

BLU TS 3000.1 PRE HT
BLU TS 4000.1 PRE HT



Technical data



Operating instructions



Electric diagrams



Spare parts list



Gas train manual is separate



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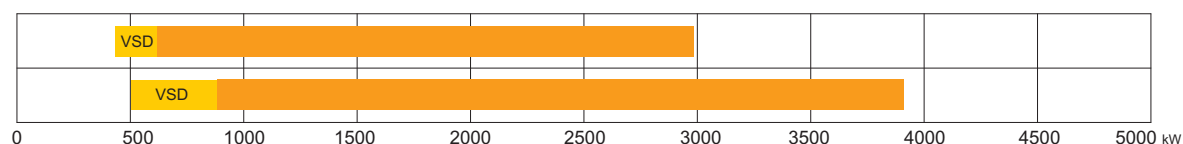
15-09-2015

BLU TS 4000.1 PRE ETO HT TC 230-50 3144346

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BLU TS 3000.1 PR

BLU TS 4000.1 PR



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GENERAL WARNINGS - CONFORMITY DECLARATION

BLU burners are designed for the combustion of natural gas or LPG with kit. The design and function of the burners meet the standard EN676. They are suitable for use with all heat generators complying with standard within their respective performance range. Any other type of application requires the approval of ECOFLAM.

Installation, start-up and maintenance must only be carried out by authorised specialists and all applicable guidelines and regulations must be complied with.

BURNER DESCRIPTION

BLU burners are progressive mechanical fully automatic monoblock devices. Emissions values may differ, depending on combustion chamber dimensions, combustion chamber load and the firing system (three-pass boilers, boilers with reverse firing).

PACKAGING

The burner, the gas train and all the additional components are supplied in a modular system of packages according to the configuration ordered that based on the country of installation shall follow the applicable standards and the local rules and code of practise. The following standards should be observed in order to ensure safe, environmentally sound and energy-efficient operation:

EN 676

Forced-draught gas burners

EN 60335-1, -2-102

Specification for safety of household and similar electrical appliances, particular requirements for gas burning appliances

GAS LINES

When installing the gas lines and gas train, the general EN676 directives and guidelines must be observed.

EN676 compulsory kit and accessories in order to comply to the safety regulations. Additional accessories and kits shall be installed by the installer in accordance to the local safety regulations and codes of practise.

INSTALLATION LOCATION

The burner must not be operated in rooms containing aggressive vapours (e.g. spray, perchloroethylene, hydrocarbon tetrachloride, solvent, etc.) or tending to heavy dust formation or high air humidity. Adequate ventilation must be provided at the place of installation of the furnace system to ensure a reliable supply with combustion air.

Declaration of conformity for gas burners

We,
Ecoflam Bruciatori S.p.A.

declare under our sole responsibility that the products:

BLU TS 3000.1 PR
BLU TS 4000.1 PR

conform to the following standards:

EN 676: 2008
EN 60335-1: 2008
EN 60335-2-30: 2006
EN 60335-2-102: 2007
EN 55014-1: 2008 + A1: 2009
EN 55014-2: 1998 + A1: 2001 + A2: 2008

These products are built in accordance with the following directives
2006/42/EC Machinery directive
2004/108/EC EMC directive
2006/95/EC Low voltage directive
2009/142/EC Gas appliances Directive

CE certification, when required, must be done at installation site by the end user

Resana, 20th December 2010
M. PANIZZON



BURNER SELECTION: Type of operation and configuration must be done by professional personnel in order to grant correct working of the burner. Installation, start-up and maintenance must be carried out by authorised specialists and all applicable guidelines and regulations (including local safety regulations and codes of practise) must be observed.

We accept no responsibility for damage arising from:

- inappropriate use;
- incorrect installation and/or repair on the part of the buyer or any third party, including the fitting of non-original parts;
- non authorised modifications made on the burner.

Final delivery and instructions for use

The firing system installer must supply the operator of the system with operating and maintenance instructions on or before final delivery. These instructions should be displayed in a prominent location at the point of installation of the heat generator. They should include the address and telephone number of the nearest customer service centre.

Notes for the operator

The system should be inspected by a specialist at least once a year. Depending on the type of installation, shorter maintenance intervals may be necessary. It is advisable to take out a maintenance contract to guarantee regular servicing.

Ecoflam burners have been designed and built in compliance with all current regulations and directives.

All burners comply to the safety and energy saving operation regulations within the standard of their respective performance range. The quality is guaranteed by a quality and management system certified in accordance with ISO 9001:2008.



BURNER DESIGNATION

BLU TS 8000.1 PR TC HT

RANGE NAME BY FUEL TYPE

BLU TS Gas

MODEL SIZE (Gas: kW; Oil: kg/h)

BLU 8000.1 8000 kW

EMISSIONS

Standard Class 2 - GAS EN676 (<120 mg/kWh)
 LN Low NOx Class 3 - GAS EN676 (<80 mg/kWh)

OPERATION TYPE

PAB 2 stages soft start
 PR 2 stages progressive mechanical
 PRE 2 stages modulating electronic

HEAD TYPE

TC Short head
 TL Long head

TYPE

Normal
 S Special
 O OEM

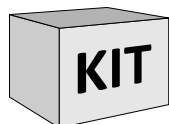
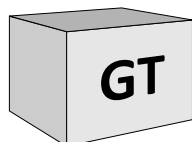
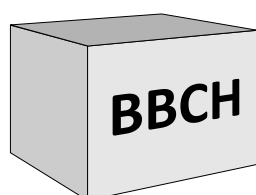
EQUIPMENT

HT High temperature
 CV Continuous ventilation

ELECTRICAL POWER SUPPLY

230-400 Volt, 50 Hz
 60 230-400 Volt, 60 Hz

MODULAR DELIVERY SYSTEM



Gas burners

All gas burners are delivered in separate set/box, i.e. burner body including combustion head and separate gas train with separate additional kit and accessories that shall complete the gas train or the burner according to the applicable standard. Kit and accessories are delivered separately.

Gas train - GTCP - KITS - Accessories

All gas and dual fuel burners gas trains are delivered separately in different models and configuration.

Export configuration gas train completion are available but it is mandatory for the local installer in this case to comply to the local safety regulations.

For burners over 1700 kW gas train connection pipe must be ordered.

Kits and accessories are managed and delivered separately.

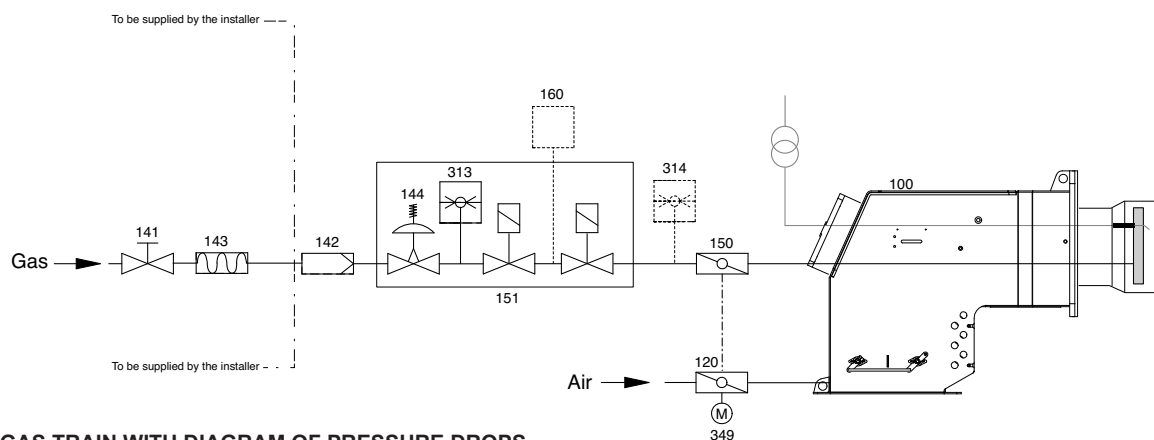
Component type

BBCH	Burner Body with Combustion Head (without gas train)
GTCP	Gas Train Connection pipe
GT	Gas Train (delivered separately)

BURNER DESCRIPTION

BURNER DESCRIPTION

Gas train - Kit - Accessories: assembly to the burner



MATCHING GAS TRAIN WITH DIAGRAM OF PRESSURE DROPS ARE IN THE DEDICATED SECTION OF THIS MANUAL

Ecoflam gas trains are delivered separately for all gas and dual fuel burners and are available in different configurations:

Double gas valves with actuators and regulator VGD Siemens and min pressure switch + ACS gas filter

VGD 20.503 Rp 2" / VGD 40.065 - 40.080 - 40.100 - 40.125			
	1. Main gas pipe		
	2. Ball valve		ACS
	3. Antivibration coupling		ACS
	5. Min gas pressure switch	EXPORT	GAS TRAIN
	6. Safety gas valve + 10. Actuator		
	7. Working gas valve + 11. Actuator		
	8. Gas leakage control		KITTC *
	9. Gas filter		ACS
	KIT - MAX Gas pressure switch		KITPRES
	ACS - Gas train connection pipe		GTCP **

! **GTCP-...* WARNING:** in order to fit the gas train, the corresponding connection pipe must be ordered (GTCP size and fitting depend on the burner and the gas train selected).

HOW TO INSTALL THE GAS TRAIN INTO THE BURNER AND CALCULATE THE OVERALL DIMENSIONS:

refer to the dimension page and the gas train manual for all detailed information

! **WARNING:** EN676 compulsory kit and accessories in order to comply to the safety regulations. Additional accessories and kits shall be installed by the installer in accordance to the local safety regulations and codes of practise.

