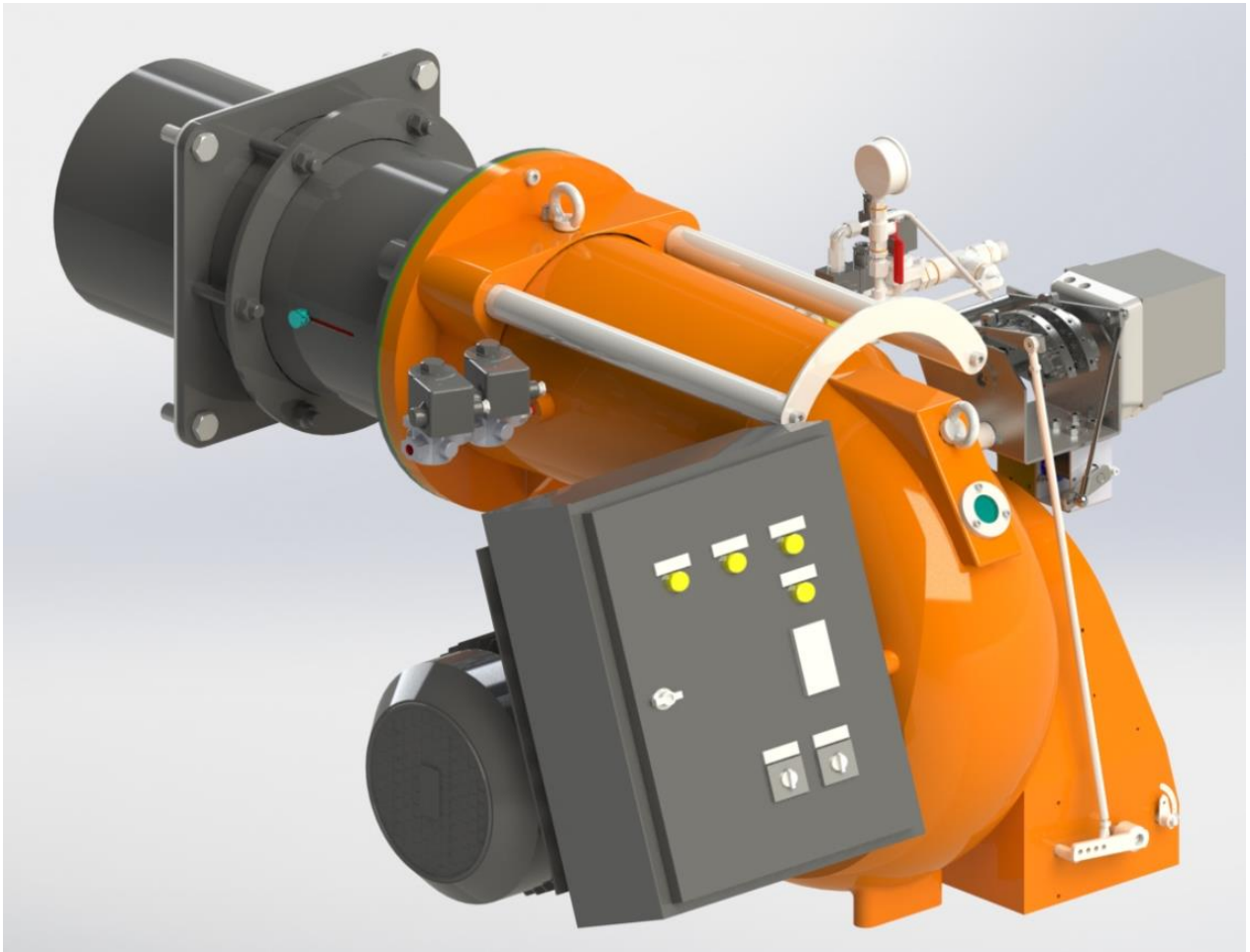


# MONOBLOCK HEAVY OIL BURNERS INSTALLATION, OPERATING AND MAINTENANCE MANUAL

TWO STAGE AND MODULATING OPERATION



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



**DEAR USER,**

**ECOSTAR ECO 50, ECO 55, ECO 60, ECO 65, ECO 70, ECO 75 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.

Ecostar Heavy Oil Burners are manufactured in accordance with TS EN 267 standards.






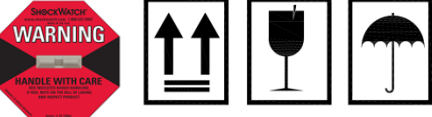
This Operating Manual is an integral part of the burner and must be maintained in a plastic dossier and hung at a clearly visible place in the burner room.

## 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.	FLUE GAS AND HEATING WATER SCHEMA.....	31
5.	TECHNICAL DATA.....	32
5.1.	Capacity Table.....	32
5.2.	Back Pressure-Capacity Diagrams .....	33
5.3.	Burner Dimensions.....	34
5.4.	Flame Length and Diameter .....	35
5.5.	Noise Level.....	35
6.	BURNER HANDLING INFORMATION .....	36
7.	INSTALLATION .....	37
7.1.	Burner Installation Picture.....	37
7.2.	In reverse flame front mirror boilers .....	38
7.3.	In cylindrical (straight flame) boilers .....	38
8.	COMMISSIONING.....	39
8.1.	Before Commissioning.....	39
8.2.	General Controls.....	39
8.3.	Combustion Adjustment.....	40
8.4.	Fuel Pumps .....	40
8.5.	Servomotor Adjustment .....	44
8.6.	Emission Measurement .....	49
8.7.	Program Relay.....	49
8.8.	Heavy Oil Burner Fuel Ring Line .....	51
9.	MAINTENANCE.....	52
9.1.	Weekly Maintenance .....	52
9.2.	Monthly Maintenance.....	52
9.3.	Seasonal Maintenance .....	53
9.4.	Installation and Disassembly Instructions for Maintenance Purposes .....	54
10.	TROUBLESHOOTING.....	55
11.	PERIODICAL FLUE GAS MEASUREMENT REPORT .....	56
12.	AFTER SALES SERVICES.....	57
13.	NOTES.....	58

## 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.
	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 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.



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
- 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 air dampers and oil regulators, servomotor and air 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 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 Heavy Oil burners are designed to operate with oil at 2.5 – 20 Cst (mm<sup>2</sup>/s) viscosity, at rated capacity and pressure ranges and -15% to +10% nominal voltage.

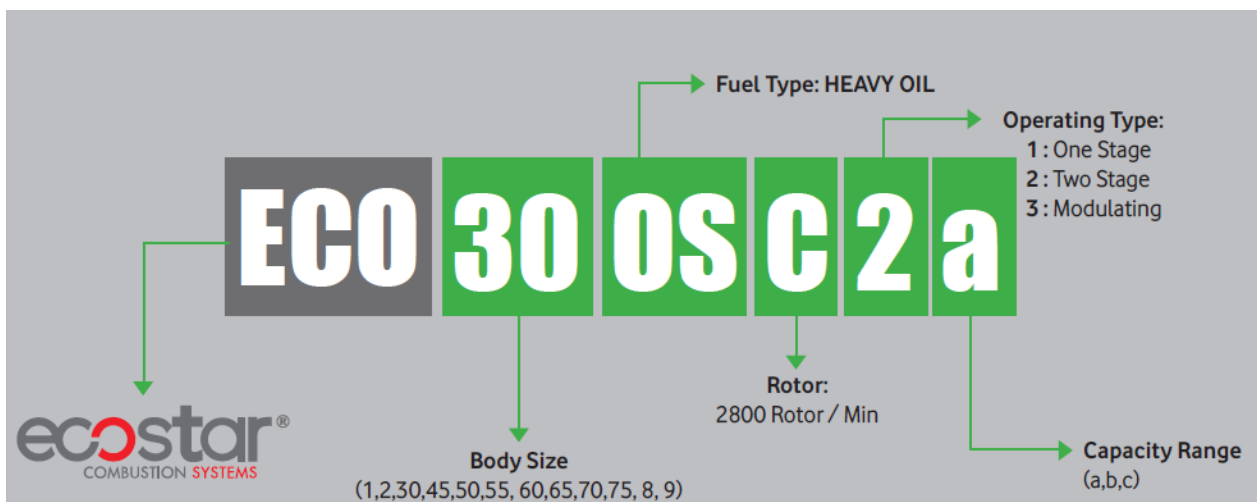
#### 3.1. Purpose of Use and Work Limits of Burners

- 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.

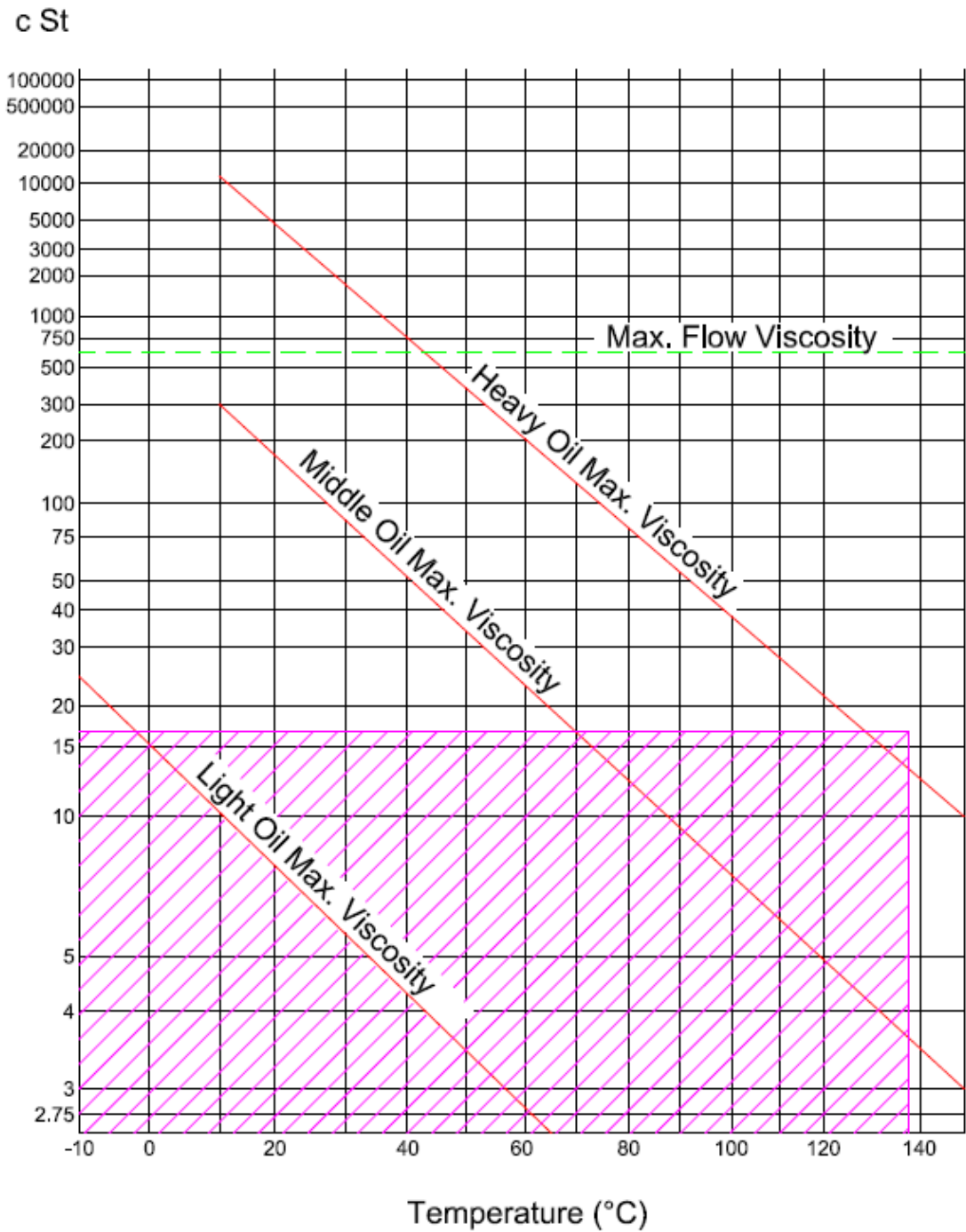


This device must never be operated with open flame!

#### 3.2. Code Key







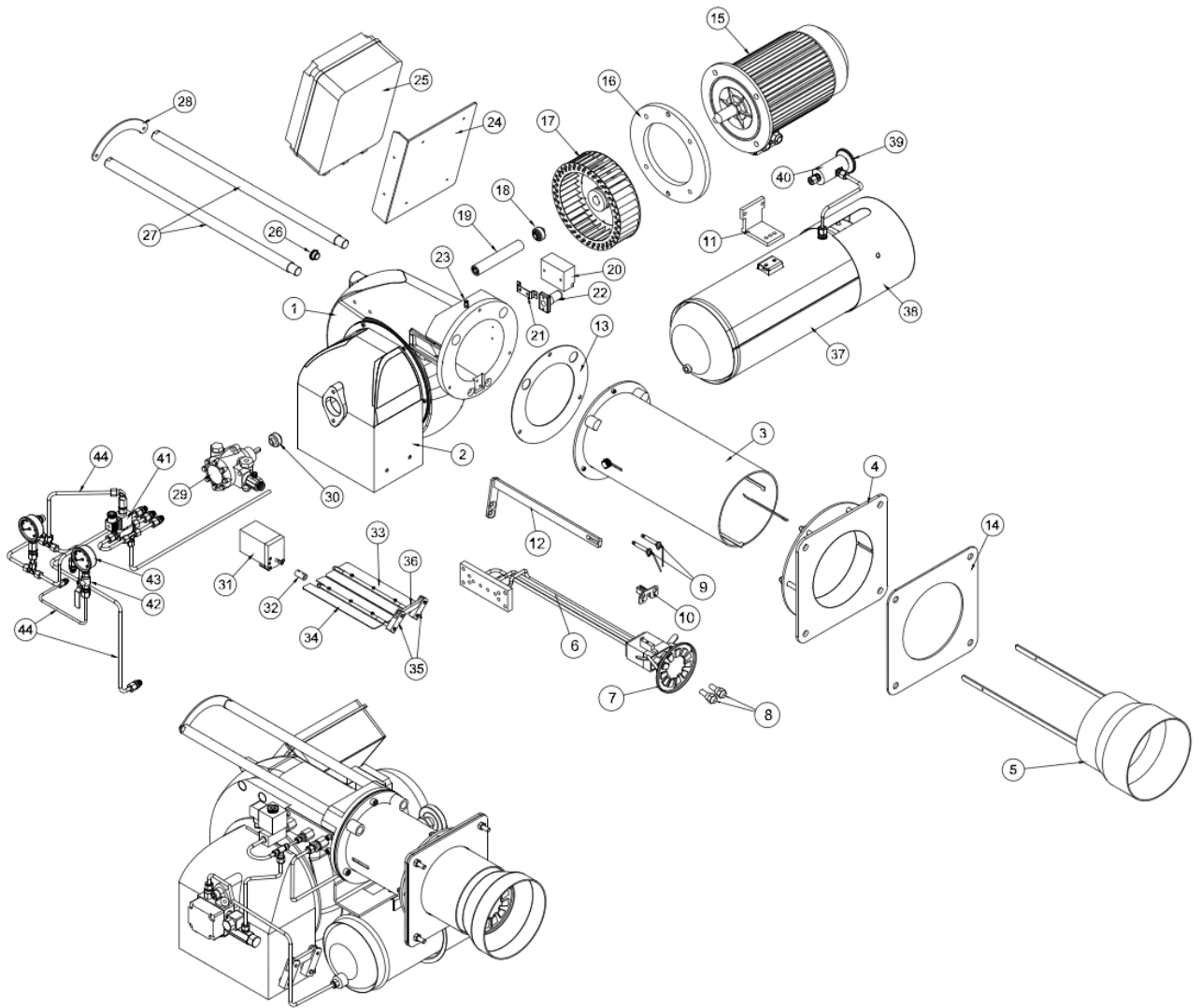
Temperature change of fuel used in ECOSTAR heavy oil burners dependent on viscosity



