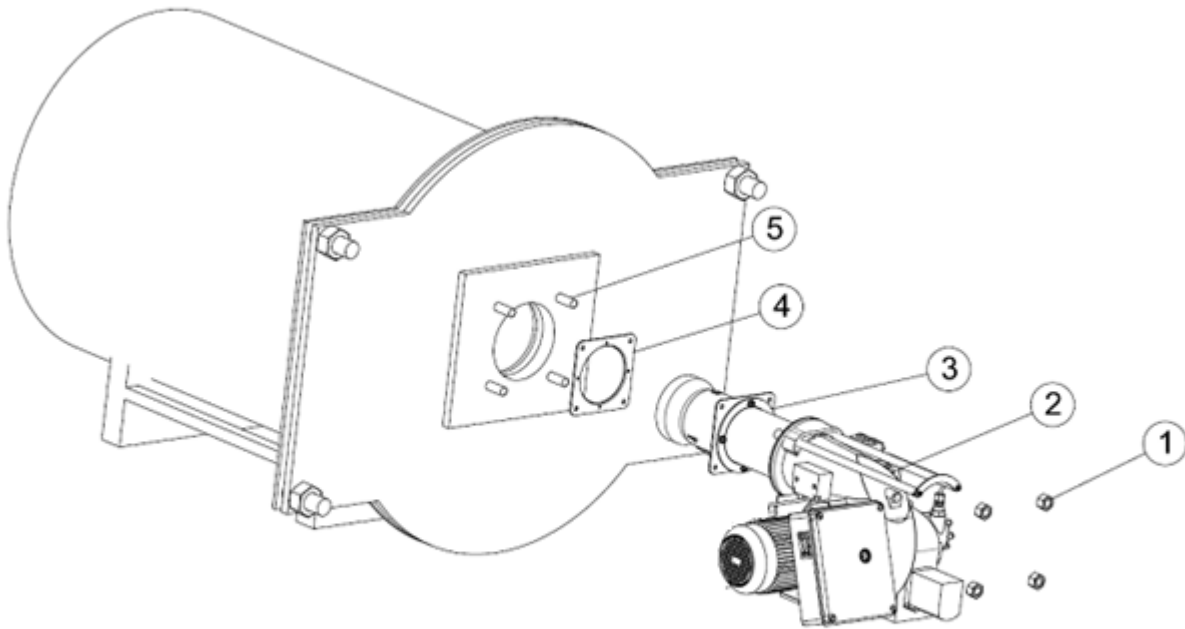


Heavy Oil



6. INSTALLATION

6.1. Burner Installation Picture



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

- In the installation of the burner (2), use the installation materials supplied with the burner (2).
- Secure the burner connection flange (3) onto the burner cover by 4 bolts (1). Gasket (4) must be connected such that it will remain between connecting flange and boiler cap.

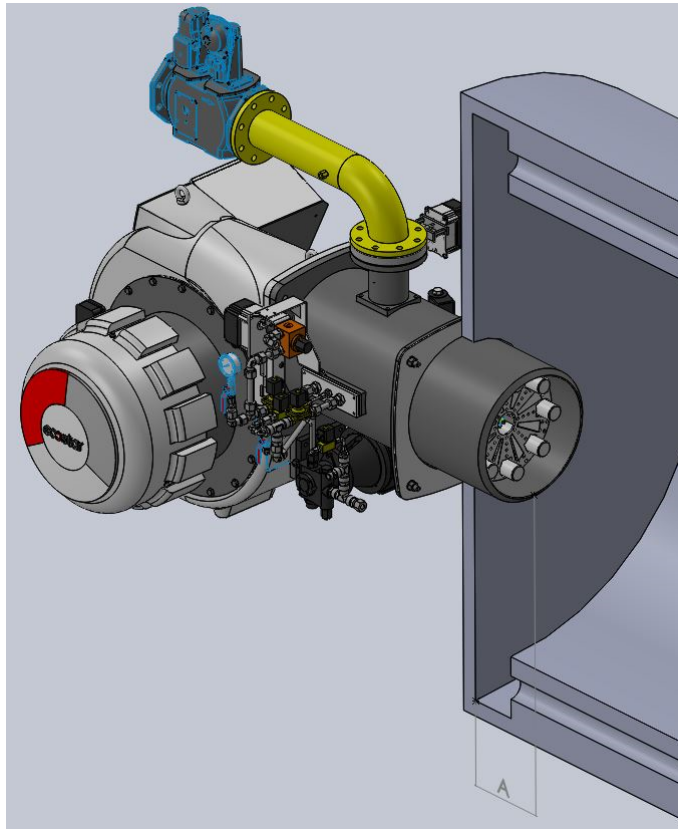
After completing the installation of the burner on the boiler:

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



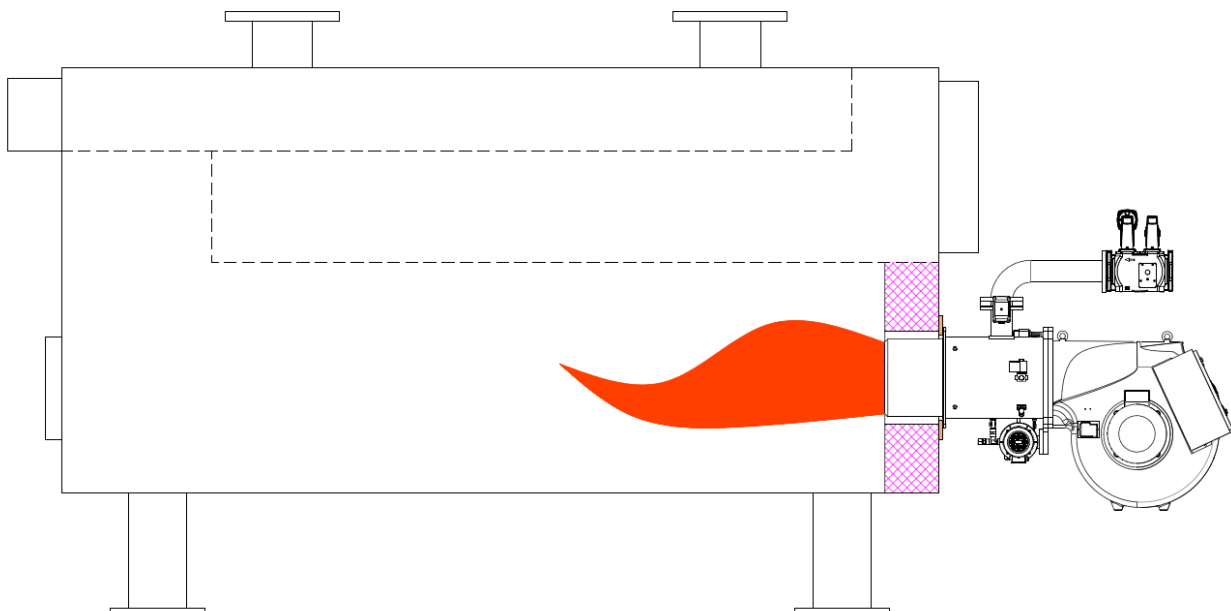
Clean the inside of fuel line thoroughly before installing the burner to the fuel line. Any damage that may occur due to solid objects and metal particles from the fuel line shall not be covered by our company.

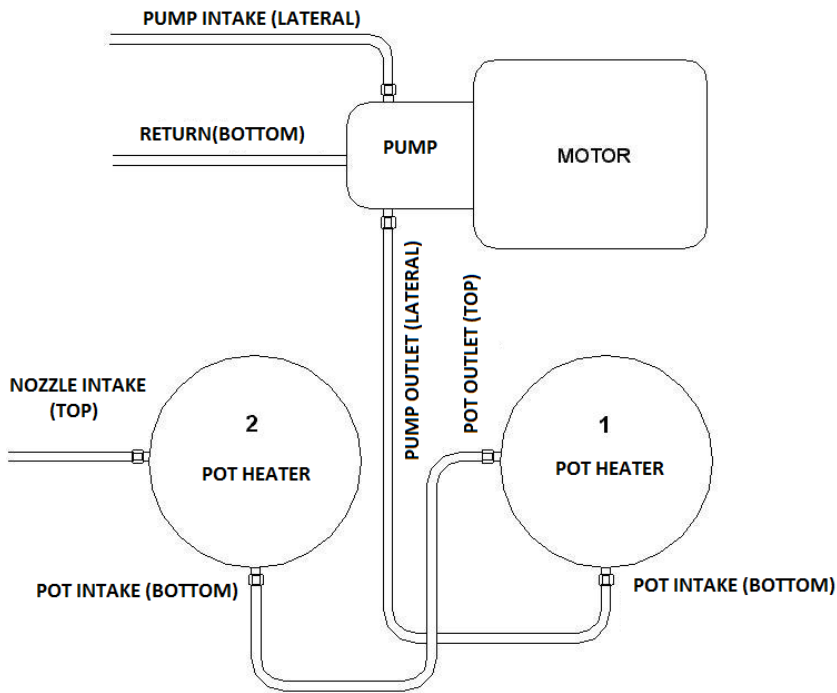
6.2. In reverse flame front mirror boilers



