Ecoflam
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EN

MULTIFLAM 300.1 PR
MULTIFLAM 400.1 PR

Technical data

Operating instructions

Electric diagrams

Spare parts list

Gas train manual is separate

420010601100

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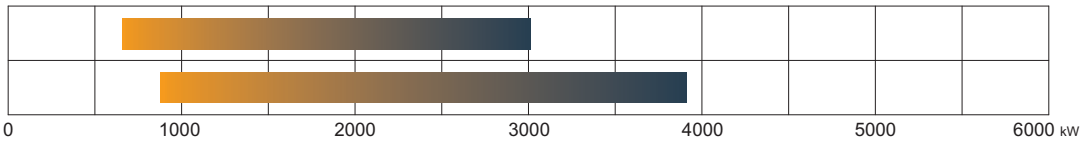
MULTIFLAM 300.1

MULTIFLAM 400.1



GENERAL WARNINGS - CONFORMITY DECLARATION

MULTIFLAM burners are designed for the combustion of natural gas and heavy oil. The design and function of the burners meet the standard EN267 and 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
MULTFLAM 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 267
Automatic forced draught burners for liquid fuels.

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 dual fuel burners

We,
Ecoflam Bruciatori S.p.A.

declare under our sole responsibility
that the products:
MULTIFLAM 300.1 PR
MULTIFLAM 400.1 PR

conform to the following standards:
EN 676: 2008
EN 267: 2010
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

MULTIFLAM 300.1 PR TC SGT 230-400-50

RANGE NAME BY FUEL TYPE

MULTIFLAM	Dual fuel (Gas / Heavy oil)

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

MULTIFLAM 300.1	300 kg/h - 3000 kW

EMISSIONS

-	Standard Class 2 - GAS EN676 (<120 mg/kWh)

OPERATION TYPE

PR	2 stages progressive mechanical gas / oil
MD	2 stages modulating mechanical with PID
E	2 stages modulating electronic

HEAD TYPE

TC	Short head
TL	Long head

FUEL

	Natural gas
LPG	Liquid gas
BIOGAS	Biogas

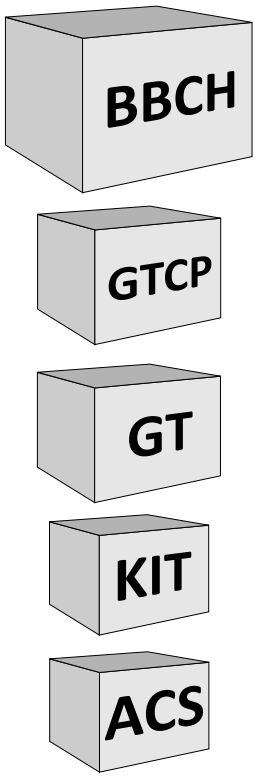
EQUIPMENT

SGT	Separate gas train

ELECTRICAL POWER SUPPLY

230-400V/50Hz	230-400 Volt, 50 Hz

MODULAR DELIVERY SYSTEM



Dual fuel burners

All dual fuel 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.

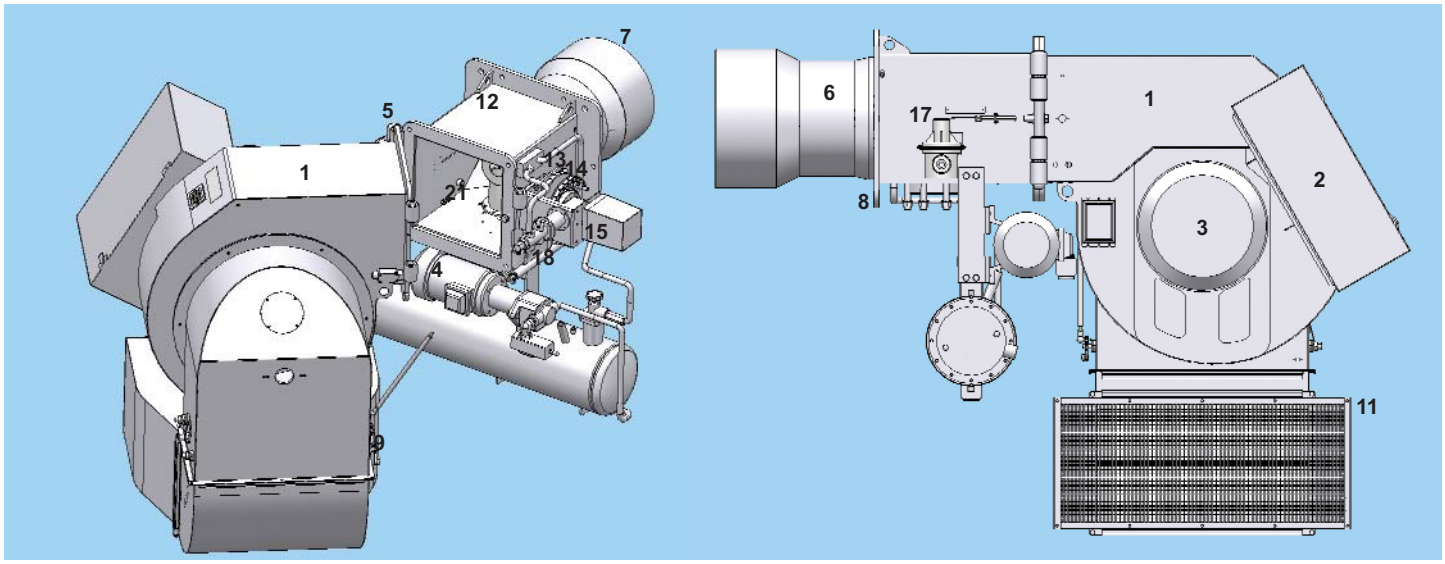
Gas train - GTCP - KITS - Accessories

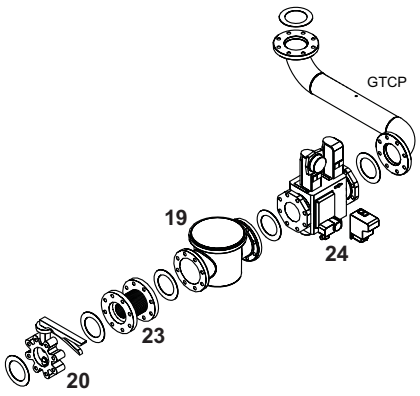
All gas and dual fuel burners gas trains are delivered separately in different models and configuration.
Export configuration gas train completion are available but it is mandatory for the local installer in this case to comply to the local safety regulations.
For burners over 1700 kW gas train connection 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



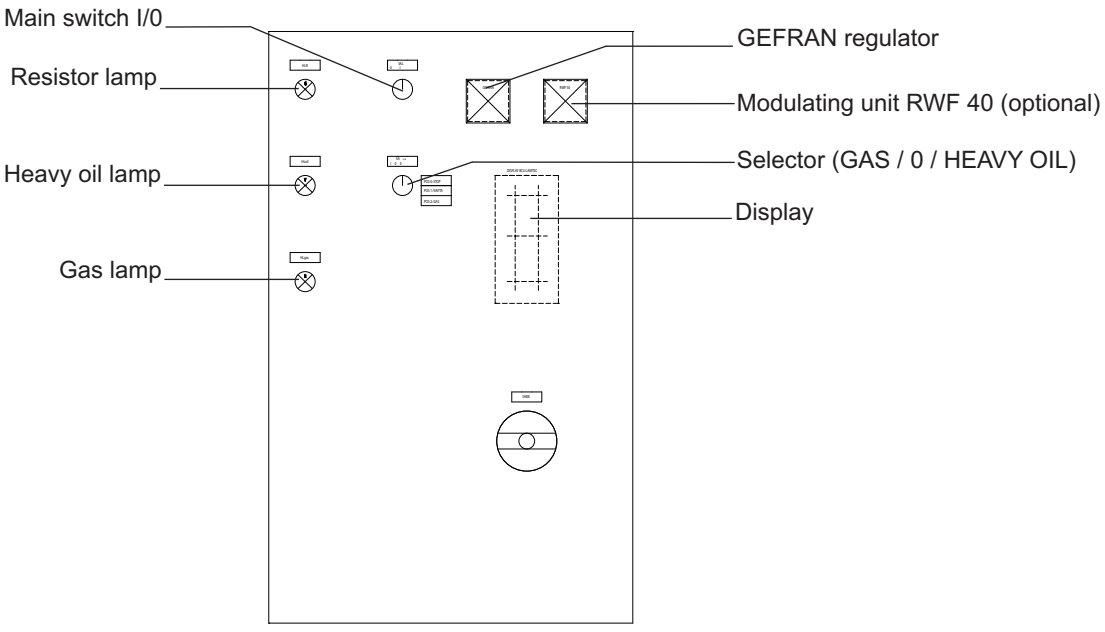


LEGENDA

1. Housing
2. Electrical control panel
3. Blower motor
4. Pump and pump motor
5. Hinge flange
6. Blast tube
7. Burner head
8. Burner fixing flange
9. Air flap regulation
10. Fan wheel / blower
11. Silencer
12. Lifting eyebolts
13. Mechanical cam gas
14. Mechanical cam oil
15. Servomotor for gas and air
16. Gas train
17. Pilot gas train
18. Oil pressure regulator
19. Gas filter
20. Ball valve
21. Oil coil
22. Nozzle rod
23. Antivibration coupling
24. Tightness control

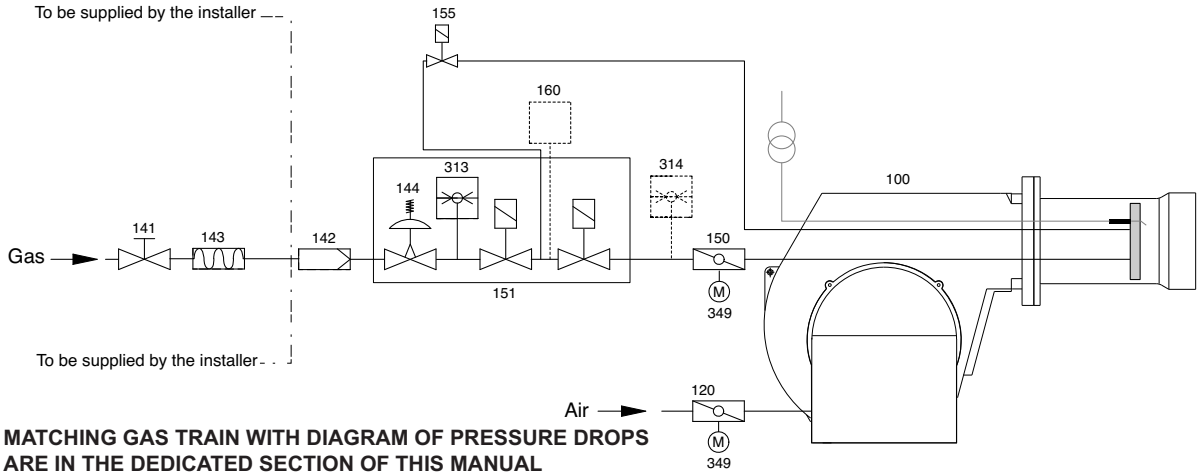
GTCP. Gas train connection pipe

Control panel



BURNER DESCRIPTION

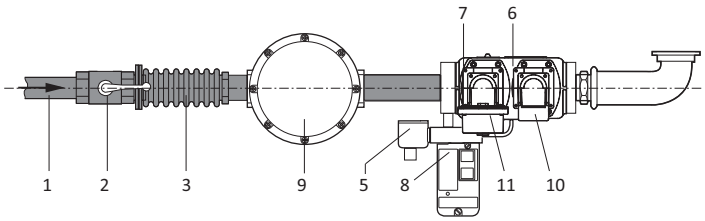
Gas train - Kit - Accessories: assembly to the burner



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

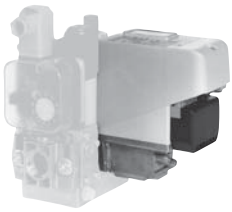


1. Main gas pipe			
2. Ball valve		ACS	
3. Antivibration coupling		ACS	
5. Min gas pressure switch	EXPORT	GAS TRAIN	EN676
6. Safety gas valve + 10. Actuator	EXPORT	GAS TRAIN	EN676
7. Working gas valve + 11. Actuator	EXPORT	GAS TRAIN	EN676
8. Gas leakage control		KITTC *	EN676
9. Gas filter		ACS	EN676
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	Tightness control	Modulation Kit	Max Pressure switch	Other accessories
FGDR - FILTER	KITTC- Model	KITMD-RWF50	KITPRES50	
Compulsory EN676	Compulsory > 1200 kW	Probe-...	KITPRES150	
				

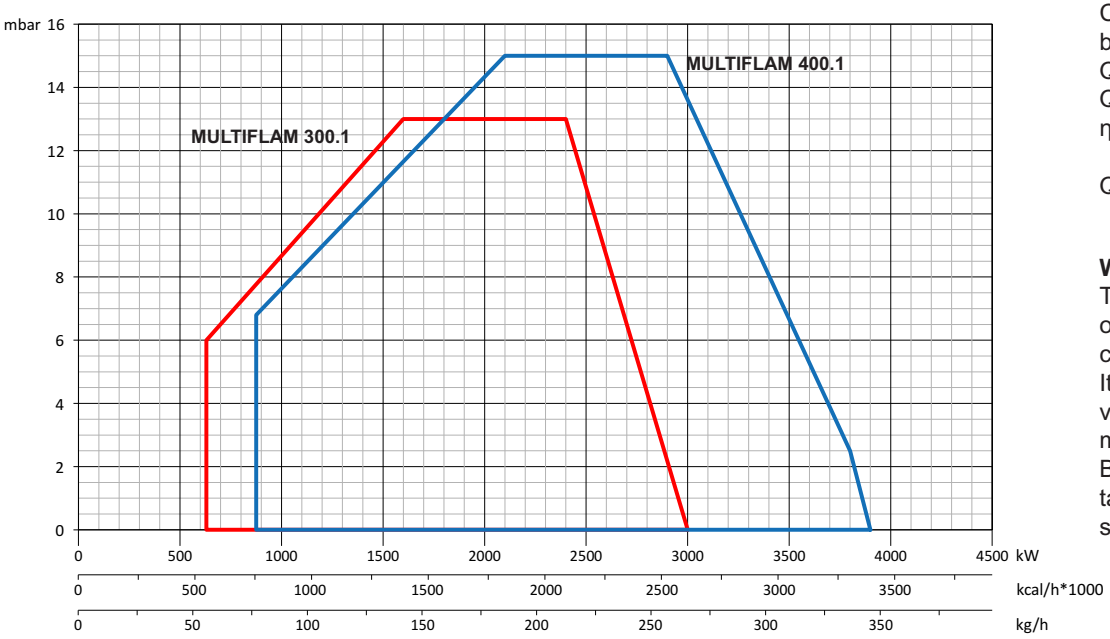
TECHNICAL DATA

MODEL		MULTIFLAM 300.1	MULTIFLAM 400.1
Thermal power max.	kW	3.000	3.900
	kcal/h	2.580.000	3.354.000
	kg/h	264	343
Thermal power min.	kW	630	875
	kcal/h	541.800	752.500
	kg/h	88	115
Operation mode	Type	Progressive mechanical heavy oil / gas - Modulating with PID	
Regulation ratio nominal	Type	1÷4 GAS - 1÷3 HEAVY OIL	
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) Heavy oil (L.C.V. 9.800 kcal/kg max visc. 50°E at 50°C)	
Emission class	std	Standard Class 2 GAS EN676 (<120 mg/kWh)	
Control unit	Type	LAMTEC BT340	
Gas train	GT	VGD separate gas train + Filter + KIT Tightness control + Other KIT/ACS	
Gas connection	GTCP	Gas connection range RP 50 to DN 100 depending on the gas train selected	
GAS natural 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 QRA	
Ignitier	Model	BRAHMA	
Motor	kW	5,5	7,5
Rpm	N°	2.800	2.800
Voltage	V/Hz	230/400 V - 50 Hz	
Total power consumption operation	W	27.000	30.000
Weight body BBCH	Kg		
Electrical panel protection level	IP	IP55	IP55
Sound pressure level without silencer	dB(A) Lab tests	87,3	88,3
Sound pressure level with silencer		81,8	83
Ambient temperature storage	Min/Max	-20°…+70° C	
Ambient temperature use		-10°…+60° C	
Oil pump	Model	TA3	TA3
Oil pump motor	kW	1,1 kW	1,1 kW
Nozzles	Type	according to the output requested	
Fuel thermo regulator	Type	GEFRAN	
Electrical pre-heater	kW	18	21

