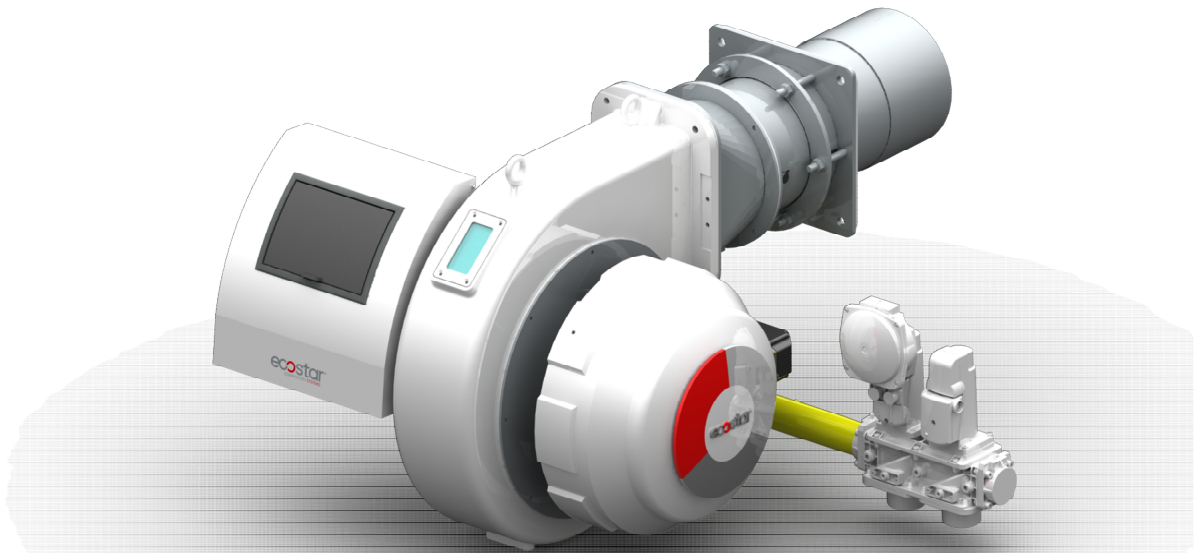


MONOBLOCK NG SERIES LOW NO_x AND ULTRA LOW NO_x SERIES GAS BURNERS

INSTALLATION, OPERATING AND MAINTENANCE MANUAL

MODULATING OPERATION



ECO NG LNX 90 G (FGR)
ECO NG LNX 120 G (FGR)
ECO NG LNX 200 G (FGR)
ECO NG LNX 300 G (FGR)
ECO NG LNX 400 G (FGR)



DEAR USER,

ECOSTAR ECO NG LNX 90 G (FGR), ECO NG LNX 120 G (FGR), ECO NG LNX 200 G (FGR), ECO NG LNX 300 G (FGR), ECO NG LNX 400 G (FGR)) **Series Low NO_x and Ultra Low NO_x Gas** burners are prepared and manufactured according to the latest technical developments and safety rules. It is easy to use for our customers.

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

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

We thank you for choosing ECOSTAR brand.











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

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1. WARNINGS

1.1. Warning Symbols and Descriptions

Symbols	Symbol Descriptions
	Important information and useful hints.
	Warning of danger to life or property.
	Warning of electrical voltage.
	Product handling information.
P_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 and fully read and understood this manual.
- No changes that might damage the safety of the burner unit must be made by persons and/or organizations on the burner unit.
- All operation, commissioning and installation works (except for burning adjustment) should be carried out when the burner is not operating and after disconnecting the power supply. Noncompliance with these rules may lead to serious bodily injuries and even death by electrical shocks or uncontrolled flame formation.
- Repairs concerned with safety elements should be carried out only by the manufacturing company.
- The device should never be used by children, mentally handicapped and inexperienced persons.
- Children must not be allowed to play with the device.
- Keep the device away from explosive and flammable materials.
- Device must intake air, ventilation and air discharge holes must not be closed.



If you sense gas leakage;

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



Do not store any inflammable materials in boiler room.



Wear hearing protectors if there is noise in boiler room.



In case of fire or other emergency;

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



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



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



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



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



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



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

In gas and air dampers, 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 gas 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 NG Series Low NO_x and **Ultra Low NO_x** gas burners are manufactured such that they operate in gas pressure of min. 20 mbar and max. 300mbar. at 15%...+10% of nominal voltage, between the ambient temperature range of -15°C...+60°C and declared capacity and boiler pressure ranges with Natural Gas.

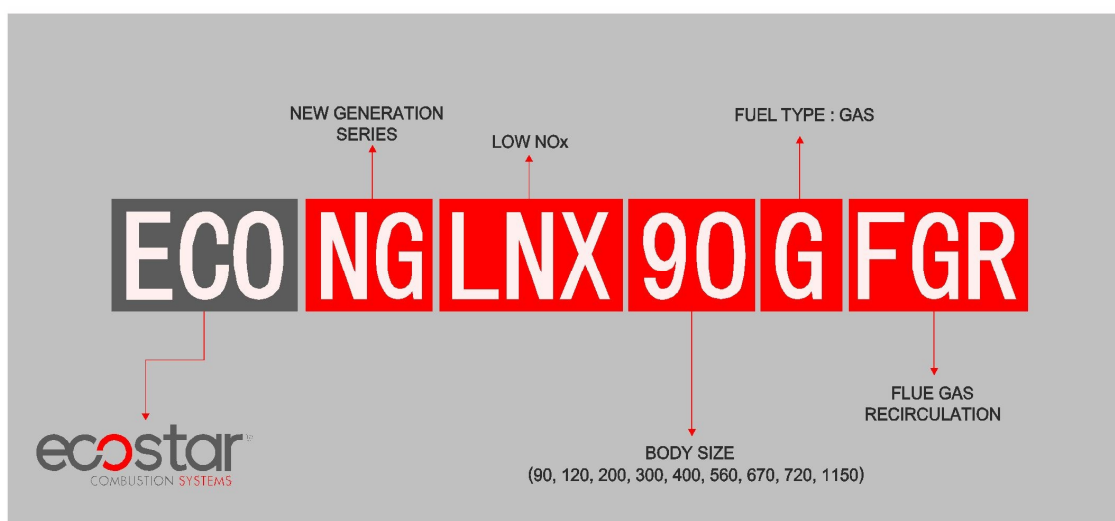
3.1. Purpose of Use and Work Limits of Burners

- 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.
 - Operation with Natural gas and LPG.



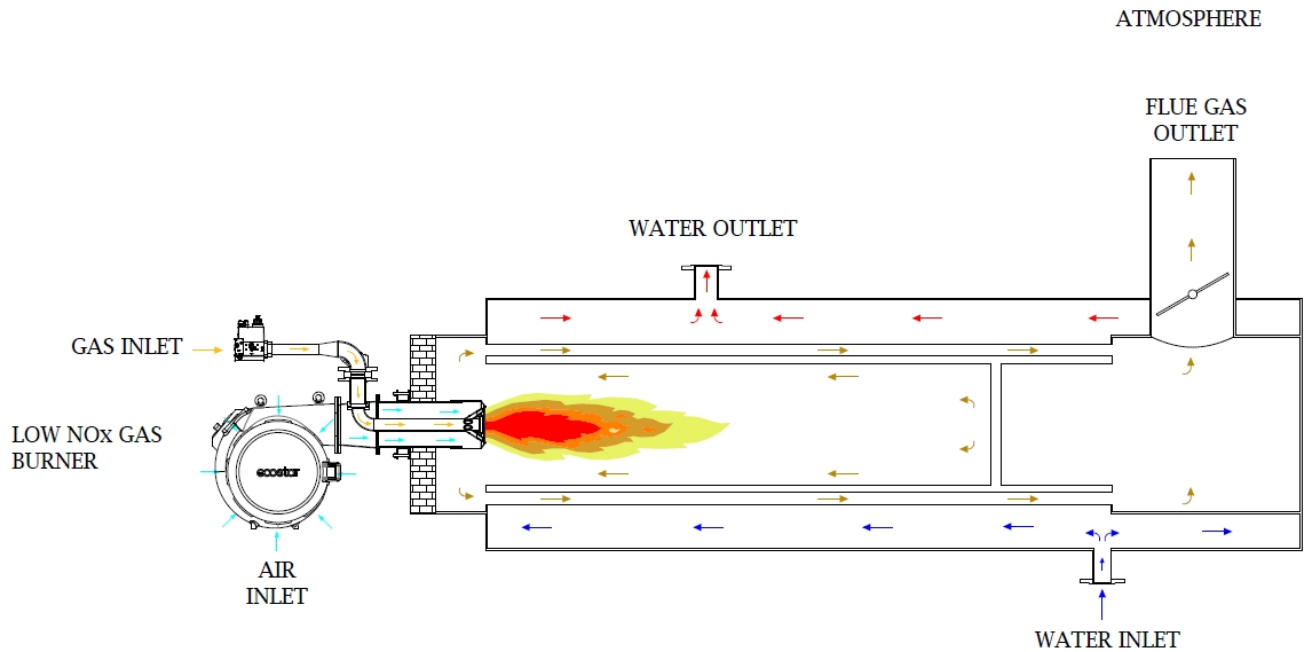
This device must never be operated with open flame!