Gas governor / Filter	Max Pressure switch	Other accessories
FGDR - FILTER	KITPRES50	
Compulsory EN676	KITPRES150	

TECHNICAL DATA

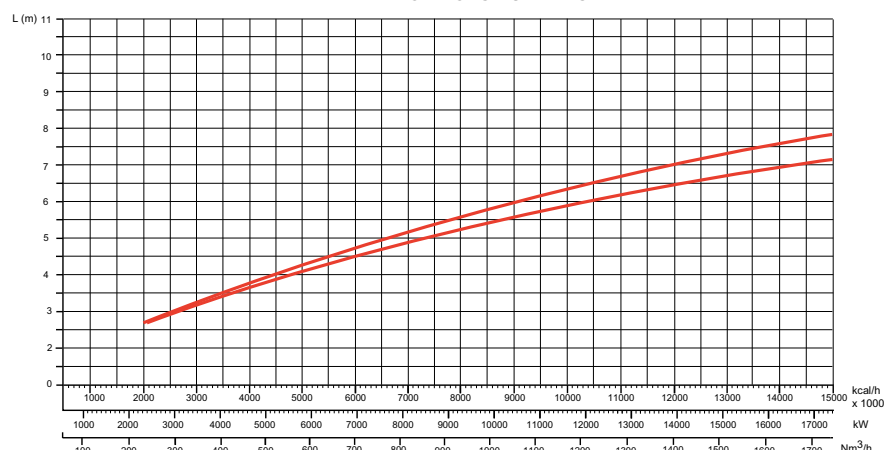
MODEL		BLU TS 3000.1	BLU TS 4000.1
Thermal power max.	kW	3.000	3.900
	kcal/h	2.580.000	3.354.000
Thermal power min.	kW	630	875
	kcal/h	541.800	752.500
Operation mode	Type	Modulating with PID	
Regulation ratio nominal	Type	1+4 GAS	
Fuel	Type	G20 (L.C.V. 8.570 kcal/Nm ³), G25 (L.C.V. 7.370 kcal/Nm ³) G31 (L.C.V. 22.260 kcal/Nm ³), G30 (L.C.V. 29.320 kcal/Nm ³)	
Emission class	std	Standard Class 2 - GAS EN676 (<120 mg/kWh)	
Control unit	Type	LAMTEC ETAMATIC	
Gas train	GT	VGD separate gas train + Filter + KIT Tightness control + Other KIT/ACS	
Gas connection	GTCP	Gas connection range RP50 to DN100 depending on the gas train selected	
NATURAL GAS pressure	mbar	22÷700	30÷700
LPG pressure	mbar	45÷700	70÷700
Air regulation	Type	Air flap	Air flap
Air flap control with servomotor	Model	LAMTEC	
Air pressure switch	mbar	1...10 mbar	
Flame monitoring	Type	UV cell	
Ignitier	Model	COFI	
Voltage	V/Hz	230/400 V - 50 Hz	
Weight body BBCH	Kg		
Loose form	IP	IP55	IP55
Sound pressure level without silencer	dB(A) Lab tests		
Ambient temperature storage	Min/Max	-20°...+70° C	
Ambient temperature use		-10°...+60° C	

GAS CATEGORY BY COUNTRY

Gas category	Country																								
II _{2R,3R}	BE	CH	CZ	DE	DK	ES	FI	FR	GB	GR	HU	IE	IT	LU	NL	PT	SE	EE	LT	LV	NO	PL	SK	SI	-
II _{2H,3P/B}	AT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I _{3R}	CY	MT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TEST BOILER - FLAME DIMENSIONS

FLAME LENGHT GAS BURNERS



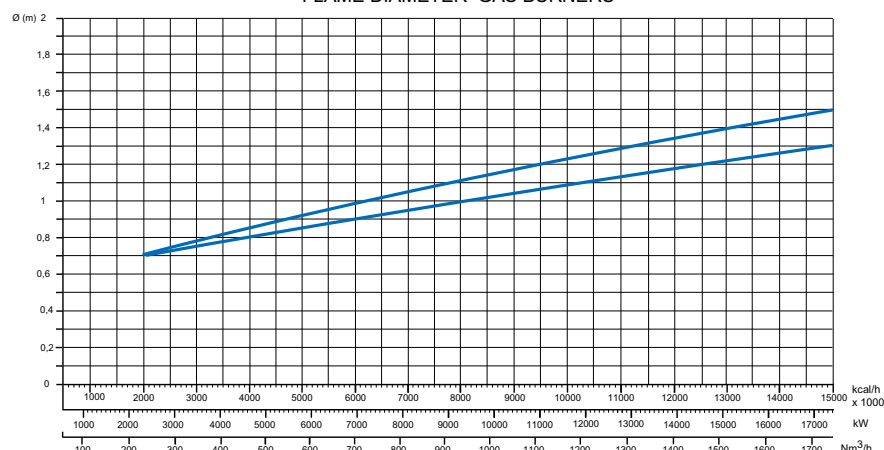
The burner/boiler matching does not pose any problems if the boiler is CE type-approved.

If the burner must be combined with a boiler that has not been CE type-approved and/or its combustion chamber dimensions are clearly smaller than those indicated in diagram, consult the manufacturer.

The firing rates were set in relation to special test boilers, according to EN676 - EN267 regulations.

The sizes are indicative and depend on the configuration, to the combustion chamber pressure and to the draught. The values have been taken out from tests executed with flame tubes.

FLAME DIAMETER GAS BURNERS



The dimensions of the flame are made in test boiler in laboratory without resistance therefore exists max and min length that take into account the difference in length that comes from the boiler backpressure.

Example:

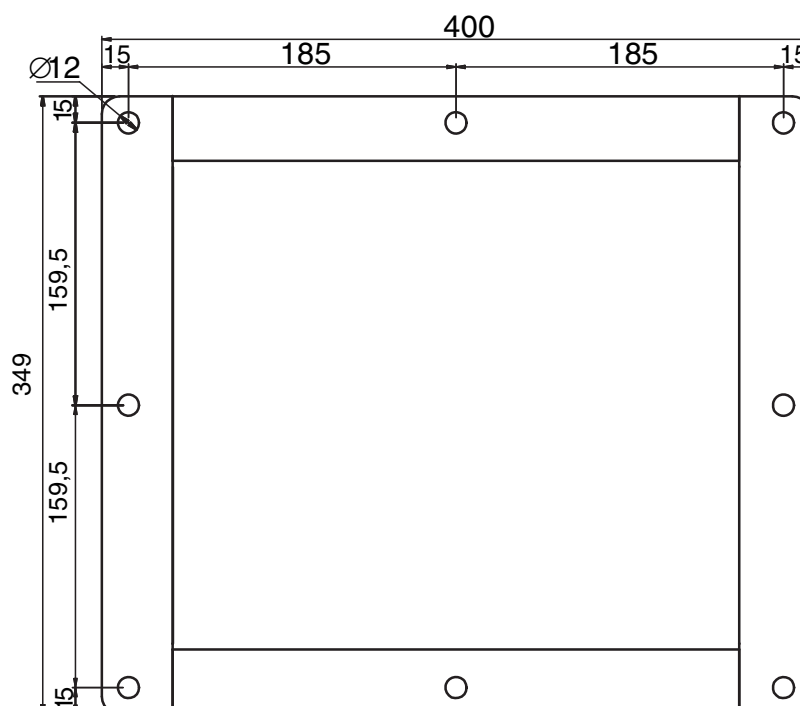
Burner thermal output = 8000 kW;

L flame (m) = 5 m (medium value)

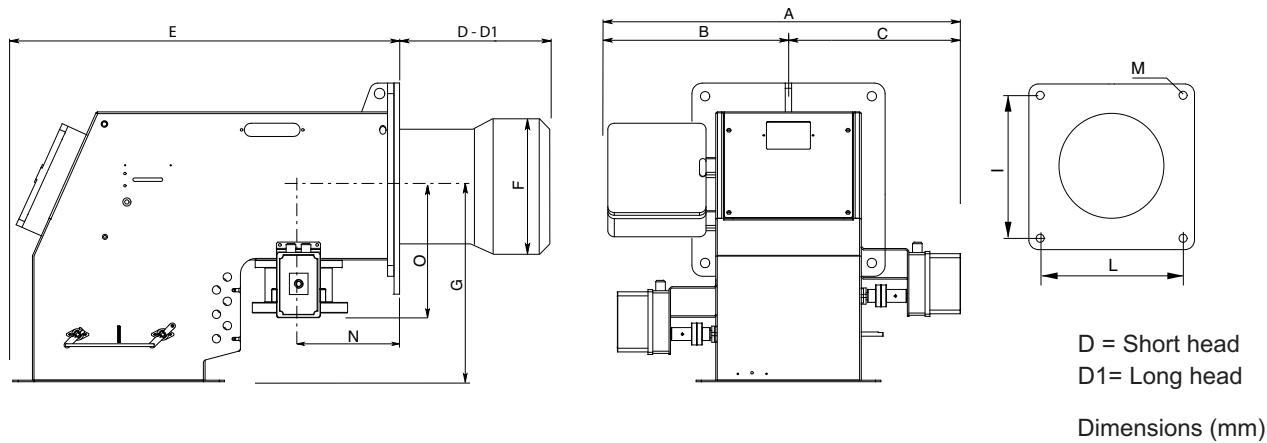
D flame (m) = 1 m (medium value)

WARNING: Some flame modifications can be done in our FLEXSHOP in the factory in order to shape the flame and adapt it to some special boiler or application.