Operating Range

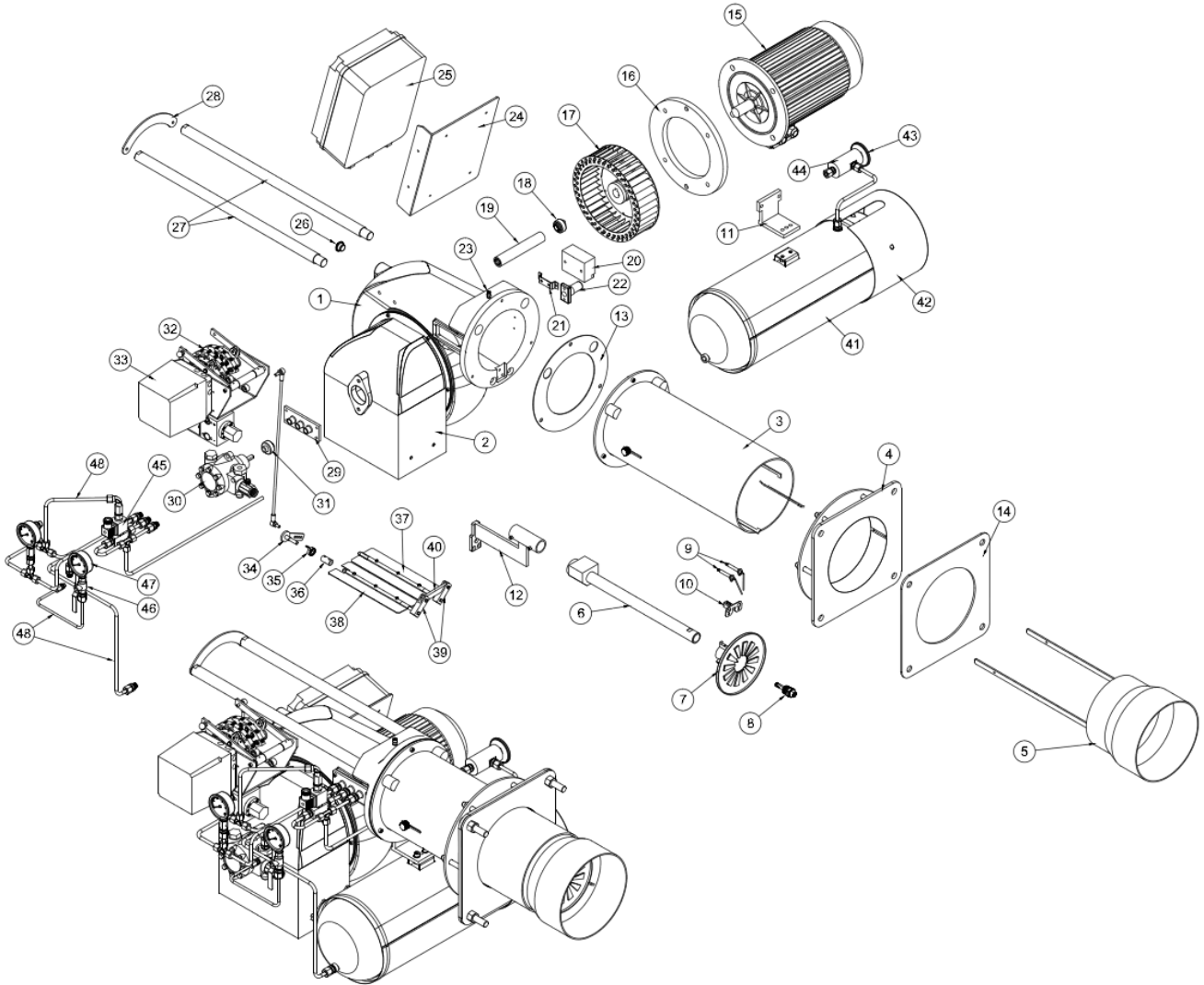
### 3.3. Burner Components

#### ECO 50 OSC2



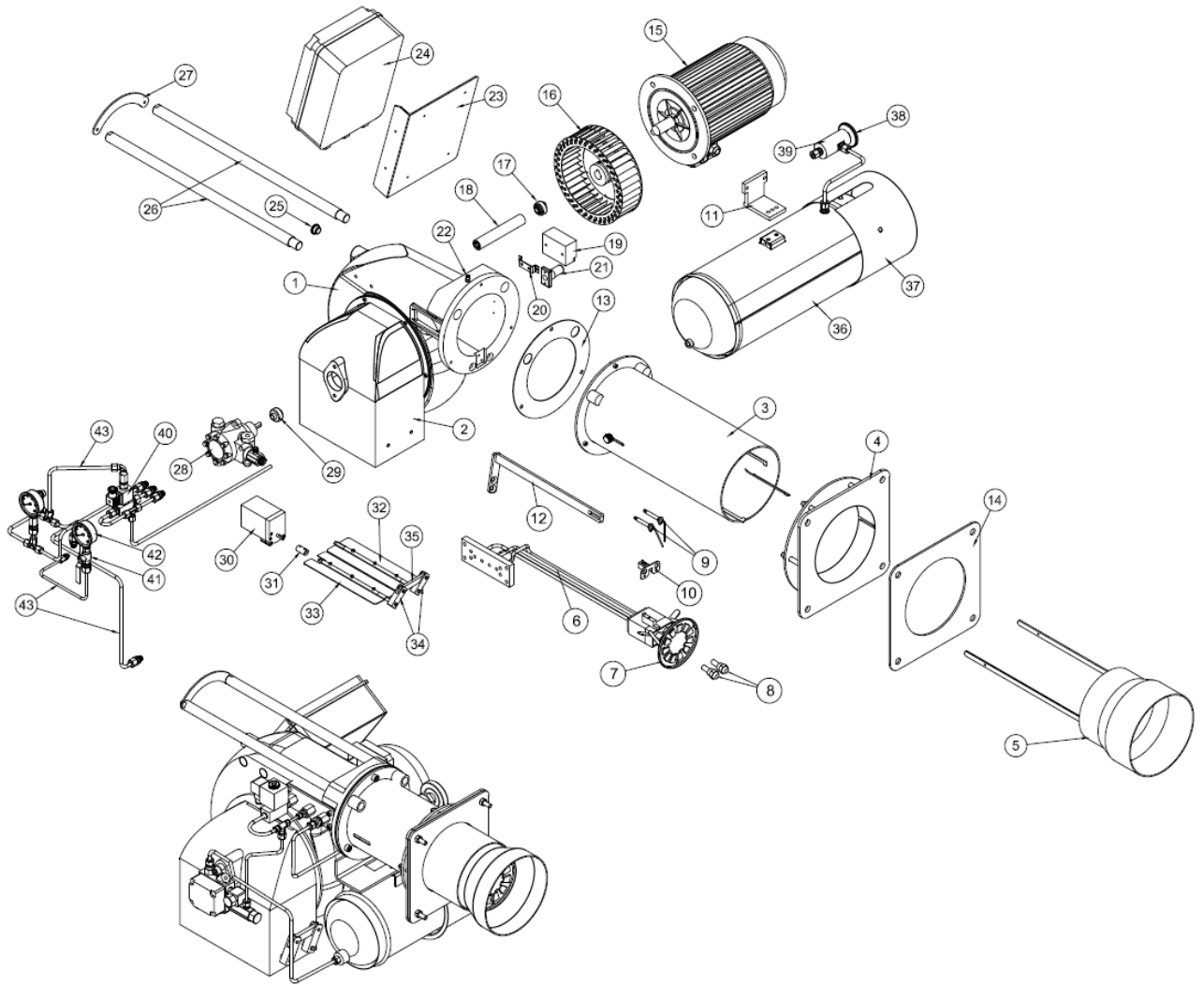
Assembly No	Part Number	Assembly No	Part Number
1	Body	23	Purger
2	Air Intake	24	Electrical Panel Mounting Plate
3	Flame Tube	25	Electrical Panel
4	Boiler Connection Flange Sheet Metal	26	Observation Glass
5	Flame Tube Extension	27	Handling Shaft
6	Lance	28	Handling Shaft Fixing Plate
7	Combustion Head	29	Pump
8	Fuel Nozzle	30	Pump Coupling
9	Ignition Electrode	31	Servomotor
10	Electrode Connection Sheet Metal	32	Servomotor Coupling
11	Pot Heater Connection	33	Air Damper
12	Lance Centering Console	34	Air Damper
13	Klingerit Gasket	35	Air Damper Motion Rod
14	Gasket	36	Air Damper Motion Transfer Rod
15	Fan Motor	37	Pot Heater
16	Fan Motor Connection Flange	38	Pot Heater Protection Cover
17	Fan	39	Thermometer
18	Fan Coupling	40	Thermometer Connection Adaptor
19	Coupling Connection Pipe	41	Solenoid Valve
20	Ignition Transformer	42	Ball Valve
21	Transformer Mounting Plate	43	Manometer
22	Photocell	44	Fuel Pipes

### ECO 50 OSC3



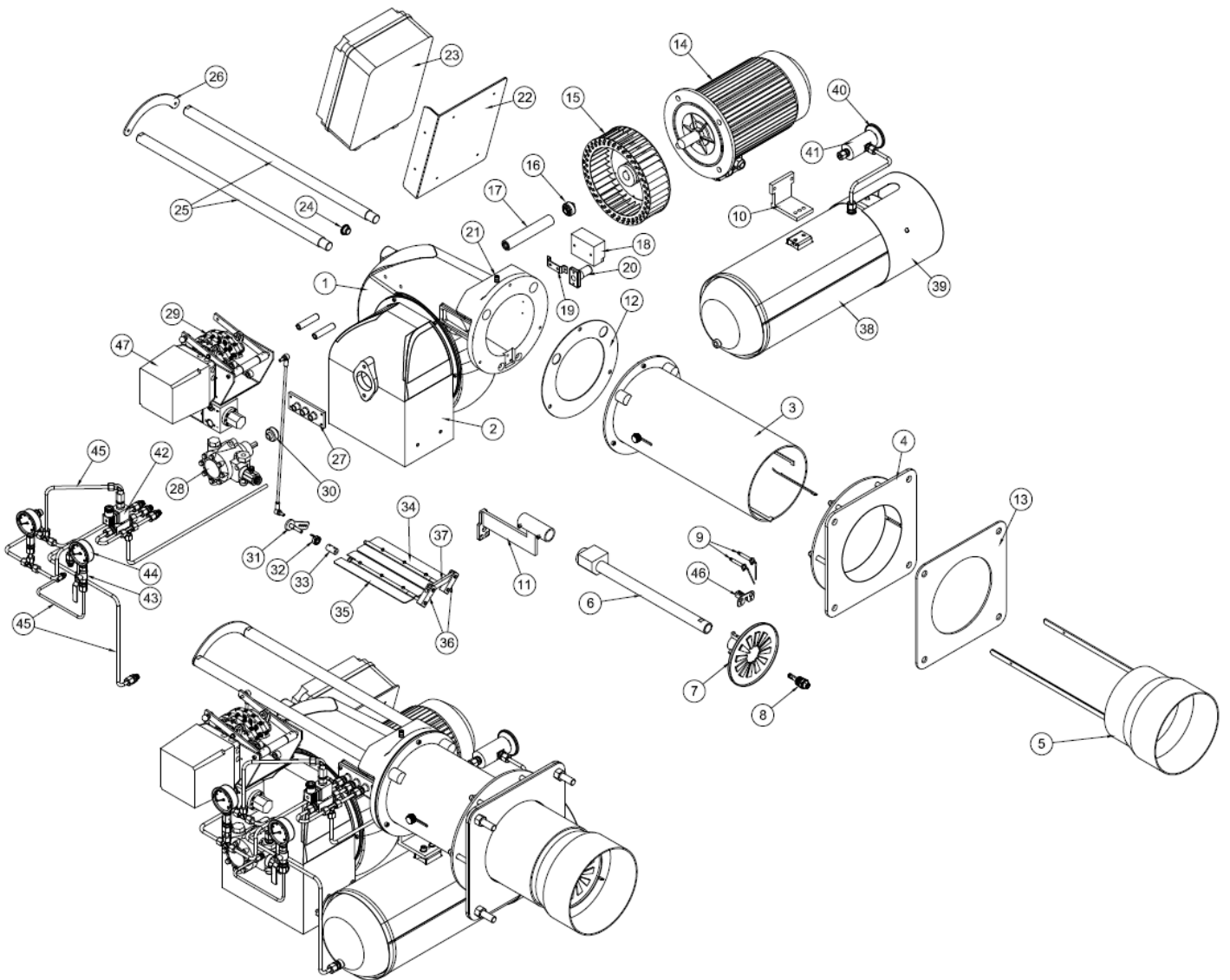
<b>Assembly No</b>	<b>Part Number</b>	<b>Assembly No</b>	<b>Part Number</b>
1	Body	25	Electrical Panel
2	Air Intake	26	Observation Glass
3	Flame Tube	27	Handling Shaft
4	Boiler Connection Flange sac	28	Handling Shaft Fixing Plate
5	Flame Tube Extension	29	Solenoid Valve Connection Plate
6	Lance	30	Pump
7	Combustion Head	31	Pump Coupling
8	Fuel Nozzle	32	Disc Control Group
9	Ignition Electrode	33	Servomotor
10	Electrode Connection Sheet Metal	34	Air Damper Modulating Motion Rod
11	Pot Heater Connection	35	Air Damper Modulating Spring
12	Lance Centering Console	36	Servomotor Coupling
13	Klingerit Gasket	37	Air Damper
14	Gasket	38	Air Damper
15	Fan Motor	39	Air Damper Motion Rod
16	Fan Motor Connection Flange	40	Air Damper Motion Transfer Rod
17	Fan	41	Pot Heater
18	Fan Coupling	42	Pot Heater Protection Cover
19	Coupling Connection Pipe	43	Thermometer
20	Ignition Transformer	44	Thermometer Connection Adaptor
21	Transformer Mounting Plate	45	Solenoid Valve
22	Photocell	46	Ball Valve
23	Purger	47	Manometer
24	Electrical Panel Mounting Plate	48	Fuel Pipes

ECO 55 OSC2



Assembly No	Part Number	Assembly No	Part Number
1	Body	23	Electrical Panel Mounting Plate
2	Air Intake	24	Electrical Panel
3	Flame Tube	25	Observation Glass
4	Boiler Connection Flange sac	26	Handling Shaft
5	Flame Tube Extension	27	Handling Shaft Fixing Plate
6	Lance	28	Pump
7	Combustion Head	29	Pump Coupling
8	Fuel Nozzle	30	Servomotor
9	Ignition Electrode	31	Servomotor Coupling
10	Electrode Connection Sheet Metal	32	Air Damper
11	Pot Heater Connection	33	Air Damper
12	Lance Centering Console	34	Air Damper Motion Rod
13	Klingerit Gasket	35	Air Damper Air Damper Motion Transfer Rod
14	Gasket	36	Pot Heater
15	Fan Motor	37	Pot Heater Protection Cover
16	Fan	38	Thermometer
17	Fan Coupling	39	Thermometer Connection Adaptor
18	Coupling Connection Pipe	40	Solenoid Valve
19	Ignition Transformer	41	Ball Valve
20	Transformer Mounting Plate	42	Manometer
21	Photocell	43	Fuel Pipes
22	Purger		