3.2. Code Key

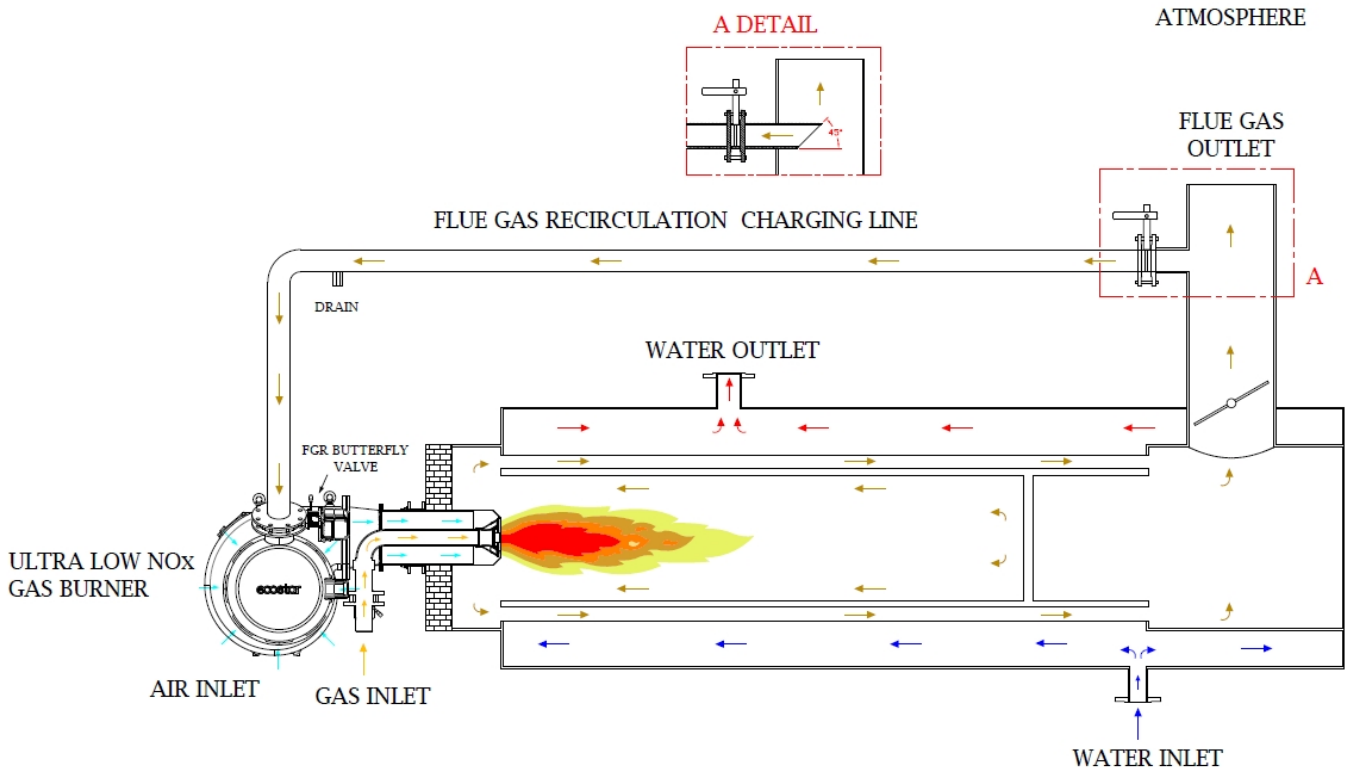


4. GAS, FLUE GAS AND HEATING WATER SCHEME

4.1. New Generation Low NO_x Gas Burner Gas, Flue Gas, and Heating Water Scheme



4.2. New Generation Ultra Low NO_x Gas Burner Gas, Flue Gas, and Heating Water Scheme



5. TECHNICAL DATA

5.1. Capacity Table

NEW GENERATION LOW NO _x GAS BURNERS CAPACITY TABLE									
BURNER TYPE	THERMAL CAPACITY				NATURAL GAS CONSUMPTION		NO _x EMISSIONS	FAN MOTOR POWER	MAIN SUPPLY
	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. Nm ³ /h	Max. Nm ³ /h	Standard mg/kWh	kW	VAC
ECO NG LNX 90 G	154.800	774.000	180	900	18,8	93,8	≤80	1,50	3N 380
ECO NG LNX 120 G	215.000	1.032.000	250	1.200	26,1	125,1	≤80	2,20	3N 380
ECO NG LNX 200 G	404.200	1.720.000	470	2.000	49,0	208,5	≤80	3,00	3N 380
ECO NG LNX 300 G	369.800	2.580.000	430	3.000	44,8	312,7	≤80	4,00	3N 380
ECO NG LNX 400 G	498.800	3.440.000	580	4.000	60,5	417,0	≤80	7,50	3N 380

