

PBY1025
PBY1030
PBY1040

Progressive, Fully-modulating
Heavy oil Burners

MANUAL OF INSTALLATION - USE - MAINTENANCE

***CIB* UNIGAS**

BURNERS - BRUCIATORI - BRULERS - BRENNER - QUEMADORES - ГОРЕЛКИ

DANGERS, WARNINGS AND NOTES OF CAUTION

THIS MANUAL IS SUPPLIED AS AN INTEGRAL AND ESSENTIAL PART OF THE PRODUCT AND MUST BE DELIVERED TO THE USER.

INFORMATION INCLUDED IN THIS SECTION ARE DEDICATED BOTH TO THE USER AND TO PERSONNEL FOLLOWING PRODUCT INSTALLATION AND MAINTENANCE.

THE USER WILL FIND FURTHER INFORMATION ABOUT OPERATING AND USE RESTRICTIONS, IN THE SECOND SECTION OF THIS MANUAL. WE HIGHLY RECOMMEND TO READ IT.

CAREFULLY KEEP THIS MANUAL FOR FUTURE REFERENCE.

1) GENERAL INTRODUCTION

- The equipment must be installed in compliance with the regulations in force, following the manufacturer's instructions, by qualified personnel.
- Qualified personnel means those having technical knowledge in the field of components for civil or industrial heating systems, sanitary hot water generation and particularly service centres authorised by the manufacturer.
- Improper installation may cause injury to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Remove all packaging material and inspect the equipment for integrity. In case of any doubt, do not use the unit - contact the supplier.

The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc), should not be left within the reach of children, as they may prove harmful.

- Before any cleaning or servicing operation, disconnect the unit from the mains by turning the master switch OFF, and/or through the cut-out devices that are provided.
- Make sure that inlet or exhaust grilles are unobstructed.
- In case of breakdown and/or defective unit operation, disconnect the unit. Make no attempt to repair the unit or take any direct action.

Contact qualified personnel only.

Units shall be repaired exclusively by a servicing centre, duly authorised by the manufacturer, with original spare parts and accessories.

Failure to comply with the above instructions is likely to impair the unit's safety.

To ensure equipment efficiency and proper operation, it is essential that maintenance operations are performed by qualified personnel at regular intervals, following the manufacturer's instructions.

- When a decision is made to discontinue the use of the equipment, those parts likely to constitute sources of danger shall be made harmless.
- In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.
- This unit shall be employed exclusively for the use for which it is meant. Any other use shall be considered as improper and, therefore, dangerous.

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer. The occurrence of any of the following circumstances may cause explosions, polluting unburnt gases (example: carbon monoxide CO), burns, serious harm to people, animals and things:

- Failure to comply with one of the WARNINGS in this chapter
- Incorrect handling, installation, adjustment or maintenance of the burner
- Incorrect use of the burner or incorrect use of its parts or optional supply

2) SPECIAL INSTRUCTIONS FOR BURNERS

- The burner should be installed in a suitable room, with ventilation openings complying with the requirements of the regulations in force, and sufficient for good combustion.
- Only burners designed according to the regulations in force should be used.
- This burner should be employed exclusively for the use for which it was designed.
- Before connecting the burner, make sure that the unit rating is the same as delivery mains (electricity, gas oil, or other fuel).
- Observe caution with hot burner components. These are, usually, near to the flame and the fuel pre-heating system, they become hot during the unit operation and will remain hot for some time after the burner has stopped.

When the decision is made to discontinue the use of the burner, the user shall have qualified personnel carry out the following operations:

- a Remove the power supply by disconnecting the power cord from the mains.
- b Disconnect the fuel supply by means of the hand-operated shut-off valve and remove the control handwheels from their spindles.

Special warnings

- Make sure that the burner has, on installation, been firmly secured to the appliance, so that the flame is generated inside the appliance fire-box.
- Before the burner is started and, thereafter, at least once a year, have qualified personnel perform the following operations:
 - a set the burner fuel flow rate depending on the heat input of the appliance;
 - b set the flow rate of the combustion-supporting air to obtain a combustion efficiency level at least equal to the lower level required by the regulations in force;
 - c check the unit operation for proper combustion, to avoid any harmful or polluting unburnt gases in excess of the limits permitted by the regulations in force;
 - d make sure that control and safety devices are operating properly;
 - e make sure that exhaust ducts intended to discharge the products of combustion are operating properly;
 - f on completion of setting and adjustment operations, make sure that all mechanical locking devices of controls have been duly tightened;
 - g make sure that a copy of the burner use and maintenance instructions is available in the boiler room.
- In case of a burner shut-down, reset the control box by means of the RESET pushbutton. If a second shut-down takes place, call the Technical Service, **without trying to RESET further**.
- The unit shall be operated and serviced by qualified personnel only, in compliance with the regulations in force.

3) GENERAL INSTRUCTIONS DEPENDING ON FUEL USED

3a) ELECTRICAL CONNECTION

- For safety reasons the unit must be efficiently earthed and installed as required by current safety regulations.
- It is vital that all safety requirements are met. In case of any doubt, ask for an accurate inspection of electrics by qualified personnel, since the manufacturer cannot be held liable for damages that may be caused by failure to correctly earth the equipment.
- Qualified personnel must inspect the system to make sure that it is adequate to take the maximum power used by the equipment shown on the equipment rating plate. In particular, make sure that the system cable cross section is adequate for the power absorbed by the unit.
- No adaptors, multiple outlet sockets and/or extension cables are permitted to connect the unit to the electric mains.
- An omnipolar switch shall be provided for connection to mains, as required by the current safety regulations.
- The use of any power-operated component implies observance of a few basic rules, for example:
 - do not touch the unit with wet or damp parts of the body and/or with bare feet;
 - do not pull electric cables;
 - do not leave the equipment exposed to weather (rain, sun, etc.) unless expressly required to do so;
 - do not allow children or inexperienced persons to use equipment;
- The unit input cable shall not be replaced by the user. In case of damage to the cable, switch off the unit and contact qualified personnel to replace. When the unit is out of use for some time the electric switch supplying all the power-driven components in the system (i.e. pumps, burner, etc.) should be switched off.

3b) FIRING WITH GAS, LIGHT OIL OR OTHER FUELS

GENERAL

- The burner shall be installed by qualified personnel and in compliance with regulations and provisions in force; wrong installation can cause injuries to people and animals, or damage to property, for which the manufacturer cannot be held liable.
- Before installation, it is recommended that all the fuel supply system pipes be carefully cleaned inside, to remove foreign matter that might impair the burner operation.
- Before the burner is commissioned, qualified personnel should inspect the following:
 - a the fuel supply system, for proper sealing;
 - b the fuel flow rate, to make sure that it has been set based on the firing rate required of the burner;
 - c the burner firing system, to make sure that it is supplied for the designed fuel type;
 - d the fuel supply pressure, to make sure that it is included in the range shown on the rating plate;
 - e the fuel supply system, to make sure that the system dimensions are adequate to the burner firing rate, and that the system is equipped with all the safety and control devices required by the regulations in force.
- When the burner is to remain idle for some time, the fuel supply tap or taps should be closed.

SPECIAL INSTRUCTIONS FOR USING GAS

Have qualified personnel inspect the installation to ensure that:

- a the gas delivery line and train are in compliance with the regulations and provisions in force;
- b all gas connections are tight;
- c the boiler room ventilation openings are such that they ensure the air supply flow required by the current regulations, and in any case are sufficient for proper combustion.
- Do not use gas pipes to earth electrical equipment.
- Never leave the burner connected when not in use. Always shut the gas valve off.
- In case of prolonged absence of the user, the main gas delivery valve to the burner should be shut off.

Precautions if you can smell gas

- a do not operate electric switches, the telephone, or any other item likely to generate sparks;
- b immediately open doors and windows to create an air flow to purge the room;
- c close the gas valves;
- d contact qualified personnel.
- Do not obstruct the ventilation openings of the room where gas appliances are installed, to avoid dangerous conditions such as the development of toxic or explosive mixtures.

DIRECTIVES AND STANDARDS

Gas burners

European directives

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Light oil burners

European directives

- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 267-2011 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
- CEI EN 60335-2-102 (Household and similar electrical appliances. Safety. Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections).
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

National Standard

- UNI 7824 (Atomizing burners of the monobloc type. Characteristics and test methods)

Heavy oil burners

European Directives

- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 267 (Automatic forced draught burners for liquid fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
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- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

Norme nazionali / National Standard

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Gas - Light oil burners

European Directives

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
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Gas - Heavy oil burners

European directives:

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- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- UNI EN 676 (Automatic forced draught burners for gaseous fuels)
- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- CEI EN 60335-1 (Specification for safety of household and similar electrical appliances);
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- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);

National Standard

- UNI 7824 (Atomizing burners of the monobloc type. Characteristics and test methods.

Industrial burners

European directives

- Regulation 2016/426/UE (appliances burning gaseous fuels)
- 2014/35/UE (Low Tension Directive)
- 2014/30/UE (Electromagnetic compatibility Directive)
- 2006/42/EC (Machinery Directive)

Harmonized standards

- EN 55014-1 (Electromagnetic compatibility- Requirements for household appliances, electric tools and similar apparatus)
- EN 746-2 (Industrial thermoprocessing equipment - Part 2: Safety requirements for combustion and fuel handling systems)
- UNI EN ISO 12100:2010 (Safety of machinery - General principles for design - Risk assessment and risk reduction);
- EN 60204-1:2006 (Safety of machinery – Electrical equipment of machines.)
- EN 60335-2 (Electrical equipment of non-electric appliances for household and similar purposes. Safety requirements)

Burner data plate

For the following information, please refer to the data plate:

- burner type and burner model: must be reported in any communication with the supplier
- burner ID (serial number): must be reported in any communication with the supplier
- date of production (year and month)
- information about fuel type and network pressure

Type	--
Model	--
Year	--
S.Number	--
Output	--
Oil Flow	--
Fuel	--
Category	--
Gas Pressure	--
Viscosity	--
El.Supply	--
El.Consump.	--
Fan Motor	--
Protection	--
Drwaing n°	--
P.I.N.	--

SYMBOLS USED



WARNING!

Failure to observe the warning may result in irreparable damage to the unit or damage to the environment



DANGER!

Failure to observe the warning may result in serious injuries or death.



WARNING!

Failure to observe the warning may result in electric shock with lethal consequences

Figures, illustrations and images used in this manual may differ in appearance from the actual product.

PART I: INSTALLATION

GENERAL FEATURES

This particular burner series has been studied to use compressed air or alternatively steam, to atomize heavy oil. In this way we have achieved higher efficiency compared to mechanical atomization. These burners are equipped with a low pressure nozzle which permits to save fuel and, above all, to preserve the whole system. All burners are progressive type, complete with electrical panel, with self cleaning nozzle system and oil pump motor to be separately installed by the final user. A supplying system of compressed air and steam at 8 bar must be provided on the site. All burners are ignited by means of a pilot flame burning LPG or Natural gas. The standard version of the burner uses compressed air to atomize oil fuel. If compressed air is not available on site, it is possible to use steam to atomize oil fuel by using a special kit. In any case compressed air is essential: to ignite the burner when steam is not available, to control valves and for self cleaning nozzle.

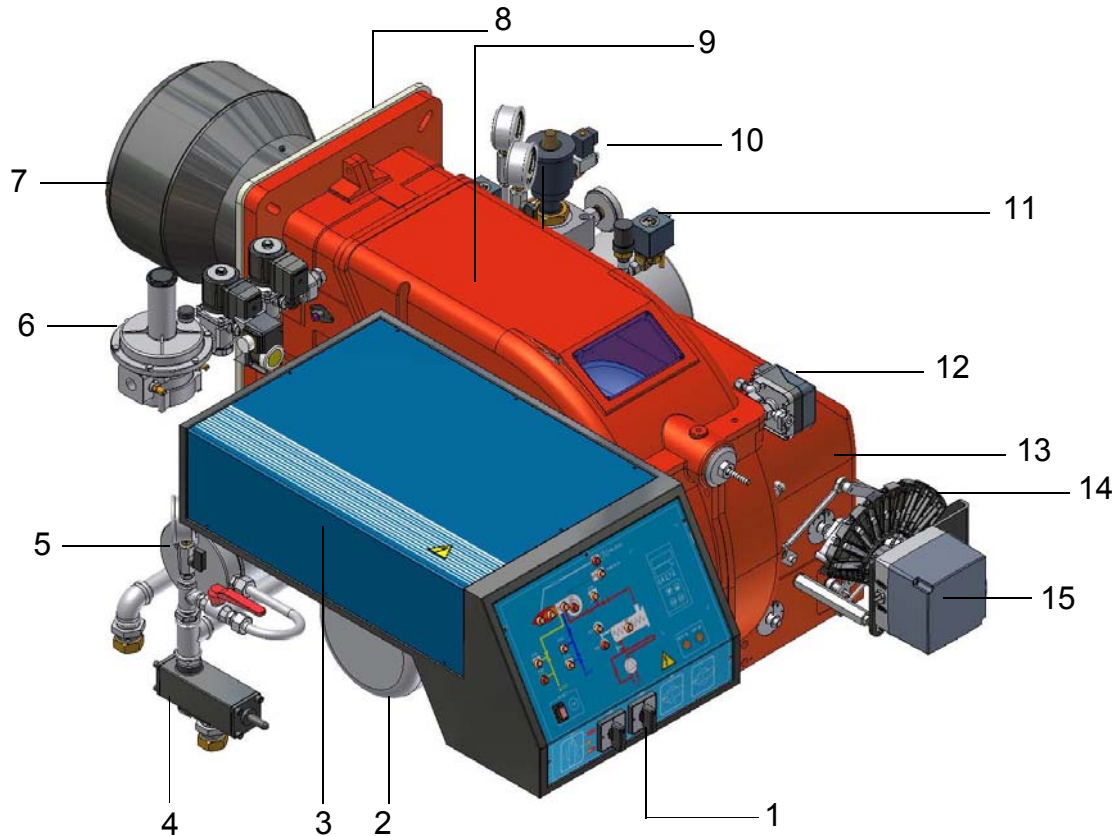


Fig. 1

Note: the figure is indicative only.

- 1 Control panel
- 2 Fan motor
- 3 Electrical panel
- 4 Pressure governor
- 5 Oil pre-heater tank
- 6 Pilot gas train
- 7 Blast tube-combustion head
- 8 Burner flange
- 9 Burner cover
- 10 Oil train
- 11 Compressed air train
- 12 Air pressure switch
- 13 Air inlet
- 14 Adjusting cam
- 15 Actuator

Burner model identification

Burners are identified by burner type and model. Burner model identification is described as follows.

Type (1)	Model (2)	D- (3)	PR. (4)	S. (5)	*. (6)	A.
(1) BURNER TYPE	PBY1025 - PBY1030 - PBY1040					
(2) FUEL	H - heavy oil, viscosity $\leq 4000\text{cSt}$ (530°E) @ 50°C					
(3) OPERATION (Available versions)	PR - Progressive MD - Fully modulating					
(4) BLAST TUBE	S - Standard L - Extended					
(5) DESTINATION COUNTRY	* - see data plate					
(6) BURNER VERSION	A - Standard					

Technical Specifications

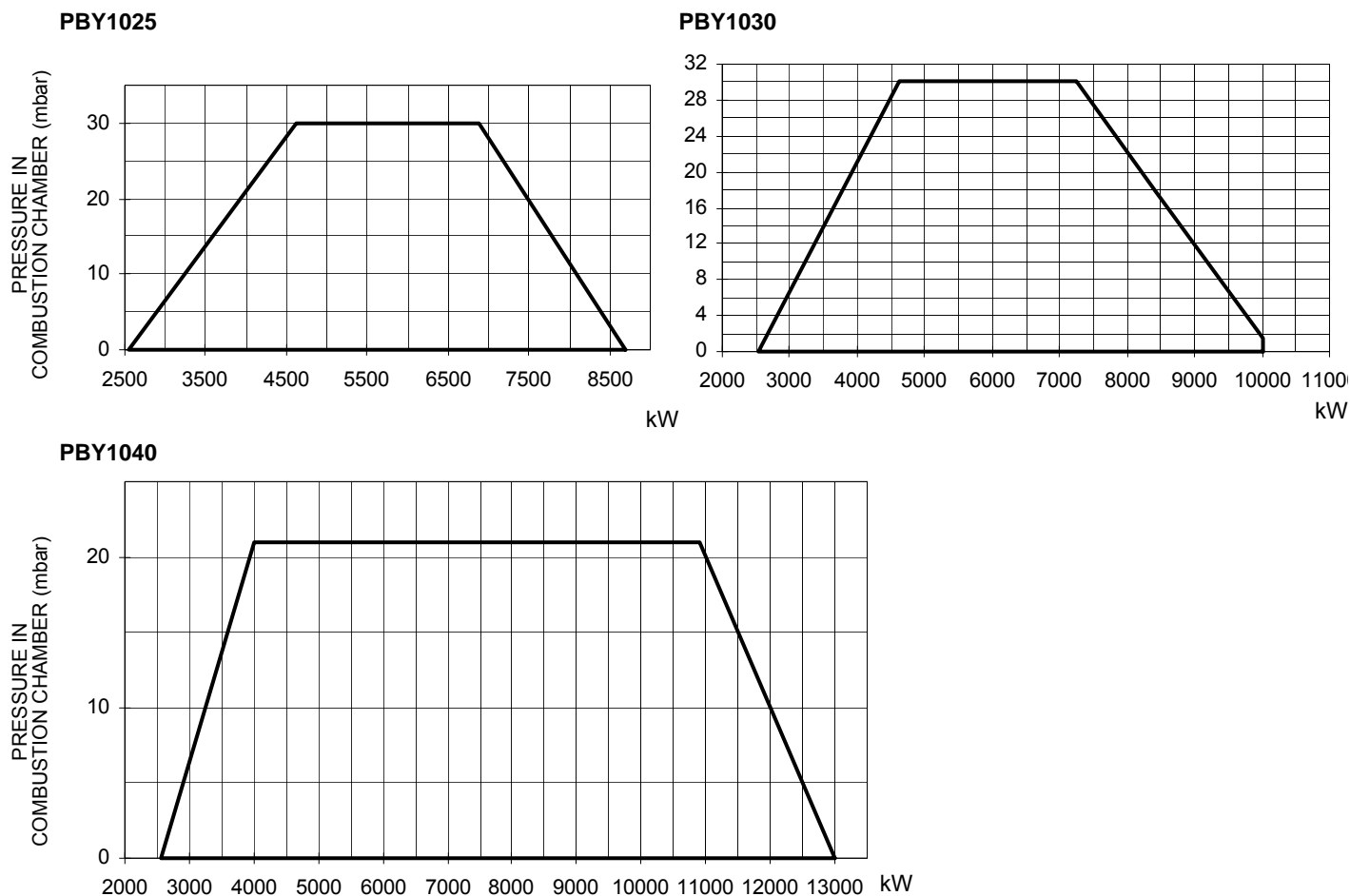
BURNER		PBY1025	PBY1030	PBY1040
Output	min - max kW	2550 - 8700	2550 - 10000	2550 - 13000
Fuel		Heavy oil		
Viscosity		See "Burner model identification" table		
Heavy oil rate	min. - max. kg/h	227 - 775	227 - 891	227 - 1160
Gas pressure	max. mbar	500		
Gas pressure after gas governor	mbar	100		
Compressed air pressure	min - max bar	4 - 10		
Power supply		400V 3N a.c. 50Hz		
Total power consumption	kW	44.1	59.6	79.6
Fan motor	kW	18.5	22	30
Pump motor	kW	1.1	1.1	1.1
Pre-heater resistors	kW	24	36	48
Protection		IP40		
Protection (if provided with light oil pilot)		IP21		
Operation		Progressive - Fully modulating		
Operating temperature	°C	(-10) / (+50)		
Storage Temperature	°C	(-20) / (+60)		
Working service*		Intermittent		

Heavy oil net calorific value (Hi): 9650 kcal/kg or 40395 kJ/kg (average value).

***NOTE ON THE BURNER WORKING SERVICE:** for safety reasons, one controlled shutdown must be performed after 24 hours of continuous operation.

WARNING: the burners are supplied for 400V three phase supply; in case of three phase 230V supply, replace the thermal overload relays. Maximum output is referred to a null backpressure in the furnace.

Performance Curves

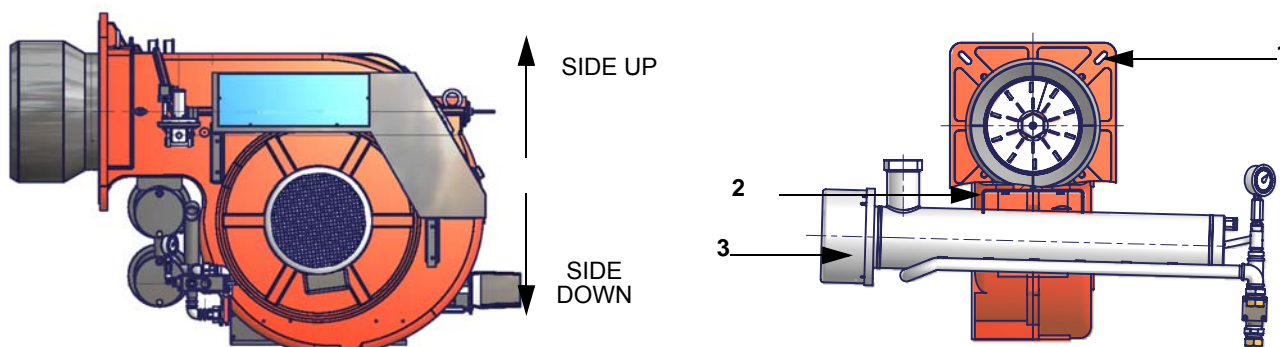


To get the input in kcal/h, multiply value in kW by 860.

Data are referred to standard conditions: atmospheric pressure at 1013mbar, ambient temperature at 15°C

NOTE: The performance curve is a diagram that represents the burner performance in the type approval phase or in the laboratory tests, but does not represent the regulation range of the machine. On this diagram the maximum output point is usually reached by adjusting the combustion head to its "MAX" position (see paragraph "Adjusting the combustion head"); the minimum output point is reached setting the combustion head to its "MIN" position. During the first ignition, the combustion head is set in order to find a compromise between the burner output and the generator specifications, that is why the minimum output may be different from the Performance curve minimum.

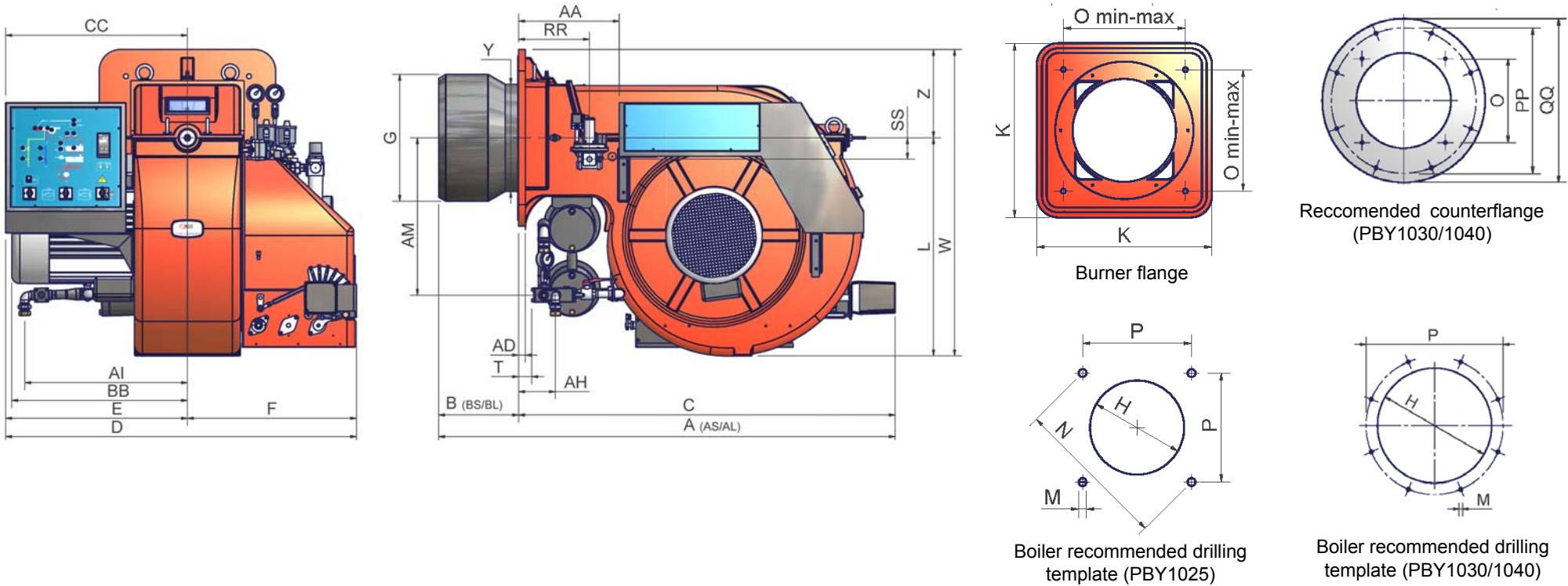
The burner is designed to work positioned according to the picture below. Set the upper side of the burner flange in a horizontal position, in order to find the correct inclination of the pre-heater tank. For different installations, please contact the Technical Department.



Key

- 1 Burner flange (upper side indicated)
- 2 Bracket
- 3 Pre-heater tank on the burner

Overall dimensions (mm)

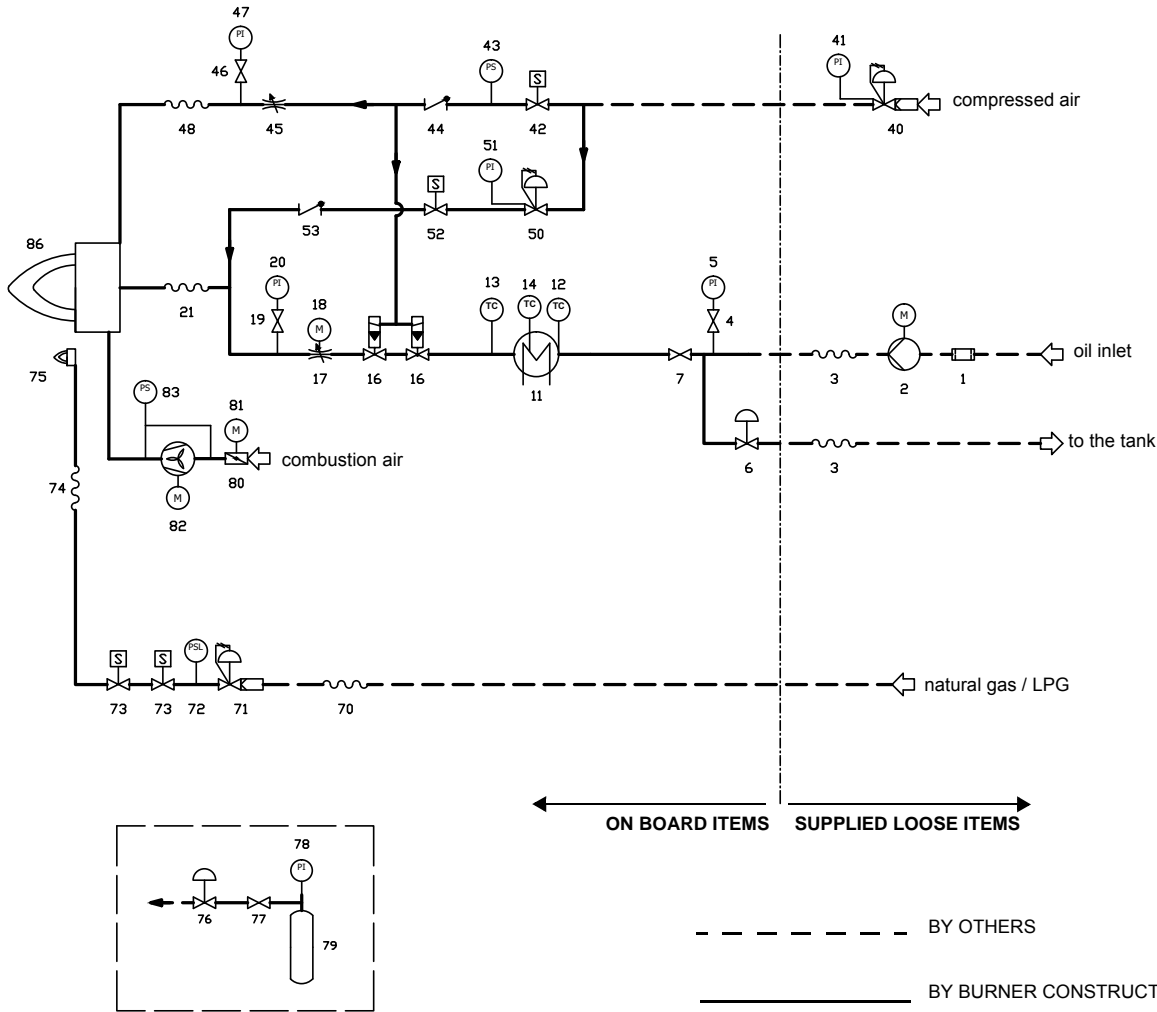


	A(*S)	A(*L)	AA	AD	AH	AI	AM	B(*S)	B(*L)	BB	C	CC	D	E	F	G	H	K	L	M	N	O	P	PP	QQ	RR	SS	T	W	Y	Z
PBY1025	1784	1980	377	25	304	404	335	376	572	641	1408	680	1312	680	632	472	522	660	815	M16	651	460	460	x	x	265	80	49	1145	379	330
PBY1030	1761	2006	377	25	138	608	589	353	598	657	1408	680	1312	680	632	633	524	660	815	M16	x	460	460	800	900	265	80	49	1145	400	330
PBY1040	1769	1988	377	25	138	608	589	361	580	657	1408	680	1312	680	632	671	731	660	815	M16	x	460	800	800	900	265	80	49	1145	400	330

*S = measure referred to burner fitted with standard blast tube
*L = measure referred to burner fitted with extended blast tube

PBY1030/1040: It is necessary to place a counterflange between the burner and the boiler.