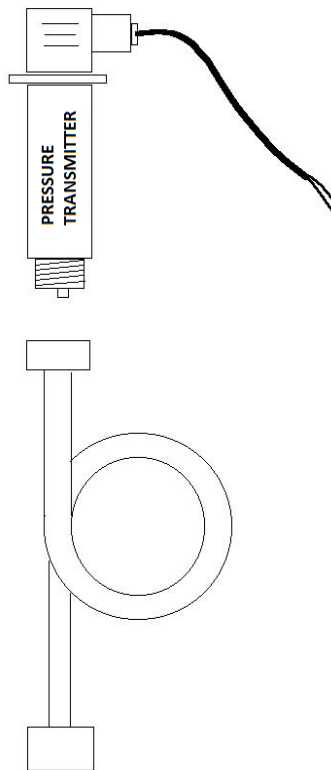
While installing the burner in reverse flame front mirror boilers, flame tube tip must be adjusted such that it gets inside by 50 mm-100 mm from flue pipes ($50\text{mm} \leq A \leq 100\text{mm}$). Otherwise flue gas temperature will rise and fuel consumption will increase.

6.3. In cylindrical (straight flame) boilers





Fuel Pumping Station



Interconnection of pressure transmitters

7. COMMISSIONING

7.1. 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.



Electric and wiring diagrams are provided with an additional CD and document. For detailed information; please check the aforementioned document and CD.

7.2. 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 Heavy Oil;

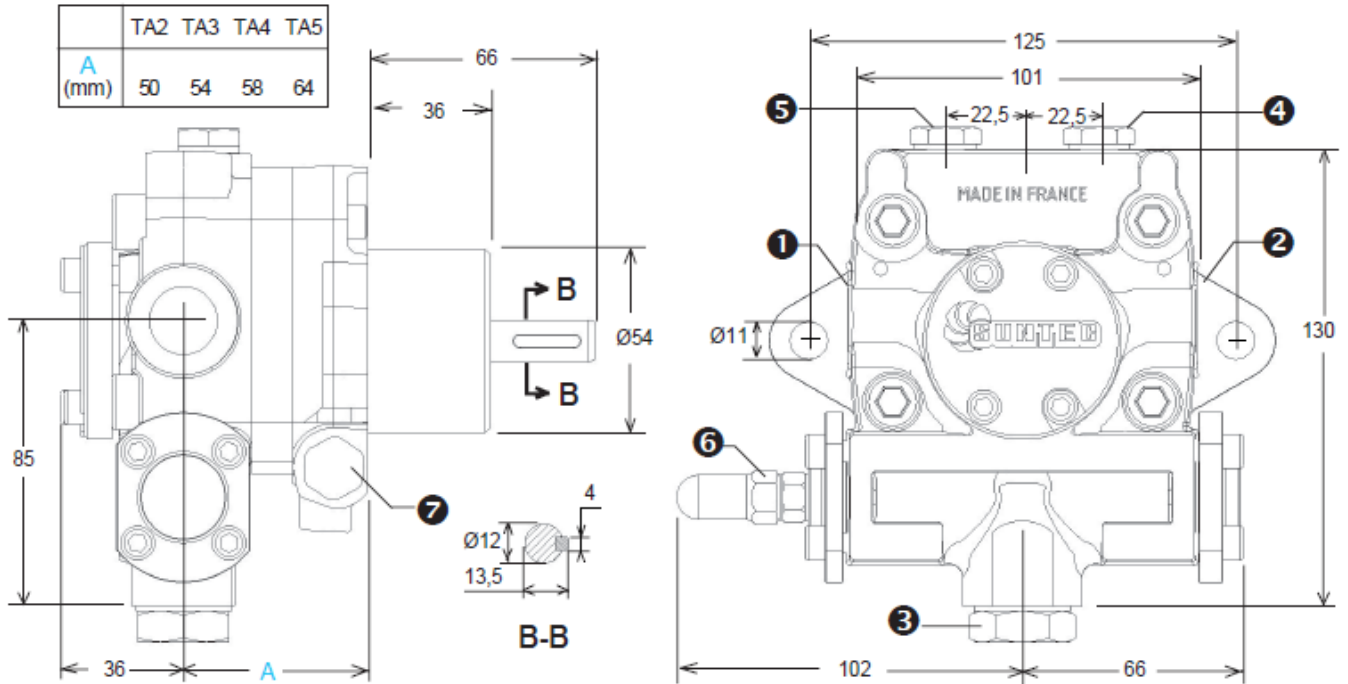
- After performing the above mentioned controls, open the fuel tank valve.
- Open the valve upstream of the fuel filter.
- Check direction of motor rotation.
- Open the pump's vent plug and place the manometer (0-40 bar).
- Turn on the burner switch.
- When the burner starts up, the motor is activated and turns the pump at the same time.
- 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 (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.

TA Type



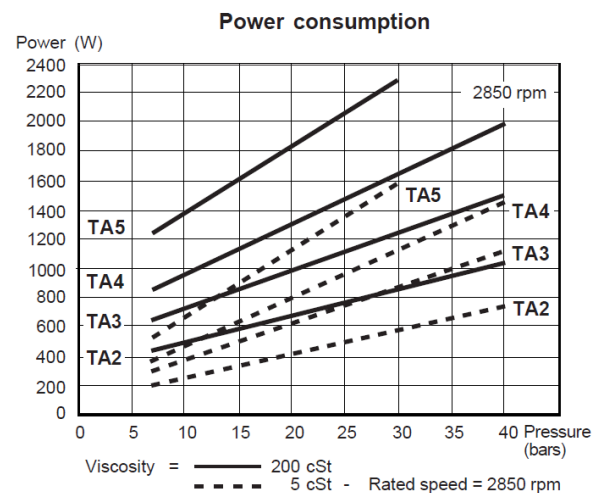
- 1-Suction
- 2-Nozzle outlet
- 3-Return
- 4-Manometer inlet
- 5-Vacuum or inlet manometer and internal return inlet
- 6-Pressure adjustment
- 7-Pre heater location

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
Return pressure	heavy oil : 5 bars max.
Rated speed	light oil : 5 bars max.
Starting torque	heavy oil : 5 bars max.
	3600 rpm max.
	0,3 N.m

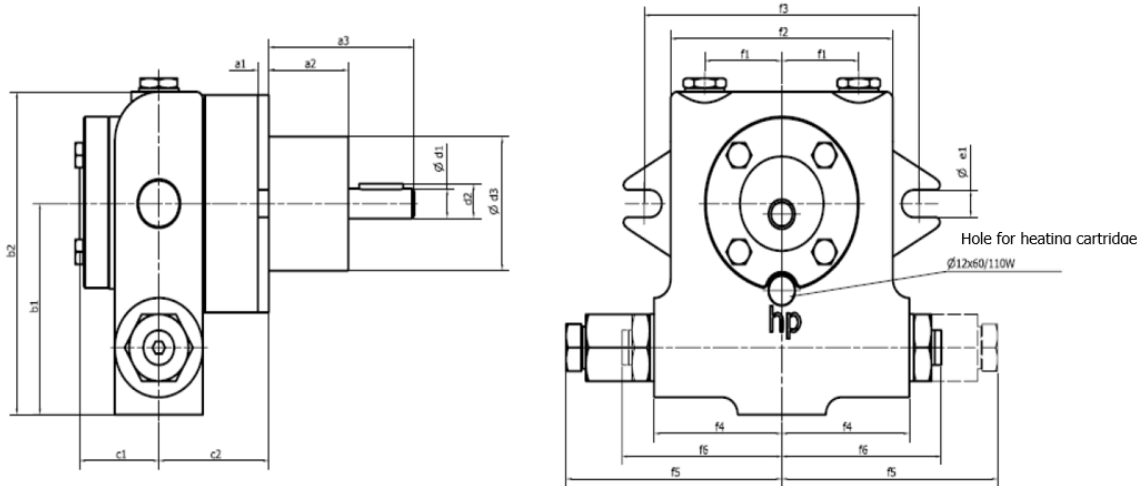
Choice of heater

Cartridge	Ø 12 mm
Fitting according to DIN 40430,	NFC 68190 (N°9 elec.)
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"