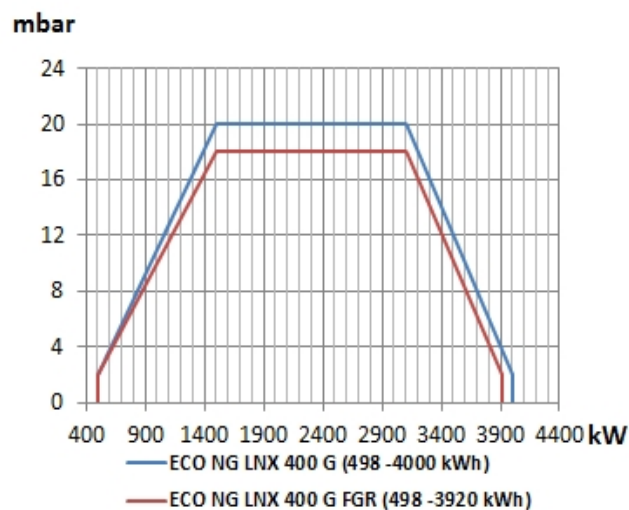
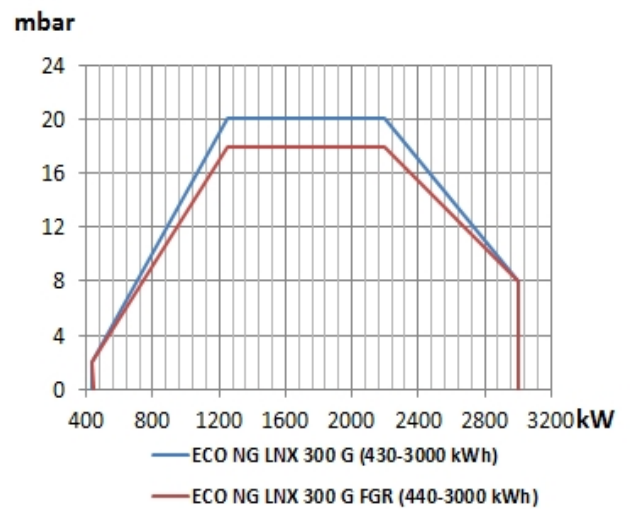
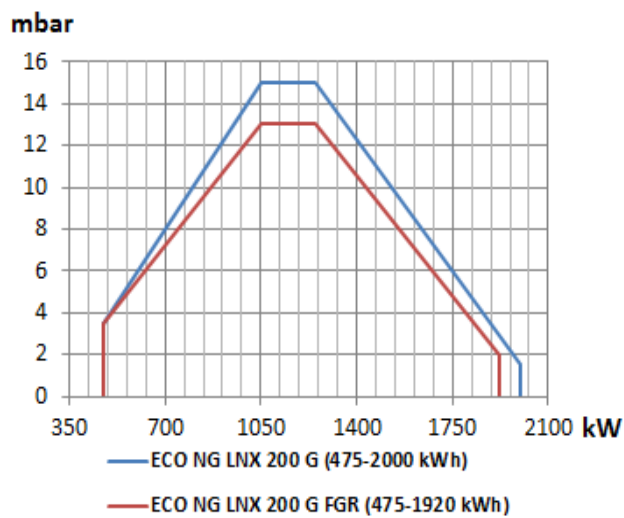
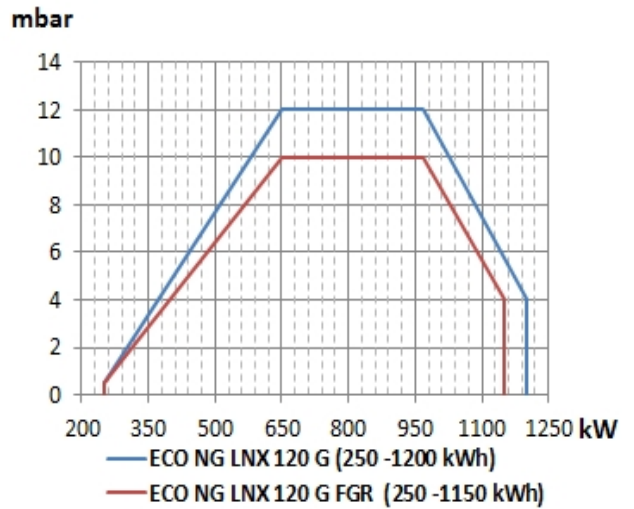
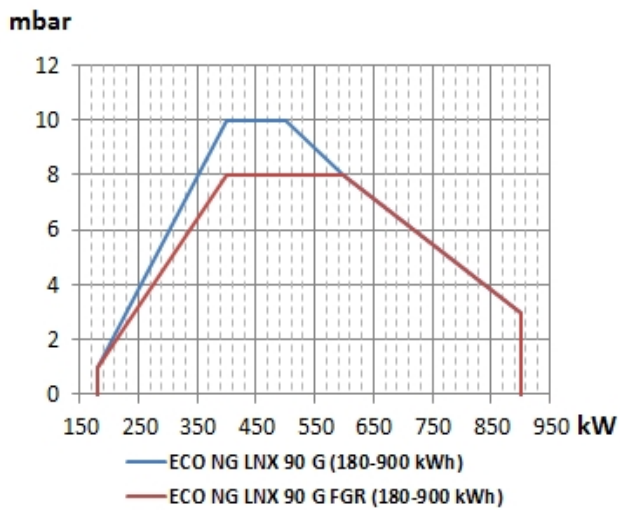
NEW GENERATION ULTRA LOW NO _x GAS BURNERS CAPACITY TABLE									
BURNER TYPE	THERMAL CAPACITY				NATURAL GAS CONSUMPTION		NO _x EMISSIONS	FAN MOTOR POWER	MAIN SUPPLY
	Min. kcal/h	Max. kcal/h	Min. kW	Max. kW	Min. Nm ³ /h	Max. Nm ³ /h	Standard mg/kWh	kW	VAC
ECO NG LNX 90 G FGR	154.800	774.000	180	900	18,8	93,8	≤50	1,50	3N 380
ECO NG LNX 120 G FGR	215.000	989.000	250	1.150	26,1	120	≤50	2,20	3N 380
ECO NG LNX 200 G FGR	404.200	1.651.200	470	33.604	49	200	≤50	3,00	3N 380
ECO NG LNX 300 G FGR	378.400	2.580.000	440	3.000	45,9	312,7	≤50	4,00	3N 380
ECO NG LNX 400 G FGR	498.800	3.371.200	580	3.920	60,5	409	≤50	7,50	3N 380

H_u Natural Gas =8250 kcal/Nm³



NO_x emissions are given on the capacity tables according to EN 676+A2 standard.

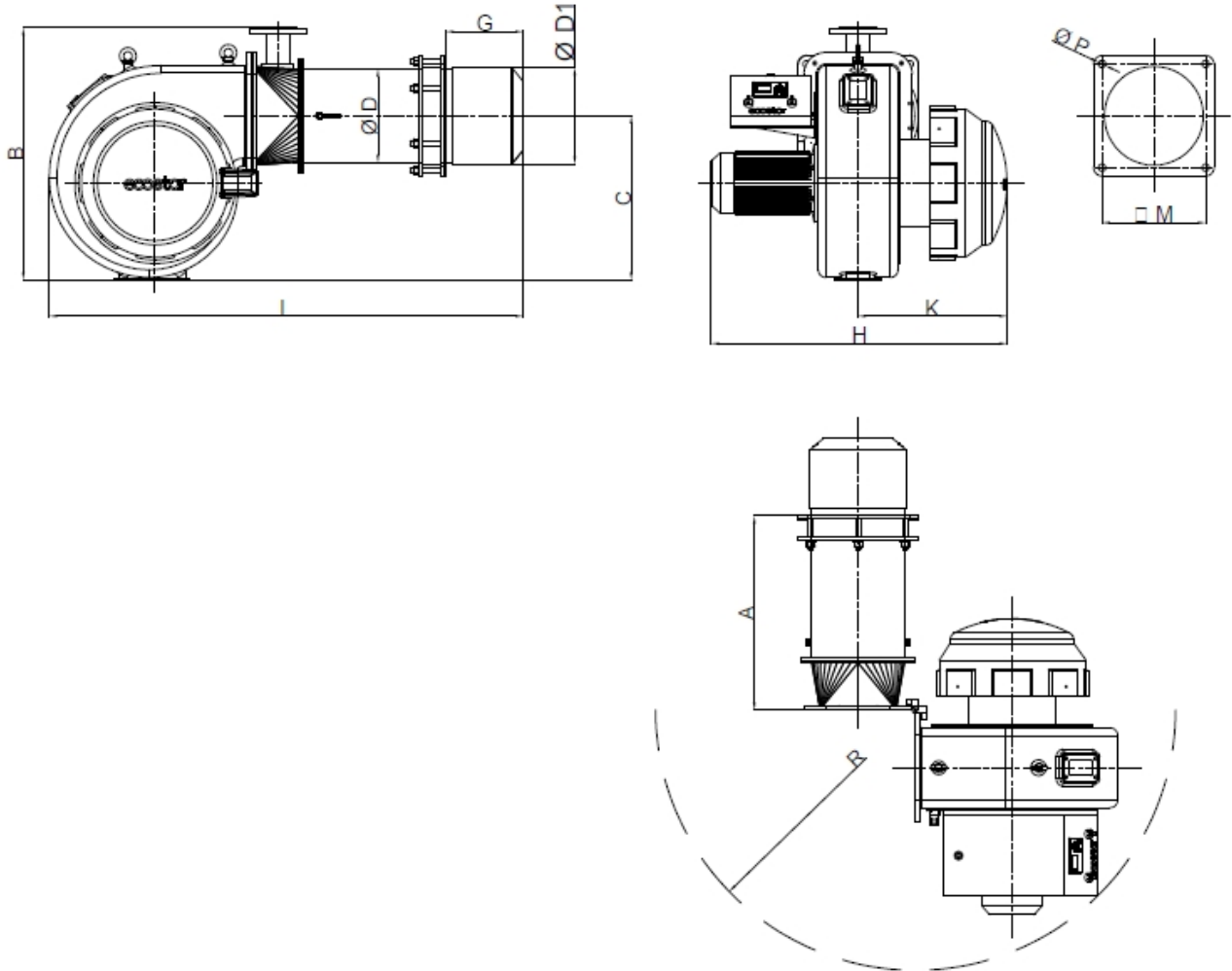
5.2. Back Pressure-Capacity Diagrams



Boiler back pressure values are measured at back pressured test boiler using **G20** reference gas according to **EN 676+ A2**, with net calorific value is **8250 kcal/Nm³**.