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

WORKING FIELDS



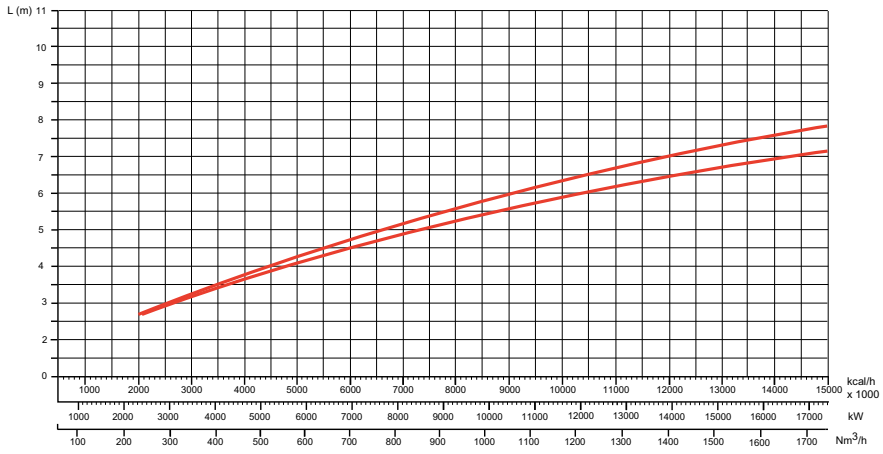
Calculation of
burner output
Q_F = Burner output (kW)
Q_N = Rated boiler output(kW)
η = Boiler efficiency (%)

$$Q_F = \frac{Q_N}{\eta} \times 100$$

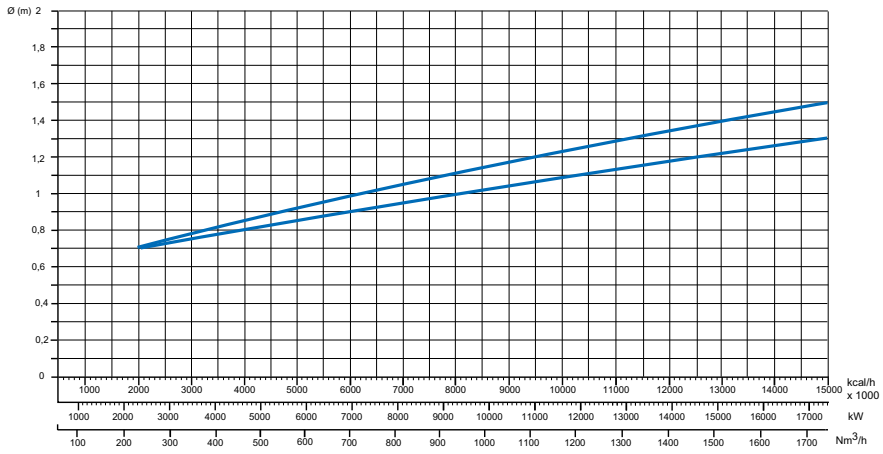
Working fields
The working field shows burner output as a function of combustion chamber pressure. It corresponds to the maximum values specified by EN 676 measured at the test fire tube. Boiler efficiency should be taken into consideration when selecting the burner.

TEST BOILER - FLAME DIMENSIONS

FLAME LENGHT GAS BURNERS



FLAME DIAMETER 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.

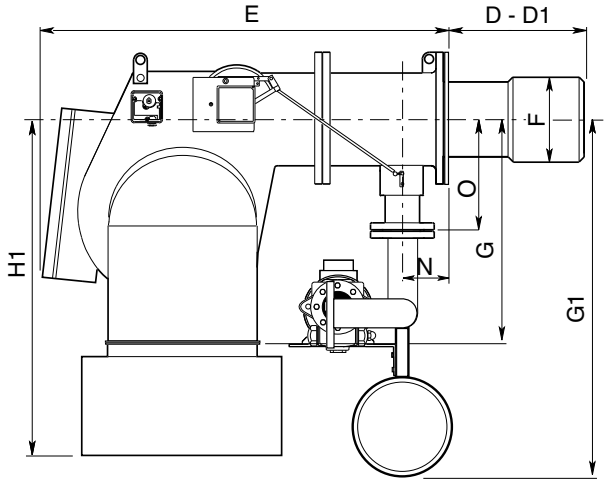
The sizes are indicative and dipend on the configuration, to the combustion chamber pressure and to the draught. The values have been taken out from tests executed with flame tubes.

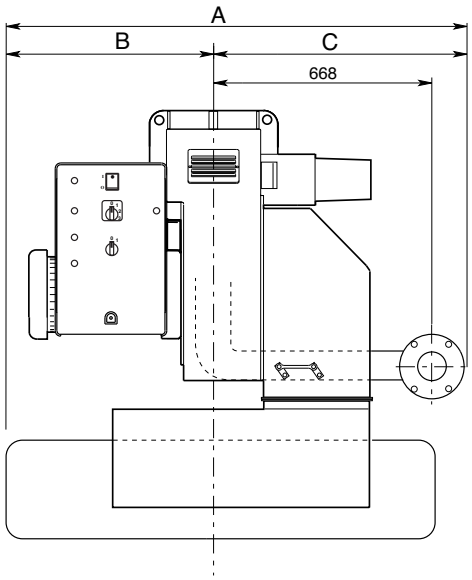
The dimensions of the flame are made in test boiler in laboratory without resistence therefore exists max and min lenght that take into account the difference in lenght that comes from the boiler backpressure.

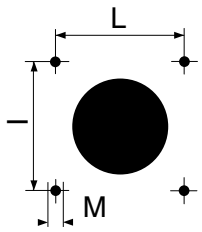
Example:
Burner thermal output = 8000 kW;
L flame (m) = 5 m (medium value)
D flame (m) = 1 m (medium value)

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







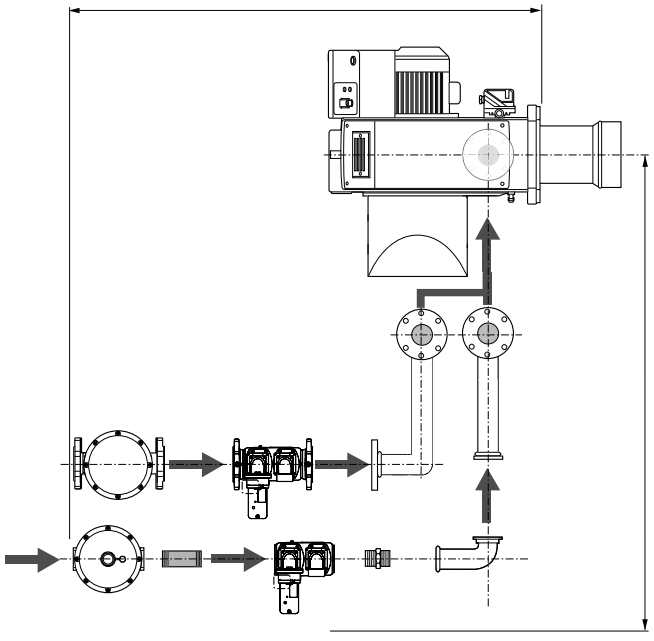
D = Short head
D1= Long head

Dimensions (mm)

	A	B	C	D	D1	E	F	G	G1	H1	I	L	M	N	O
MULTIFLAM 300.1	1288	610	678	330	530	1130	290	471	750	746	315	315	M16	195	250
MULTIFLAM 400.1	1288	610	678	345	545	1130	320	471	750	746	315	315	M16	195	250

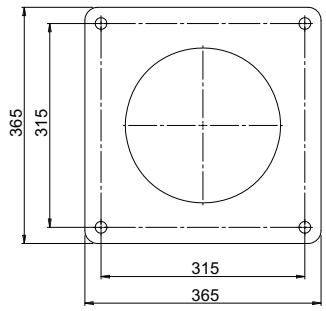
HOW TO INSTALL THE GAS TRAIN INTO THE BURNER AND CALCULATE THE OVERALL DIMENSIONS:

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



Burner-boiler mounting flange

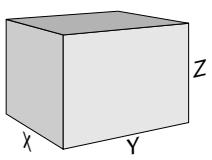
Fixing hole dimensions are “I” and “L” as per dimension table.
Boiler hole shall be done according to the blast tube dimension “F” plus 15-25 mm in order to be able to extract it during maintenance.



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
MULTIFLAM 300.1	1580	1630	1090	
MULTIFLAM 400.1	1580	1630	1090	



OIL 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 preventilation 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. This operation will be followed by the pre-ignition procedure and the oil feed start.
The solenoid valves will open and thus allow the pressurized oil to flow to the nozzle and to the return line.
The oil will be atomized, mixed with the combustion air and ignited.
A safety period is provided to allow the flame to develop a proper and steady pattern.
On the termination of the safety period, a flame signal must have been received by the control box via the flame monitor and remain on until the regular shut-off.
The startup program of the burner has now been completed.

OIL 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 mechanical compound control system will be fed with the OPEN or CLOSE signal via the regulator and thus increase or decrease the oil and air flow rates.
This compound control system will vary the positions of the oil control valve and air damper and thus regulate the oil flow rate in conjunction with the air flow rate. The burner can either be controlled in two-stage sliding mode or, if a respective controller is provided, in stepless control mode.
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 be turned off from 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 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 (shut-off on trouble).
A shut-off on trouble 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 shut-off on trouble with the control box being locked.

The trouble is indicated by the trouble signal lamp lighting up.
The control box can be unlocked immediately after a shut-off on trouble 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.

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 preventilation 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 ignition gas solenoid valves will be opened to allow gas to flow into the pilot burner.
The ignition electrodes incorporated in the pilot burner will ignite the ignition gas.
The ionization probe 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 pilot flame with a specified safety period (minimum furnace heat generating rate).
After the safety period has run down the pilot burner will be turned off.

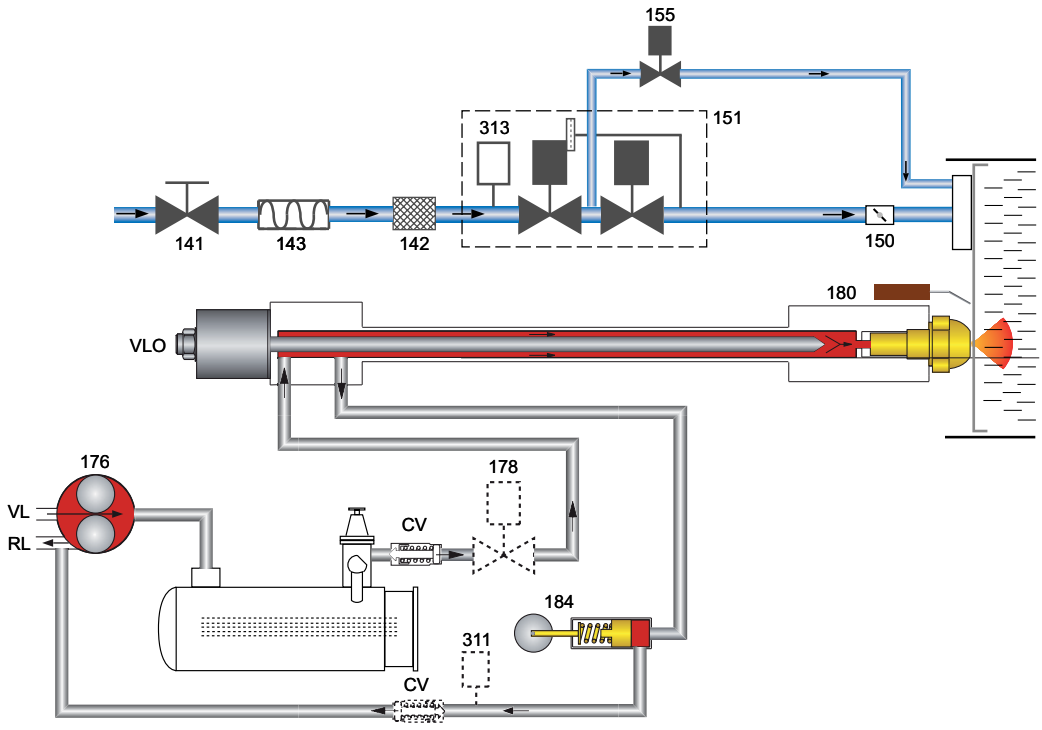
Attention:
If there are shut-off dampers in the flue gas tract they must be completely open. Otherwise there will be a high danger of low-speed detonation or explosion!

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.

Scheme of functioning

LEGENDA
141: ball valve
142: filter
143: antivibration coupling
150: butterfly valve
151: gas train Landis VGD
155: pilot gas valve
176: oil pump
178: solenoid valve
180: nozzle rod
184: output control valve
311: return oil pressure switch
313: min gas pressure switch
CV: check valve
RL: return line
VL: suction line
VLO: working oil valve



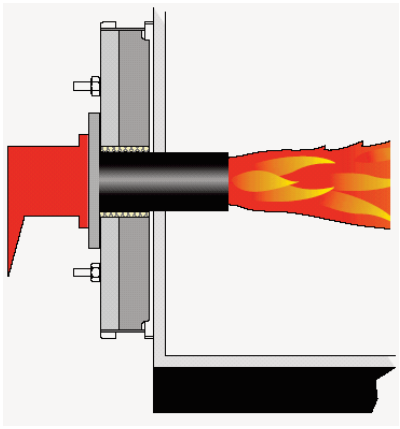
INSTALLATION

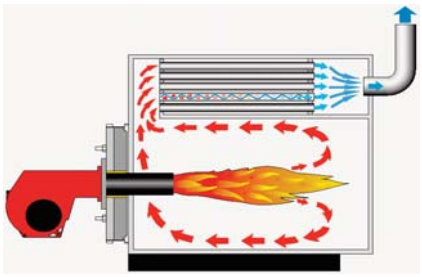
Fitting the burner to the boiler

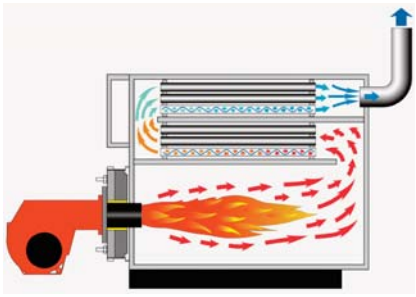
WARNING: handling and moving operations must be carried out by specialised personnel.
Use the eyebolts to lift the burner in order that it will not overturn and fall down.

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:

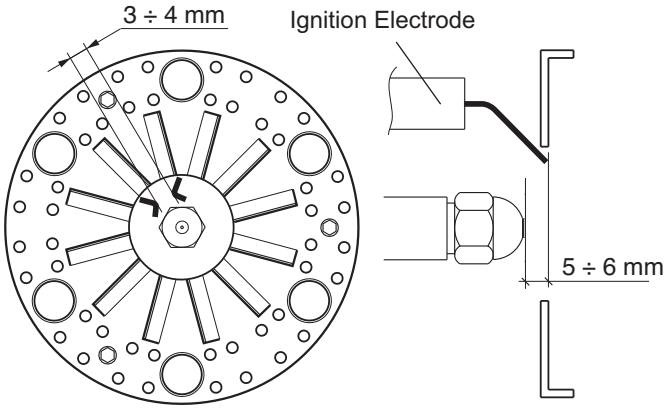
1. Depending on the type of boiler (reverse flame or three pass) check the burner blast tube installation depth according to the data specified by the boiler manufacturer or consult the burner producer.

2. From the factory the nozzle for progressive version must be specified from the customer according to boiler output and combustion chamber geometry, otherwise we will select the nozzle for the 80% capacity of the burner.

3. Check the ignition electrodes and the nozzle 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.

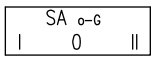
4. Check that the head is preset at 50%.

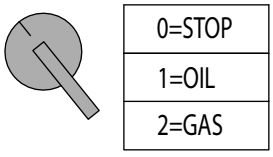
Position of the electrodes - nozzle installation



FUEL SELECTION MODE

0 - STOP
1 - OIL
2 - GAS





Standard version running on manual fuel selection mode and on request kit for automatic fuel changeover.
The automatic changeover system can be triggered by a gas pressure switch or by a timer.

INSTALLATION

Heavy oil preparation ring

WARNING: make sure that the feeding line is properly dimensioned and is in compliance the local safety rules and code of practise in the country of installation.

All installations using heavy oil burners have to be completed with a forced oil preparation ring in order to guarantee oil supply to the burner at suitable temperature and pressure (temperature +/- 50° C, pressure 3 bar).
For heavy oil with more than 50°E at 50°C Ecoflam recommends to lower the maximum output of 10-20% and work in excess of air in order to grant better operation and reduce maintenance.

Installation with heavy oil must provide to the burners:

- CONSTANT PRESSURE
- CONSTANT TEMPERATURE

To size correctly the ring for the heavy oil supply consider the diagram of the pre-heating temperature of the heavy oil according to viscosity and the pump pressure according to temperature.
Ecoflam heavy oil and dual fuel heavy oil burners do have in the electrical panel the fuel temperature device GEFRAN that adjusts the temperature of the heavy oil and grants temperature stability.