OVERALL DIMENSIONS AIR FLANGE



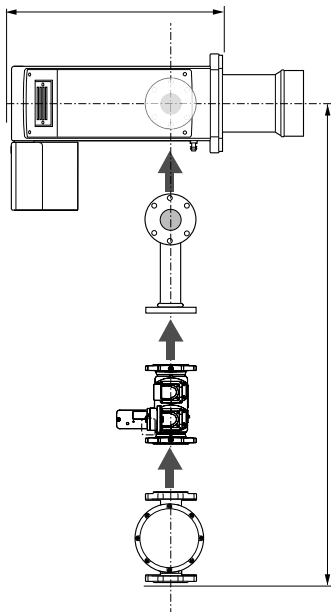
OVERALL DIMENSIONS



	A	B	C	D	D1	E	F	G	I	L	M	N	O
BLU TS 3000.1	800	470	330	330	530	810	290	392	315	315	M16	190	250
BLU TS 4000.1	800	470	330	365	565	810	320	392	315	315	M16	190	250

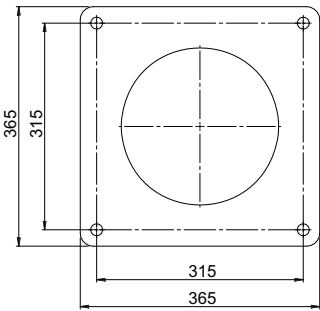
HOW TO INSTALL THE GAS TRAIN INTO THE BURNER AND CALCULATE THE OVERALL DIMENSIONS:

refer to the dimension page and the gas train manual for all detailed information



Burner-boiler mounting flange

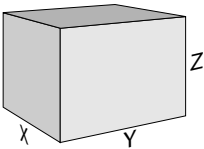
Fixing hole dimensions are "I" and "L" as per dimension table.
Boiler hole shall be done according to the blast tube dimension "F" plus 15-25 mm in order to be able to extract it during maintenance.



WARNING: Please follow the suggested dimension for the hole on the boiler flange in order to fit the burner. Make sure that between the boiler and the blast tube proper insulation is fitted.

Packaging (only burner)

	X	Y	Z	kg
BLU TS 3000.1	1140	1370	940	
BLU TS 4000.1	1140	1370	940	



GAS OPERATING MODE - GENERAL SAFETY FUNCTIONS

START-UP MODE

As soon as the furnace system is required to supply heat, the burner control circuit will close and the program flow started. When the program has come to its end, the burner will be turned on.

An automatic test is made for the tightness of the gas valves prior to each burner start. The air damper is in its closed position when the burner is out of operation.

The electric actuator will open the closed air damper to its full-load position so that the burner will ventilate the furnace and the exhaust hoods with the specified air rate.

Shortly after the pre-ventilation process has been started the lack-of-air cut-out must change over to operating position within a certain time, i.e. the minimum air pressure setting must be reached and maintained until the burner is turned off. At the end of the specified pre-ventilation time the air damper will be moved into its partial-load position in a linked control concept with the gas damper.

The ignition transformer will be started.

At the end of the pre-ignition time the gas valves will be opened to allow gas to flow into the burner.

The ignition electrodes incorporated in the burner will ignite the ignition gas.

The UV cell gives flame signal to

control box so that the safety shut-off valves will be opened.

The gas will be fed to the gas nozzles via the gas damper while combustion air is supplied by the fan.

Gas and air will be intensively mixed in the mixing unit and ignited by the spark.

After the safety period has run down the ignition spark will be turned off.

Attention:

If there are shut-off dampers in the flue gas tract they must be completely open. Otherwise there will be a high danger of low-speed detonation or explosion!

GAS OPERATING MODE

After the flame has developed the load regulator will be enabled which brings the burner into its operating position.

The load regulator will now control the burner automatically between its partial-load and full-load stages. Depending on the heat demand, the electric actuator of the compound control system will be fed with the OPEN or CLOSE command via the regulator and thus increase or decrease the gas and air flow rates.

This compound control system will vary the positions of the gas control valve and

air damper and thus regulate the gas flow rate in a linked concept with the air flow rate. The burner can either be controlled by a 2-stage sliding or, if a respective controller is provided, a stepless control concept.

The stepless control will allow the burner to be operated at any desired stage between its partial-load and full-load positions.

The burner will always be turned off out of its partial-load position.

The air damper will be closed when the burner is out of operation and will thus prevent cold air flowing through the burner chamber, heat exchanger and chimney. The interior cooling losses will thus be greatly minimized.

GENERAL SAFETY FUNCTIONS

In case a flame does not develop when starting the burner (fuel release) the burner will shut off at the end of the safety period (safety lock-out).

A safety lock-out will also occur in the case of flame failure during operation, air flow failure during the pre-ventilation phase and pressure failure during the whole period of burner operation.

Any failure of the flame signal at the end of the safety period and a flame signal during

the pre-ventilation phase (external light control) will result in a safety lock-out with the automatic furnace controller being locked.

The trouble is indicated by the trouble signal lamp lighting up.

The automatic furnace controller can be unlocked immediately after a safety lock-out by pressing the unlocking key. The program unit will return to its starting position and proceed with the restart of the burner.

A voltage failure will result in a regular shut-off of the burner. Upon voltage recovery there may be an automatic restart unless another interlock is provided, e.g. by the safety system. In any case of trouble the fuel oil supply will be shut off right away. The program unit will stop at the same time causing also the trouble location indicator to stop. The symbols will indicate the kind of trouble.

INSTALLATION

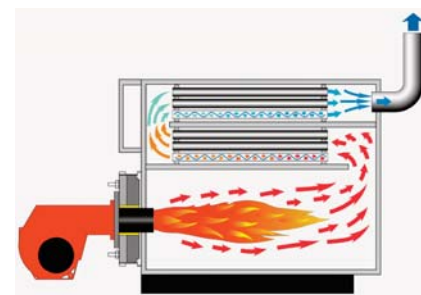
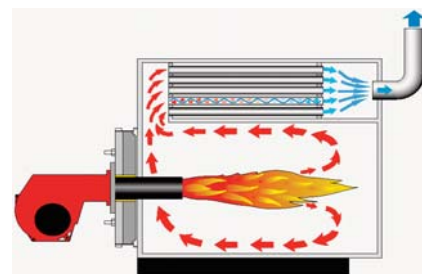
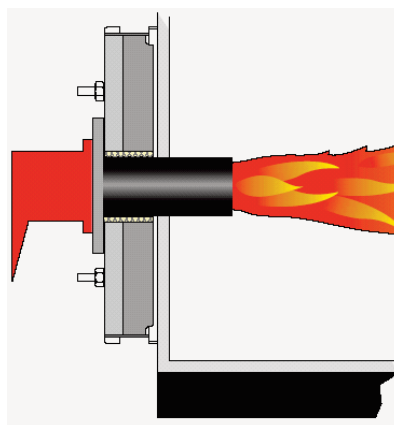
Fitting the burner to the boiler



WARNING: handling and moving operations must be carried out by specialised personnel.
Use the eyebolts to lift the burner in order that it will not overturn and fall down.

To perform the installation of the burner into the boiler drill the boiler plate according to the dimension given on this manual and place the burner towards it by lifting and moving the burner by means of eyebolts.

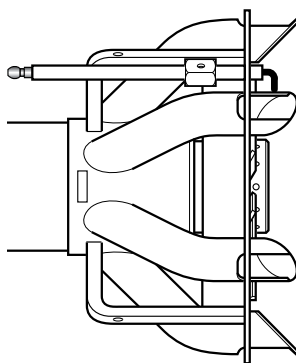
Place the gasket on the burner flange and install the burner into the boiler by fixing nuts into the bolts.
The space between the blast tube and the boiler lining must be sealed with appropriate insulating material.



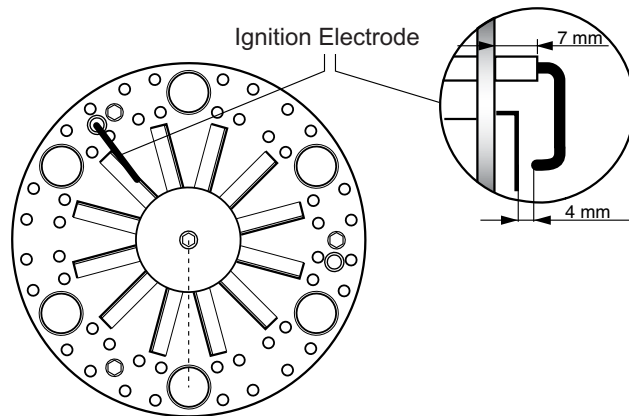
BURNER LINING

Check before burner installation:

1. Depending on the type of boiler (reverse flame or three pass) check the burner blast tube installation depth according to the data specified by the boiler manufacturer or consult the burner producer.
2. Check the ignition electrodes on the burner head as per factory setting (see figures).
The setting of the mixing and ignition unit according to the boiler output will be performed during commissioning procedure.
3. Check that the head is preset at 50%.