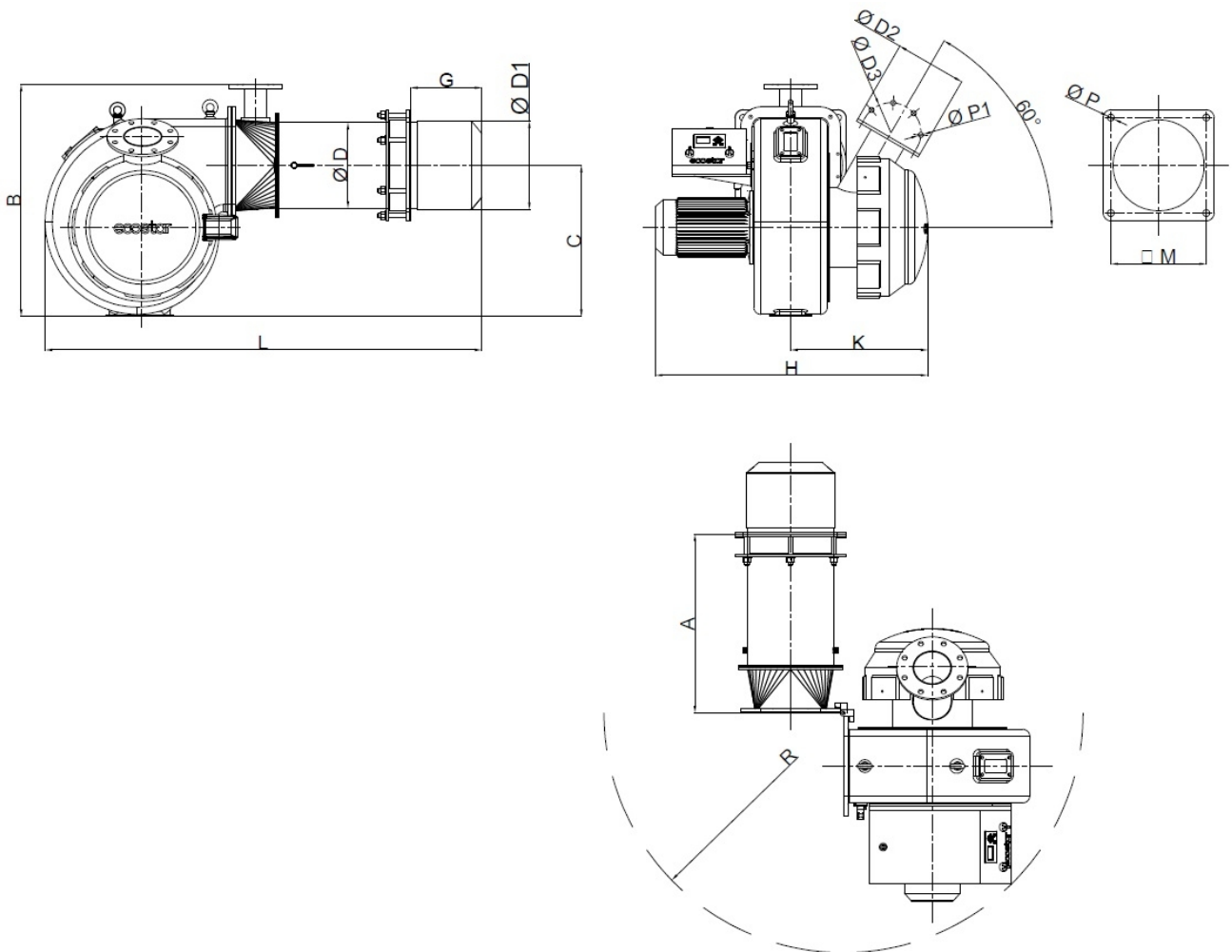
5.3. Burner Dimensions

ECO NG LNX 90 G , ECO NG LNX 120 G, ECO NG LNX 200 G, ECO NG LNX 300 G, ECO NG LNX 400 G



BURNER	L	Gmin	Gmax	H	K	A	B	C	R	ØP	M	ØD	ØD1
	mm	mm	mm	mm	mm	mm	mm	mm	mm	Ø	mm	Ø	Ø
ECO NG LNX 90 G	1300	250	360	765	380	450	715	500	730	18	275	218	226
ECO NG LNX 120 G	1300	250	360	765	380	450	715	500	730	18	275	218	226
ECO NG LNX 200 G	1365	250	360	830	420	460	810	550	775	18	275	248	256
ECO NG LNX 300 G	1550	250	450	960	485	630	815	530	900	22	335	302	310
ECO NG LNX 400 G	1710	300	510	1110	590	680	905	595	950	22	400	360	367

**ECO NG LNX 90 G FGR , ECO NG LNX 120 G FGR , ECO NG LNX 200 G FGR , ECO NG LNX 300 G FGR ,
ECO NG LNX 400 G FGR**



BURNER	L	Gmin	Gmax	H	K	A	B	C	R	ØP	ØP1	M	ØD	ØD1	ØD2	ØD3
	mm	mm	mm	mm	mm	mm	mm	mm	mm	Ø	Ø	mm	Ø	Ø	Ø	Ø
ECO NG LNX 90 G FGR	1300	250	360	765	380	450	715	500	730	18	18	275	218	226	220	180
ECO NG LNX 120 G FGR	1300	250	360	765	380	450	715	500	730	18	18	275	218	226	220	180
ECO NG LNX 200 G FGR	1365	250	360	830	420	460	810	550	775	18	18	275	248	256	250	210
ECO NG LNX 300 G FGR	1550	250	450	960	485	630	815	530	900	22	18	335	302	310	250	210
ECO NG LNX 400 G FGR	1710	300	510	1110	590	680	905	595	950	22	22	400	360	367	285	240

6. FGR NO_x REDUCTION SYSTEM

External Flue Gas Recirculation (FGR) is effective and low cost solution to achieve very low NO_x emissions. Some flue gas from chimney is led back to the combustion chamber through burner; which reduces NO_x emissions by cooling down flame peak temperature and by slowing combustion reactions. Achivable reduction depends on burner type, boiler; combustion air temperature and other factors.



6.1. FGR System Factory Control Parameters

Parameter	Default Set Value	Operating Mode
402	1	FGR active
319	140 s	Pre purge time
331	195 s	FGR system activating time at burner maximum heat capacity
332	110 °C	Minimum flue gas temperature for FGR
402	1	FGR channel function 3
414	30 s	FGR flap starting time – During the burner prepurge



FGR system install parameters can be changed by the manufacturer.

FGR Operating Conditions are Listed Below:

1.	Burner safety control is done with air presostat.
2.	Flow rate is controlled with butterfly valve .
3.	Flue gas flow rate is controlled by a butterfly valve integrated with servomotor.
4.	Burner O ₂ emission values must be setted over 0,5 – 0,7% when FGR is closed. O ₂ ≤ %3, when FGR is closed; 3,5 ≤ %O ₂ ≤ 3,7, when FGR is opened.
5.	If operation set value of inverter and O ₂ / CO control burner is setted while FGR is active.
6.	FGR flap must be closed position while burner is setting for ignition.
7.	Leak proofing of FGR flap must be controlled.
8.	FGR flap is closed at the beginning of pre purge time.
9.	Air control actuator is positioned for ignition, after prepurging is completed.
10.	Fuel and air flaps are positioned for ignition when FGR flap is closed. After they are positioned , ignition starts.
11.	Burner is setted up to maximum heat capacity when FGR system is closed.
12.	Maximum flue gas flow rate of burner shouldn't be exceeded of %20, when burner at minimum and maximum heat capacity.
13.	FGR system flue gas temperature must be between 80°C and 120°C on setting 332 parameter. If the temperature range is not among the defined temperature range, FGR flap is not move.
14.	PT 100 temperature sensor must be positioned on aspiration line .
15.	Electric scheme must be linked to 28-29-30 terminal.
16.	If the burner reaches temperature and pressure limit values, air, fuel and FGR flaps are closed.
17.	One direction flow flap should be used, if combustion air suction is provided by combustion fan on the conventional monoblock burners.
18.	Straight pipes should be placed at the flow direction with 1 – 2 ° angle to provide condensing water flow easily.
19.	The channel must be linked to flue gas outlet with 45° angle. The center of the cut must coincide with the center of the chimney.
20.	The components of pipe channel to create an air leakproof channel should be welded, flanged, and screwed professionally. Maintenance of the air channel should be done periodically.

