

OILFLAM 300.1 PR
OILFLAM 400.1 PR



Technical data



Operating instructions



Electric diagrams



Spare parts list



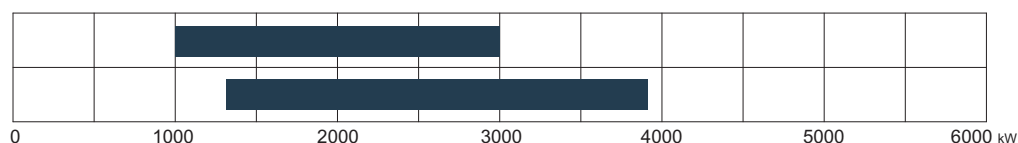
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OILFLAM 300.1 PR TC 230-400-50	3142616
OILFLAM 300.1 PR TL 230-400-50	3142617
OILFLAM 400.1 PR TC 230-400-50	3142618
OILFLAM 400.1 PR TL 230-400-50	3142619

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OILFLAM 300.1

OILFLAM 400.1



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GENERAL WARNINGS - CONFORMITY DECLARATION

OILFLAM burners are designed for the combustion of heavy oil. The design and function of the burners meet the standard EN267. 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

OILFLAM 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 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 60335-1, -2-102

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

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:

OILFLAM 300.1 PR
OILFLAM 400.1 PR

conform to the following standards:

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

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

OILFLAM 300.1 PR TC 230-400-50

RANGE NAME BY FUEL TYPE

OILFLAM Heavy oil

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

OILFLAM 300.1 264 kg/h - 3000 kW

EMISSIONS

Standard Class 1 - OIL EN267 (<250 mg/kWh)

OPERATION TYPE

PR 2 stages progressive mechanical

MD 2 stages modulating mechanical with PID

E 2 stages modulating electronic

HEAD TYPE

TC Short head

TL Long head

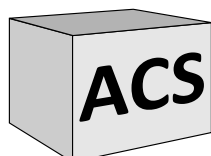
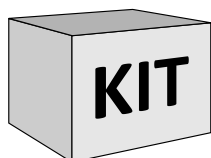
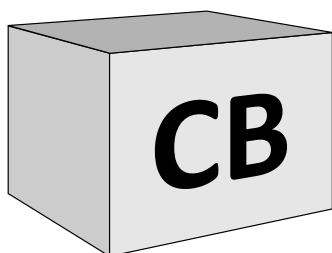
FUEL

Heavy oil

ELECTRICAL POWER SUPPLY

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

MODULAR DELIVERY SYSTEM



Heavy oil burners

All heavy oil burners are delivered with electrical pre-heater preassembled into the burner body, including filter and flexible hoses up to 6 MW. Additional accessories and options shall be installed by the installer in accordance to the instruction and local safety regulations and codes of practise.

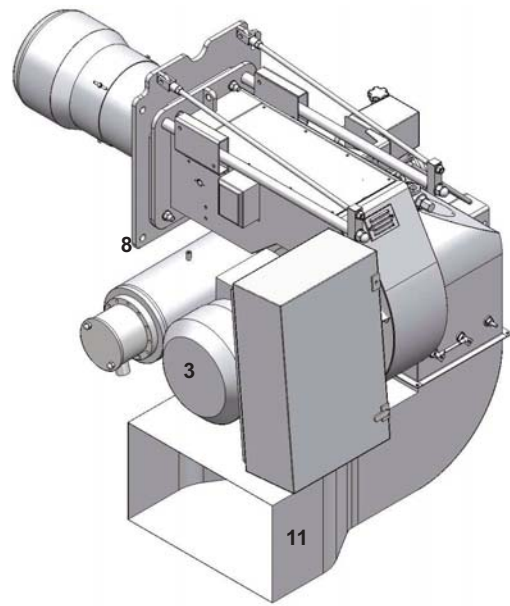
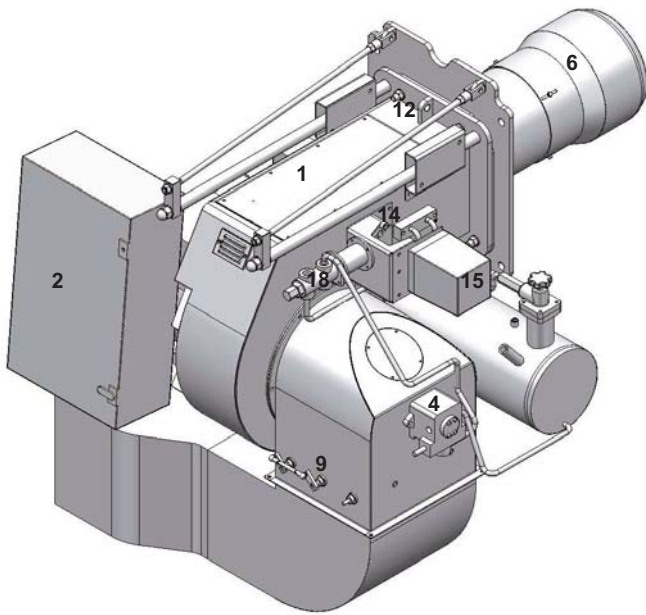
KITS - Accessories

Kits and accessories are managed and delivered separately.

Component type

CB	Complete burner
KIT	Kits
ACS	Accessories

BURNER DESCRIPTION

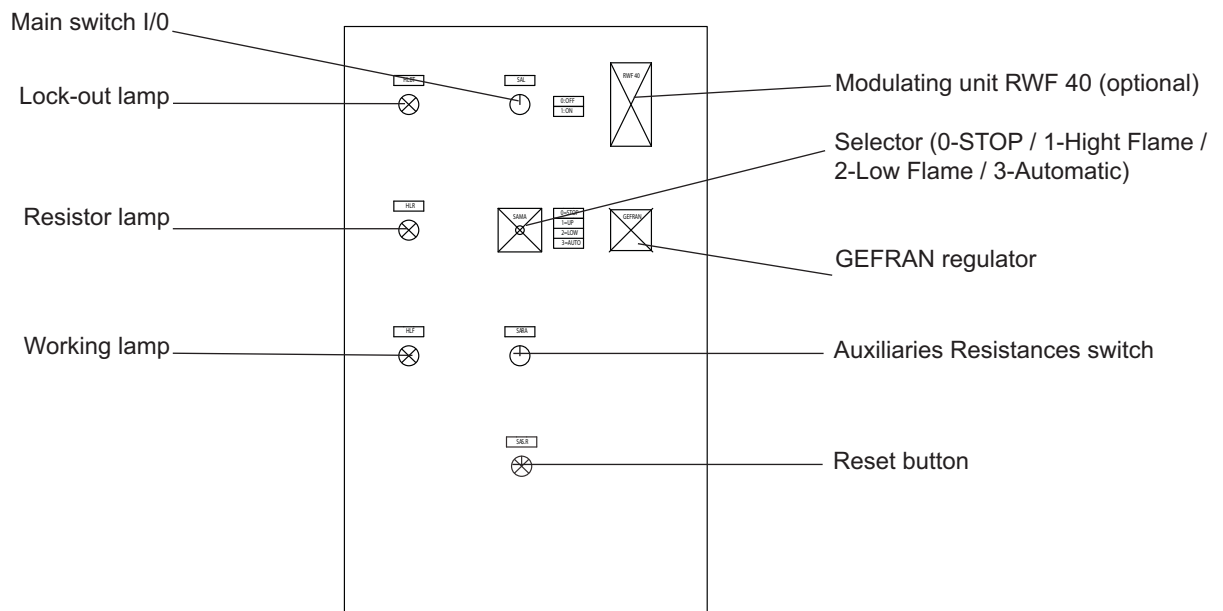


LEGENDA

- 1. Housing
- 2. Electrical control panel
- 3. Blower motor
- 4. Pump
- 6. Blast tube
- 8. Burner fixing flange
- 9. Air flap regulation
- 11. Silencer

- 12. Lifting eyebolts
- 14. Mechanical cam oil
- 15. Servomotor
- 18. Oil pressure regulator

Control panel



TECHNICAL DATA

MODEL		OILFLAM 300.1	OILFLAM 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	1.000	1.300
	kcal/h	867.300	1.127.500
	kg/h	88,5	115
Operation mode	Type	Progressive mechanical heavy oil / gas - Modulating with PID	
Regulation ratio nominal	Type	1÷3 HEAVY OIL	
Fuel	Type	Heavy oil (L.C.V. 9.800 kcal/kg max visc. 50°E at 50°C)	
Emission class	std	-	
Control unit	Type	LAL	
Air regulation	Type	Air flap	Air flap
Air flap control with servomotor	Model	SQM50	
Flame monitoring	Type	photoresistor	
Ignitier	Model	BRAHMA	
Motor	kW	7,5	9
Rpm	N°	2.800	2.800
Voltage	V/Hz	230/400 V - 50 Hz	
Total power consumption operation	W	27.500	32.000
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
Nozzles	Type	according to the output requested	
Fuel thermo regulator	Type	GEFRAN	
Electrical pre-heater	kW	18	21

WORKING FIELDS



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

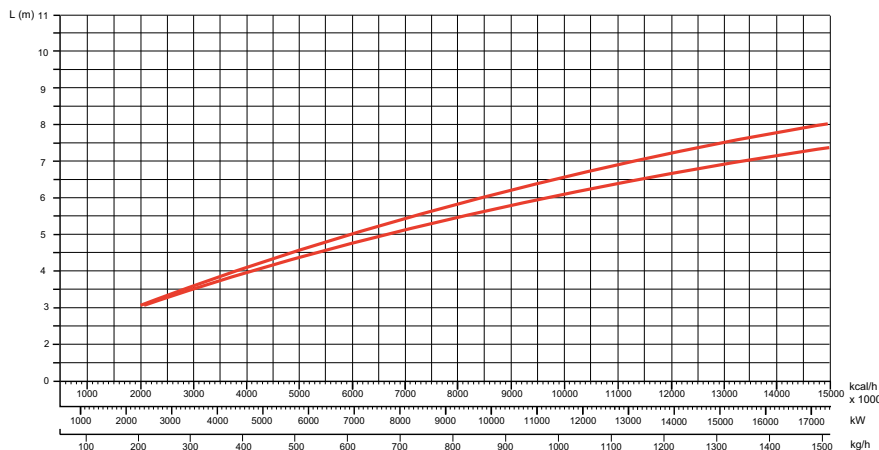
$$Q_F = \frac{Q_N}{\eta} \times 100$$

Working fields

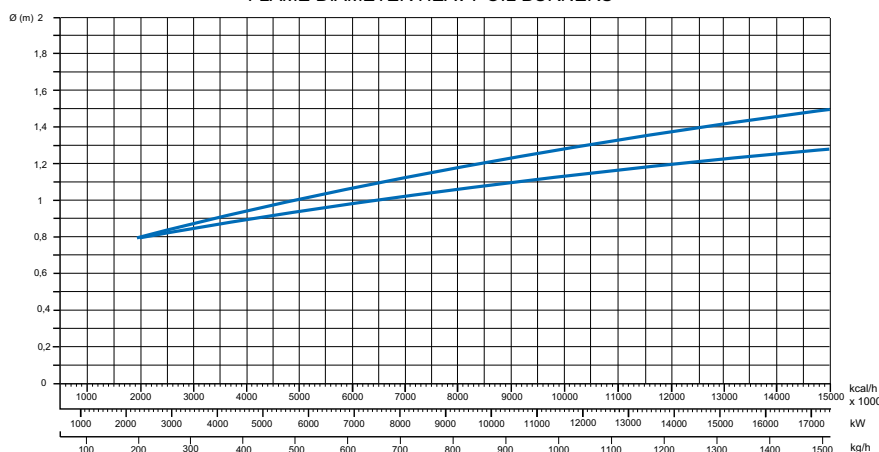
The working field shows burner output as a function of combustion chamber pressure. It corresponds to the maximum values specified by EN 267 measured at the test fire tube. Boiler efficiency should be taken into consideration when selecting the burner.