Position of the electrodes



MAIN SWITCH

0 - OFF

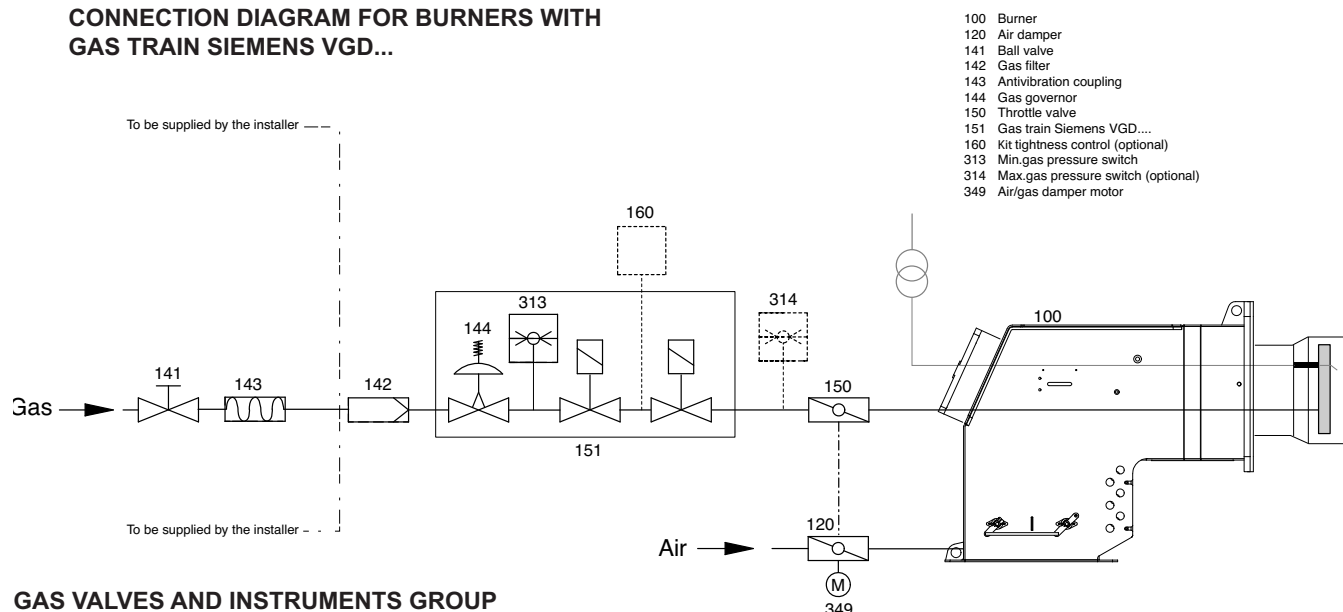
1 - ON



INSTALLATION

Gas line

CONNECTION DIAGRAM FOR BURNERS WITH GAS TRAIN SIEMENS VGD...



GAS VALVES AND INSTRUMENTS GROUP

The gas valves and instruments group used with the furnace will be selected according to the specific requirements to be met by a burner system.

The following factors must be taken into account:

- burner output
- furnace back pressure
- gas pressure loss of the burner head
- gas pressure losses of the gas valves and instruments group

NOTE: Only gas trains assembled by the burner manufacturer and approved in accordance with the burner test specifications. EN676 compulsory kit and accessories in order to comply to the safety regulations. Additional accessories and kits shall be installed by the installer in accordance to the local safety regulations and codes of practise.

GAS CONNECTION PRESSURE

A minimum connection pressure must be available upstream of the burner gas valve to ensure the proper functioning of the burner.

WARNING: the total gas pressure loss must always be smaller than the available gas flow pressure.

For the installation of the valves and instruments group take care to observe the mounting instructions supplied by their manufacturers (these are packed with the equipment).

The gas line installed to the burner must be dimensioned in accordance with the throughput rate and the available pressure.

For selecting the nominal bore "DN" of the gas valves and instruments group care should be taken to observe the flue resistance of the boiler and the gas pressure loss of the burner and valves and instruments group.

GAS VALVES AND INSTRUMENTS GROUP

The gas valves and instruments group can be connected directly to the gas feed line.

Take care to observe the correct order of installation and direction of flow (arrow on housing).

Check the valves and instruments and connection pieces for absence of dirt particles and foreign matter before installation and initial operation. To provide effective conditions for start-up make sure the distance between the burner and the gas stop valve is as short as possible.

LEAK TEST

The gas line upstream of the burner gas valves and instruments group must be installed in accordance with the applicable regulations, checked for absence of leaks, vented and certified accordingly by the gas installation company. The screwed unions and flanged joints must be checked for proper tightness (by making a pressure test). The leak test must be made under pressure using approved foaming agents which do not cause corrosion. For steam boiler furnaces the result of the leak test must be duly certified.

VENTING

Prior to taking the burner into operation or after any repair work make sure to vent the complete gas feed line and the gas valves and instruments group into the open atmosphere (e.g. by means of a hose) taking care to avoid any hazards.

In no case should the gas line be vented into the heating or furnace chambers. Make use of a test burner to check the gas-carrying spaces are free from an inflammable gas mixture.

SUPPORT

The valves and instruments group must be supported with a telescopic jacking member or similar during and after installation (e.g. on filter and valve).

JOINT


It is recommended to provide an easy to disconnect joint (with planar sealing faces) to facilitate repair work on the boiler (furnace) and allow the boiler door to be swivelled out if required.

INSTALLATION

KITPRES... Maximum pressure switch assembly

Maximum pressure switch is provided as a kit and shall be assembled into the main gas train according to the instructions of the gas train separate manual.

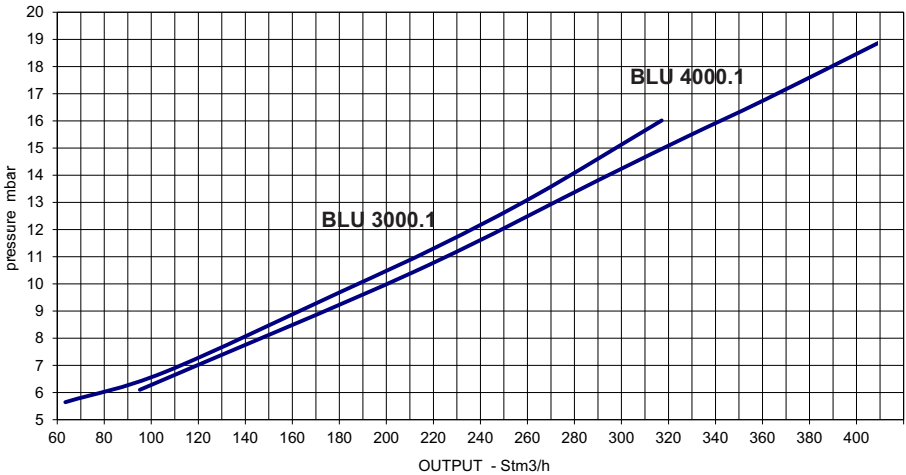
Max Pressure switch
KITPRES50
KITPRES150



GAS PRESSURE LOSS DIAGRAM:
combustion head - platform 320

The diagram provides combustion head pressure loss. To have pressure loss combined with the different type of gas train you must refer to the pressure loss diagrams.

WARNING:
Note that the head loss diagram is only indicative and does vary depending on the setting of the head.



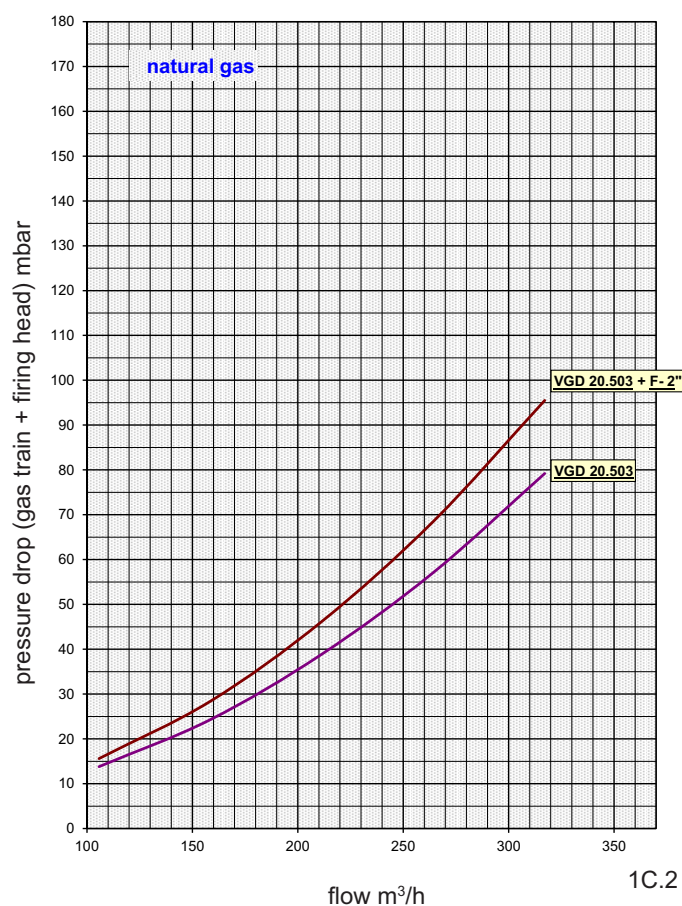
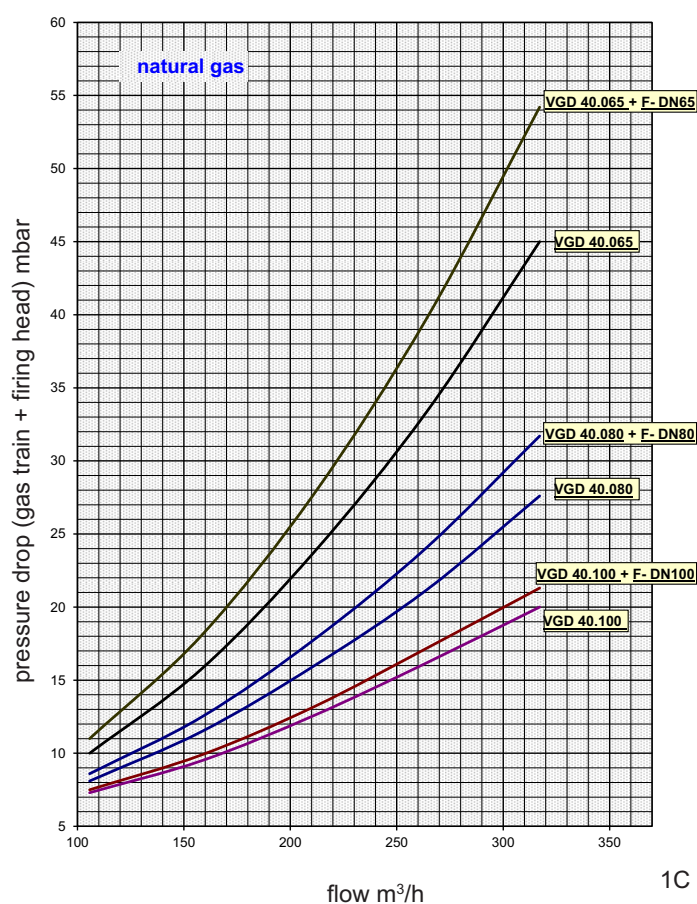
INSTALLATION