Fig. 2 - (3I2D-02 v4) Hydraulic diagram

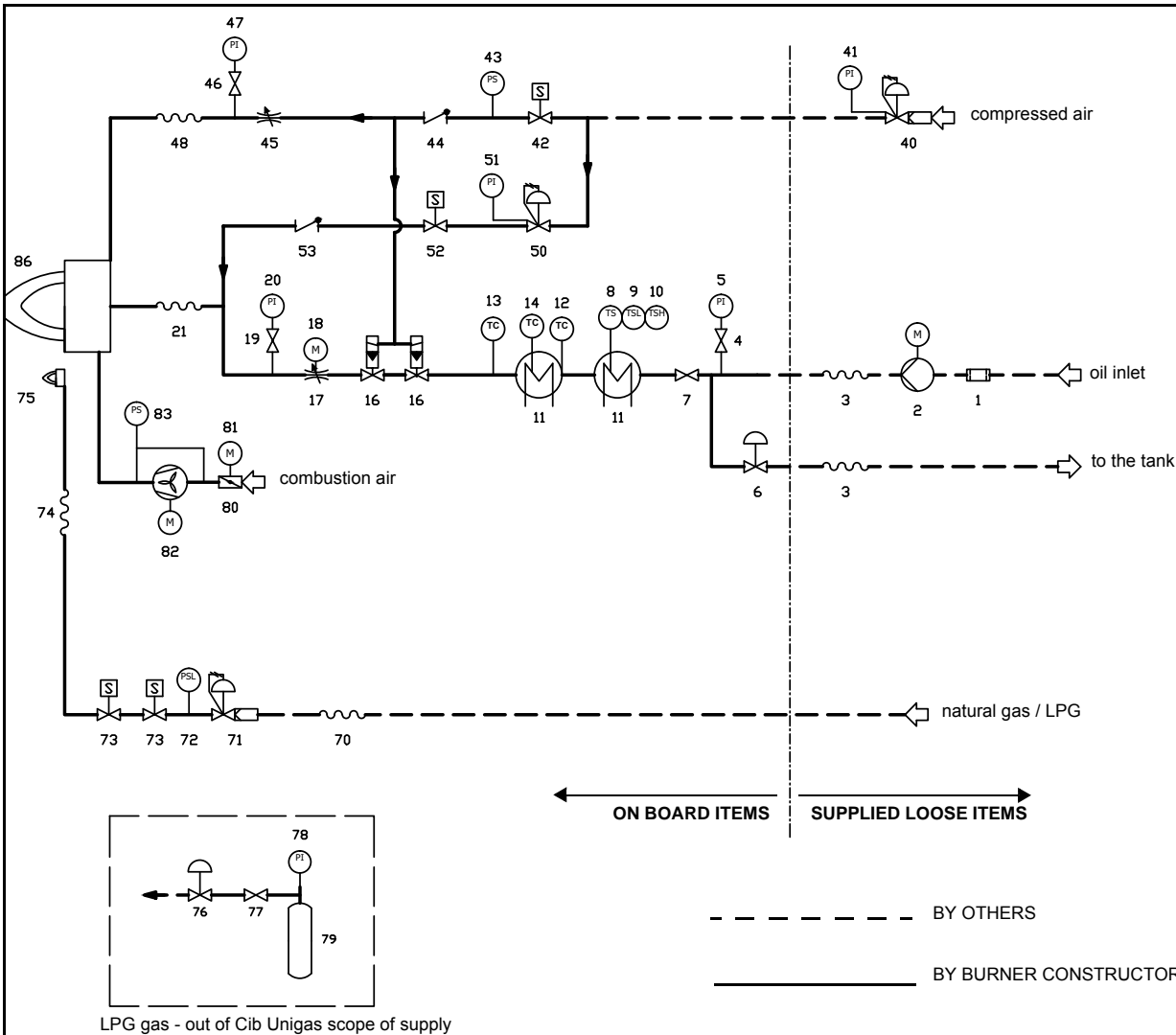


LEGEND	
POS	OIL TRAIN
1	Filter
2	Pump with electromotor
3	Flexible hose
4	Maual valve
5	Pressure gauge
6	Pressure governor
7	Maual valve
11	Electrical preheater tank
12	Temperature probe
13	Temperature probe
14	Temperature probe
16	Pneumatic valve
17	Metering valve with servomotor
18	Actuator
19	Maual valve
20	Pressure gauge
21	Flexible hose
COMPRESSED AIR TRAIN (ATOMIZATION)	
40	Pressure governor with filter
41	Pressure gauge
42	Solenoid valve
43	Pressure switch
44	One-way valve
45	Metering valve
46	Manual valve
47	Pressure gauge
48	Flexible hose
COMPRESSED AIR TRAIN (PURGE)	
50	Pressure governor with filter
51	Pressure gauge
52	Solenoid valve
53	One-way valve
PILOT GAS TRAIN	
71	Pressure governor with filter
72	Pressure switch
73	Solenoid valve
74	Flexible hose
75	Pilot burner
76	Pressure governor for L.P.G. tank
77	Manual valve
78	Pressure gauge
79	L.P.G. tank
COMBUSTION AIR TRAIN	
80	Air damper
81	Actuator
82	Remote draught fan with electromotor
83	Pressure switch - PA
86	Burner

LPG gas - out of Cib Unigas scope of supply

The following items are out of CIB UNIGAS scope of supply: 77 - 78 - 79

Fig. 3 - (3I2D-03 v5) Hydraulic diagram



The following items are out of CIB UNIGAS scope of supply: 77 - 78 - 79

LEGEND	
POS	OIL TRAIN
1	Filter
2	Pump with electromotor
3	Flexible hose
4	Maual valve
5	Pressure gauge
6	Pressure governor
7	Maual valve
8	Thermostat
9	Low thermostat
10	High thermostat
11	Electrical preheater tank
12	Temperature probe
13	Temperature probe
14	Temperature probe
16	Pneumatic valve
17	Metering valve with servomotor
18	Actuator
19	Maual valve
20	Pressure gauge
21	Flexible hose
COMPRESSED AIR TRAIN (ATOMIZATION)	
40	Pressure governor with filter
41	Pressure gauge
42	Solenoid valve
43	Pressure switch
44	One-way valve
45	Metering valve
46	Manual valve
47	Pressure gauge
48	Flexible hose
COMPRESSED AIR TRAIN (PURGE)	
50	Pressure governor with filter
51	Pressure gauge
52	Solenoid valve
53	One-way valve
PILOT GAS TRAIN	
71	Pressure governor with filter
72	Pressure switch
73	Solenoid valve
74	Flexible hose
75	Pilot burner
76	Pressure governor for L.P.G. tank
77	Manual valve
78	Pressure gauge
79	L.P.G. tank
COMBUSTION AIR TRAIN	
80	Air damper
81	Actuator
82	Remote draught fan with electromotor
83	Pressure switch - PA
86	Burner

INSTALLING THE BURNER

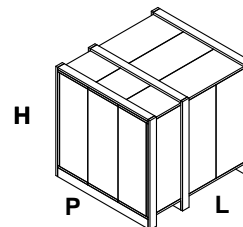
Packing

Burners are despatched in wooden crates whose dimensions are:

- 2280 mm x 1730 mm x 1360 mm (L x P x H)

Packing cases of this kind are affected by humidity and are not suitable for stacking. The following are placed in each packing case:

- burner;
- ceramic fibre plait to be inserted between the burner and the boiler;
- oil flexible hoses;
- oil filter;
- oil pump with motor;
- envelope containing this manual.

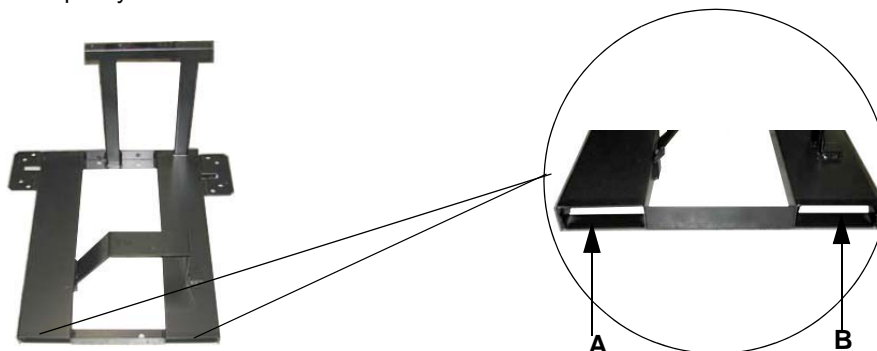


To get rid of the burner's packing, follow the procedures laid down by current laws on disposal of materials.

Handling the burner

	ATTENTION! The handling operations must be carried out by specialised and trained personnel. If these operations are not carried out correctly, the residual risk for the burner to overturn and fall down still persists.
	To move the burner, use means suitable to support its weight (see paragraph "Technical specifications").
	The unpacked burner must be lifted and moved only by means of a fork lift truck.

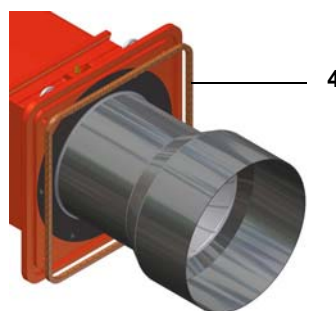
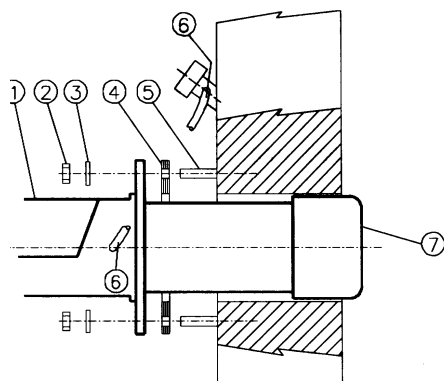
The burner is mounted on a stirrup provided for handling the burner by means of a fork lift truck: the forks must be inserted into the A and B ways. Remove the stirrup only once the burner is installed to the boiler.



Fitting the burner to the boiler

To perform the installation, proceed as follows:

- 1 drill the furnace plate as described in paragraph ("Overall dimensions");
- 2 place the burner towards the furnace plate: lift and move the burner by means of its eyebolts placed on the top side (see "Lifting and moving the burner");
- 3 screw the stud bolts (5) in the plate holes, according to the burner's drilling plate described on paragraph "Overall dimensions";
- 4 place the ceramic fibre plait on the burner flange;
- 5 install the burner into the boiler;
- 6 fix the burner to the stud bolts, by means of the fixing nuts, according to the picture below.
- 7 After fitting the burner to the boiler, ensure that the gap between the blast tube and the refractory lining is sealed with appropriate insulating material (ceramic fibre cord or refractory cement).



Keys

- 1 Burner
- 2 Fixing nut
- 3 Washer
- 4 Ceramic fibre plait
- 5 Stud bolt
- 7 Blast tube

Electrical connections

	Respect the basic safety rules. Make sure of the connection to the earthing system. do not reverse the phase and neutral connections. Fit a differential thermal magnet switch adequate for connection to the mains.
	ATTENTION: before executing the electrical connections, pay attention to turn the plant's switch to OFF and be sure that the burner's main switch is in 0 position (OFF) too. Read carefully the chapter "WARNINGS", and the "Electrical connections" section.
	WARNING: The burner is provided with an electrical bridge between terminals 6 and 7; when connecting the high/low flame thermostat, remove this bridge before connecting the thermostat.
	IMPORTANT: Connecting electrical supply wires to the burner teminal block MA, be sure that the ground wire is longer than phase and neutral ones.
	auxiliary contacts are provided (terminals no. 507 and no. 508 of the MA terminal block) to connect an intervention system (alarm/power supply cutoff) in case of fault of the oil resistor contactor (see Fig. 4- Fig. 5).

To execute the electrical connections, proceed as follows:

- 1 remove the cover from the electrical board, unscrewing the fixing screws;
- 2 execute the electrical connections to the supply terminal board as shown in the following diagrams,
- 3 check the direction of the fan-pump motor (see next paragraph)
- 4 refit the panel cover

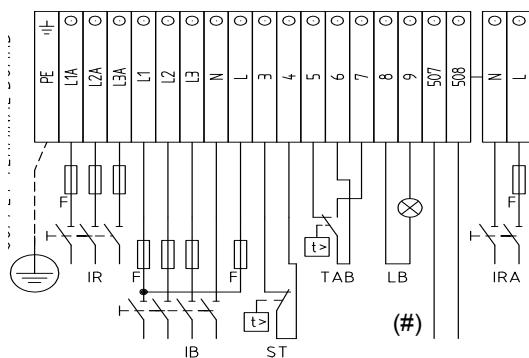


Fig. 4 - Progressive burners

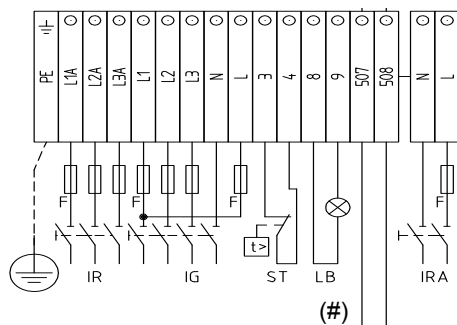


Fig. 5 - Fully modulating burners

(#) Free contact for "Faulty heater resistor contactor"

(**) Probes connection (see Fig. 6)

Probes connection

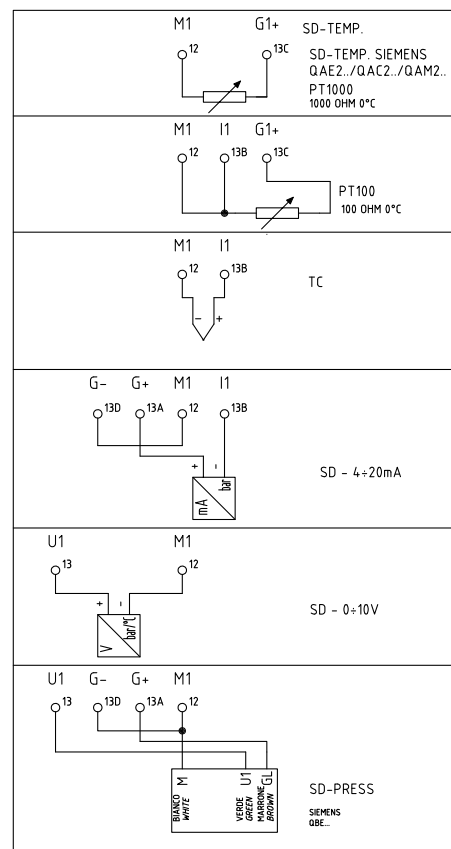


Fig. 6

Probes connection by means of the 7-pins plug (Fig. 7) - see Fig. 6 for connections.

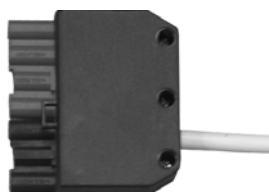
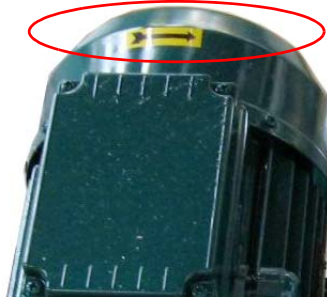


Fig. 7

Fan motor and pump motor direction

Once the electrical connection of the burner is performed, remember to check the rotation of the motor. The motor should rotate according to the arrow shown on the next picture. In the event of incorrect rotation reverse the three-phase supply and check again the rotation of the motor.

NOTE: burners are supplied for three-phase 400 V supply, and in the case of three-phase 230 V supply it is necessary to modify the electrical connections inside the terminal box of the electric motor and replace the thermal cutout relay.



Connecting the oil heating resistors

2.4 - 4.5 kW

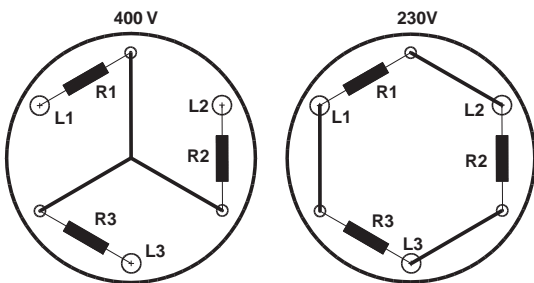


Fig. 8

8 - 12 kW

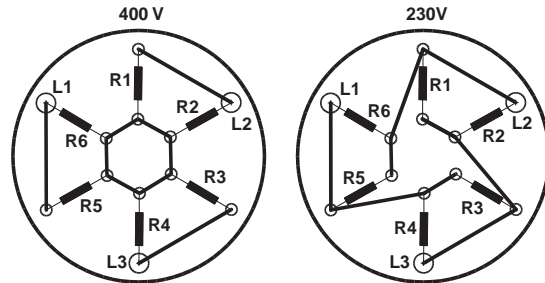


Fig. 9

18 - 24 kW

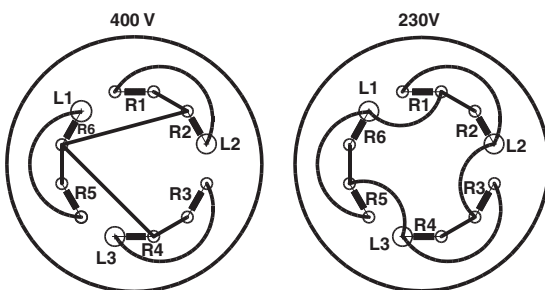


Fig. 10

ELECTRIC MOTOR CONNECTION

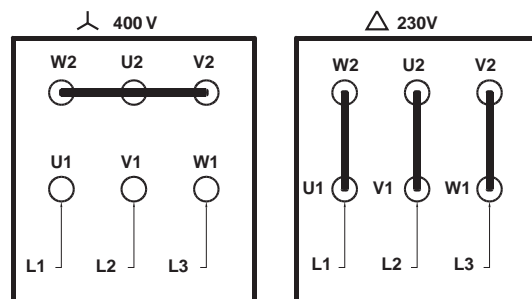


Fig. 11

RECOMMENDATIONS TO DESIGN HEAVY OIL FEEDING PLANTS

This paragraph is intended to give some suggestions to make feeding plants for heavy oil burners. To get a regular burner operation, it is very important to design the supplying system properly. Here some suggestions will be mentioned to give a brief description.

The term "heavy oil" is generic and summarises several chemical-physical properties, above all viscosity. The excessive viscosity makes the oil impossible to be pumped, so it must be heated to let it flow in the pipeline; because of the low-boiling hydrocarbons and dissolved gases, the oil must be also pressurised. The pressurisation is also necessary to feed the burner pump avoiding its cavitation because of the high suction at the inlet. The supplying system scope is to pump and heat oil.

The oil viscosity is referred in various unit measures; the most common are: °E, cSt, Saybolt and Redwood scales. Table 3 shows the various unit conversions (e.g.: 132 cSt viscosity corresponds to 17.5°E viscosity).

The diagram in Fig. 12 shows how the heavy oil viscosity changes according to its temperature.

Example: an oil with 22°E viscosity at 50°C once heated to 100°C gets a 3 °E viscosity.

As far as the pumping capability, it depends on the type of the pump that pushes the oil even if on diagram in Fig. 12 a generic limit is quoted at about 100 °E, so it is recommended to refer to the specifications of the pump provided.

Usually the oil minimum temperature at the oil pump inlet increases as viscosity does, in order to make the oil easy to pump. Referring to the diagram on Fig. 13, it is possible to realise that to pump an oil with 50°E viscosity at 50°C, it must be heated at about 80°C.

Pipe heating system

Pipe heating system must be provided, that is a system to heat pipes and plant components to maintain the viscosity in the pumping limits. Higher the oil viscosity and lower the ambient temperature, more necessary the pipe heating system.

Inlet minimum pressure of the pump (both for supplying system and burner)

A very low pressure leads to cavitation (signalled by its peculiar noise): the pump manufacturer declares the minimum value. Therefore, check the pump technical sheets.

By increasing the oil temperature, also the minimum inlet pressure at the pump must increase, to avoid the gassification of the oil low-boiling products and the cavitation. The cavitation compromises the burner operation, it causes the pump to break too. The diagram on Fig. 14 roughly shows the inlet pump pressure according to the oil temperature.

Pump operating maximum pressure (both for the supplying system and burner)

Remember that pumps and all the system components through which the oil circulates, feature an upper limit. Always read the technical documentation for each component. Schemes on Fig. 15 are taken from UNI 9248 "liquid fuel feeding lines from tank to burner" standard and show how a feeding line should be designed. For other countries, see related laws in force. The pipe dimensioning, the execution and the winding dimensioning and other constructive details must be provided by the installer.

Adjusting the supplying oil ring

According to the heavy oil viscosity used, in the table below indicative temperature and pressure values to be set are shown.

Note: the temperature and pressure range allowed by the supplying ring components must be checked in the specifications table of the components themselves.

HEAVY OIL VISCOSITY AT 50 °C		PIPELINE PRESSURE	PIPELINE TEMPERATURE
cSt (°E)		bar	°C
	< 50 (7)	1- 2	20
> 50 (7)	< 110 (15)	1- 2	50
> 110 (15)	< 400 (50)	1- 2	65
> 400 (50)	< 4000 (530)	1- 2	100

Tab. 1 - Supply pipeline hydraulic scheme 3ID0024, pump n.4



ATTENTION: Atomizing air pressure is typically set at 1 bar lower than oil pressure.

Viscosity units conversion table

Cinematics viscosity Centistokes (cSt)	Engler Degrees (°E)	Saybolt Seconds Universal (SSU)	Saybolt Seconds Furol (SSF)	Redwood Seconds no.1 (Standard)	Redwood Seconds no..2 (Admiralty)
1	1	31	--	29	--
2.56	1.16	35	--	32.1	--
4.3	1.31	40	--	36.2	5.1
7.4	1.58	50	--	44.3	5.83
10.3	1.88	60	--	52.3	6.77
13.1	2.17	70	12.95	60.9	7.6
15.7	2.45	80	13.7	69.2	8.44
18.2	2.73	90	14.44	77.6	9.3
20.6	3.02	100	15.24	85.6	10.12
32.1	4.48	150	19.3	128	14.48
43.2	5.92	200	23.5	170	18.9
54	7.35	250	28	212	23.45
65	8.79	300	32.5	254	28
87.6	11.7	400	41.9	338	37.1
110	14.6	500	51.6	423	46.2
132	17.5	600	61.4	508	55.4
154	20.45	700	71.1	592	64.6
176	23.35	800	81	677	73.8
198	26.3	900	91	762	83
220	29.2	1000	100.7	896	92.1
330	43.8	1500	150	1270	138.2
440	58.4	2000	200	1690	184.2
550	73	2500	250	2120	230
660	87.6	3000	300	2540	276
880	117	4000	400	3380	368
1100	146	5000	500	4230	461
1320	175	6000	600	5080	553
1540	204.5	7000	700	5920	645
1760	233.5	8000	800	6770	737
1980	263	9000	900	7620	829
2200	292	10000	1000	8460	921
3300	438	15000	1500	13700	--
4400	584	20000	2000	18400	--

Tab. 2

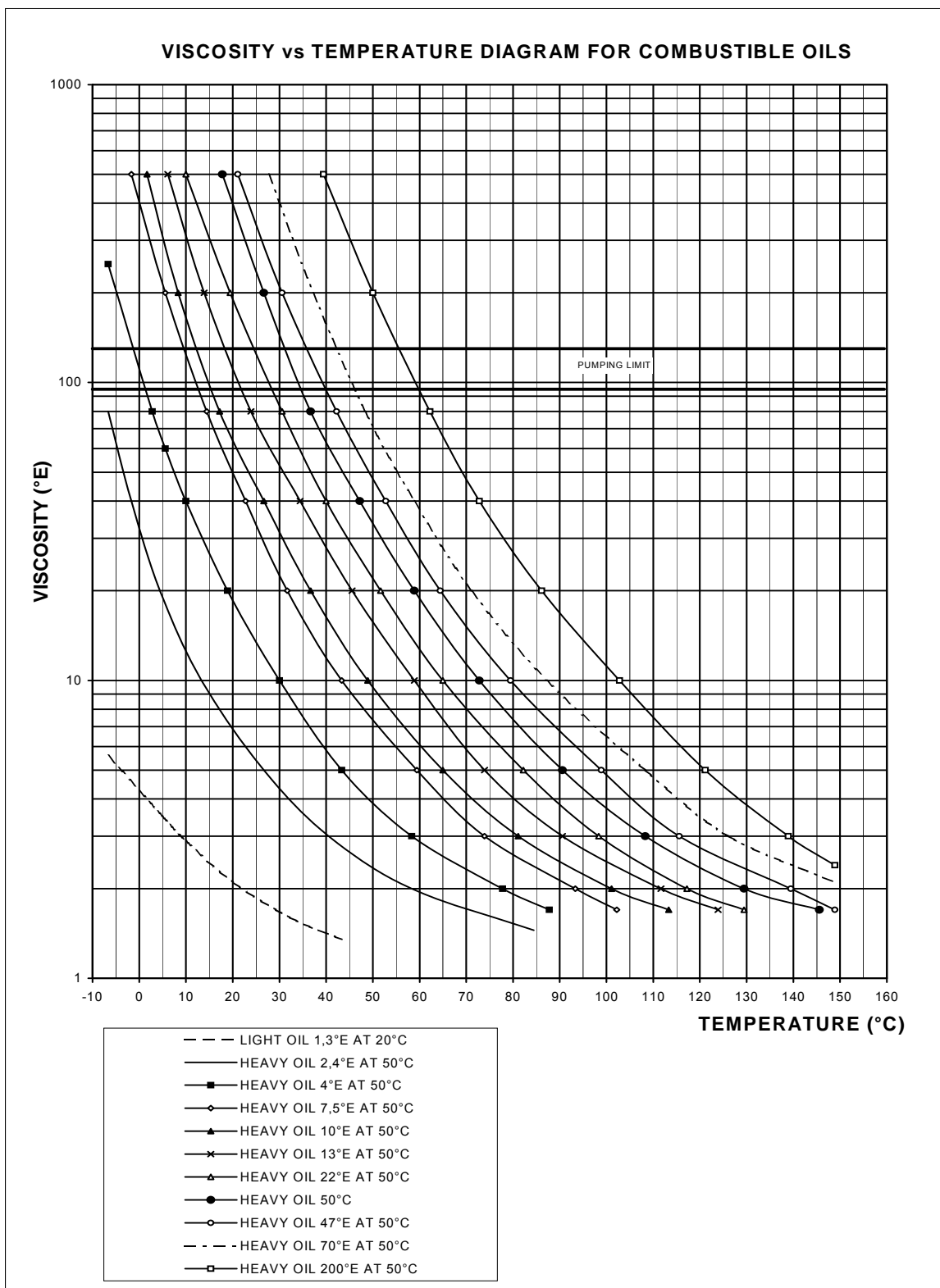


Fig. 12

Indicative diagram showing the oil temperature at burner pump inlet vs. oil viscosity

Example: if the oil has a 50°E @ 50°C viscosity, the oil temperature at the pump inlet should be 80°C (see diagram).