TEST BOILER - FLAME DIMENSIONS

FLAME LENGHT HEAVY OIL BURNERS



FLAME DIAMETER HEAVY OIL 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 EN 267 regulations.

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

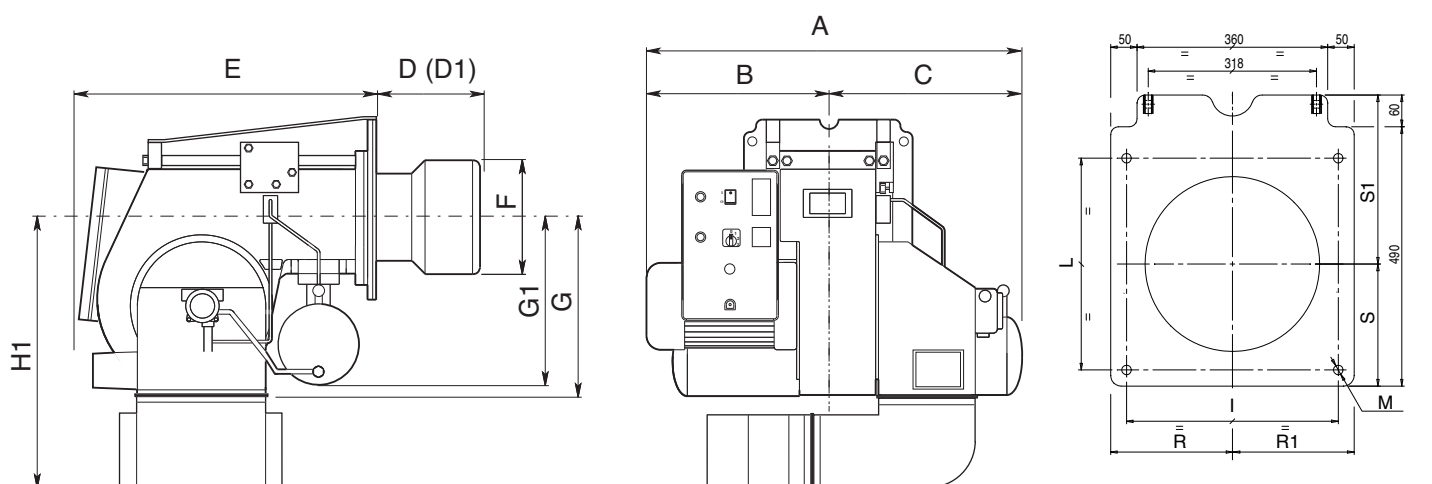
The dimensions of the flame are made in test boiler in laboratory without resistance therefore exists max and min length that take into account the difference in length that comes from the boiler backpressure.

Example:

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

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

OVERALL DIMENSIONS



D = Short head

D1= Long head

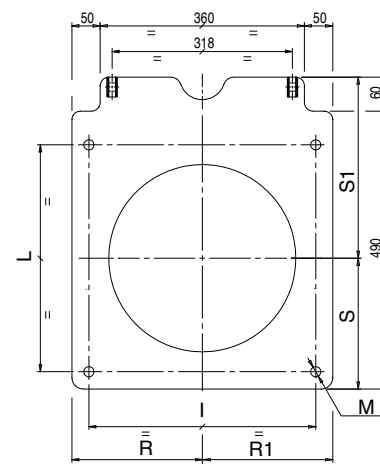
Dimensions (mm)

	A	B	C	D	D1	E	F	G	G1	H1	I	L	M
OILFLAM 300.1	1205	603	602	350	600	925	290	470	430	746	400	400	M16
OILFLAM 400.1	1205	603	602	350	600	925	320	470	430	746	400	400	M16

Burner-boiler mounting flange

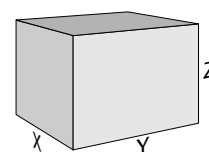
Fixing hole dimensions are "I" and "L" as per dimension table.
Boiler hole shall be done according to the blast tube dimension "F" plus 15-25 mm in order to be able to extract it during maintenance.

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
OILFLAM 300.1	1575	1575	1042	
OILFLAM 400.1	1575	1575	1042	



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 be started. After the program has run down the burner will start. The air damper is closed when the burner is out of operation.

The automatic furnace controller controls and monitors the starting function. The electric actuator opens the closed air damper to its full-load position so that the burner will sweep the furnace compartment and exhaust ports at the required air flow rates. At the end of the specified pre-ventilation time the air damper will be moved into its partial load position. 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 automatic furnace controller 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.

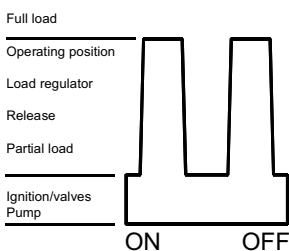
The stepless control will allow the burner to be operated at any desired stage between its partial-load and full-load

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.

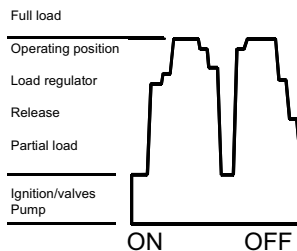
The interior cooling losses will be greatly minimized.

Oil control:

2-stage sliding



Stepless



GENERAL SAFETY FUNCTIONS

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

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

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

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

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

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

A voltage failure will result in a regular shut-off of the burner. Upon voltage

recovery there may be an automatic restart unless another interlock is provided, e.g. by the safety system. In any case of trouble the fuel oil supply will be shut off right away. The program unit will stop at the same time causing also the trouble location indicator to stop.

The symbols will indicate the kind of trouble.

INSTALLATION

Fitting the burner to the boiler

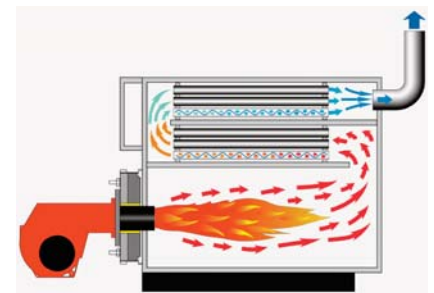
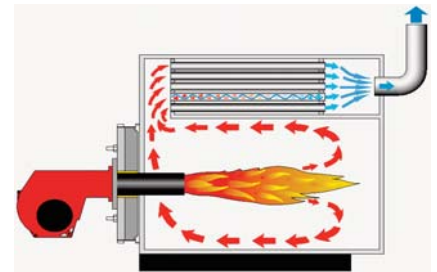
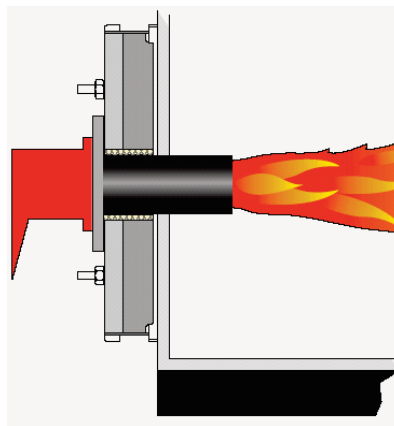


WARNING: handling and moving operations must be carried out by specialised personnel. Use the eyebolts to lift the burner in order that it will not overturn and fall down.

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

Place the gasket on the burner flange and install the burner into the boiler by fixing nuts into the bolts.

The space between the blast tube and the boiler lining must be sealed with appropriate insulating material.

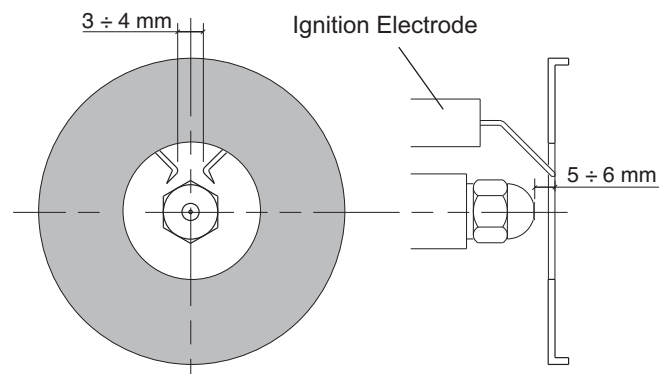


BURNER LINING

Check before burner installation:

1. Depending on the type of boiler (reverse flame or three pass) check the burner blast tube installation depth according to the data specified by the boiler manufacturer or consult the burner producer.
2. 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%.

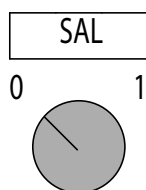
Position of the electrodes - nozzle installation



MAIN SWITCH

0 - OFF

1 - ON



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 GEFRAF 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

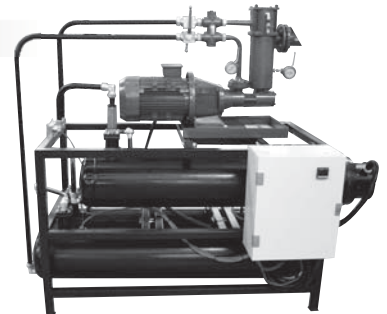
I. Feeding and filtering system

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

III. Forced oil supply system "RING"

OIL PREPARATION 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.

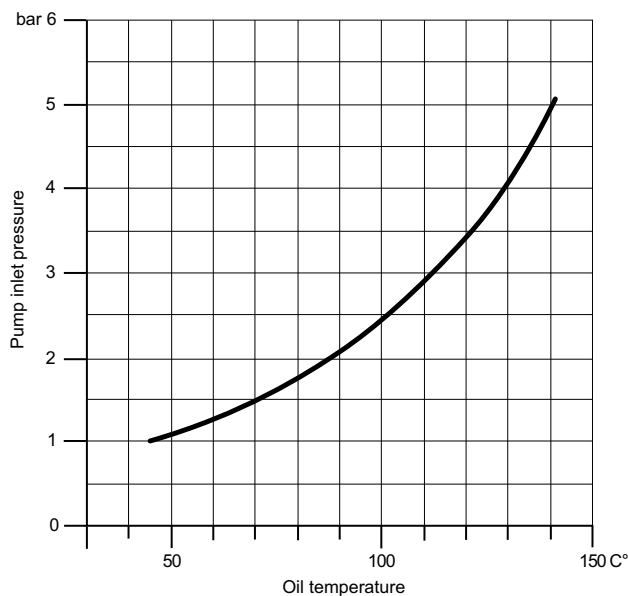


ACCESSORIES

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



RACOMMENDED OIL SUPPLY PRESSURE



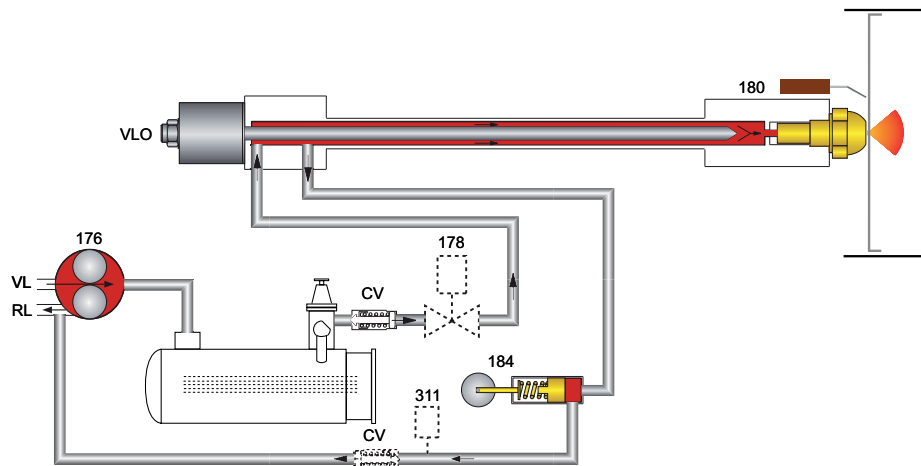
INSTALLATION

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 bar. 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. When taking the burner into operation pro

ceed by gradually increasing the pressure to operating level (25 bar).

