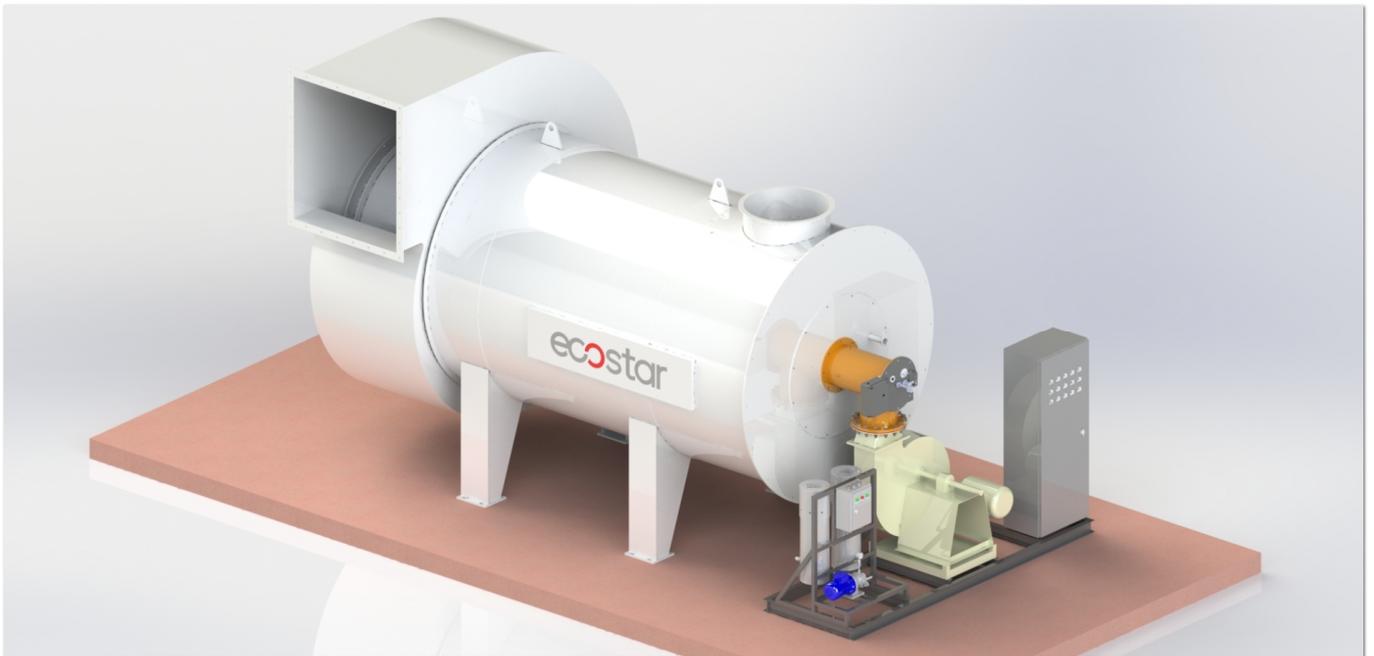


# HOT AIR GENERATOR INSTALLATION, OPERATING AND MAINTENANCE MANUAL



SHG 25  
SHG 50  
SHG 75  
SHG 100  
SHG 150  
SHG 200  
SHG 250  
SHG 500  
SHG 750  
SHG 1000  
SHG 1500  
SHG 2000  
SHG 2500  
SHG 3000

**DEAR USER,**

ECOSTAR SHG 25, SHG 50, SHG 75, SHG 100, SHG 150, SHG 200, SHG 250, SHG 500, SHG 750, SHG 1000, SHG 1500, SHG 2000, SHG 2500, SHG 3000 hot air generators 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 hot air generator and must be maintained in a plastic dossier and hung at a clearly visible place in the burner room.

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## WARNINGS

### Warning Symbols and Descriptions

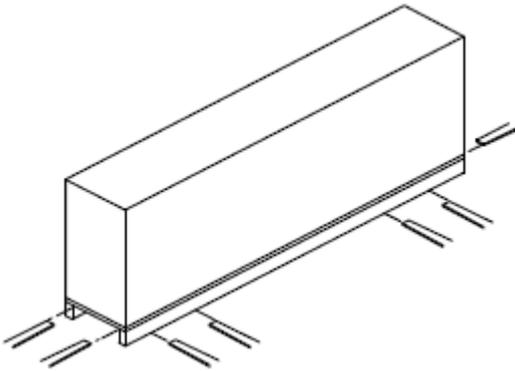
Symbols	Symbol Descriptions
	<p>Important information and useful hints.</p>
	<p>Warning of danger to life or property.</p>
	<p>Warning of electrical voltage.</p>
	<p>Product handling information.</p>
	<p>Carry in an upright position. Fragile Item. Protect against water.</p>