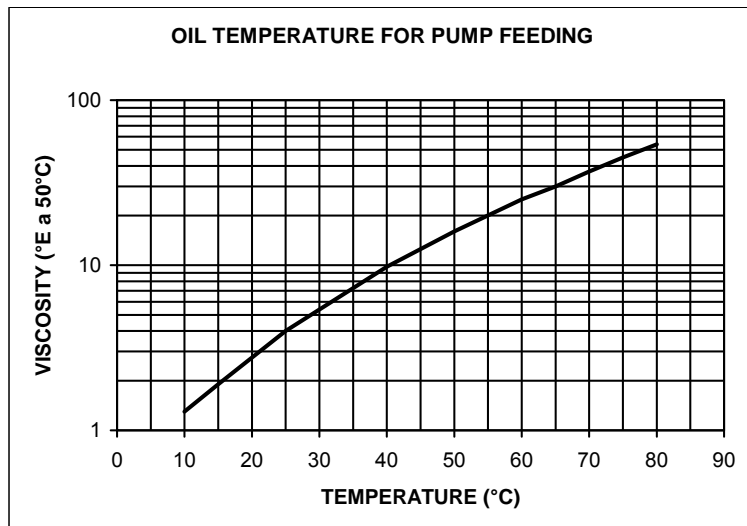


Fig. 13

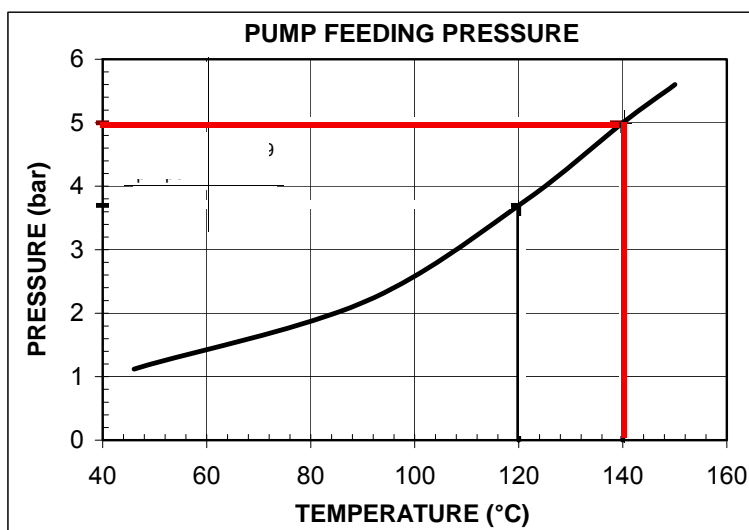
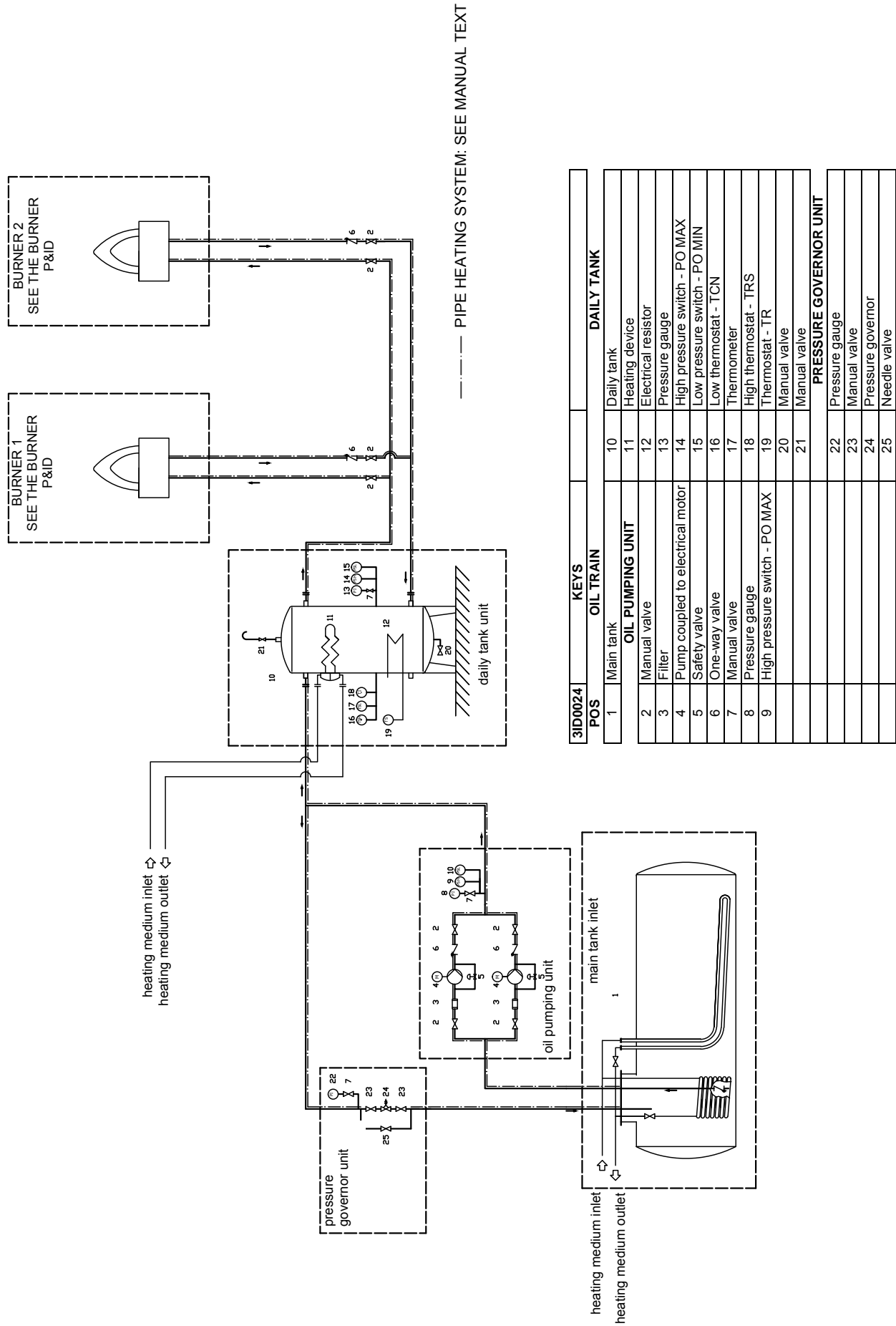
Indicative diagram showing the oil pressure according to its temperature

Fig. 14

Fig. 15 - Hydraulic diagram 3ID0024



Pilot gas train

The connection to the pilot gas train must be done according to the following scheme, valid for LPG. In case of natural gas, connect the pressure governor (pos. 3) to the natural gas line (maximum input pressure = 1 bar).

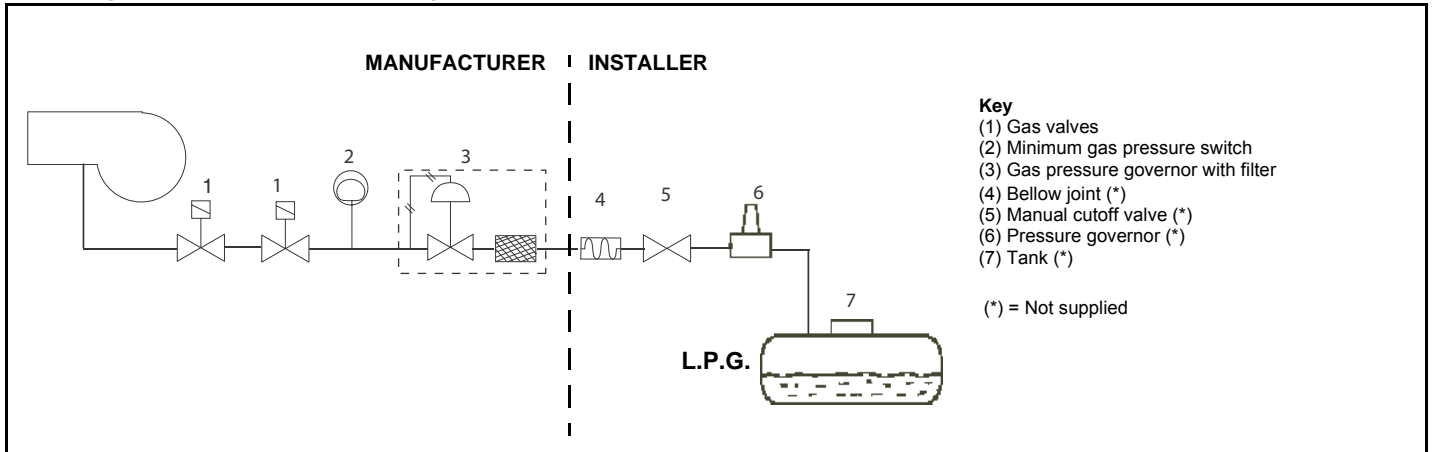


Fig. 16

The pilot gas train is already installed into the burner, the connection from the filter with stabiliser to the gas supply network must be carried out.



connection to the gas supply network - 1/2"

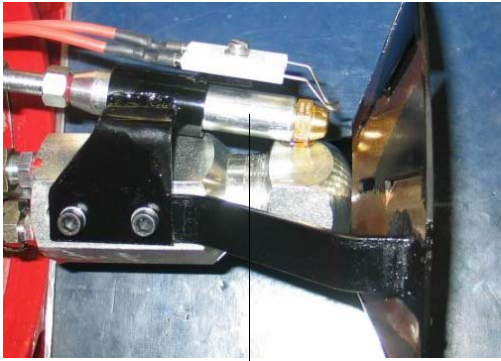
Once the gas train is installed, execute the electrical connections for all its items (gas valves group, pressure switch).



ATTENTION: once the gas train is mounted according to the diagram on Fig. 16, the gas proving test must be performed, according to the procedure set by the laws in force.

Light oil pilot

The burner can be provided with light oil pilot, instead of gas pilot.



light oil pilot nozzle



light oil pilot pump

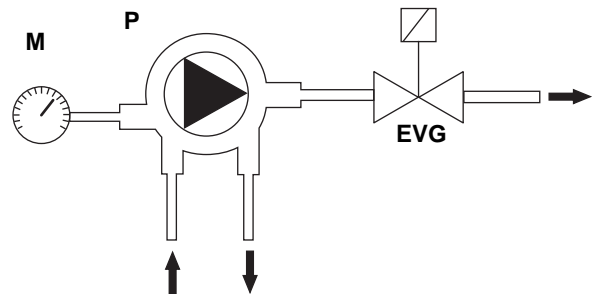
Key

EVG Light oil solenoid valve

M Manometer

P Pump

Fig. 17

**Heavy oil pumps**

The pump provided with the burner must be installed according to the hydraulic diagram.

Cucchi FMG40 pumps

Capacity: 2500l/h

Power consumption: 1.1 kW

Speed: 1400 rpm

Max outlet pressure: 10bar

Max inlet pressure: 2bar

Min inlet pressure: -0.4bar

For further details see the manufacturer documentation.

Suntec TV Pressure governor**Pressure adjustment**

Remove cap-nut 1 and the gasket 2, unscrew the lock nut 4. To increase pressure, twist adjusting screw 3 clockwise.

To decrease the pressure, twist screw counterclockwise. Tight the lock nut 4, refit the gasket 2 and the cap nut 1.

Key

1 Cap nut

2 Gasket

3 Adjusting screw

4 Lock nut

5 Gasket

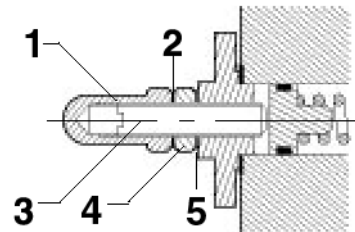


Fig. 18

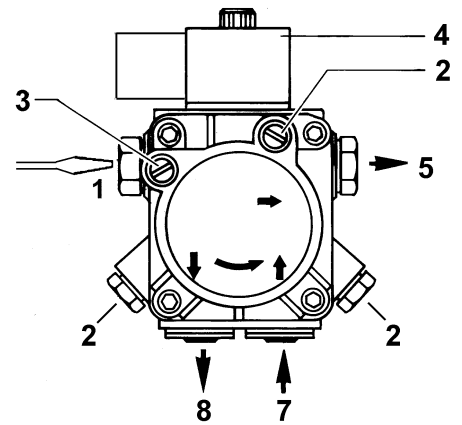
Light oil pilot pump

Suntec AS47-57-67 B

Oil viscosity	2 - 12 cSt
Oil temperature	0 - 60 °C
Max. suction pressure	2 bar max.
Max. return pressure	2 bar max.
Min. suction pressure	- 0.45 bar to avoid gasing
Rotation speed	3600 rpm max.

Key

- 1 Pressure governor
- 2 Manometer
- 3 Vacuum gauge
- 4 Solenoid valve
- 5 Nozzle
- 7 Suction
- 8 Return



Fuel Oil filters



	Item	Note	Connection	Max. operating pressure	Max. operating temperature	Filtering degree	Protection
1	51000/05	Self-cleaning filter with heating elements	2" - DN50	4 bar	150 °C	500 µ	IP54

About the use of fuel pumps

- Do not use fuel with additives to avoid the possible formation over time of compounds which may deposit between the gear teeth, thus obstructing them.
- After filling the tank, wait before starting the burner. This will give any suspended impurities time to deposit on the bottom of the tank, thus avoiding the possibility that they might be sucked into the pump.
- On initial commissioning a "dry" operation is foreseen for a considerable length of time (for example, when there is a long suction line to bleed). To avoid damages inject some lubrication oil into the vacuum inlet.
- Care must be taken when installing the pump not to force the pump shaft along its axis or laterally to avoid excessive wear on the joint, noise and overloading the gears.
- Pipes should not contain air pockets. Rapid attachment joint should therefore be avoided and threaded or mechanical seal junctions preferred. Junction threads, elbow joints and couplings should be sealed with removable sg component. The number of junctions should be kept to a minimum as they are a possible source of leakage.
- Do not use PTFE tape on the suction and return line pipes to avoid the possibility that particles enter circulation. These could deposit on the pump filter or the nozzle, reducing efficiency. Always use O-Rings or mechanical seal (copper or aluminium gaskets) junctions if possible.
- An external filter should always be installed in the suction line upstream the fuel unit.

The pump provided with the burner must be installed according to the hydraulic diagram.

Pumps	capacity [l/h]	power [kW]	speed [rpm]	connection	max outlet pressure [bar]	max inlet pressure (bar)
Kral KF 32 BCB	1800	1,1	1500	DN32	10	2
Cucchi FMG40	2500	1,1	1400	1"	10	2

For further details see the manufacturer documentation.

Connecting the pump

According to the pump provided, proceed as follows:

- 1 remove the closing nuts A and B on the inlet and return connections of the pump;
- 2 connect the pump **being careful to avoid exchanging the lines**: see the arrows marked on the pump.

For further information, refer to the technical documentation of the pump.

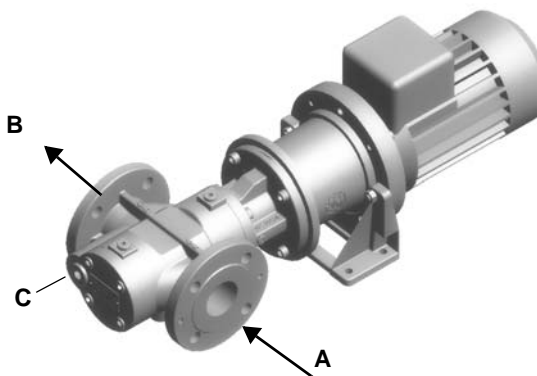


Fig. 19 - Kral

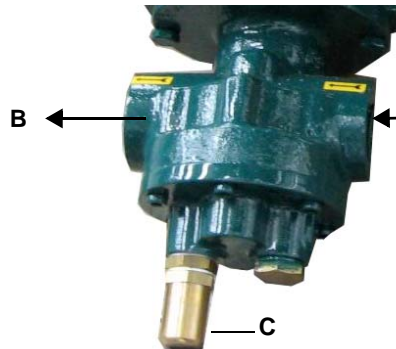


Fig. 20 - Cucchi

Legend

A - Inlet

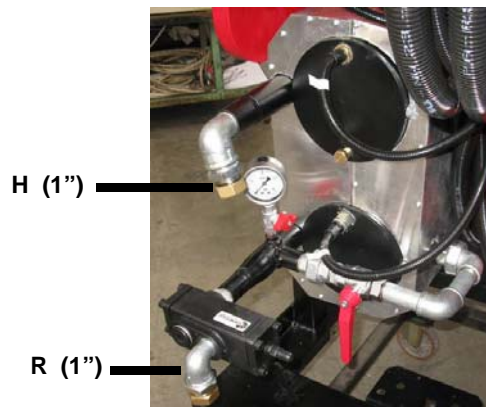
B - Outlet

C - Overflow pressure adjusting screw

Connecting the oil flexible hoses to the burner

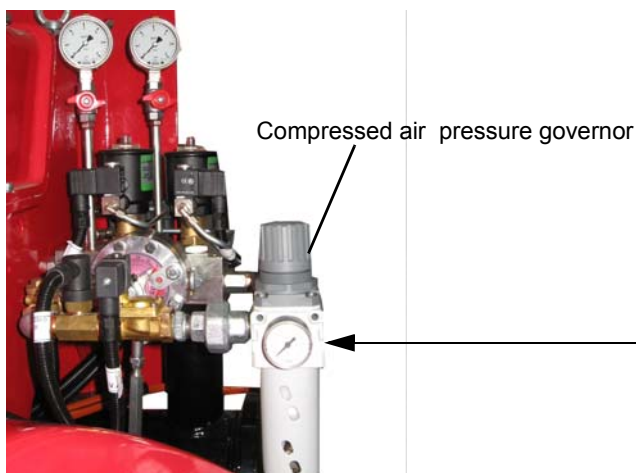
To connect the flexible oil hoses to the pump, proceed as follows, according to the pump provided:

- 1 remove the closing nuts **H** (on the heater) and **R** (on the oil pressure governor) of the inlet and return connections;
- 2 screw the rotating nut of the two flexible hoses on the burner **being careful to avoid exchanging the inlet and return lines**: see the arrows marked that show the inlet and the return.



Connecting the compressed air hoses

To connect the compressed air supply, refer to the following pictures



Hydraulic connections**Key**

- G Gas
- A Compressed Air
- O Oil

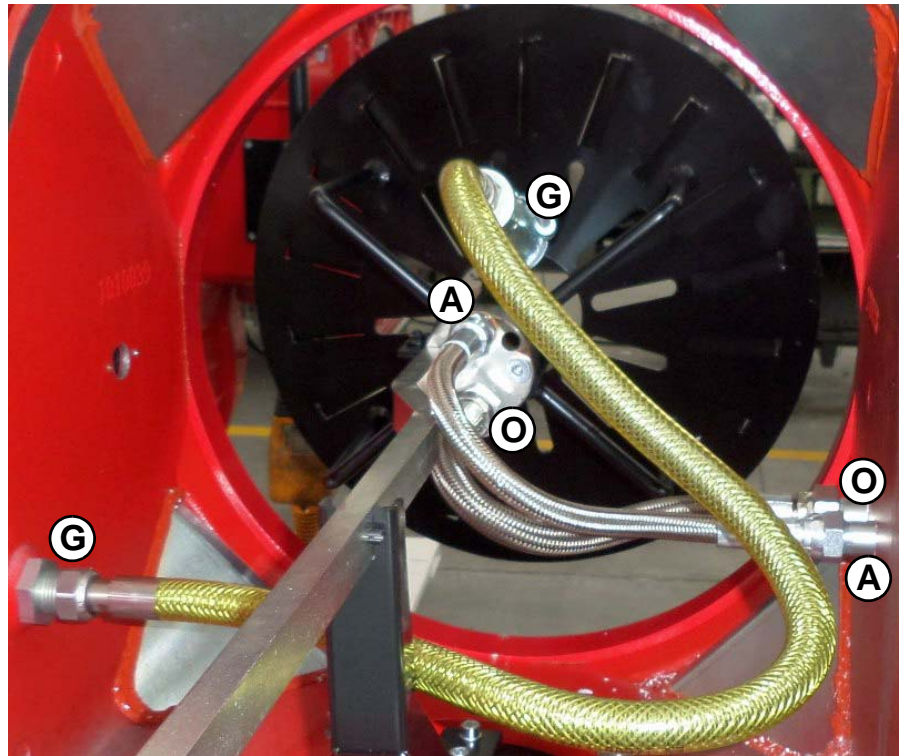




Fig. 21

ADJUSTING AIR AND FUEL RATE

	ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open. Be sure that the mains switch is closed.
	ATTENTION: During commissioning operations, do not let the burner operate with insufficient air flow (danger of formation of carbon monoxide); if this should happen, make the fuel decrease slowly until the normal combustion values are achieved.

	Before starting up the burner, make sure that the return pipe to the tank is not obstructed. Any obstruction would cause the pump seal to break.
---	--

	IMPORTANT! the combustion air excess must be adjusted according to the values in the following chart.
---	--


Recommended combustion parameters		
<i>Fuel</i>	<i>Recommended (%) CO₂</i>	<i>Recommended (%) O₂</i>
Heavy oil	11 ÷ 12.5	4.7 ÷ 6.7

The heavy oil flow rate can be adjusted choosing a nozzle that suits the boiler/utilisation output and setting properly the delivery pressure values.

The table below shows indicative values of temperature and pressure to be set on the burner devices, according to the viscosity of the heavy oil used. The oil temperature should be set on TR resistor thermostat in order to get about 1.5°E viscosity at the nozzle.

VISCOSITY AT 50 °C		OIL PRESSURE AFTER BURNER PUMP (N. 2 in 3I2-D02/03)		OIL PRESSURE AFTER OIL METERING VALVE (N. 17 IN 3I2-D02/03)	
		min	max	min	max
°E		bar		bar	
	< 50 (7)	5	8	0.5	2 (xBY1025/1030) / 4 (xBY1040)
> 50 (7)	< 110 (15)	5	8	0.5	2 (xBY1025/1030) / 4 (xBY1040)
> 110 (15)	< 400 (50)	5	8	0.5	2 (xBY1025/1030) / 4 (xBY1040)
> 400 (50)	<4000 (530)	5	8	0.5	2 (xBY1025/1030) / 4 (xBY1040)

Tab. 3 - Burner - hydraulic scheme 3I2-D02/03, pump n.2

	ATTENTION: Atomizing air pressure is typically set at 0.1 ÷ 0.3 bar lower than oil pressure (xBY1025/1030). Atomizing air pressure is typically set at 0.5 ÷ 1 bar lower than oil pressure (xBY1040).
---	---

Fluidics noozles

The oil flow rate can be adjusted choosing nozzles that suit the boiler/utilisation output and setting the delivery and return pressure values according to the ones quoted in the diagram below (as far as reading the pressure values, see next paragraphs).

Nozzle 32-Y - A° - 8-7 (**Note:** the nozzle mounted on PBY1040 is without "reverse disc")

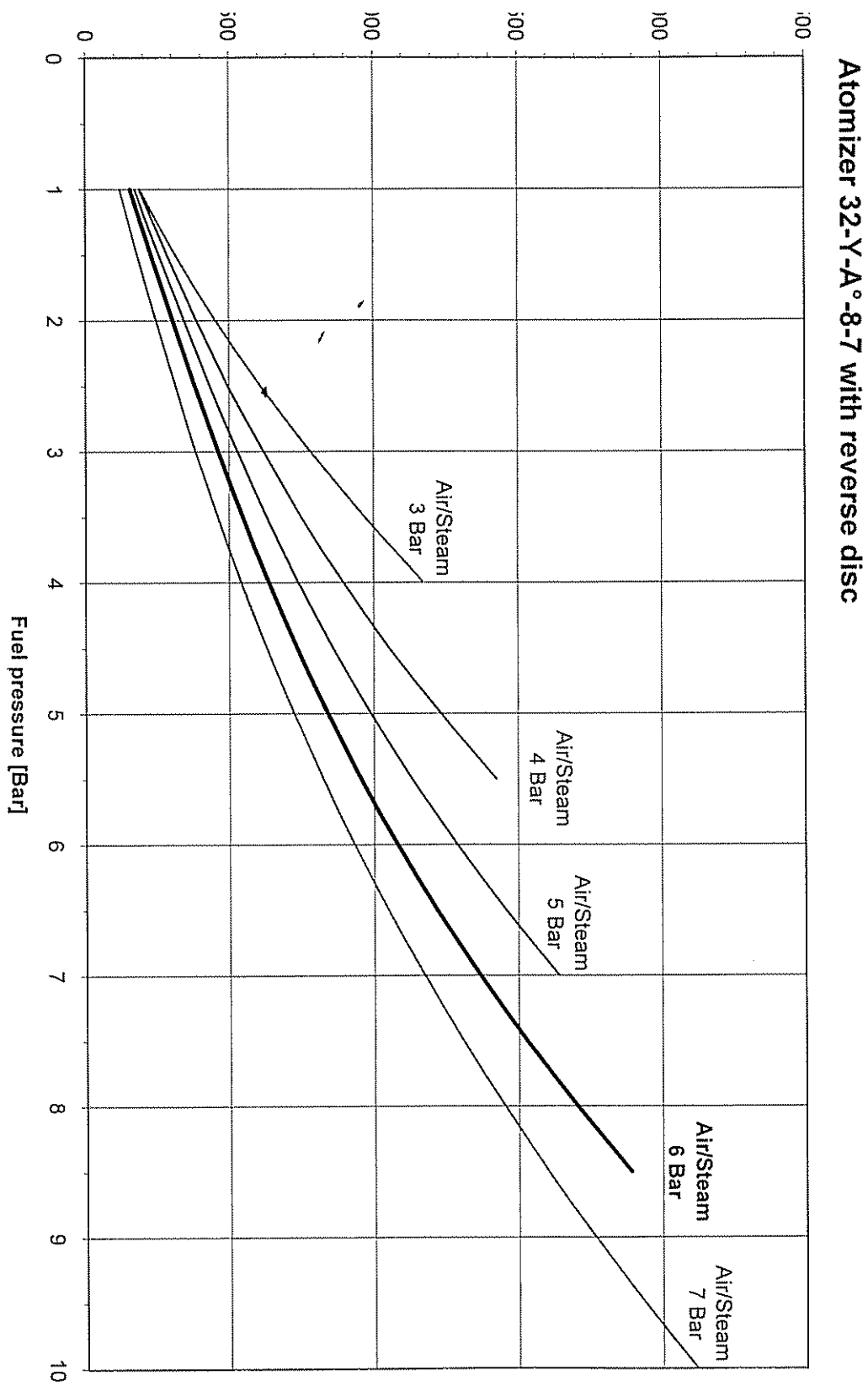


Fig. 22

Oil thermostat adjustment

Progressive and fully modulating oil burners are equipped with electronic multi-thermostat Danfoss MCX, whose operation is controlled by thyristor. (for details refer to the attached technical documentation)



Fig. 23 - Danfoss MCX

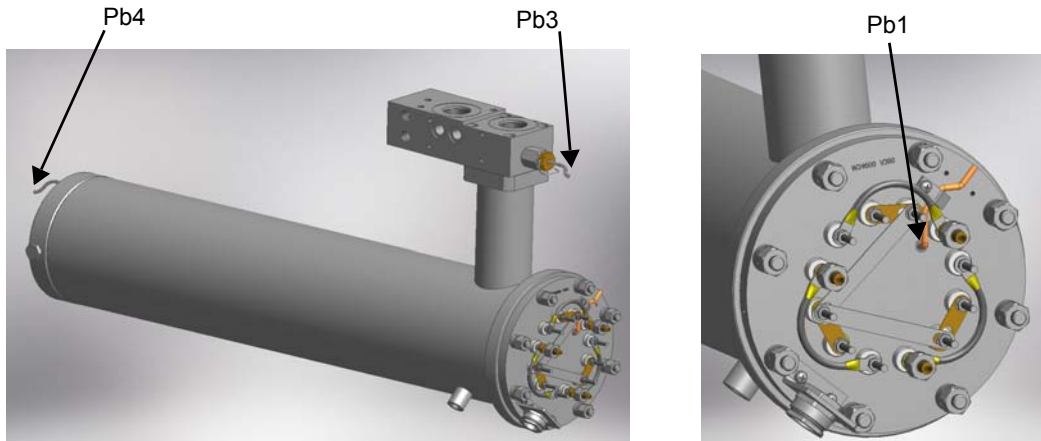


Fig. 24 - Probe connections (Danfoss MCX)

Menu path			Oil viscosity at 50 °C according to the letter shown in the burner model				
			P	N	E	D	H
			89 cSt	< 50 cSt	> 50 cSt	> 110 cSt	> 400 cSt
					< 110 cSt	< 400 cSt	< 4000 cSt
			12 °E	< 7°E	> 7 °E	> 15 °E	> 50 °E
					< 15 °E	< 50 °E	< 530 °E
Par							
rEG	Pb1	tr	parameter not visible				
	Pb2	tCl	Oil heater temperature probe (when installed)	20 °C	70 °C	70 °C	70 °C
	Pb3	Oil	oil heater output temperature probe (PID regulation);	60-70 °C	110-120 °C	120-130 °C	130-140 °C
		SP0	Set-point oil heater with oil pump stopped (stand-by)	45 °C	120 °C	130 °C	140 °C
	Pb4	tcn	Oil heater consent temperature probe	40 °C	100 °C	100 °C	110 °C
		trS	Safety temperature tank resistors (manual reset)	120 °C	190-200 °C	190-200 °C	190-200 °C

The oil viscosity at the nozzle, should be about 1,5 °E, which guarantees correct and safe functioning of the burner. The above temperature values are suggested and refer to a plant designed according to the prescriptions in the burner user manual. The suggested values can change in reference to the fuel oil specifications.