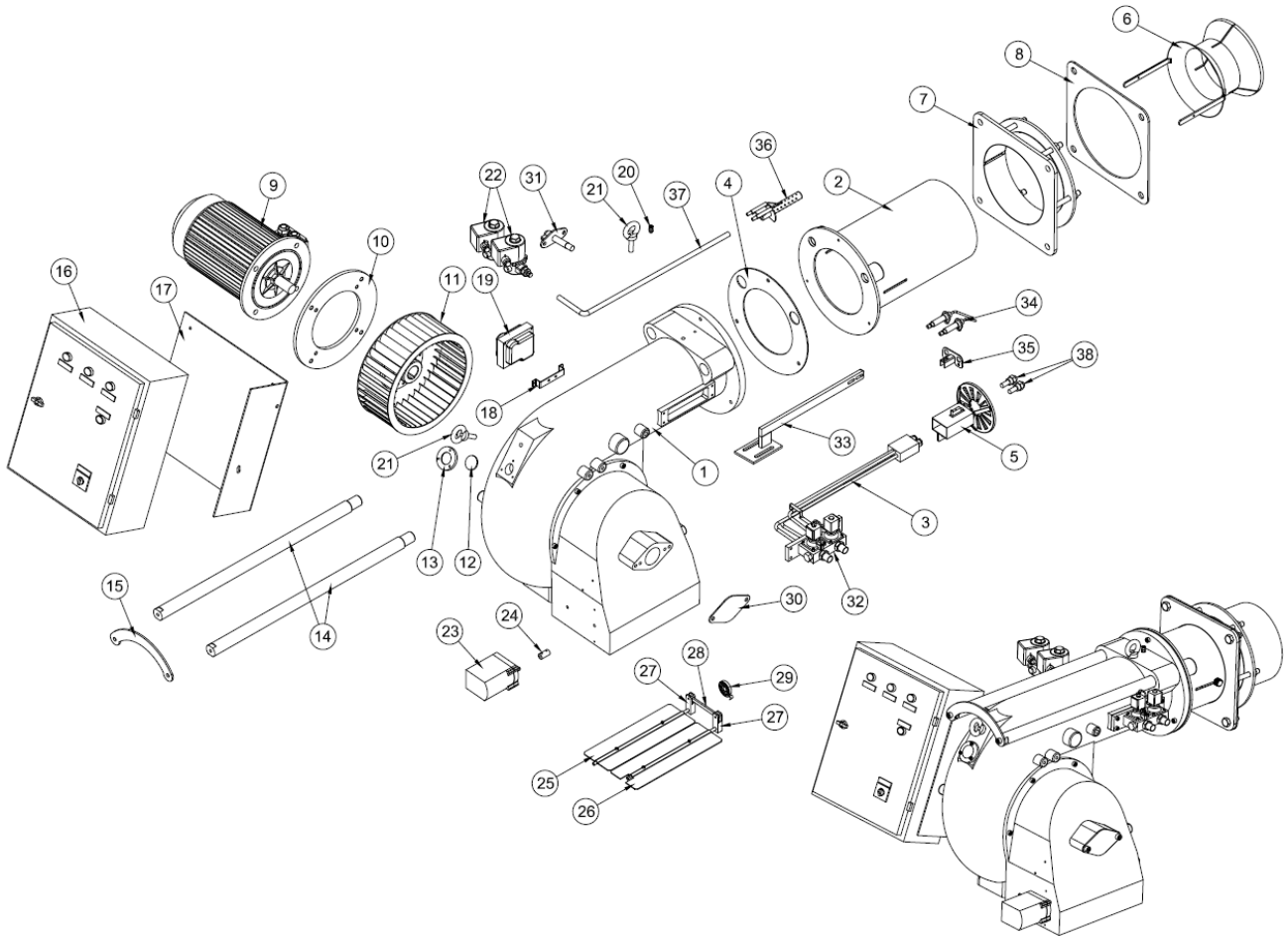
ECO 55 OSC3-3a





<b>Assembly No</b>	<b>Part Number</b>	<b>Assembly No</b>	<b>Part Number</b>
1	Body	25	Handling Shaft
2	Air Intake	26	Handling Shaft Fixing Plate
3	Flame Tube	27	Solenoid Valve Connection Plate
4	Boiler Connection Flange	28	Pump
5	Flame Tube Extension	29	Disc Control Group
6	Lance	30	Pump Coupling
7	Combustion Head	31	Air Damper Modulating Motion Rod
8	Fuel Nozzle	32	Air Damper Modulating Spring
9	Ignition Electrode	33	Servomotor Coupling
10	Pot Heater Connection	34	Air Damper
11	Lance Centering Console	35	Air Damper
12	Klingerit Gasket	36	Air Damper Motion Rod
13	Gasket	37	Air Damper Air Damper Motion Transfer Rod
14	Fan Motor	38	Pot Heater
15	Fan	39	Pot Heater Protection Cover
16	Fan Coupling	40	Thermometer
17	Coupling Connection Pipe	41	Thermometer Connection Adaptor
18	Ignition Transformer	42	Solenoid Valve
19	Transformer Mounting Plate	43	Ball Valve
20	Photocell	44	Manometer
21	Purger	45	Fuel Pipes
22	Electrical Panel Mounting Plate	46	Electrode Connection Plate
23	Electrical Panel	47	Servomotor
24	Observation Glass		

ECO 60 OSC2

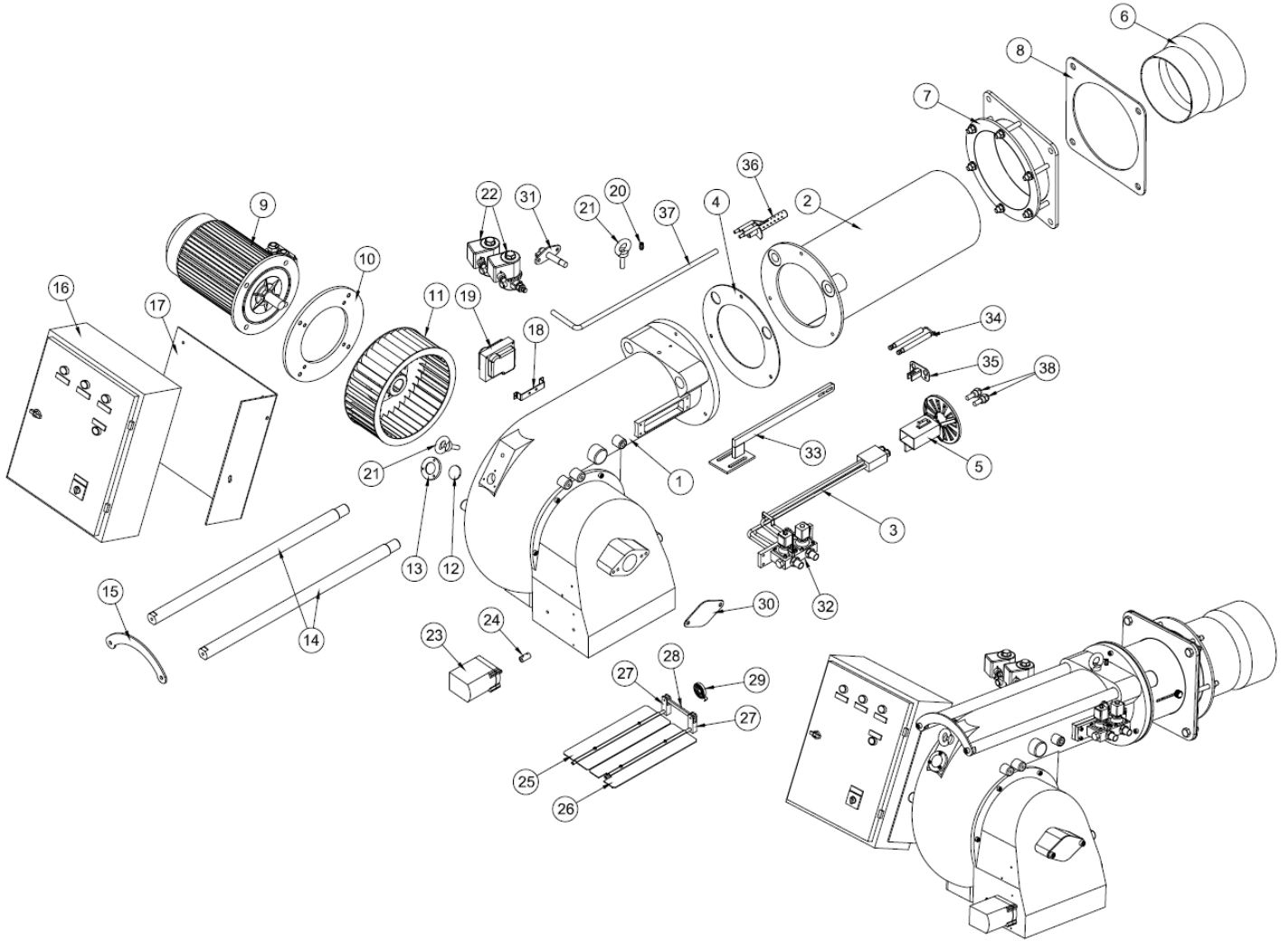


Assembly No	Part Number	Assembly No	Part Number
1	Body Group	20	Purger
2	Flame Tube	21	Eye Bolt
3	Lance	22	Gas Solenoid Valve
4	Klingerit Gasket	23	Servomotor
5	Combustion Head	24	Servomotor Coupling
6	Air Adjustment Mechanism	25	Air Damper
7	Boiler Connection Flange	26	Air Damper
8	Gasket	27	Air Damper Motion Rod
9	Fan Motor	28	Air Damper Air Damper Motion Transfer Rod
10	Fan Motor Connection Flange	29	Air Damper Modulating Spring
11	Fan	30	Pump Housing Cover
12	Observation Glass	31	Photocell
13	Observation Glass Frame	32	Liquid Fuel Solenoid Valve
14	Handling Shaft	33	Lance Centering Console
15	Handling Shaft Fixing Plate	34	Ignition Electrode
16	Electrical Panel	35	Electrode Connection Plate
17	Electrical Panel Mounting Plate	36	Pilot Ignition
18	Transformer Mounting Plate	37	Pilot Ignition Pipe
19	Ignition Transformer	38	Fuel Nozzle



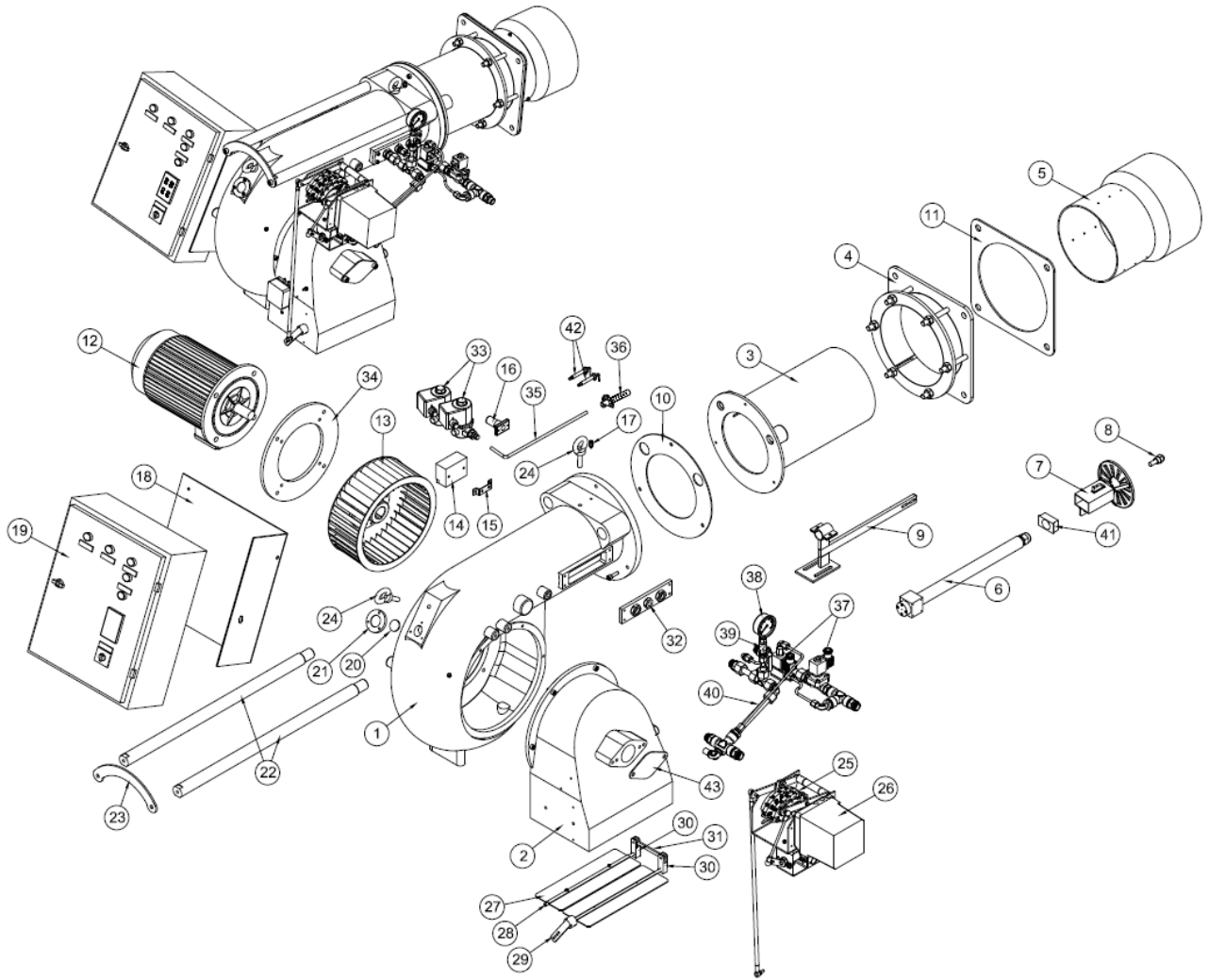
Assembly No	Part Number	Assembly No	Part Number
1	Body	22	Handling Shaft
2	Air Intake	23	Handling Shaft Fixing Plate
3	Flame Tube	24	Eye Bolt
4	Boiler Connection Flange	25	Disc Control Group
5	Air Adjustment Mechanism	26	Servomotor
6	Lance	27	Air Damper Plate
7	Combustion Head	28	Air Damper Shaft
8	Fuel Nozzle	29	Air Damper Adjustment Rod
9	Lance Centering Console	30	Air Damper Motion Rod
10	Klingerit Gasket	31	Air Damper Air Damper Motion Transfer Rod
11	Gasket	32	Solenoid Valve Connection Plate
12	Fan Motor	33	Gas Solenoid Valve
13	Fan	34	Fan Motor Connection Flange
14	Ignition Transformer	35	Pilot Ignition Pipe
15	Transformer Mounting Plate	36	Pilot Combustion Head
16	Photocell	37	Solenoid Valve
17	Purger	38	Ball Valve
18	Electrical Panel Mounting Plate	39	Manometer
19	Electrical Panel	40	Fuel Pipes
20	Observation Glass	41	Pilot Ignition Electrode
21	Observation Glass Frame	42	Pump Housing Cover

ECO 65 OSC2



Assembly No	Part Number	Assembly No	Part Number
1	Body Group	20	Purger
2	Flame Tube	21	Eye Bolt
3	Lance	22	Gas Solenoid Valve
4	Klingerit Gasket	23	Servomotor
5	Combustion Head	24	Servomotor Coupling
6	Flame Tube Extension	25	Air Damper
7	Boiler Connection Flange	26	Air Damper
8	Gasket	27	Air Damper Motion Rod
9	Fan Motor	28	Air Damper Air Damper Motion Transfer Rod
10	Fan Motor Connection Flange	29	Air Damper Modulating Spring
11	Fan	30	Pump Housing Cover
12	Observation Glass	31	Photocell
13	Observation Glass Frame	32	Liquid Fuel Solenoid Valve
14	Handling Shaft	33	Lance Centering Console
15	Handling Shaft Fixing Plate	34	Ignition Electrode
16	Electrical Panel	35	Electrode Connection Plate
17	Electrical Panel Mounting Plate	36	Pilot Ignition Pipe
18	Transformer Mounting Plate	37	Pilot Ignition
19	Ignition Transformer	38	Fuel Nozzle