CHECKING OIL RING PRESSURE

Refer to diagram at page 11 to define recommended oil pressure.

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

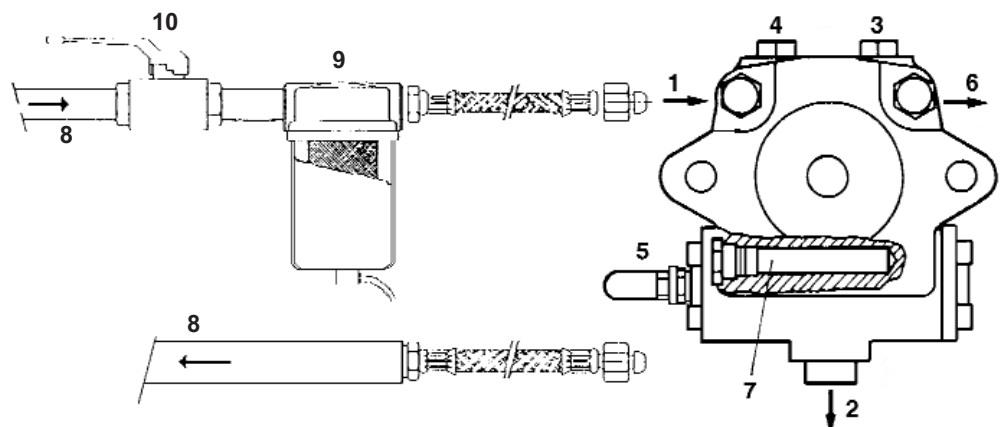
A filter must be installed upstream of the pump to protect the oil pressure pump and the hydraulic system.

INSTALLATION OPTIONS

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

LEGENDA

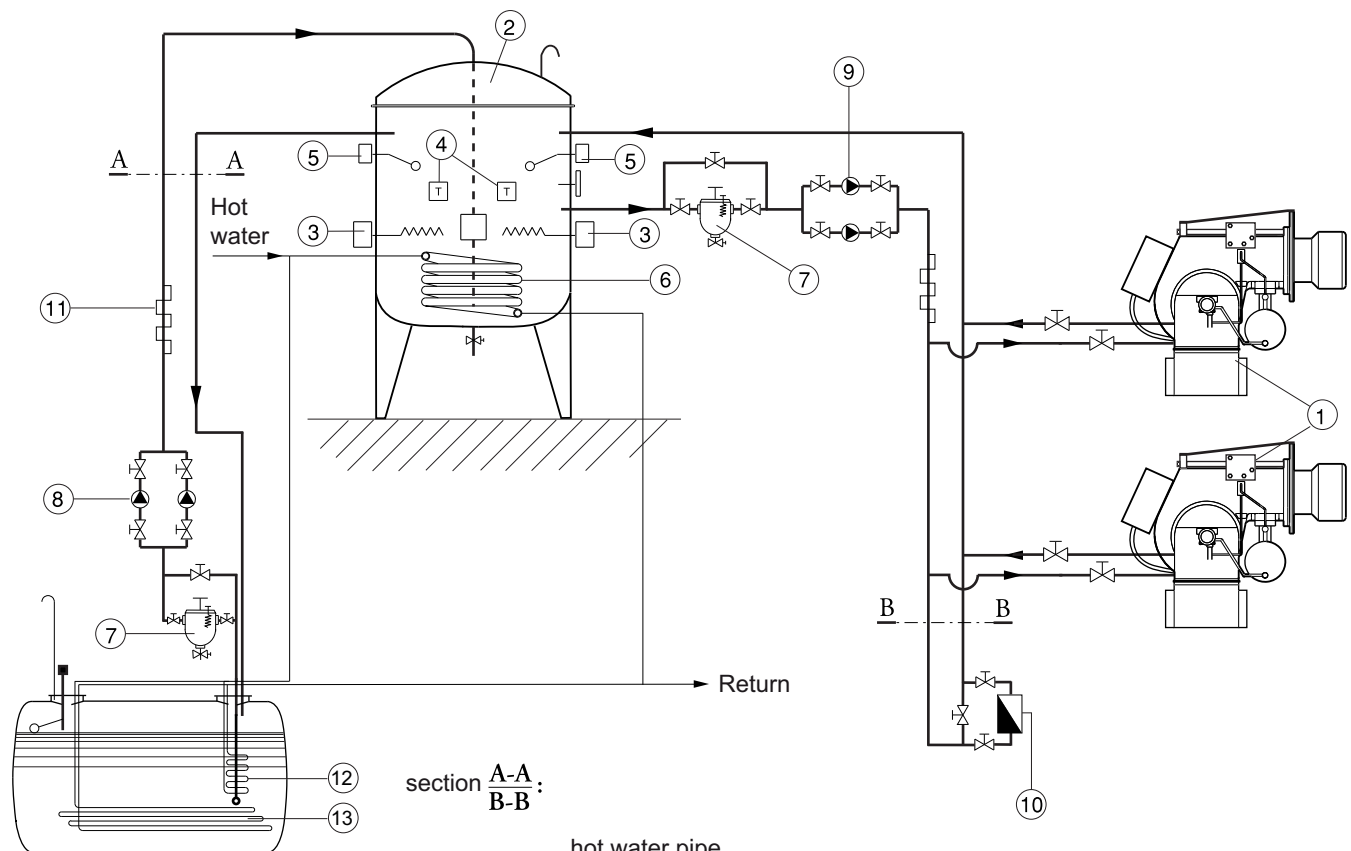
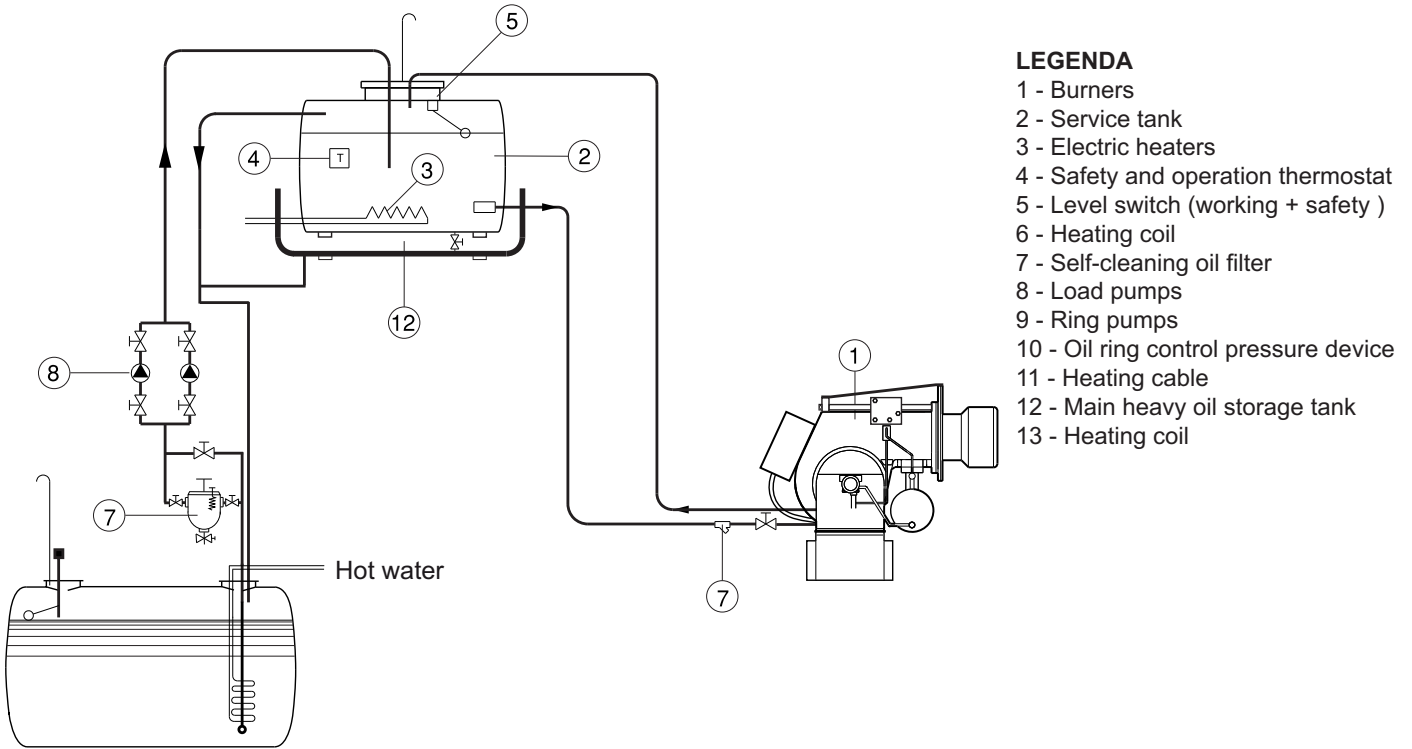
1. Inlet
2. Return
3. Bleed and pressure gauge port
4. Vacuum gauge port
5. Pressure adjustment
6. Nozzle outlet
7. Heater
8. Hose
9. Oil filter
10. Oil ball valve



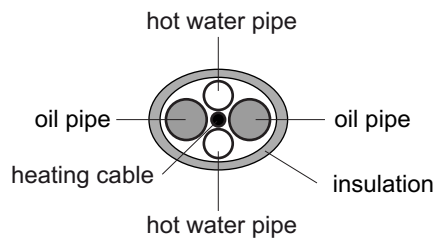
! **WARNING:** Check that the pump rotation is correct and before start up it has been pre-filled

INSTALLATION

Heavy oil preparation ring scheme



section A-A:
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

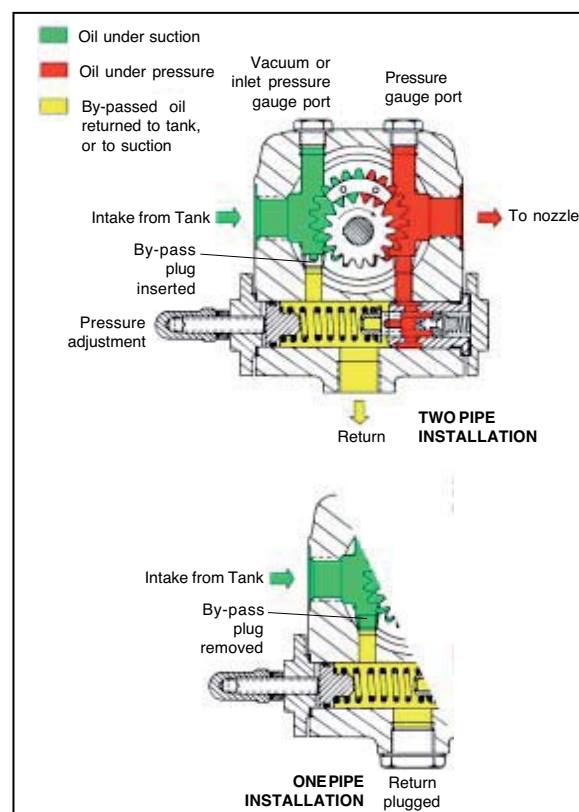
Please refer to diagram to select Ecoflam recommended nozzle for the output that is required given the output necessary in the installation.