## TRANSPORT

### Transport of pallets with a forklift

Packages which are delivered on pallets can be transported with a forklift under the following conditions:

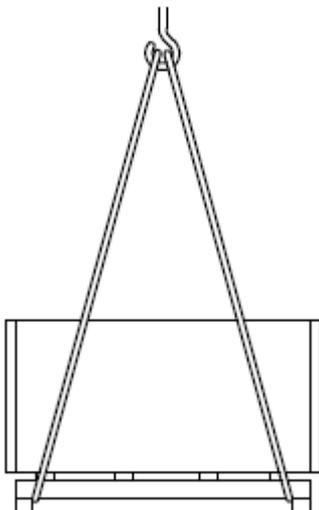
- The forklift must be designed for the weight of the package,
- The driver must be allowed to drive the forklift,
- Insert the forks to an extent that they stand out on the other side,
- Ensure that the pallet cannot tip when the center of gravity is not in the middle of the pallet,



### Transport pallets using a crane

Packages which are delivered on pallets can be transported using a crane under the following conditions,

- Crane and lifting equipment must be designed for the weight of the package,
- The operator must be authorized to operate the crane,
- Verify that the package is not damaged by the sling gear. If necessary, use other different sling gear.



## Storage Conditions

Store the hot air generators, accessories and spare parts under the following conditions:

- Never keep outdoors,
- Store in dry and dust free condition,
- Do not expose to any corrosive substances,
- Protect the equipment from mechanical damage,
- Storage temperature 0°C-60°C,
- Relative humidity: max %60,
- When storing for longer than 3 months, regularly check the condition of all parts and the packaging. If necessary refresh or replace the conservation.

## 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.



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

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



Do not store any inflammable materials in boiler room.



Wear hearing protectors if there is noise in boiler room.



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

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



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



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



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.

## TERMS OF WARRANTY

Main and auxiliary equipment and all components used in ECOSTAR hot air generators 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.

### 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.

## **HOT AIR GENERATOR GENERAL FEATURES**

ECOSTAR direct and indirect type hot air generators are provided an outlet temperature up to 1000 °C, and designed to operate with natural gas, fuel oil and light oil with a capacity range between 250.000 kcal/h – 30.000.000 kcal/h.

### **Area of Use-Drying Process**

**Soil Industry:** Artificial drying chambers of brick plants. Sand drying rotary furnaces. Gypsum Block-Gypsum Panel drying kilns.

**Chemical Industry:** Detergent manufacturing towers.

**Fertilizer Industry:** Rotary fertilizer drying kilns.

**Sugar Industry:** Pulp drying kilns.

**Paper Industry:** Continuous paper drying.

**Packaging Industry:** Print paste drying.

**Metal Industry:** Stress relief furnaces.

**Cement Industry:** Raw meal drying, coal and slag drying.



This device must never be operated with open flame!

## **SHG TYPES**

- 1. Direct Type SHG**
- 2. Indirect Type SHG**

### **1. Direct Type SHG**

Direct type hot air generators are used to produce the hot air needed in processes in various fields of use. In the high temperature resistant material manufactured combustion chamber, the exhaust gas of the fuel burned by the burner is either directly blown into the air or mixed with air in the mixing chamber to obtain hot air. The efficiency of the fuel burned in the combustion chamber is higher when it is transferred directly to the hot air to be heated. Such SHGs are used where the process gas of the exhaust gas is not inconvenient.

## **2. Indirect Type SHG**

Indirect type hot air generators are used to produce the hot air needed in processes in various fields of use. In the high temperature resistant material manufactured combustion chamber, the exhaust gas of the fuel burned by the burner is discharged from a separate hull without being mixed with fresh air (secondary air). The secondary air is supplied at the desired temperature and clean as the process. Such SHGs are generally used to heat areas where food processes, industrial processes where sensitive production is occurring, and living things.

### **TECHNICAL SPECIFICATIONS**

- Ø Durable, solid construction,
- Ø High operating safety,
- Ø Easy installation-operation and low maintenance,
- Ø Reduced overhead thanks to low pressure losses of the combustion and mixture air,
- Ø Elimination of transfer losses and increase of efficiency in direct type hot air generators by direct mixing of burnt gases with fresh air in the mixing chamber without any heat transfer item in between,
- Ø Total increase in efficiency with low flue loss,
- Ø Minimization of heat losses between the body coated with insulation material and the environment,
- Ø Allows exhausting from the explosion cap on the mixture chamber in case of gas jam, and also provides easy access into the generator by service personnel for maintenance-inspection,
- Ø Provides increase in efficiency by heating the combustion air up to 100-120°C by recovery,
- Ø Design resistant to high temperature and temperature stresses in brick hot air generators, achieved with the refractory material used to cover the combustion chamber, and by heating the combustion air passing around the combustion chamber,