STANDARD SYSTEM COMPOSITION FOR LIGHT OIL AND HEAVY OIL HEATING AND PUMPING UNIT

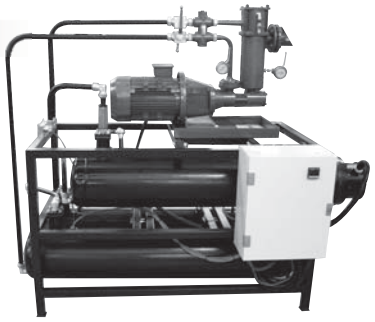
I. Feeding and filtering system

II. Fuel heating system for reducing oil viscosity plus service tank

III. Forced oil supply system "RING"

PRE-HEATER UNIT

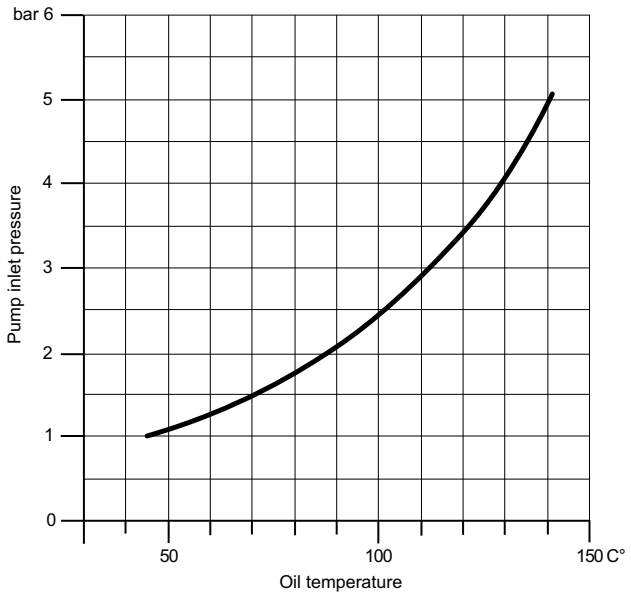
Ecoflam heavy oil burners are delivered with electrical pre-heater assembled into the burner body or in a separate skid. Additional Forced system "OIL RING" can be design and delivered assembled on skid/frame or offered as single component.



ACCESSORIES

Service tanks + Pumps units.
Quotation on request depending on output and configuration.

RACOMMENDED OIL SUPPLY PRESSURE



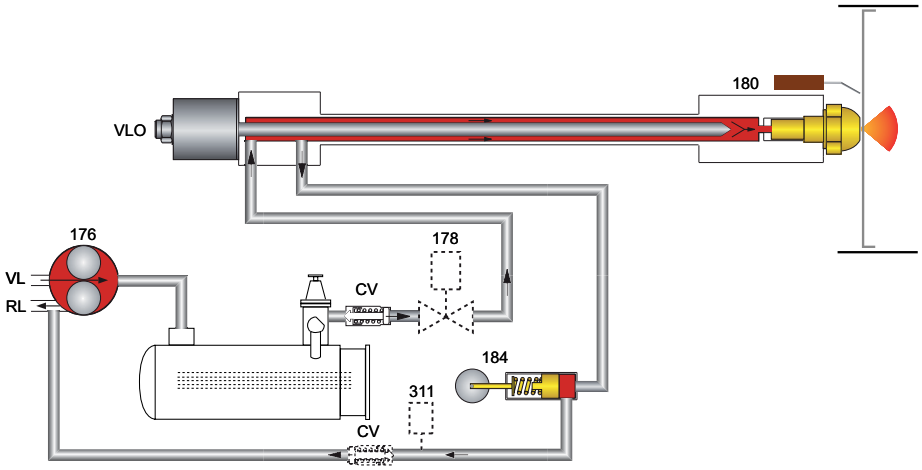
INSTALLATION

Oil connection

WARNING: make sure that the feeding line is properly dimensioned and is in compliance with the local safety rules and code of practise in the country of installation

HYDRAULIC CIRCUIT HEAVY OIL FEEDING

176: oil pump
178: solenoid valve
180: nozzle rod
184: output control valve
311: return oil pressure switch
CV: check valve
RL: return line
VL: suction line
VLO: working oil valve



OIL PRESSURE CONTROL (FEED)

The feed pressure is controlled by means of the pressure regulator installed in the pump and should be set at 25. The pressure regulator is operated by turning its screw. Make sure to fill the pump with oil prior to taking into operation.

PUMP BLEEDING

Open the feed and return stop valves and ensure the ring line (if any) is in operation. Reduce the oil pressure at the pressure regulating valve. Turn on the pump by pressing the contactor.
Check the pump for proper direction of rotation. Check for proper oil delivery and absence of leaks in the hydraulic oil system. For bleeding the pump open the pressure gauge connection, for example. When taking the burner into operation pro ceed by gradually increasing the pressure to operating level (25 bar).

CHECKING THE PRESSURE (OIL SUCTION PRESSURE)

The maximum permissible vacuum is 0,4 bar. At higher vacuum levels the fuel oil will tend to separate air from oil which may lead to operating trouble. In the ring line mode of operation the recommended oil pressure is 2 bar.

OIL CONNECTION

Hoses are used for connection to the oil lines and stop valves. The hoses must be installed according to the applicable standards (relieved of tensile load, free of distortion) to avoid kinking and exclude the danger of breakage. Take care when mounting the oil lines to bring their ends as close to the burners as possible and to arrange them in a way that the boiler door and the burner can be swing out without any obstruction.
Refer to the technical documentation for the line dimensions for the feed and return lines from the stop valves to the tank.

OIL FILTER

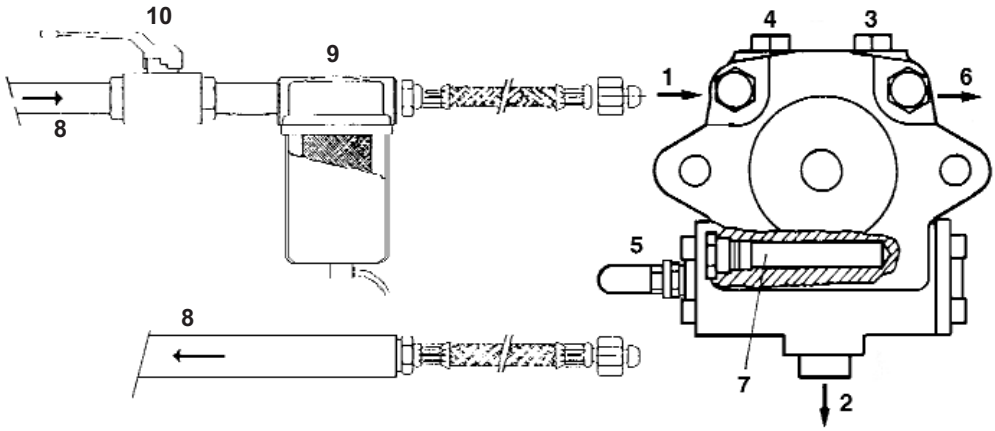
A filter must be installed upstream of the pump to protect the oil pressure pump and the hydraulic system.

INSTALLATION OPTIONS

• Two-line installation (separate feed and return lines without delivery pump).
• Ring line system (with delivery pump and gas-air separator).

LEGENDA

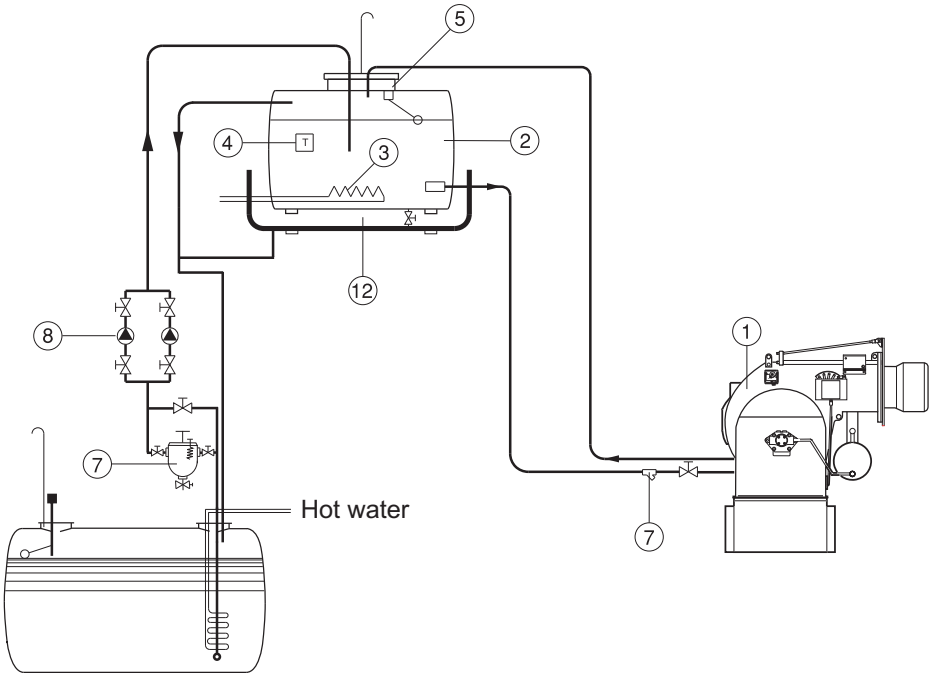
1. Inlet
2. Return
3. Bleed and pressure gauge port
4. Vacuum gauge port
5. Pressure adjustment
6. Nozzle outlet
7. Heater
8. Hose
9. Oil filter
10. Oil ball valve



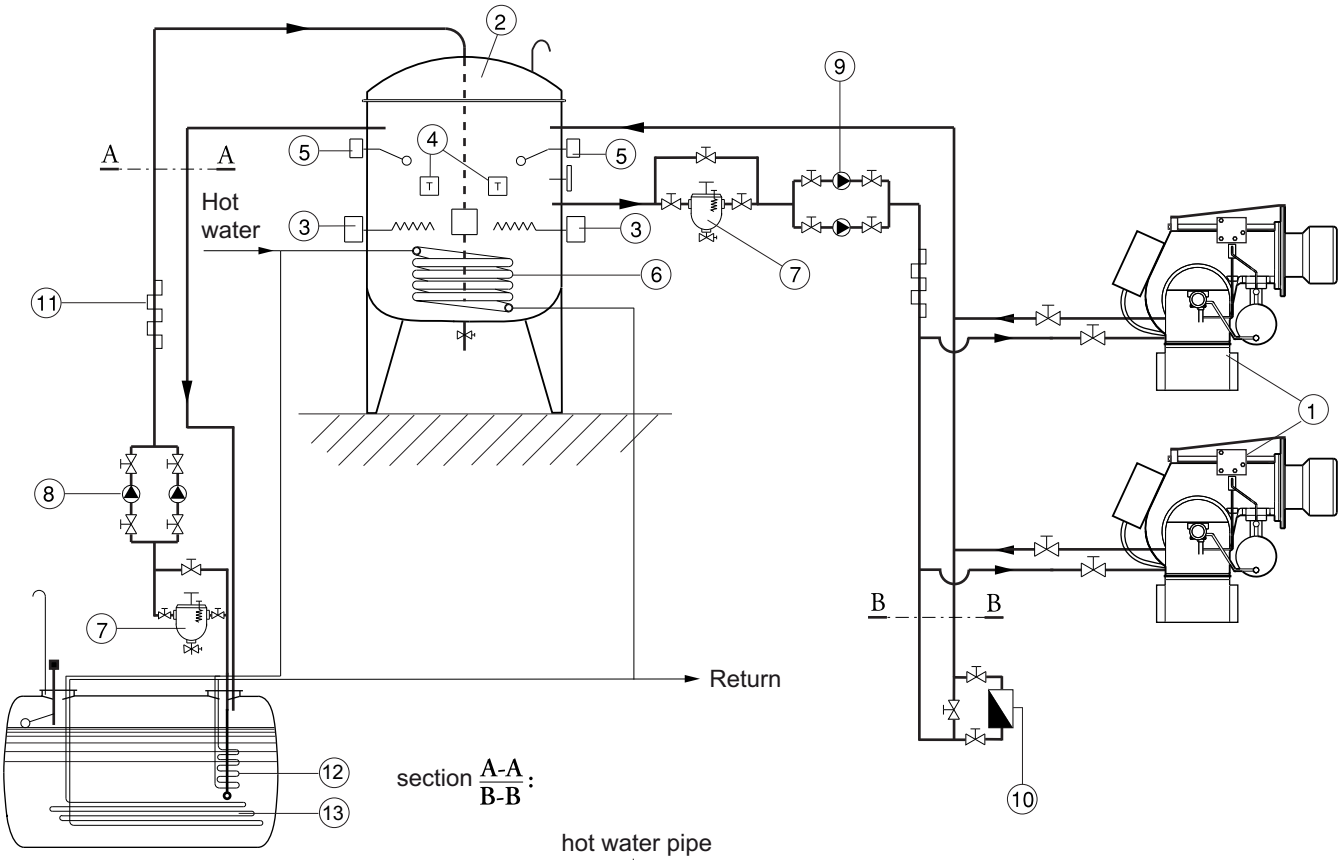
WARNING: Check that the pump rotation is correct and before start up it has been pre-filled

INSTALLATION

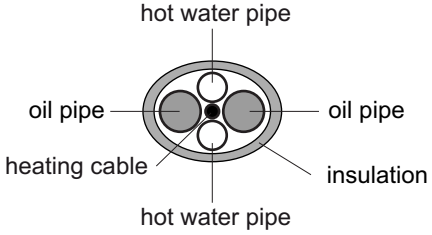
Heavy oil preparation ring scheme



LEGENDA
1 - Burners
2 - Service tank
3 - Electric heaters
4 - Safety and operation thermostat
5 - Level switch (working + safety)
6 - Heating coil
7 - Self-cleaning oil filter
8 - Load pumps
9 - Ring pumps
10 - Oil ring control pressure device
11 - Heating cable
12 - Main heavy oil storage tank
13 - Heating coil



section $\frac{\text{A-A}}{\text{B-B}}$:



INSTALLATION

Feeding line for heavy oil

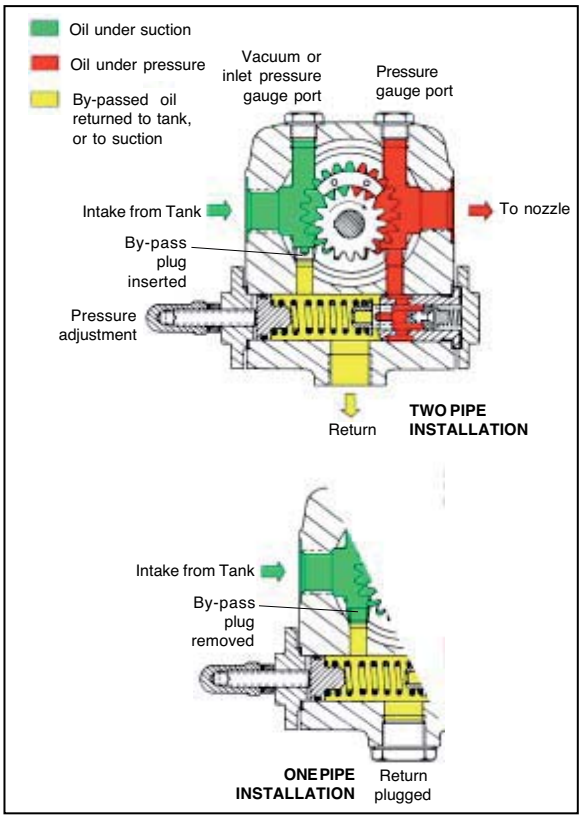
The pumps that are used can be installed both into single-pipe and double-pipe systems:
Single-pipe system: a single pipe drives the oil from the tank to the pump's inlet that deliver the pressurized oil to the nozzle and part of the oil not used goes back to the pump. With this single pipe the by-pass plug must be removed and the return port must be sealed with steel plug and washer.
Double-pipe system: this is the default solution from the factory.
The return pipe send the excess oil from the pump to the tank. Depending on the type of pump used to change from a 1-pipe system to a 2-pipe-system, insert the by-pass plug (as for ccw-rotation referring to the pump shaft).

Note for commissioning: during commissioning, the filter, pipelines and pumps must be pre-filled with fuel oil and vented.
The direction of rotation of the motor should be checked. When commissioning it must be ensured that pump never run dry.

NOZZLE SELECTION
Please refer to diagram to select Ecoflam recommended nozzle for the output that is required given the output necessary in the installation.
Regular maintenance is highly recommended.
Nozzle has to be cleaned in petrol or paraffin and if filter or other parts are defective or
damaged the nozzle must be replaced.