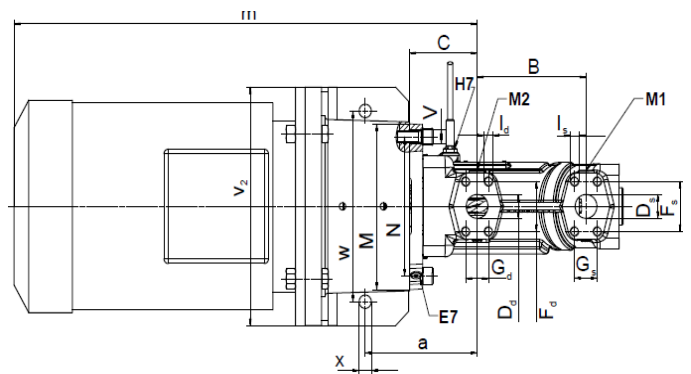
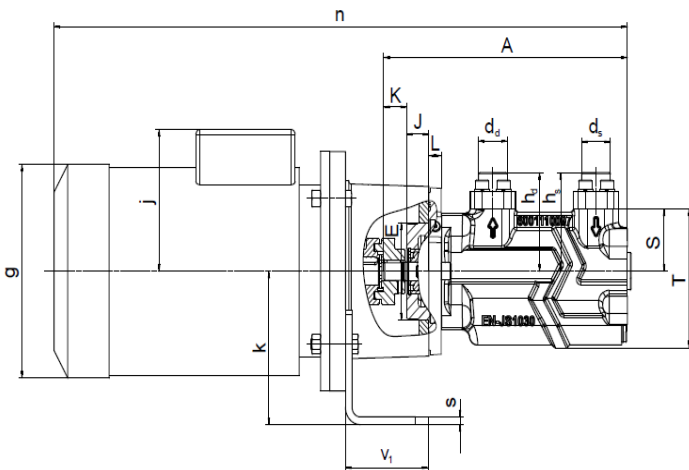
Inspection and Maintenance

- 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**

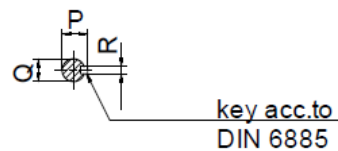
Application limits

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 ⁻¹ 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)

AFI (ALLWEILER)



Shaft end



AFI size	Pump dimensions														
	A	B	C	E	J	K	L	M	N	P	Q	R	S	T	V
10	247	110	55,5	82,55 _{-0,05}	19,4	21,6	13	130	106	16	14 _{±6}	5	60	132	11
20	293,5	125	77,5	101,6 _{-0,05}	27	26	15	175	146	21,5	19 _{±6}	6	65	145	14
40	342,5	135					17						80	164	

AFI size	Motor size	Unit dimensions									
		a	c	e ₁	e ₂	f ₁	f ₂	g [⊖]	j [⊖]	k	m [⊖]
10	80	89,5	150,5	120	200	84	160	162	209	140	452
	90S							181	218		496
	90L							202	223		546
	100L	111,5									
20	90S	151,5	163	220	84	180	181	218	160	558	
	90L	128,5					202	223		564	
	100L	141,5					227	238		571	
	112M	151,5					266	278		683	
	132S	151,5					181	218		140	558
40	90L	128,5	212	240	84	200	202	223	160	564	
	100L	141,5					227	238		571	
	112M	150/ 415 [⊖]					266	278		170	683
	132S						320	314		235	862
	132M										
	160M										

Connections

AFI size	Venting	Heating Cartridge	Pressure gauge
	E7	H7	M1/M2
10	M8x1	M12x1	G 1/8
20 and 40			G 1/4

AFI size	Connection dimensions													
	SAE-suction flange ①							SAE-pressure flange ①						
	Inch	D _s	F _s	G _s	I _s	d _s	h _s	Inch	D _d	F _d	G _d	I _d	d _d	h _d
10	¾	22	47,63	22,23	4 x M10	28	96	¾	22	47,63	22,23	4 x M10	28	96
20	1	25	52,37	26,19		35	103	1	25	52,37	26,19		35	103
40	1 ¼	32	58,72	30,18		4 x M12	43	121	1	25	52,37		26,19	35

HP Technik-Overflow Valve

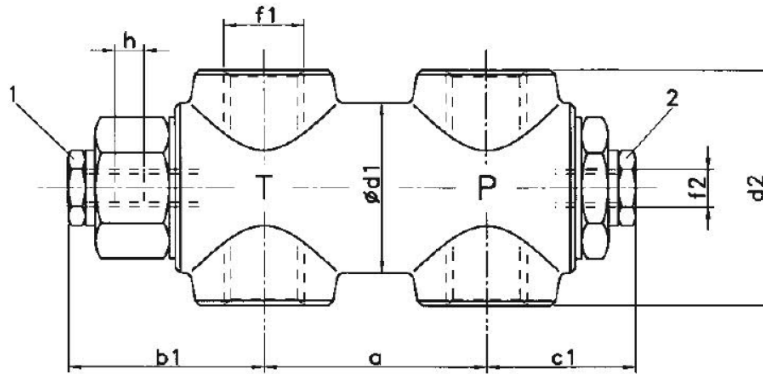


Fig.4 Dimensions

Type	a	b1	c1	d1	d2	f1	Max. pipe	NW	f2	Adjustable range h at stage:			
										0 + 1	2	3	4
PP	44	36	34	26	40	G 1/4"	10 x 1	8	G 1/8"	10	6	6	1,5
P	55	51	37	36	52	G 3/8"	12 x 1	10	G 1/8"	15	12	8	7
G	55	51	37	36	52	G 1/2"	18 x 1,5	15	G 1/8"	15	12	8	7
GH	63	57	43	50	70	G 3/4"	22 x 1,5	20	G 1/4"	15	10	8	5
GHG	80	71	60	56	86	G 1"	28 x 1,5	25	G 1/4"	20	17	9	6
GHG - 1 1/4"	80	71	60	56	86	G 1 1/4"	35 x 2	30	G 1/4"	20	17	9	6

Installation

- The pressure line which fluid pressure is to be regulated by the overflow valve, shall be connected to the pressure connection "P".
- Please connect the return flow line which has to lead back the controlled fluid from the regulating piston to the tank, to the return-flow / tank connection "T".
- The overflow valve can be connected at one pipe system to work as a max. Press. regulator (Fig.2)
- Should there be no manometer attached, please remove the plug screw 2 and fit one to the manometer connection G1/4" (Fig. 1).

NOTE : Water is not allowed to use as purging liquid, danger of corrosion!