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

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 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 qualified personnel.

The manufacturer declines all responsibility for modifications 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 multi-pole 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.

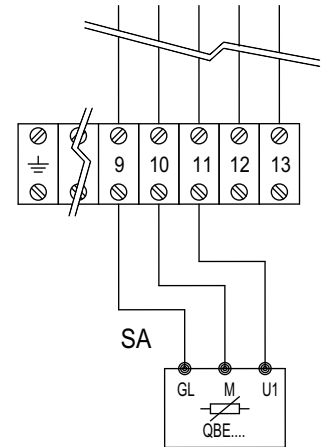
2) of the fuel oil motor-pump unit

- Connect the power circuit of the motor (hanging wires) to the plugs on the fuel oil valves.

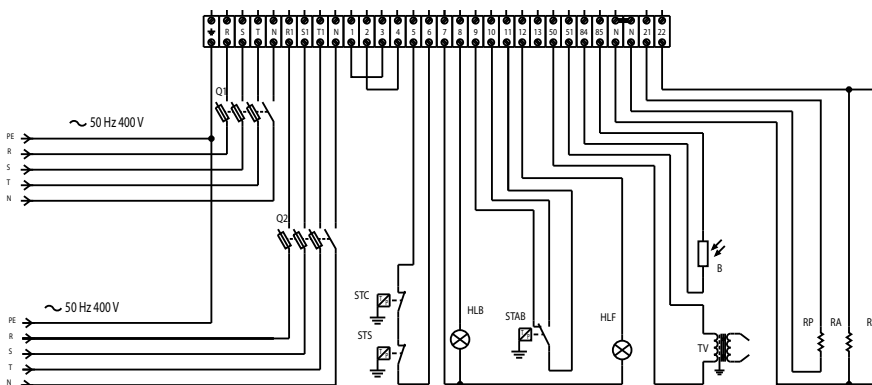
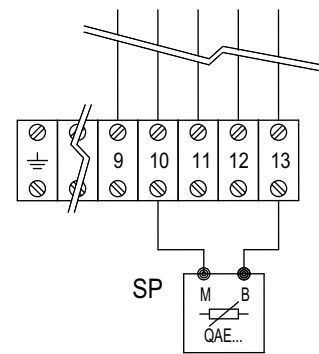
- Check proper motor rotation.

PROBES CONNECTION

ACTIVE PROBE CONNECTION (FOR MODULATING VERSION)



PASSIVE PROBE CONNECTION (FOR MODULATING VERSION)



LEGENDA

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

START-UP: CHECKING PROCEDURE

CHECKS BEFORE COMMISSIONING:

- That the burner is assembled in accordance with the instructions given here.
- Setting the combustion components.
- All electrical connections must be correct.
- Check the burner motor for correct direction of rotation.
- The heat generator must be ready for operation, and the operating regulations for the heat generator must be observed.
- The heat generator and heating system must be filled with water and the circulating pumps must be in operation.
- The temperature regulator, pressure regulator, low water detectors and any other safety or limiting devices that might be fitted must be connected and operational.
- The exhaust gas duct must be unobstructed and the secondary air system, if available, must be operational.
- An adequate supply of fresh air must be guaranteed.
- 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.

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. Safety lock-out after expiry of safety period (see control box).
- Reconnect the valve.
- 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 (Q_F) is the amount of heat supplied with the gas in a unit of time.

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

Example:

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

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

Volumetric gas flow rate at STP:

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

Volumetric gas flow rate in operating condition:

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

Recommended combustion parameters

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

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

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

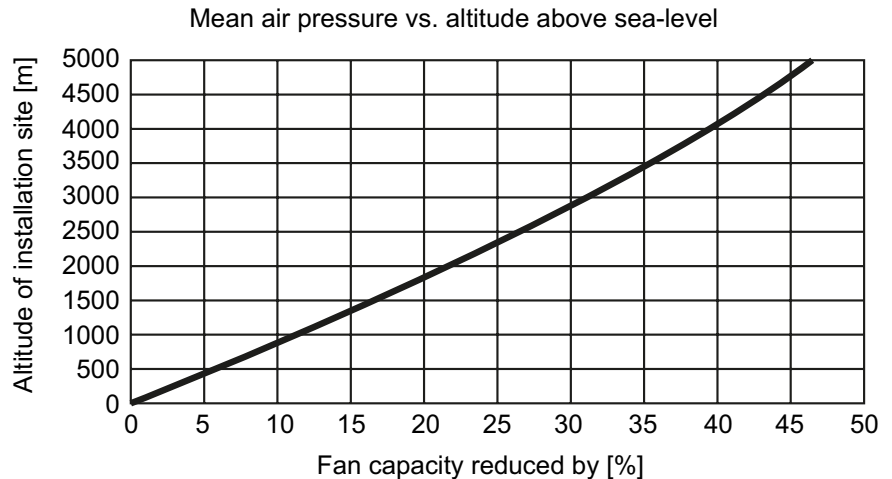
Ratio between O₂- and CO₂- for heavy oil S (CO₂max = 15,60%)

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

CO₂ gem = % CO₂ measured on dry flue gases

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

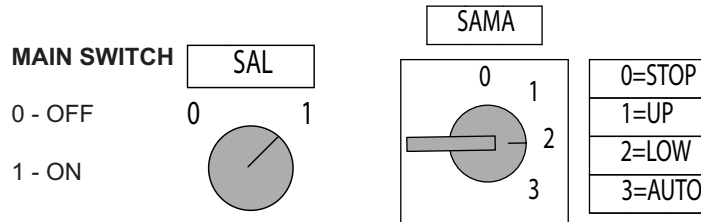
The regulation of the burner in this case shall take into account the reduced power of the burner due to the missing air.



START-UP

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.



- 0 : operating elements locked in an intermediate position.
1 : operation on maximum capacity
2 : operation on minimum capacity
3 : automatic operation



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



KMV

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 position.

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

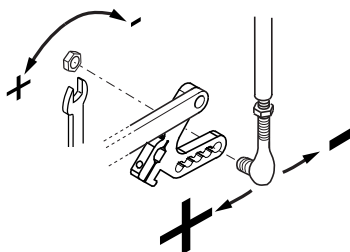
After a few seconds the control box opens the oil valve and starts the flame. After the flame stabilisation the control box drives the servomotor in the low flame.

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

Gradually go step by step using the selector on position 0 to stop the flame, from the low flame to the high flame in order to have a stable flame. For each position from 0 to 90° do oil setting adjusting oil return pressure as described in the next pages. When the servomotor arrives at 90° you have completed first tuning of air and oil flow according to the boiler capacity required. Check the combustion values and adjust the oil pressure.

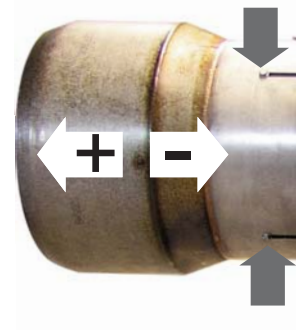
Adjusting the maximum air flow rate

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



Firing head setting

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



START-UP

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:

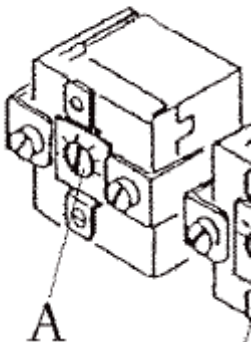
- Out 1 (113°)
- Out 2 (115°)
- Out 3 (120°)
- Out 4 (105°)

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 untill the regulator automatically goes out from "configuration level".



ADJUSTMENT OF FUEL THERMOSTATS

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

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

START-UP

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.

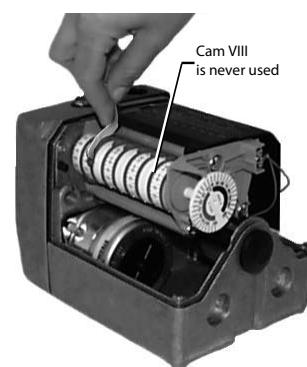
NOTE: the pump pressure is set from the factory at the pressure required nozzle pressure required as per table of nozzle selection in appendix. If the output required is different from the one set from the factory the pressure can be adjusted according to the instruction below.

Servomotor SQM50 - Air damper motor pre-setting

The cams of the servomotor are set from the factory in order to start the burner and reach the maximum output.

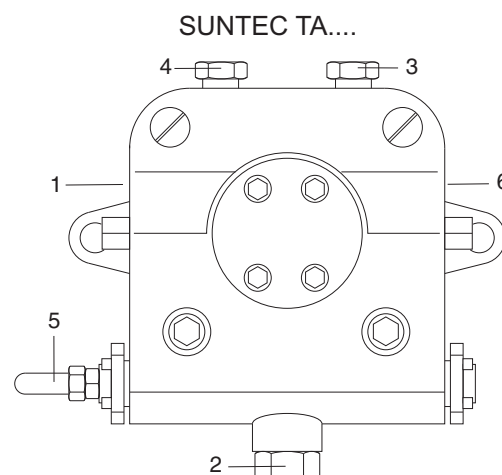
The following setting are the standard one:

- I. High flame position 90° (maximum value 70°).
- II. Air flap position in standby 0° (minimum value 0°).
- III. Ignition position 15°.
- IV. Low flame position 40° (can be modified depending on the minimum output of the boiler).
- V. To VIII not used



Adjusting the pump pressure

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



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

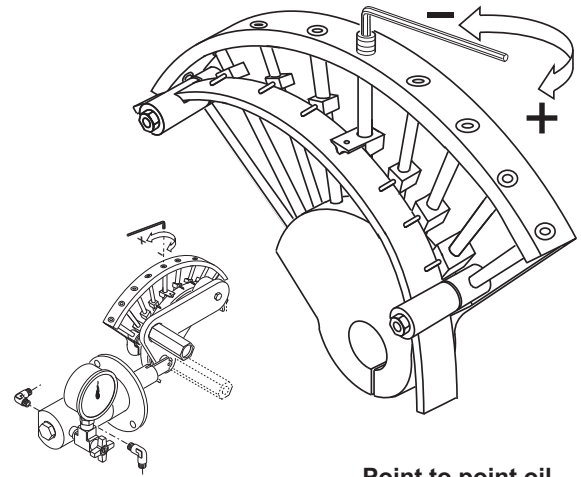
Adjusting the intermediate burner capacity

In order to adjust intermediate capacity of the burner use the selector on position 0 to stop the stroke and regulate the cam on the different screw position.