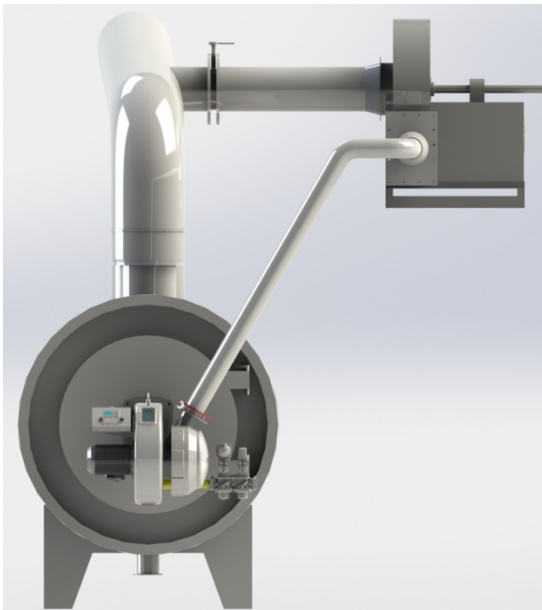
6.2. FGR System Pipe Diameter, Length ,and Equivalent Length Informations

Pipe Diameter	ECO NG LNX 90 G	ECO NG LNX 120 G	ECO NG LNX 200 G	ECO NG LNX 300 G	ECO NG LNX 400 G
DN 50	2,4	1,2	-	-	-
DN 65	9,1	4	2	1,5	-
DN 80	25	13	7	4	3
DN 100	52	35	25	14	8
DN 125	-	104	72	40	25
DN 150	-	-	-	-	70

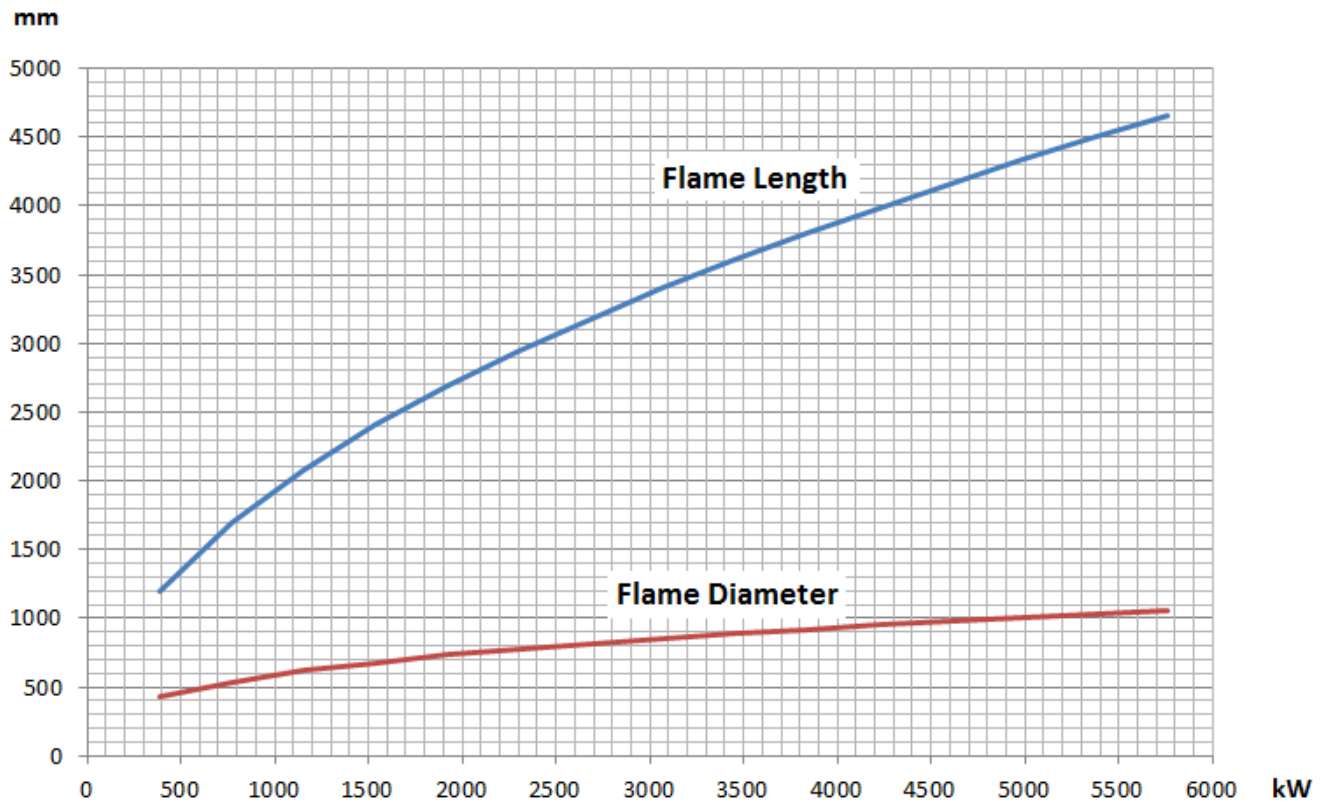
FGR Line Pipe Diameter and Length (L, m) at %20 Load

Pipe Diameter	90° Elbow	45° Elbow	90° "T" Shape Drainage Return
DN 50	1	0,4	4
DN 65	2,5	1,1	4,5
DN 80	2,7	1,3	6
DN 100	4	2,2	7,5
DN 125	4	2,5	9
DN 150	5	3	12

FGR Line ΔP Equivalent Length (m)



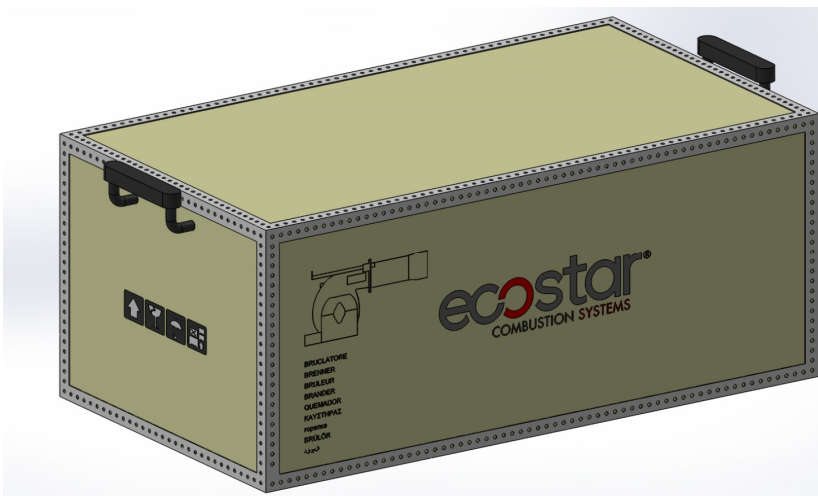
6.3. Flame Length and Diameter



6.4. Noise Level

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

7. 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.

8. INSTALLATION

8.1. Burner Installation Picture



1. Burner
2. Boiler Connection Flange
3. Gasket
4. Boiler Flange
5. FGR Flap
6. Condensation Outlet
7. FGR Flap Servomotor



You must definitely ensure sealing between boiler and burner!



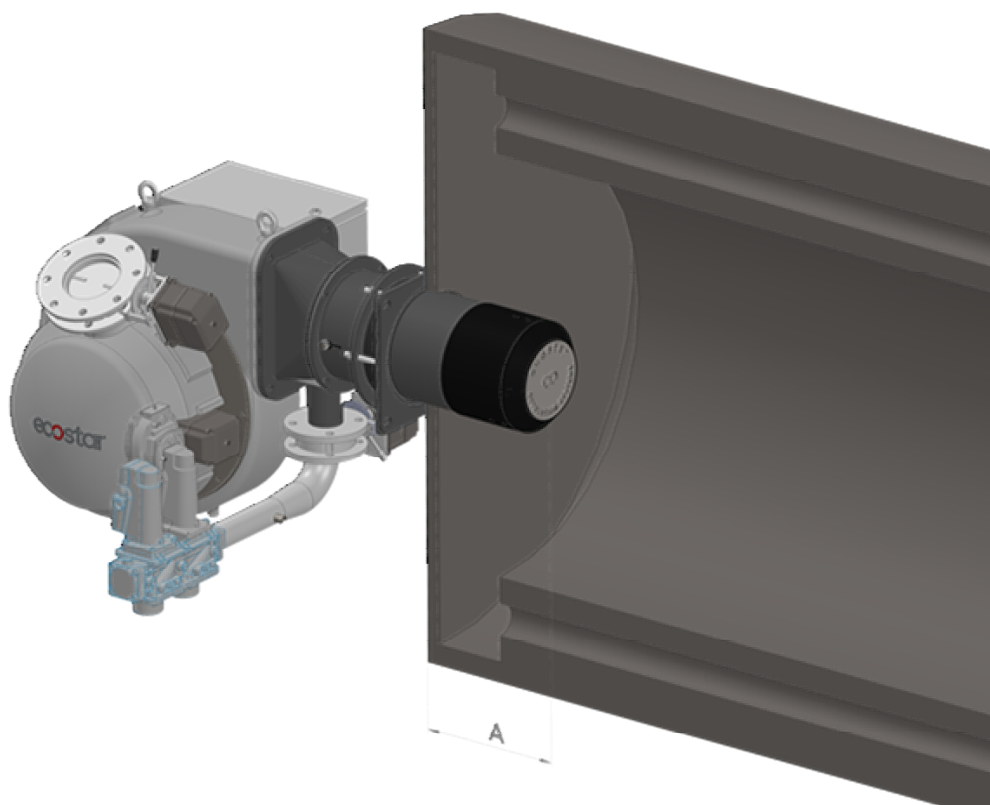
Device must be shipped in original packaging!