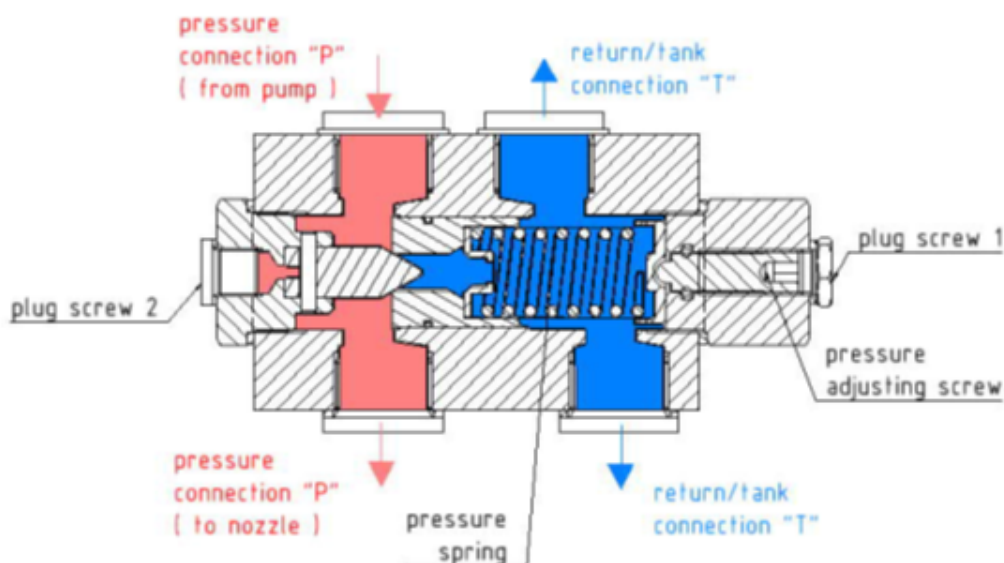


Fig.1 Operating principle

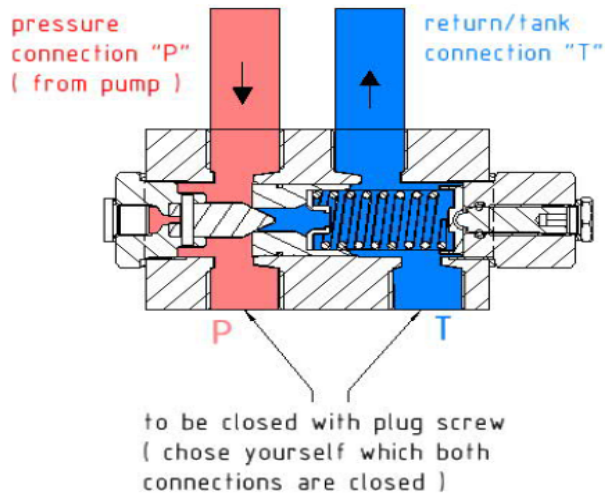


Fig.2 One pipe system

- Overflow valves have been factory-set to the lowest possible pressure level, In order to set the desired operating pressure, first remove the plug screw 1 (see Fig.1) to reveal the adjusting screw beneath.
- Now switch on the unit's pump and turn the adjusting screw to the right to adjust the operating pressure to the desired setting (turn the setting screw to the right – clockwise -> to increase the pressure, turn the setting screw to the left – counterclockwise -> to decrease the pressure. For a reading of the set value, a manometer to be attached to the unit. please remove the plug screw 2 (see Fig.1) and fit one to the manometer connection.
- After adjusting the pressure setting to the desired level, replace and retighten the plug screw 1. Assure that this screw is made tamper-proof as per Section 4.13 of DIN EN 12514-2

Model/Type designation: B-P-E/4



B-P-E -> Overflow valve with flow rate 15 – 160 l/h
 · 4 -> pressure stage

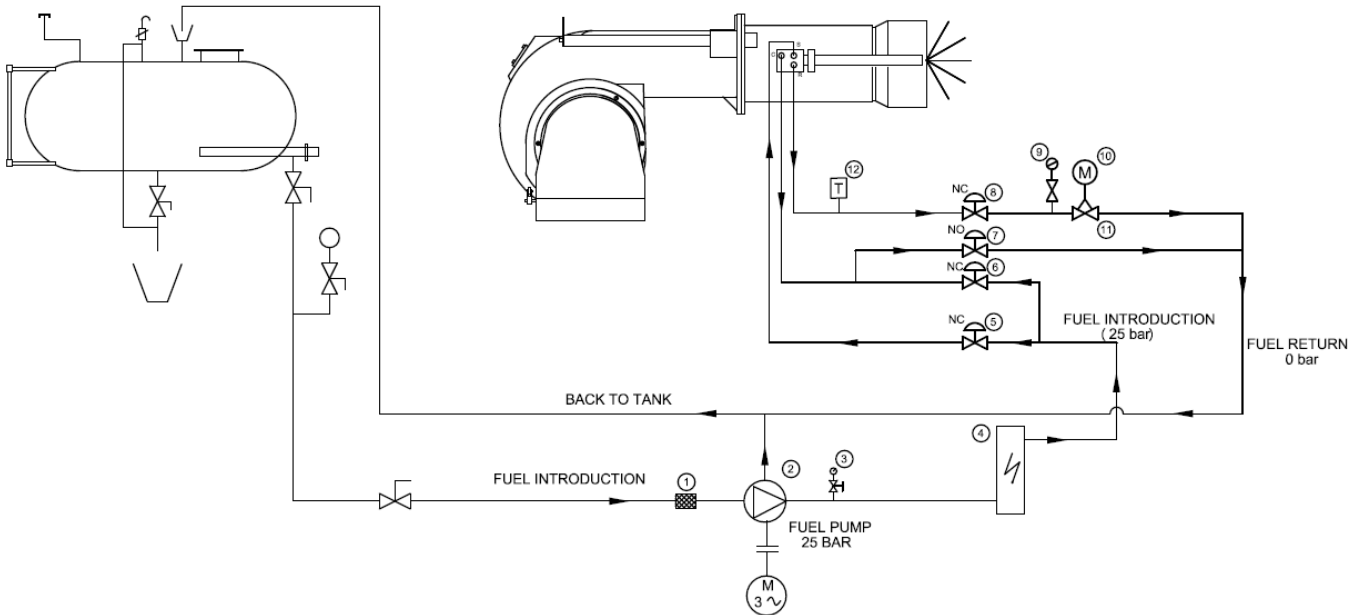
Pressure stage	Pressure range
0	from 0,5 - 1,5 bar
1	from 1 – 4 bar
2	from 2 - 9 bar
3	from 6 - 25 bar
4	from 15 - 40 bar

Operational limits

Flow max. 10 000 l/h
 Temperature up to 150 °C
 Max. viscosity 450 mm²/s
 Ambient temperature -10 to +90 °C
 Storage temperature -10 to +60 °C

➤ **Modulating Heavy Oil Burner Fuel Diagram**

ECO 8 Fuel Diagram

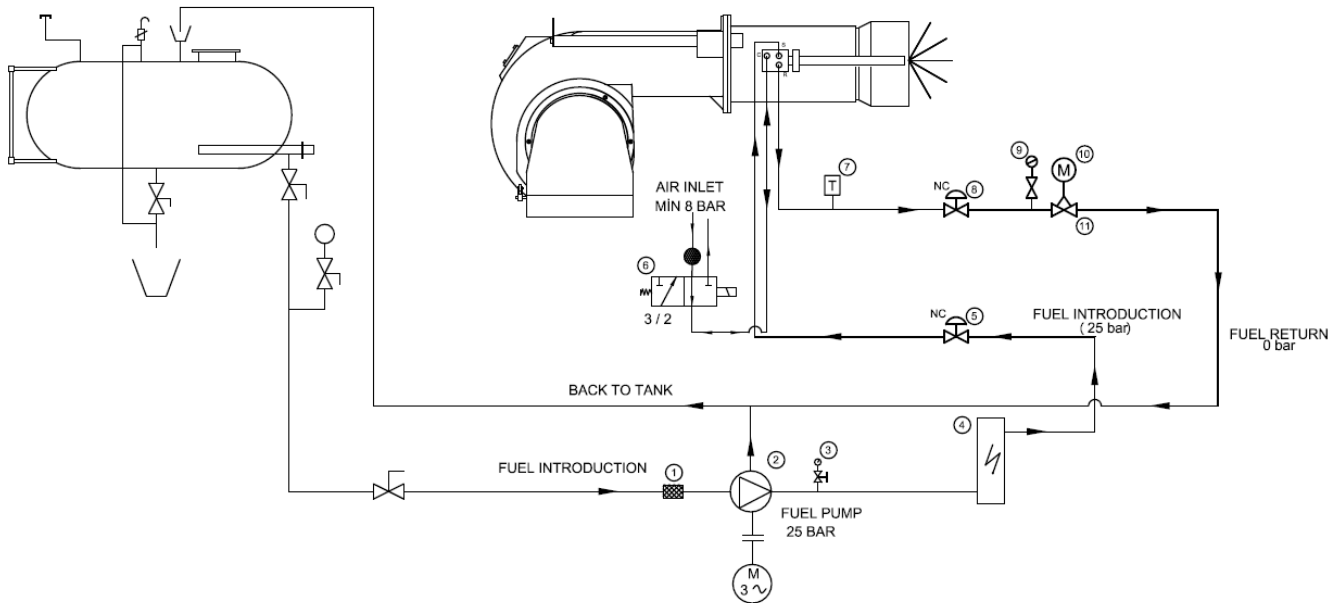


1	FILTER
2	PUMP
3	MANOMETER
4	HEATER
5	INPUT VALVE
6	HYDRAULIC CONTROL VALVE
7	DRAINING THE HYDRAULIC CONTROL VALVE
8	OUTPUT VALVE
9	MANOMETER
10	SERVOMOTOR
11	OIL ADJUSTMENT VALVE
12	FUEL TEMPERATURE °C



Fuel return line should be non-pressured line.

ECO 8,5-ECO 9 Fuel Diagram



1	FILTER
2	PUMP
3	MANOMETER
4	HEATER
5	INPUT VALVE
6	3/2 FUEL CONTROL VALVE
7	FUEL TEMPERATURE °C
8	OUTPUT VALVE
9	MANOMETER
10	SERVOMOTOR
11	OIL ADJUSTMENT VALVE



Fuel return line should be non-pressured line.

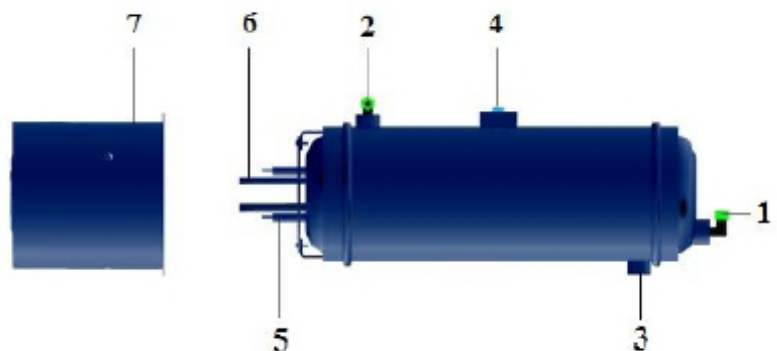


CAUTION!