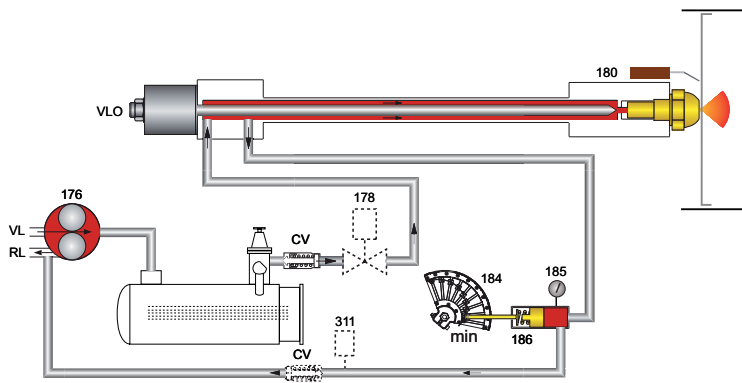
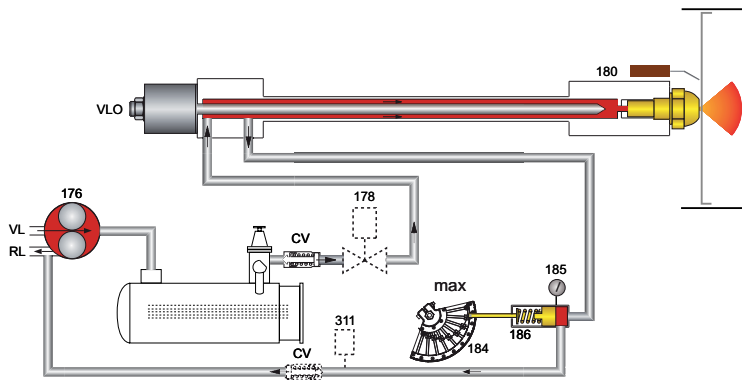
The adjustment shall be done according to the drawing in order to have the correct combustion value in each point "+/-" switch (different screw positions).

Using a suitable Allen wrench, change the position of the cam guide blade; if you screw it down, the flow rate is reduced; if you unscrew it, the flow rate increases.

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.



Point to point oil cam configuration

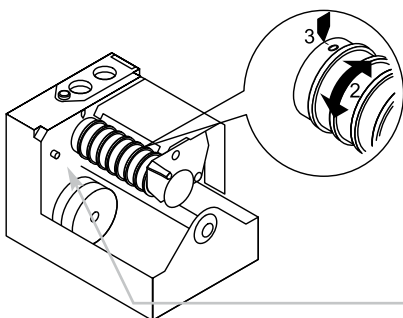


WARNING: Once the setting on the oil has been completed make sure that you close the manometer – pressure switch tap.

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

Servomotor SQM50 - Final setting



Once the point to point oil cam setting has been completed we need to set the final minimum output of the burner using the servomotor cam VI (low flame oil). Using the suitable key regulate the grades (" +/- " switch). The low flame position must be higher than the ignition position cam on the servomotor. Turn the burner off and start it again in order to check if the burner start properly otherwise adjust the ignition oil cam number IV.

OIL SETTING ENDED: switch the selector to automatic position.



WARNING: Do not use the button cam drum release button.

MAINTENANCE PROGRAM

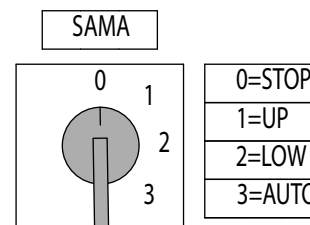
! Burner and boiler servicing must only be carried out by authorised qualified personnel at least once a year. Depending on the type of installation, shorter maintenance intervals may be necessary. The system operator is advised to take out a maintenance contract to guarantee regular servicing.

WARNING: Use original spare parts.

SAFETY WARNINGS:

1. Turn off the power supply and protect the system from accidental start-up
2. Cut oil 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
- Make visual inspection of the burner's electrical components and eliminate malfunctions if necessary
- Burner safety devices function check (air pressure/gas pressure switches)
- Commissioning the burner and correct the adjustment values if necessary

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

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

EXHAUST GAS LOSS

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

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

q_A = exhaust gas loss [%]

t_A = exhaust gas temperature [°C]

t_L = combustion air temperature [°C]

CO_2 = volumetric content of carbon dioxide [%]

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

Example

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

The exhaust gas loss can be calculated as follows:

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

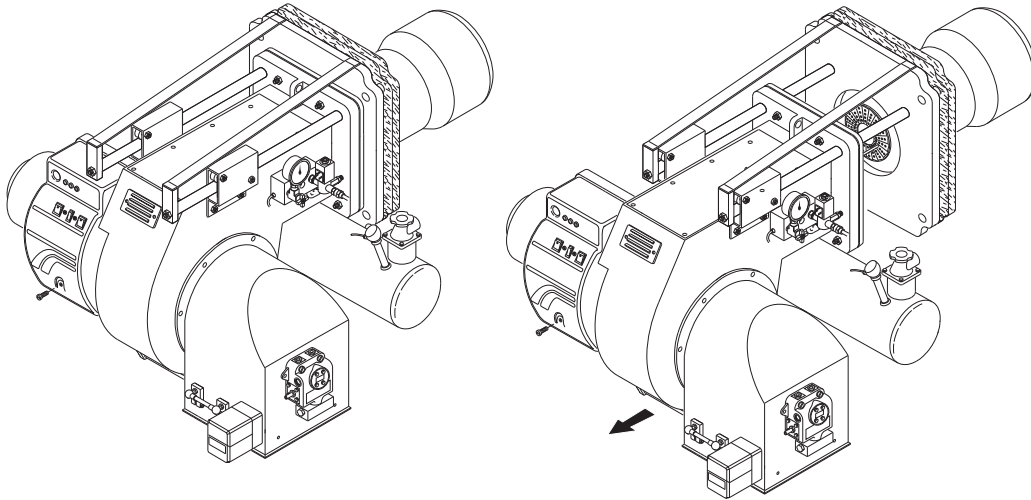
Data measured in fuel oil mode:
 CO₂ content of exhaust gases: 12,8%
 Exhaust gas temperature: 195°C
 Air intake temperature: 22°C

The exhaust gas loss can be calculated as follows:

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

MAINTENANCE PROGRAM

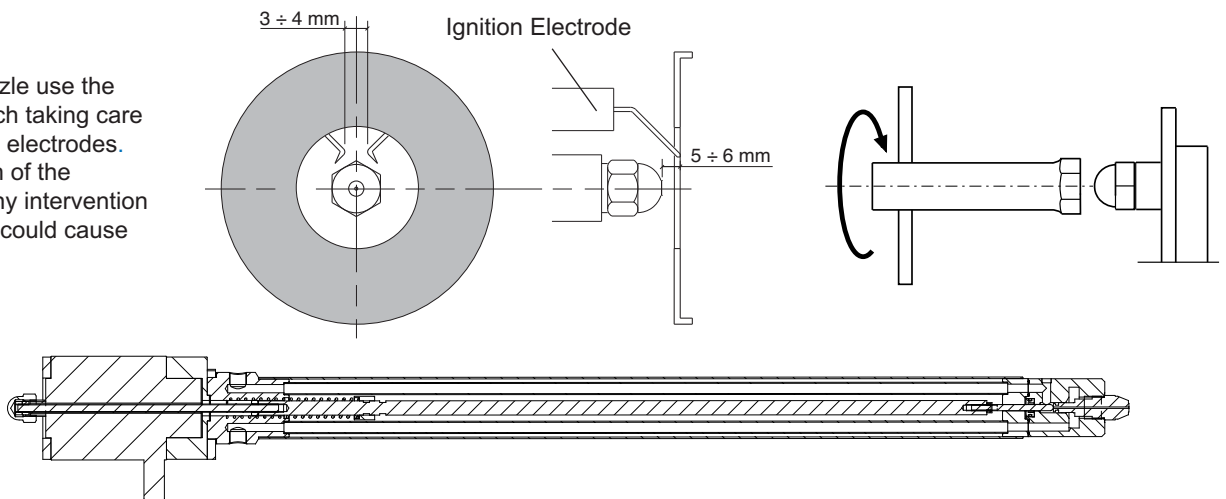
REMOVING THE FIRING HEAD



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.



OIL FILTER CLEANING



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

TROUBLESHOOTING INSTRUCTIONS

The list of faults/causes/possible solutions for a set of main failures is a guideline for professional personell authorised to carry out service and maintenance.

Irregular burner operation or malfunction: check that every adjustment parameter is correctly set as per instruction on this manual.

TROUBLESHOOTING TABLE OIL OPERATION			Burner doesn't start	Fuel pump noisy / unprimes / leaks	Burner starts with continuous pre-purge	Burner starts and then goes into lock-out	Pilot Ignition failure (1st safety time - LFL only)	Main Ignition failure (2nd safety time)	Burner lock-out after flame appearance / pulsation	Flame control repeats the cycle and doesn't give consent	Smoke in flame - dark Bacharach	Burner doesn't switch into Hi flame	Burner lock-out during operation	LFL	LAL
STATUS	CAUSES	REMEDIES													
HEAVY OIL	Preheating period too long	Check GEFTRAN controller, replace if necessary	X								X		X	YES	YES
	Defective Gefran controller	Replace control unit	X								X		X	YES	YES
PRE-START (MISSING SIGNALS)	Defective control box unit	Replace control box unit	X			X	X	X	X	X		X	X	YES	YES
	No electrical power supply Wrong electrical connections	Check switches/contactors Check connections	X											YES	YES
	Air pressure switch not "closed"	Check contacts	X											YES	YES
	Boiler thermostats open	Check contacts	X											YES	YES
	Fan motor overload intervention	Replace fuse	X											YES	YES
	Auxiliaries fuses interrupted	Replace fuse	X											YES	YES
	Servomotor [CLOSE] position switch not reach	Check servomotor settings	X											YES	YES
PRE-START (OIL PUMP)	High vacuum in oil pipe due to dirty filter	Clean filter or replace filter cartridge		X							X			YES	YES
	Burner is higher than oil tank by more than 3 m	Reduce Height or prepare a ringline pump		X							X			YES	YES
	Air in the oil pipeline	Re-tighten pipe connections		X										YES	YES
SEQUENCE START	Servomotor [OPEN] position switch not reach	Check servomotor settings			X									YES	YES
	Servomotor [MIN] position switch not reach	Check servomotor settings			X									YES	YES
	Extraneous Light	Eliminate light source				X								YES	YES
	Fuel solenoid valve fails to close (Light oil Burner - direct ignition)	Clean valves or replace if necessary				X								YES	YES
LACK OF AIR	Air pressure switch fail to connect to Terminal 14	Check contacts				X								YES	NO
	Fan contaminated/dirty	Clean fan				X					X		X	YES	NO
	Fan motor rotation direction not correct	Check direction and contactor				X					X		X	YES	NO
IGNITION & FLAME STABILISATION PERIOD	Flame supervision circuit internal test failed	Replace control unit				X								YES	NO
	Pilot flame failure - Pilot gas valves not open	Check valves contacts / replace if necessary					X							YES	NO
	Pilot flame establish - weak flame signal	Check flame sensor Replace if necessary					X							YES	NO
	Ignition transformer faulty	Replace					X	X						YES	YES
	Ignition cable & electrodes defective	Replace					X	X						YES	YES
	Electrode bad position	Check setting / replace if necessary					X	X						YES	YES
	Fuel oil solenoid valve fails to open	Check contacts and clean valves. Replace solenoid coil if necessary						X						YES	YES
ONLY FOR OIL BURNER	Air pressure switch not close, Oil pump contactor open	Check air pressure switch contacts						X						NO	YES
	No oil supply	Check shut-off valves Check Pump, replace if necessary						X						NO	YES
	Oil pump coupling broken	Replace pump unit						X						NO	YES
COMBUSTION	Flame sensor signal failure	Clean, re-position or replace if necessary				X	X	X	X				X	YES	YES
	Head adjustment not correct	Check settings							X		X		X	YES	YES
	Oil/Air mixture setting not correct	Check settings							X		X		X	YES	YES
	Dirty combustion head	Clean or replace disk if necessary							X		X		X	YES	YES
	Nozzle dirty or damaged	Clean or replace nozzle if necessary							X		X			YES	YES
	Fuel pressure inappropriate	Adjust pressure or replace pump if necessary							X		X		X	YES	YES
	Capacity reduction	Check filter, pump pressure and nozzle. Replace item if necessary									X			YES	YES
	Load control device does not close	Check load control, replace if necessary										X	X	YES	YES