NOZZLE CHART IS AVAILABLE ON APPENDIX PAGE

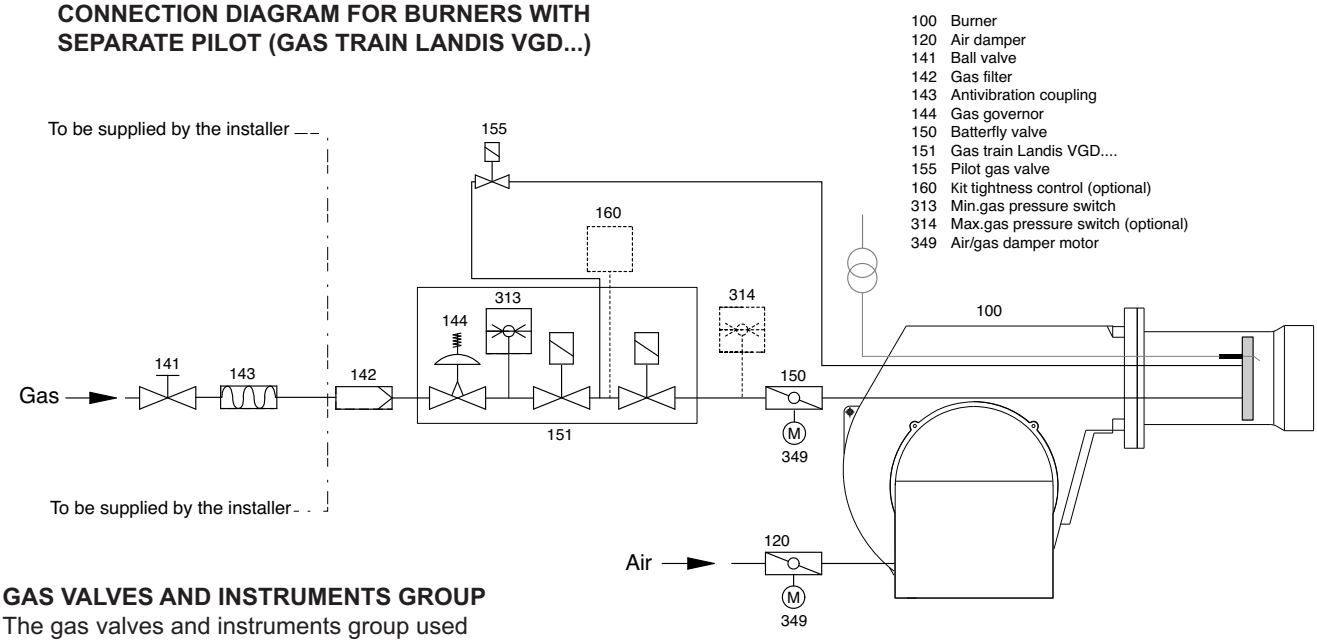
SUNTEC TA



INSTALLATION

Gas line

CONNECTION DIAGRAM FOR BURNERS WITH SEPARATE PILOT (GAS TRAIN LANDIS 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).

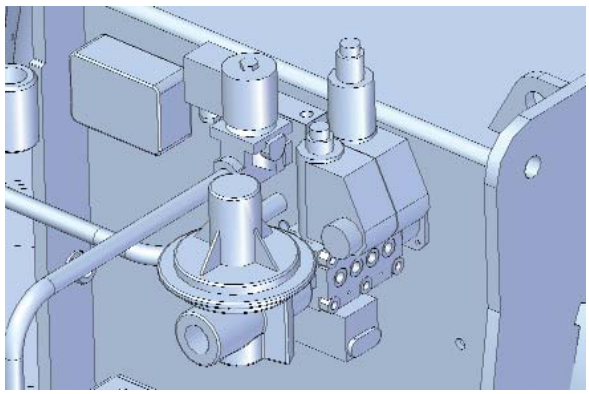
JOINT
It is recommended to provide an easy to disconnect joint (with planar sealing faces) to facilitate repair work on the boiler (furnace) and allow the boiler door to be swivelled out if required.

INSTALLATION

Pilot gas train, kit and accessories connection - head loss diagram

PILOT GAS TRAIN CONNECTION

The pilot gas train is already installed to the burner and shall be connected to the main gas supply line preferebly with flexible pipe.
The pilot gas train is composed of n° 2 safety valves and n°1 gas governor and filter. Max inlet pressure 1 bar.
WARNING: Pilot gas train must be connected according to the drawing of the gas line.

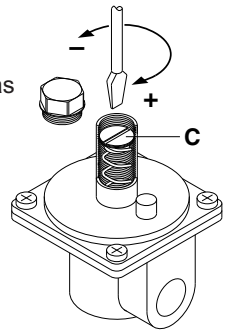


GAS VALVES ADJUSTMENT

Note : the pilot valves are pre-adjusted in the factory. To increase or reduce the gas flow act on the gas governor.

GAS GOVERNOR ADJUSTMENT

The gas governor, with built-in filter, must be installed so as to stabilise the outlet gas pressure and to avoid that eventual impurities reach the gas valve. To increase gas pressure, remove the cover of governor and turn screw C. Unscrew screw C to reduce pressure, then fit the cover.
Note: the inlet gas pressure must not be higher than the specified max. gas pressure.



KITTC- Tightness control

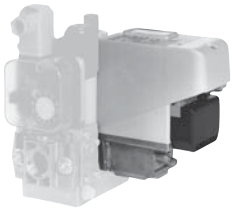
Tightness control is provided as a kit and shall be assembled into the main gas train according to the instructions of the gas train separate manual.

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.

KITMD-RWF40 PID regulator

All progressive burner can be turned modulationg with the installation of the PID that regulates the output combined with a probe.

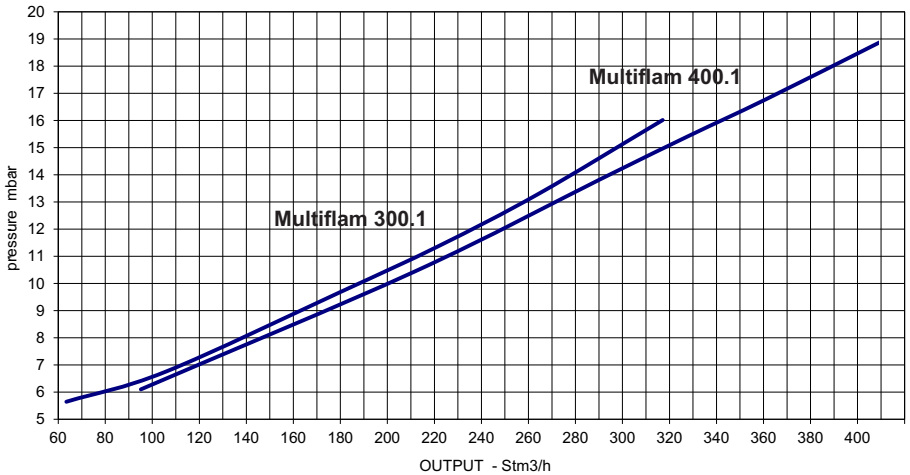
Tightness control	Modulation Kit	Max Pressure switch
KITTC- Model	KITMD-RWF50	KITPRES50
Compulsory > 1200 kW	Probe-...	KITPRES150
		

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.

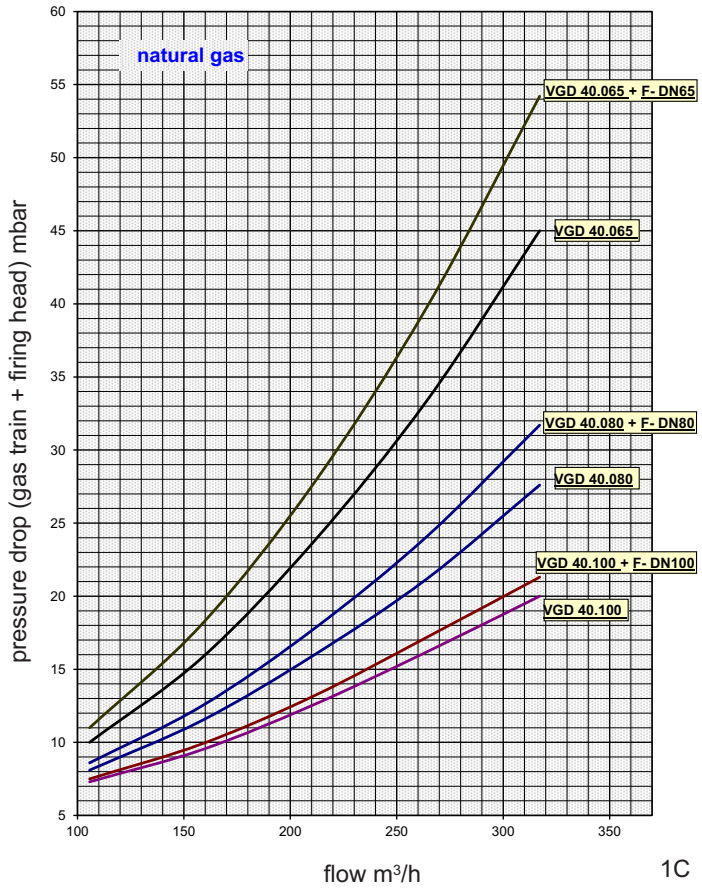


INSTALLATION

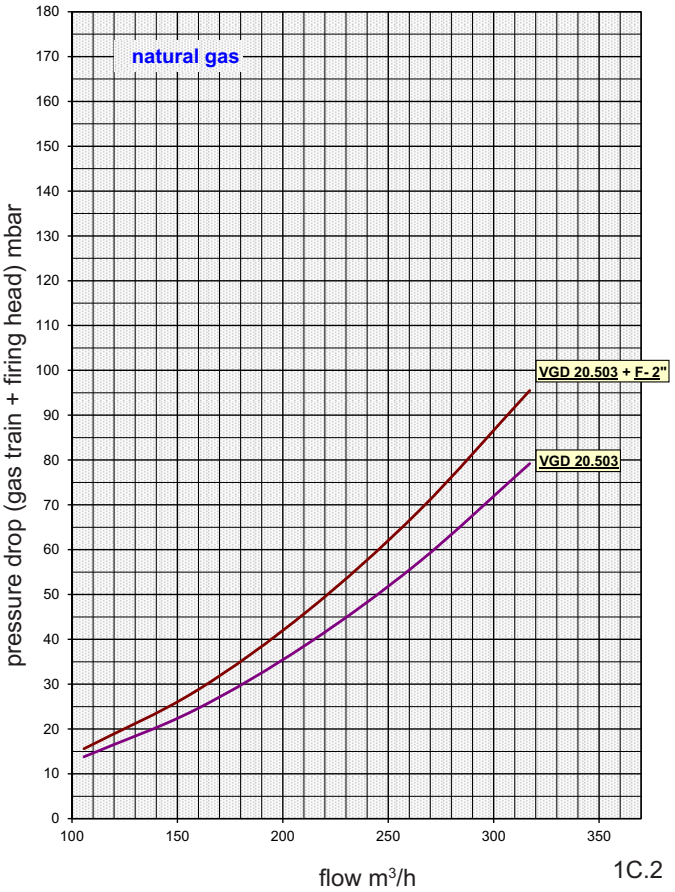
Gas pressure loss diagrams

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	
		FILTER DN 65		55	700	
	VGD 20.503	no	neutral	80	600	1C.2
		FILTER 2"		100	600	

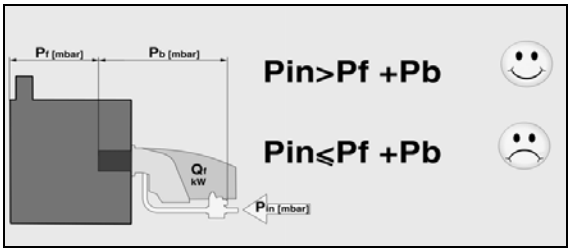


1C



1C.2

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

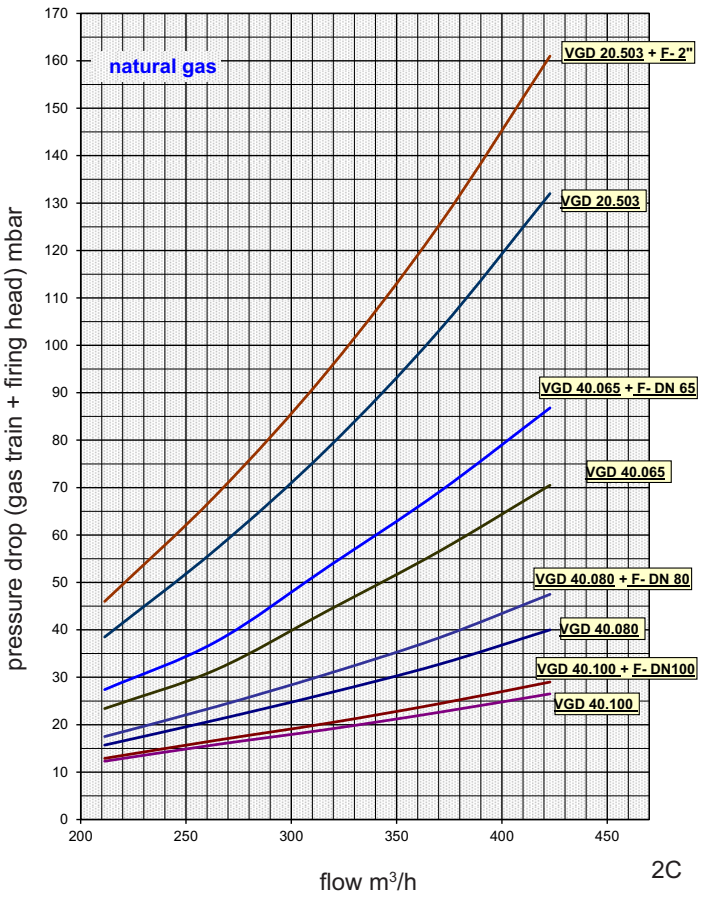


INSTALLATION

Gas pressure loss diagrams

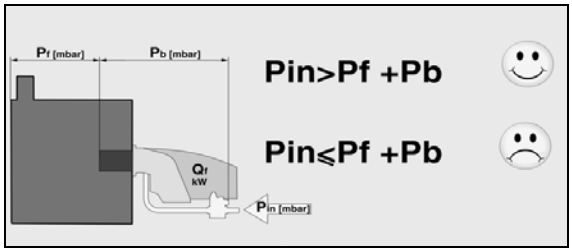
PRESSURE DROP includes: “COMBUSTION HEAD + GAS TRAIN + GAS GOVERNOR & FILTER” as per EN676 Standard.
Back pressure of boiler (or other applications) must be added/included in order to have the total min pressure drop.

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	



2C

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



INSTALLATION

Electrical connections

WARNING: Electrical wiring must be carried out with electrical supply disconnected and with burner switch in position OFF.
Electrical supply must correspond to the one shown on the burner label.

APPLICABLE STANDARD

The electrical connection work comprising all the installation materials, terminals and earth connections must be carried out in accordance with the applicable regulations. For the electrical installation of the burner care must be taken to observe the circuit diagram made out for the furnace system.
The electrical connection of the burner and gas valves and instruments shall be entrusted to authorized specialists only.

NOTE: For the installation of the connection cables care must be taken to provide cable loops of sufficient length to allow for the swing-out of the boiler door and burner.
Make sure after the completion of the electrical connection work to check the wiring of the electrical system of the burner. This should include a check of the direction of rotation of the burner motor (fan).

GENERAL WARNINGS:

All applicable electrical safety regulations must be followed. Failure to correctly dimension the suitable input power and earth the equipment may cause damages to person and compromise the correct function of the burner therefore the electrical system shall be checked by qualifed personnel.
The manufacturer declines all responsibility for modifcations or connections different from those shown in the electrical scheme.
Adapters, multiple plugs and extension cables may not be used for the equipment's power supply.
An omnipolar switch in accordance with current safety regulations is required for the mains supply connection.

ELECTRICAL CONNECTION

1) of the burner
- Built-in electrical cabinet

Use cable gland in order to secure the required level of protection. All the links, power and control, are connected to the terminal block of the cabinet. Provide cables in sufficient length to secure the rotation of the burner body according to the assembly.
Check and adjust the size of the contactors and thermal relays and the wires section according to the motor and supply voltage specs.

ATTENTION: Wiring is not supplied.

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.

3) of the fuel oil motor-pump unit
- Connect the power circuit of the motor (hanging wires) to the plugs on the fuel oil valves.
- Check the rotary direction.