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



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



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.

9. COMMISSIONING

9.1. 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.

9.2. General Controls



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

- Ø Are the electrical connections correct?
- Ø Is there electricity current?
- Ø Is there gas?
- Ø Has the heating system been filled with water?
- Ø Is the thermostat set at the required temperature?
- Ø Has the boiler explosion lid been controlled?
- Ø Is there sufficient air in boiler room (ventilation section $\text{cm}^2 = \text{boiler capacity kW} \times 7$)
- Ø Has the boiler been installed correctly? Has the boiler cover been closed properly?
- Ø Has the air of the gas line been removed? Has a sealing test been made?

Operation of a modulating burner

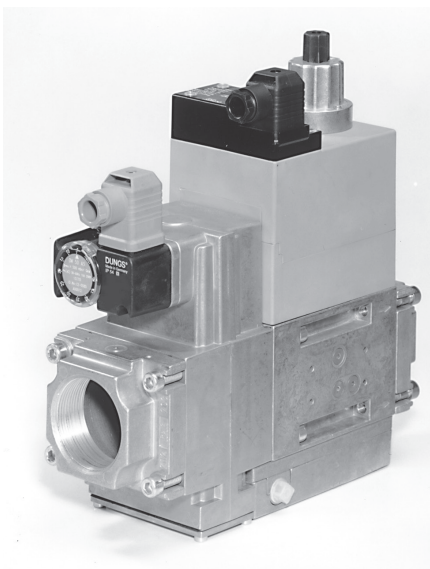
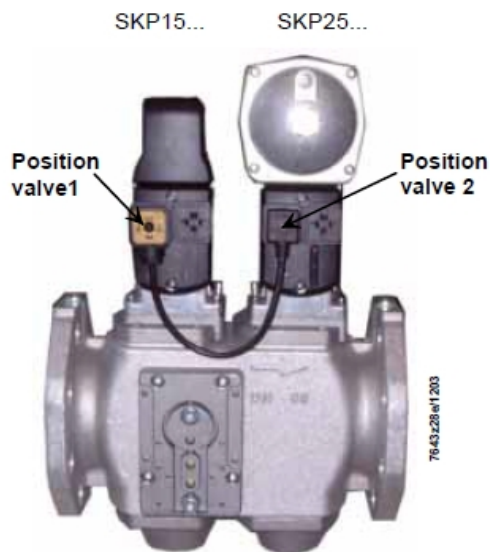
- Ø Open the main gas valve; check max 300 mbar gas pressure from the manometer.
- Ø Open operating switch on the burner panel.
- Ø Switch on the modulating control switch.
- Ø Switch automatic-hand switch to automatic.
- Ø Check the temperature and pressure set values from the modulating control unit.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

9.3. Combustion Adjustment

9.3.1. Gas Adjustment

Follow the instructions of the valve manufacturer during installation, dismantling and adjustment of the gas valve

9.3.1.1. VGD 40... Series Gas Valve

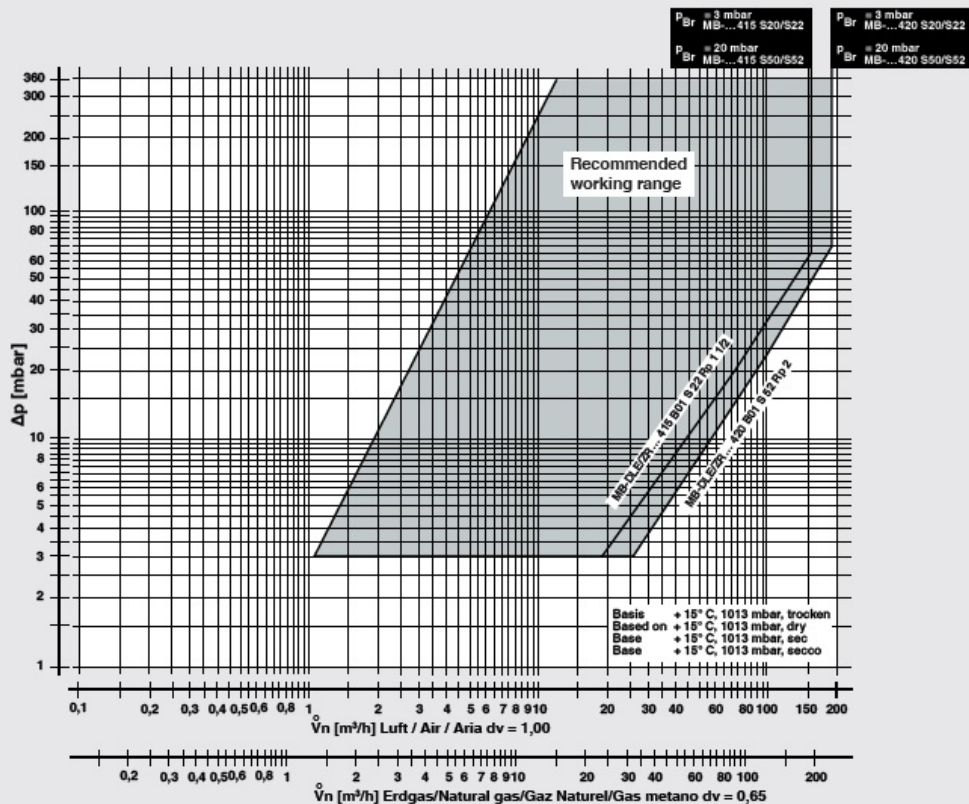


Technical Features

Gas Multiblock Valve integrates filter, regulator, valves and pressure switches in one compact fitting.

- Ø Dirt trap: microfilter,
- Ø One regulator and two valves: B01,
- Ø Two valves are fast opening,
- Ø One valve is fast opening and one valve is slow opening,
- Ø Solenoid valves up to 360 mbar (36 kPa) as per DIN EN 161 Class A Group 2,
- Ø Sensitive setting of output pressure by proportional regulator as per DIN EN 88 Class A Group 2,
- Ø High flow rates with low pressure drop,
- Ø DC solenoid drive interference degree N,
- Ø Main volume restrictor at valve V2,
- Ø Hydraulic opening delay,
- Ø Flange connections with pipe threads as per ISO 7/1,
- Ø Simple mounting, compact, light-weight.

Volumetric flow pressure loss characteristics in regulated state with microfilter



f = $\sqrt{\frac{\text{Dichte Luft}}{\text{Dichte des verwendeten Gases}}}$
 Spec. weight air / Spec. weight of gas used
 poids spécifique de l'air / poids spécifique du gaz utilisé
 peso específico aria / peso específico del gas utilizado

Gas type	Density [kg/m³]	dv	f
Nat. gas	0.81	0.65	1.24
City gas	0.58	0.47	1.46
LPG	2.08	1.67	0.77
Air	1.24	1.00	1.00

$\dot{V}_{\text{verwendetes Gas/gas used/gaz utilisé/gas utilizzato}} = \dot{V}_{\text{Luft/air/aria}} \times f$

9.4. Air pressure switch adjustment

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

- Ø Unscrew the screw of the transparent cover and remove the cover.
- Ø Turn the adjustment wheel in the direction to increase the pressure, note the pressure value at which the burner is failed.
- Ø 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.
- Ø It is recommended that this adjustment is carried out when the burner is at minimum load.