Gas pressure loss diagrams



PRESSURE DROP includes: "COMBUSTION HEAD + GAS TRAIN + GAS GOVERNOR & FILTER" as per EN676 Standard.
Back pressure of boiler (or other applications) must be added/included in order to have the total min pressure drop.

Burner	Gas train	Advisable gas governor & filter	Spring color	Inlet gas pressure MIN [mbar]	Inlet gas pressure MAX [mbar]	Diagram
BLU 3000.1 PR MULTICALOR 300.1 MULTIFLAM 300.1	VGD 40.100	no	neutral	20	700	1C
		FILTER DN 100		22	700	
	VGD 40.080	no	neutral	30	700	
		FILTER DN 80		35	700	
	VGD 40.065	no	neutral	45	700	1C.2
		FILTER DN 65		55	700	
	VGD 20.503	no	neutral	80	600	
		FILTER 2"		100	600	

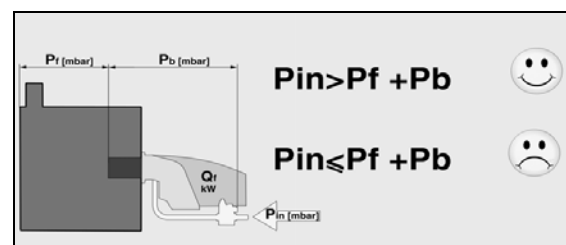


LEGENDA

Pf: Back pressure of furnace

Pb: Pressure of burner (combustion head + complete gas train)

Pin: Minimum inlet pressure

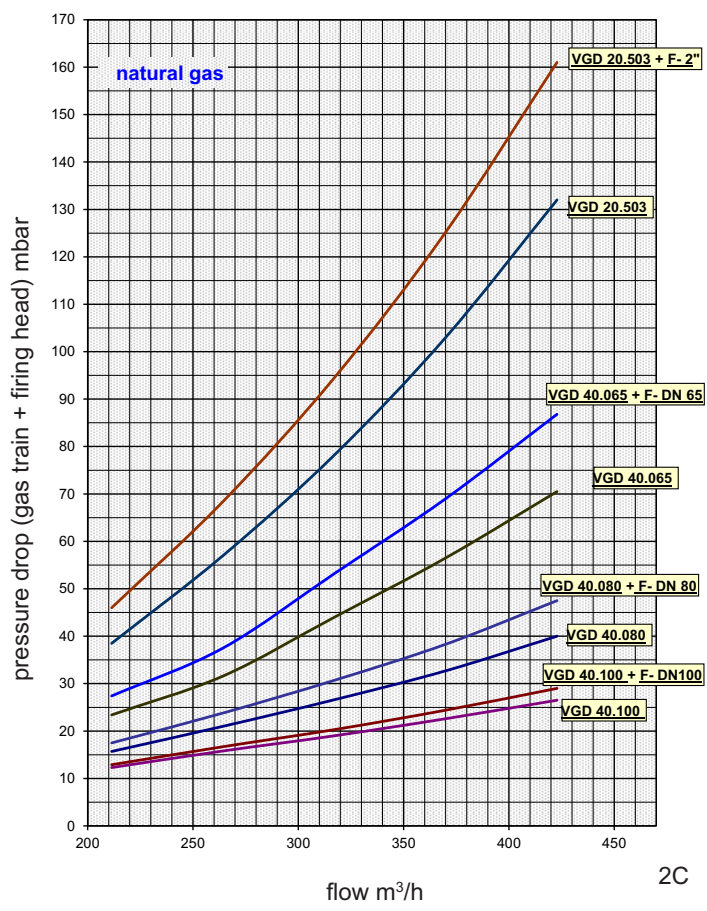


INSTALLATION

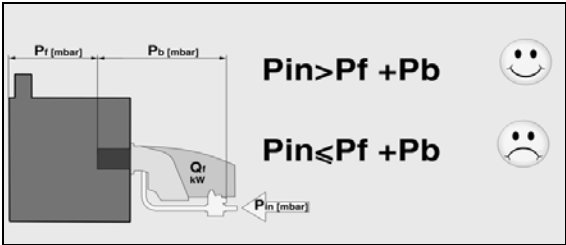
Gas pressure loss diagrams

! PRESSURE DROP includes: "COMBUSTION HEAD + GAS TRAIN + GAS GOVERNOR & FILTER" as per EN676 Standard. Back pressure of boiler (or other applications) must be added/included in order to have the total min pressure drop.

Burner	Gas train	Advisable gas governor & filter	Spring color	Inlet gas pressure MIN [mbar]	Inlet gas pressure MAX [mbar]	Diagram
BLU 4000.1 PR MULTICALOR 400.1 MULTIFLAM 400.1	VGD 40.100	no	neutral	27	700	2C
		FILTER DN 100		30	700	
	VGD 40.080	no	neutral	40	700	
		FILTER DN 80		50	700	
	VGD 40.065	no	neutral	75	700	
		FILTER DN 65		90	700	
	VGD 20.503	no	neutral	135	600	
		FILTER 2"		170	600	



LEGENDA
Pf: Back pressure of furnace
Pb: Pressure of burner (combustion head + complete gas train)
Pin: Minimum inlet pressure



Electrical connections



APPLICABLE STANDARD

GENERAL WARNINGS:

An omnipolar switch in accordance with current safety regulations is required for the mains supply connection.

ELECTRICAL CONNECTION

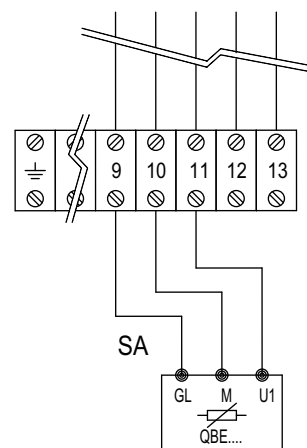
1) of the burner

2) of the gas train

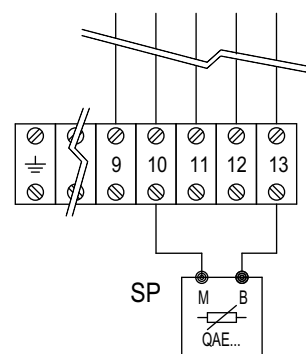
- Connect the plugs pending to the valve:
either on the cabinet,
or on the coupling case on the body of the
burner.

PROBES CONNECTION

ACTIVE PROBE CONNECTION (FOR MODULATING VERSION)

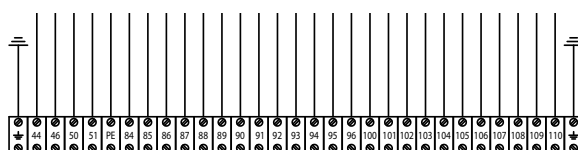


PASSIVE PROBE CONNECTION (FOR MODULATING VERSION)



LEGENDA

HLB: lock-out lamp
STAB: two stages thermostat
HLF: burner on flame lamp
STC: boiler thermostat
STS: safety thermostat
SA: active probe
SP: passive probe



START-UP: CHECKING PROCEDURE

CHECKS BEFORE COMMISSIONING:

- That the burner is assembled in accordance with the instructions given here.
- Setting the combustion components.
- All electrical connections must be correct.
- Check the burner motor for correct direction of rotation.
- The heat generator must be ready for operation, and the operating regulations for the heat generator must be observed.
- The heat generator and heating system must be filled with water and the circulating pumps must be in operation.
- The temperature regulator, pressure regulator, low water detectors and any other safety or limiting devices that might be fitted must be connected and operational.
- The exhaust gas duct must be unobstructed and the secondary air system, if available, must be operational.
- An adequate supply of fresh air must be guaranteed.
- Make a test of the all gas-carrying elements for absence of leaks.
- With burner in starting position check that air damper is in "CLOSED" position.
- Check that control box is unlocked and in its original position.
- A standard-compliant measuring point must be available, the exhaust gas duct up to the measuring point must be free of leaks to prevent anomalies in the measurement results.

GAS START-UP

- Connect the measuring instruments for the gas head pressure on the test connection downstream of the gas damper and the air pressure on the burner test connection.
- Open the gas shut-off valve before the gas-armatures and test the gas pressure on the pressure gauge
- Set the "Manual-Automatic" selector switch to "Manual".