Burners equipped with double tank

All thermostats are located inside the control panel. To set the temperature use a small screwdriver.

Such temperature must be set during burner operation, checking temperature in the thermometer mounted on the pre-heating tank. We suggest a thermometer with scale up to 200° C.

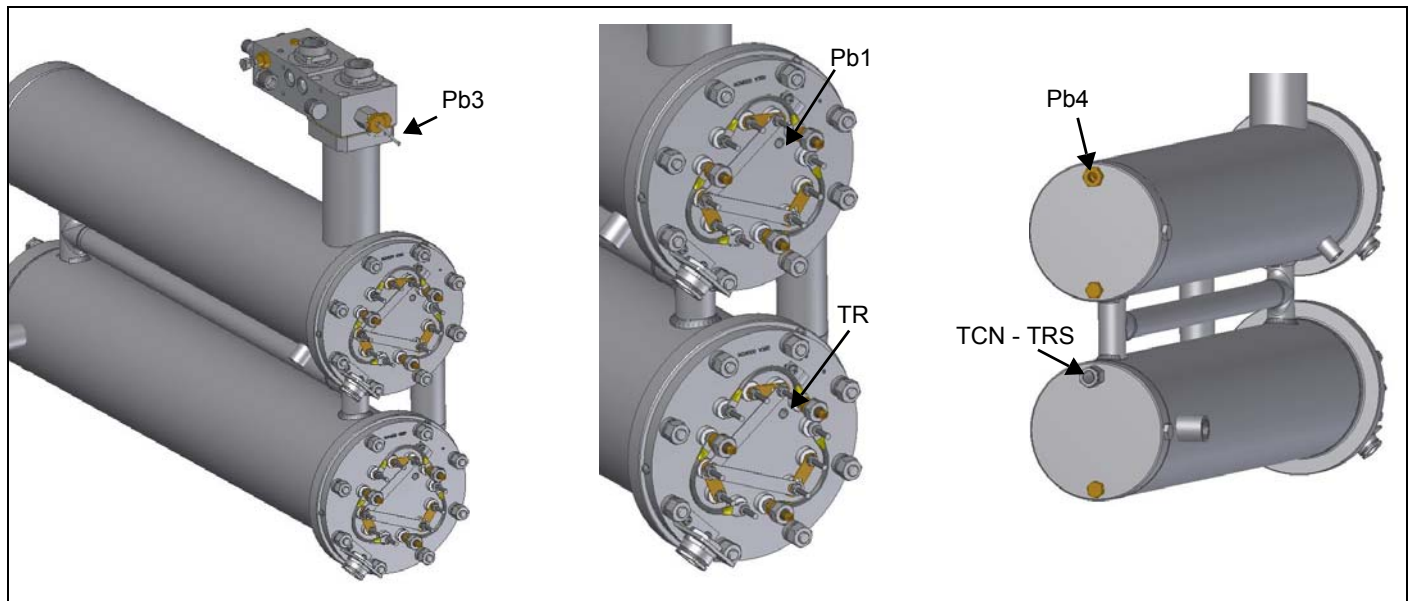
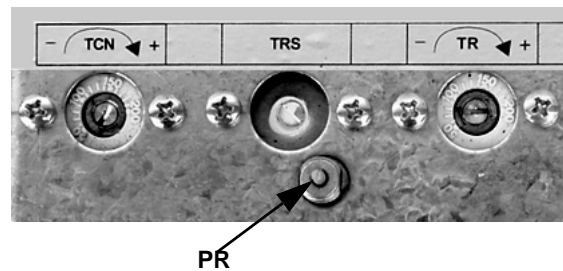
Adjust this thermostat to the correct value according to the viscosity-temperature diagram and check the temperature by using a thermometer with a scale of up to 200° C mounted on the pre-heating tank.

Safety resistors thermostat TRS: it is factory preset and sealed. Don not modify it!

When the set temperature is exceeded, check the reason and reset it by means of the push button PR

Resistor thermostat TR: check the best atomising oil temperature and set it on TR.

Thermostat TCN (it gives the enabling signal to the oil N.C. valve): set TCN at about 20° less than TR.



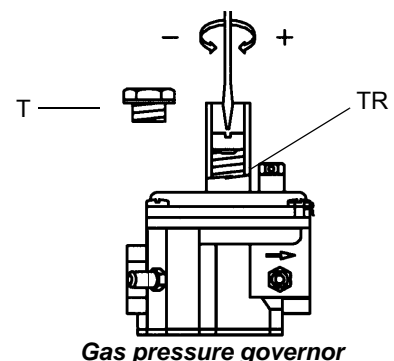
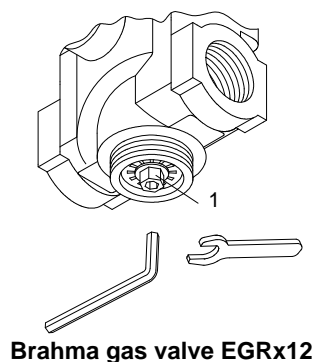
Adjusting the pilot gas flow rate: gas valve Brahma EG12xR and pressure governor

To change the pilot gas valve flow rate, proceed as follows:

- 1 remove the protection on the bottom of the valve, moving it counterclockwise (see next picture);
- 2 rotate clockwise the nut 1 as shown in to close the valve or counterclockwise to open.

To perform gas pressure adjustment, act on the pressure governor as follows (see next picture):

- 3 remove the cap T: to increase the gas pressure at the outlet use a screwdriver on the screw TR as shown in the next picture. Screw to increase the pressure, unscrew to decrease; once the regulation is performed, replace cap T.

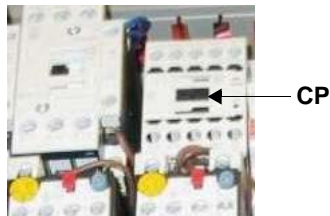


Adjustments - brief description

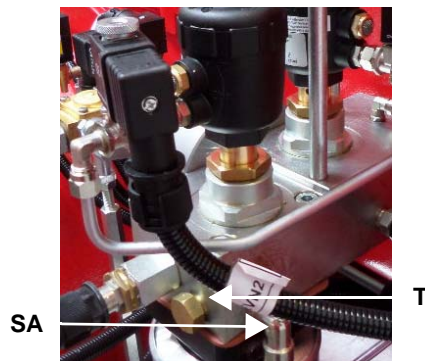
- Adjust the air and oil flow rates at the maximum output ("high flame") first, by means of the air damper and the adjusting cam respectively.
- Check that the combustion parameters are in the suggested limits.
- Then, adjust the combustion values corresponding to the points between maximum and minimum: set the shape of the adjusting cam foil. The adjusting cam sets the air/fuel ratio in those points, regulating the opening-closing of the fuel governor.
- Now set the low flame output, acting on the low flame microswitch of the actuator (cam III) in order to avoid the low flame output increasing too much or the flues temperature getting too low to cause condensation in the chimney.

Oil Flow Rate Settings

- 1 With the electrical panel open, prime the oil pump acting directly on the related contactor **CP** (see next picture): check the pump motor rotation (see "Fan motor and pump motor direction" on page 13) and keep pressing for some seconds until the oil circuit is charged;

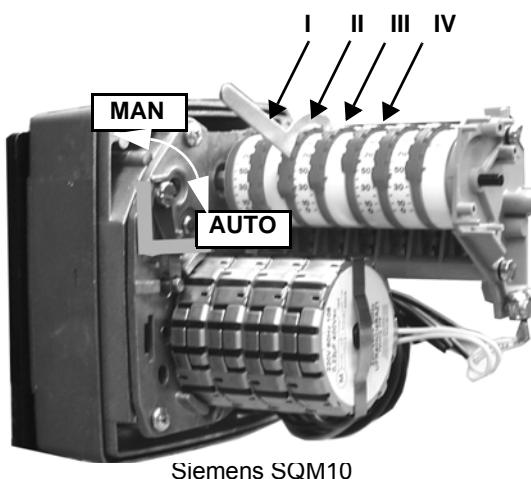


- 2 bleed the air from the **SA** port by loosening the cap **T** without removing it, then release the contactor and fasten cap **T**.



- 3 Before starting the burner up, drive the high flame actuator microswitch matching the low flame one (in order to let the burner operates at the lowest output) to safely achieve the high flame stage.
- 4 Turn the burner on by means of its main switch **A** (see next picture): if the burner locks (LED **B** on in the control panel) press the RESET button (**C**) on the control panel - see chapter "OPERATION".
- 5 Start the burner up by means of the thermostat series (terminals 3 and 4 - see wiring diagrams) and wait until the pre-purge phase comes to end and that burner starts up;
- 6 drive the burner to high flame stage, by means of the thermostat **TAB** (high/low flame thermostat - see Wiring diagrams), as far as fully-modulating burners, see related paragraph.

Then move progressively the microswitch to higher values until it reaches the high flame position; always check the combustion values (see next steps).



Siemens SQM10



Actuator cams

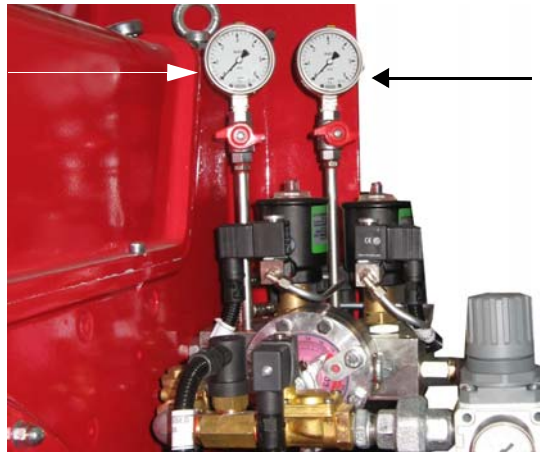
- | | |
|-----|-----------------------|
| I | High flame |
| II | Stand-by and Ignition |
| III | Low flame |
| IV | Stroke limitation |



Siemens SQM40

- 7 During high fire operation, oil pressure is about 2 bar (read on oil pressure gauge - see picture below).

compressed air pressure gauge



oil pressure gauge

Fig. 25

- 8 Set the atomising air pressure switch **PA** (Fig. 26) at 0.5 bar
9 Set the pilot gas pressure switch **PG** (Fig. 27) at 50 mbar.

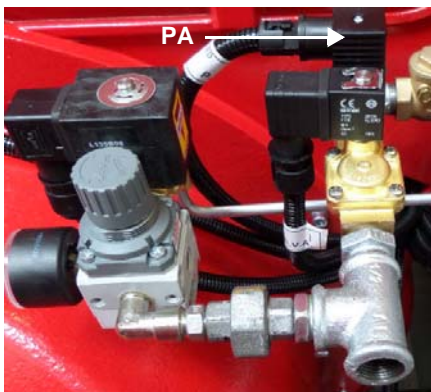


Fig. 26 - Atomising air pressure switch



Fig. 27 - Gas pressure switch

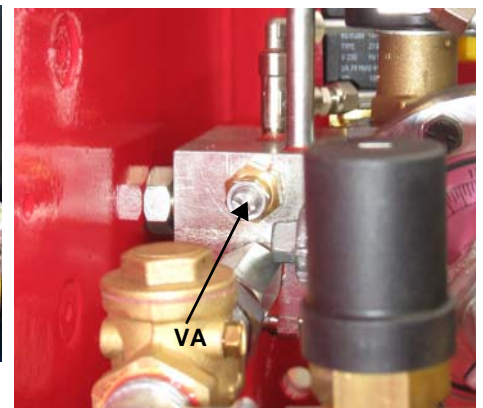


Fig. 28 - Atomising air flow rate adjustment

- 10 The nozzle supply pressure is already factory-set and must not be changed. Only if necessary, adjust the supply pressure as follows (see related paragraph); read the pressure on the oil pressure gauge on Fig. 25 and act on the pump-governor adjusting screw **VR** (see Fig. 29 and description on page 20) as to get the nozzle pressure at 2bar (see step 8). If the required flow rate is not reached, increase the feeding pressure by means of the Suntec TV governor (see picture below)



Fig. 29 - Suntec TV governor

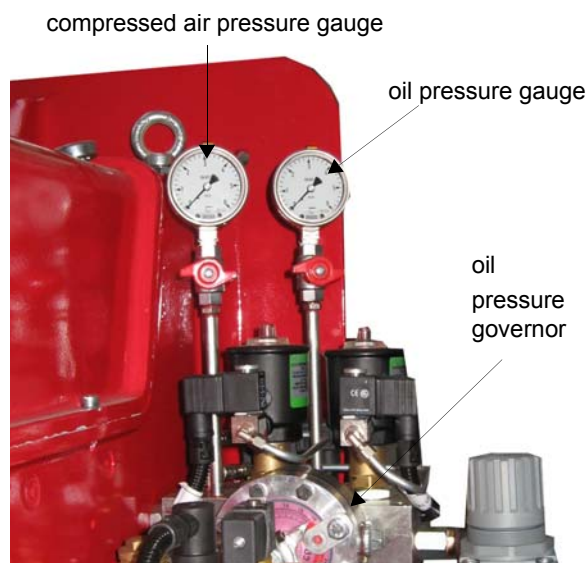


Fig. 31 - Oil pressure governor

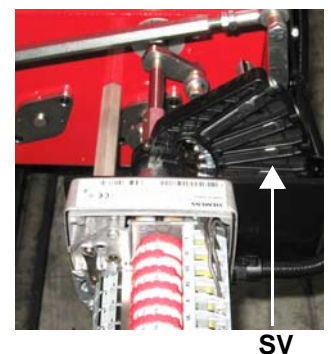
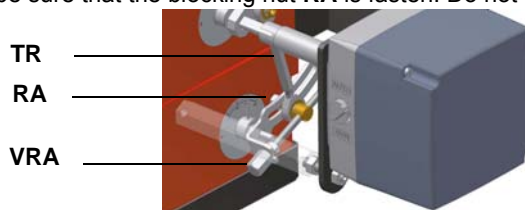


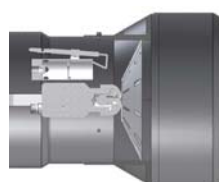
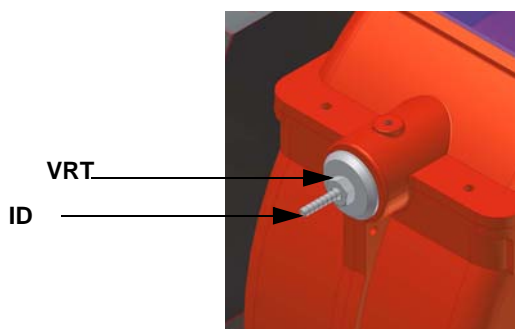
Fig. 33

- 11 in order to get the maximum oil flow rate, adjust the pressure (reading its value on the oil pressure gauge (Fig. 31): checking always the combustion parameters, the adjustment is to be performed by means of the **SV** adjusting cam screw **V** (Fig. 33) when the cam has reached the high flame position.
- 12 The atomising air flow rate and pressure can be adjusted with the **VA** screw (Fig. 28). Too low a pressure produces poor atomising with smoke in the flue. Too high a pressure produces instability and the flame can be cut off.
- 13 To adjust the **comburent air flow rate in the high flame stage**, loose the **RA** nut and screw **VRA** as to get the desired air flow rate: moving the rod **TR** towards the air damper shaft, the air damper opens and consequently the air flow rate increases, moving it far from the shaft the air damper closes and the air flow rate decreases.

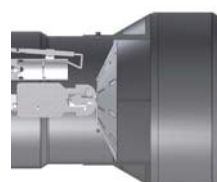
Note: once the procedure is performed, be sure that the blocking nut **RA** is fasten. Do not change the position of the air damper rods.



- 14 If necessary, change the combustion head position: to let the burner operate at a lower output, move progressively back the combustion head towards the MIN position, by turning clockwise the **VRT** ring nut. The graduated index **ID** shows the combustion head shifting (each mark refers to 5mm).



"MAX" position



"MIN" position

Attention! if it is necessary to change the head position, repeat the air and gas adjustments described above.

- 15 as for the point-to-point regulation in order to set the cam foil shape, move the low flame microswitch (cam III) a little lower than the maximum position (90°);
- 16 set the **TAB** thermostat to the minimum in order that the actuator moves progressively towards the low flame position;
- 17 move cam III towards the minimum to make the actuator move towards the low flame until the two bearings find the adjusting screw that refers to a lower position: screw **V** to increase the rate, unscrew to decrease, in order to get the pressure as showed on diagram on , according to the requested rate.
- 18 Move again cam III towards the minimum to meet the next screw on the adjusting cam and repeat the previous step; go on this way as to reach the desired low flame point.
- 19 The low flame position must never match the ignition position that is why cam **III** must be set 20° - 30° more than the ignition position.

Turn the burner off; then start it up again. If the adjustment is not correct, repeat the previous steps.

Calibration of air pressure switch

To calibrate the air pressure switch, proceed as follows:

- Remove the transparent plastic cap.
- Once air and heavy oil setting have been accomplished, startup the burner.
- During the pre-purge phase of the operation, turn slowly the adjusting ring nut **VR** in the clockwise direction until the burner lockout, then read the value on the pressure switch scale and set it to a value reduced by 15%.
- Repeat the ignition cycle of the burner and check it runs properly.
- Refit the transparent plastic cover on the pressure switch.

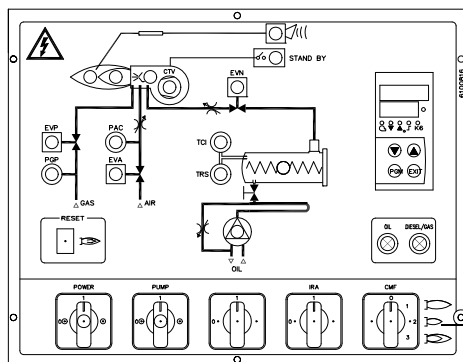


Fully-modulating burners

To adjust the fully-modulating burners, use the **CMF** switch on the burner control panel (see next picture), instead of the **TAB** thermostat as described on the previous paragraphs about the progressive burners. Go on adjusting the burner as described before, paying attention to use the CMF switch instead of **TAB**.

The **CMF** position sets the operating stages: to drive the burner to the high-flame stage, set CMF=1; to drive it to the low-flame stage, set CMF=2.

To move the adjusting cam set CMF=1 or 2 and then CMF=0.



- CMF = 0 stop at the current position
- CMF = 1 high flame operation
- CMF = 2 low flame operation
- CMF = 3 automatic operation

EVL air valve for gun cleaning

After the flame is off, an automatic system provides the compressed air to clean the gun.

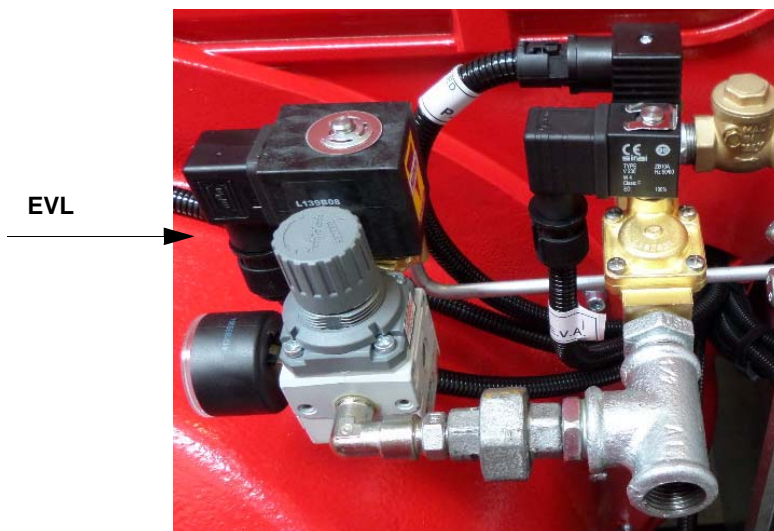


Fig. 34

PART II: OPERATION

LIMITATIONS OF USE

THE BURNER IS AN APPLIANCE DESIGNED AND CONSTRUCTED TO OPERATE ONLY AFTER BEING CORRECTLY CONNECTED TO A HEAT GENERATOR (E.G. BOILER, HOT AIR GENERATOR, FURNACE, ETC.), ANY OTHER USE IS TO BE CONSIDERED IMPROPER AND THEREFORE DANGEROUS.

THE USER MUST GUARANTEE THE CORRECT FITTING OF THE APPLIANCE, ENTRUSTING THE INSTALLATION OF IT TO QUALIFIED PERSONNEL AND HAVING THE FIRST COMMISSIONING OF IT CARRIED OUT BY A SERVICE CENTRE AUTHORIZED BY THE COMPANY MANUFACTURING THE BURNER.

A FUNDAMENTAL FACTOR IN THIS RESPECT IS THE ELECTRICAL CONNECTION TO THE GENERATOR'S CONTROL AND SAFETY UNITS (CONTROL THERMOSTAT, SAFETY, ETC.) WHICH GUARANTEES CORRECT AND SAFE FUNCTIONING OF THE BURNER.

THEREFORE, ANY OPERATION OF THE APPLIANCE MUST BE PREVENTED WHICH DEPARTS FROM THE INSTALLATION OPERATIONS OR WHICH HAPPENS AFTER TOTAL OR PARTIAL TAMPERING WITH THESE (E.G. DISCONNECTION, EVEN PARTIAL, OF THE ELECTRICAL LEADS, OPENING THE GENERATOR DOOR, DISMANTLING OF PART OF THE BURNER).

NEVER OPEN OR DISMANTLE ANY COMPONENT OF THE MACHINE.

OPERATE ONLY THE MAIN SWITCH, WHICH THROUGH ITS EASY ACCESSIBILITY AND RAPIDITY OF OPERATION ALSO FUNCTIONS AS AN EMERGENCY SWITCH, AND ON THE RESET BUTTON.

IN CASE OF A BURNER SHUT-DOWN, RESET THE CONTROL BOX BY MEANS OF THE RESET PUSHBUTTON. IF A SECOND SHUT-DOWN TAKES PLACE, CALL THE TECHNICAL SERVICE, WITHOUT TRYING TO RESET FURTHER.

WARNING: DURING NORMAL OPERATION THE PARTS OF THE BURNER NEAREST TO THE GENERATOR (COUPLING FLANGE) CAN BECOME VERY HOT, AVOID TOUCHING THEM SO AS NOT TO GET BURNT.

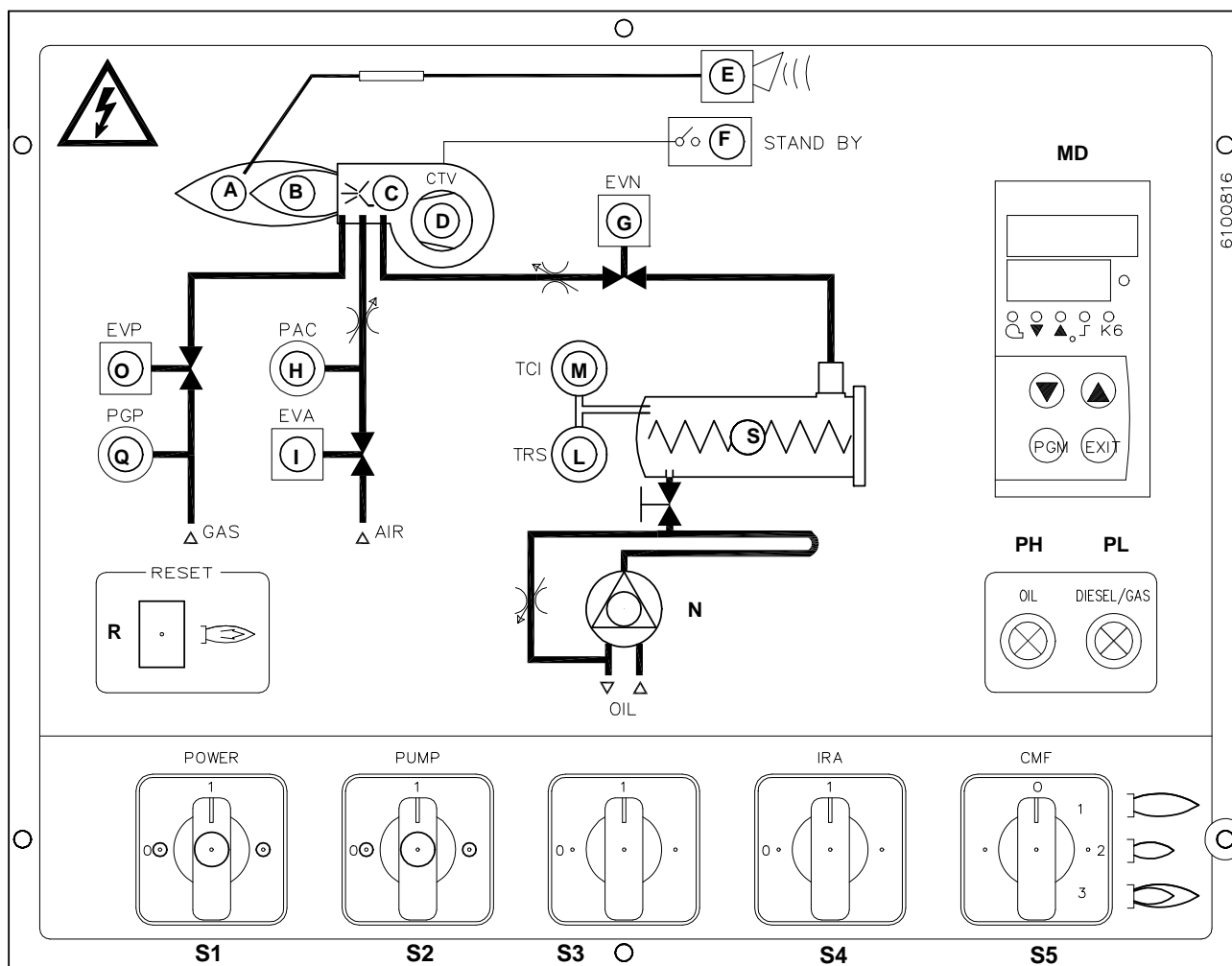
OPERATION



ATTENTION: before starting the burner up, be sure that the manual cutoff valves are open. Be sure that the mains switch is closed.

- Turn the burner on by means of its main switch **S1** (see next pictures).
- Check that the burner is not locked (LED **E** lights up); if so, reset it by pressing the reset button **R**.
- Check that the series of thermostats/pressure switches (terminals 3 and 4 - see Wiring diagrams), the TCI thermostat and the pilot gas pressure switch enable the burner to start up.
- At the beginning of the start-up cycle, the fan motor starts up and the compressed air valve (EVA) opens. (If the oil atomising pressure is not enough, the PAC pressure switch closes the oil valve causing the burner to lock out). The pre-purge phase begins (the air damper is closed).
- After the post-ignition time, the transformer is de-energised and the pilot turns off some seconds later.
- When the oil valve opens, the burner is working: the actuator starts opening. The burner drives to high flame (A signalling lamp on) or to low flame (B signalling lamp on) according to the plant requirements.
- When the burner turns off, even in case of lock out, the EVL valve performs the oil gun cleaning (page 36).

As far as fully-modulating burners, see the Siemens RWF40 burner modulator manual.

Control panel

- A High flame lamp
- B Low flame lamp
- C Ignition transformer lamp
- D Fan motor thermal cutout lamp
- E Burner lockout lamp
- F Burner stand-by lamp
- G Solenoid valve lamp
- H Atomisation air pressure switch lamp
- I Compressed air solenoid valve lamp
- L Heating resistors safety thermostat lamp
- M Plant enabling thermostat lamp
- MD Siemens modulator (on fully modulating versions only)
- N Oil pump in operation
- O Pilot solenoid valve lamp
- PL Light oil operation lamp
- PH Heavy oil operation lamp
- Q Pilot gas pressure switch
- R Reset pushbutton for control box
- S Pre-heating in operation lamp
- S1 Burner main switch
- S2 Pump operation selector MAN-AUTO
- S3 Heavy oil/light oil operation switch
- S4 Auxiliary resistors switch
- S5 Operation mode manual switch /0-Off, 1-

PART III: MAINTENANCE

At least once a year carry out the maintenance operations listed below. In the case of seasonal servicing, it is recommended to carry out the maintenance at the end of each heating season; in the case of continuous operation the maintenance is carried out every 6 months.