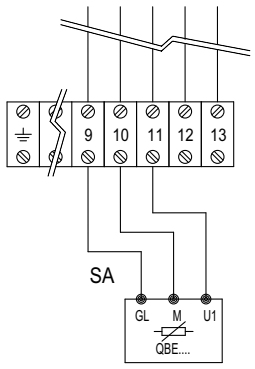
The burners are produced with connections suitable for power supply 400 V three-phase.
The burners with electric motors of an output lower or equal to 7,5 kW can be adapted to 220-230 V (please follow the instructions on the backside); motors with higher output can only work 380-400 V three-phase.
In case of request of burners different from the above mentioned standard, it is recommended to make specific mention in the order.

Instructions: how to adapt electric motors of an output lower or equal to 7,5 kW to 220-230 V power supply
It is possible to change the voltage of the burner by operating as follows:
1. change the connection inside the electric box of the motor, from star to delta (see picture 1);
2. change the setting of the thermal relay, referring to the absorption values indicated in the motor nameplate. If necessary, replace the thermal relay with another one of suitable scale.

This operation is not possible on motors above 7.5 kW.
For more information, please contact the Ecoflam staff.

PROBES CONNECTION

ACTIVE PROBE CONNECTION
(FOR MODULATING VERSION)



PASSIVE PROBE CONNECTION
(FOR MODULATING VERSION)

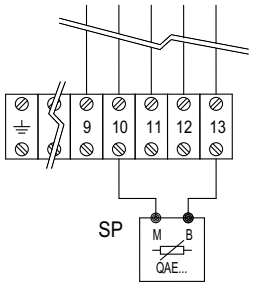
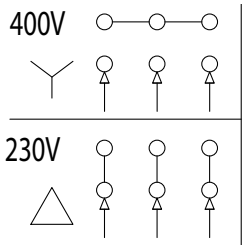
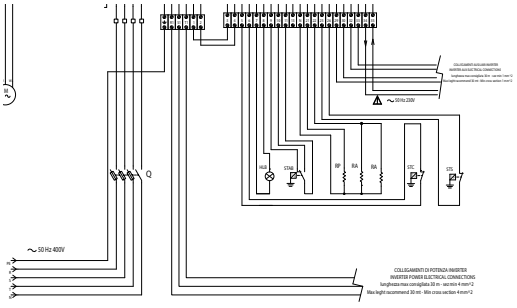


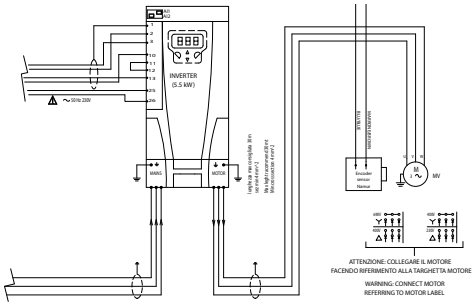
fig.1



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.
• Check tank, lines and oil pump are filled with oil and correct oil nozzle is fitted.
• 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.

OIL START-UP

Open all shut-off valves of oil supply system.
• Set fuel selector switch to its “Oil” position.
• Fill pump with oil.
• Mount pressure gauge in the feed line and return line.
• Mount the pressure gauge for checking the pump suction pressure.
• Make sure that the nozzle is size and mounted correctly.

Bleeding of oil system

Shortly start the burner and check for proper direction of rotation. Bleed the oil line and oil pump.

CAUTION: The hydraulic system has been filled with oil by the manufacturer.
This may cause ignition trouble when initially operating the system.
When starting the burner take care to increase the oil pressure slowly to the operating level.

GAS START-UP

NOTE: Adjust the gas unit according to the fuel oil unit. Set the fuel selector switch to its “Gas” position.
• 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:

Oil system:

• Open all shut-off valves of the oil supply system.
• The oil solenoid valve in the feed line disconnect on the terminal strip (see Circuit Diagram).
• Start burner and check program flow for correct start-up sequence:
1. Fan starts.
2. Pre-ventilating damper.
3. Air pressure check.
4. Partial-load air damper.
5. Ignition.
6. Valves open (disconnected valve remains closed).
7. Shut-off upon trouble after expiry of safety period (see control box).
• Reconnect the valve.
• Unlock the control box.

Gas system:

• Shortly open the gas shut-off valve before the gas train 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. Shut-off upon trouble after expiry of safety period (see control box) or shut-off because of gas supply failure.
7. The burner will either stop as the gas valves open (due to gas pressure decrease) or lock out at the end of the safety time.
• Unlock the 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	n_K	0,88
Calorific value of gas	H_u	9,1 kWh/m³
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 atmosferic pressure	p_n	1013 mbar

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

Volumetric gas flow rate at STP:

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

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

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.

Ratio between O_2- and CO_2- for natural gas H (CO_2max = 11,7%)

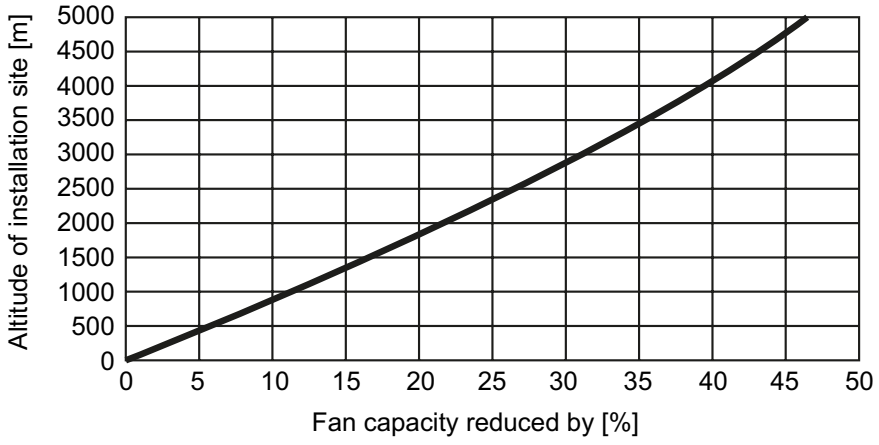
Ratio between O_2- and CO_2- for light oil EL (CO_2max = 15,40%)

Ratio between O_2- and CO_2- for heavy oil S (CO_2max = 15,60%)

$$O_2 = 21 \frac{CO_2\text{max} - CO_2\text{gem}}{CO_2\text{max}} = \%$$

CO_2 gem = % CO_2 measured on dry flue gases

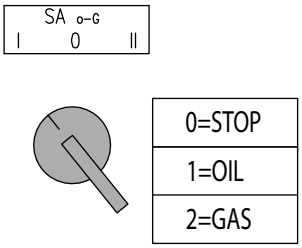
Mean air pressure vs. altitude above sea-level

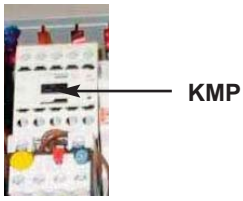


START-UP OIL SIDE

Fuel selection - Start-up

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





KMP - contactor: check the oil pump motor rotation and keep KMP pressed till the oil circuit is loaded.
If the rotation if not correct invert the two phases on the power supply.

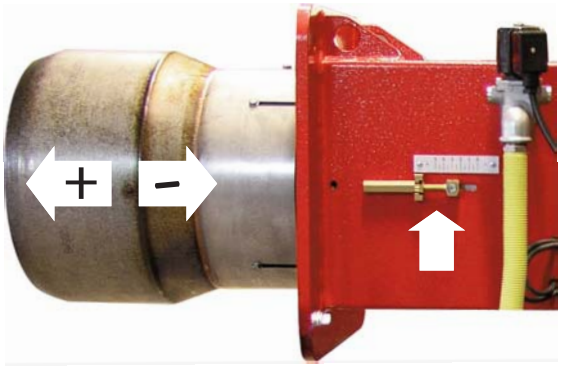
START UP THE BURNER
The control box starts the pre-purge cycle, the fan motor and the oil motor and opens the air flaps in full open positon.
At the end of pre-purging, the control box drives the servomotors into the igniton positon and starts the igniton transformer.
After a few seconds the control box opens the oil valve and starts the flame. After the flame stabilisaton the control box drives the servomotor in the low flame.
In case of faulty igniton, 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 oil servomotor curve in order to have a stable flame. Refer to LAMTEC manual attacched.

Adjusting the maximum air flow rate

Air and Oil adjustment are accomplished through LAMTEC parameters setting. Refer to LAMTEC manual attacched.

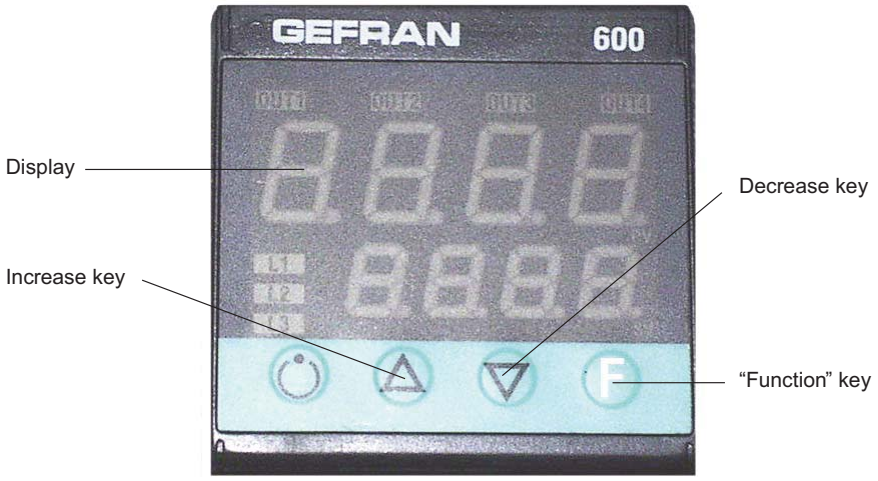
Firing head setting

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.



START-UP OIL SIDE

Gefran setting



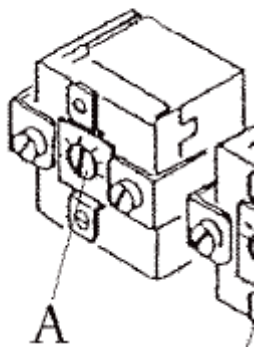
The display shows oil temperature.

The 4 leds are related to the following functions:
• Out 1: contact driving working heaters
• Out 2: contact driving upper heaters KMRL1
• Out 3: contact driving upper heaters KMRL2
• Out 4: burner start driving contact (as the oil reaches this temp the pump is activated)

The temperatures are already properly factory setted:
• Out 1 (113°)
• Out 2 (115°)
• Out 3 (120°)
• Out 4 (105°)

WARNING: Burner will start only when the first three led of the temperature will be off so that heavy oil will be in temperature.

To modify factory temperature setting act as follow:
• press key "F"
• the led Out 1 starts to ash, if You need to modify minimum oil temperature press increase or decrease button, after confirm the new value pressing again "F"
• if you need to modify an other temperature press again "F" untill You the relevant led ashes.
Please take care: if key "F" is pressed for a too long time, you enter in "configuration level" phase 1, (see "CF1" on the display); these parameters are factory setted and they have not to be modified: if you enter this function – you see CF1 ashing on the display – wait 10 seconds until the regulator automatically goes out from "configuration level".



ADJUSTMENT OF FUEL THERMOSTATS

Inside the electrical panel there is a safety termostat that is set up at 160°C.

Said adjustments can be slightly modified following the type of fuel and particular uses.

START-UP OIL SIDE

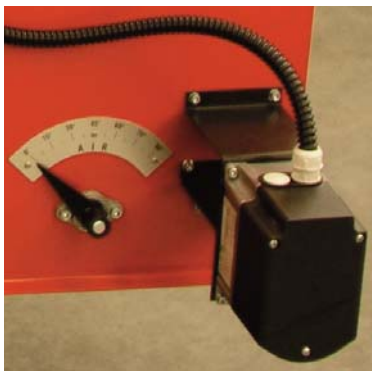
Adjusting the maximum oil flow rate

Put the selector on the maximum operation. Adjust the oil pressure reading the value on the return manometer / pressure gauge according to the nozzle tables provided in the appendix.

NOTE: the pump pressure is set from the factory at the pressure required nozzle pressure required as per table of nozzle selection in appendix. If the output required is different from the one set from the factory the pressure can be adjusted according to the instruction below.

Servomotor STE 15 - Air damper motor pre-setting

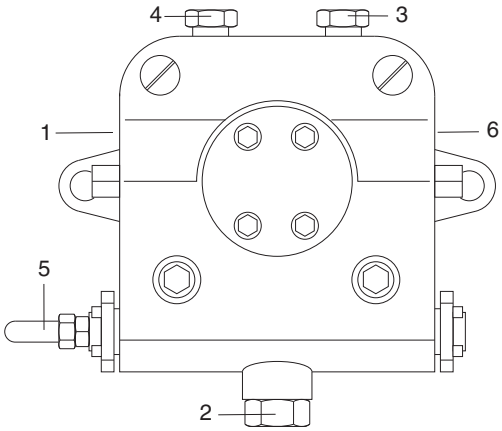
Air adjustment is accomplished through BT 340 parameters setting. Refer to BT 340 manual attacched.



Adjusting the pump pressure

1 - INLET
2 - RETURN
3 - BLEED AND PRESSURE GAUGE PORT
4 - VACUUM GAUGE PORT
5 - PRESSURE ADJUSTMENT
6 - TO NOZZLE

SUNTEC TA....



The pump pressure is set at a value of 22-25 bar during the testing of burners.
Before starting the burner, bleed the air in the pump through the gauge port.
Fill the piping with heavy oil to facilitate the pump priming. Start the burner and check the pump feeding pressure.
In case the pump priming does not take place during the first pre-purging, with a consequent,
subsequent lock-out of the burner, rearm the burner's lock-out to restart, by pushing the button on the control box.
If, after a successful pump priming, the burner locks-out after the prepurging,
due to a fuel pressure drop in the pump, rearm the burner's lock-out to restart the burner.
Do never allow the pump working without oil for more than three minutes.

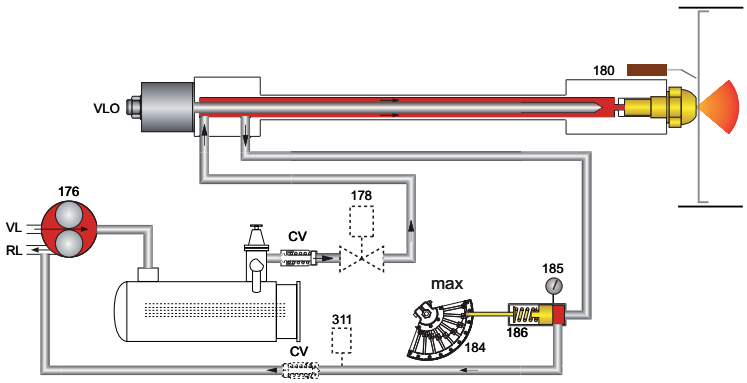
NOTE: before starting the burner, check that the return pipe is open. An eventual obstruction could damage the pump sealing device.

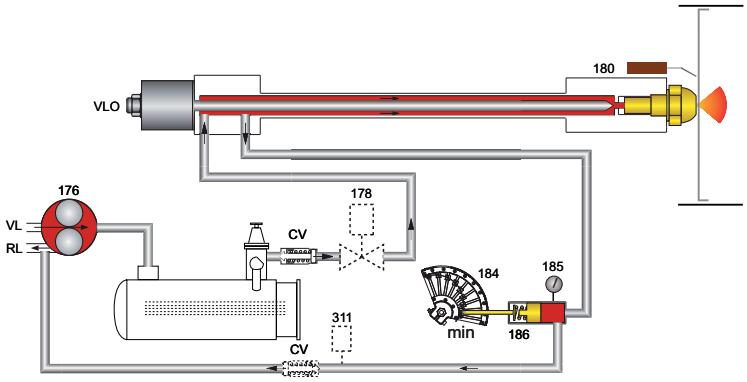
START-UP OIL SIDE

Adjusting the intermediate burner capacity

Oil adjustment is accomplished through LAMTEC parameters setting. Refer to LAMTEC manual attacched.

WARNING: the variable profile of the cam shall have a normal proportional curvature in order to have good combustion values and reduce its mechanical stress breakdown.





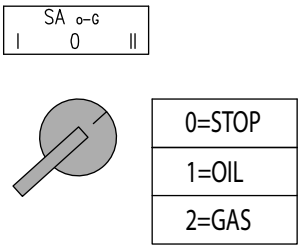
WARNING: Once the setting on the oil has been completed make sure that you close the manometer – pressure switch tap.

LEGENDA

176: oil pump
178: solenoid valve
180: nozzle rod
184: output control valve
185: manometer
186: pressure regulator
311: return oil pressure switch
CV: check valve
RL: return line
VL: suction line
VLO: working oil valve

START-UP GAS SIDE

Select the gas operation in order to proceed with start up on the gas side.