## TECHNICAL DATA

### Capacity Table

TYPE	Capacity (kcal/h)	FUEL CONSUMPTION			
		NATURAL GAS (Nm <sup>3</sup> /h)	LPG GAS (Nm <sup>3</sup> /h)	LIGHT OIL (kg/h)	HEAVY OIL (kg/h)
SHG 25	250.000	30,3	11,1	24,5	25,9
SHG 50	500.000	60,6	22,2	49,0	51,8
SHG 75	750.000	90,9	33,3	73,5	77,7
SHG 100	1.000.000	121,2	44,4	98,0	103,6
SHG 150	1.500.000	181,8	66,7	147,1	155,4
SHG 200	2.000.000	242,4	88,9	196,1	207,3
SHG 250	2.500.000	303,0	111,1	245,1	259,1
SHG 500	5.000.000	606,1	222,2	490,2	518,1
SHG 750	7.500.000	909,1	333,3	735,3	777,2
SHG 1000	10.000.000	1212,1	444,4	980,4	1036,3
SHG 1500	15.000.000	1818,2	666,7	1470,6	1554,4
SHG 2000	20.000.000	2424,2	888,9	1960,8	2072,5
SHG 2500	25.000.000	3030,3	1111,1	2451,0	2590,7
SHG 3000	30.000.000	3636,4	1333,3	2941,2	3108,8

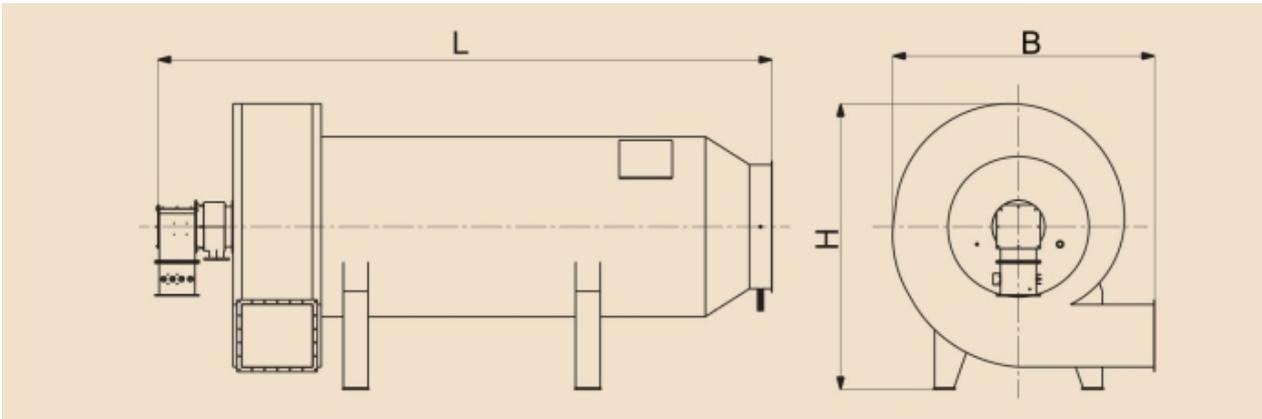
**H<sub>u</sub> Natural Gas =8250 kcal/Nm<sup>3</sup>**

**H<sub>u</sub> LPG=22500 kcal/Nm<sup>3</sup>**

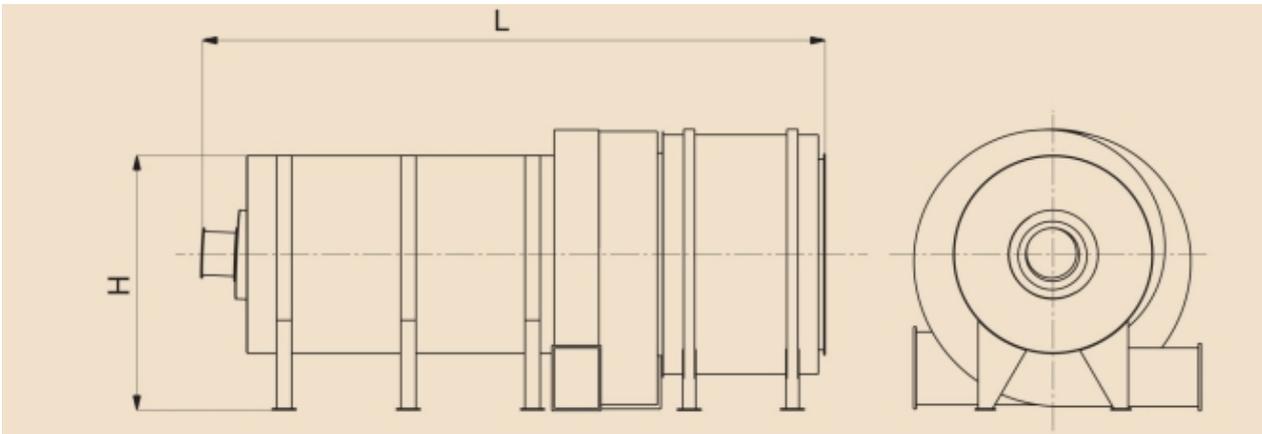
**H<sub>u</sub> Heavy Oil = 9650 kcal/kg**