WARNING: ALL OPERATIONS ON THE BURNER MUST BE CARRIED OUT WITH THE MAINS DISCONNECTED AND THE FUEL MANUAL CUTOFF VALVES CLOSED!

ATTENTION: READ CAREFULLY THE "WARNINGS" CHAPTER AT THE BEGINNING OF THIS MANUAL..

ROUTINE MAINTENANCE

- Clean and examine the gas filter and replace it if necessary (next paragraph).
- Clean and examine the oil filter cartridge and replace it if necessary.
- Examine the flexible hoses and check for possible leaks.
- Check and clean if necessary the oil heaters and the tank, according to the fuel type and its use; remove the heaters flange fixing nuts and remove the heaters from the tank: clean by using steam or solvents and not metallic things.
- Remove and clean the combustion head (page 35).
- Examine and clean the ignition electrode, adjust and replace if necessary (see page 36).
- Examine and clean the detection probe, adjust and replace if necessary (see page 37).
- Examine the detection current (see page 37).
- Remove and clean (page 37) the heavy oil nozzle (**Important: use solvents for cleaning, not metallic tools**) and at the end of the maintenance procedures, after replacing the burner, turn it on and check the shape of the flame; if in doubt replace the nozzle. Where the burner is used intensively it is recommended to replace the nozzle as a preventive measure, at the begin of the operating season.
- Clean and grease joints and rotating parts.

IMPORTANT: Remove the combustion head before checking the ignition electrode.

- Remove and clean the compressed air governor **A** in Fig. 35
- Remove and clean the oil governor **B** in Fig. 35



CAUTION: avoid the contact of steam, solvent and other liquids with the electric terminals of the resistor. On flanged heaters, replace the seal gasket before refitting it. Periodic inspections must be carried out to determine the frequency of cleaning.

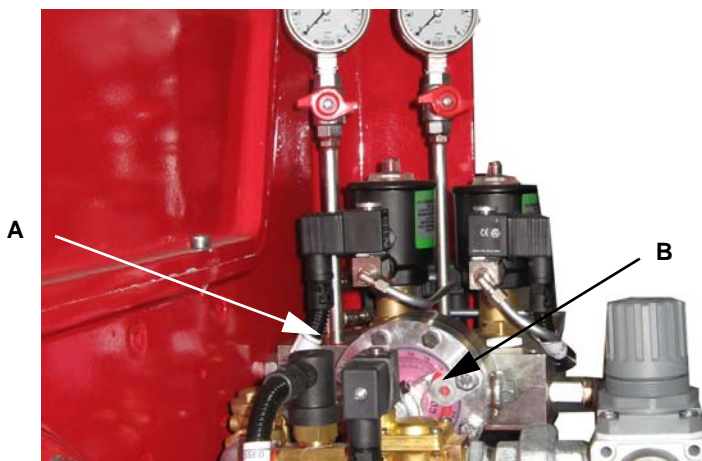


Fig. 35

Maintenance of the gas governor with filter (pilot gas train)

Before disassembling the device, be sure that there is no pressurised gas inside it.

To check the filtering part (1) on threaded bodies (see Fig. 36):

- remove the bottom cover, unscrewing the fixing screws;
- remove the filtering part (1), clean it with water and soap, blow it with compressed air or replace it if necessary;
- reassemble the filtering part in its initial position checking that it is placed in its own slots (see Fig. 37);
- reassemble the bottom cover (3), being sure that the main bolt is centered in the bottom cover slot.

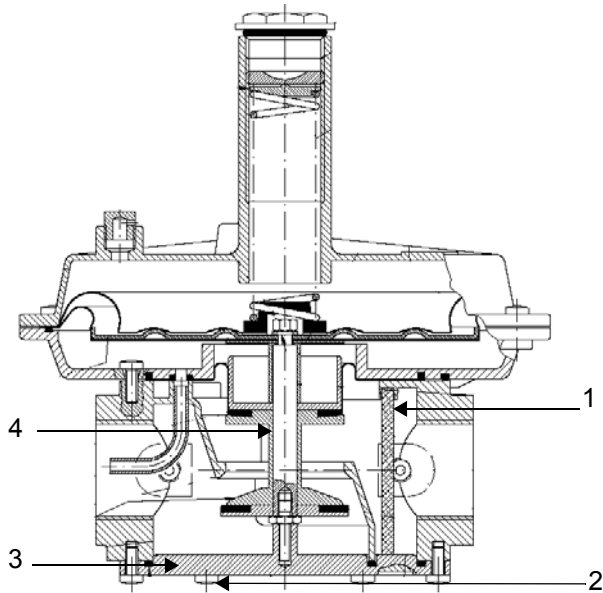


Fig. 36 - threaded body

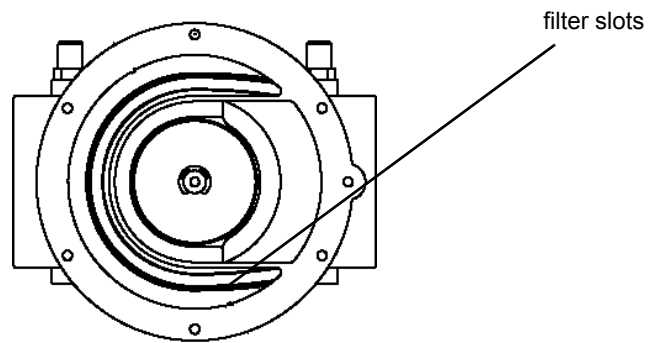


Fig. 37 - threaded body without bottom cover

Removing the combustion head

- Remove the cover H.
- Slide the photoresistor out of its housing.
- Unscrew the flexible hoses from the gun (burner side) and remove the whole assembly as shown on Fig. 38.

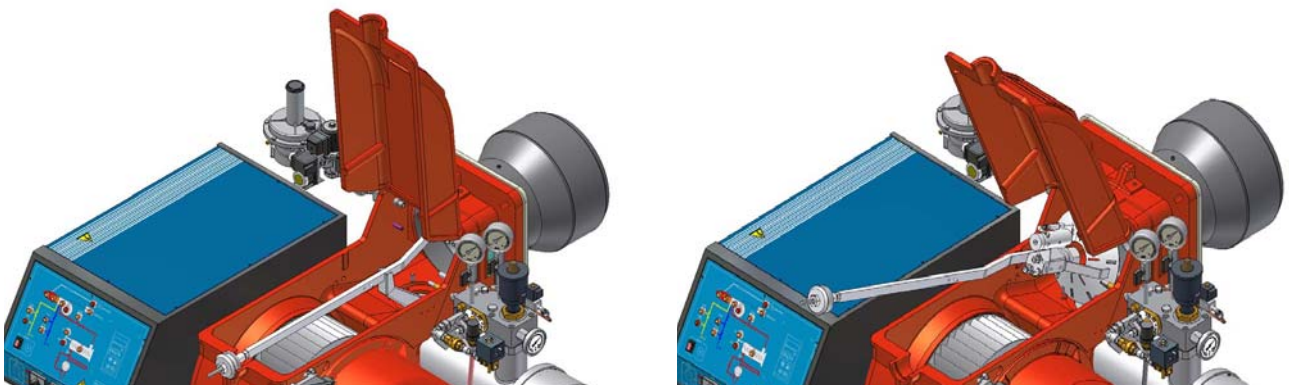


Fig. 38

Removing the oil gun, replacing/adjusting the nozzle and the ignition electrode



ATTENTION: avoid the electrode to get in touch with metallic parts (blast tube, head, etc.), otherwise the boiler operation would be compromised. Check the electrode position after any intervention on the combustion head.

To remove the oil gun, proceed as follows:

- 1 remove the combustion head as described on the previous paragraph;
- 2 after removing the oil gun, to clean the nozzle remove it from its place after unscrewing **V**;
- 3 unscrew cap **C** and clean the nozzle body **CU**; replace the nozzle if necessary;
- 4 in order to replace the electrode, unscrew the fixing screw and remove it: place the new electrode being careful to observe the measures (in mm) shown on next pictures and reassemble following the reversed procedure.
- 5 To adjust the nozzle position, unscrew the fixing screw, move the nozzle backwards or forwards, then fix the screw on the new position. In the example from "1" to "2" - see picture below.

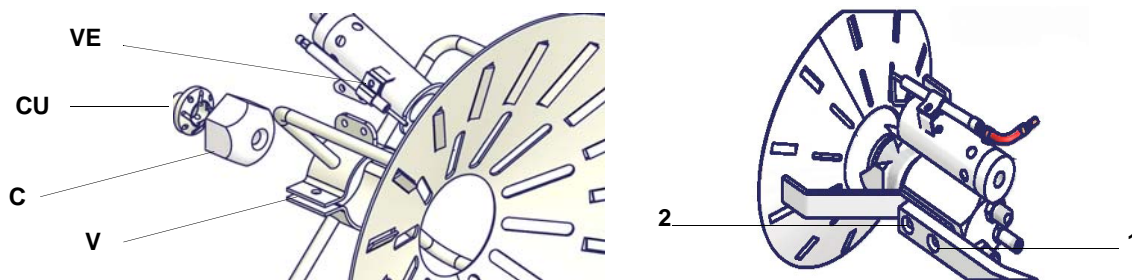
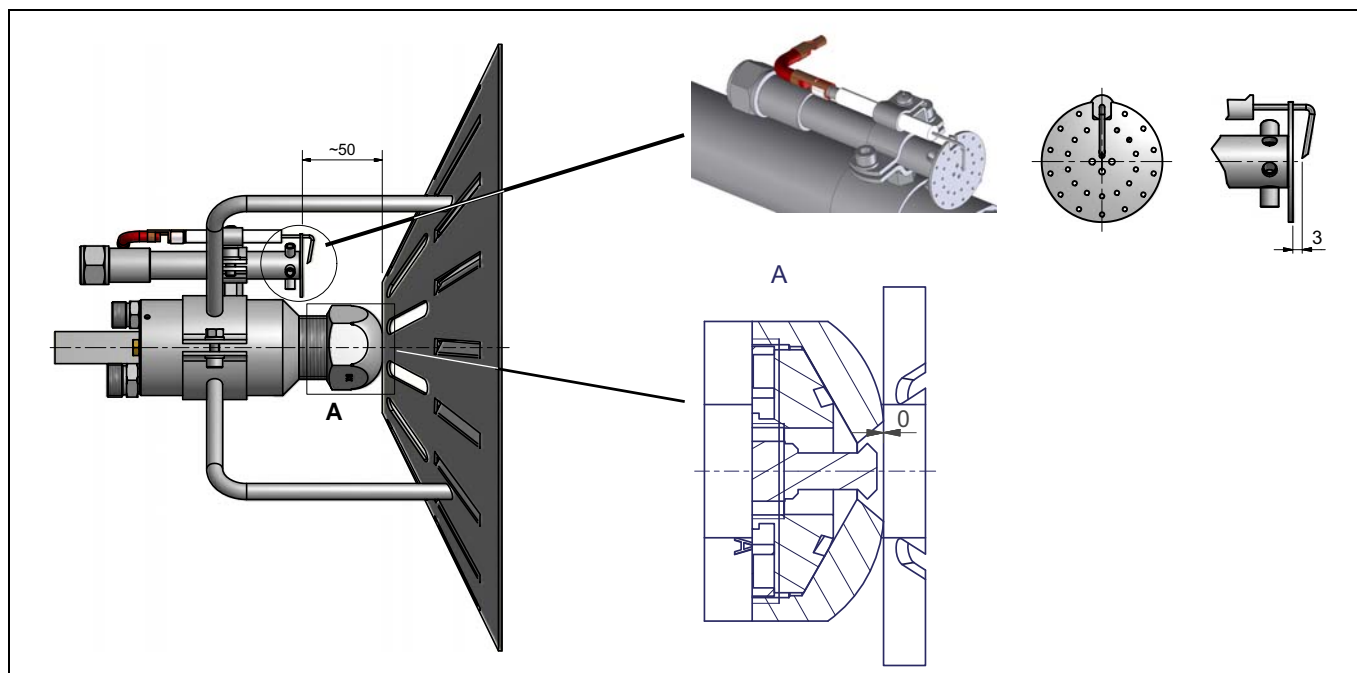


Fig. 39

To change the nozzle position, please contact the Technical Dpt.



Checking the detection current

To measure the detection signal follow the diagram in Fig. 40.

If the signal is not in the advised range, check the electrical contacts, the cleaning of the combustion head, the position of the photoresistor and if necessary replace it.

Minimum current intensity with flame: $8\mu\text{A}$

Maximum possible current intensity with flame: $35\mu\text{A}$

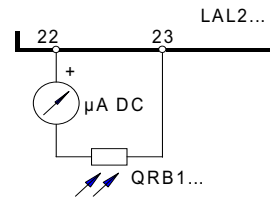


Fig. 40

Cleaning and replacing the detection photoresistor

When cleaning the photoresistive detector, always use a clean cloth. If necessary, remove it from its slot to replace it.

TROUBLESHOOTING**Heavy oil operation**

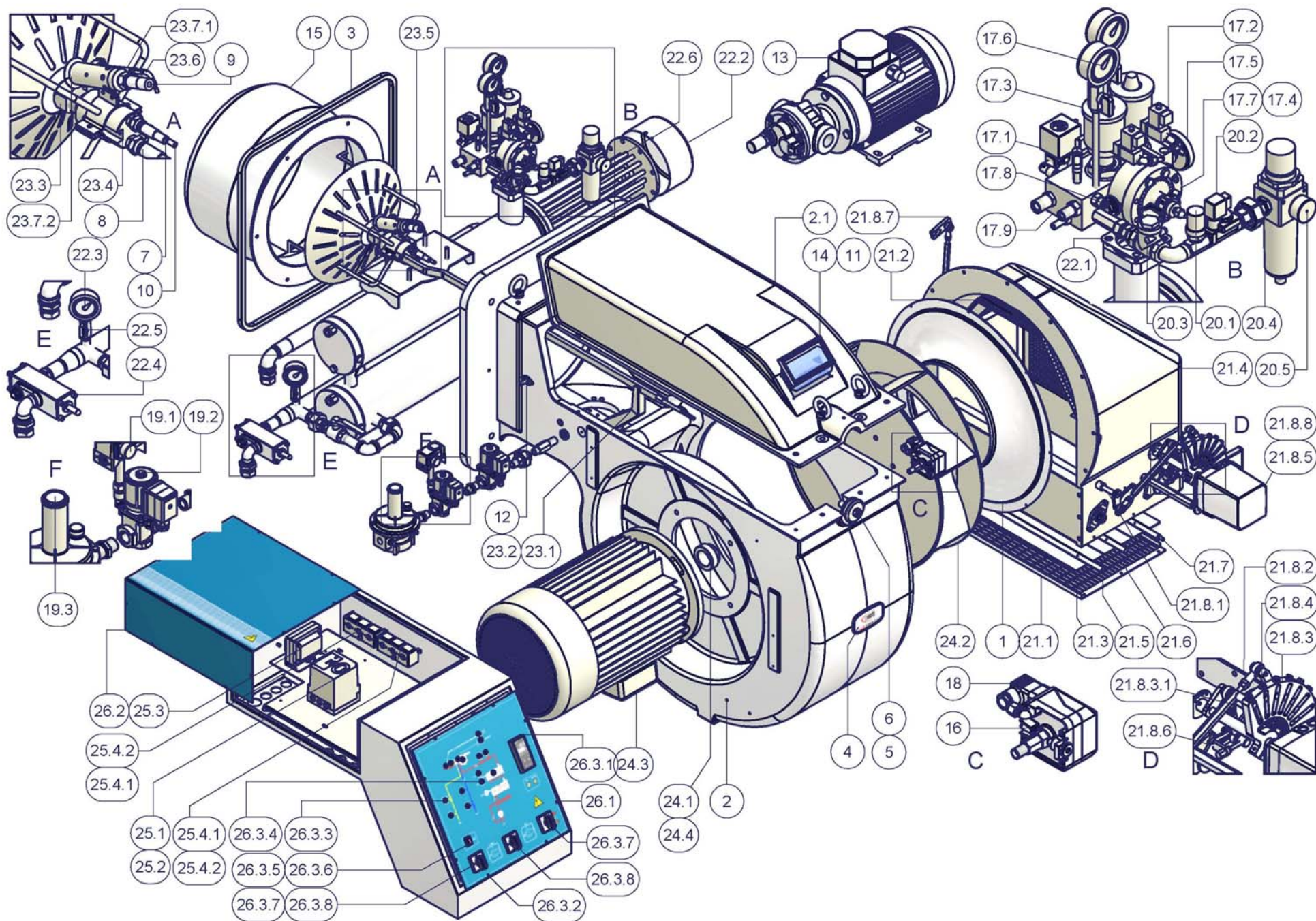
	THE BURNER DOESN'T START	THE BURNER REPEATS PRE- PURGE	NOISY FUEL PUMP	THE BURNER DOESN'T START AND STOPS	THE BURNER STARTS AND STOPS	THE BURNER DOESN'T SWITCH TO HIGH FLAME	THE BURNER STOPS DURING OPERATION	THE BURNER STOPS AND REPEATS THE CYCLE DURING OPE- RATION
MAIN SWITCH OPEN	●							
LINE FUSE INTERVENTION	●							
MAX. PRESSURE SWITCH FAULT	●							●
FAN THERMAL CUTOUT INTERVENTION	●							
AUXILIARY RELAIS FUSES INTERVENTION	●							
CONTROL BOX FAULT	●	●		●	●		●	
SERVOCONTROL FAULT						●		
SMOKEY FLAME					●		●	
IGNITION TRANSFORMER FAULT				●				
IGNITION ELECTRODE DIRTY OR WRONG POSI- TIONED				●				
DIRTY NOZZLE				●			●	
FUEL SOLENOID VALVE DEFECTIVE				●			●	
PHOTORESISTOR DIRTY OR DEFECTIVE					●		●	
HI-LO FLAME THERMOSTAT DEFECTIVE						●		
WRONG POSITION OF SERVOCONTROL CAMS						●		
FUEL PRESSURE TOO LOW				●				
DIRTY FUEL FILTERS			●	●			●	

BURNER EXPLODED VIEW

ITEM	DESCRIPTION
1	AIR INLET CONE
2	BURNER HOUSING
2.1	COVER
3	CERAMIC FIBRE PLAIT
4	NAME PLATE
5	PLUG
6	NIPPLE
7	FLEXIBLE HOSE
8	FLEXIBLE HOSE
9	GAS FLEXIBLE HOSE
10	FLEXIBLE HOSE
11	INSPECTION GLASS
12	PHOTORESISTOR
13	PUMP
14	BRACKET
15	STANDARD BLAST TUBE
16	AIR PRESSURE SWITCH
17.1	OIL SOLENOID VALVE
17.2	COMPRESSED AIR SOLENOID VALVE
17.3	PNEUMATIC OIL VALVE
17.4	INTERLOCK
17.5	THERMOMETER
17.6	PRESSURE GAUGE
17.7	OIL PRESSURE GOVERNOR
17.8	COMPRESSED AIR PRESS. GOVERNOR
17.9	OIL MANIFOLD
18	CONNECTOR
19.1	GAS PRESSURE
19.2	GAS SOLENOID VALVE
19.3	GAS GOVERNOR WITH FILTER

ITEM	DESCRIPTION
20.1	AIR PRESSURE SWITCH
20.2	COMPRESSED AIR SOLENOID VALVE
20.3	ONE-WAY VALVE
20.4	COMPRESSED ARI GOVERNOR WITH FILTER
20.5	PRESSURE GAUGE
21.1	NET
21.2	NET
21.3	AIR INTAKE DAMPER
21.4	AIR INTAKE
21.5	LOUVER SHAFT
21.6	LOUVER SHAFT
21.7	LOUVER SHAFT
21.8.1	THROTTLE SHAFT
21.8.2	BRACKET
21.8.3	ADJUSTING CAM
21.8.3.1	ADJUSTING CAM FOIL
21.8.4	LEVERAGE
21.8.5	ACTUATOR
21.8.6	CAM
21.8.7	LEVERAGE
21.8.8	ACTUATOR SHAFT
22.1	GASKET
22.2	COVER
22.3	PRESSURE GAUGE
22.4	OIL PRESSURE GOVERNOR
22.5	MANUAL VALVE
22.6	RESISTOR
23.1	BRACKET
23.2	NOZZLE HOLDER ROD
23.3	NOZZLE

ITEM	DESCRIPTION
23.4	NOZZLE HOLDER
23.5	COMBUSTION HEAD
23.6	IGNITION CABLE
23.7.1	IGNITION ELECTRODE
23.7.2	PILOT
24.1	SPACER
24.2	FAN WHEEL
24.3	MOTOR
24.4	CLAMPING PLATE
25.1	CONTROL BOX
25.2	CONTROL BOX SOCKET
25.3	IGNITION TRANSFORMER
25.4.1	THERMOSTAT
25.4.2	THERMOSTAT
26.1	BOARD
26.2	COVER
26.3.1	POWER CONTROLLER
26.3.2	FRONT CONTROL PANEL
26.3.3	LIGHT
26.3.4	LIGHT
26.3.5	LOCK-OUT RESET BUTTON
26.3.6	PROTECTION
26.3.7	SWITCH
26.3.8	SWITCH



SIEMENS LAL.. CONTROL BOX

Use

- Control and supervision of oil atomization burners
- For burners of medium to high capacity
- For intermittent operation (at least one controlled shutdown every 24 hours)
- Universally applicable for multistage or modulating burners

Housing and plug-in base

- Made of impact-proof and heat-resistance black plastic
- Lockout reset button with viewing window; located behind it:
- Lockout warning lamp
- Lockout indicator coupled to the spindle of the sequence switch and visible in the transparent lockout reset button
- uses easy-to-remember symbols to indicate the type of fault and the point in time lockout occurred

Base and plug-in section of the LAL... are designed such that only burner controls of the LAL... family can be plugged in.

- 24 connection terminals
- Auxiliary terminals «31» and «32»
- 3 earth terminals terminating in a lug for earthing the burner
- 3 neutral conductor terminals prewired to terminal 2
- 14 knockout holes for cable entry by means of cable glands
- 8 at the side
- 6 in the bottom of the base
- 6 lateral threaded knockout holes for cable entry glands Pg11 or M20

Operation

Flame detector and flame simulation test are made automatically during burner off times and the prepurge time «t1». If loss of flame occurs during operation, the burner control will initiate lockout. If automatic repetition of the startup sequence is required, the clearly marked wire link on the plug-in section of the LAL... must be cut away.

Pre-conditions for burner startup

- Burner control is not in the lockout position
- Sequence switch is in its start position (with LAL2 voltage is present at terminals 11 and 12.
- Air damper is closed; end switch «Z» for the CLOSED position must feed power from terminal 11 to terminal 8.
- Contact of the limit thermostat or pressure switch «W» and the contacts of any other switching devices in the control loop between terminals 4 and 5 must be closed e.g. a control contact for the oil preheater's temperature
- Normally closed contact of the air pressure switch must be closed.

Startup sequence

Start command by «R»:

- «R» closes the start control loop between terminals 4 and 5
- The sequence switch starts to run
- Only prepurging, fan motor at terminal 6 receives power
- Pre- and postpurging, fan motor or flue gas fan at terminal 7 receives power on completion of «t7»
- On completion of «t16», the control command for opening the air damper is delivered via terminal 9
- Terminal 8 receives no power during the positioning time
- The sequence switch continues to run only after the air damper has fully closed.

t1 Prepurge time with air damper fully open:

- The correct functioning of the flame supervision circuit is checked during «t1»
- The burner control will initiate lockout if correct functioning is not ensured.

With LAL2:

Shortly after the beginning of «t1», the air pressure switch must change over from terminal 13 to terminal 14 otherwise, the burner control will initiate lockout start of the air pressure check.

t3 Short preignition time:

«Z» must be connected to terminal 16, release of fuel via terminal 18.

t3' Long preignition time: «Z» connected to terminal 15.

t3n Postignition time:

- «Z» must be connected to terminal 15

- With short preignition, «Z» remains on until «TSA» has elapsed connection to terminal 16.

t4 Interval «BV1 – BV2» or «BV1 - LR»: On completion of «t4», voltage is present at terminal 19. The voltage is required to power «BV2» connected to auxiliary switch «v» in the actuator.

t5 Interval: On completion of «t5», terminal 20 receives power. At the same time, control outputs 9 to 11 and input 8 are galvanically separated from the LAL... control section.

LAL... is now protected against reverse voltages from the load control circuit. With the release of «LR» at terminal 20, the startup sequence of the LAL... ends. After a few idle steps (steps with no contact position changes), the sequence switch switches itself off.

B Operating position of the burner

B-C Burner operation: during burner operation, «LR» drives the air damper to the nominal load or low-fire position, depending on heat demand; the release of the nominal load takes place via auxiliary switch «v» in the actuator and in the event of loss of flame during operation, the LAL... will initiate lockout. For automatic start repetition, the clearly marked wire link «B» on the plugin section of the LAL... must be cut away.

C Controlled shutdown: in the case of controlled shutdown, «BV...» will immediately be closed. At the same time, the sequence switch is started to program «t6»

C-D Sequence switch travels to start position «A»

t6 Postpurge time: fan «M2» connected to terminal 7. Shortly after the start of «t6», terminal 10 receives power and the air damper is driven to the MIN position. Full closing of the air damper starts only shortly before «t6» has elapsed initiated by the control signal at terminal 11. During the following burner off time, terminal 11 is live.

t13 Permissible afterburn time: during «t13», the flame signal input may still receive a flame signal.

D-A End of control program: start position

As soon as the sequence switch has reached the start position – having thereby switched itself off – the flame detector and flame simulation test will start again.

During burner off times, the flame supervision circuit is live.

Lockout and indication of the stop position

Whenever a fault occurs, the sequence switch stops and with it the lockout indicator. The symbol appearing above the reading mark indicates the type of fault:

◀ No start. One of the contacts is not closed (also refer to «Preconditions for burner startup»):

Extraneous light:

Lockout during or after completion of the control program

Examples: nonextinguished flame, leaking fuel valves faulty flame supervision circuit.

▲ Interruption of startup. No OPEN signal at terminal 8 from the changeover end switch «a». Terminals 6, 7 and 15 are live until fault has been corrected

P Lockout. No air pressure indication at the beginning of the air pressure check. Air pressure failure after the air pressure check.

■ Defect in the flame supervision circuit.

▼ Interruption of the startup sequence. No positioning signal at terminal 8 from the auxiliary switch «m» for the low-fire position. Terminals 6, 7 and 15 are live until fault has been corrected.

1 Lockout. No flame signal at the end of the safety time.

| Flame signal has been lost during operation.

A Consenso all'avviamento (ad esempio tramite il termostato o il pressostato R dell'impianto)

B Operating position of the burner

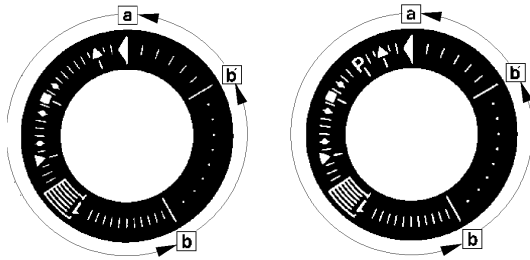
B-C Burner operation: during burner operation, «LR» drives the air damper to the nominal load or low-fire position, depending on heat demand; the release of the nominal load takes place via auxiliary switch «v» in the actuator and in the event of loss of flame during operation, the LAL... will initiate lockout. For automatic start repetition, the clearly marked wire link «B» on the plugin section of the LAL... must be cut away.

C Controlled shutdown: in the case of controlled shutdown, «BV...» will immediately be closed. At the same time, the sequence switch is started to program «t6»

C-D Sequence switch travels to start position «A».

During burner off times, the flame supervision circuit is live.