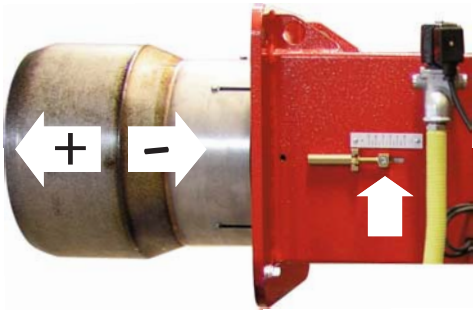
START UP THE BURNER
The control box starts the pre-purge cycle, the fan motor and opens the air flaps in full open position.
At the end of pre-purging, the control box drives the servomotor into the ignition position and starts the ignition transformer.
After a few seconds the control box opens the pilot valves and starts the pilot flame.
After the flame stabilisation the control box opens the main valves and the burner goes in the low flame and the pilot switch off.
In case of faulty igniton, 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 manual attacched.

Adjusting the maximum air flow rate

Air and Gas adjustment are accomplished through LAMTEC parameters setting. Refer to LAMTEC manual attacched.

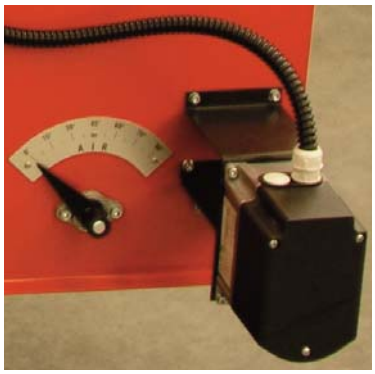
Firing head setting

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 STE 15 - Air damper motor pre-setting

Air adjustment is accomplished through BT 340 parameters setting. Refer to BT 340 manual attacched.



START-UP GAS SIDE

Adjusting the intermediate burner capacity

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

WARNING: the variable profile of the cam shall have a normal proportional curvature in order to have good combustion values and reduce its mechanical stress breakdown.

Pressure switch adjustment

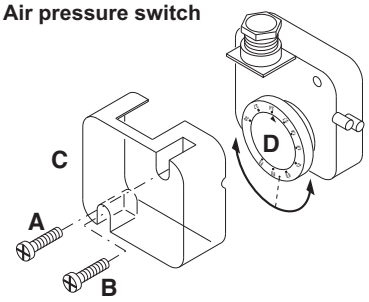
AIR PRESSURE SWITCH CALIBRATION
The air pressure switch is provided for monitoring the pressure of the combustion air fan.
Unscrew screws A and B and remove cover C.
After the air and gas setting you have to calibrate the air switch with the burner working on the low flame by slowly turning the relative 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.

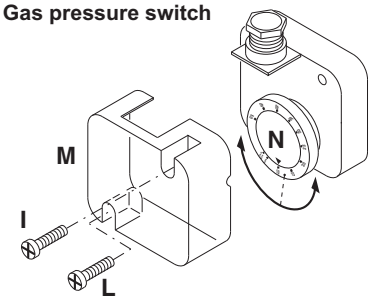
MIN GAS PRESSURE SWITCH
The gas pressure switch has the function to check that the gas pressure before the gas valve does have the minimum pressure to make the burner running correctly.
Unscrew off and remove cover M. - Set knob N to a value equal to 60% of gas nominal feed pressure (i.e. for natural 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

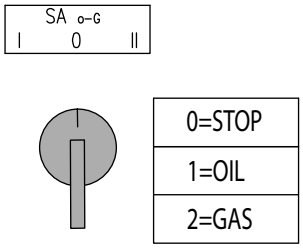


MAINTENANCE PROGRAM

Burner and boiler servicing must only be carried out by authorised qualied 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 oil and 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 and nozzle 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
- Clean the oil filter cartridge with gasoline periodically and check the tightening of the O rings, replace them 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:
CO_2 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:

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

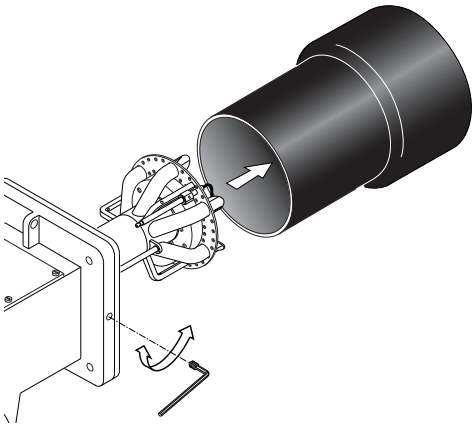
Data measured in fuel oil mode:
CO_2 content of exhaust gases: 12,8%
Exhaust gas temperature: 195°C
Air intake temperature: 22°C

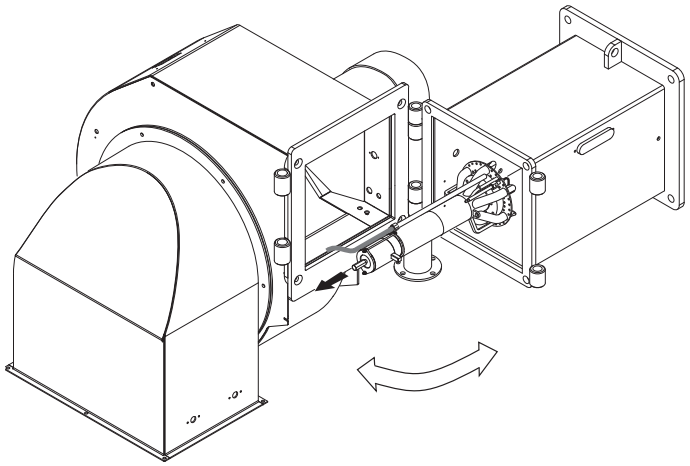
The exhaust gas loss can be calculated as follows:

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

MAINTENANCE PROGRAM

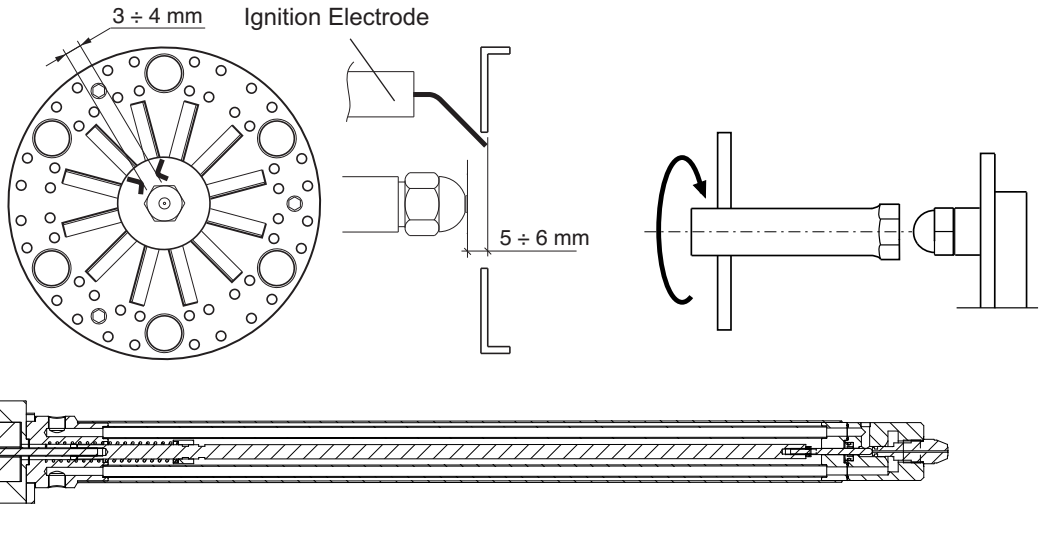
REMOVING THE FIRING HEAD AND THE BLAST TUBE





POSITION OF ELECTRODES

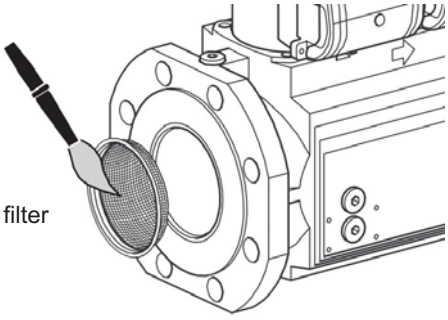
ATTENTION:
to remove the nozzle use the suitable box wrench taking care to not damage the electrodes. Check the position of the electrodes after any intervention as wrong position could cause ignition troubles.



GAS FILTER CLEANING - GAS PILOT FILTER CLEANING

ATTENTION: Periodically clean oil cartridge with gasoline and the gas filter cartridge with air and replace them if it is necessary!

Check and clean the gas filter in the pilot gas valve



TROUBLESHOOTING INSTRUCTIONS

For Setting and Error Lists refer to LAMTEC manual attacched.

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

Control box - Damper actuators

Lamtec BT340 control and safety unit

The control and safety unit BT 3xx controls and monitors the forced draught burner. The microprocessor-controlled program sequence ensures the maximum consistency of the cycle times involved, regardless of fluctuations in the mains voltage or ambient temperature. The control and safety unit is designed to detect power failures. Depending on the parameter assignment, the unit either switches to malfunction mode or goes into the standby position if the power supply falls below the mains voltage. In the standby position, there is an automatic restart as soon as the set threshold value is exceeded by 105%.

Manual locking and unlocking
Using the reset button, the control and safety unit can be locked manually (interlocked) or unlocked, provided the unit is connected to the mains power supply. This function must not be confused with automatic locking and fault acknowledgement in case of an error.

! Always switch off the power supply before installing or removing the control unit. Do not attempt to open or carry out repairs on the control unit.

Pressing the unlocking button on the unit for	.... causes ....
... 1 second ...	the control unit to unlock.
... 4 seconds ...	he control unit to unlock.

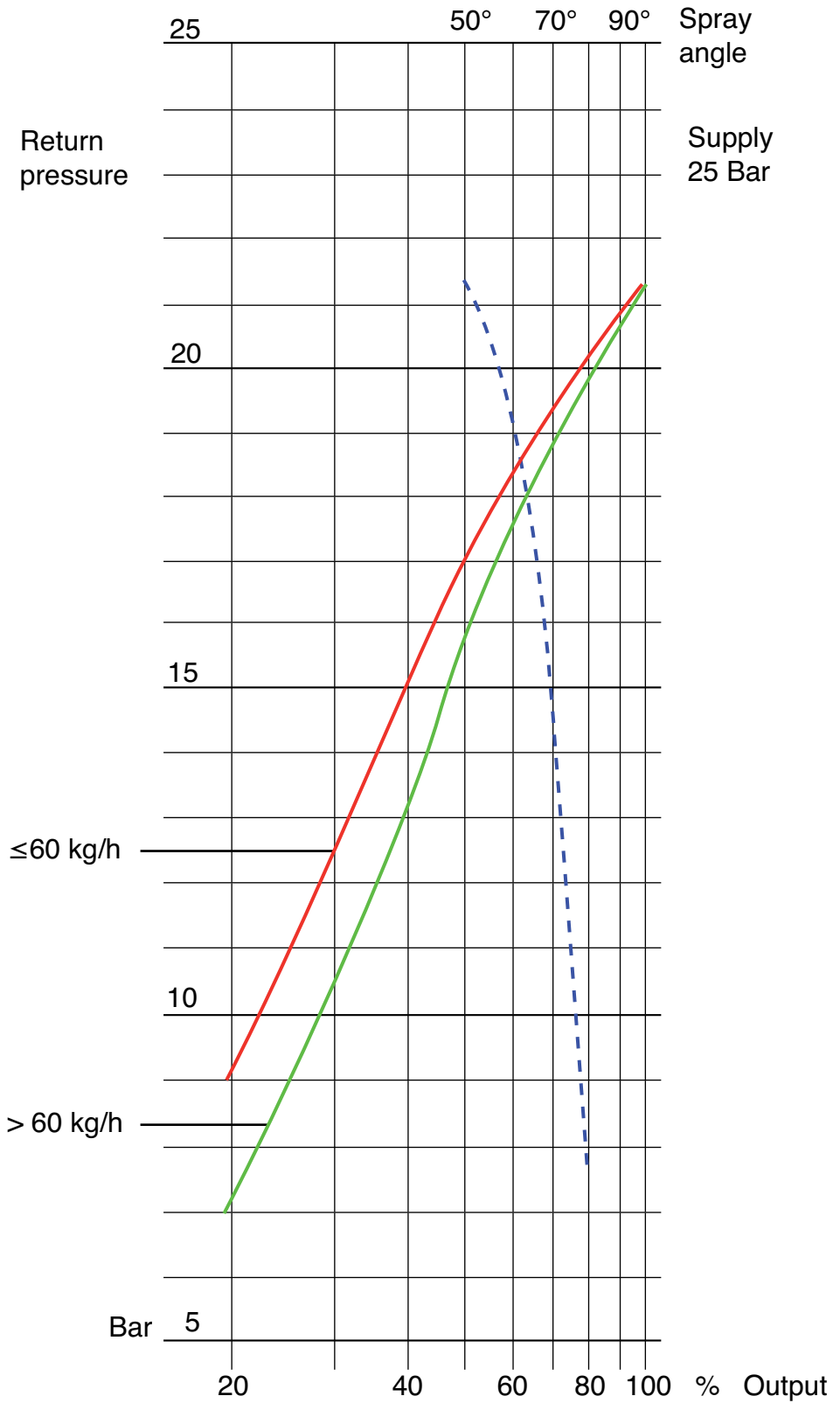
- Moves the cursor upwards.
- Moves the cursor downwards.
- Increases the marked value.
- Reduces the marked value.
- Modifies/Confirms the value shown.
- Unlocks the control unit.
- Red LED (flashes if a fault is present).

For damper actuators refer to STE....manual attacched.

APPENDIX

Fluidics nozzle chart

RETURN NOZZLE
The nozzle type Fluidics W is a by-pass nozzle with integrated spring-loaded cut-off needle.
The throughput rate is controlled by varying the return pressure while keeping the supply pressure at a constant level.
Prior to burner start, check the nozzle size against the required output.
It might be necessary to replace the nozzle (see nozzle selection diagram).



Return pressure [bar]

GPH		Bar	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
100	A	20	20	22	23	24	25	27	30	32	35	38	40	44	48	52	60	70	90										
100	B	20	250	248	245	238	230	225	215	200	185	175	160	150	140	128	115	100	90										
100	A	25	22	23	24	25	25	26	28	30	32	33	35	37	40	42	45	48	52	55	62	75	90						
100	B	25	290	290	288	286	284	280	275	265	255	248	240	225	215	200	190	175	165	150	140	125	110						
100	A	30	23	24	24	25	25	26	27	28	30	31	32	33	35	37	38	40	42	44	45	48	50	55	60	65	75	90	
100	B	30	300	300	300	300	295	295	288	285	282	280	275	270	265	255	250	240	230	220	200	190	170	165	150	140	130	115	
125	A	20	22	23	25	26	27	29	32	34	37	40	44	50	57	65	77	95											
125	B	20	285	280	275	274	272	271	245	235	220	205	190	175	160	145	130	115											
125	A	25	24	25	26	27	28	29	30	31	32	34	35	37	40	43	45	52	60	68	80	95	115						
125	B	25	330	328	325	320	315	307	300	285	280	275	260	250	235	220	190	180	180	170	168	150	135						
125	A	30	25	26	26	27	28	28	29	30	31	32	33	35	37	38	42	43	46	50	54	60	65	72	80	90	108	130	
125	B	30	370	365	360	355	350	348	345	340	335	328	320	305	300	290	280	270	260	245	240	225	210	190	180	165	150	130	
150	A	20	30	33	34	35	37	39	43	46	50	55	60	68	75	85	100	120											
150	B	20	325	320	315	308	300	290	285	275	260	250	240	220	190	180	160	140											
150	A	25	32	33	34	35	37	37	38	42	45	47	50	55	60	65	70	78	83	94	110	120	150						
150	B	25	375	370	365	363	358	355	350	345	330	320	310	300	285	275	260	250	240	220	195	180	150						
150	A	30	35	36	36	37	37	37	39	41	42	45	46	48	50	54	58	62	65	70	75	80	88	95	110	120	140	180	
150	B	30	420	420	415	410	405	400	400	395	390	380	375	365	350	345	340	330	320	300	290	280	270	250	240	220	200	180	
175	A	20	35	37	39	42	44	46	48	55	58	62	68	75	84	95	118	155											
175	B	20	350	350	349	348	330	325	315	300	290	280	265	248	225	195	175	155											
175	A	25	35	36	37	41	42	44	45	47	50	52	58	62	65	70	78	88	95	110	120	140	170						
175	B	25	395	390	385	382	380	378	370	360	350	348	330	325	315	300	280	275	260	240	225	200	170						
175	A	30	42	43	44	45	46	47	48	50	52	55	58	60	62	65	70	72	78	85	90	100	110	118	135	158	190		
175	B	30	440	440	435	430	425	420	415	410	408	400	390	380	370	360	350	330	320	300	285	275	260	250	235	220	190		
200	A	20	38	40	42	44	47	50	55	60	65	70	80	90	100	120	140	170											
200	B	20	400	398	388	380	370	360	350	340	330	320	300	280	275	250	230	210											
200	A	25	42	43	43	44	45	47	50	52	55	60	65	70	78	85	95	105	115	130	150	170	220						
200	B	25	450	448	448	445	440	430	425	412	405	400	390	380	375	360	345	325	315	290	280	260	220						
200	A	30	48	49	50	51	52	53	55	56	58	60	62	64	68	70	75	80	85	92	100	110	120	130	150	175	200		
200	B	30	500	500	495	490	485	480	475	470	460	450	440	430	420	410	395	385	375	350	340	325	315	300	290	275	260		
225	A	20	42	43	45	47	48	52	56	60	65	70	80	90	100	115	140	180											
225	B	20	420	410	405	400	395	380	375	365	350	345	335	320	300	280	265	250											
225	A	25	45	46	47	48	50	52	55	58	60	63	68	73	80	90	98	108	120	140	160	180	225						
225	B	25	475	468	460	455	450	450	445	437	425	410	400	380	375	360	350	340	315	300	280	260	240						
225	A	30	50	50	51	52	52	53	54	55	57	60	62	66	68	75	80	88	94	100	110	120	130	140	155	175	200	240	
225	B	30	510	510	505	505	503	500	495	490	480	460	440	430	420	410	400	390	380	370	360	350	340	325	310	300	285	275	
250	A	20	42	44	46	47	50	55	60	65	70	80	90	100	115	140	160	220											
250	B	20	425	415	408	403	400	380	375	365	350	338	325	300	280	265	250	240											
250	A	25	46	47	49	50	52	55	58	60	63	66	72	78	85	92	100	110	130	140	165	200							
250	B	25	480	475	475	470	465	450	445	440	425	410	400	380	375	355	340	330	310	300	280	275							
250	A	30	52	52	52	53	54	55	58	60	62	65	68	72	78	82	90	95	105	105	125	135	150	165	180	220	260		
250	B	30	520	515	515	510	510	505	500	500	490	480	475	460	450	440	430	420	400	380	370	360	350	340	325	310	280		