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 oil in the tank. 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:

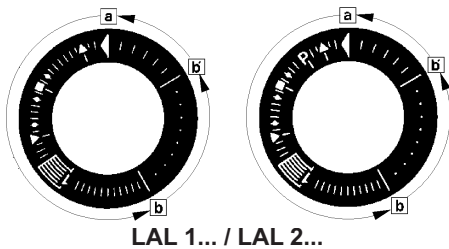
The burner will be found to be out of operation and in faulty and interlocked position. Proceed with searching for the cause of the trouble and eliminate it. Unlock the control box by pressing the fault eliminate key and start the burner.

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.

Control program in the case of trouble and fault indicator LAL 1... / LAL 2...



LAL 1... / LAL 2...

a-b Starting program

b-b' In a number of time versions; idle steps of the program unit to self-stop after burner start-up (b' = operating position of program unit)

b(b')-a After-flushing program after regular stop. In the starting position "a" the program unit will automatically stop or initiate an immediate restart of the burner, e.g. after a fault has been eliminated

- Duration of the safety period for single-tube burners
- Duration of the safety period for burners with ignition gas valve

Basically, any type of trouble will result in the immediate stop of the fuel supply. At the same time, the program unit and consequently the fault indicator will stop. The type of trouble can be identified by the symbol opposite to the reading mark of the indicator:

◀ **No start**, e.g. because the "CLOSED" signal from the "Air Damper CLOSED" limit switch is missing or a contact is not closed between terminals (12) and (4) or (4) and (5); or the contacts of all control and safety units in the controlled system are not closed (e.g. gas pressure or air pressure switches, temperature or pressure regulators).

▲ **Operating stop** because the "OPEN" signal from the "Air Damper OPEN" limit switch is missing. Check and adjust the limit switch concerned.

P **Shut-off on trouble because there is not air pressure** signal at the beginning of the air pressure check (apply only to LAL 2.25).

Any air pressure failure after this time will also lead to a shut-off on trouble.

■ **Shut-off on trouble** because of a fault in the flame monitoring circuit.

▼ **Operating stop** because the position signal of the "Partial Load" limit switch (air damper in "Partial Load" position) is not available on terminal (8). Check and adjust the limit switch concerned.

1 **Shut-off on trouble** because a flame signal is not available on the expiry of the (1st) safety time.

Any failure of the flame signal on the expiry of the safety time will also lead to a shut-off on trouble.

| **Shut-off on trouble** because the flame signal failed during burner operation or a lack of air has occurred.

◀ **Shut-off on trouble** during or after the control program flow due to external light (e.g. by flame not extinguished, leaking fuel valves) or a faulty flame signal (e.g. fault in flame monitoring circuit, or similar); see flame monitor.

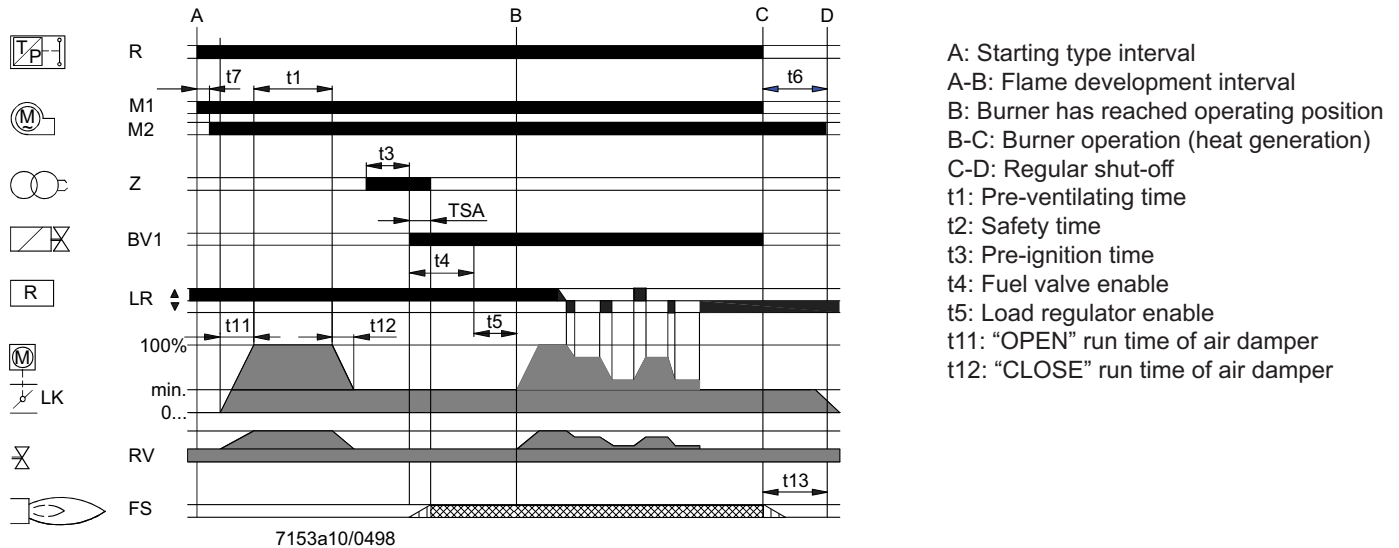
If the shut-off on trouble occurs at any other time between start and pre-ignition that is not identified by a symbol as above, this will normally be due to an early flame signal which is considered to be a faulty flame signal.

The automatic furnace controller may be unlocked immediately after a shut-off on trouble using the unlock button with integrated fault signal lamp or an external switch. After it has been unlocked (and after a defect with resultant operating stop has been eliminated and after a voltage failure), the program unit will in any case return to its starting position with voltage being only supplied to terminals 7, 9, 10 and 11 as preset by the control program. It is only at this stage that the program of the automatic furnace controller will restart the burner.

APPENDIX

Control box - Damper actuators

CONTROL BOX LAL...



BV: Fuel valve

FS: Flame signal amplifier

LK: Air damper

LR: Load controller

M: Fan or burner motor

R: Control thermostat or pressurestat

RV: Modulating fuel valve

Z: Ignition transformer

DAMPER ACTUATORS SQM50...

Description

The SQM actuator is intended for use with two-stage sliding or modulating oil, gas or dual-fuel burners. The reversible actuator is fitted with a synchronous motor which drives a shaft via a gearbox. The shaft end carries a coupling to drive the fuel and combustion air controlling element.

The SQM actuator has been designed for dual-wire control by controller or switching units with change-over contacts.

Potentiometers can be installed for a range of applications on customer's request.

The limit and auxiliary switches are set by means of manually adjustable latching cam plates. Scales are fitted between the disks to facilitate the selection of the switching points.

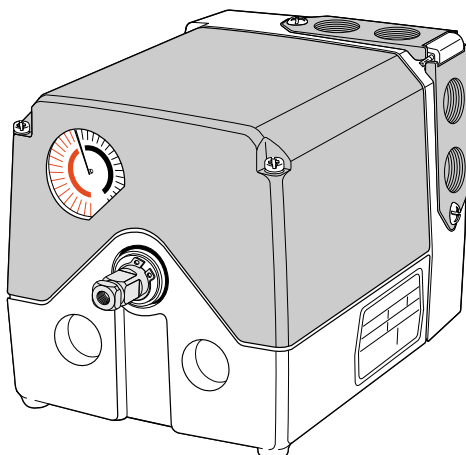
The cam plates are provided with a small pointer for indicating the switching point of a scale between the setting ranges.

An additional scale fitted to the end of the cam roller serves to indicate the position of the actuator.

The drive unit may be disconnected from the controlling element by changing over a rocker arm mounted to the gearbox.

This will allow any desired position of the controller plate to be selected by hand. Drive and output will be coupled in the vertical position of the rocker arm.

The fuel-air curve should be set over the full range of the cam plate so that operating safety will be retained also when the limit switch is overrun.