ECO 65 OSC3



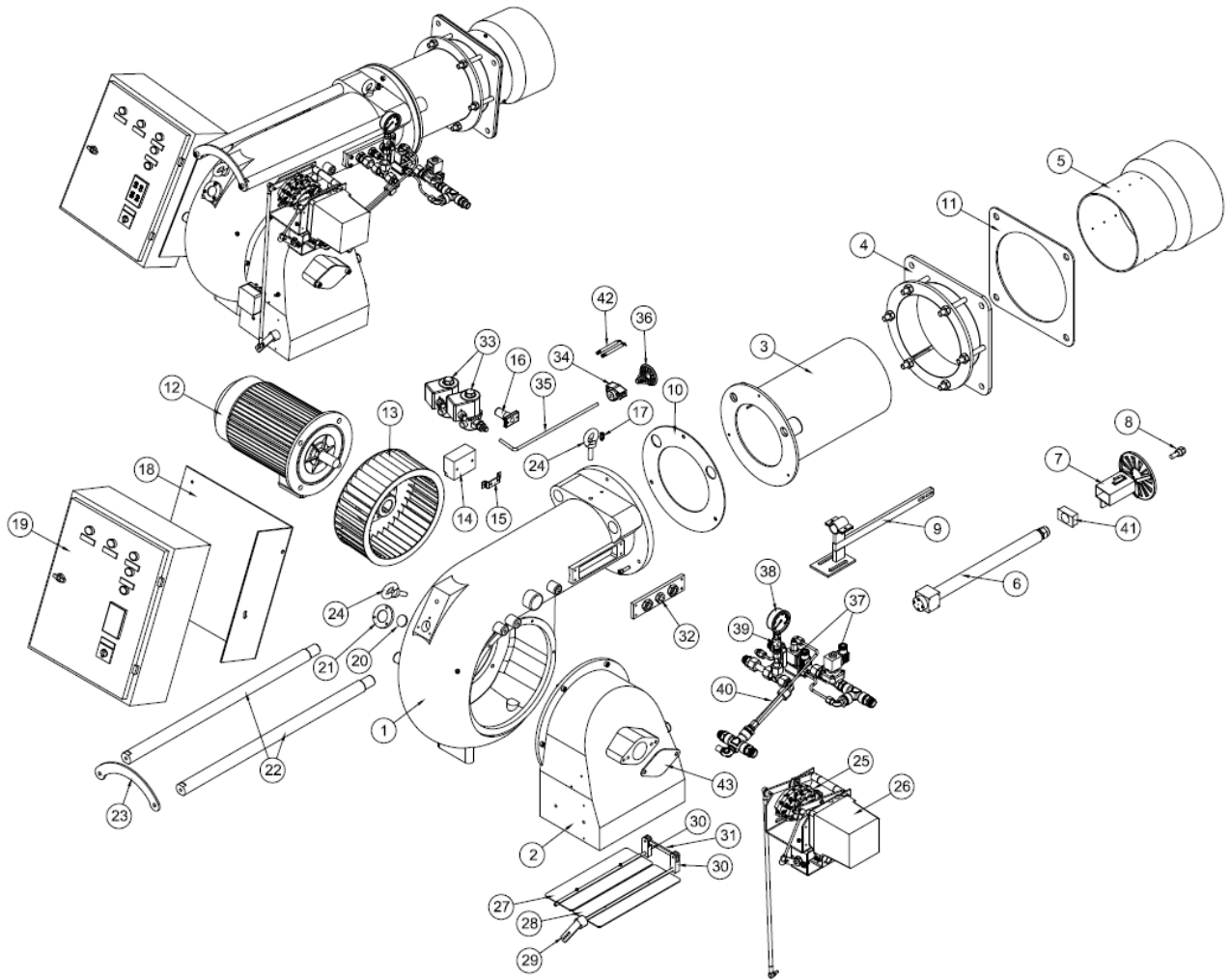


Assembly No	Part Number	Assembly No	Part Number
1	Body	23	Handling Shaft Fixing Plate
2	Air Intake	24	Eye Bolt
3	Flame Tube	25	Disc Control Group
4	Boiler Connection Flange	26	Servomotor
5	Flame Tube Extension	27	Air Damper Plate
6	Lance	28	Air Damper Shaft
7	Combustion Head	29	Air Damper Adjustment Rod
8	Fuel Nozzle	30	Air Damper Motion Rod
9	Lance Centering Console	31	Air Damper Air Damper Motion Transfer Rod
10	Klingerit Gasket	32	Solenoid Valve Connection Plate
11	Gasket	33	Gas Solenoid Valve
12	Fan Motor	34	Fan Motor Connection Flange
13	Fan	35	Pilot Ignition Pipe
14	Ignition Transformer	36	Pilot Combustion Head
15	Transformer Mounting Plate	37	Solenoid Valve
16	Photocell	38	Ball Valve
17	Purger	39	Manometer
18	Electrical Panel Mounting Plate	40	Fuel Pipes
19	Electrical Panel	41	Centering Block
20	Observation Glass	42	Pilot Ignition Electrode
21	Observation Glass Frame	43	Pump Housing Cover
22	Handling Shaft		



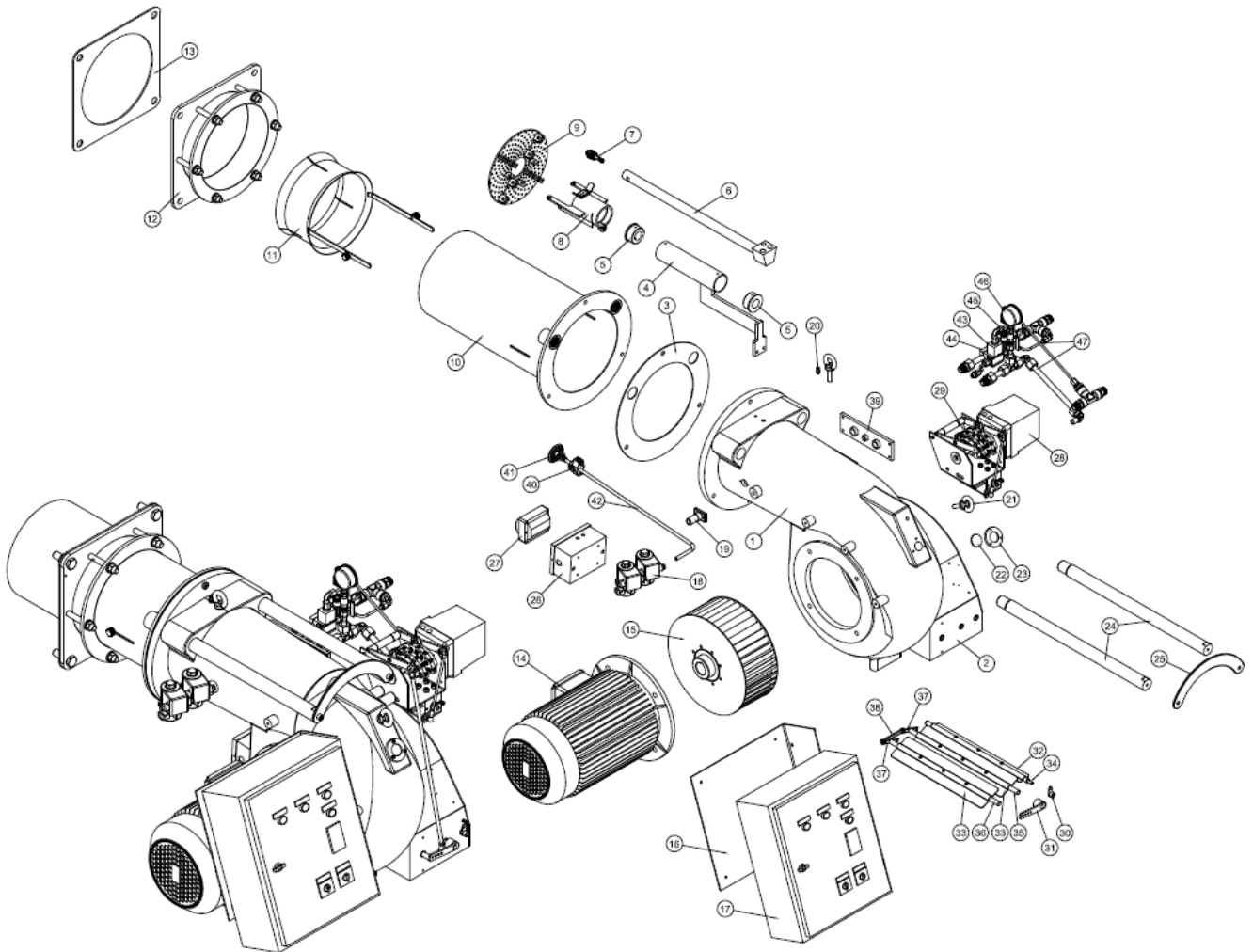
<b>Assembly No</b>	<b>Part Number</b>	<b>Assembly No</b>	<b>Part Number</b>
1	Body Group	20	Purger
2	Flame Tube	21	Eye Bolt
3	Lance	22	Gas Solenoid Valve
4	Klingerit Gasket	23	Servomotor
5	Combustion Head	24	Servomotor Coupling
6	Flame Tube Extension	25	Air Damper
7	Boiler Connection Flange	26	Air Damper
8	Gasket	27	Air Damper Motion Rod
9	Fan Motor	28	Air Damper Air Damper Motion Transfer Rod
10	Fan Motor Connection Flange	29	Air Damper Modulating Spring
11	Fan	30	Pump Housing Cover
12	Observation Glass	31	Photocell
13	Observation Glass Frame	32	Liquid Fuel Solenoid Valve
14	Handling Shaft	33	Lance Centering Console
15	Handling Shaft Fixing Plate	34	Ignition Electrode
16	Electrical Panel	35	Electrode Connection Plate
17	Electrical Panel Mounting Plate	36	Pilot Ignition Pipe
18	Transformer Mounting Plate	37	Pilot Ignition
19	Ignition Transformer	38	Fuel Nozzle

# ECO 70 OSC3



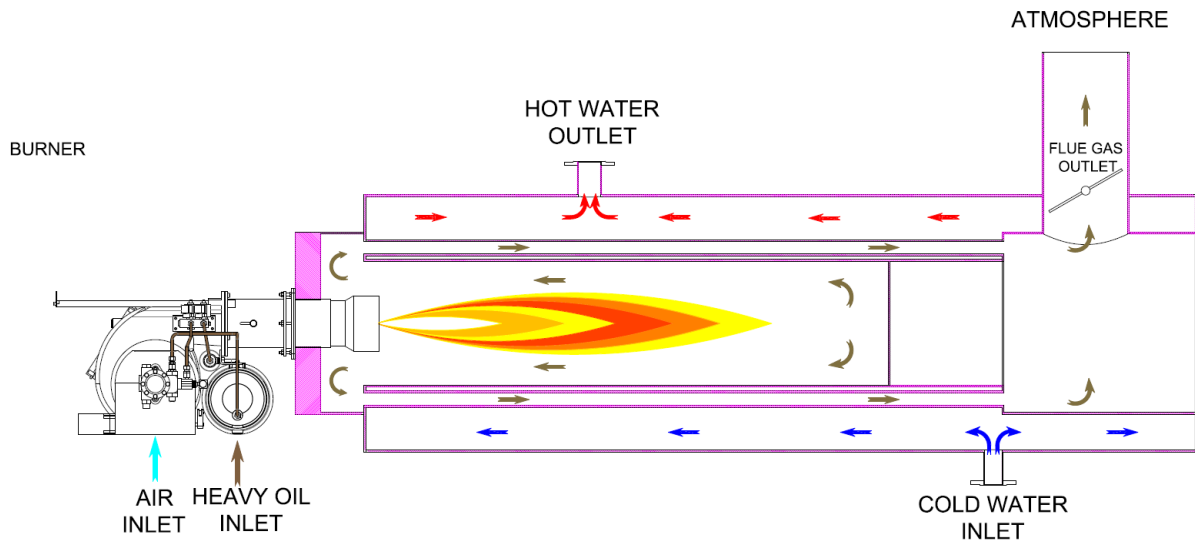
<b>Assembly No</b>	<b>Part Number</b>	<b>Assembly No</b>	<b>Part Number</b>
1	Body	23	Handling Shaft Fixing Plate
2	Air Intake	24	Eye Bolt
3	Flame Tube	25	Disc Control Group
4	Boiler Connection Flange	26	Servomotor
5	Flame Tube Extension	27	Air Damper
6	Lance	28	Air Damper
7	Combustion Head	29	Air Damper Adjustment Rod
8	Fuel Nozzle	30	Air Damper Motion Rod
9	Lance Centering Console	31	Air Damper Air Damper Motion Transfer Rod
10	Klingerit Gasket	32	Solenoid Valve Connection Plate
11	Gasket	33	Gas Solenoid Valve
12	Fan Motor	34	Electrode Clamp
13	Fan	35	Pilot Ignition Pipe
14	Ignition Transformer	36	Pilot Combustion Head
15	Transformer Mounting Plate	37	Solenoid Valve
16	Photocell	38	Ball Valve
17	Purger	39	Manometer
18	Electrical Panel Mounting Plate	40	Fuel Pipes
19	Electrical Panel	41	Centering Block
20	Observation Glass	42	Pilot Ignition Electrode
21	Observation Glass Frame	43	Pump Housing Cover
22	Handling Shaft		

ECO 75 OSC3



Assembly No	Part Number	Assembly No	Part Number
1	Body	25	Handling Shaft Fixing Plate
2	Air Intake	26	Transformer Box
3	Klingerit Gasket	27	Ignition Transformer
4	Lance Centering Console	28	Servomotor
5	Lance Centering Bushing	29	Disc Control Group
6	Lance	30	Air Damper Gauge
7	Fuel Nozzle	31	Air Damper Modulating Motion Rod
8	Combustion Head Connection Part	32	Air Damper Plate
9	Combustion Head	33	Air Damper Plate
10	Flame Tube	34	Air Damper Shaft
11	Air Adjustment Mechanism	35	Air Damper Shaft
12	Boiler Connection Flange	36	Air Damper Shaft
13	Gasket	37	Air Damper Motion Rod
14	Fan Motor	38	Air Damper Air Damper Motion Transfer Rod
15	Fan	39	Solenoid Valve Connection Plate
16	Electrical Panel Mounting Plate	40	Electrode Clamp
17	Electrical Panel	41	Pilot Ignition Combustion Head
18	Gas Solenoid Valve	42	Pilot Ignition Pipe
19	Photocell	43	Solenoid Valve
20	Purger	44	Solenoid Valve Connection Plate
21	Eye Bolt	45	Manometer
22	Observation Glass	46	Ball Valve
23	Observation Glass Frame	47	Fuel Pipes
24	Handling Shaft		

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





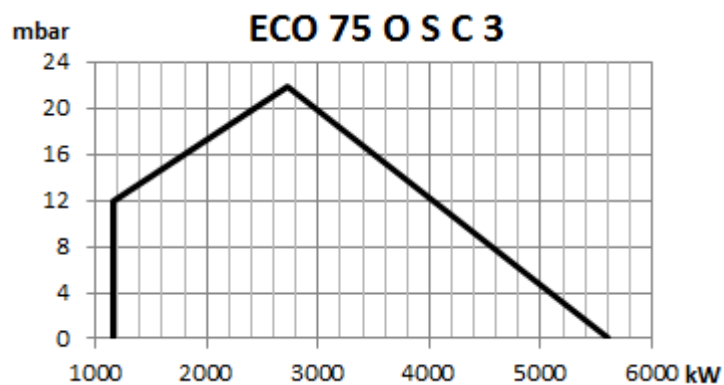
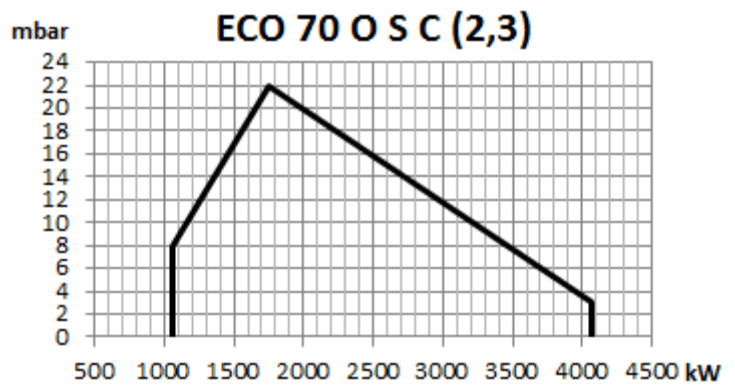
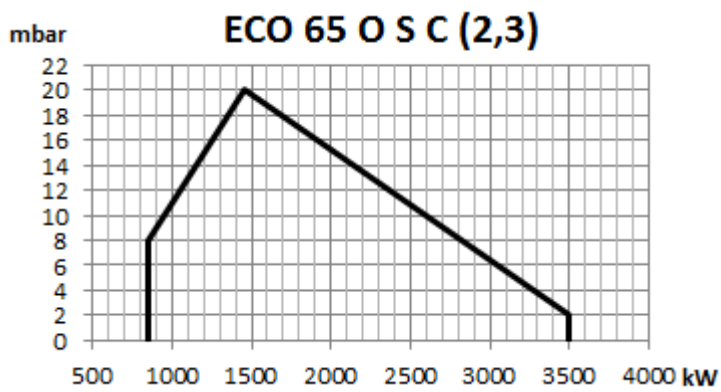
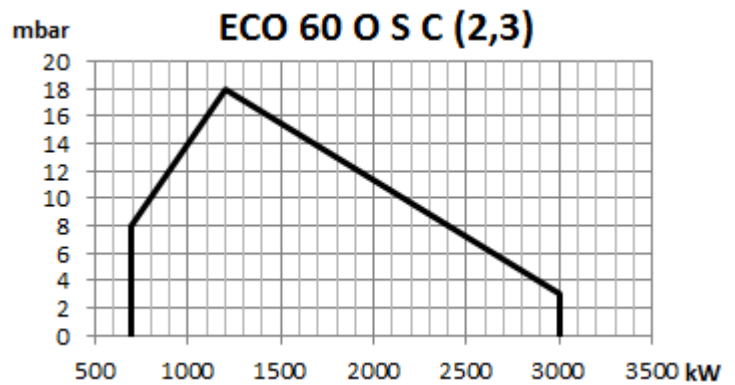
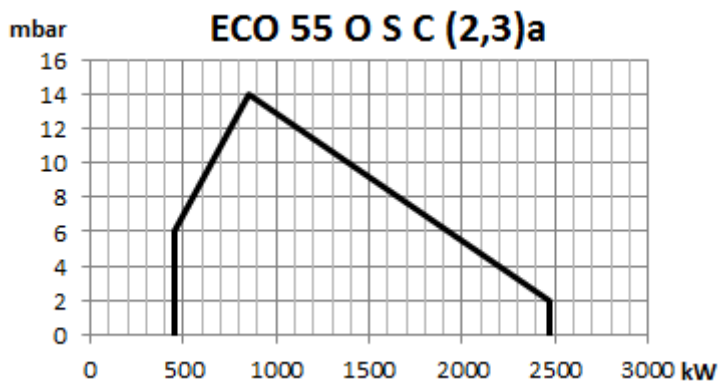
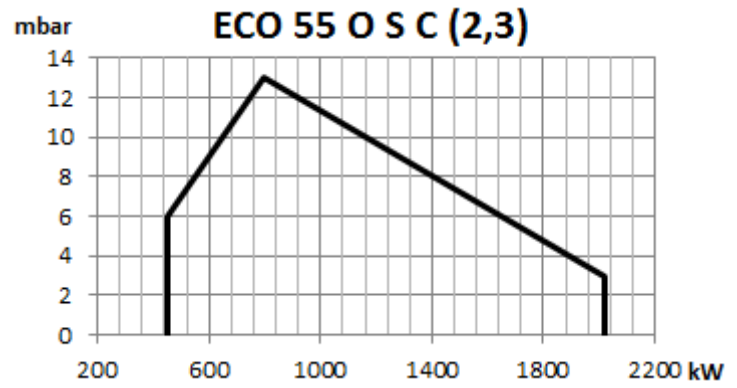
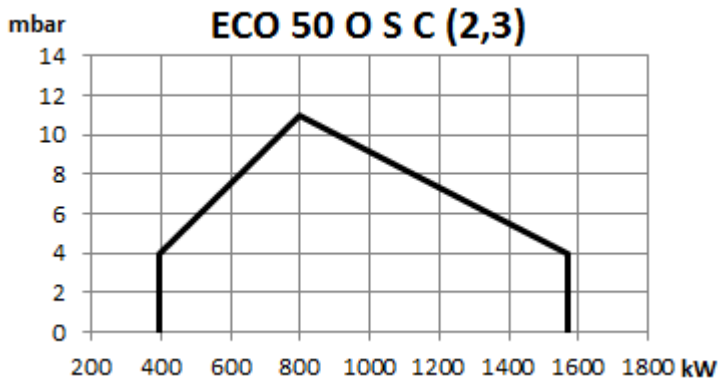
## 5. TECHNICAL DATA