- **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, while its maximum operating temperature is 140°C. These values 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.**

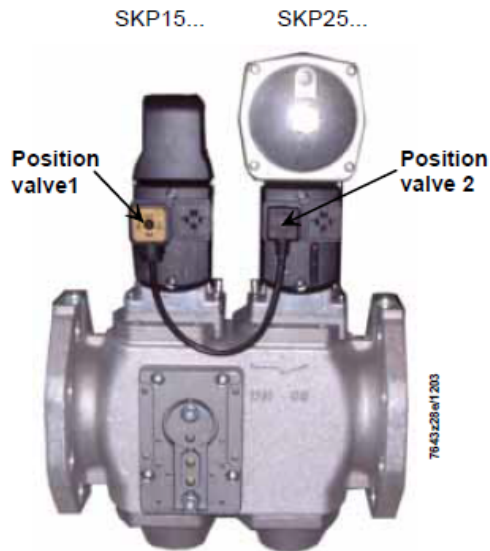
➤ **Burner preheater**

1. Fuel inlet
2. Fuel outlet
3. Discharge
4. Fixing plate
5. Resistance
6. Thermostat bulb pipe
7. Housing cover



7.5. Gas Adjustment

7.5.1. VGD 40... Series Gas Valve



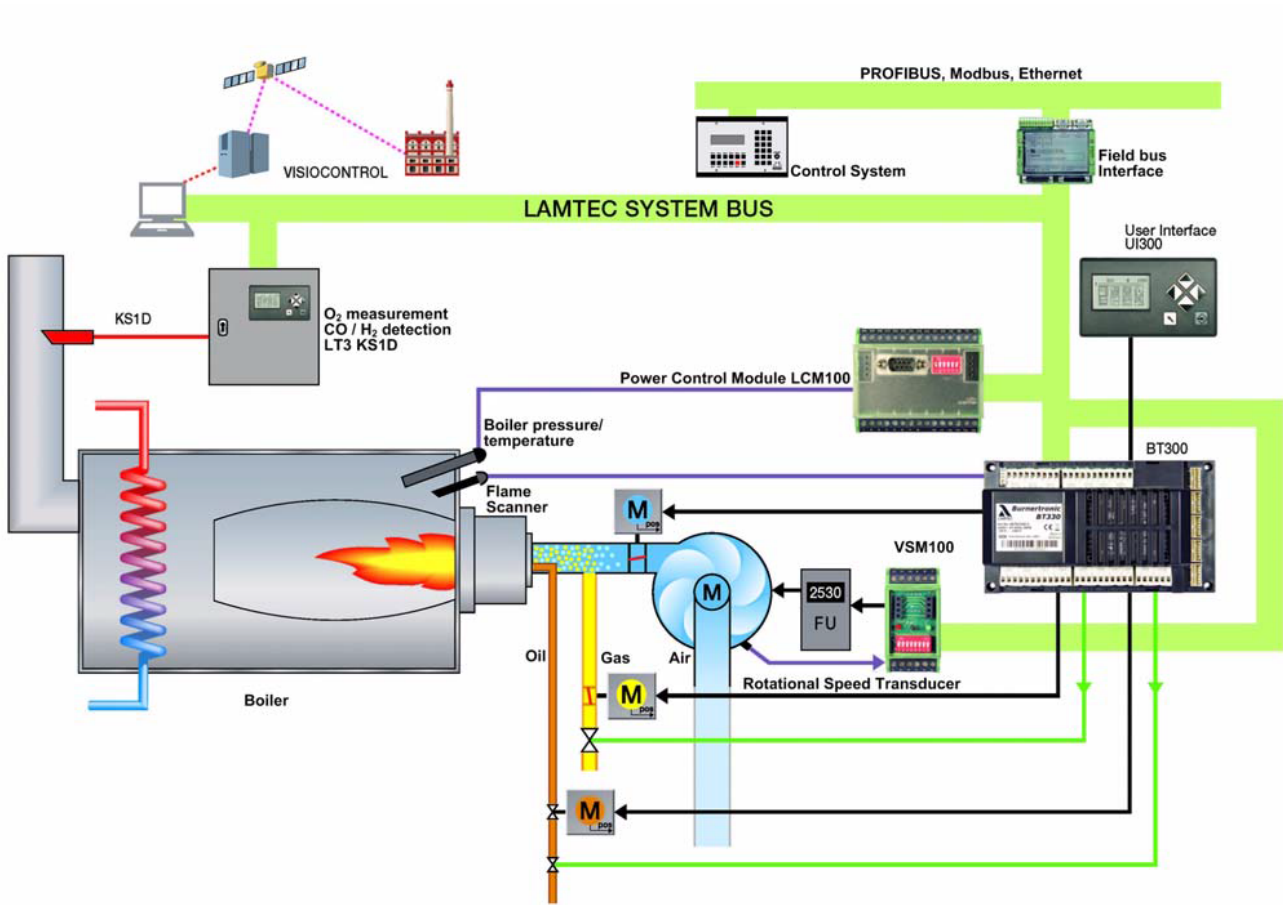
7.6. Air pressure switch adjustment

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

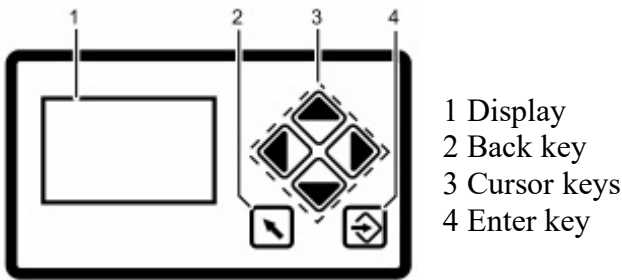
- Unscrew the screw of the transparent cover and remove the cover.
- Turn the adjustment wheel in the direction to increase the pressure, note the pressure value at which the burner is failed.
- Set the pressure switch to a value 1 mbar lower than the pressure value at which the burner failed and close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



7.7. BT 300



7.7.1. Operating Control and Displays



Display: The display shows in pictograms:

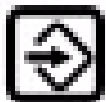
- 1 - The menu structure
- 2 - Operating status
- 3 - Parameters
- 4 - Error messages



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.