**H<sub>u</sub> Light Oil = 10200 kcal/kg**

## Hot Air Generator Dimensions



Type	Capacity (kcal/h)	Dimensions (mm)		
		L	B	H
SHG 25	250.000	2500	1450	2250
SHG 50	500.000	2750	1700	2500
SHG 75	750.000	3000	1950	2750
SHG 100	1.000.000	3250	2200	3000
SHG 150	1.500.000	3500	2700	3500
SHG 200	2.000.000	3750	3200	4000
SHG 250	2.500.000	4000	3450	4250
SHG 500	5.000.000	5000	3700	4500
SHG 750	7.500.000	6000	3950	4750



Type	Capacity (kcal/h)	Dimensions (mm)	
		L	H
SHG 1000	10.000.000	6900	3000
SHG 1500	15.000.000	8300	3200
SHG 2000	20.000.000	9900	3450
SHG 2500	25.000.000	10900	3700
SHG 3000	30.000.000	11900	3950

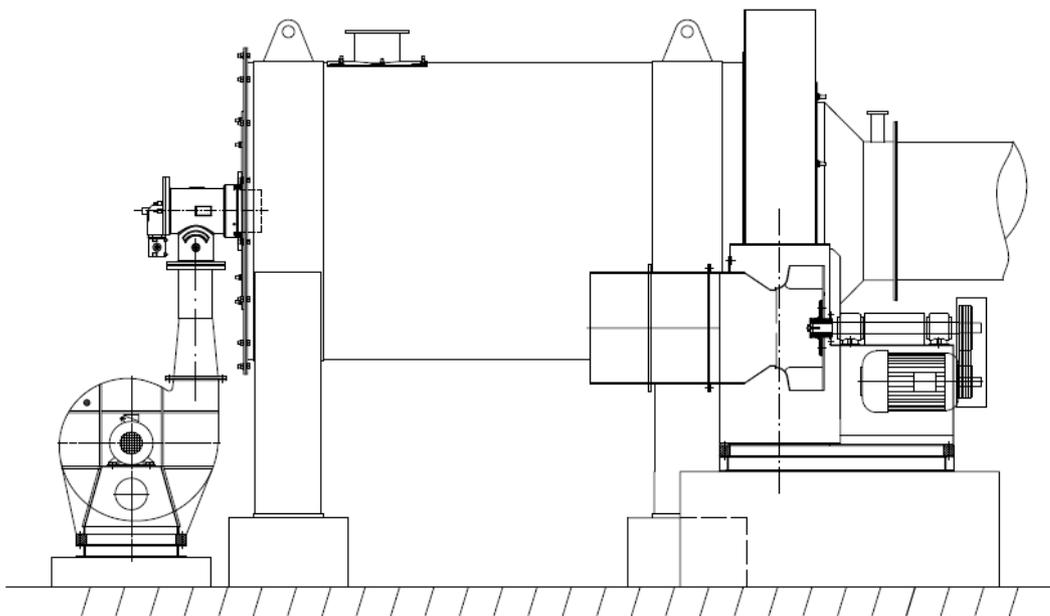
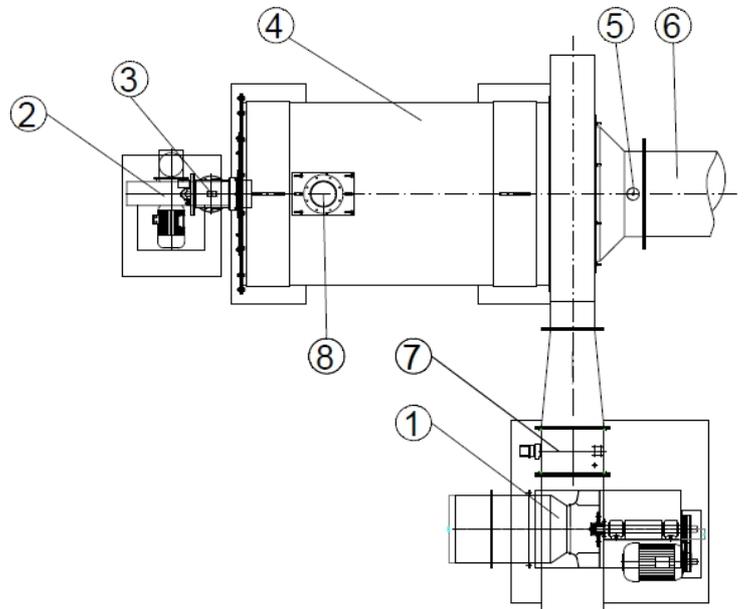
**i** A special design application is made for the hot air generators for the capacities which are not indicated on the capacity table

**i** The dimensions in the guide are for informational purposes only. Depending on the process temperature and the outlet temperature, the dimensions may vary.