### 5.1. Capacity Table

HEAVY OIL BURNERS CAPACITY TABLE										
BURNER TYPE	CAPACITY		CAPACITY		HEAVY OIL CONSUMPTION		FAN MOTOR POWER	OIL PUMP POWER	OIL HEATER	MAIN SUPPLY
	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. kg/h	Max. kg/h	kW	kW	kW	VAC
<b>TWO STAGE HEAVY OIL BURNERS</b>										
ECO 50 O (S) C 2	337.750	1.351.000	393	1.571	35	140	2,20	-	6,0	3N 380
ECO 55 O (S) C 2	386.000	1.737.000	449	2.020	40	180	3,00	-	12,0	3N 380
ECO 55 O (S) C 2a	386.000	2.123.000	449	2.469	40	220	3,00	-	12,0	3N 380
ECO 60 O (S) C 2	598.300	2.576.550	696	3.000	62	267	4,00	0,75	14,0	3N 380
ECO 65 O (S) C 2	733.400	3.010.800	853	3.500	76	312	5,50	0,75	14,0	3N 380
ECO 70 O (S) C 2	916.750	3.502.950	1.066	4.070	95	363	7,50	0,75	2 x 9,0	3N 380
<b>MODULATING HEAVY OIL BURNERS</b>										
ECO 50 O (S) C 3	337.750	1.351.000	393	1.571	35	140	2,20	-	6,0	3N 380
ECO 55 O (S) C 3	386.000	1.737.000	449	2.020	40	180	3,00	-	12,0	3N 380
ECO 55 O (S) C 3a	386.000	2.123.000	449	2.469	40	220	3,00	-	12,0	3N 380
ECO 60 O (S) C 3	598.300	2.576.550	696	3.000	62	267	4,00	1,10	14,0	3N 380
ECO 65 O (S) C 3	733.400	3.010.800	853	3.500	76	312	5,50	1,50	2 x 9,0	3N 380
ECO 70 O (S) C 3	916.750	3.502.950	1.066	4.070	95	363	7,50	1,50	2 x 9,0	3N 380
ECO 75 O (S) C 3	1.003.600	4.825.000	1.167	5.600	104	500	11,00	1,50	2 x 14,0	3N 380

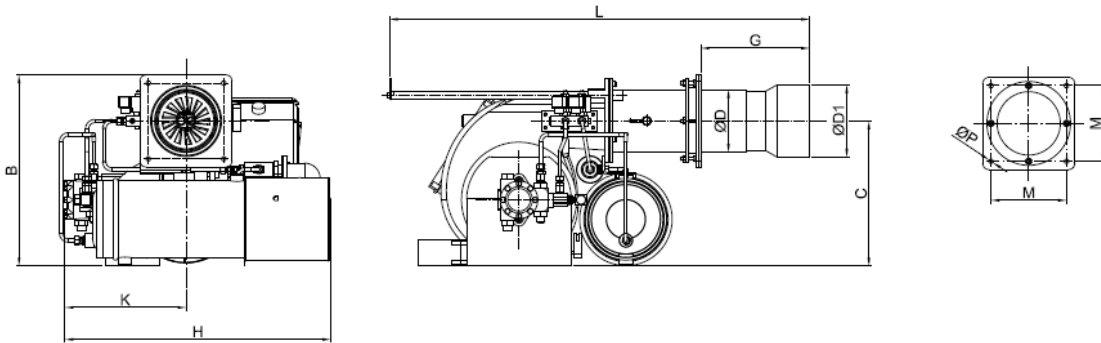
$H_u$  Heavy Oil (S) = 9650 Kcal/kg

## 5.2. Back Pressure-Capacity Diagrams

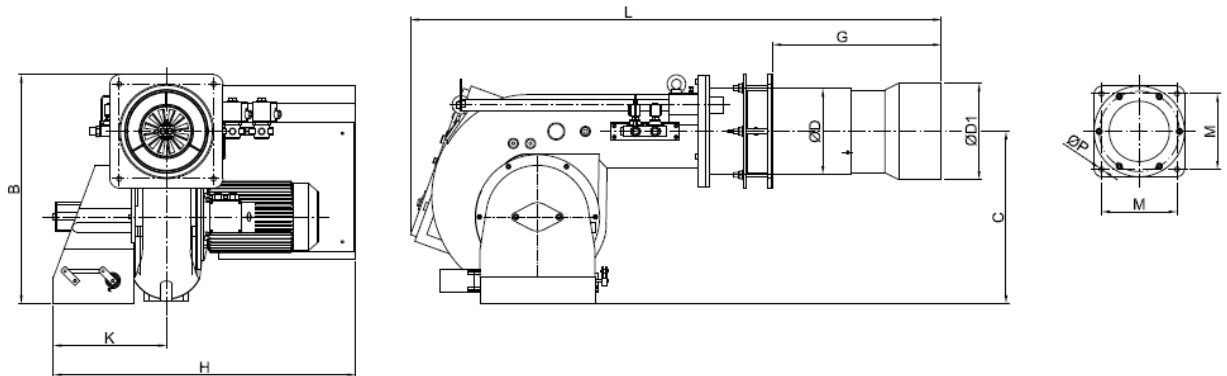


### 5.3. Burner Dimensions

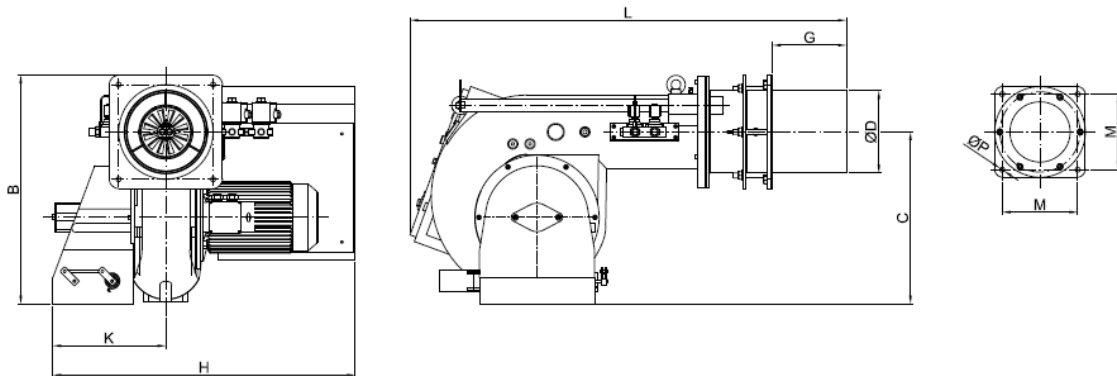
ECO 50 ECO 55



ECO 65 ECO 70

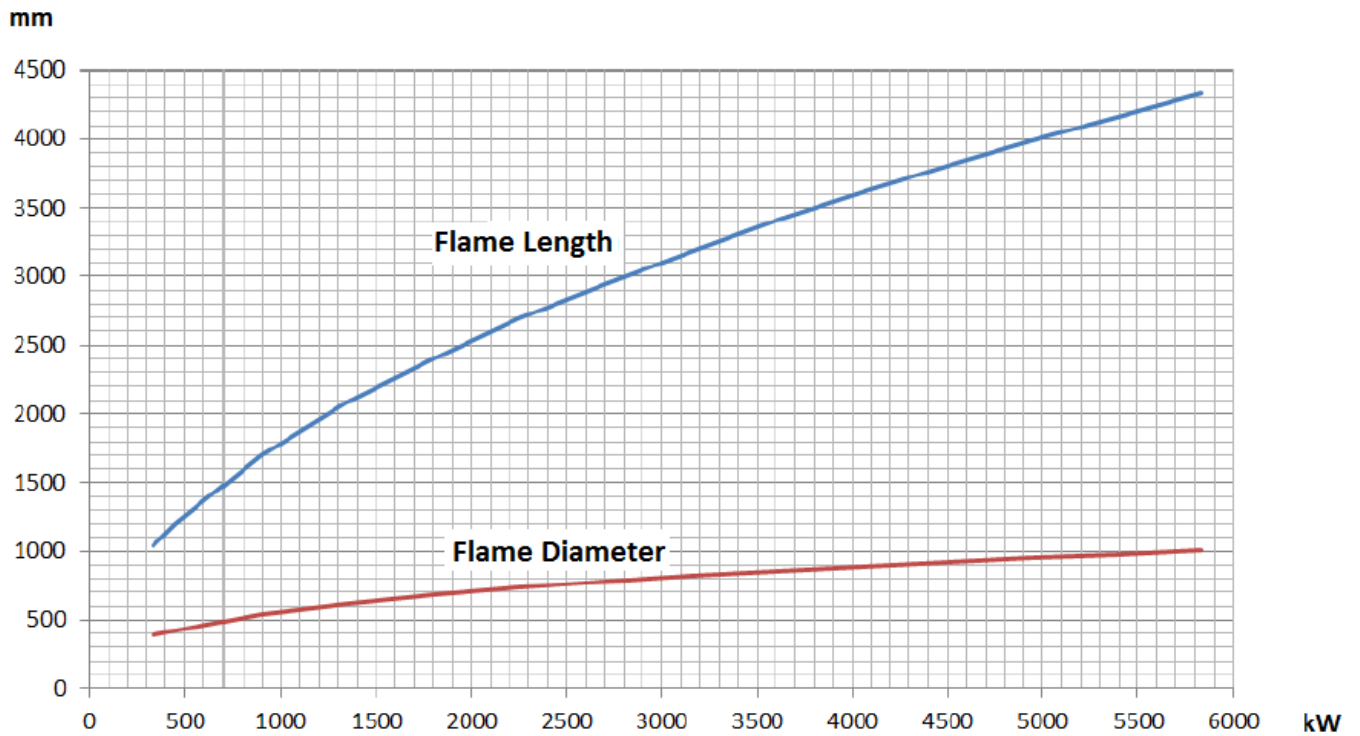


ECO 60 ECO 75



	L	Gmin	Gmax	H	K	B	C	ØP	M	ØD	ØD1
ECO 50 O (S)	1370	280	440	780	360	590	422	18	275	218	236
ECO 55 O (S)	1370	280	440	780	360	590	422	18	275	218	236
ECO 60 O (S)	1300	-	140	890	340	670	510	18	275	240	-
ECO 65 O (S)	1580	200	535	890	340	670	510	18	275	250	280
ECO 70 O (S)	1580	200	535	890	340	670	510	18	275	250	280
ECO 75 O (S)	1500	200	285	870	360	730	525	22	335	300	-

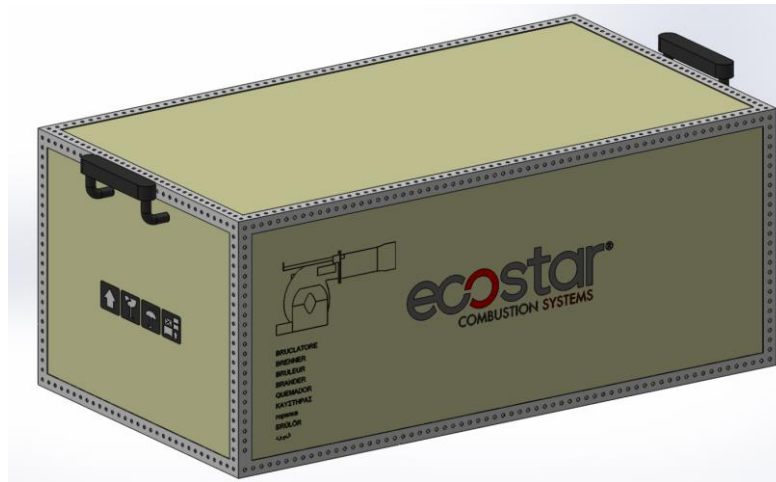
#### 5.4. Flame Length and Diameter



#### 5.5. 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.



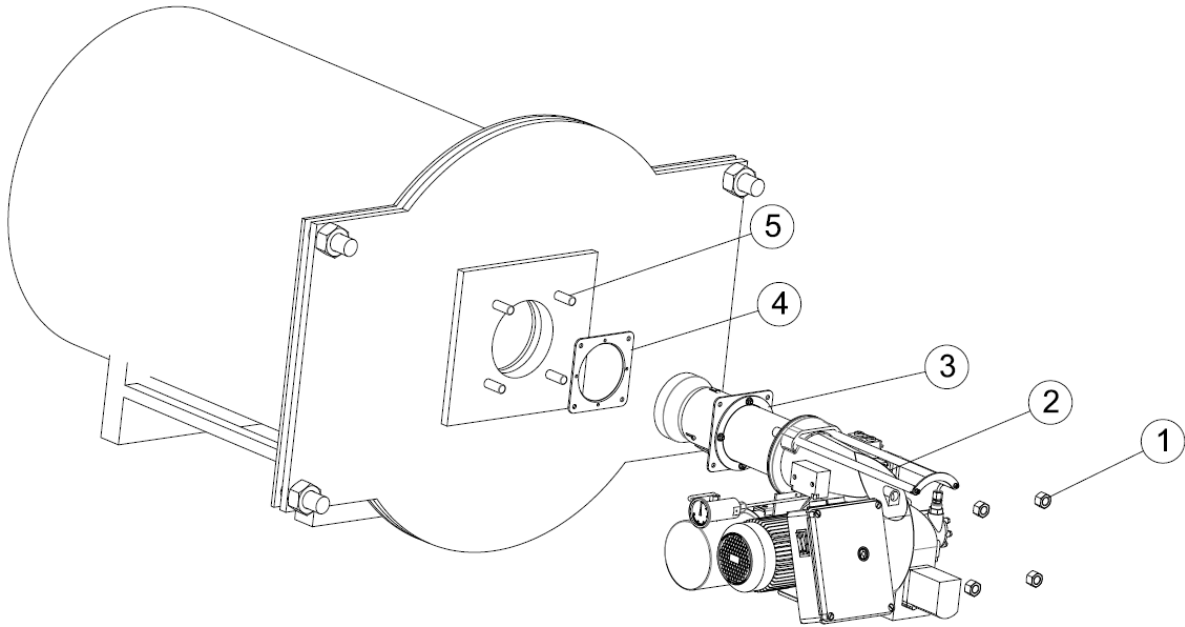
Dimensions of the box used for handling

Burner	L x W x H (cm)	Weight(kg)
ECO 50 OSC2	135 X 82 X 70	131
ECO 50 OSC3	135 X 82 X 70	135
ECO 55 OSC2	135 X 82 X 70	140
ECO 55 OSC2a	135 X 82 X 70	140
ECO 55 OSC3	135 X 82 X 70	145
ECO 55 OSC3a	135 X 82 X 70	145
ECO 60 OSC2	136 X 90 X 76	190
ECO 60 OSC3	136 X 90 X 76	190
ECO 65 OSC2	170 X 90 X 85	200
ECO 65 OSC3	160 X 115 X 85	200
ECO 70 OSC2	170 X 90 X 85	200
ECO 70 OSC3	170 X 90 X 85	200
ECO 75 OSC3	160 X 115 X 95	270