Lockout indication

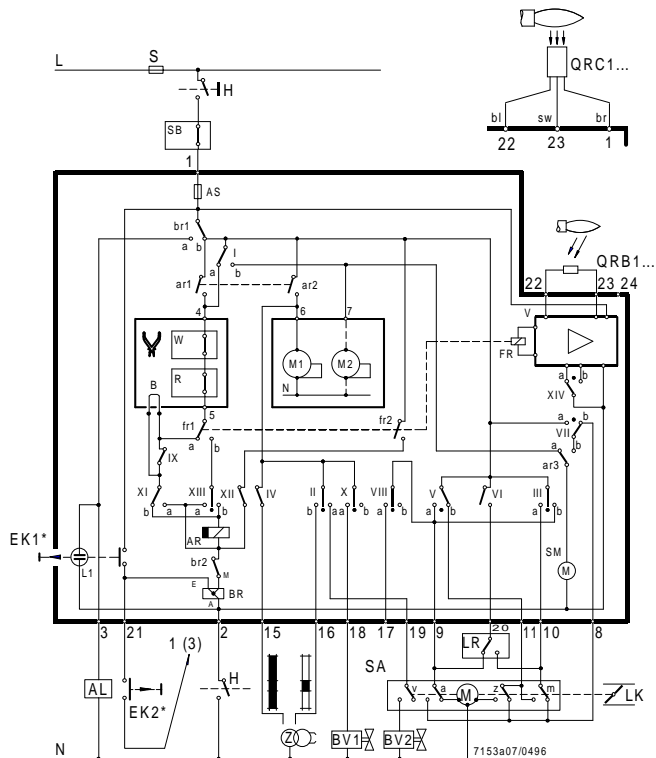


- a-b Startup sequence
- b-b' Idle step (with no contact confirmation)
- b(b')-a Postpurge program

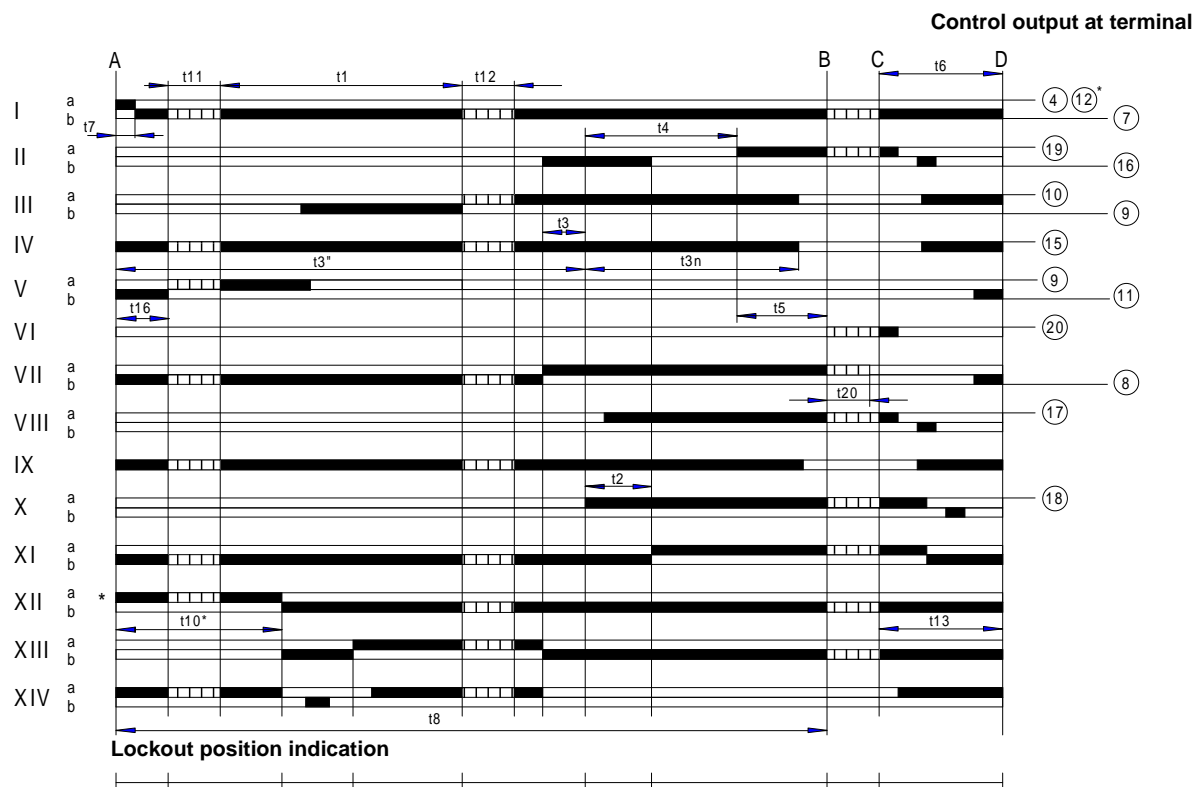
Burner control can immediately be reset after lockout:
 Do not press the lockout reset button for more than 10 seconds
 The sequence switch always travels to the start position first
 After resetting
 After rectification of a fault that led to shutdown
 After each power failure
 During this period of time, power is only fed to terminals 7 and 9...11.
 Then, the LAL... will program a new burner startup sequence

Specifications

Power supply	AC 230 V -15 / +10 %
for LAL2...	on request AC 100 V -15 %...AC 110 V +10 %
Frequency	50 Hz -6 %...60 Hz +6 %
Absorption	AC 3.5 VA
Mounting position	optional
Protection	IP 40
Perm. input current at terminal 1	AC 5 A max., 20 A peak
Perm. current rating of control terminals 3, 6, 7, 9...11, 15...20	4 A max., 20 A peak
Internal fuse	T6,3H250V according to IEC 127
External fuse	max. 10 A
Weight	Device 1000 g Plug-in base 165 g



Sequence diagram



Key

- t1 Prepurge time with air damper fully open
- t2 Safety time
- t3 Preignition time, short («Z» connected to terminal 16)
- T3' Preignition time, long («Z» connected to terminal 15)
- t3n Postignition time («Z» connected to terminal 15)
- t4 Interval between voltage at terminals 18 and 19 («BV1-BV2»)
- t5 Interval between voltage at terminals 19 and 20 («BV2» load controller)
- t6 Postpurge time (with «M2»)
- t7 Interval between start command and voltage at terminal 7 (start delay time for «M2»)
- t8 Duration of startup sequence (excluding «t11» and «t12»)
- t10 Interval from startup to the beginning of the air pressure check
- t11 Air damper running time to the OPEN position
- t12 Air damper running time to the low-fire position (MIN)
- t13 Permissible afterburn time
- t16 Interval to the OPEN command for the air damper
- t20 For self-shutdown of the sequence switch



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Note: specifications and data subject to change. Errors and omissions excepted.



CIB UNIGAS

WIRING DIAGRAMS / SCHEMI ELETTRICI

SE12-088: PBY1025 - progressive burners/bruciatori progressivi

SE12-090: PBY1025 - fully-modulating burners/bruciatori modulanti

SE12-087: PBY1030 - progressive burners/bruciatori progressivi

SE12-089: PBY1030 - fully-modulating burners/bruciatori modulanti

ELECTRICAL WIRING DIAGRAMS / SCHEMI ELETTRICI

Electric supply connections must be arranged in order to ensure the burner stops if IRxx switch is open. When the three phase power supply is interrupted, the auxiliary (single phase) power supply must be interrupted as well.

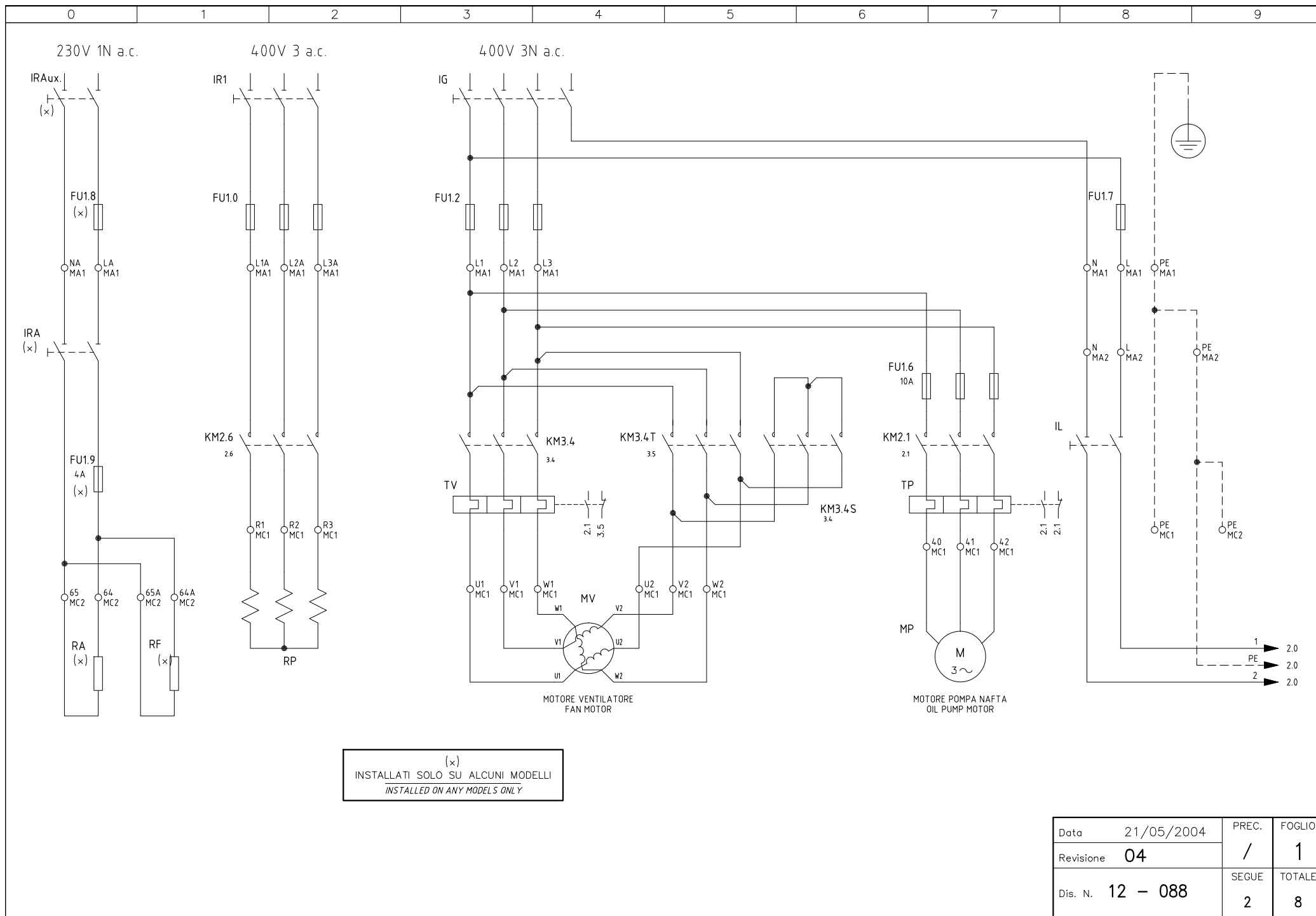
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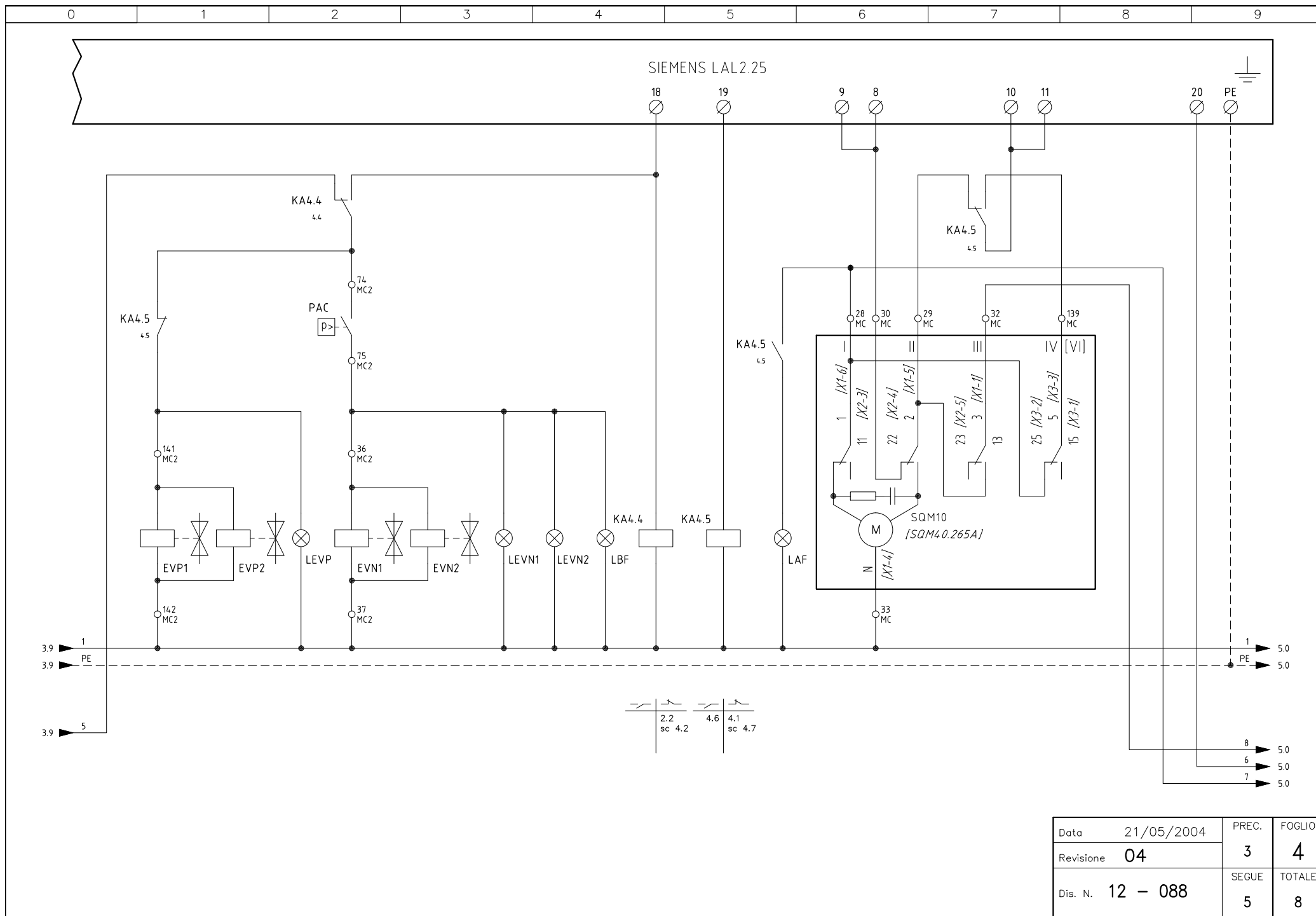
- 1 - Power supply 400V 50Hz 3N AC with neutral
- 2 - Don't reverse phase with neutral
- 3 - Ensure the burner is properly earthed

Si raccomanda di eseguire i collegamenti esterni di alimentazione in modo tale che un'eventuale apertura degli interruttori IRx provochi l'arresto del bruciatore interrompendone l'alimentazione monofase.

ATTENZIONE:

- 1 - Alimentazione elettrica 400V 50Hz + Neutro
- 2 - Non invertire fase con neutro
- 3 - Assicurare una buona messa a terra del bruciatore





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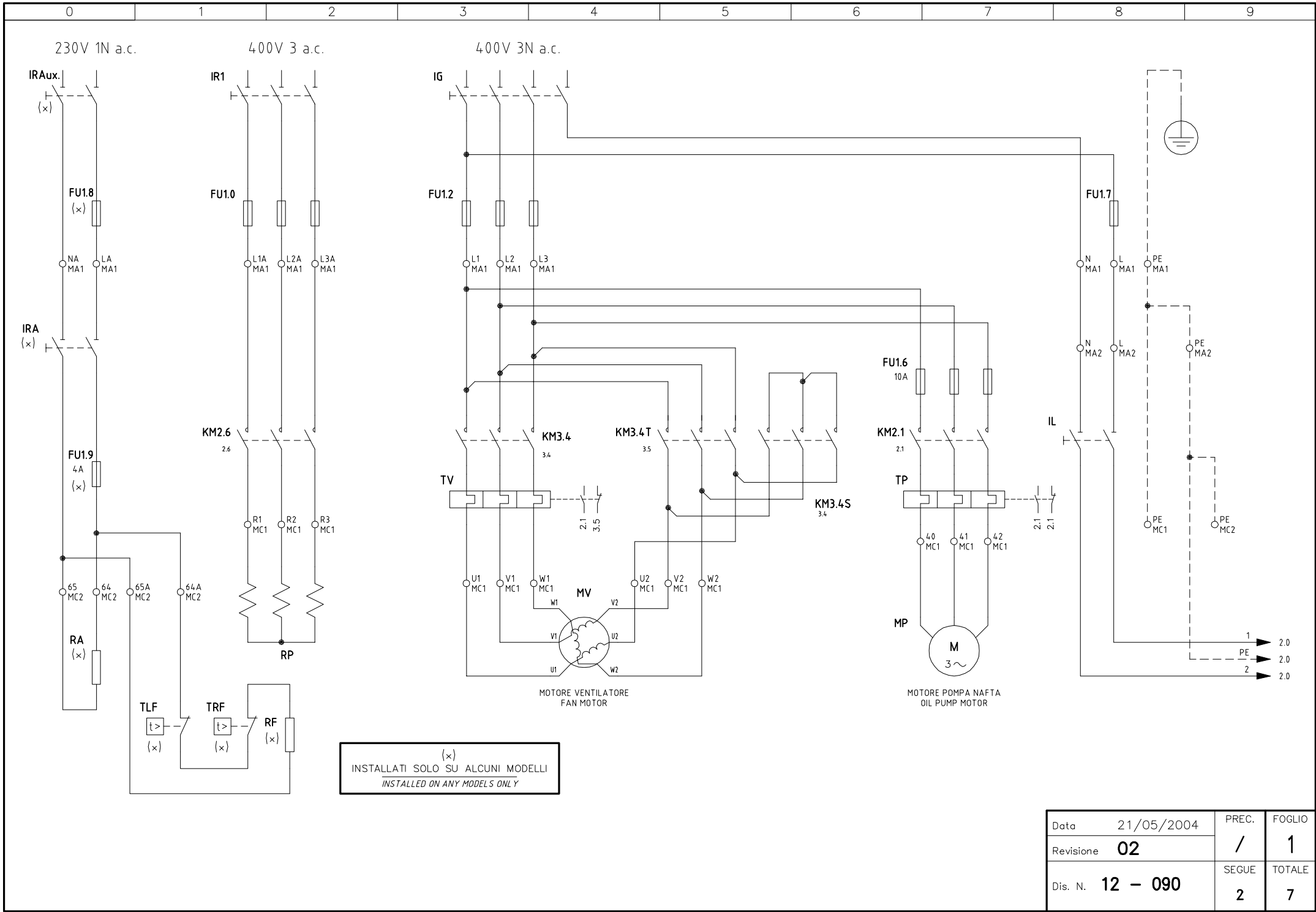
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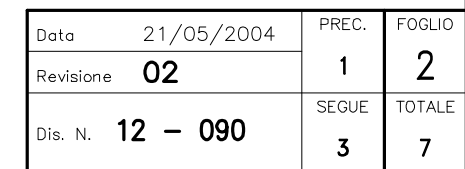
SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
LEVP	4	LAMPADA SEGNALAZIONE APERTURA [EVP1-EVP2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVP1-EVP2]
LP	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO POMPA	INDICATOR LIGHT FOR PUMP OPERATION
LPAC	3	LAMPADA SEGNALAZIONE INTERVENTO PRESSOSTATO PAC	INDICATOR LIGHT FOR OPERATING PRESSURE SWITCH PAC
LPGP	2	LAMPADA SEGNALAZIONE PRESSOSTATO GAS PILOTA	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE PILOT NETWORK
LRP	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RP]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RP] OPERATION
LS	2	LAMPADA SEGNALAZIONE SOSTA BRUCIATORE	INDICATOR LIGHT FOR BURNER STAND-BY
LT	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN OVERLOAD TRIPPED
LTA	3	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
LTCI	3	LAMPADA SEGNALAZIONE CONSENSO TERMOSTATO [TCI]	INDICATOR LIGHT FOR [TCI] CONSENT
LTP	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO POMPA	INDICATOR LIGHT FOR PUMP OVERLOAD TRIPPED
LTRS	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRS]	INDICATOR LIGHT FOR [TRS] SAFETY THERMOSTAT
MP	1	MOTORE POMPA NAFTA	OIL PUMP MOTOR
MV	1	MOTORE VENTILATORE	FAN MOTOR
PA	2	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PAC	4	PRESSOSTATO ARIA DI POLVERIZZAZIONE	POLVERIZATION AIR PRESSURE SWITCH
PGP	2	PRESSOSTATO PILOTA GAS	PILOT MINIMUM GAS PRESSURE SWITCH
PS	2	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
PT100	5	SONDA DI TEMPERATURA	TEMPERATURE PROBE
(x) RA	1	RESISTENZE AUSILIARIE	AUXILIARY RESISTORS
(x) RF	1	RESISTENZA AUSILIARIA FILTRO NAFTA	OIL FILTER AUXILIARY RESISTOR
RP	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
SD-PRESS	5	SONDA DI PRESSIONE	PRESSURE PROBE
SD-PRESS	5	SONDA DI PRESSIONE	PRESSURE PROBE
SD-TEMP.	5	SONDA DI TEMPERATURA	TEMPERATURE PROBE
SD - 4÷20mA	5	TRASDUTTORE USCITA IN CORRENTE	TRANSDUCER CURRENT OUTPUT
SIEMENS LAL2.25	2	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
SIEMENS RWF40.0x0	5	REGOLATORE MODULANTE	BURNER MODULATOR
SIEMENS RWF50.2	5	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
SQM10	4	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
ST	3	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	3	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TCI	3	TERMOSTATO CONSENSO IMPIANTO	PLANT CONSENT THERMOSTAT
TP	1	TERMICO MOTORE POMPA	PUMP MOTOR THERMAL
TR	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RP]	REGULATION THERMOSTAT FOR PRE-HEATING [RP] RESISTORS
TRS	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RP]	PRE-HEATING [RP] A SAFETY THERMOSTAT
TV	1	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL
[SQM40.265A]	4	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)

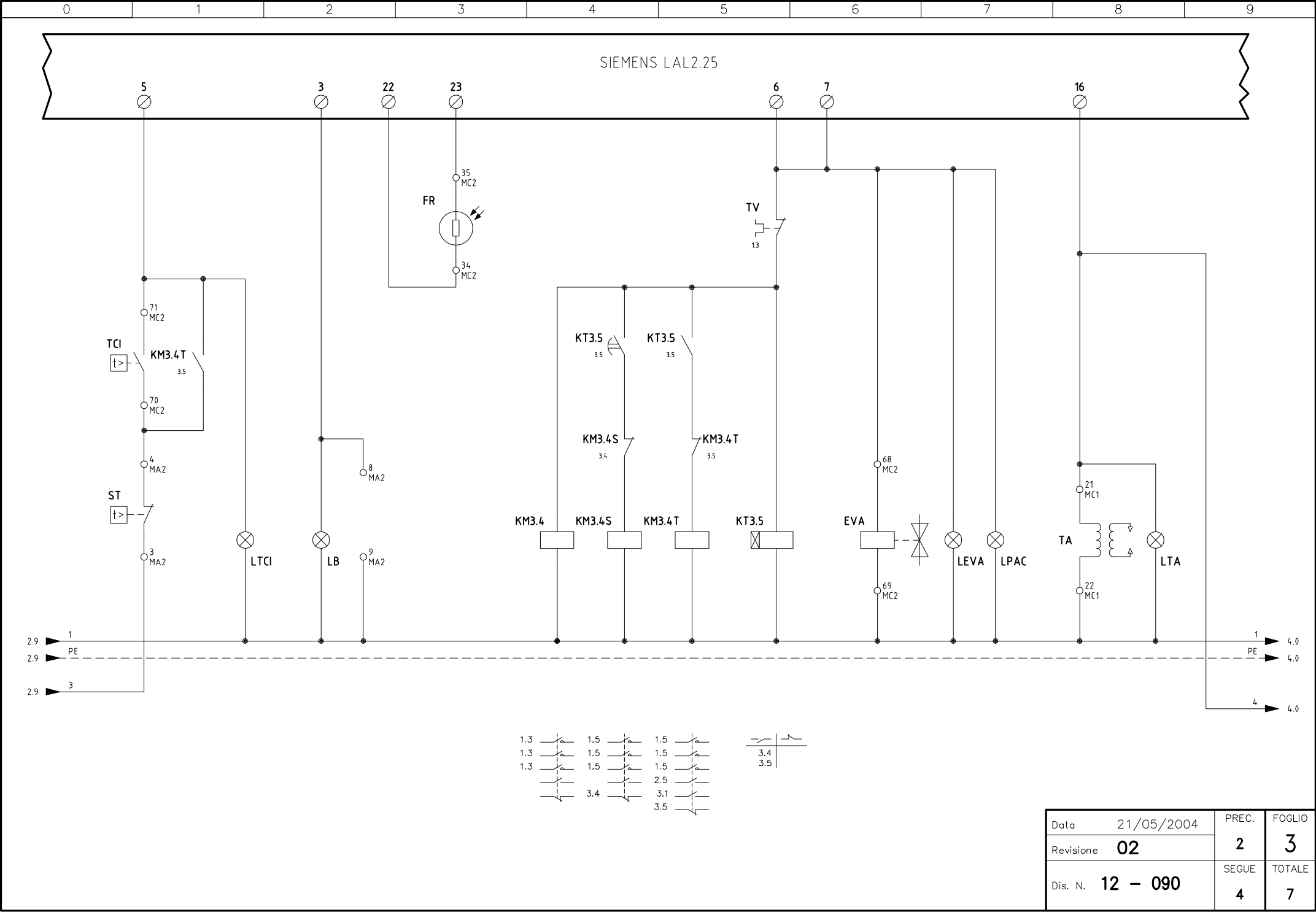
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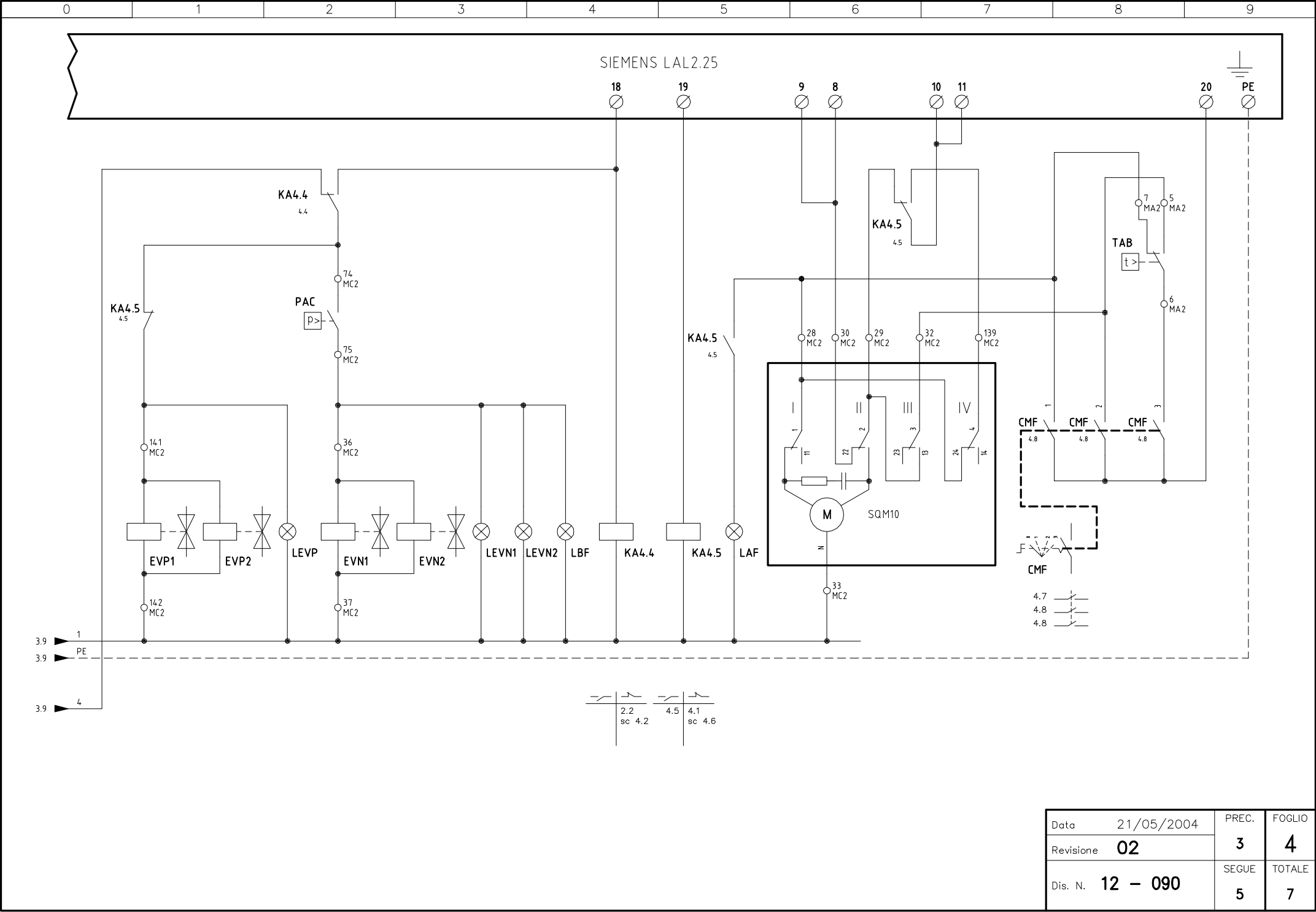
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Revisione	04	7	8
Dis. N.	12 - 088	SEGUE	TOTAL
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Dis. N.	12 - 090	SEGUE	TOTALE
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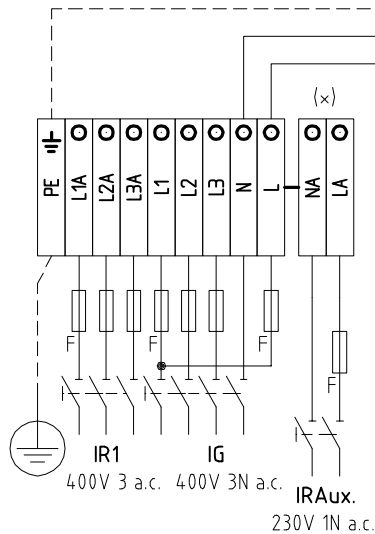