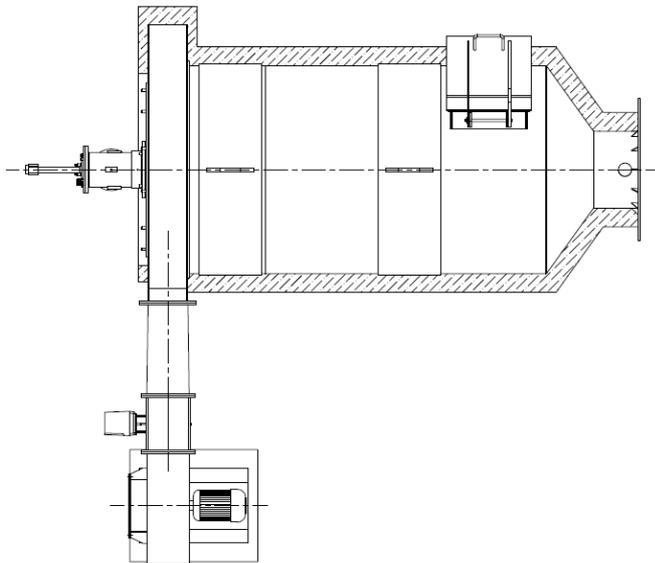
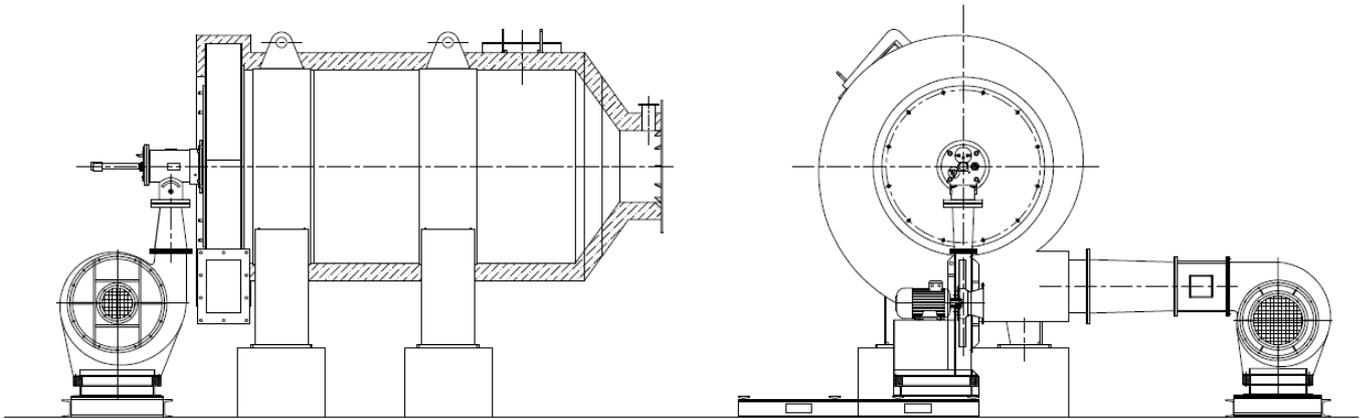
## INSTALLATION