<b>PUMPING STATION</b>		
Burner	L x W x H (cm)	Weight(kg)
ECO 60 OSC2	66 X 66 X 115	100
ECO 60 OSC3	66 X 66 X 115	100
ECO 65 OSC2	66 X 66 X 115	100
ECO 65 OSC3	66 X 66 X 115	100
ECO 70 OSC2	66 X 66 X 115	100
ECO 70 OSC3	66 X 66 X 115	100

## 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.

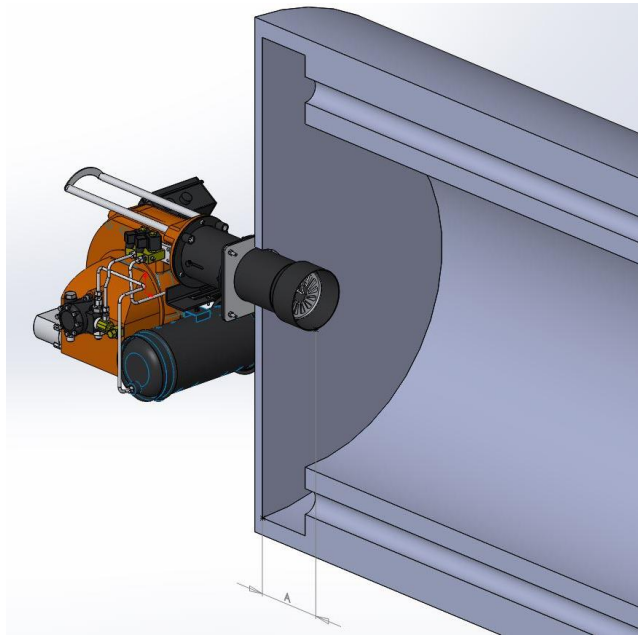
#### **After completing the installation of the burner on the boiler:**

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



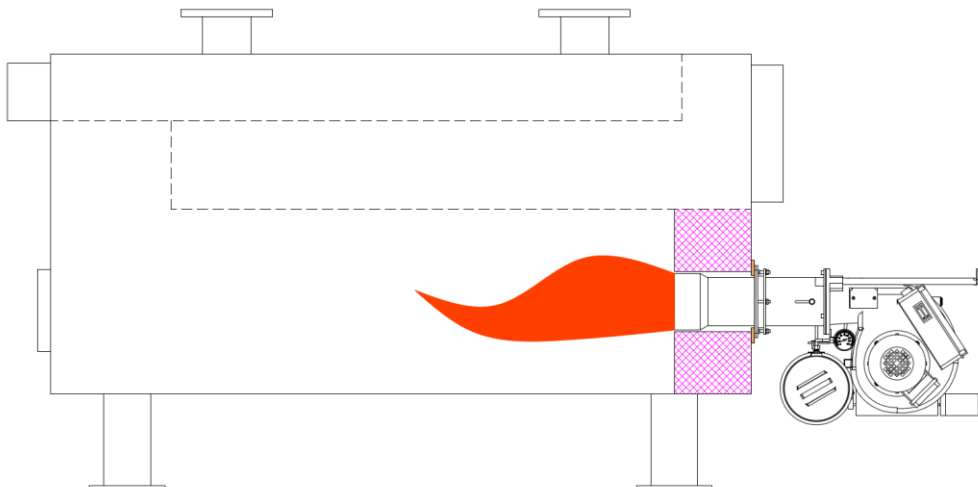
Clean the inside of fuel line thoroughly before installing the burner to the fuel line. Any damage that may occur due to solid objects and metal particles from the fuel line shall not be covered by our company.

### 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.

#### **Commissioning order**

- 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 (two stage 18 bar, modulating 25 bar).
- If the burner has two stages, the switch is brought to position "2", and the capacity of the burner is increased through servomotor. Ideal combustion is obtained by increasing the amount of air by the fuel given according to analyses value.
- 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.

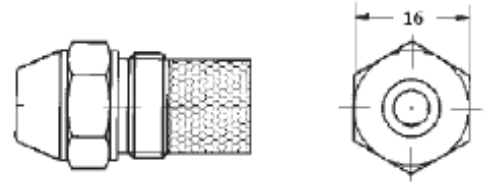


### 8.3. Combustion Adjustment

#### ➤ 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.



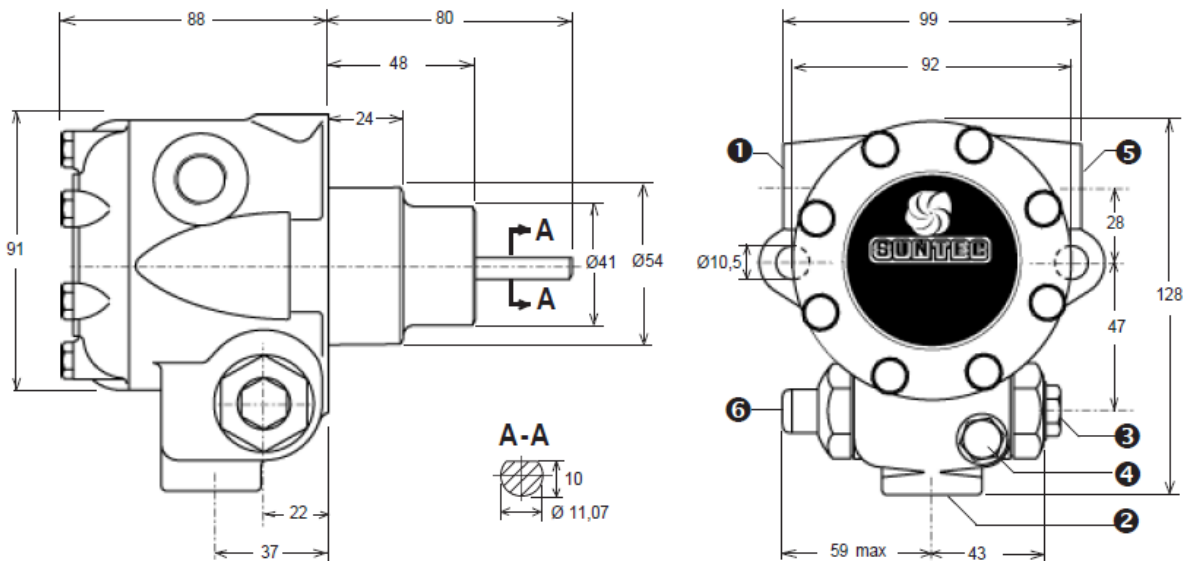
#### ➤ Photocell

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



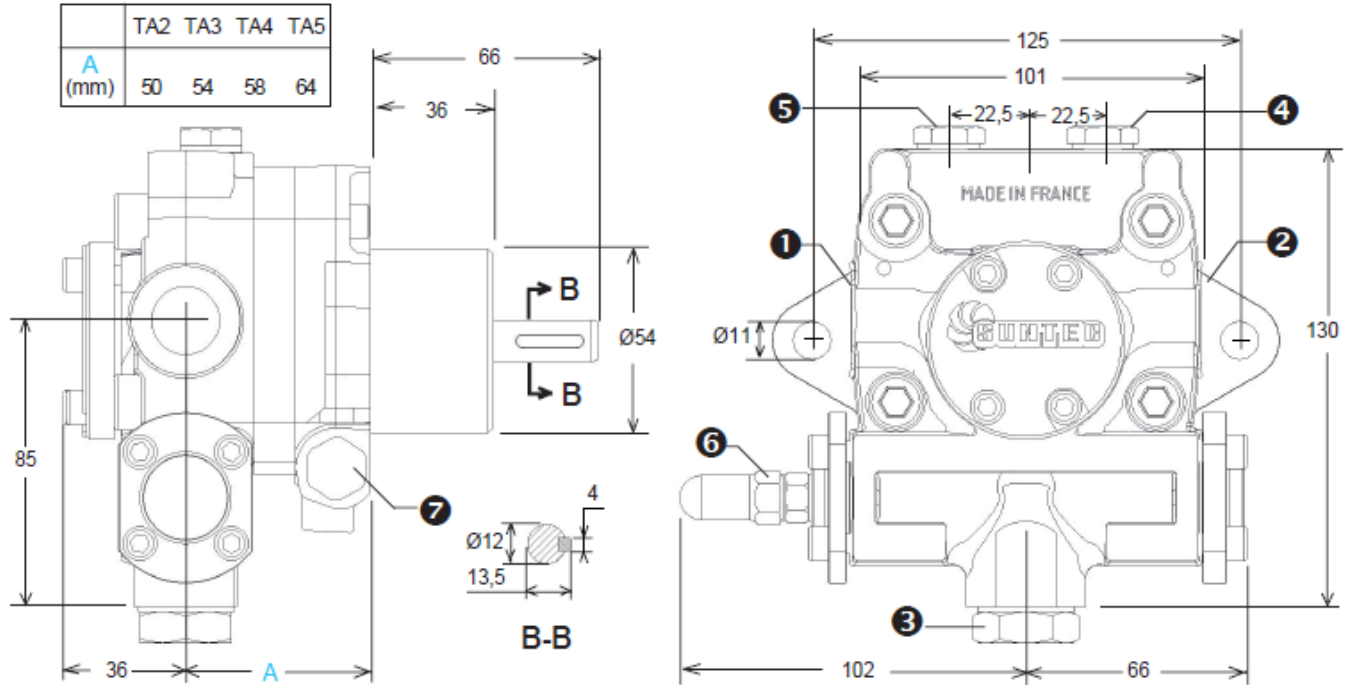
### 8.4. Fuel Pumps

#### E Type



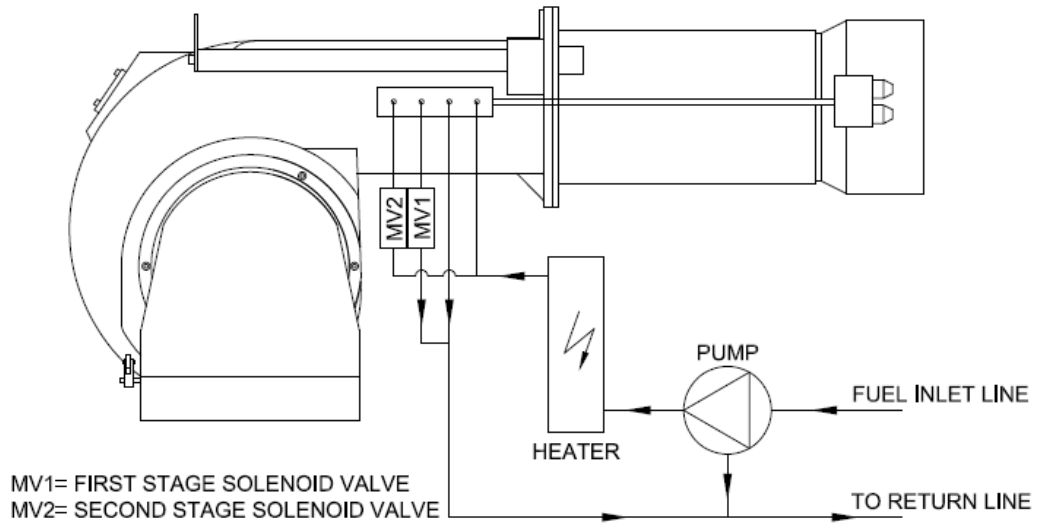
- 1- Suction or vacuum manometer connection
- 2- Return and internal bypass
- 3- Nozzle outlet
- 4- Manometer connection
- 5- Suction or vacuum manometer connection
- 6- Pressure adjustment

## TA Type

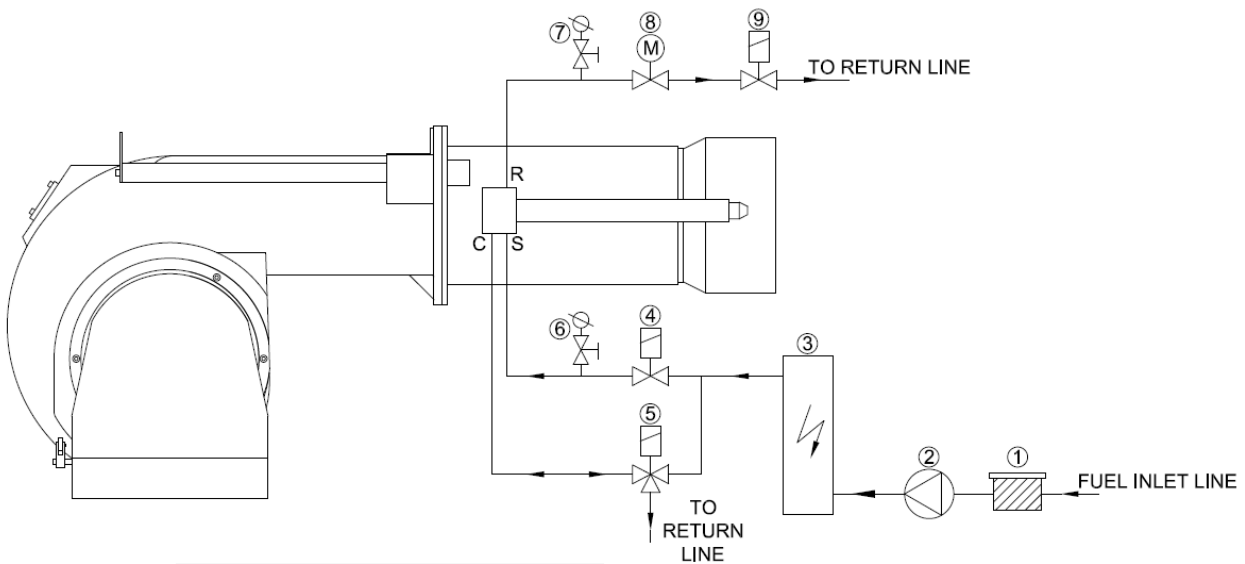


- 1-Suction
- 2-Nozzle outlet
- 3-Return
- 4-Manometer inlet
- 5-Vacuum or inlet manometer and internal return inlet
- 6-Pressure adjustment
- 7-Pre heater location

➤ **Two Stages Heavy Oil Burner Fuel Circuit**



➤ **Modulating Heavy Oil Burner Fuel Circuit**



1	FILTER
2	PUMP
3	HEATER
4	FUEL INLET VALVE
5	HYDRAULIC CONTROL VALVE
6	MANOMETER
7	MANOMETER
8	OIL REGULATING VALVE
9	FUEL RETURN VALVE

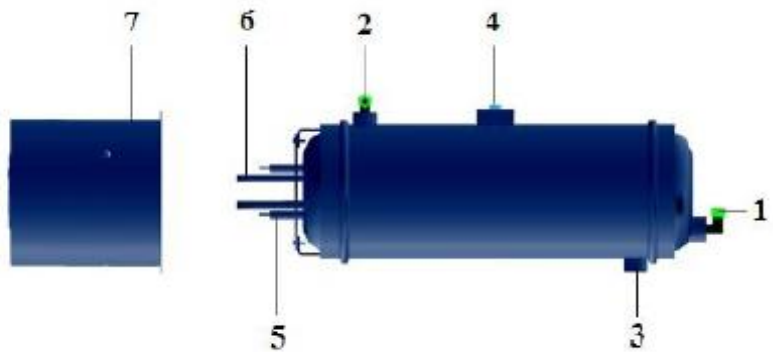


**CAUTION!**

- **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.**
- **During fuel supply, the pressure at the burner fuel pump must be max. 1.0 + 0.2 bar for fuel 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.**

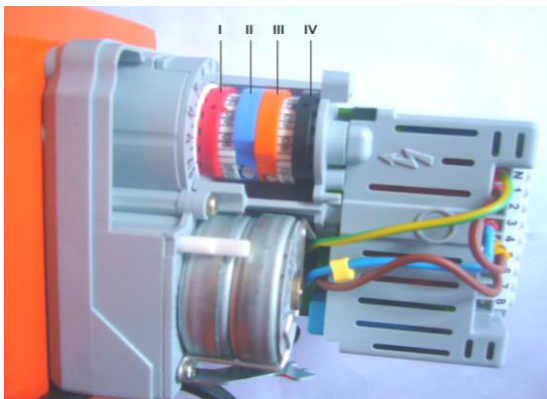
➤ **Burner preheater**

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



**8.5. Servomotor Adjustment**

➤ **SQN70**



**At Two-stage Burners;**

- I. Red Cam: Adjusts 2nd level max. air.
- II. Blue Cam: Resets the clamp.
- III. Orange Cam: Adjusts 1st level min. air.
- IV. Black Cam: Adjusts 2nd level valve opening degree.