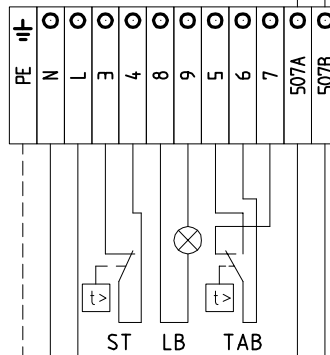


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MORSETTIERA ALIMENTAZIONE - PIASTRA 1
SUPPLY TERMINALS - PLATE 1

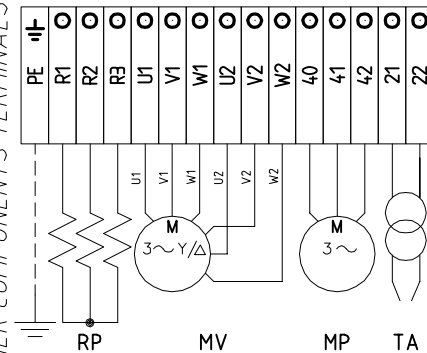


QG - MA2
MORSETTIERA ALIMENTAZIONE - PIASTRA 2
SUPPLY TERMINALS - PLATE 2

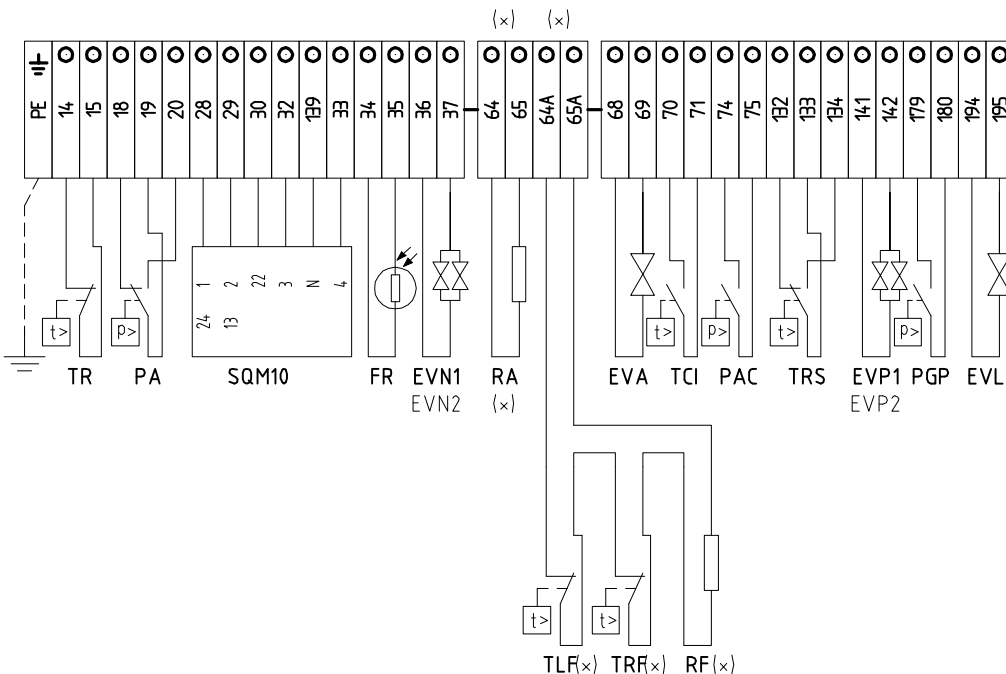


KA2.6

QG - MC1
MORSETTIERA COMPONENTI BRUCIATORE - PIASTRA 1
BURNER COMPONENTS TERMINALS - PLATE 1



QG - MC2
MORSETTIERA COMPONENTI BRUCIATORE - PIASTRA 2
BURNER COMPONENTS TERMINALS - PLATE 2



CONTATTI AUSILIARI CONTATTORE RESISTENZE PRERISCALDATORE NAFTA
AUXILIARY CONTACTS FOR PRE-HEATER RESISTOR SOLENOID STARTER

CAMME SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR CAMS
SQM10

- I ALTA FIAMMA
HIGH FLAME
II SOSTA E ACCENSIONE
STAND-BY AND IGNITION
III BASSA FIAMMA
LOW FLAME
IV LIMITAZIONE ANTICIPO SERVOCOMANDO
SERVO CONTROL AUTOMATIC ADVANCE RESTRICTION

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Data	21/05/2004	PREC.	FOGLIO
Revisione	02	4	5
Dis. N.	12 - 090	SEGUE	TOTALE
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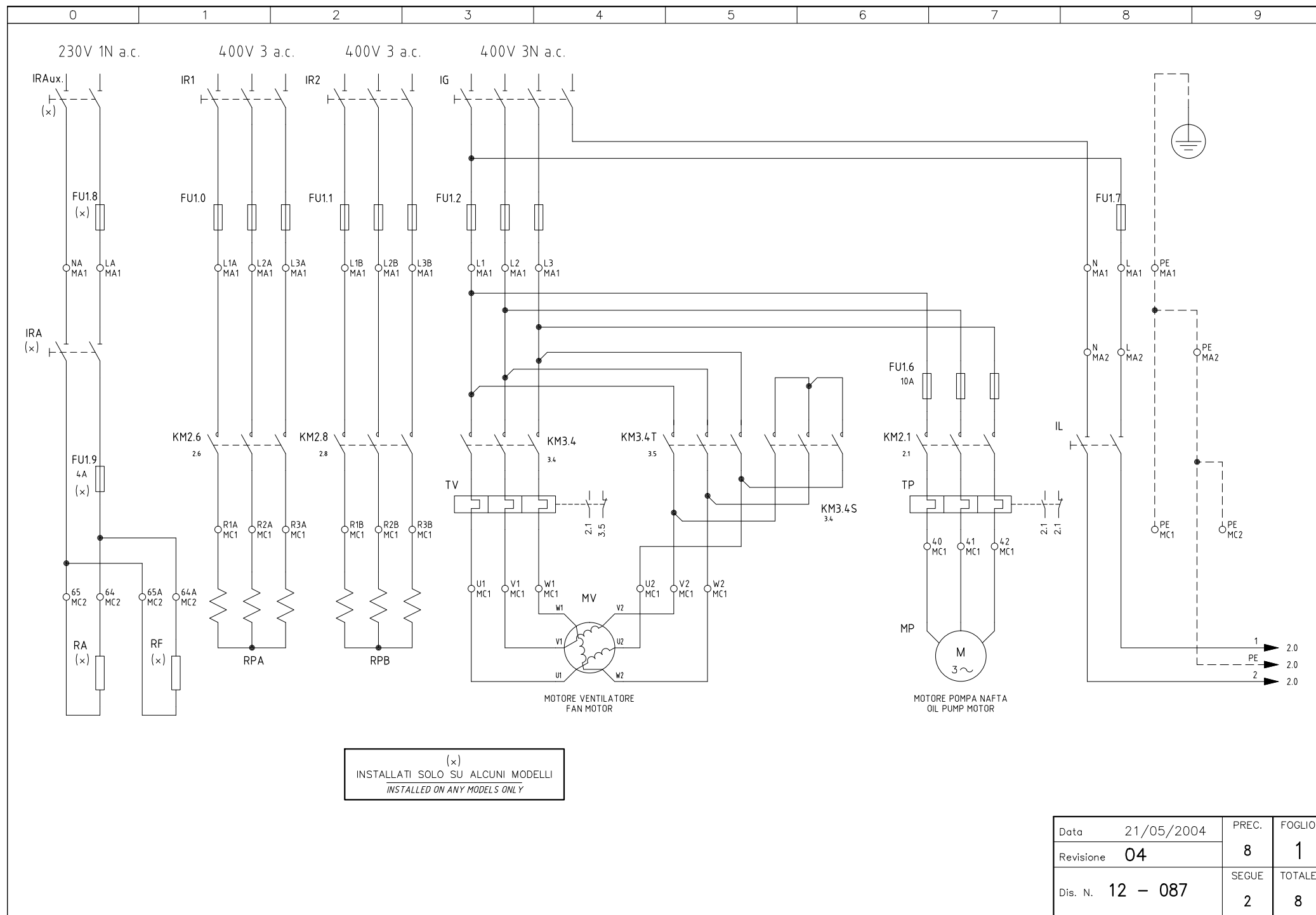
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SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
CMF	4	COMMUT. MANUALE FUNZ. 0)FERMO 1)ALTA FIAMMA 2)BASSA FIAMMA 3)AUTOMATICO	MANUAL SWITCH 0)OFF 1)HIGH FLAME 2)LOW FLAME 3)AUTOMATIC
EVA	3	ELETTROVALVOLA ARIA COMPRESSA	COMPRESSED AIR SOLENOID VALVE
EVL	2	ELETTROVALVOLA LAVAGGIO LANCIA	OIL GUN CLEAN SOLENOID VALVE
EVN1	4	ELETTROVALVOLA NAFTA	OIL SOLENOID VALVE
EVN2	4	ELETTROVALVOLA NAFTA DI SICUREZZA	OIL SAFETY SOLENOID VALVE
EVP1	4	ELETTROVALVOLA PILOTA GAS	PILOT GAS SOLENOID VALVE
EVP2	4	ELETTROVALVOLA PILOTA GAS	PILOT GAS SOLENOID VALVE
FR	3	FOTORESISTENZA RILEVAZIONE FIAMMA	PHOTORESISTOR FLAME DETECTOR
FU1.0	1	FUSIBILI LINEA PRERISCALDATORE [RP]	LINE PRE-HEATING [RP] FUSES
FU1.2	1	FUSIBILI LINEA BRUCIATORE	BURNER LINE FUSES
FU1.6	1	FUSIBILI LINEA POMPA	PUMP LINE FUSES
FU1.7	1	FUSIBILE LINEA AUSILIARI	AUXILIARY LINE FUSE
(x) FU1.8	1	FUSIBILE LINEA RESISTENZE AUSILIARIE	LINE AUXILIARY RESISTORS FUSE
(x) FU1.9	1	FUSIBILE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS FUSE
IG	1	INTERRUTTORE LINEA BRUCIATORE	BURNER LINE SWITCH
IL	1	INTERRUTTORE LINEA AUSILIARI	AUXILIARY LINE SWITCH
IP	2	INTERRUTTORE POMPA NAFTA	OIL PUMP SWITCH
IR1	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE	PRE-HEATING RESISTORS LINE SWITCH
(x) IRA	1	INTERRUTTORE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS SWITCH
(x) IRAux.	1	INTERRUTTORE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS SWITCH
KA2.6	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE	AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE
KA4.4	4	RELE' AUSILIARIO	AUXILIARY RELAY
KA4.5	4	RELE' AUSILIARIO	AUXILIARY RELAY
KM2.1	2	CONTATTORE MOTORE POMPA NAFTA	OIL PUMP MOTOR CONTACTOR
KM2.6	2	CONTATTORE RESISTENZE PRERISCALDATORE [RP]	PRE-HEATING RESISTORS [RP] CONTACTOR
KM3.4	3	CONTATTORE MOTORE VENTILATORE (LINEA)	FAN MOTOR CONTACTOR (LINE)
KM3.4S	3	CONTATTORE MOTORE VENTILATORE (TRIANGOLO)	FAN MOTOR CONTACTOR (DELTA)
KM3.4T	3	CONTATTORE MOTORE VENTILATORE (STELLA)	FAN MOTOR CONTACTOR (STAR)
KT2.2	2	RELE' TEMPORIZZATORE	DELAYED RELAY
KT3.5	3	TEMPORIZZATORE STELLA/TRIANGOLO	STAR/DELTA DELAYED RELAY
LAF	4	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	3	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	4	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LEVA	3	LAMPADA SEGNALAZIONE APERTURA [EVA]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVA]

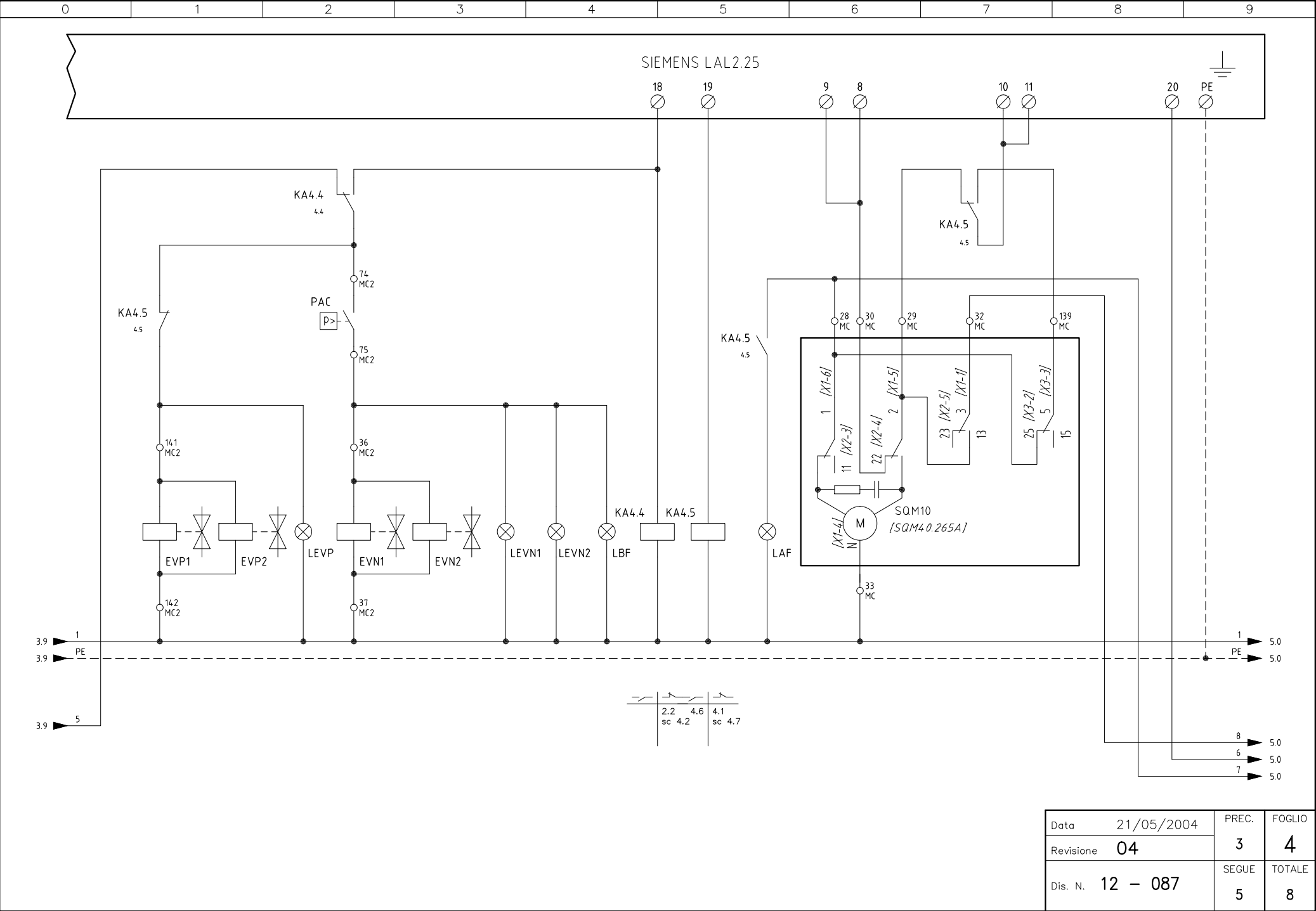
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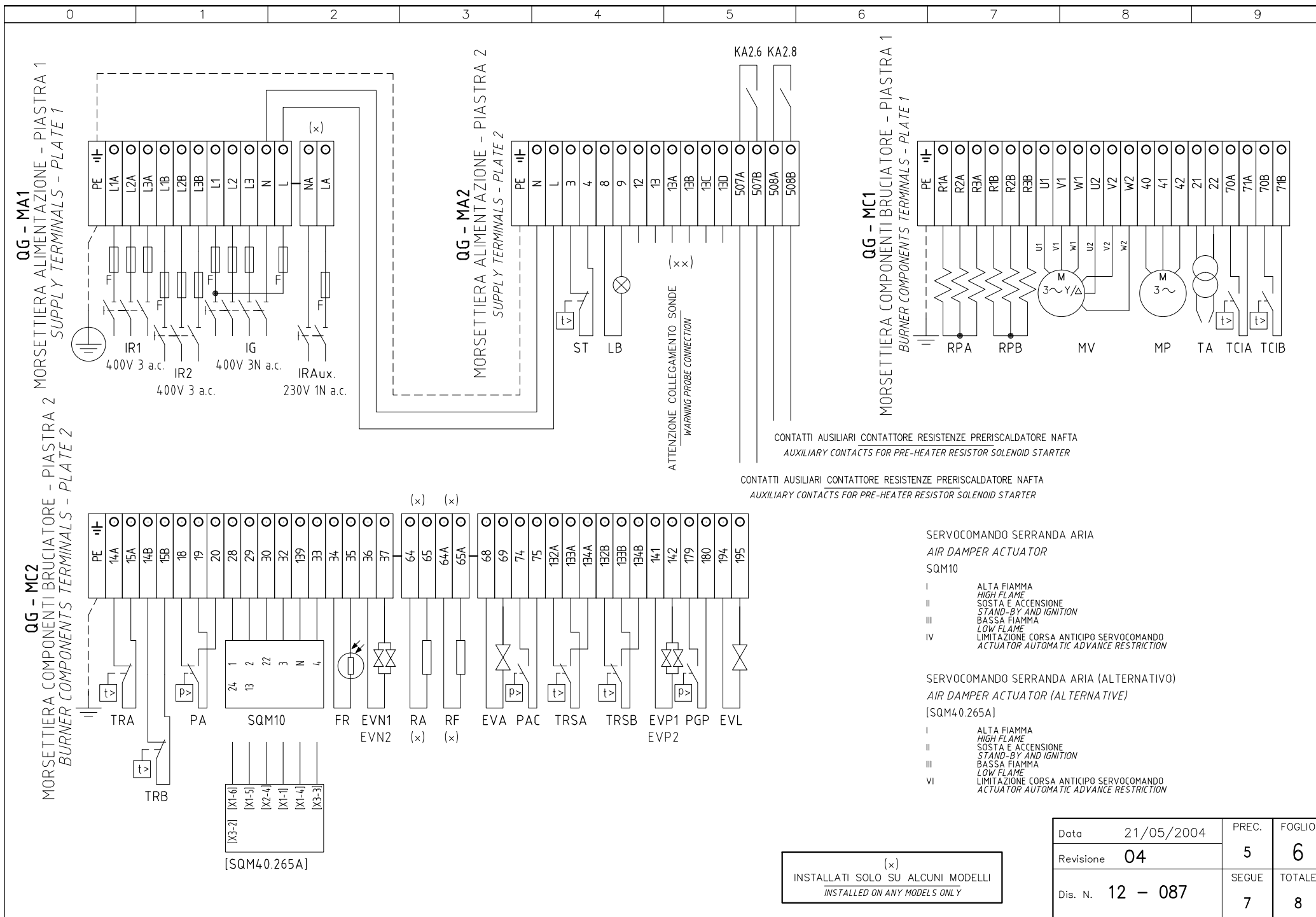
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Data	21/05/2004	PREC.	FOGLIO
Revisione	04	8	1
Dis. N.	12 - 087	SEGUE	TOTALE
		2	8





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	SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE			FUNCTION				
	CMF	5	COMMUT. MANUALE FUNZ. 0)FERMO 1)ALTA FIAMMA 2)BASSA FIAMMA 3)AUTOMATICO			MANUAL SWITCH 0)OFF 1)HIGH FLAME 2)LOW FLAME 3)AUTOMATIC				
	EVA	3	ELETTROVALVOLA ARIA COMPRESSA			COMPRESSED AIR SOLENOID VALVE				
	EVL	2	ELETTROVALVOLA LAVAGGIO LANCIA			OIL GUN CLEAN SOLENOID VALVE				
	EVN1	4	ELETTROVALVOLA NAFTA			OIL SOLENOID VALVE				
	EVN2	4	ELETTROVALVOLA NAFTA DI SICUREZZA			OIL SAFETY SOLENOID VALVE				
	EVP1	4	ELETTROVALVOLA PILOTA GAS			PILOT GAS SOLENOID VALVE				
	EVP2	4	ELETTROVALVOLA PILOTA GAS			PILOT GAS SOLENOID VALVE				
	FR	3	FOTORESISTENZA RILEVAZIONE FIAMMA			PHOTORESISTOR FLAME DETECTOR				
	FU1.0	1	FUSIBILI LINEA PRERISCALDATORE [RPA]			LINE PRE-HEATING [RPA] FUSES				
	FU1.1	1	FUSIBILI LINEA PRERISCALDATORE [RPB]			LINE PRE-HEATING [RPB] FUSES				
	FU1.2	1	FUSIBILI LINEA BRUCIATORE			BURNER LINE FUSES				
	FU1.6	1	FUSIBILI LINEA POMPA			PUMP LINE FUSES				
	FU1.7	1	FUSIBILE LINEA AUSILIARI			AUXILIARY LINE FUSE				
(x)	FU1.8	1	FUSIBILE LINEA RESISTENZE AUSILIARIE			LINE AUXILIARY RESISTORS FUSE				
(x)	FU1.9	1	FUSIBILE RESISTENZE AUSILIARIE			AUXILIARY RESISTORS FUSE				
	FU5.6	5	FUSIBILE			FUSE				
	IG	1	INTERRUTTORE LINEA BRUCIATORE			BURNER LINE SWITCH				
	IL	1	INTERRUTTORE LINEA AUSILIARI			AUXILIARY LINE SWITCH				
	IP	2	INTERRUTTORE POMPA NAFTA			OIL PUMP SWITCH				
	IR1	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE			PRE-HEATING RESISTORS LINE SWITCH				
	IR2	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE			PRE-HEATING RESISTORS LINE SWITCH				
(x)	IRA	1	INTERRUTTORE RESISTENZE AUSILIARIE			AUXILIARY RESISTORS SWITCH				
(x)	IRAux.	1	INTERRUTTORE RESISTENZE AUSILIARIE			AUXILIARY RESISTORS SWITCH				
	KA2.6	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE			AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE				
	KA2.8	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE			AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE				
	KA4.4	4	RELE' AUSILIARIO			AUXILIARY RELAY				
	KA4.5	4	RELE' AUSILIARIO			AUXILIARY RELAY				
	KM2.1	2	CONTATTORE MOTORE POMPA NAFTA			OIL PUMP MOTOR CONTACTOR				
	KM2.6	2	CONTATTORE RESISTENZE PRERISCALDATORE [RP]			PRE-HEATING RESISTORS [RP] CONTACTOR				
	KM2.8	2	CONTATTORE RESISTENZE PRERISCALDATORE [RPA]			PRE-HEATING RESISTORS [RPA] CONTACTOR				
	KM3.4	3	CONTATTORE MOTORE VENTILATORE (LINEA)			FAN MOTOR CONTACTOR (LINE)				
	KM3.4S	3	CONTATTORE MOTORE VENTILATORE (TRIANGOLO)			FAN MOTOR CONTACTOR (DELTA)				
	KM3.4T	3	CONTATTORE MOTORE VENTILATORE (STELLA)			FAN MOTOR CONTACTOR (STAR)				
	KT2.2	2	RELE' TEMPORIZZATORE			DELAYED RELAY				
	KT3.5	3	TEMPORIZZATORE STELLA/TRIANGOLO			STAR/DELTA DELAYED RELAY				
	LAF	4	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE			BURNER IN HIGH FLAME INDICATOR LIGHT				
	LB	3	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE			INDICATOR LIGHT FOR BURNER LOCK-OUT				
	LBF	4	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE			BURNER IN LOW FLAME INDICATOR LIGHT				
	LEVA	3	LAMPADA SEGNALAZIONE APERTURA [EVA]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVA]				
	LEVN1	4	LAMPADA SEGNALAZIONE APERTURA [EVN1]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVN1]				
	LEVN2	4	LAMPADA SEGNALAZIONE APERTURA [EVN2]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVN2]				
	LEVP	4	LAMPADA SEGNALAZIONE APERTURA [EVP1-EVP2]			INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVP1-EVP2]				

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Data	21/05/2004	PREC.	FOGLIO
Revisione	04	6	7
Dis. N.	12 - 087	SEGUE 8	TOTALE 8

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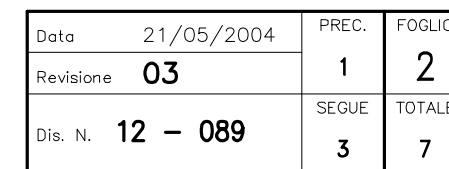
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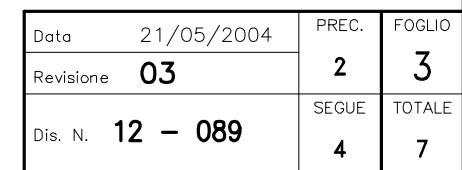
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SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
LP	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO POMPA	INDICATOR LIGHT FOR PUMP OPERATION
LPAC	3	LAMPADA SEGNALAZIONE INTERVENTO PRESSOSTATO PAC	INDICATOR LIGHT FOR OPERATING PRESSURE SWITCH PAC
LGP	2	LAMPADA SEGNALAZIONE PRESSOSTATO GAS PILOTA	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE PILOT NETWORK
LRPA	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RPA]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RPA] OPERATION
LRPB	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RPB]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RPB] OPERATION
LS	2	LAMPADA SEGNALAZIONE SOSTA BRUCIATORE	INDICATOR LIGHT FOR BURNER STAND-BY
LT	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN OVERLOAD TRIPPED
LTA	3	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
LTCI	3	LAMPADA SEGNALAZIONE CONSENSO TERMOSTATO [TCI]	INDICATOR LIGHT FOR [TCI] CONSENT
LTP	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO POMPA	INDICATOR LIGHT FOR PUMP OVERLOAD TRIPPED
LTRSA	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRSA]	INDICATOR LIGHT FOR [TRSA] SAFETY THERMOSTAT
LTRSB	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRSB]	INDICATOR LIGHT FOR [TRSB] SAFETY THERMOSTAT
MP	1	MOTORE POMPA NAFTA	OIL PUMP MOTOR
MV	1	MOTORE VENTILATORE	FAN MOTOR
PA	2	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PAC	4	PRESSOSTATO ARIA DI POLVERIZZAZIONE	POLVERIZATION AIR PRESSURE SWITCH
PGP	2	PRESSOSTATO PILOTA GAS	PILOT MINIMUM GAS PRESSURE SWITCH
PS	2	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
PT100	5	SONDA DI TEMPERATURA	TEMPERATURE PROBE
RA	1	RESISTENZE AUSILIARIE	AUXILIARY RESISTORS
RF	1	RESISTENZA AUSILIARIA FILTRO NAFTA	OIL FILTER AUXILIARY RESISTOR
RPA	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
RPB	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
SD-PRESS	5	SONDA DI PRESSIONE	PRESSURE PROBE
SD-PRESS	5	SONDA DI PRESSIONE	PRESSURE PROBE
SD-TEMP.	5	SONDA DI TEMPERATURA	TEMPERATURE PROBE
SD - 4÷20mA	5	TRASDUTTORE USCITA IN CORRENTE	TRANSDUCER CURRENT OUTPUT
SIEMENS LAL2.25	2	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
SIEMENS RWF40.0x0	5	REGOLATORE MODULANTE	BURNER MODULATOR
SIEMENS RWF50.2	5	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
SQM10	4	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
ST	3	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	3	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TCIA	3	TERMOSTATO CONSENSO IMPIANTO [RPA]	PLANT CONSENT THERMOSTAT [RPA]
TCIB	3	TERMOSTATO CONSENSO IMPIANTO [RPB]	PLANT CONSENT THERMOSTAT [RPB]
TP	1	TERMICO MOTORE POMPA	PUMP MOTOR THERMAL
TRA	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RPA]	REGULATION THERMOSTAT FOR PRE-HEATING [RPA] RESISTORS
TRB	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RPB]	REGULATION THERMOSTAT FOR PRE-HEATING [RPB] RESISTORS
TRSA	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RPA]	PRE-HEATING [RPA] A SAFETY THERMOSTAT
TRSB	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RPB]	PRE-HEATING [RPB] A SAFETY THERMOSTAT
TV	1	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL
[SQM40.265A]	4	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)