### Indirect Type SHG

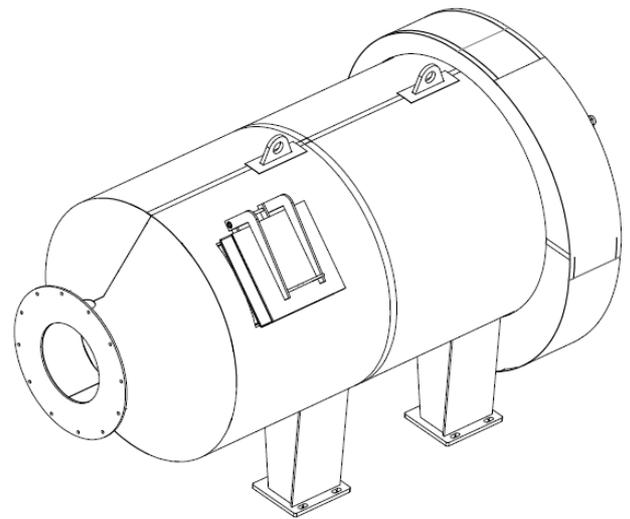
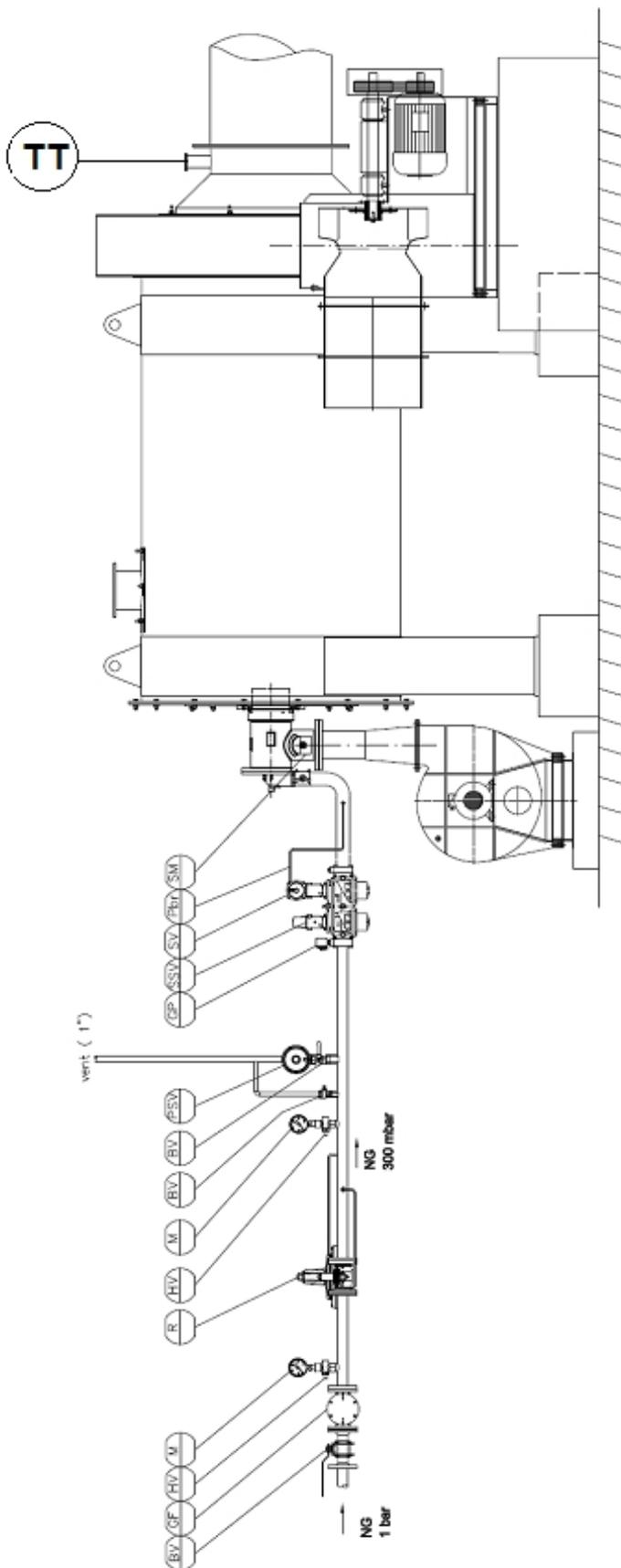
1. Secondary fan
2. Combustion air fan
3. Burner
4. Hot air generator
5. Temperature measurement probe
6. Hot air outlet pipe
7. Secondary air damper
8. Flue