If the gas valves are tested for absence of leaks, this should be continued until a positive result is obtained. If a valve is found to leak, the program will not step forward to the control box.

The burner will start according to the program flow of the control box.

Prior to the initial fuel feed start make a functional test of the burner program flow:

Gas system:

- Shortly open the gas shut-off valve in the valve group until pressure is available and close again.
- Start burner and check program flow for correct start-up sequence:
 1. Fan.
 2. Pre-ventilation damper.
 3. Check air pressure.
 4. Partial-load damper.
 5. Ignition.
 6. Valves open.
 7. Safety lock-out after expiry of safety period (see control box) or shut-off because of gas supply failure.
- Unlock the see control box.

EXHAUST GAS TEST

To ensure an economically efficient and trouble-free operation of the system it will be necessary to adjust the burner specifically in accordance with the furnace system. This is achieved by means of a fuel-combustion air compound control unit which adjusts the burner to ensure a proper combustion. Exhaust gas tests are required for this purpose.

The percentage CO₂ and O₂ and the exhaust gas temperature will have to be measured to determine the efficiency and combustion quality.

Prior to any measurement make sure to check the boiler and exhaust gas system for absence of leaks.

Secondary air will falsify the measured results

Check that the exhaust gases have a residual oxygen (O₂) content as low as possible and a carbon dioxide (CO₂) content as high as possible.

The carbon monoxide content of the exhaust gases must be below the currently applicable specifications in all load stages. In the fuel oil combustion mode the permissible soot number in the exhaust gas is not allowed to be exceeded

DETERMINING THE VOLUMETRIC GAS FLOW RATE

The thermal furnace output of a boiler (QF) is the amount of heat supplied with the gas in a unit of time.

When taking the burner into operation the volumetric fuel flow rate should be selected according to the nominal thermal capacity of the boiler.

Example:

Nom. thermal output	Q _N	1000 kW
Boiler efficiency	η _K	0,88
Calorific value of gas	H _u	9,1 kWh/m ³
Gas pressure	p _U	100 mbar
Barometer reading	p _{amb}	980 mbar
Gas temperature relative	t _{gas}	15°C
Gas temperature absolute	T	(t _{gas} +273)
Standard atmospheric pressure	p _n	1013 mbar

$$Q_F = \frac{Q_N}{\eta_K} = \frac{1000}{0,88} = 1136 \text{ kW}$$

Volumetric gas flow rate at STP:

$$v_{Bn} = \frac{Q_N}{H_u \cdot \eta_K} = \frac{1000}{9,1 \cdot 0,88} = 125 \text{ m}^3/\text{h}$$

Volumetric gas flow rate in operating condition:

$$v_{BB} = v_{Bn} \frac{T}{273} = \frac{p_n}{p_{amb} + p_U} = 125 \frac{273+15}{273} \frac{1013,25}{980+100} = 123,9 \text{ m}^3/\text{h}$$

Recommended combustion parameters

Fuel	Recommended (%) CO ₂	Recommended (%) O ₂
Natural gas	10 ÷ 9	3,1 ÷ 4,8
Light oil	13 ÷ 11,5	3,3 ÷ 5,3
Heavy oil	12,5 ÷ 11	4,2 ÷ 6,2

Ratio between O₂- and CO₂- for natural gas H (CO₂max = 11,7%)

Ratio between O₂- and CO₂- for light oil EL (CO₂max = 15,40%)

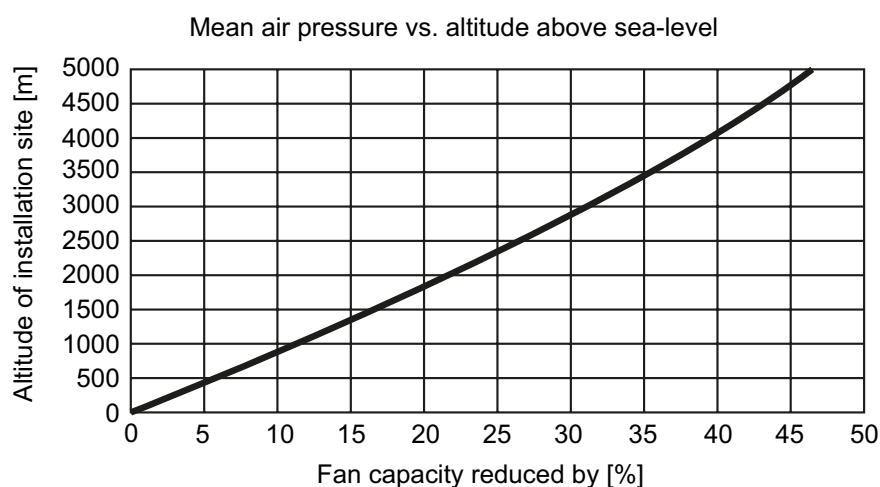
Ratio between O₂- and CO₂- for heavy oil S (CO₂max = 15,60%)

$$O_2 = 21 \frac{CO_{2max} - CO_{2gem}}{CO_{2max}} = \%$$

CO₂ gem = % CO₂ measured on dry flue gases

WARNING: if the installation is above sea level the output of the burner vary base on the diagram.

The regulation of the burner in this case shall take into account the reduced power of the burner due to the missing air.



START-UP

Select the gas operation in order to proceed with start up on the gas side. On the selector put the operation on minimum capacity.

MAIN SWITCH

0 - OFF

1 - ON



KMV



KMV contactor: check the air fan motor rotation.
If not correct invert the two phases on the power supply.

START UP THE BURNER

The control box starts the pre-purge cycle, the fan motor and opens the air flaps in full open position.

At the end of pre-purging, the control box drives the servomotor into the ignition position and starts the ignition transformer.

After a few seconds the control box opens the gas valves and starts the flame.

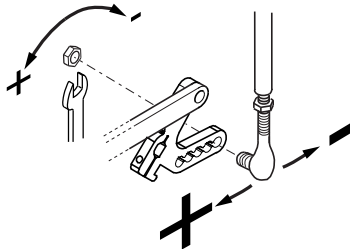
After the flame stabilisation the burner goes in the low flame.

In case of faulty ignition, the control box switches the burner into safety condition, in such a case you must rearm the burner.

Gradually increase burner output from the low flame to the high flame and set gas servomotor curve in order to have a stable flame. Refer to LAMTEC ETAMATIC manual attached

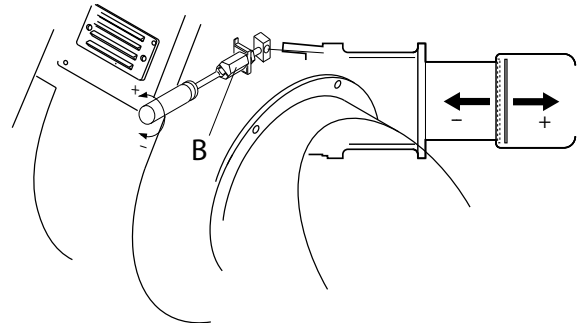
Adjusting the maximum air flow rate

In order to adjust the maximum air flow rate see figure with selector in maximum operation. Loosen the nut holding the air damper transmission rod and correct air flow till you reach the combustion values suggested by reading the value on the combustion analyser. If you do not reach acceptable air flow rate you shall adjust the firing head. Move the head forward to increase air flow backwards to reduce.



Firing head setting

The firing head is pre-adjusted at the 50% from the factory. The setting fully open enables to reach the full power of the burner and full close to reach the minimum power of the burner. The optimal position depends on the output that we need to reach but the default setting shall be modified only when you are not able to reach the suggested combustion value by adjusting the air flow in the maximum flame.



Servomotor LAMTEC 662R2111/N - Air damper motor pre-setting

Air adjustment is accomplished through LAMTEC ETAMATIC parameters setting. Refer to LAMTEC ETAMATIC manual attached.



START-UP

Adjusting the intermediate burner capacity

Gas adjustment is accomplished through LAMTEC ETAMATIC parameters setting. Refer to LAMTEC ETAMATIC manual attached.

Pressure switch adjustment

AIR PRESSURE SWITCH CALIBRATION

The air pressure switch is provided for monitoring the pressure of the combustion air fan. Unscrew screws A and B and remove cover C.

After the air and gas setting you have to calibrate the air switch with the burner working on the low flame by slowly turning the relative knob clockwise until the burner locks out. Read the value and then decrease it by 15%.

Set the pressure switch to the minimum by turning knob D to position 1.

Start the burner and keep in low flame running, while checking that combustion is correct. Through a small cardboard, progressively obstruct the air intake until to obtain a CO₂ increase of 0,5÷0,8% or else, if a pressure gauge is available, connected to pressure port E, until reaching a pressure drop of 1 mbar (10 mm of W.G.).

Slowly increase the adjustment value of the air pressure switch until to have the burner lockout. Remove the obstruction from the air intake, screw on the cover C and start the burner by pressing the control box rearm button.

WARNING: the air pressure switch shall prevent the air pressure to go below 80% from the adjustment value in order to prevent the CO in the fumes to exceed 1% (10000 ppm). Using the analyser try to close the air inlet and check that the burner locks out before exceeding CO value of 1% in the fumes.

MIN GAS PRESSURE SWITCH

The gas pressure switch has the function to check that the gas pressure before the gas valve does have the minimum pressure to make the burner running correctly.