Supply: 25 bar

Output [kg/h]

A = nozzle output

B = pump output

Return pressure [bar]

GPH		Bar	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
275	A	20	52	53	55	58	60	63	68	75	80	90	100	115	125	150	170	225											
275	B	20	540	530	520	510	500	490	475	450	440	420	400	375	350	325	300	275											
275	A	25	55	56	57	58	60	64	68	70	75	80	85	95	100	115	125	135	150	170	190	225	265						
275	B	25	600	600	595	590	580	570	560	550	540	525	510	500	480	460	440	425	400	375	350	325	300						
275	A	30	60	61	62	63	64	65	66	67	70	74	78	82	88	95	100	110	118	125	135	150	165	180	200	240	275		
275	B	30	680	675	668	662	658	650	640	630	620	610	600	590	580	565	555	545	525	500	480	460	440	425	400	375	350		
300	A	20	55	58	60	64	65	70	76	85	92	105	118	135	145	175	200	270											
300	B	20	550	535	525	515	500	485	470	450	430	410	380	375	360	330	310	280											
300	A	25	24	25	26	27	28	29	30	31	32	34	35	37	40	43	45	52	60	68	80	95	115						
300	B	25	330	328	325	320	315	307	300	285	280	275	260	250	235	220	190	180	180	170	168	150	135						
300	A	30	25	26	26	27	28	28	29	30	31	32	33	35	37	38	42	43	46	50	54	60	65	72	80	90	108	130	
300	B	30	370	365	360	355	350	348	345	340	335	328	320	305	300	290	280	270	260	245	240	225	210	190	180	165	150	130	
325	A	20	58	62	65	68	72	78	88	95	110	118	135	150	170	200	240	290											
325	B	20	570	560	550	530	510	500	485	475	450	440	425	400	370	350	330	300											
325	A	25	65	67	69	72	74	75	80	85	90	98	105	115	125	140	160	170	190	225	270	320							
325	B	25	650	643	638	630	628	620	610	600	590	580	565	540	520	500	475	450	425	400	375	350							
325	A	30	68	69	70	71	73	75	78	82	88	92	98	105	110	120	130	140	150	165	180	200	225	250	280	320	360		
325	B	30	720	715	710	705	702	700	700	690	680	670	655	620	610	600	580	570	550	520	500	480	460	440	420	400	380		
350	A	20	64	68	70	75	80	90	98	105	118	130	145	160	180	210	250	310											
350	B	20	620	600	590	580	570	550	530	500	480	460	440	420	400	375	360	340											
350	A	25	68	69	70	75	80	85	90	98	105	112	120	130	145	160	170	190	210	240	270	300	350						
350	B	25	700	700	690	680	670	660	650	630	610	590	580	550	520	500	480	465	450	430	410	380	360						
350	A	30	68	69	70	73	78	82	88	92	98	105	110	120	128	138	145	160	170	190	210	225	250	275	300	350	375		
350	B	30	790	780	770	760	750	740	720	710	700	690	680	665	650	625	610	590	570	550	520	505	490	475	440	425	400		
375	A	20	72	76	82	88	94	105	115	125	140	155	170	195	225	250	300												
375	B	20	630	615	600	590	580	565	550	520	490	475	450	425	400	375	360												
375	A	25	78	80	85	90	95	100	105	110	120	130	140	155	170	190	200	230	250	280	325	375							
375	B	25	700	690	680	670	660	650	640	625	615	600	580	565	550	520	500	480	460	440	420	400							
375	A	30	90	92	93	95	98	100	105	110	115	120	130	140	150	160	170	180	200	220	240	260	280	320	350	400			
375	B	30	800	790	786	778	770	760	750	730	710	700	690	670	650	630	610	600	590	570	550	530	510	490	470	440			
400	A	20	85	90	98	105	115	125	135	150	165	185	210	240	270	320													
400	B	20	610	605	595	585	575	565	550	520	500	480	460	440	420	400													
400	A	25	85	90	98	104	110	118	125	135	145	155	170	190	200	225	250	280	310	360	400								
400	B	25	710	705	700	695	690	680	670	650	630	610	590	580	560	540	520	500	480	450	425								
400	A	30	100	102	106	110	114	117	120	130	138	148	158	170	180	195	210	230	250	275	300	340	360	400	440				
400	B	30	800	790	786	778	770	760	750	730	710	700	690	670	650	630	610	600	590	570	550	530	510	490	470				
425	A	20	78	80	85	90	95	100	110	120	135	150	170	190	220	250	300	350											
425	B	20	700	690	680	670	650	630	615	600	590	570	530	510	490	450	410	380											
425	A	25	85	88	90	93	95	100	105	110	120	130	140	150	165	180	195	225	250	280	325	380							
425	B	25	750	745	740	730	720	710	700	685	675	665	650	630	610	600	580	560	540	515	490	430							
425	A	30	91	92	94	96	98	99	100	104	110	118	128	138	145	158	168	180	195	210	235	260	280	320	350	400	450		
425	B	30	820	816	812	808	804	800	790	780	770	760	750	740	730	720	710	695	680	650	625	600	590	570	540	515	490		

Supply: 25 bar

Output [kg/h]

A = nozzle output

B = pump output

APPENDIX

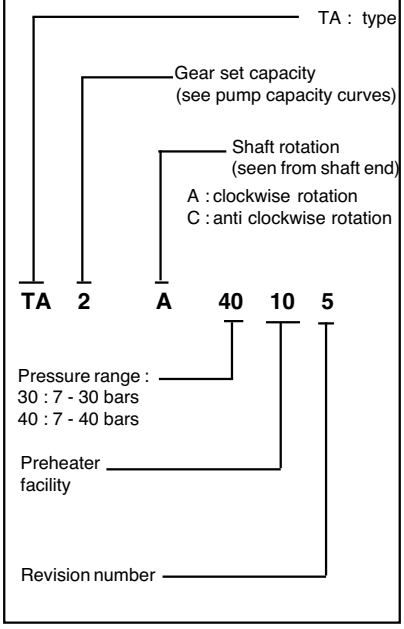
Pumps and pressure regulators

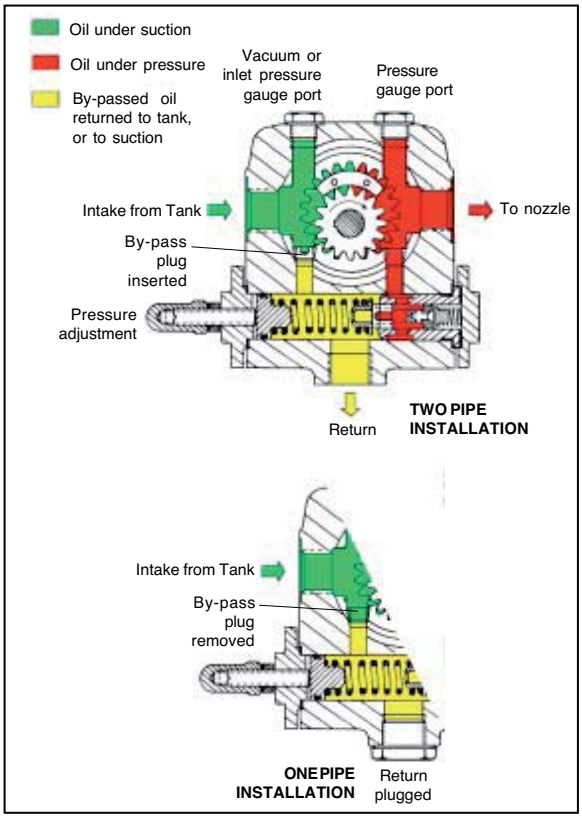
PUMP SUNTEC TA TECHNICAL DATA

Note: All TA models are delivered for two-pipe system (by-pass plug fitted in vacuum gauge port).
For one-pipe system, the by-pass plug must be removed and the return port sealed by steel plug and washer.

PUMP IDENTIFICATION

(Not all model combinations are available Consult your Suntec representative)





General

Mounting	Flange mounting
Connection threads	Cylindrical according to ISO 228/1
Inlet end return	G 1/2"
To nozzle	G 1/2"
Pressure gauge port	G 1/4"
Vacuum gauge port	G 1/4"
Shaft	Ø 12 mm
By-pass plug	Inserted in vacuum gauge port for 2 pipe system; to be removed with a 3/16" Allen key for 1 pipe system
Weight	5,4 kg (TA2) - 5,7 kg (TA3) 6 kg (TA4) - 6,4 kg (TA5)

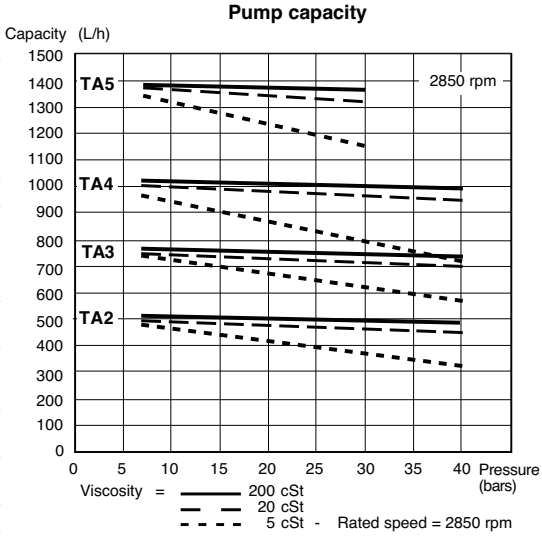
Hydraulic data

Nozzle pressure ranges	30 : 7 - 30 bars 40 : 7 - 40 bars
Delivery pressure setting	30 bars
Operating viscosity	4 - 450 cSt
Oil temperature	0 - 140°C max. in the pump
Inlet pressure	light oil : 0,45 bars max. vacuum to prevent air separation from oil heavy oil : 5 bars max.
Return pressure	light oil : 5 bars max. heavy oil : 5 bars max.
Rated speed	3600 rpm max.
Starting torque	0,3 N.m

Choice of heater

Cartridge	Ø 12 mm
Fitting	according to DIN 40430, NFC 68190 (N°9 elec.)
Rating	80-100 W

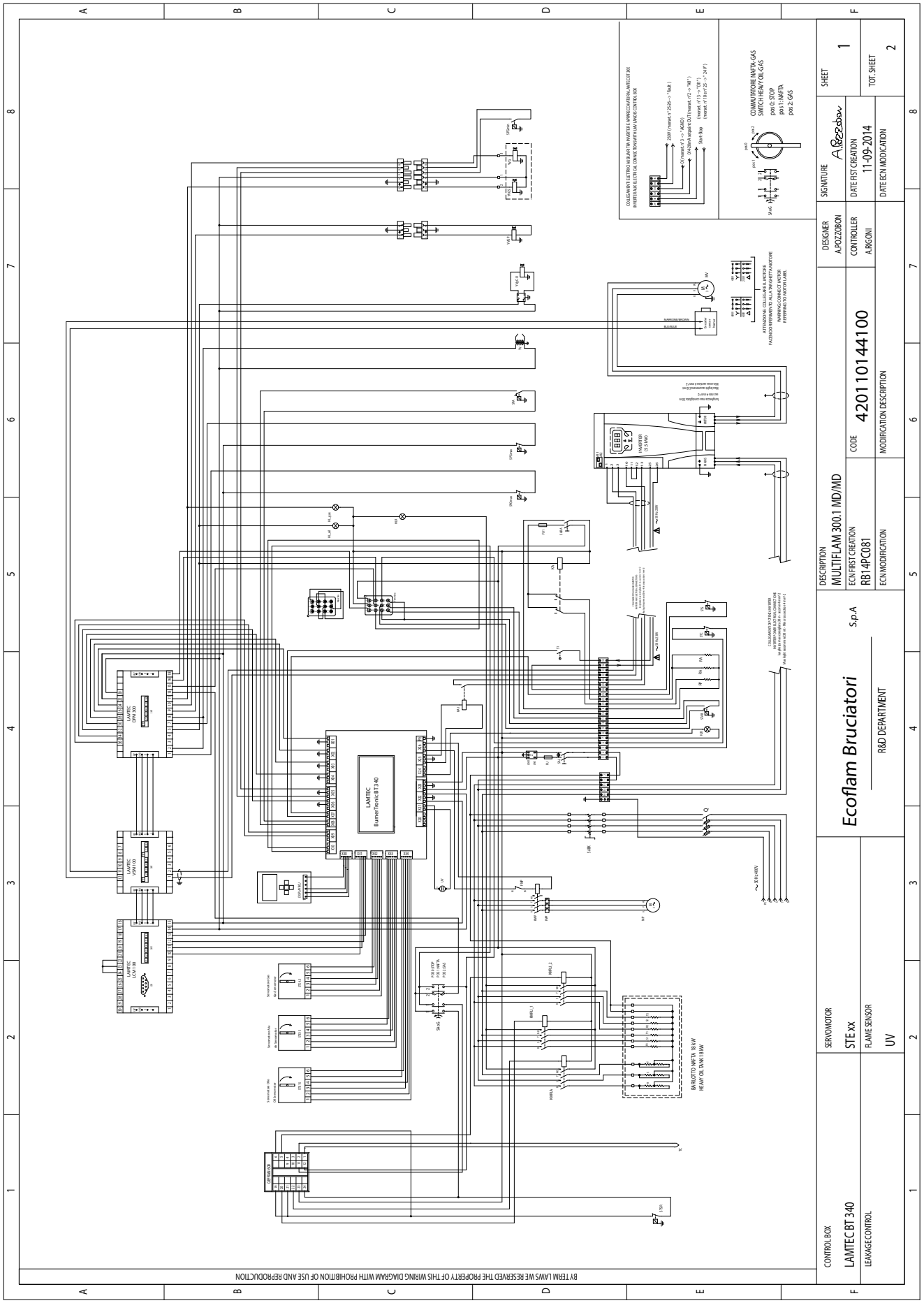
Pump capacity



Data shown are for new pumps, with no allowance for wear.