## Direct Type SHG

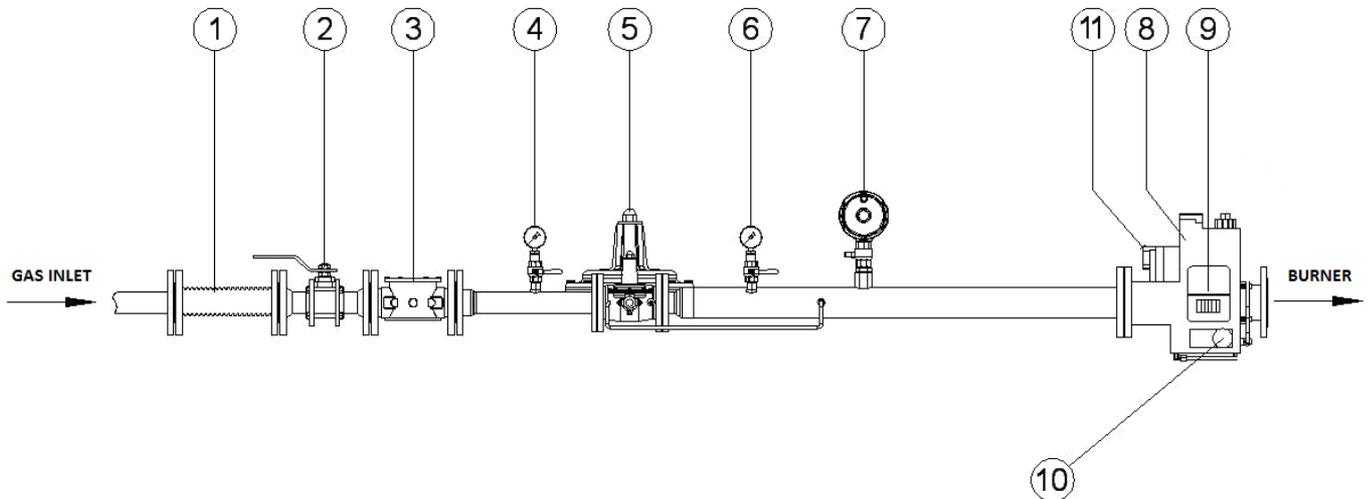


**GAS FUEL APPLICATION**



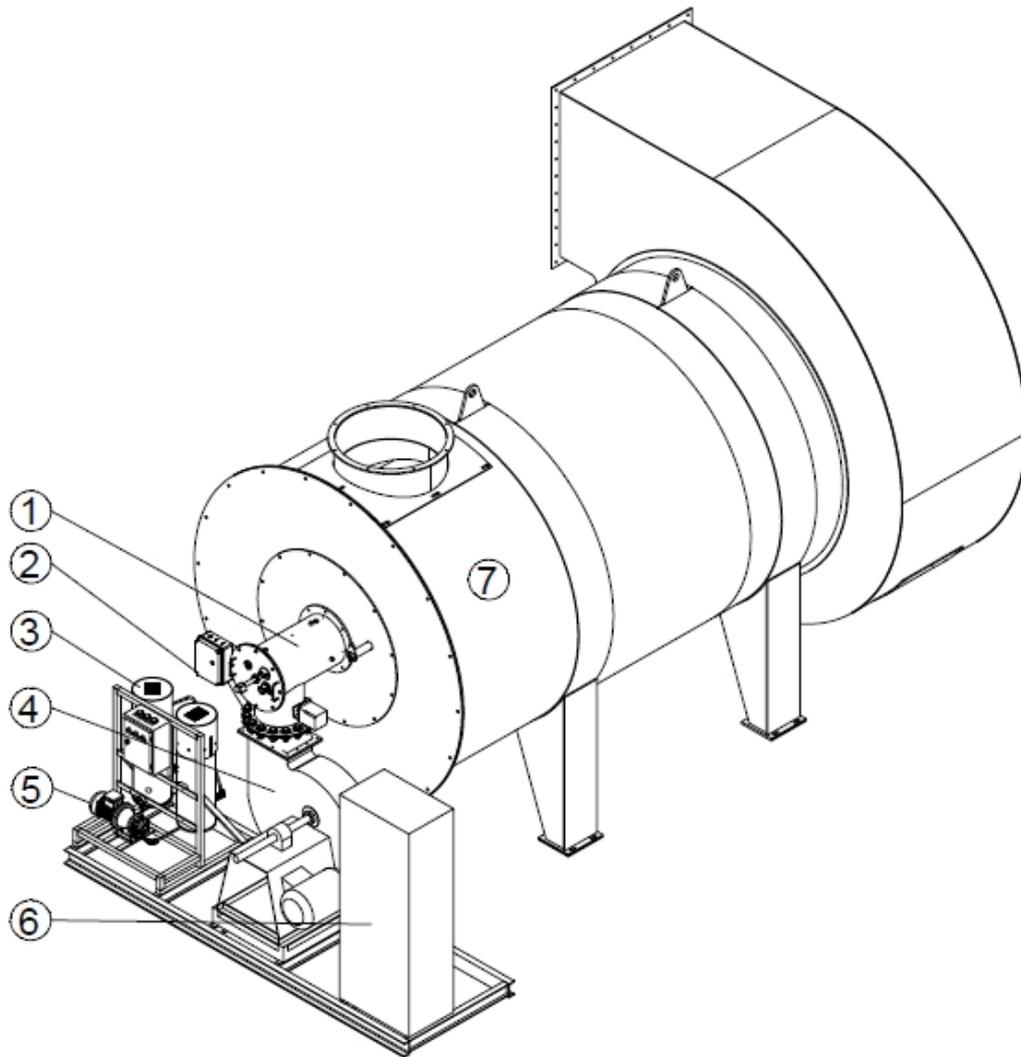
- BV** : BALL VALVE
- GF** : GAS FILTER
- HV** : PRESSURE COCK VALVE
- M** : PRESSURE GAUGE
- R** : GAS REGULATOR
- PSV** : GAS SAFETY DISCHARGE VALVE
- GP** : GAS PRESSURE SWITCH
- SV** : GAS OPERATING VALVE
- SSV** : GAS SAFETY VALVE
- SM** : COMBUSTION AIR DAMPER
- Pbr** : GAS IMPULSE
- TT** : TERMOCOUPLE (TEMPERATURE CONTROL)