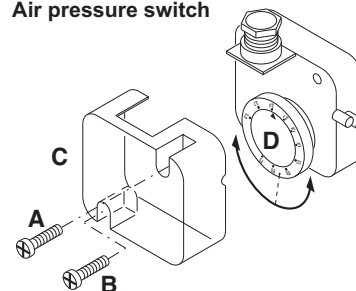
Unscrew off and remove cover M. - Set knob N to a value equal to 60% of gas nominal feed pressure (i.e. for natural gas nom. pressure = 20 mbar, set knob to a value of 12 mbar; for LPG nom. pressure of G30/G31- 30/37 mbar, set knob to a value of 18 mbar).

MAX GAS PRESSURE SWITCH (KIT)

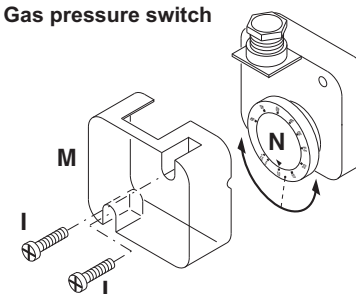
The maximum gas pressure switch has the function to check that the gas pressure after the gas train and before the head does not exceed the pre-set limits.

Max gas pressure switch: it is available as a kit for different pressure.

Air pressure switch



Gas pressure switch



MAINTENANCE PROGRAM

! Burner and boiler servicing must only be carried out by authorised and qualified personnel at least once a year. Depending on the type of installation, shorter maintenance intervals may be necessary. The system operator is advised to take out a maintenance contract to guarantee regular servicing.

WARNING: Use original spare parts.

SAFETY WARNINGS:

1. Turn off the power supply and protect the system from accidental start-up
2. Cut gas supply
3. Make sure there is no residual power in the system and that the actions in points 1 and 2 have been completed.
4. Before opening the burner casing, ensure that the fan motor has stopped completely

Failure to observe any of these instructions will result in the risk of death or injury!

WORKS RECOMMENDED AS PART OF ANNUAL BURNER MAINTENANCE:

- Emergency stop button function check
- Check burner start characteristics
- Run burner test and input measurement in the boiler room
- Clean the combustion components and replace defective parts if necessary
- Check the combustion head components and make sure that all components are in good condition otherwise replace them
- Replace ignition electrodes if necessary and check their correct position after any intervention
- Flame monitor and automatic combustion control unit function check
- Clean the fan wheel and the housing and grease rotating parts if necessary
- Perform visual inspection of gas lines in the boiler room and check the gas flow
- Clean the gas filter cartridge with air periodically, replace it if necessary
- After the cleaning of the components of the gas train perform the leakage test
- Make visual inspection of the burner's electrical components and eliminate malfunctions if necessary
- Burner safety devices function check (air pressure/gas pressure switches)
- Commissioning the burner and correct the adjustment values if necessary

NOTES ON REASSEMBLING: Perform the described step in reverse order and make sure to refit components as they were originally assembled and the system is free from leaks. Use only original spare parts.

DRAW UP A MEASUREMENT REPORT ACCORDING TO THE LOCAL REGULATION AND CODES OF PRACTISE OF THE COUNTRY

EXHAUST GAS LOSS

Exhaust gas loss by way of free heat will occur as a result of the temperature difference between the fuel-air mixture entering the furnace chamber and the gases discharged. Any increase in the excess of air and the resultant higher exhaust gas volume will cause the exhaust gas loss to rise. The exhaust gas loss can be calculated as follows:

$$q_A = (t_A - t_L) \frac{A_1}{CO_2} + B$$

q_A = exhaust gas loss [%]

t_A = exhaust gas temperature [°C]

t_L = combustion air temperature [°C]

CO_2 = volumetric content of carbon dioxide [%]

	Light oil EL	Heavy oil S	Natural gas	Town gas	LPG
A1	0,50	0,490	0,370	0,350	0,420
B	0,007	0,007	0,009	0,011	0,008

Example

Data measured in natural gas mode:
CO₂ content of exhaust gases: 10,8%
Exhaust gas temperature: 195°C
Air intake temperature: 22°C

The exhaust gas loss can be calculated as follows:

$$q_{Af} = (195-22) \left(\frac{0,37}{10,8} + 0,009 \right) = 7,48\%$$

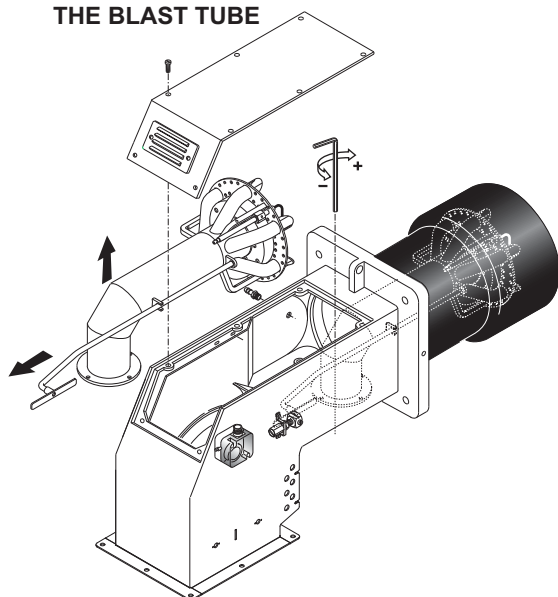
Data measured in fuel oil mode:
CO₂ content of exhaust gases: 12,8%
Exhaust gas temperature: 195°C
Air intake temperature: 22°C

The exhaust gas loss can be calculated as follows:

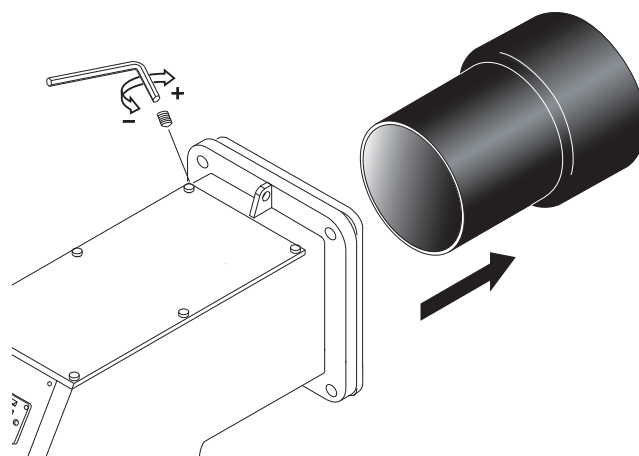
$$q_{Af} = (195-22) \left(\frac{0,49}{12,8} + 0,007 \right) = 7,83\%$$

MAINTENANCE PROGRAM

REMOVING THE BLAST TUBE

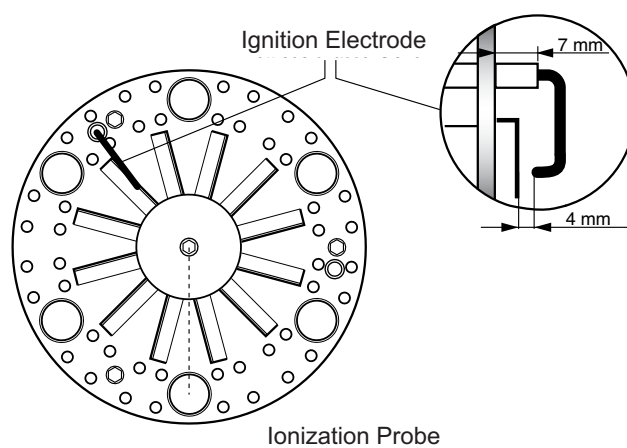
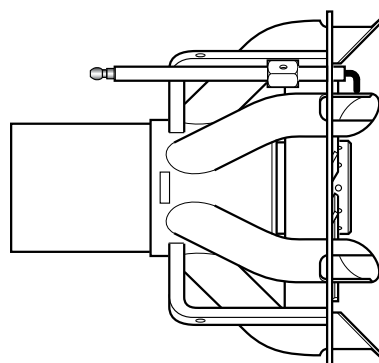


REMOVING THE FIRING HEAD



POSITION OF ELECTRODES

ATTENTION:
Check the position of the
electrodes after any
intervention as wrong
position could cause
ignition troubles.



GAS FILTER CLEANING



TROUBLESHOOTING INSTRUCTIONS

For Setting and Error Lists refer to LAMTEC ETAMATIC manual attached.

OPERATING TROUBLE

In case of operating trouble it should be checked whether the system is in proper working order.

Make a check for the following:

1. Availability of fuel.

Availability of gas in the line at sufficiently high pressure.

Availability of fuel oil in the tank (for dual fuel burner).

Correct position of fuel selector switch.

2. Availability of electric power in the burner system.

3. Proper functional order and setting of all control and safety instruments such as temperature controller, safety limiter, water failure cut-out, electrical limit switches, etc. If the trouble is not found to be due to any of the above-mentioned points it will be necessary to test the burner functions very carefully.

Prevailing conditions:

The burner will be found to be out of operation and in faulty and interlocked position.

Proceed with searching for the cause of the trouble and eliminate it. Unlock the control box by pressing the fault eliminate key and start the burner.

Do not press the fault eliminate key longer than 10 seconds.

The start-up program will be initiated and should be carefully monitored.

The possible cause of the fault may be quickly found by reference to the fault indicator of the control box and watching the start-up and operating program.