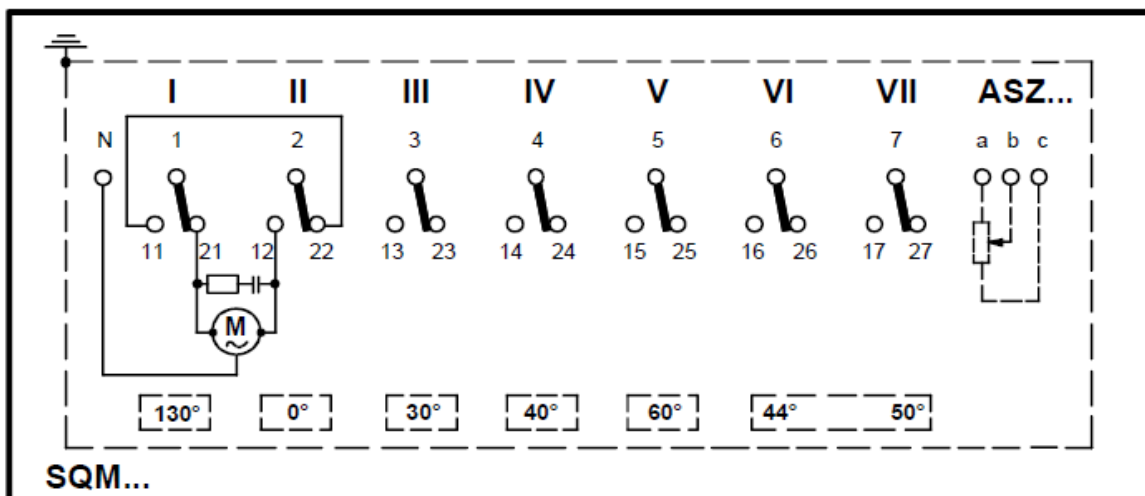
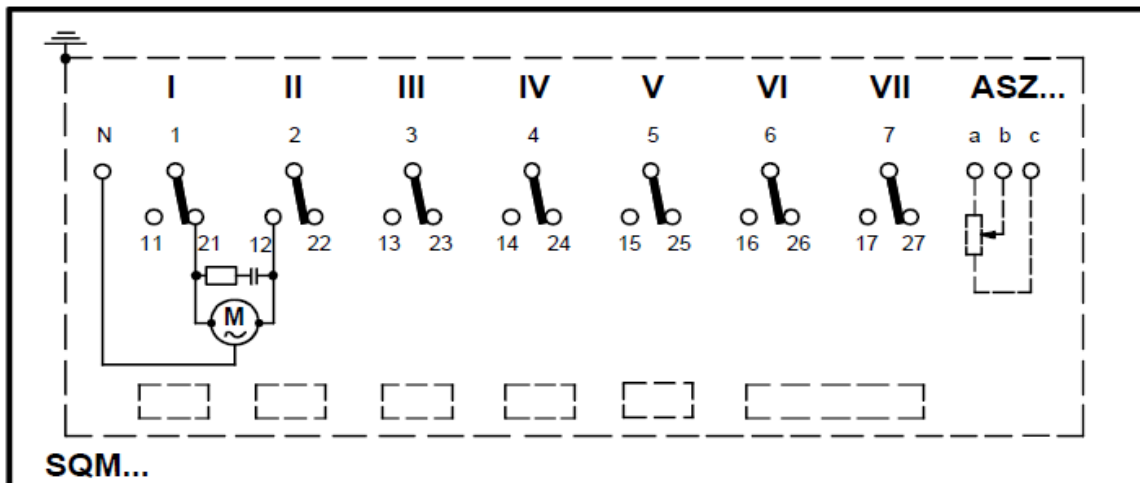
**At Modulating Burners;**

- I. Red Cam: Performance max. air adjustment.
- II. Blue Cam: Resets the clamp.
- III. Orange Cam: Performs min. air adjustment.
- IV. Black Cam: Not used.

➤ **SQM10**

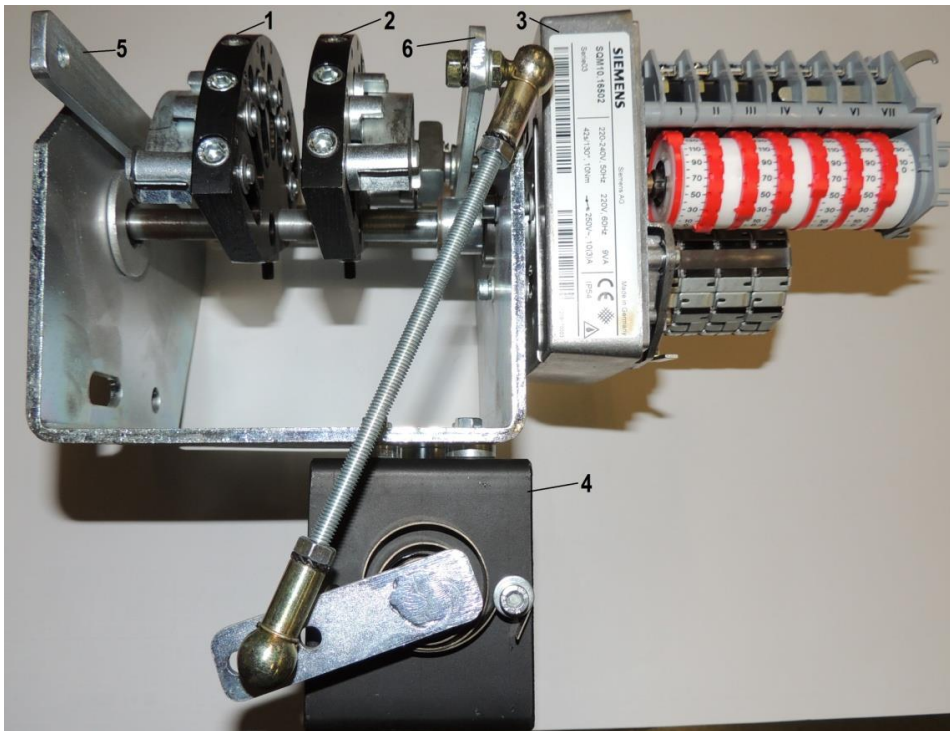


- I. Cam: Opening
- II. Cam: Resets the clamp
- III. Cam: Commissioning air
- IV. V. VI. and VII. Cam not used



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

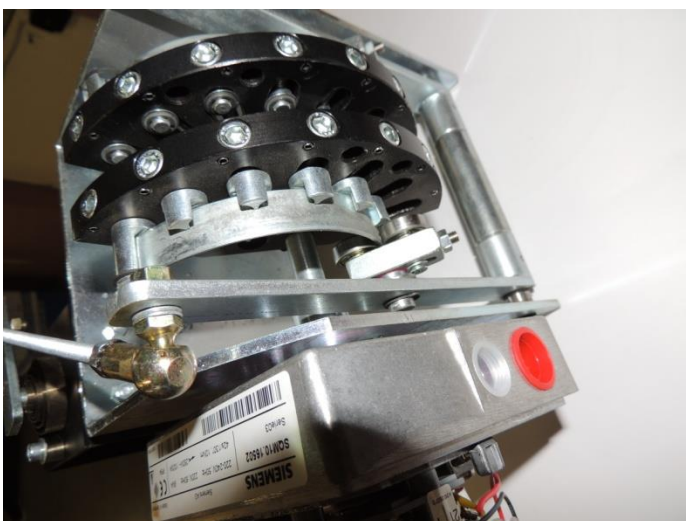
➤ **MODULATING MECHANISM ADJUSTMENT**



- 1- Air adjustment disk
- 2- Fuel adjustment disk
- 3- Servomotor
- 4- Fuel regulator
- 5- Air control lever
- 6- Fuel control lever

**ADJUSTMENT:**

- 1- Start positions prior to disc mechanism adjustment operation must be as follows:
  - Servomotor: 0°
  - Fuel adjustment disc at start position
  - Air adjustment disc at start position
  - Fuel regulator at position 10
  - Air klappes at fully closed position: 0°



**Start position for discs**



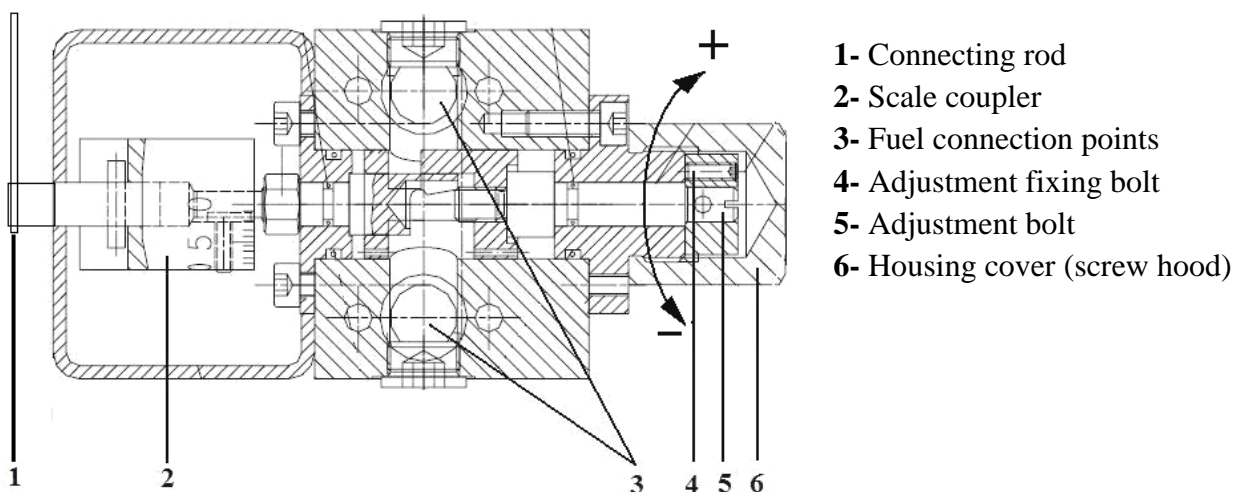
**Start position for fuel regulator**

2 – If disc mechanism start positions are correct, start the burner and ensure that it activates in basic load. Detect min capacity activation fuel amount of the burner by checking min. return pressure. If the activation fuel amount is insufficient, set fuel regulator start adjustment to 9 or 8 value by changing spring adjustment from adjusting bolt on fuel disc number 2. When you start the burner again after this operation, you will see that your fuel return pressure has increased and hence activation fuel amount has risen.

3 – Slowly increase the capacity following burner basic load adjustment provided that modulating control device is in manual position. By setting 7 or 8 points during capacity increase, at these points:

- Measure emission values
- Record fuel return pressure
- Observe air klappe position
- Check fuel regulator scale value moves from 10 to 0.

4- If you haven't been able to reach the max capacity required by the boiler in 90° position of the air klappe and 0° position of the fuel regulator once you have completed the maximum adjustment, follow the below fuel regulator adjustment procedure:



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

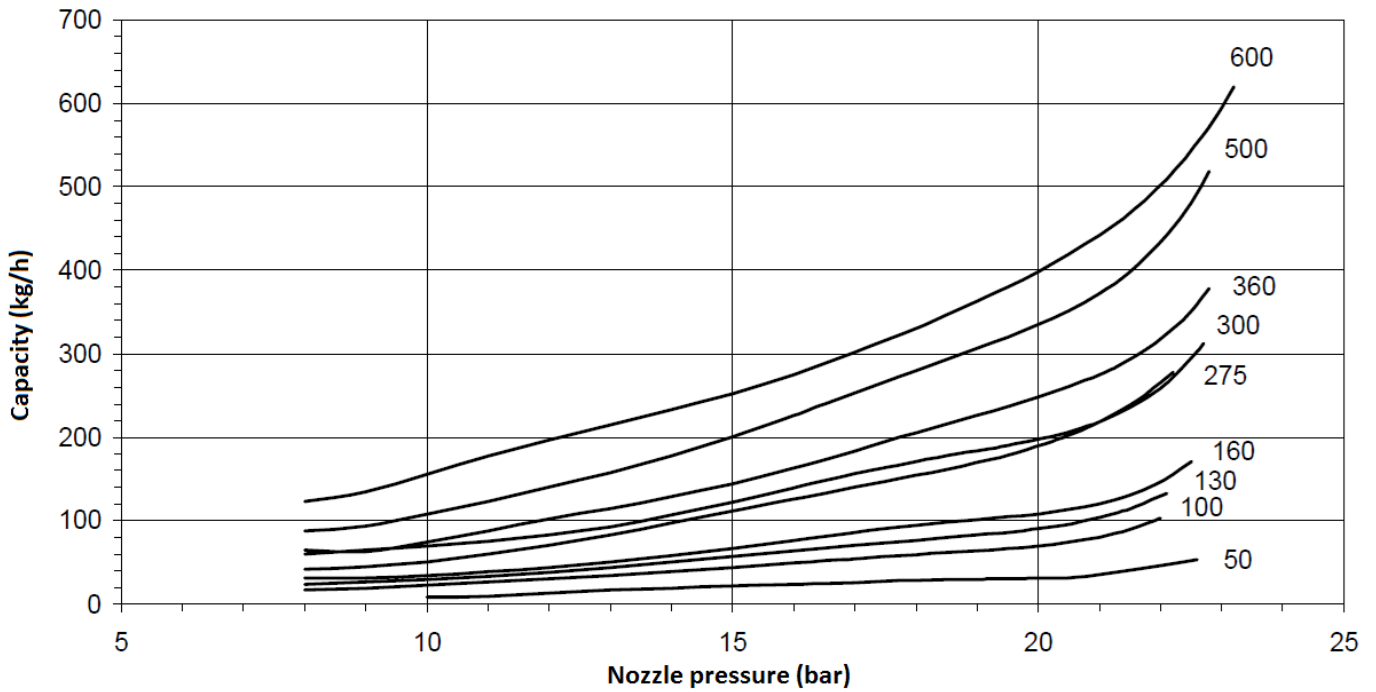
### Fuel Regulator Adjustment

- 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.