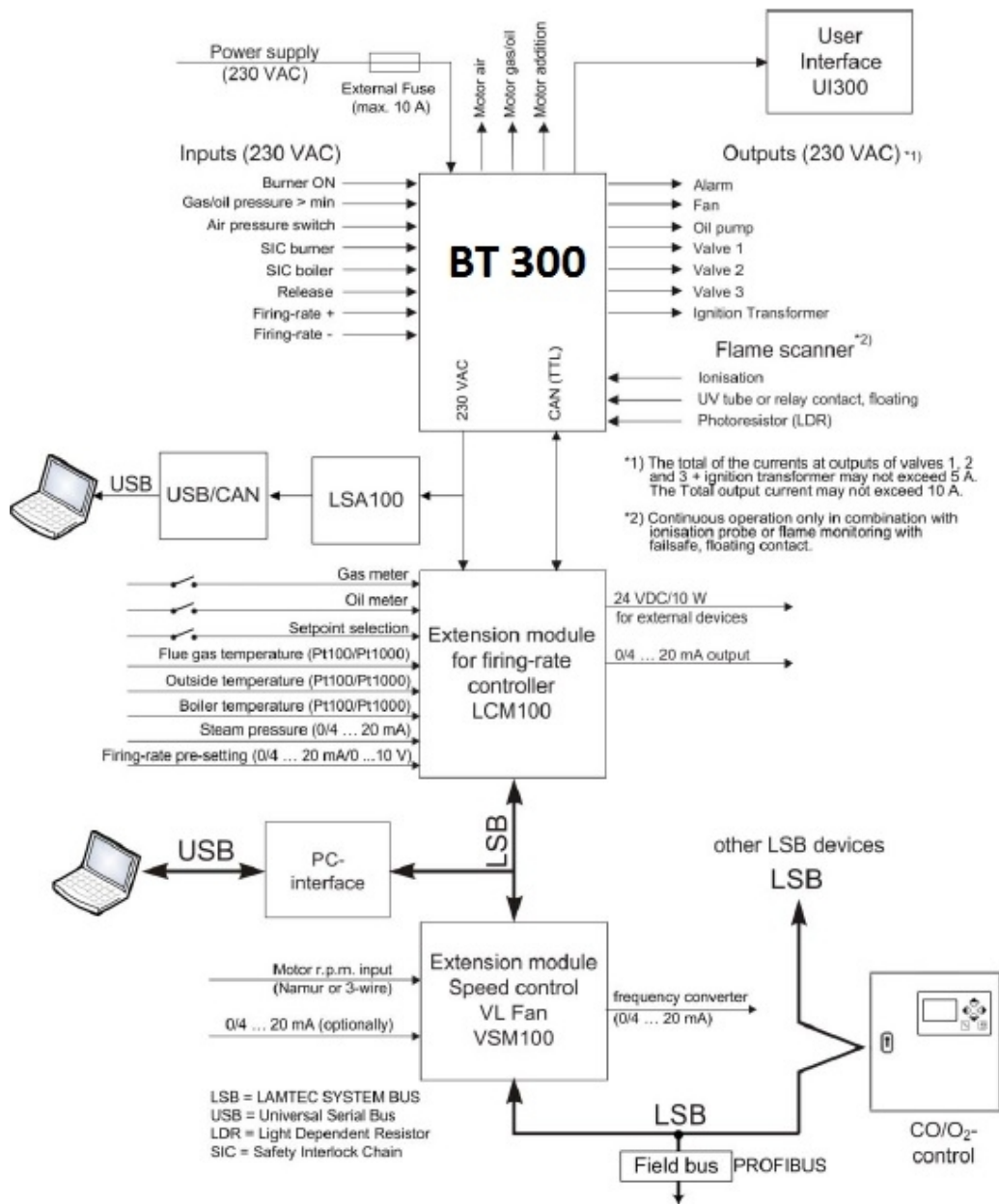


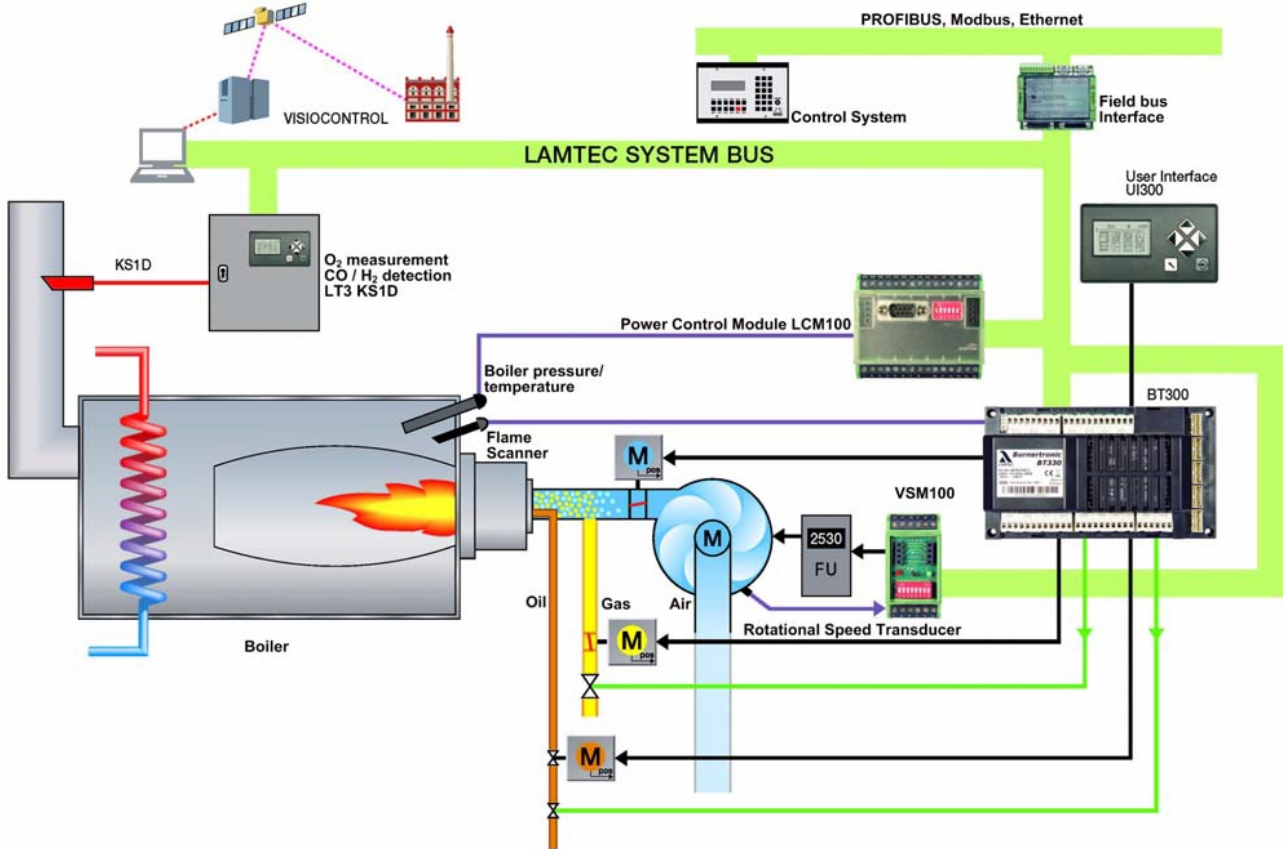
9.5. BT 300

The BT 300 is available in these functions:

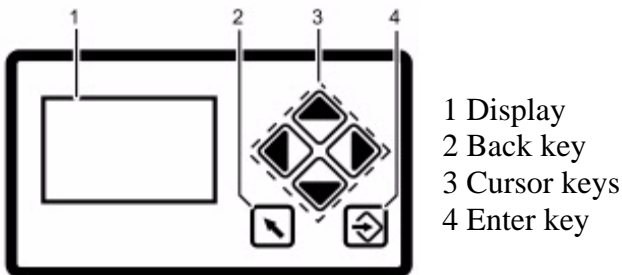
- Ø 2 (Standard) or 3 (FGR used) motorized control outputs,
- Ø 1 continuous output 0 ... 10 V, 0/4 ... 20 mA for speed control of the combustion air fan using VSM100 (optional),
- Ø Intermittent operation,
- Ø Approved for continuous operation only in combination with flame sensors capable of running continuously (FGR used).
- Ø The integrated leakage test can be run before ignition or after shutting down the burner.
- Ø Starting without pre-purge using gas is available in accordance with EN676 ,
- Ø The setting of fuel/air ratio curves can be optimised using optional CO/O2 control during operation.
- Ø Operating and fault messages are displayed by symbols and numbers on UI300 User Interface.
- Ø Plant-specific configurations and settings of fuel/air ratio control curves are operated via menu of UI300 User Interface.

9.6. Control System Mounting and Functions System Overview





9.6.1. 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.