APPENDIX

Fluidics nozzle chart



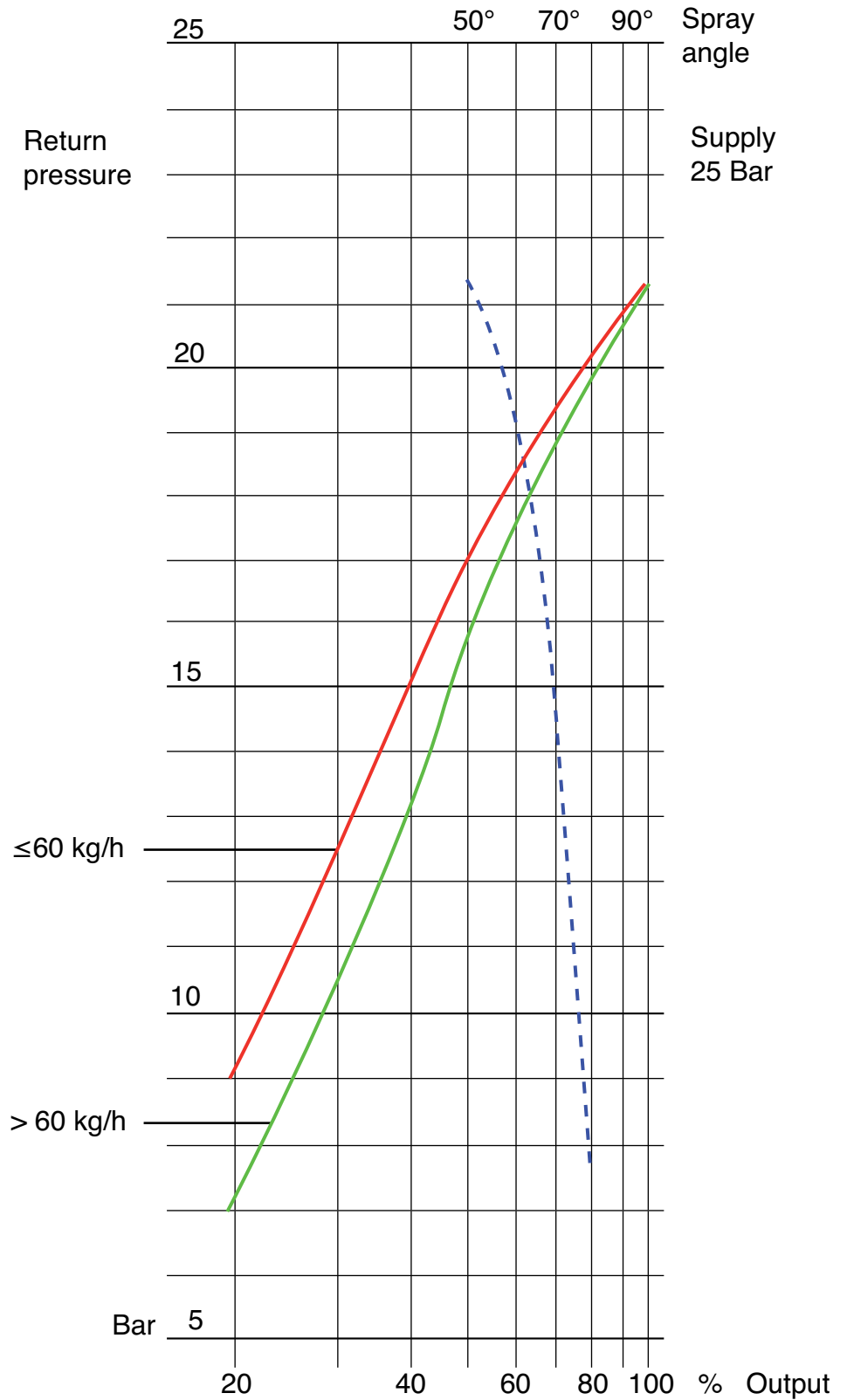
RETURN NOZZLE

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).



APPENDIX

Bergonzo nozzle tables

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	62	75	90										
100	B	25	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	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	170	168	150	135										
125	A	30	25	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	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	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	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	200	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	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	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	445	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	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

APPENDIX

Bergonzo nozzle tables

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	350		
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	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	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			

B = pump output

A = nozzle output

Output [kg/h]

Supply: 25 bar

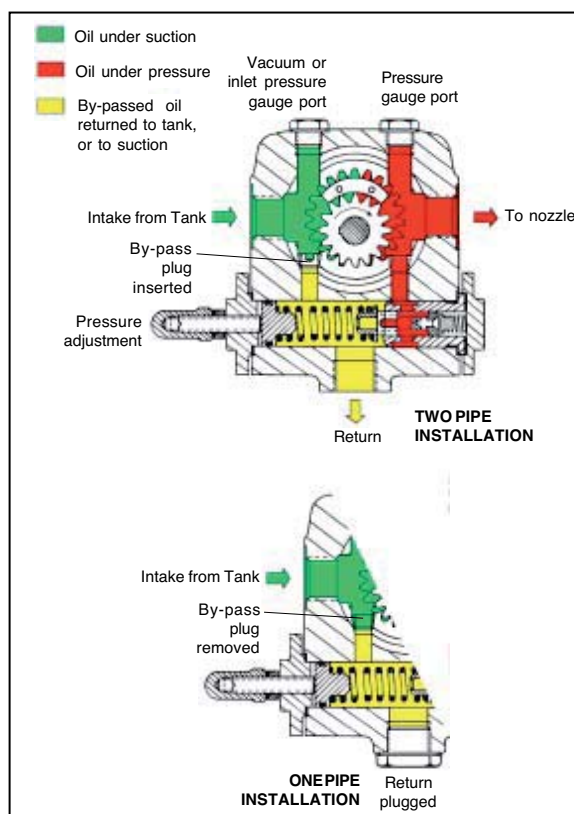
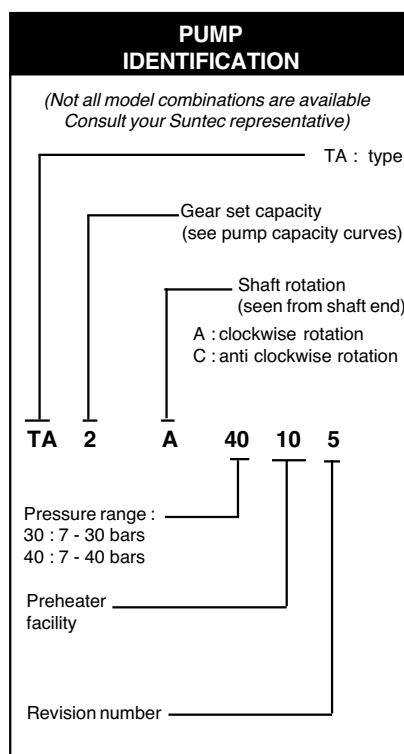
APPENDIX

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.



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) 6 kg (TA4)	5,7 kg (TA3) 6,4 kg (TA5)

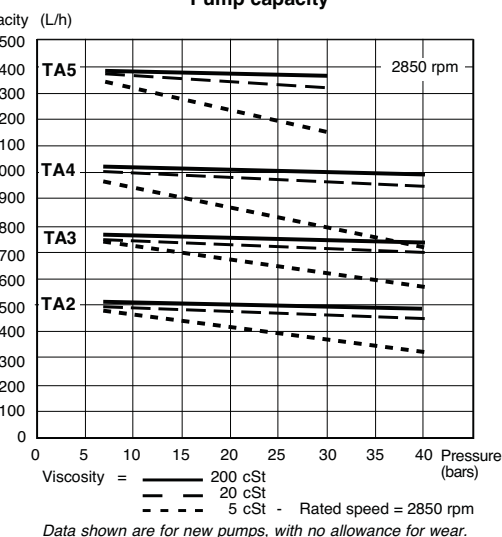
Hydraulic data

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

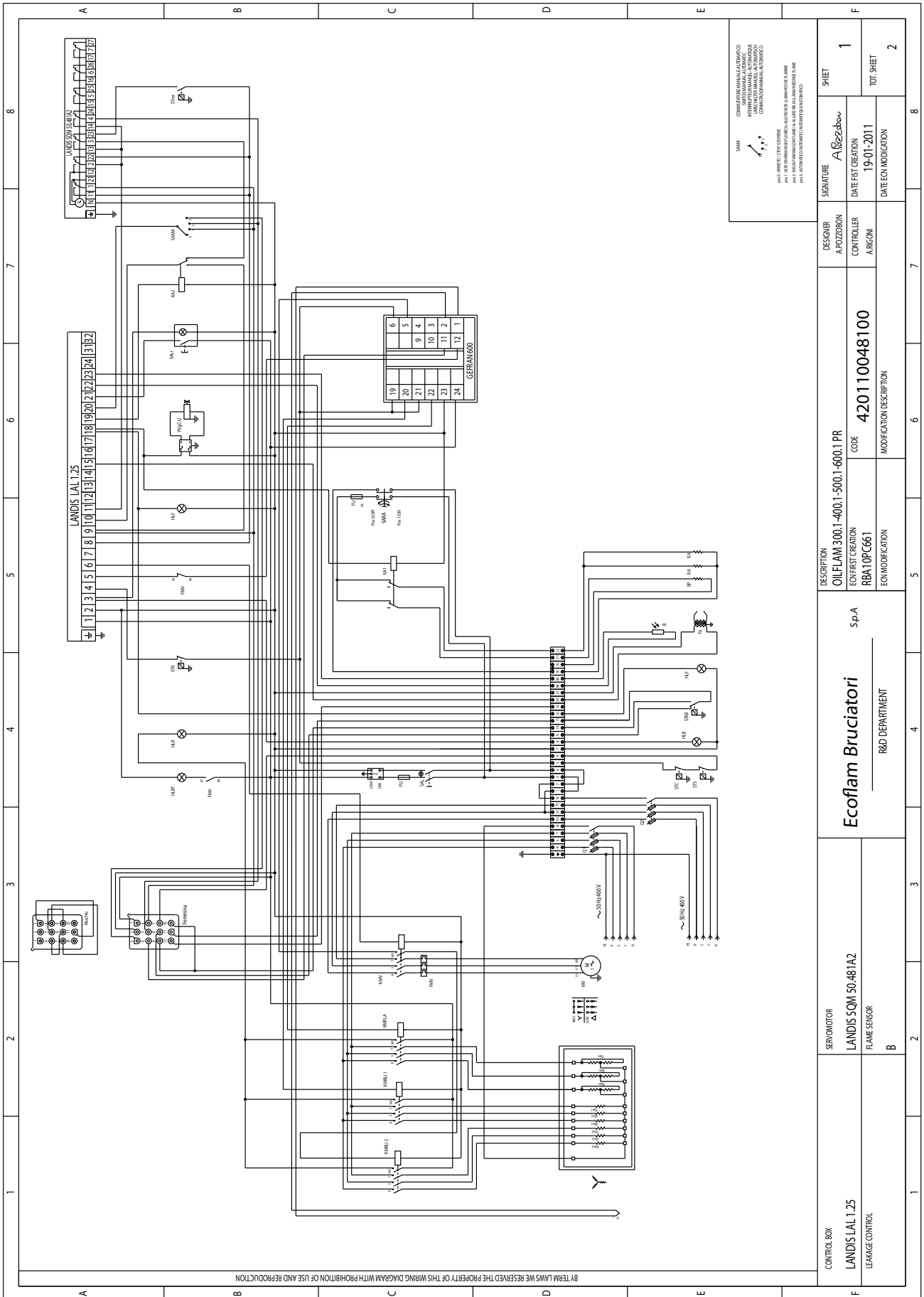
Cartridge	Ø 12 mm
Fitting	according to DIN 40430, NFC 68190 (N°9 elec.)
Rating	80-100 W