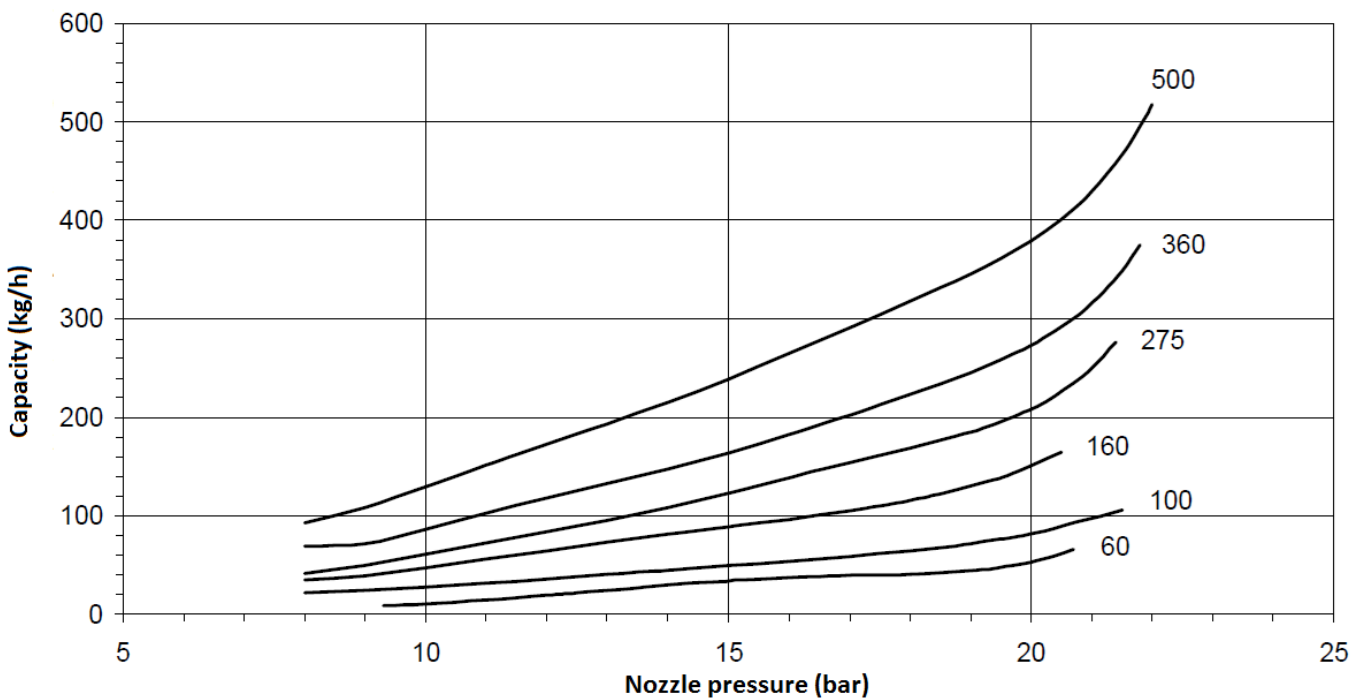


**5** - Set the burner to the correct capacity required by the boiler by considering the below nozzle pressure and consumption values.

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



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



**6** – 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.

## 8.6. Emission Measurement

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

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



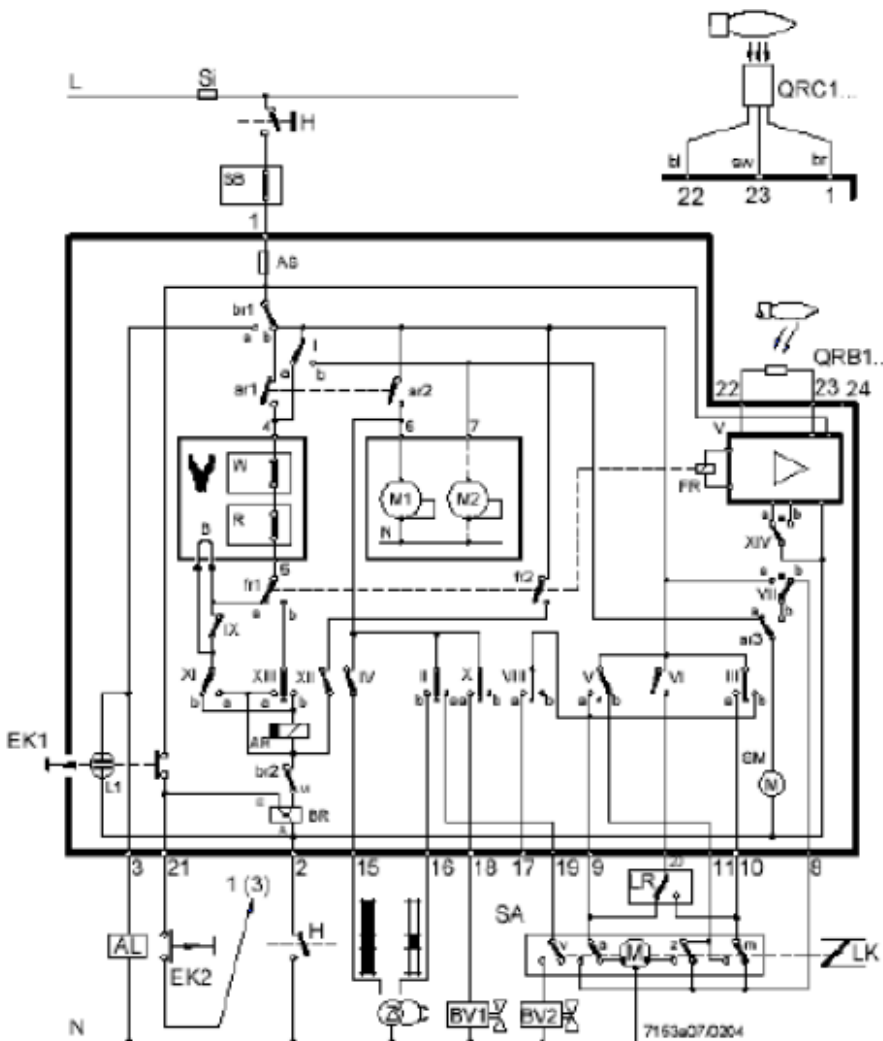
It is important for the boiler to be sealed in order to avoid incorrect measurements during emission measurements.



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

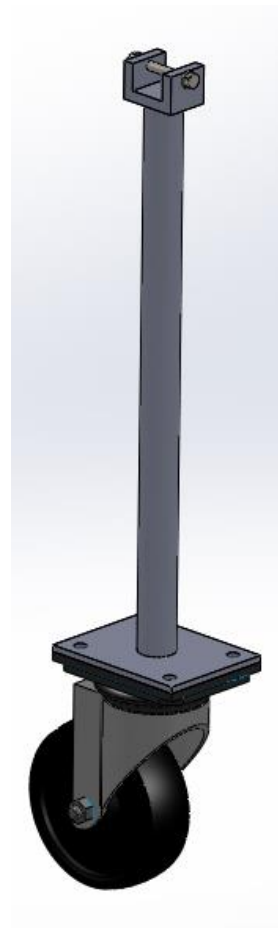
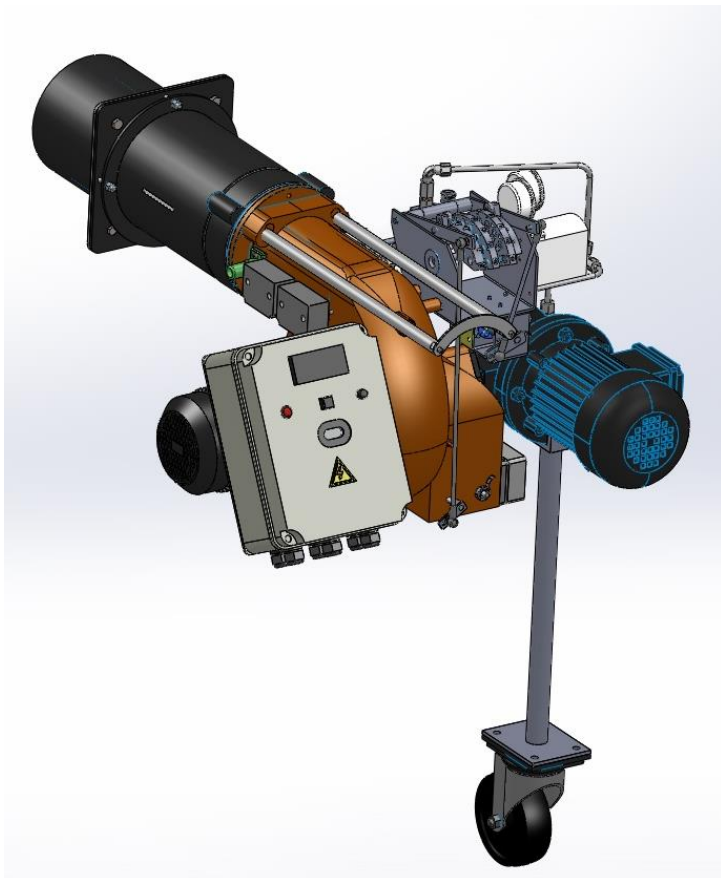
## 8.7. Program Relay

### LAL 1.25

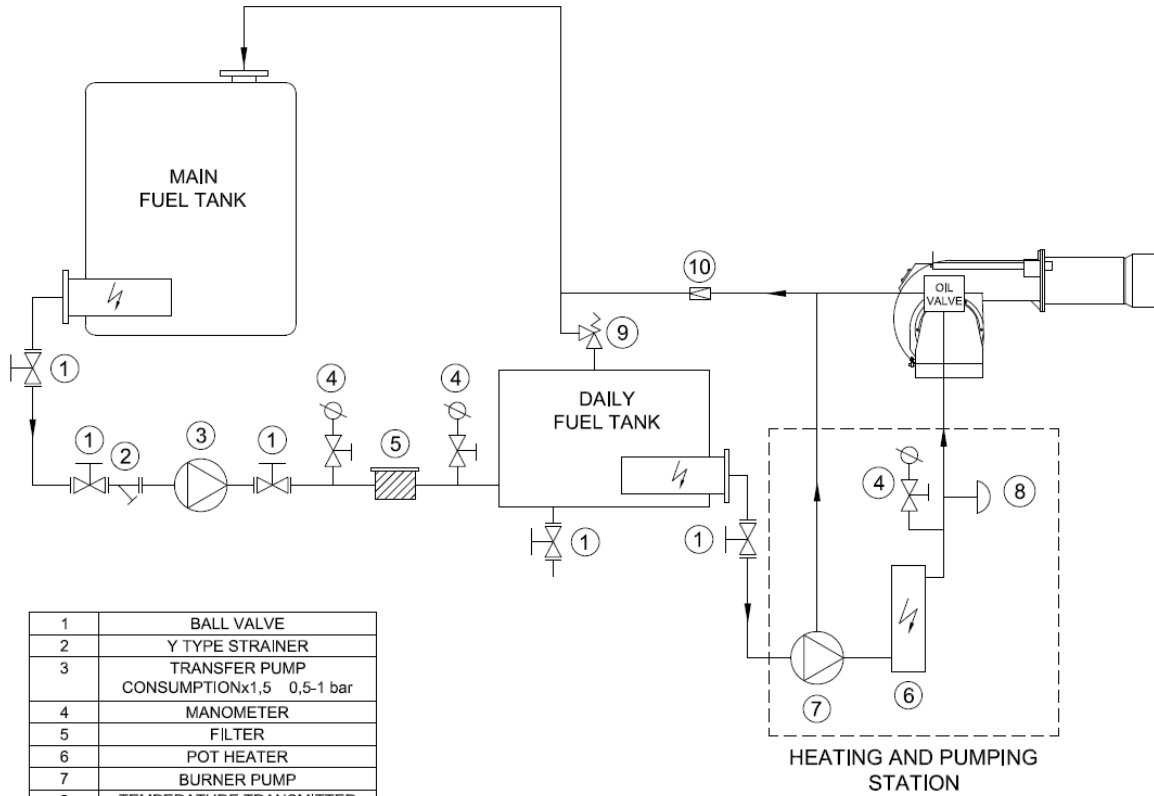




If the flame tube of the burner is longer than standard (standard flame tube length of the burner), please do not forget to support burner body during maintenance and installation/commissioning.



### 8.8. 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.

## 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.

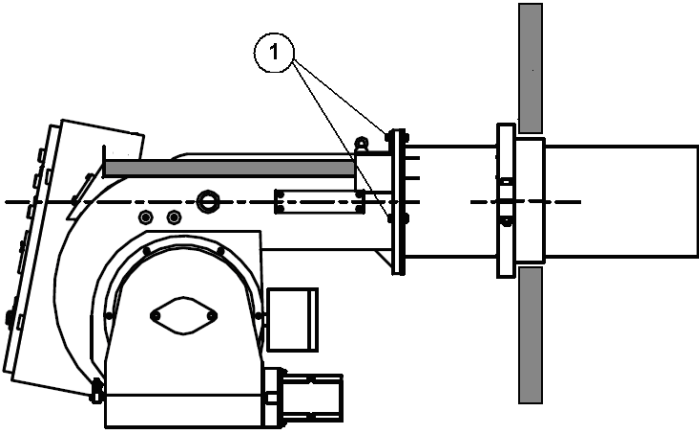
- Clean the filters on the fuel line to the burner.
- Clean fuel nozzle of the burner.
- Clean the surface of the diffuser.
- Clean flame pipe.
- Check all wiring points. Tighten loose connections.
- Clean the solenoid valves.
- Clean the photocell.
- Clean the dust and layers accumulated on the fan and air valves.
- Check pump pressure. Check if necessary (Heavy Oil: 18bar)
- 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.
- After starting the burner and adjusting air klappe, perform flue gas analysis and check if there is an ideal combustion.

### 9.3. Seasonal Maintenance

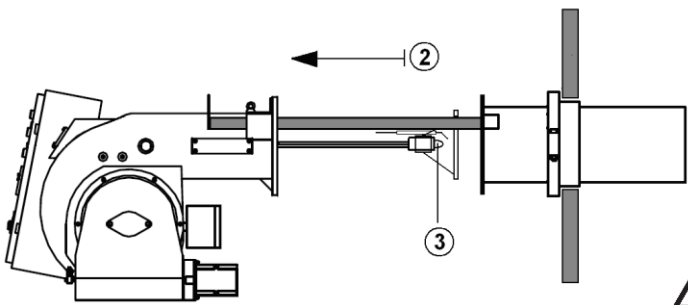
Comprehensive maintenance work when the burner is re-started after long periods of shut-down or interruptions. After completion of maintenance and adjustment processes, make sure to perform a combustion analysis.

- 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.

### 9.4. Installation and Disassembly Instructions for Maintenance Purposes



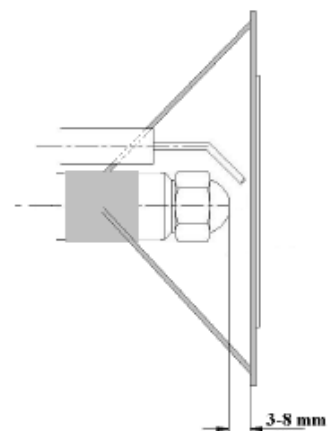
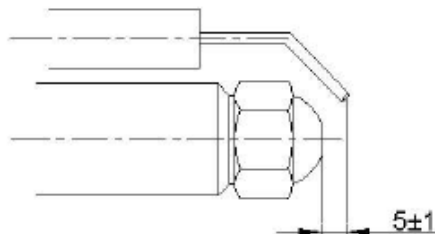
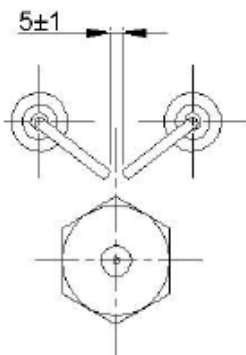
1. Remove 3 bolts connecting the burner body to the flame tube



2. Pull the burner body back
3. Remove and perform maintenance of fuel nozzle, diffuser and ignition electrodes.



Be careful to connect the components correctly during installation after maintenance.



Perform the installation by following the reverse of the method you have followed during disassembly.

## 10. TROUBLESHOOTING

Problem	Cause	Explanation-Suggestion
Burner cannot be commissioned	Fuel is cut or does not come	Fuel 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.	Fuel pressure error	Circuit fuel 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.
	Fan motor failure	Check fan motor coils, motor contactor and outlet from program relay.
Burner starts up, but fails after 30 seconds.	Fuel valve, fuel pressure drop	Fuel valve might be closed. Supply fuel pressure might be low. Check fuel 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.



11. PERIODICAL FLUE GAS MEASUREMENT REPORT								
Fuel Consumption (kg/h)	CO (ppm)	O <sub>2</sub> (%)	CO <sub>2</sub> (ppm)	NO <sub>x</sub> (ppm)	Yield (%)	Flue Temp. (°C)	Date	Signature

## 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.

Our contact details for your requests and complaints

**Esentepe Mah.Milangaz Cad. No:75 K:3**

**Kartal Monumento Plaza**

**KARTAL/İSTANBUL/TÜRKİYE**

**Tel: +90 216 442 93 00**

**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.