7.7.2. 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

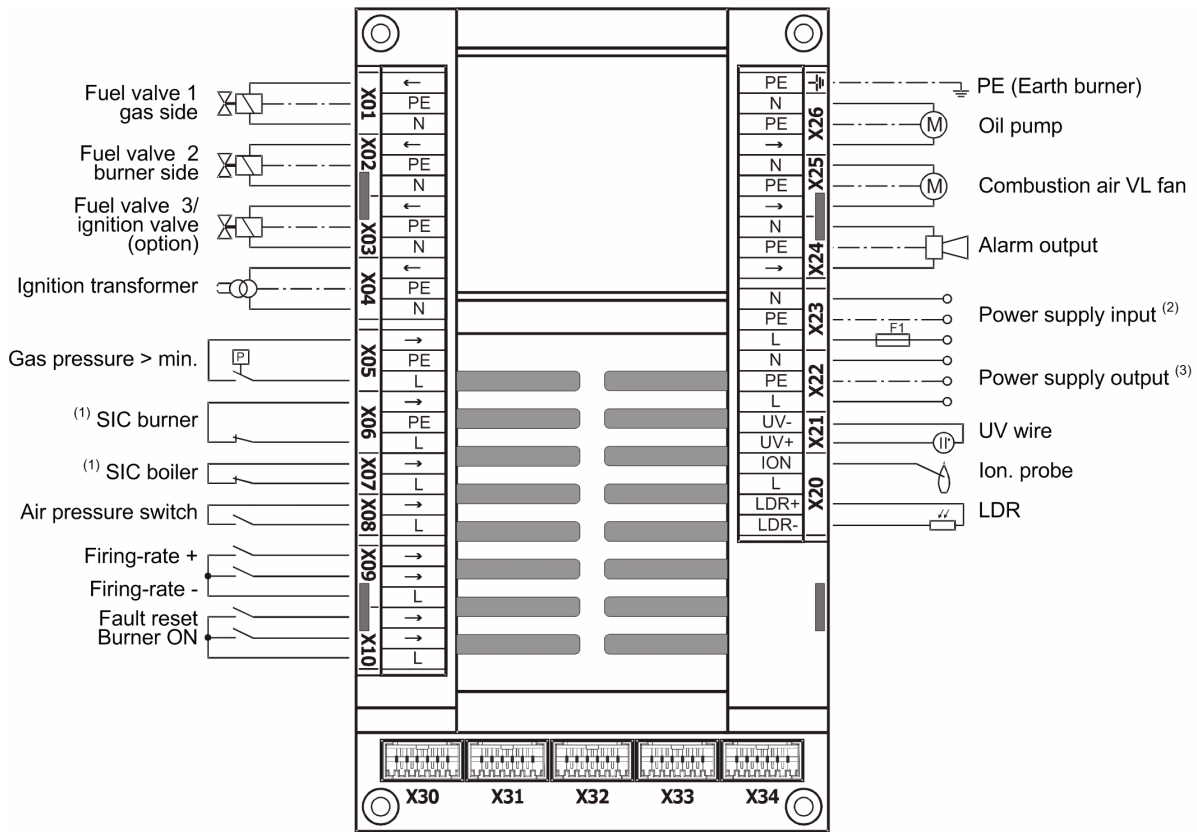
SETTINGS



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

7.7.3. 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

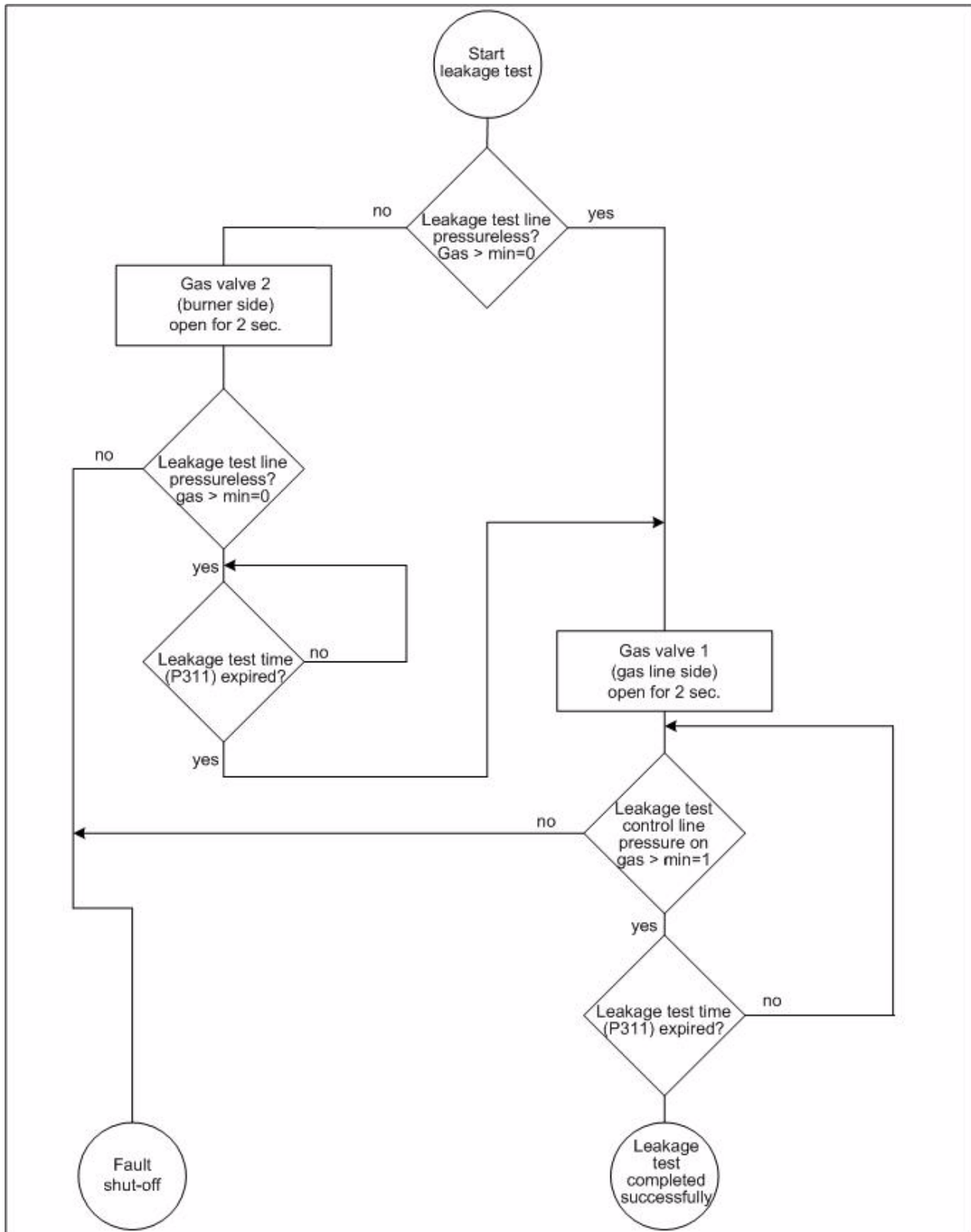
X31: 1m

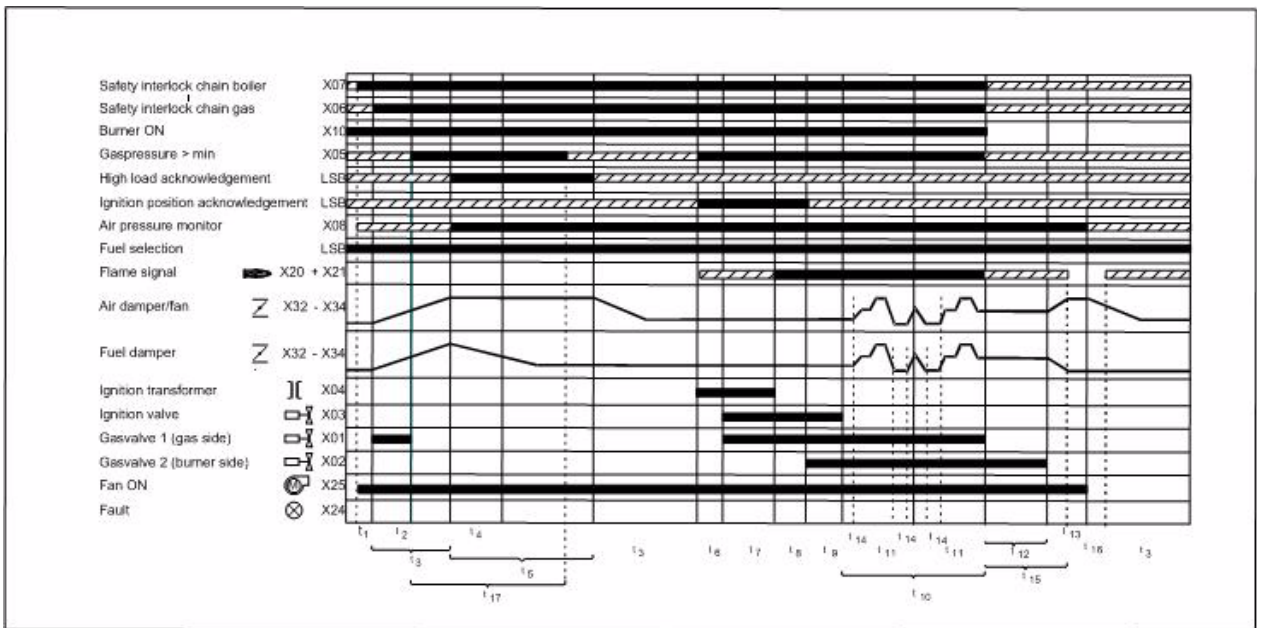
X22-X23: unlimited

X32-X34: 3m

X24-X26: 10m

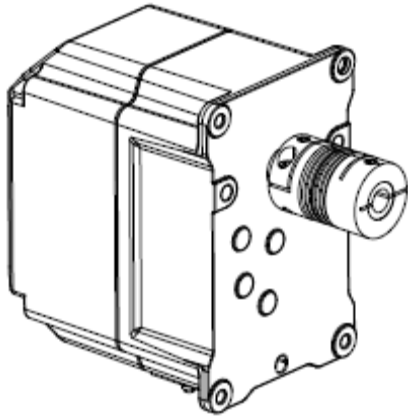
7.8. Leakage Test for Main Gas Valves





Gas with pilot burner and leakage test BT300

7.9. 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.

7.10. 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 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/O₂ 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.