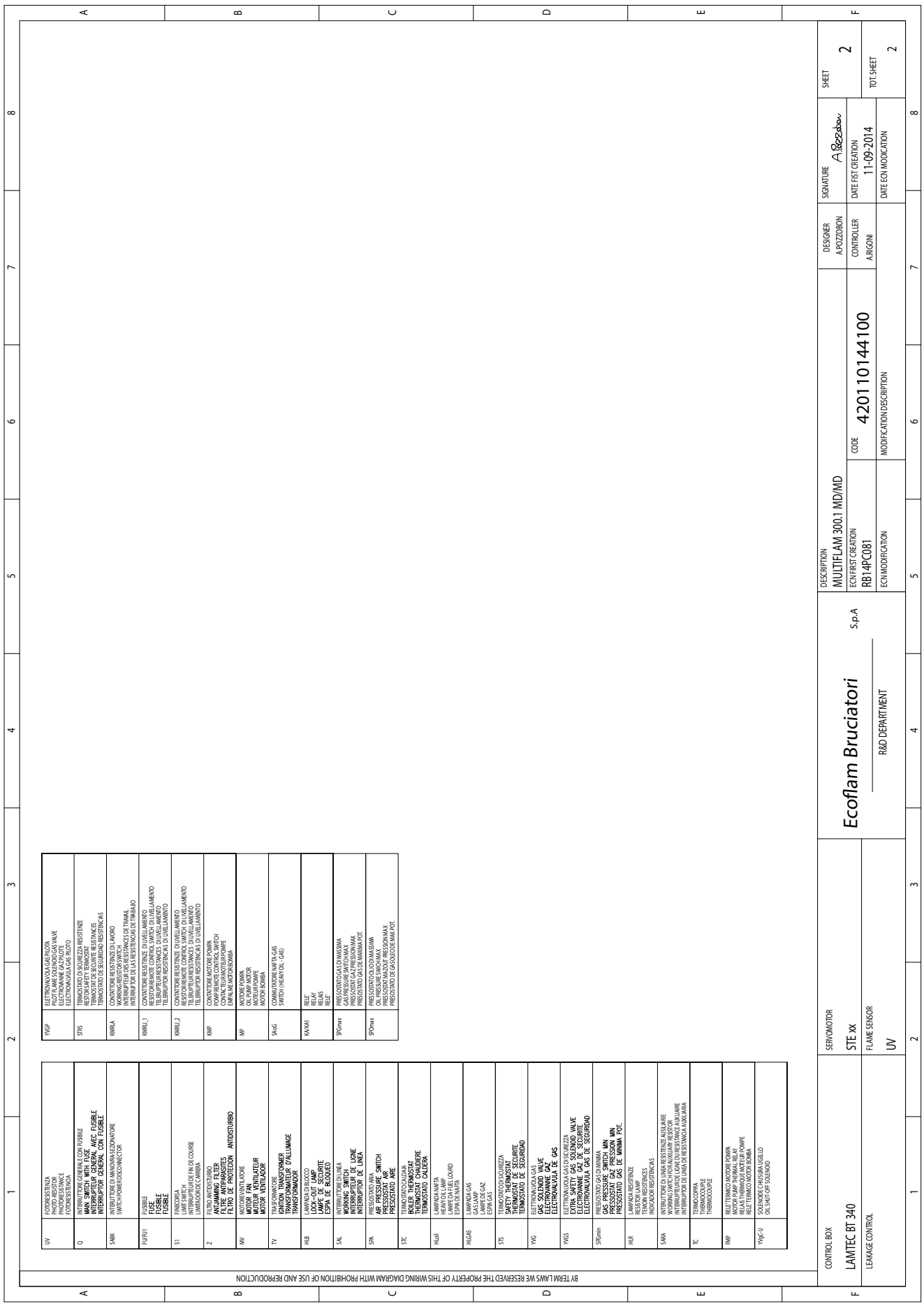
APPENDIX

Electrical diagrams



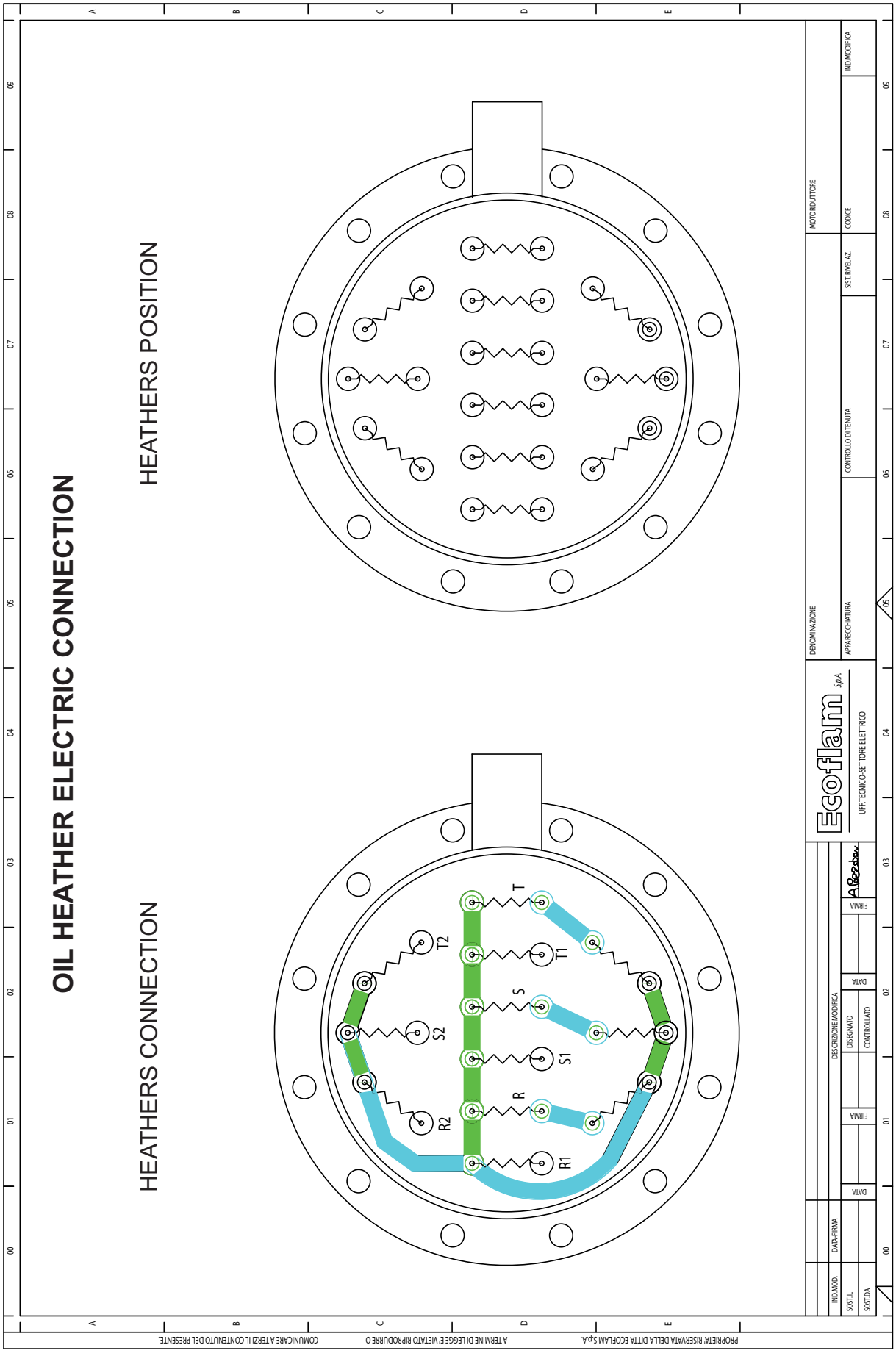
APPENDIX

Electrical diagrams



APPENDIX

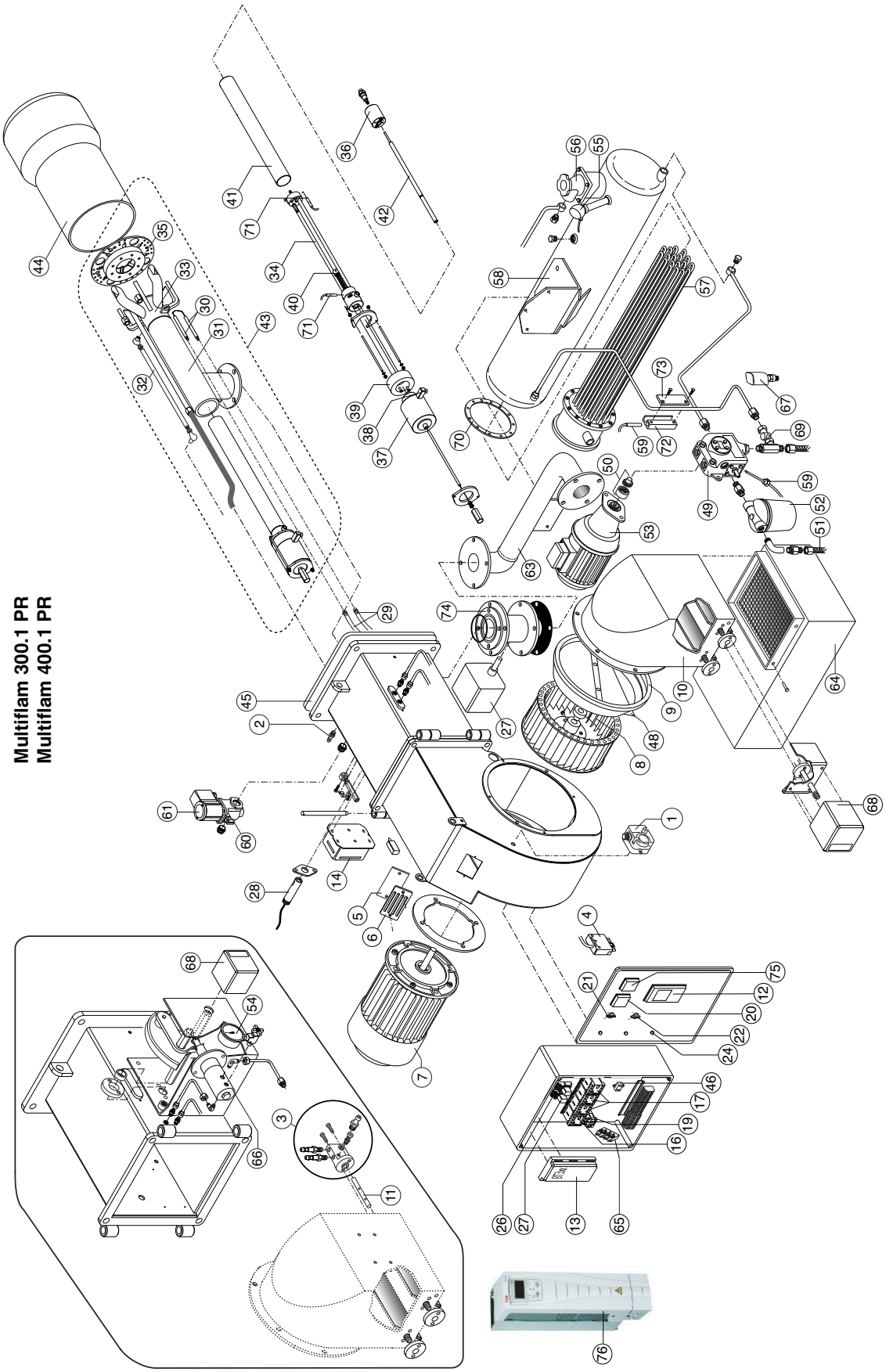
Electrical diagrams



APPENDIX

Spare parts

Multiflam 300.1 PR
Multiflam 400.1 PR



APPENDIX

Spare parts list

			MULTIFLAM 300.1 PR	MULTIFLAM 400.1 PR
N°	DESCRIPTION		code	code
1	AIR PRESSURE SWITCH	DUNGS LGW10 A2P	65323047	65323047
2	PRESSURE GAUGE		65321341	65321341
3	AIR INTAKE SET		65322346	65322346
4	WIELAND PLUG	6 pin	65322072	65322072
5	GLASS		65320487	65320487
6	PEED WINDOM FRAME		65320488	65320488
7	MOTOR	5,5 k W	65325357	-
		7,5 k W	-	65325350
8	FAN	320 x 150	65321800	65321800
9	AIR CONVEYOR		65320645	65320645
10	AIR INTAKE		65324357	65324357
11	AIR INTAKE PIPE		65321230	65321230
12	DISPLAY	LAMTEC	342503203	342503203
13	CONTROL BOX	BT 340 667R1340-1	14058433	14058433
14	IGNITION TRANSFORMER	BRAHMA T8	65323222	65323222
15	REMOTE CONTROL SWITCH		-	-
16	REMOTE CONTROL SWITCH (PUMP)	AEG LS05.10	65323132	65323132
17	REMOTE CONTROL SWITCH	AEG LS7K.10	65324097	65324097
		AEG LS4K.10	65323133	65323133
18	MOTOR THERMAL RELAY		-	-
19	MOTOR THERMAL RELAY (PUMP)	AEG 3-4,7A	65323116	65323116
20	ADJUSTMENT OF FUEL TEMPERATURE	GEFRAN 600-R	65322045	65322045
21	MAIN SWITCH	Comepi	65324098	65324098
22	GAS/HEAVY-OIL SELECTOR	Comepi a.ECX1	65324099	65324099
23	SELECTOR		-	-
24	LAMP	LYVIA 10X28 BA9S	65324100	65324100
25	PUSH		-	-
26	RELE BASE	Finder 5532	65323149	65323149
27	RELE	Finder 5532	65323139	65323139
28	UV CELL	LANDIS QRA 2	65320075	65320075
29	IGNITION CABLE	TC	65320946	65320946
		TL	65320947	65320947
30	IGNITION ELECTRODES SET		65325222	65325222
31	PIPE	TC	65324082	65324082
		TL	65324081	65324081
32	ROD	TC	65324086	65324086
		TL	65324085	65324085
33	FIRING HEAD	TC	65324084	65324084
		TL	65324083	65324083
34	HEAVY OIL FIRING HEAD	TC	65324266	65324266
		TL	65321722	65321722
35	FRONT DISC		65320820	65320820
36	NOZZLE HOLDER		65320709	65320709
37	COIL	EL011	65323809	65323809
38	COIL CONNECTOR	EL011	65323571	65323571
39	RING		65321721	65321721
40	SPRING HOLDER		65321720	65321720
41	PIPE	TC	65324292	65324292
		TL	65324676	65324676
42	ROD NOZZLE HOLDER	TC	65324268	65324268
		TL	65324269	65324269
43	INNER ASSEMBLY	TC		
		TL		
44	BLAST TUBE	TC	65325863	65325041
		TL	65320435	65320456
45	GASKET ISOMART		65321125	65321125
46	ANTIJAMMING FILTER		65323170	65323170
47	GAS DAMPER MOTOR	STE 4,5 BT3XX	14051822	

TC = SHORT HEAD TL = LONG HEAD

APPENDIX

Spare parts list

			MULTIFLAM 300.1 PR	MULTIFLAM 400.1 PR
N°	DESCRIPTION		code	code
48	FAN SCOOP		-	65320627
49	OIL PUMP	SUNTEC TA3C40105	65322992	65322992
50	COUPLING		65325386	65325386
51	HOSES	TN 25X1500 C/T	65323181	65323181
52	OIL FILTER	70501/03	65324103	65324103
53	PUMP MOTOR	1100 W	65325356	65325356
54	MANOMETER	CEWAL R1/4 D50-40BAR	65324105	65324105
55	THERMOCOUPLE	TC6MD2JBC	65322046	65322046
56	FILTER	U21008/01	65323158	65323158
57	HEATER	18000 W	65323088	-
		21000 W	-	65323089
58	OIL TANK		65324088	65324088
59	HEATING ELEMENT	50 W	65323072	65323072
60	PILOT GAS VALVE	BRAHMA EG12SRGMO	65323595	65323595
61	COIL	BRAHMA EG12SR	65323707	65323707
62	GAS GOVERNOR		-	-
63	CONNECTION PIPE		65325466	65325466
64	SILENCER		65324107	65324107
65	THERMOSTAT	IMIT TR2 40/200	65323147	65323147
66	ADJUSTMENT OIL PRESSURE	B-P-PRO-2 a.070H0136	65323165	-
		B-P-PRO-2 a.070H0138	-	65323166
67	OIL PRESSURE SWITCH	DANFOSS KPS 39 1/4F	65325377	
68	SERVOMOTOR	STE15 Q3.51/6 10Nm	14051811	
69	CHECK VALVE	NAFTA ART. FZVR10 3/8	65322205	65322205
70	OIL TANK GASKET		65324010	65324010
71	HEATING ELEMENT	30 W	65324207	65324207
72	PREHEATED'S AUX. RESISTOR HOLDER		65321716	65321716
73	FIXING PLATE		65321717	65321717
74	THROTTLE GROUP		65325510	65325510
75	MODULATING KIT	SIEMENS RWF 50	3143713	3143713
76	INVERTER	ABB 5,5KW MOD.ACH550	460090031600	460090031600

TC = SHORT HEAD TL = LONG HEAD

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