Pump capacity



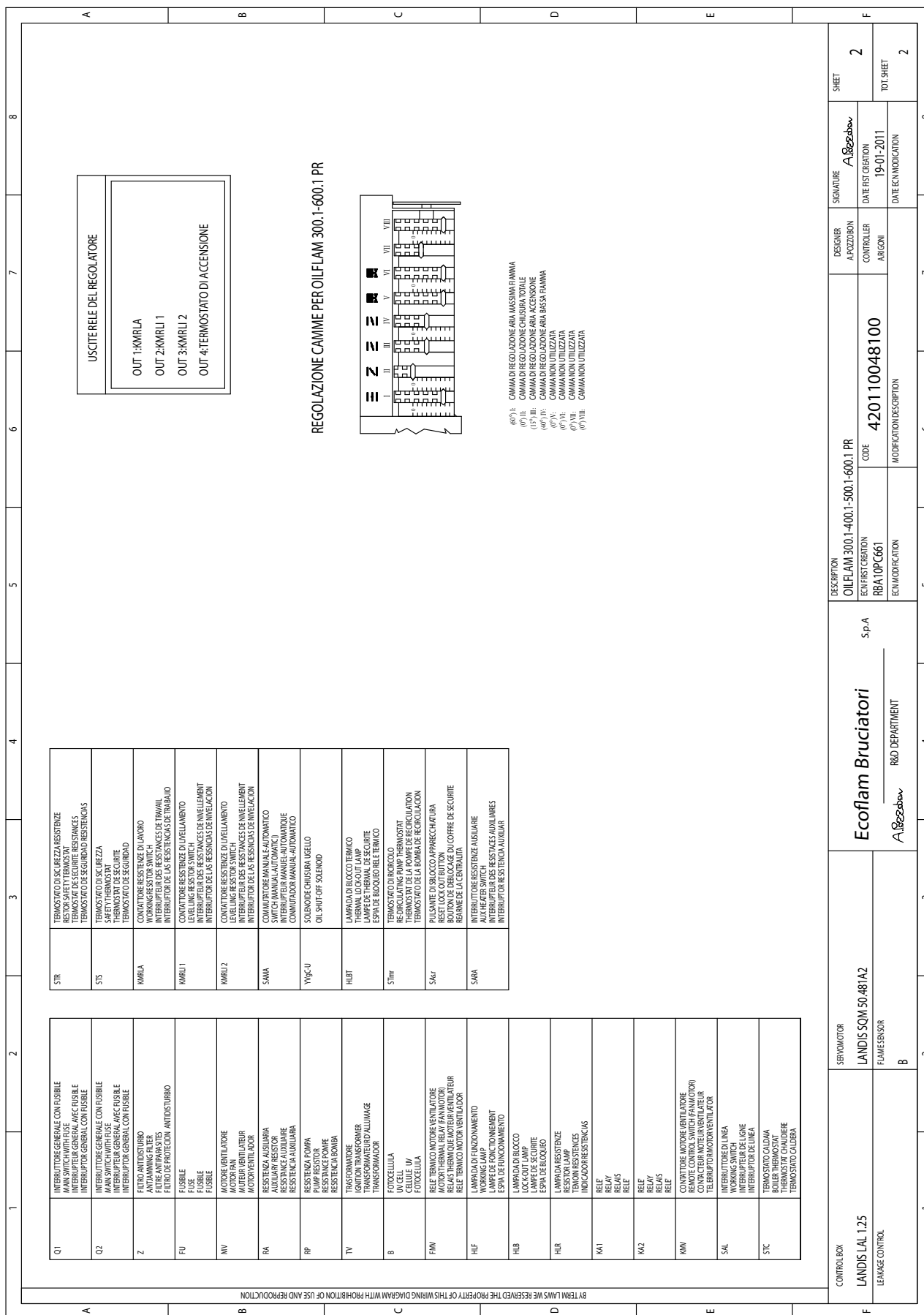
APPENDIX

Electrical diagrams



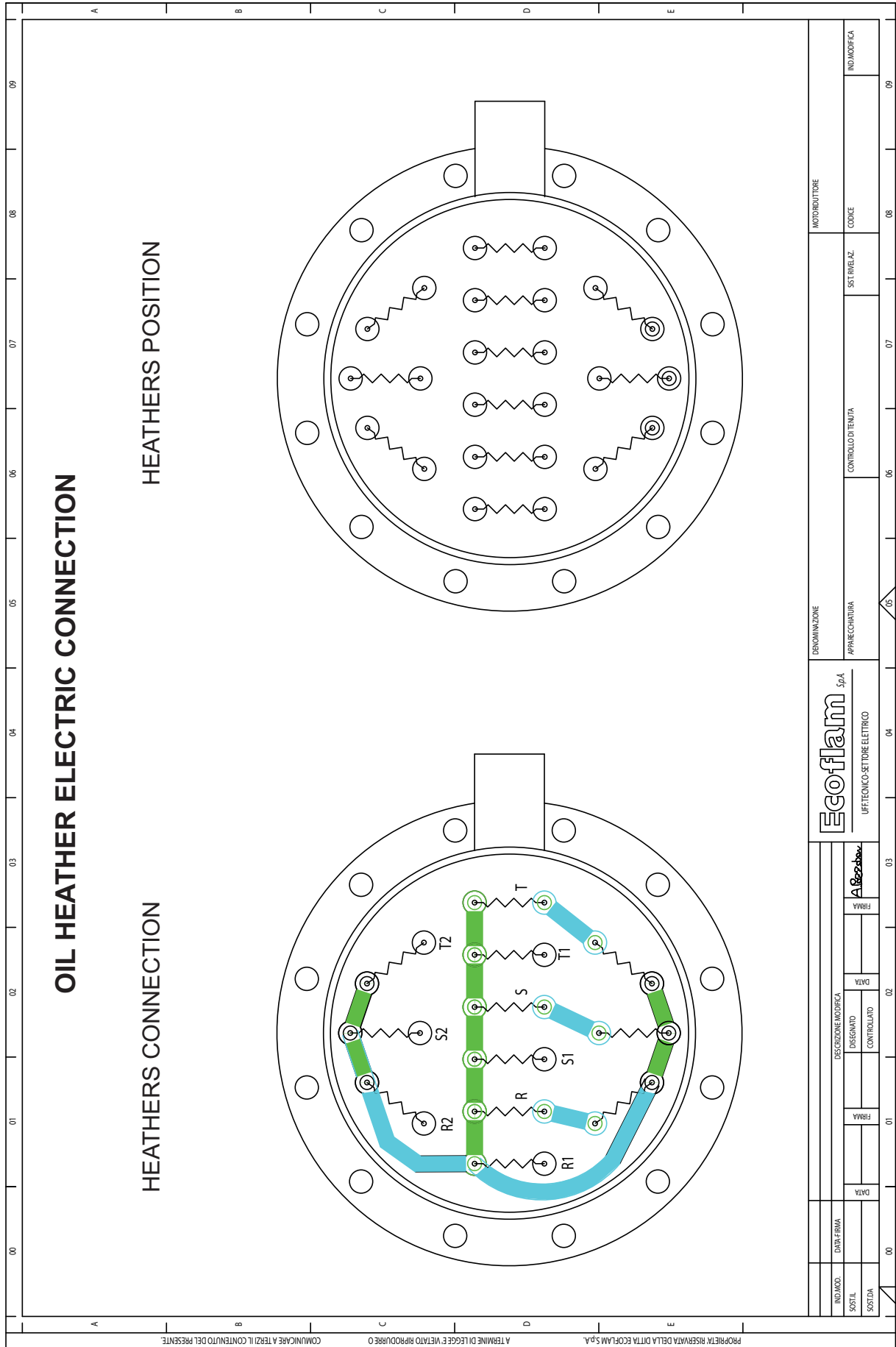
APPENDIX

Electrical diagrams



APPENDIX

Electrical diagrams



APPENDIX

Spare parts list

N°	DESCRIPTION		OILFLAM 300.1 PR	OILFLAM 400.1 PR
			code	code
1	PUMP	SUNTEC TA3C40107	65322992	65322992
2	HEATING ELEMENT PUMP	50 W	65323072	65323072
3	HOSES	25 x1500	65323181	65323181
4	COIL	EL011	65323809	65323809
5	CONETTORE BOBINA	EL011	65323571	65323571
6	MANOMETER		65324105	65324105
7	COVER		65320678	65320678
8	GLASS		65320487	65320487
9	PEEP WINDOW FRAME		65320488	65320488
10	MOTOR	7500 W	65325350	-
		9000 W	-	65322855
11	CONTROL BOX BASE	LANDIS	65320097	65320097
12	CONTROL BOX	LAL1.25 Tv22"	65320052	65320052
13	RELAY	2	65323139	65323139
14	RELAY BASE	2	65323149	65323149
15	RELAY	2	65323139	65323139
16	RELAY BASE	2	65323149	65323149
17	REMOTE CONTROL SWITCH	AEG LS4K.00	65323133	65324097
		AEG LS7K.10	65324097	65324097
18	REMOTE CONTROL SWITCH MOTOR	AEG LS15K.00	65323136	65323136
19	MOTOR THERMAL RELAY	AEG 15-23A	65323120	65323120
20	TIMER		-	-
21	TIMER BASE		-	-
22	ANTIJAMMING FILTER		65323170	65323170
23	ADJUSTMENT OF FUEL TEMPERATURE	Gefran mod. TC6MD2JBC	65322045	65322045
24	MAIN SWITCH	COMEPI art.EC	65324098	65324098
25	MANUAL/AUTOMATIC SELECTOR	GIOVENZANA A.C01600029	65323063	65323063
26	LAMP	LYVIA 10x28 BA9S	65324100	65324100
27	RESET SWITCH	COMEPI art.ECX1201	65324101	65324101
28	IGNITION TRANSFORMER	BRAHMA T8	65323222	65323222
29	PHOTORESISTOR	LANDIS QRB1A	65320076	65320076
30	FAN	320 x150	65321800	65321800
31	AIR CONVEYOR		65320645	65320645
32	FLAP		-	65320627
33	COVER AIR INLET		65320560	65320560
34	AIR DAMPER MOTOR	SQM50.481A2	65322902	65322902
35	THERMOCOUPLE	TC6MD2JBC	65322046	65322046
36	FILTER	U21008/01	65323158	65323158
37	HEATER	18 kW	65323088	-
		21 kW	-	65323089
38	OIL TANK		65321163	65321163
39	CABLE	TC	65320946	65320946
		TL	65320948	65320948
40	RING		65321721	65321721
41	SPRING HOLDER		65321720	65321720
42	FIRING HEAD	TC	65324844	65324844
		TL	65324266	65324266
43	PIPE	TC	65324887	65324887
		TL	65325098	65325098
44	DIFFUSER SUPPORT HOLDER		65324888	65324888
45	ROD NOZZLE HOLDER	TC	65324897	65324897
		TL	65324268	65324268
46	ELECTRODES		65322323	65322323
47	NOZZLE HOLDER		65320709	65320709

TC = SHORT HEAD TL = LONG HEAD

APPENDIX

Spare parts list

			OILFLAM 300.1 PR	OILFLAM 400.1 PR
N°	DESCRIPTION		code	code
48	DIFFUSER		65320785	65325097
49	BLAST TUBE	TC	65324790	65320442
		TL	65320445	65320443
50	BLAST TUBE END		65320446	65320444
51	ASSEMBLY FIRING HEAD			
52	GASKET		65321130	65321130
53	GASKET		65321132	65321133
54	GASKET		65321134	65321134
55	SILENCER		65324107	65324107
56	FILTER	70501/03	65324103	65324103
57	ROD		65321463	65321463
58	COUPLING (FAN)		65321789	65321789
59	UNION (FAN)		65321791	65321791
60	COUPLING		65321790	65321790
61	COUPLING		65321782	65321782
62	UNION (PUMP)		65321786	65321786
63	COUPLING (PUMP)		65324165	65324165
64	THERMOSTAT	IMIT TR2 40/200	65323147	65323147
65	ADJUSTMENT PRESSURE	B-P-PRO-2 070H0136	65323165	-
		B-P-PRO-2 070H0138	-	65323166
66	SWITCH	COMEPI art.E	65324278	65324278
67	PREHEATED'S AUX. RESISTOR HOLDER		65321716	65321716
68	FIXING PLATE		65321717	65321717
69	HEATING ELEMENT	30 W	65324207	65324207
70	CHECK VALVE	NAFTA ART. FZVR10 3/8	65322205	65322205
71	OIL CAM GROUP		65322356	65322356

TC = SHORT HEAD TL = LONG HEAD

Ecoflam

Ecoflam Bruciatori S.p.A.

Via Roma, 64 - 31023 Resana (TV) - Italy

Tel. +39 0423 719500

Fax +39 0423 719580

<http://www.ecoflam-burners.com>

e-mail: export@ecoflam-burners.com

Società soggetta alla direzione e al coordinamento di Ariston Thermo S.p.A.

Via A. Merloni, 45 - 60044 Fabriano (AN) - CF 01026940427

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