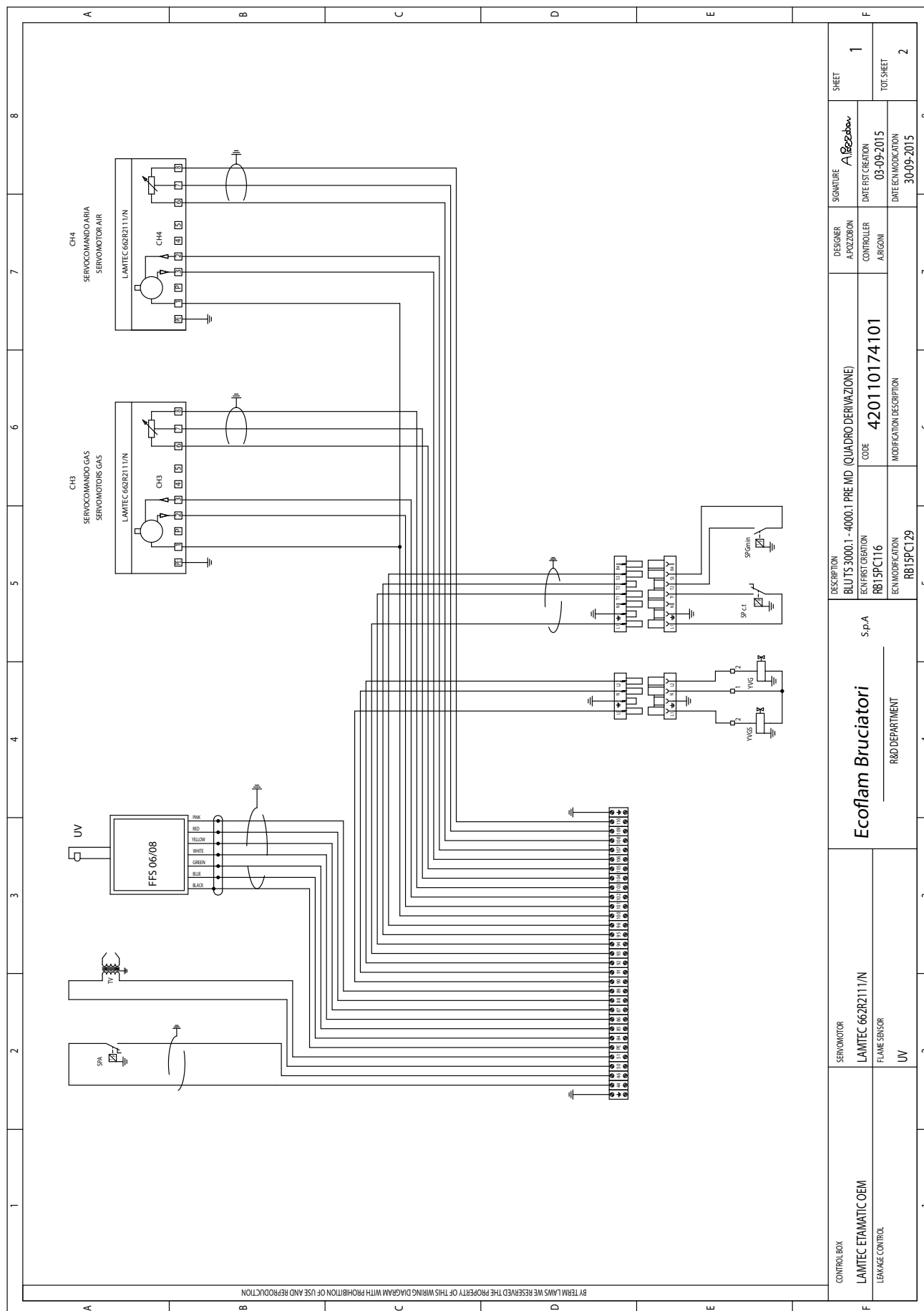
APPENDIX

Damper actuators

Refer to LAMTEC ETAMATIC manual attached.

APPENDIX

Electrical diagrams



APPENDIX

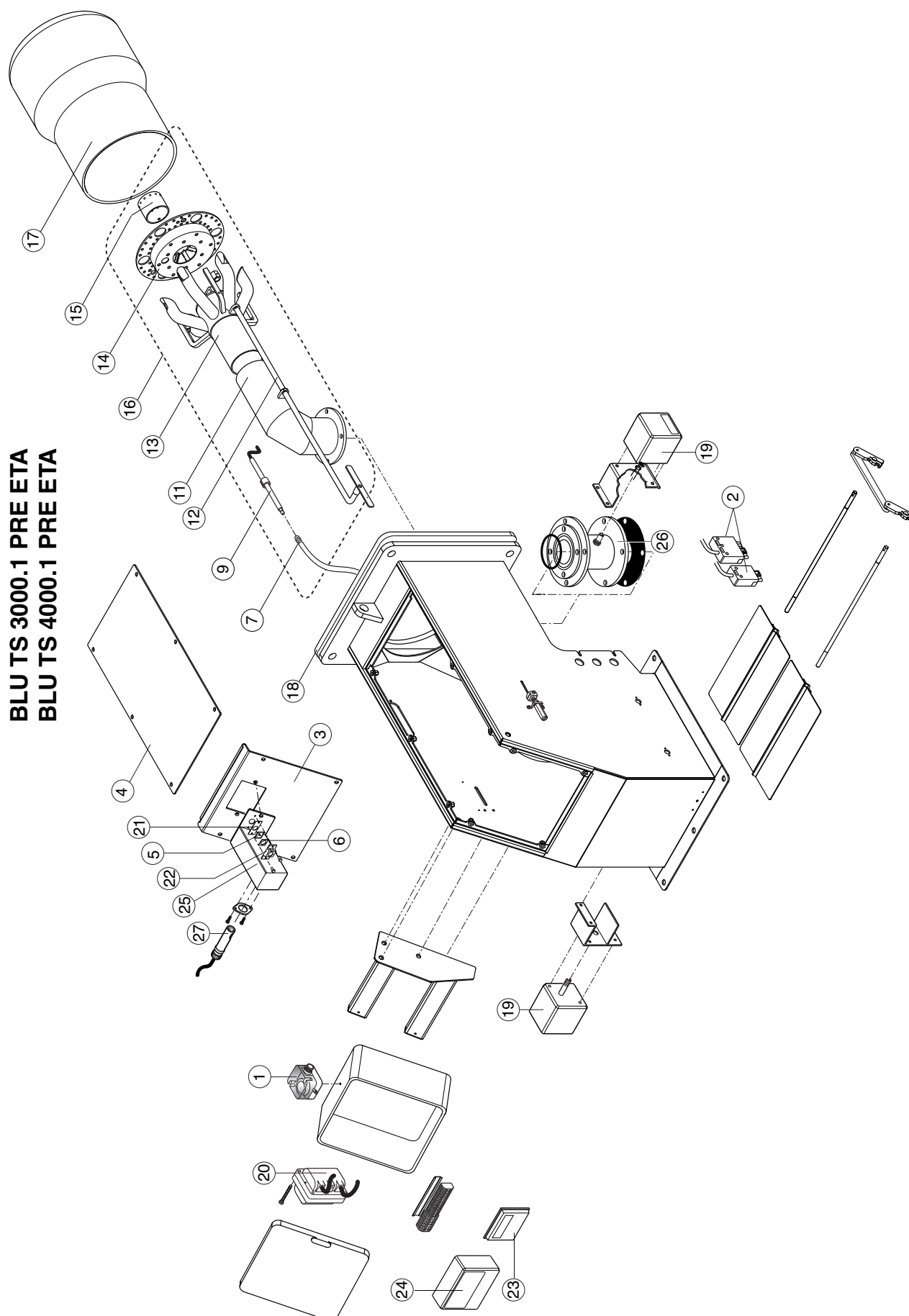
Electrical diagrams

		1	2	3	4	5	6	7	8
		BY TEAM LAWS WE RESERVED THE PROPERTY OF THIS WIRING DIAGRAM WITH PROHIBITION OF USE AND REPRODUCTION							
A									
B									
C									
D									
E									
F									

APPENDIX

Spare parts list

BLU TS 3000.1 PRE ETA
BLU TS 4000.1 PRE ETA



APPENDIX

Spare parts list

			BLU TS 3000.1 PRE	BLU TS 4000.1 PRE
N°	DESCRIPTION		code	code
1	AIR PRESSURE SWITCH	LGW10A2P	65323047	65323047
2	WIELAND PLUG	7 pin	65322069	65322069
		4 pin	65322064	65322064
3	DOWN COVER		65324765	65324765
4	UP COVER		65324766	65324766
5	GLASS		65321883	65321883
6	GASKET	28x28	65321948	65321948
7	IGNITION CABLE	TC	65322004	65322004
		TL	65320946	65320946
8	IONIZATION CABLE	TC	-	-
		TL	-	-
9	IGNITION ELECTRODE		65320891	65320891
10	IONIZATION PROBE		-	-
11	GAS PIPE	TC	65321664	65321664
		TL		
12	ROD	TC	65320242	65320242
		TL	65320243	65320243
13	FIRING HEAD		65321666	65321666
14	DISC		65320742	65320742
15	TOOTH	G20/25	65321607	65321608
16	INNER ASSEMBLY			
17	BLAST TUBE	TC	65320434	65320440
		TL	65320435	
18	GASKET ISOMART		65321125	65321125
19	AIR DAMPER MOTOR	LAMTEC 662R2111/N	65324803	65324803
20	IGNITION TRANSFORMER	COFI 820 PM	65323227	65323227
21	GASKET	30x50	65321949	65321949
22	GLASS COVER		65321884	65321884
23	DISPLAY	LAMTEC	65311162	65311162
24	CONTROL BOX	ETAMATIC OEM	65310418	65310418
25	PEED WINDOM FRAME		840050174800	840050174800
26	THROTTLE GROUP		65325510	65325510
27	UV CELL	LAMTEC FFS08-UV1	65312274	65312274

TC = SHORT HEAD TL = LONG HEAD



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