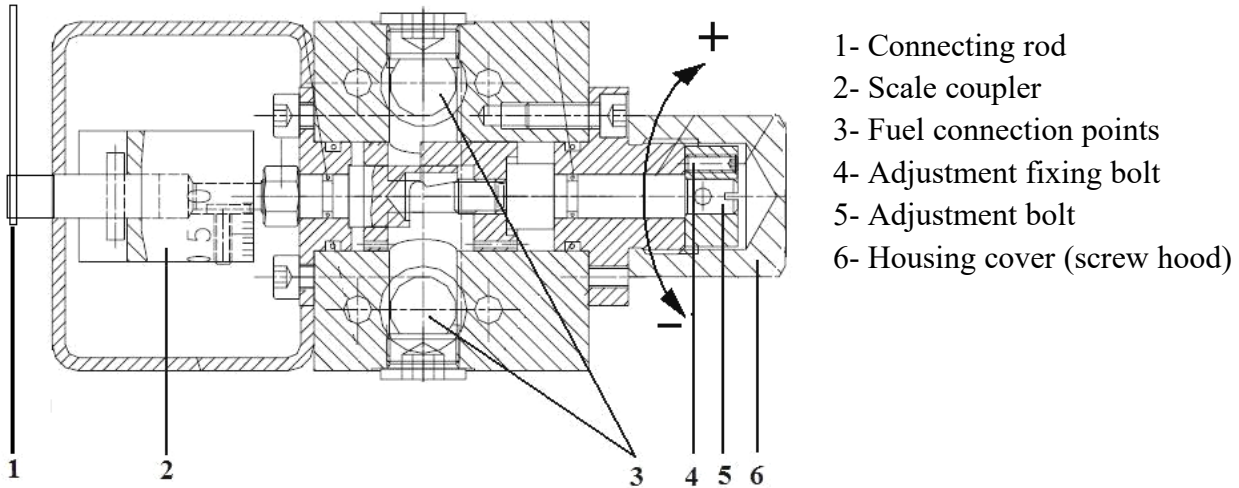


Magnetic valves must not be energized during pre-purge. Check if valves are in closed position!

7.11. 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.

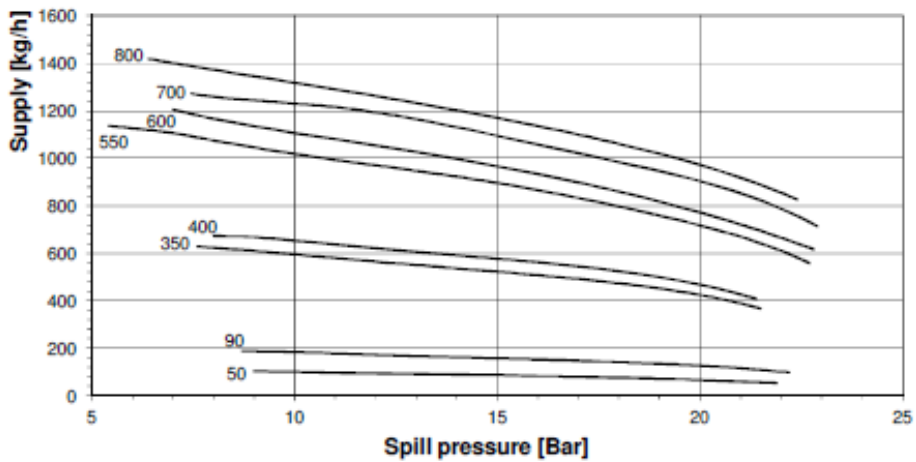
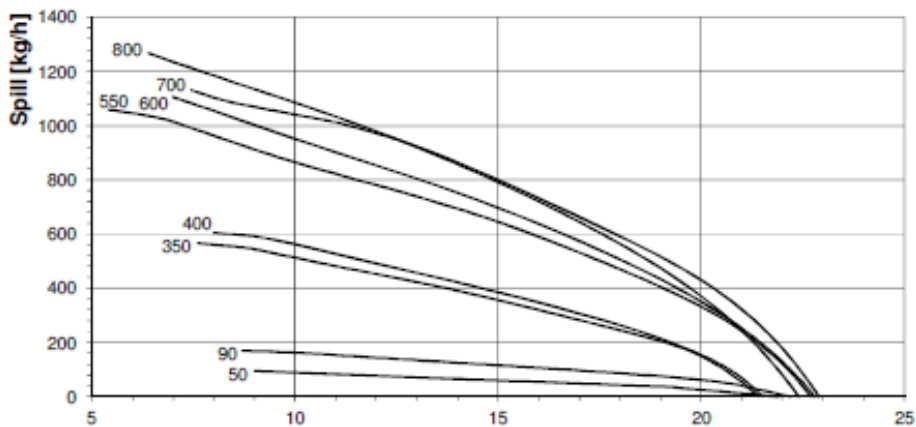
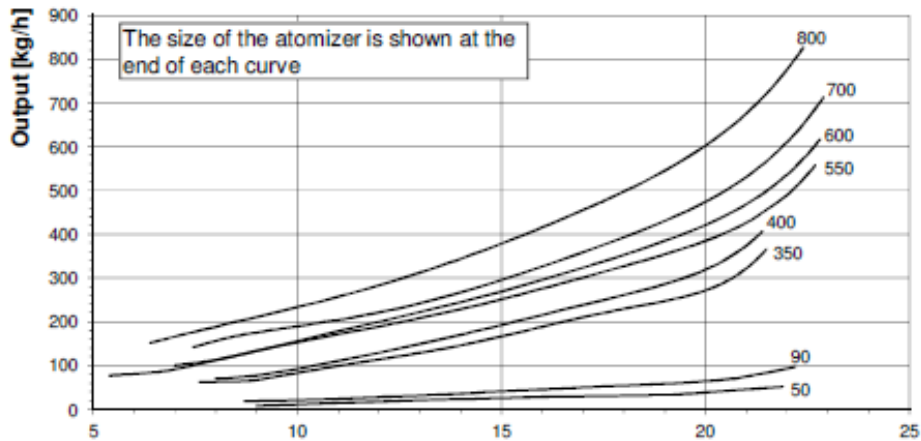
➤ **Oil adjustment regulator**



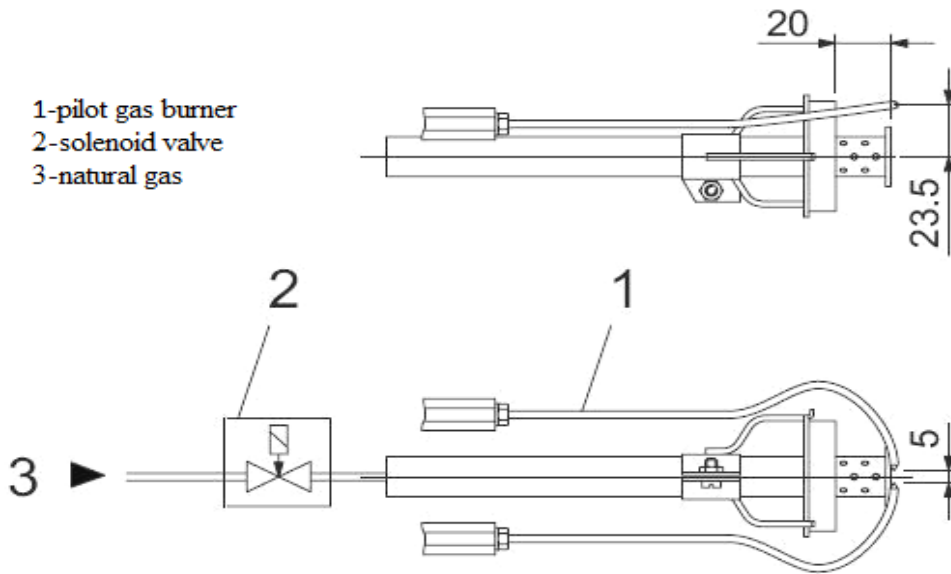
Fuel regulator adjustment

- 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.