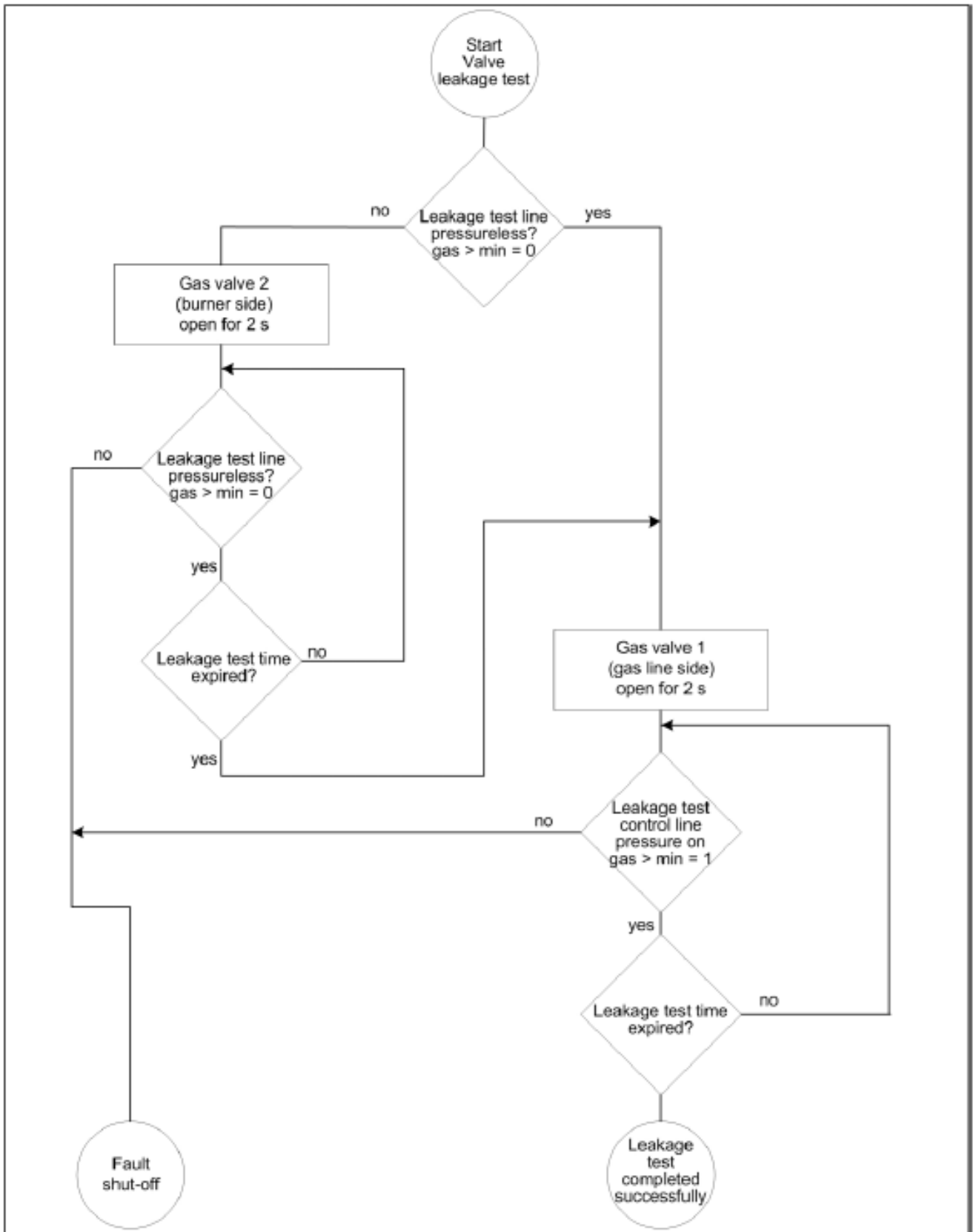


Cursor keys: You navigate in the menu using the cursor keys. You use the "left" and "right" keys to move step by step to the selected row. At the end of the selected row, the cursor jumps to the next row down, if possible. If the menu has multiple rows, you can use the "up" and "down" keys to switch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

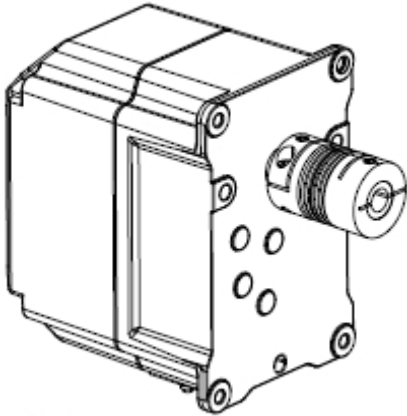


Enter key: Press ENTER to call up the menu on the start screen. You open the selected submenu from a menu window. By pressing the ENTER key, you transfer the setting values from a parameter window.

9.7. Leakage Test for Main Gas Valves



9.8. 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.



- Ø Static electricity can damage servomotor.
- Ø Do not open servomotor. Do not interfere with or modify unit or equipment connected to it. It may damage servomotor or change burner settings.
- Ø Completely isolate equipment from the main supply before performing any wiring changes in servomotor connection area.
- Ø Check that wiring is in an orderly state.
- Ø Protect equipment from condensation, water and ice.
- Ø 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.

9.9. Function Controls and Adjustments

The BT300 combines the benefits of an electronic fuel-air ratio control system with up to three motorized actuating devices and an optional module 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 optimization 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. Standardizing the wiring and the unified operator interface minimizes 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!

9.10. Final Checks

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

9.11. Emission Measurement

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

- Ø $CO < 100 \text{ mg/ kWh}$
- Ø $\%3 \leq O_2 \leq \%5$
- Ø $NO_x \leq 80 \text{ mg/ kWh}$; % 3 O₂ Reference
- Ø $NO_x \leq 50 \text{ mg/ kWh}$; % 3 O₂ Reference ; FGR feature is integrated to standard Low NO_x Gas Burner
- Ø Excess air ratio $1,2 \leq \lambda \leq 1,3$

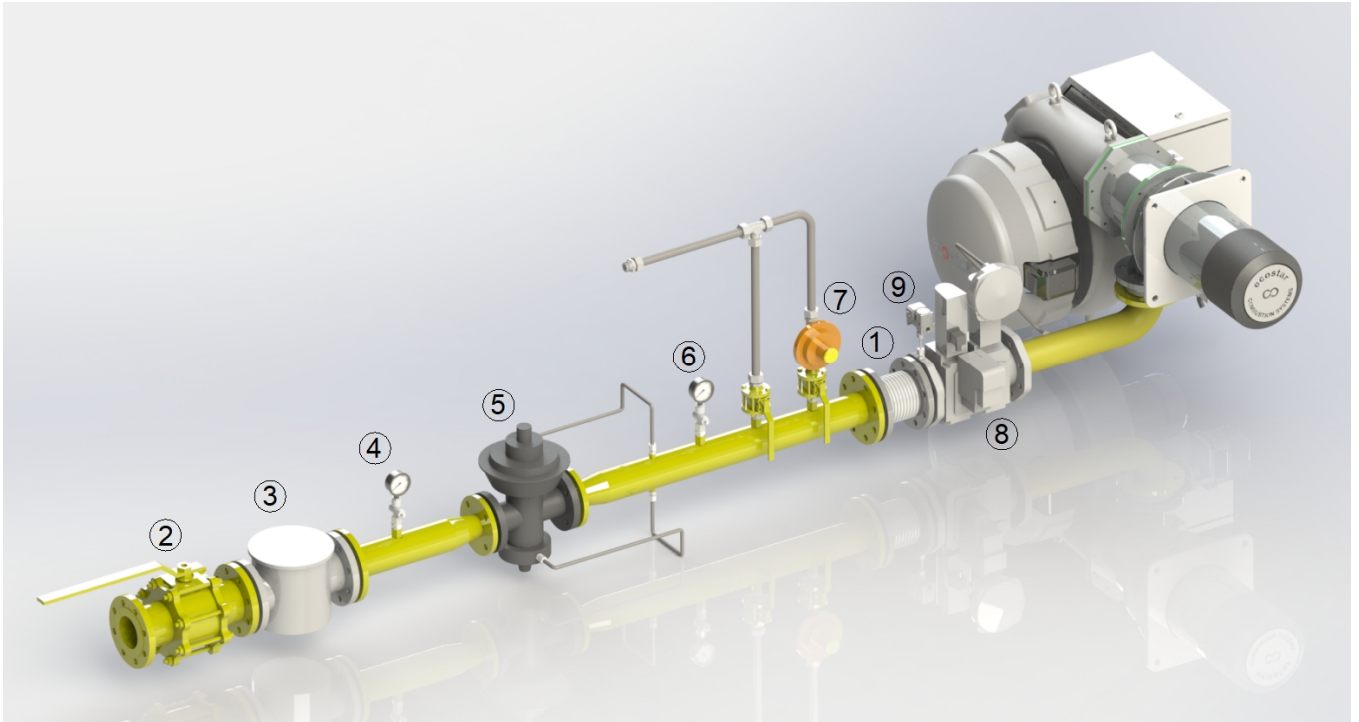


It is important for the boiler to be sealed in order to avoid incorrect measurements during emission measurements.



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

9.12. 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.

10. MAINTENANCE

10.1. 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.

- 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 damper.
- 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. Tighten loose bolts.
- Ø After starting the burner and adjusting air damper, perform flue gas emission measurement and check if there is an ideal combustion.

10.2. Seasonal Maintenance

Comprehensive maintenance work when the burner is restarted 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 boiler inside and clean if necessary.



Follow installation directions during maintenance.

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

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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.