## Gas Line Equipment's Required in Gas Line



<b>Pe &lt; 300 mbar Q&lt;1200kW</b>	<b>Pe &gt; 300 mbar Q&lt;1200kW</b>	<b>Pe &lt; 300 mbar Q&gt;1200kW</b>	<b>Pe &gt; 300 mbar Q&gt;1200kW</b>
1- Compensator	1- Compensator	1- Compensator	1- Compensator
2- Ball valve	2- Ball valve	2- Ball valve	2- Ball valve
3- Gas filter	3- Gas filter	3- Gas filter	3- Gas filter
4- Inlet manometer + valve	4- Inlet manometer + valve	4- Inlet manometer + valve	4- Inlet manometer + valve
8 – Multi-block (safety and operation solenoids)	5- Regulator	8 – Multi-block (safety and operation solenoids))	5- Regulator
10- max. gas pressure switch	6- Outlet manometer + valve	9- Sealing Control Set	6- Outlet manometer + valve
11- min. gas pressure switch	7- Safety discharge valve	10- max. gas pressure switch	7- Safety discharge valve
	8 – Multi-block (safety and operation solenoids)	11- min. gas pressure switch	8 – Multi-block (safety and operation solenoids)
	10- max. gas pressure switch		9- Sealing Control Set
	11- min. gas pressure switch		10- max. gas pressure switch
			11- min. gas pressure switch

## LIQUID FUEL APPLICATION



1. Burner
2. Electrical connection panel
3. Filtering & Heating (if it is heavy oil) & Pumping Station
4. Combustion air fan
5. Fuel pump
6. Control panel
7. Hot air generator

## COMMISSIONING

### General Controls



Perform the following checks before commissioning the hot air generator.

- Ø The hot air generator must be installed in accordance with the installation drawings,
- Ø The gas and liquid fuel station should be positioned so that the hoses can freely oscillate, and sharp curves do not occur.
- Ø All pipes and hoses must be cleaned carefully before connecting to the fuel station.

### Combustion Adjustment

- Ø Start the burner,
- Ø Check the flame on the observations glass,
- Ø Make sure that the external conditions are appropriate for the operation.
- Ø Observe the ignition process,
- Ø In cases where the gas flow or the primary air flow must be changed during ignition, adjustment must be made from the control panel.

The hot air generator can be started from the local or central control panel.

The start / stop or control of the gas flow can be done from the central control room or from the local control panel.



When the burner is in operation, electrical safety must be ensured so that the secondary fan is also active!



They must be visually inspected before the burner is started;

- Ø Combustion air and secondary air ducts must be connected and tightened,
- Ø The hoses for the burner are connected and the bolts in the flange connection must be tightened,
- Ø Ignition lances and electrical wiring must be correctly connected.
- Ø UV-sensor wiring must be correctly connected.
- Ø The main flame should be formed during the ignition process.



For detailed information, please refer to the operating manual of the burner to be used in SHG!



### **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.

### **Final Checks**

- Ø Control of a stable flame formation,
- Ø If necessary, adjust the starting position of the fuel valve to achieve the desired flame characteristics,
- Ø In the ignition process, the fuel flow must be less than 30% of the maximum flow,
- Ø When the desired output temperature is reached, the burner is switched off,
- Ø The burner has been deactivated in the set channel pressure.

## MAINTENANCE

### Weekly Maintenance

- Ø Check primer and secondary air suckers, clean if necessary,
- Ø General check (leak check) on burner fuel and air line,
- Ø Perform the function check according to the operating procedure of the burner.
- Ø Make visual checks of the shaft of SHG and inner part.

### 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.

- Ø Clean the filters on the main line and multiblock.
- Ø Check the burner gas tip.
- Ø Perform insulation measurements of ignition and ionization electrodes; replace electrodes should there be leakage to the body.
- Ø Check ignition cables and sockets.
- Ø Check all wiring points. Tighten loose connections.
- Ø Clean the dust and layers accumulated on the fan and air klappes.
- Ø Check gas line pressure, it must be the same with the first adjusted pressure, otherwise burner load and emission values will also have changed.
- Ø Check all bolts of the burner and SHG. Tighten loosened bolts

### 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.

- Ø Check insulation resistance of electric motor.
- Ø Replace ignition and ionization electrodes with new ones.
- Ø Clean air fan and clamps.
- Ø Check the operating function.
- Ø Check boiler thermostats.
- Ø Check cleanliness of combustion chamber inside and clean if necessary.



Follow installation directions during maintenance.

## 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**

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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.