	Atomizer 12	12-E1L1-DG-E
	W(R)2-"Size"-60°	
	Supply pressure 25 Bar	
	Viscosity 5 cSt	
OUTPUT CHARACTERISTICS		12-05-14



7.12. Pilot Ignition System



Pilot gas burner inlet pressure Pmax= 200 mbar

7.13. Emission Measurement

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

- CO < 100 mg/ kWh
- %3 ≤ O₂ ≤ %5
- NO_x < 170 mg/ kWh
- Excess air ratio 1,2 ≤ λ ≤ 1,3

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

- CO < 110 mg/ kWh
- %3 ≤ O₂ ≤ %5
- NO_x < 250 mg/ kWh
- Excess air ratio 1,2 ≤ λ ≤ 1,3

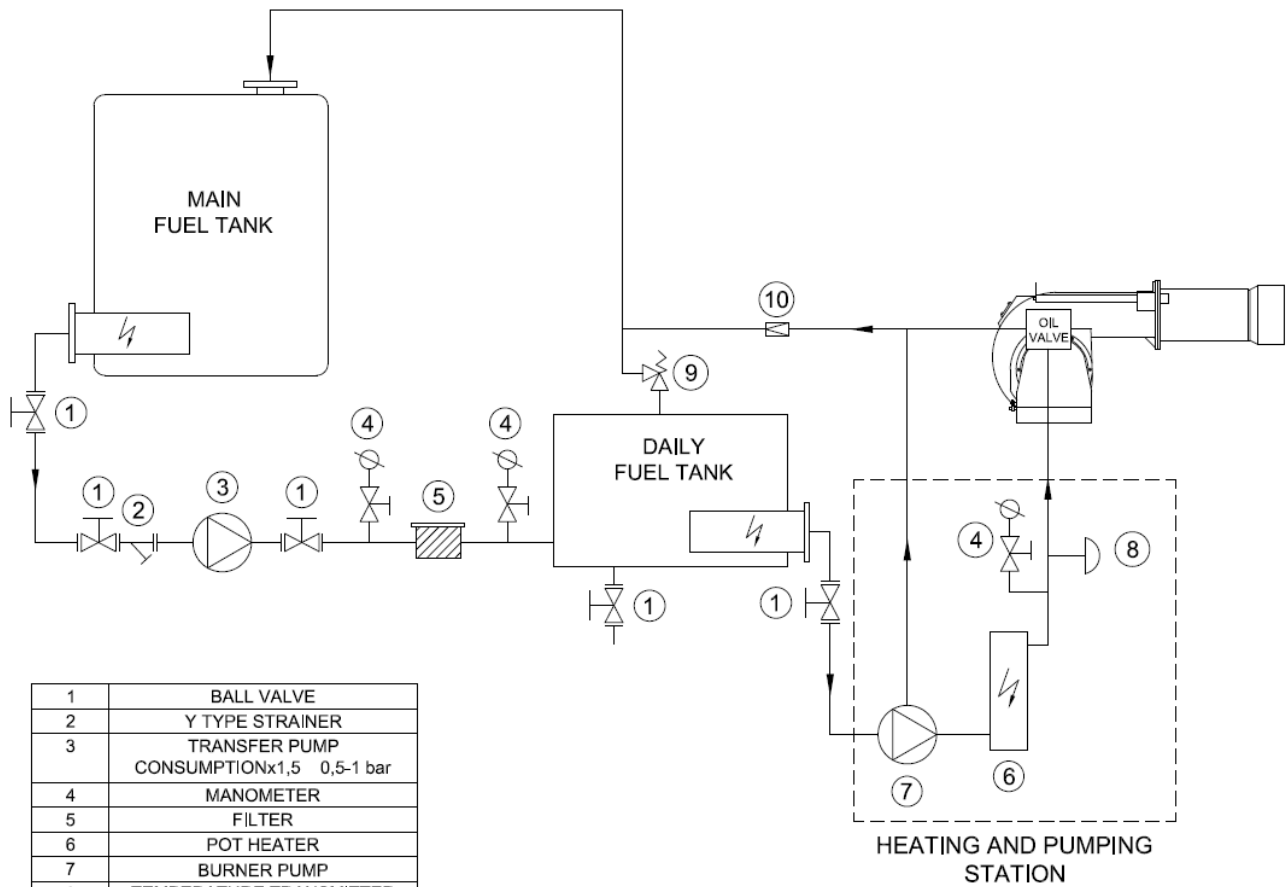


It is important for the boiler to be sealed in order to avoid incorrect measurements during emission measurements.



Boiler temperature must be between 40 C° and 80 C° while making emission measurement in hot water boilers.

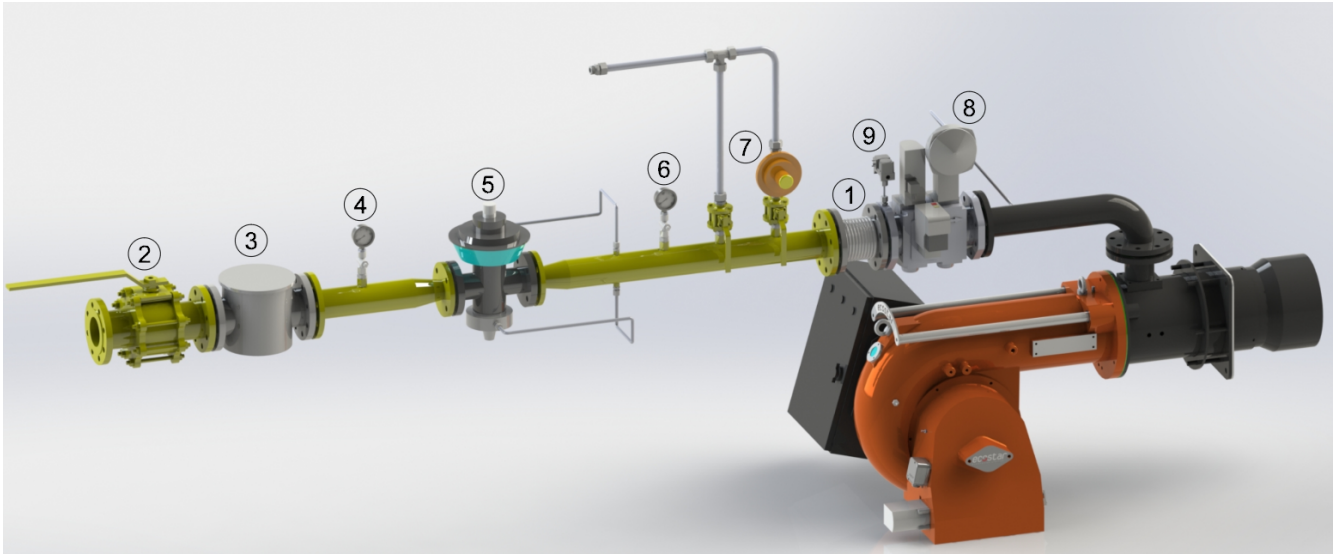
7.14. Heavy Oil Burner Fuel Ring Line



1	BALL VALVE
2	Y TYPE STRAINER
3	TRANSFER PUMP CONSUMPTIONx1,5 0,5-1 bar
4	MANOMETER
5	FILTER
6	POT HEATER
7	BURNER PUMP
8	TEMPERATURE TRANSMITTER
9	RELIEF VALVE (3/4" WITH SPRING)
10	CHECKVALVE (1" WITH SPRING)

* POT HEATER AND OIL PUMP MIGHT BE COUPLED WITH BURNER BODY OR COME AS A SEPARATE FILTERING-PUMPING-HEATING GROUP ACCORDING TO BURNER CAPACITY.

7.15. Gas Pass Equipment Required in Gas Line



Pe < 300 mbar Q<1200kW	Pe > 300 mbar Q<1200kW	Pe < 300 mbar Q>1200kW	Pe > 300 mbar Q>1200kW
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.

8. MAINTENANCE

8.1. Monthly Maintenance

Monthly maintenance is a comprehensive process 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 an emission analysis.

- Clean the filters on the main line and multiblock.
- Check the burner gas tip.
- Perform insulation measurements of ignition and ionization electrodes, replace electrodes should there be leakage to the body.
- Check ignition cables and sockets.
- Check all wiring points. Tighten loose connections.
- Clean the dust and layers accumulated on the fan and air klappes.
- Check gas line pressure, it must be the same with the first adjusted pressure, otherwise burner load and emission values will also have changed.
- Check all bolts of the burner. Tighten loose bolts.
- After starting the burner and adjusting air klappe, perform flue gas emission measurement and check if there is an ideal combustion.

8.2. 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.
- Replace ignition and ionization electrodes with new ones.
- Clean air fan and clamps.
- Check the operating function.
- Check boiler thermostats.
- Check cleanliness of boiler inside and clean if necessary.



Follow installation directions during maintenance.

9. FAULT HISTORY

Reading fault situation from the control panel

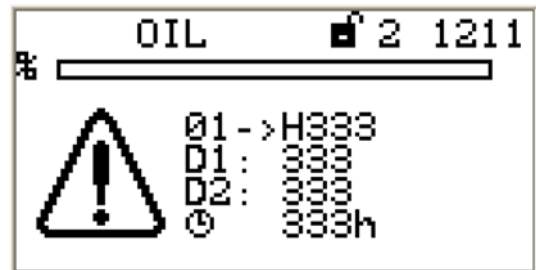
Active fault situation is shown on display. Enter-button is lit. Fault history can be read from the control panel.

See more precise fault codes in the brochure on burner control.

Resetting fault

Example

- 01: fault code H333
- D1: diagnostic code (additional information)
- D2: diagnostic code (additional information)
- clock: running hours counter in fault situation



Burner control can be reset immediately after lockout. After resetting the actuators drive to stand by position. In stand by position control unit allows burner to restart.

11. 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

E - mail : 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.