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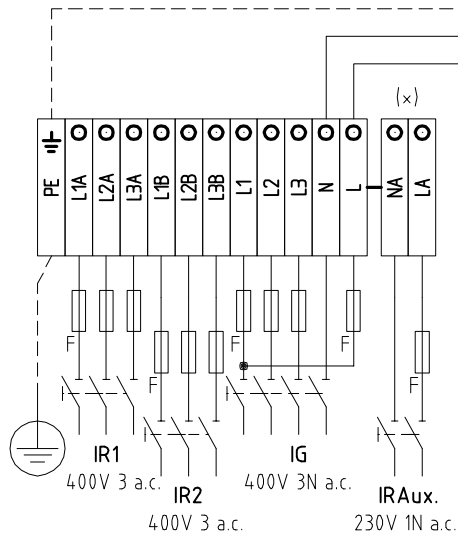
Data	21/05/2004	PREC.	FOGLIO
Revisione	04	7	8
Dis. N.	12 - 087	SEGUE /	TOTALE 8





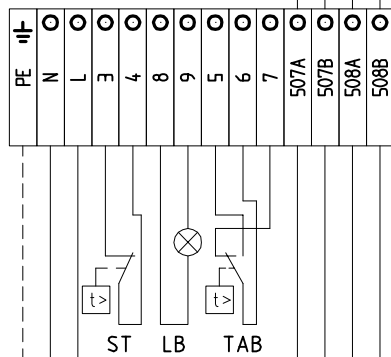
QG - MA1

MORSETTIERA ALIMENTAZIONE - PIASTRA 1
SUPPLY TERMINALS - PLATE 1



QG - MA2

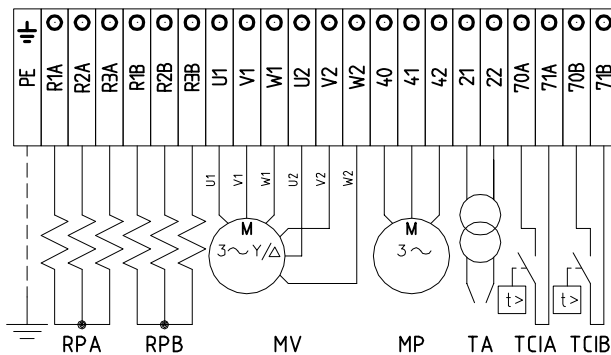
MORSETTIERA ALIMENTAZIONE - PIASTRA 2
SUPPLY TERMINALS - PLATE 2



CONTATTI AUSILIARI CONTATTORE RESISTENZE PRERISCALDATORE NAFTA
AUXILIARY CONTACTS FOR PRE-HEATER RESISTOR SOLENOID STARTER

QG - MC1

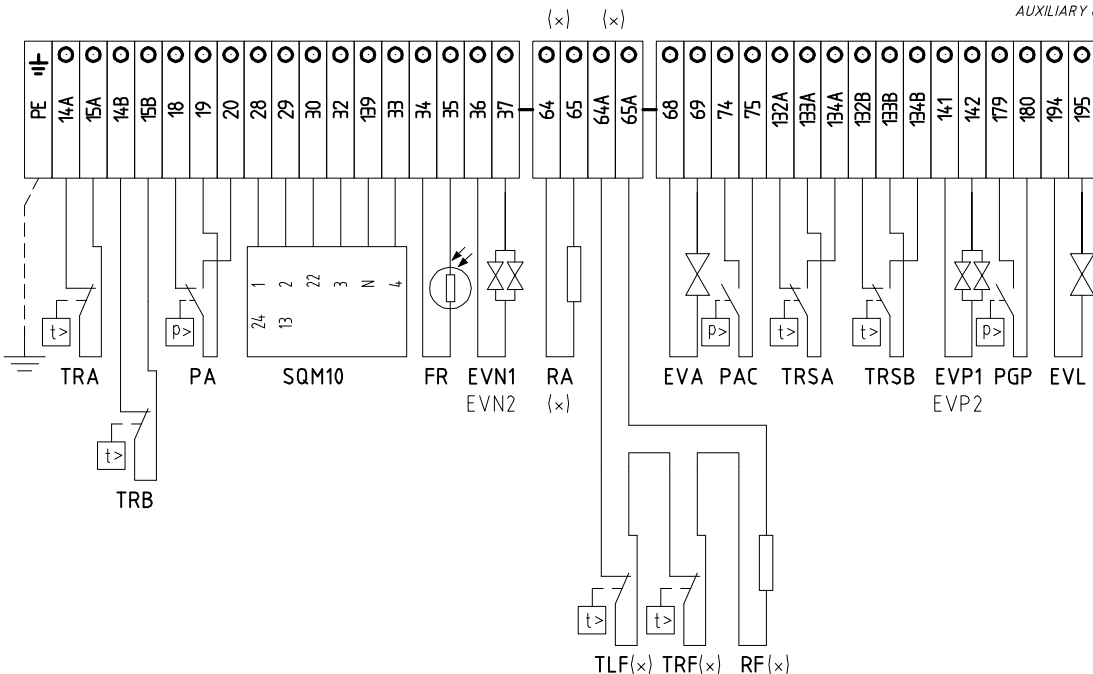
MORSETTIERA COMPONENTI BRUCIATORE - PIASTRA 1
BURNER COMPONENTS TERMINALS - PLATE 1



CONTATTI AUSILIARI CONTATTORE RESISTENZE PRERISCALDATORE NAFTA
AUXILIARY CONTACTS FOR PRE-HEATER RESISTOR SOLENOID STARTER

QG - MC2

MORSETTIERA COMPONENTI BRUCIATORE - PIASTRA 2
BURNER COMPONENTS TERMINALS - PLATE 2



CAMME SERVOCOMANDO SERRANDA ARIA
AIR DAMPER ACTUATOR CAMS
SQM10

- I ALTA FIAMMA
HIGH FLAME
- II SOSTA E ACCENSIONE
STAND-BY AND IGNITION
- III BASSA FIAMMA
LOW FLAME
- IV LIMITAZIONE ANTICIPO SERVOCOMANDO
SERVO CONTROL AUTOMATIC ADVANCE RESTRICTION

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Data	21/05/2004	PREC.	FOGLIO
Revisione	03	4	5
Dis. N.	12 - 089	SEGUE	TOTALE
		6	7

SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
CMF	4	COMMUT. MANUALE FUNZ. 0)FERMO 1)ALTA FIAMMA 2)BASSA FIAMMA 3)AUTOMATICO	MANUAL SWITCH 0)OFF 1)HIGH FLAME 2)LOW FLAME 3)AUTOMATIC
EVA	3	ELETTROVALVOLA ARIA COMPRESSA	COMPRESSED AIR SOLENOID VALVE
EVL	2	ELETTROVALVOLA LAVAGGIO LANCIA	OIL GUN CLEAN SOLENOID VALVE
EVN1	4	ELETTROVALVOLA NAFTA	OIL SOLENOID VALVE
EVN2	4	ELETTROVALVOLA NAFTA DI SICUREZZA	OIL SAFETY SOLENOID VALVE
EVP1	4	ELETTROVALVOLA PILOTA GAS	PILOT GAS SOLENOID VALVE
EVP2	4	ELETTROVALVOLA PILOTA GAS	PILOT GAS SOLENOID VALVE
FR	3	FOTORESISTENZA RILEVAZIONE FIAMMA	PHOTORESISTOR FLAME DETECTOR
FU1.0	1	FUSIBILI LINEA PRERISCALDATORE [RPA]	LINE PRE-HEATING [RPA] FUSES
FU1.1	1	FUSIBILI LINEA PRERISCALDATORE [RPB]	LINE PRE-HEATING [RPB] FUSES
FU1.2	1	FUSIBILI LINEA BRUCIATORE	BURNER LINE FUSES
FU1.6	1	FUSIBILI LINEA POMPA	PUMP LINE FUSES
FU1.7	1	FUSIBILE LINEA AUSILIARI	AUXILIARY LINE FUSE
FU1.8	1	FUSIBILE LINEA RESISTENZE AUSILIARIE	LINE AUXILIARY RESISTORS FUSE
FU1.9	1	FUSIBILE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS FUSE
IG	1	INTERRUTTORE LINEA BRUCIATORE	BURNER LINE SWITCH
IL	1	INTERRUTTORE LINEA AUSILIARI	AUXILIARY LINE SWITCH
IP	2	INTERRUTTORE POMPA NAFTA	OIL PUMP SWITCH
IR1	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE	PRE-HEATING RESISTORS LINE SWITCH
IR2	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE	PRE-HEATING RESISTORS LINE SWITCH
IRA	1	INTERRUTTORE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS SWITCH
IRAux.	1	INTERRUTTORE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS SWITCH
KA2.6	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE	AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE
KA2.8	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE	AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE
KA4.4	4	RELE' AUSILIARIO	AUXILIARY RELAY
KA4.5	4	RELE' AUSILIARIO	AUXILIARY RELAY
KM2.1	2	CONTATTORE MOTORE POMPA NAFTA	OIL PUMP MOTOR CONTACTOR
KM2.6	2	CONTATTORE RESISTENZE PRERISCALDATORE [RP]	PRE-HEATING RESISTORS [RP] CONTACTOR
KM2.8	2	CONTATTORE RESISTENZE PRERISCALDATORE [RPA]	PRE-HEATING RESISTORS [RPA] CONTACTOR
KM3.4	3	CONTATTORE MOTORE VENTILATORE (LINEA)	FAN MOTOR CONTACTOR (LINE)
KM3.4S	3	CONTATTORE MOTORE VENTILATORE (TRIANGOLO)	FAN MOTOR CONTACTOR (DELTA)
KM3.4T	3	CONTATTORE MOTORE VENTILATORE (STELLA)	FAN MOTOR CONTACTOR (STAR)
KT2.2	2	RELE' TEMPORIZZATORE	DELAYED RELAY
KT3.5	3	TEMPORIZZATORE STELLA/TRIANGOLO	STAR/DELTA DELAYED RELAY
LAF	4	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	3	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	4	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LEVA	3	LAMPADA SEGNALAZIONE APERTURA [EVA]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVA]
LEVN1	4	LAMPADA SEGNALAZIONE APERTURA [EVN1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVN1]

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Data	21/05/2004	PREC.	FOGLIO
Revisione	03	5	6
Dis. N.	12 - 089	SEQUE	TOTALE
		7	7

SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
LEVN2	4	LAMPADA SEGNALAZIONE APERTURA [EVN2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVN2]
LEVP	4	LAMPADA SEGNALAZIONE APERTURA [EVP1-EVP2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVP1-EVP2]
LP	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO POMPA	INDICATOR LIGHT FOR PUMP OPERATION
LPAC	3	LAMPADA SEGNALAZIONE INTERVENTO PRESSOSTATO PAC	INDICATOR LIGHT FOR OPERATING PRESSURE SWITCH PAC
LPGP	2	LAMPADA SEGNALAZIONE PRESSOSTATO GAS PILOTA	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE PILOT NETWORK
LRPA	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RPA]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RPA] OPERATION
LRPB	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RPB]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RPB] OPERATION
LS	2	LAMPADA SEGNALAZIONE SOSTA BRUCIATORE	INDICATOR LIGHT FOR BURNER STAND-BY
LT	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN OVERLOAD TRIPPED
LTA	3	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
LTCI	3	LAMPADA SEGNALAZIONE CONSENSO TERMOSTATO [TCI]	INDICATOR LIGHT FOR [TCI] CONSENT
LTP	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO POMPA	INDICATOR LIGHT FOR PUMP OVERLOAD TRIPPED
LTRSA	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRSA]	INDICATOR LIGHT FOR [TRSA] SAFETY THERMOSTAT
LTRSB	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRSB]	INDICATOR LIGHT FOR [TRSB] SAFETY THERMOSTAT
MP	1	MOTORE POMPA NAFTA	OIL PUMP MOTOR
MV	1	MOTORE VENTILATORE	FAN MOTOR
PA	2	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PAC	4	PRESSOSTATO ARIA DI POLVERIZZAZIONE	POLVERIZATION AIR PRESSURE SWITCH
PGP	2	PRESSOSTATO PILOTA GAS	PILOT MINIMUM GAS PRESSURE SWITCH
PS	2	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
RA	1	RESISTENZE AUSILIARIE	AUXILIARY RESISTORS
RF	1	RESISTENZA AUSILIARIA FILTRO NAFTA	OIL FILTER AUXILIARY RESISTOR
RPA	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
RPB	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
SIEMENS LAL2.25	2	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
SQM10	4	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
ST	3	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	3	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TAB	4	TERMOSTATO/PRESSOSTATO ALTA-BASSA FIAMMA	HIGH-LOW THERMOSTAT/PRESSURE SWITCHES
TCIA	3	TERMOSTATO CONSENSO IMPIANTO [RPA]	PLANT CONSENT THERMOSTAT [RPA]
TCIB	3	TERMOSTATO CONSENSO IMPIANTO [RPB]	PLANT CONSENT THERMOSTAT [RPB]
TLF	1	TERMOSTATO LIMITE FILTRO NAFTA	FILTER SAFETY THERMOSTAT
TP	1	TERMICO MOTORE POMPA	PUMP MOTOR THERMAL
TRA	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RPA]	REGULATION THERMOSTAT FOR PRE-HEATING [RPA] RESISTORS
TRB	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RPB]	REGULATION THERMOSTAT FOR PRE-HEATING [RPB] RESISTORS
TRF	1	TERMOSTATO REGOLAZIONE FILTRO NAFTA	OIL FILTER REGULATION THERMOSTAT
TRSA	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RPA]	PRE-HEATING [RPA] A SAFETY THERMOSTAT
TRSB	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RPB]	PRE-HEATING [RPB] A SAFETY THERMOSTAT
TV	1	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL

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Data	21/05/2004	PREC.	FOGLIO
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Dis. N.	12 - 089	SEQUE	TOTALE
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RWF55.5X & RWF55.6X



User manual

DEVICE INSTALLATION

Fixing system



Drilling dimensions:



FRONT PANEL





RWF55 is preset good for 90% of applications. However, you can set or edit parameters as follow:

Set-point: set or modification:

When the burner is in stand-by, (safety loop open, that is terminals 3-4/T1-T2 on the 7 pole plug open) push the Enter button: on the lower display (green) Opr appears; push Enter again and in the same display SP1 appears. Push Enter again and the lower display (green SP1) flashes. Using the up and down arrows change the set-point on the upper display (red). Push Enter to confirm and push ESC more times to get the home position.

PID parameters set and modifications (PARA):

Push **Enter** button, on the green display **Op** appears; using the **down arrow**, scroll until group **PARA** is reached and push **Enter**.

On the green display **Pb1** appears and on the red one the set parameter. Push is sequence the **down or up** arrow the menu is scrolled.

Push **Enter** to select and the **arrows** to choose the desired value. **Enter** to confirm

Parameter	Display	Range	Factory setting	Remarks
Proportional band	Pb1	1... 9999 digit	10	Typical value for temperature
Derivative action	dt	0... 9999 sec.	80	Typical value for temperature
Integral action	rt	0... 9999 sec.	350	Typical value for temperature
Dead band (*)	db	0... 999,9 digit	1	Typical value
Servocontrol running time	tt	10... 3000 sec.	15	Set servocontrol running time
Switch-on differential (*)	HYS1	0,0... -1999 digit	-5	Value under setpoint below which the burner switches back on (1N-1P closes)
Switch-off differential 2° stage (*)	HYS2	0,0 ... HYS3	3	(enable only with parameter bin1 = 4)
Upper switch-off differential (*)	HYS3	0,0... 9999 digit	5	Value over setpoint above which the burner switches off (1N-1P opens)
Switch-on differential on cooling controller (*)	HYS4	0,0... 9999 digit	5	Do not used (enable only with parameter CACT = 0)
Switch-off differential 2° stage on cooling controller (*)	HYS5	HYS6...0,0 digit	5	Do not used (enable only with parameter CACT = 0 and parameter bin1 =0)
Upper switch-off differential on cooling controller (*)	HYS6	0,0... -1999 digit	5	Do not used (enable only with parameter CACT = 0)
Delay modulation	q	0,0... 999,9 digit	0	Do not alter
Outside temperature Curve point 1 (*)	At1	-40 ...120 digit	-10	First point of external temperature for climatic curve
Boiler temperature Curve point 1 (*)	Ht1	SPL...SPH	60	Set-point temperature for the external temperature 1
Outside temperature Curve point 2 (*)	At2	-40 ...120 digit	20	Second point of external temperature for climatic curve
Boiler temperature Curve point 2 (*)	Ht2	SPL...SPH	50	Set-point temperature for the external temperature 2

(*) Parameters affected by setting of decimal place (**ConF** > **dISP** parameter **dECP**)

Setting the kind of sensor to be connected to the device:

Push the **Enter** button: on the lower display (green) **Opr** appears. Using the **up and down arrows** find **ConF**. Push **Enter** to confirm. Now on the green display the group **InP** appears. Push **Enter** and **InP1** is displayed. Enter to confirm. You are inside **InP1**; the green display shows **Sen1 (sensor type)**, while the red display shows the chosen sensor code. Push **Enter** to enter the **Sen1** parameter, then choose the desired sensor using the **arrows**. Push **Enter** to confirm and **ESC** to escape.

Once selected the sensor, you can modify all the other parameters using **up and down arrows** according to the tables here below :

ConF > InP > InP1

Parameter	Value	Description
SEn1 type of sensor for analog input 1	1	Pt100 3 wire
	2	Pt100 2 wire
	3	Pt1000 3 wire
	4	Pt1000 2 wire
	5	Ni1000 3 wire
	6	Ni1000 2 wire
	7	0 ÷ 135 ohm
	8	Cu-CuNi T
	9	Fe-CuNi J
	10	NiCr-Ni K
	11	NiCrSi-NiSi N
	12	Pt10Rh-Pt S
	13	Pt13Rh-Pt R
	14	Pt30Rh-Pt6Rh B
	15	0 ÷ 20mA
	16	4 ÷ 20mA
	17	0 ÷ 10V
	18	0 ÷ 5V
	19	1 ÷ 5V
OFF1 Sensor offset	-1999.. 0 .. +9999	Correction value measured by the sensor
SCL1 scale low level	-1999.. 0 .. +9999	minimum scale value(for input ohm, mA, V)
SCH1 scale high level	-1999.. 100 .. +9999	maximum scale value(for input ohm, mA, V)
dF1 digital filter	0... 0,6 ...100	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)
Unit temperature unit	1	1 = degrees Celsius
	2	2 = degrees Fahrenheit

(**bold** = factory settings)

ConF > InP > InP2

Input 2 : this input can be used to specify an external setpoint or carry out setpoint shifting

Parameter	Value	Description
FnC2	0	0= no function
	1	1= external setpoint (display SPE)
	2	2 =setpoint shifting (display dSP)
	3	3 = angular positioning feedback
SEn2 tisensor type input 2	1	0 ÷ 20mA
	2	4 ÷ 20mA
	3	0 ÷ 10V
	4	0 ÷ 5V
	5	1 ÷ 5V
	1	0 ÷ 20mA
OFF2 Sensor offset	-1999.. 0 .. +9999	Correction value measured by the sensor
SCL2 scale low level	-1999.. 0 .. +9999	minimum scale value(for input ohm, mA, V)
SCH2 scale high level	-1999.. 100 .. +9999	maximum scale value(for input ohm, mA, V)
dF2 digital filter	0... 2 ...100	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)

(**bold** = factory settings)

ConF > InP > InP3

Input 3: this input is used to acquire the outside temperature

Parameter	Value	Description
SEn3 sensor type input 3sensor type input 2	0	0 =
	1	1 = wire
	2	2 = wire
OFF3 Sensor offset	-1999.. 0 .. +9999	Correction value measured by the sensor
dF3 digital filter	0... 1278 ...1500	Is used to adapt the digital 2nd order input filter (time in s; 0 s = filter off)

(**bold** = factory settings)

ConF > Cntr

Here, the type of controller, operating action, setpoint limits and presets for self-optimization are selected

Parameter	Value	Description
CtYP controller type	1 2	1 = 3-position controller (open-stop-close) 2 = continuative action controller (0 ÷ 10V or 4 ÷ 20mA)
CACt control action	1 0	1 = heating controller 0 = cooling controller
SPL least value of the set-point range	-1999.. 0 ..+9999	minimum set-point scale
SPH maximum value of the set-point range	-1999.. 100 ..+999	maximum set-point scale
Self-optimization	0 1	0 = Free 1 = Locked Self-optimization can only be disabled or enabled via the ACS411 setup program. Self-optimization is also disabled when the parameter level is locked
pLLo set-point limitation start, operation limit low	-1999.... +9999	lower working range limit
pLHi set-point limitation end, operation limit high	-1999.... +9999	upper working range limit

(**bold** = factory settings)

ConF > rAFC

Activation boiler shock termic protetion:

RWF55.. can activate the thermal shock protection only on sites where the set-point is lower than 250°C and according to **rAL** parameter

Parameter	Value	Description
FnCT type of control	0 1 2	choose type of range degrees/time 0 = deactivated 1 = Kelvin degrees/minute 2 = Kelvin degrees/hour
rASL ramp rate	0,0 ... 999,9	Slope of thermal shock protection (only with functions 1 and 2)
tolP tolerance band ramp	2 x (HYS1) = 10 ...9999	width of tolerance band (in K) about the set-point 0 = tolerance band inactive
rAL ramp limit	0 ...250	Ramp limit. When this value is lower than the temperature set-point, the RWF controls the output increasing the temp set point step by step according to rASL . If this is over the temp set point, the control is performed in cooling



(**bold** = factory settings)

Alarm functionAF

The alarm function can be used to monitor the analog inputs. If the limit value is exceeded, multifunctional relay K6 (terminals **6N** and **6P**) is activated (depending on the switching characteristic)

The alarm function can have different switching functions (Ik1 to Ik8) and can be set to a deviation from the active setpoint or to a fixed limit value

Limit value **AL** relative to setpoint (x)



Fixed limit value **AL**



ConF > AF

Parameter	Value	Description
FnCt type of control	0 1 2 3 4 5 6 7 8 9 10 11 12	0 = Without function Ik1 = monitored input InP1 Ik2 = monitored input InP1 Ik3 = monitored input InP1 Ik4 = monitored input InP1 Ik5 = monitored input InP1 Ik6 = monitored input InP1 Ik7 = monitored input InP1 Ik8 = monitored input InP1 Ik7 = monitored input InP2 Ik8 = monitored input InP2 Ik7 = monitored input InP3 Ik8 = monitored input InP3
Alarm value AL	-1999 ... 0 1999	Limit value or deviation from setpoint to be monitored (see alarm functions Ik1 to Ik8 : limit value AL) Limit value range for Ik1 and Ik20 ...9999
HySt switching differential	0... 1... 9999	Switching differential for limit value AL
ACrA response by out of range	0 1	Switched-off ON Switching state in the case of measuring range overshoot or undershoot (Out of Range)

(**bold** = factory settings)

ConF > OutP

For fuel-air ratio control purposes, the RWF55 has the binary outputs K2, K3 (terminals KQ,K2, K3) and the analog output (terminals A+, A-). The burner is released via relay K1 (terminals 1N, 1P) .

The binary outputs of the RWF55 offer no setting choices

The RWF55 has an analog output.

The analog output offers the following setting choices:

Parameter	Value	Description
FnCt type of control	1 2 3 4	1 = analog input 1 doubling with possibility to convert 2 = analog input 2 doubling with possibility to convert 3 = analog input 3 doubling with possibility to convert 4 = Controller's angular positioning is delivered (modulating controller)
SiGn type of output signal	0 1 2	physical output signal (terminals A+, A-) 0 = 0÷20mA 1 = 4÷20mA 2 = 0÷10V DC
rOut value when out of input range	0 ...101	signal (in percent) when measurement range is crossed
oPnt zero point	-1999... 0 ...+9999	A value range of the output variable is assigned to a physical output signal (for FnCt = 1, 2, 3)
End end point	-1999... 100 ...+9999	A value range of the output variable is assigned to a physical output signal (for FnCt = 1, 2, 3)

(**bold** = factory settings)

ConF > binF

This setting decides on the use of the binary inputs **D1**, **D2**, **DG**

b

Parameter	Value	Description
bin1 binary input 1 (terminals DG – D1)	0 1 2 3	0 = without function 1 = set-point changeover (SP1 / SP2) 2 = lset-point shift (Opr > dSP parameter = value of set-point modify) 3 = input alarm
bin2 binary input 2 (terminals DG – D2)	4	changeover of operating mode DG-D2 open = modulating operation DG-D2 close = 2 stage operation

(**bold** = factory settings)

ConF > dISP

Both displays can be customized to suit your needs by configuring the displayed value, decimal, time out and blocking

Parameter	Value	Description
diSU upper display (red)	0 1 2 3 4 6 7	Display value for upper display: 0 = display power-off 1 = analog input 1 (InP1) value 2 = analog input 2 (InP2) value 3 = analog input 3 (InP3) value 4 = controller's angular positioning 6 = set-point values 7 = end value with thermal shock protection
diSL lower display (green)	0 1 2 3 4 6 7	Display value for lower display: 0 = display power-off 1 = analog input 2 (InP2) value 2 = analog input 2 (InP2) value 3 = analog input 2 (InP2) value 4 = controller's angular positioning 6 = set-point values 7 = end value with thermal shock protection
tout timeout	0.. 180 ..250	time (s) on completion of which the controller returns automatically to the basic display, if no button is pressed
dECP decimal point	0 1 2	0 = no decimal place 1 = one decimal place 2 = two decimal place
CodE level lockout	0 1 2 3	0 = no lockout 1 = configuration level lockout (ConF) 2 = parameter and configuration level lockout (PARa & ConF) 3 = keyboard lockout

(**bold** = factory settings)

ConF > IntF

The controller can be integrated into a data network using an optional RS-485 (terminals R+ and R-) interface or an optional Profibus DP interface(only model **RWF55.6x** terminals C1-C2-C3-C4)

Parameter	Value	Description
bdr baudrate	0 1 2 3	0 = 4800 baud 1 = 9600 baud 2 = 19200 baud 3 = 38400 baud
Adr Device address Modbus	0.. 1 .. 254	Address in the data network
dP Device address Profibus	0.. 125	only with RWF55.6x
dt Remote detection time	0.. 30 .. 7200s	0 = switched-off

(**bold** = factory settings)

Manual control :

In order to manual change the burner load, while firing keep pushing the **ESC** button for more than 5 s; on the lower green display **Hand** appears.

using the **UP** and **DOWN** arrows, the load varies.

Keep pushing the **ESC** button for getting the normal operation again.

NB: every time the device shuts the burner down (start led switched off - contact 1N-1P open), the manual control is not active.

Device self-setting (auto-tuning):

If the burner in the steady state does not respond properly to heat generator requests, you can activate the Device's self-setting function, which recalculates PID values for its operation, deciding which are most suitable for the specific kind of request



Follow the below instructions:

push the **UP** and **DOWN** arrows for more than 5 s; on the green lower display **tUNE** appears. Now the device pushes the burner to increase and decrease its output. During this time, the device calculates **PID** parameters (**Pb1**, **dt** and **rt**). After the calculations, the **tUNE** is automatically deactivated and the device has already stored them.

In order to stop the Auto-tuning function while it works, push again the **UP** and **DOWN** arrows for more than 5 s. The calculated **PID** parameters can be manually modified following the previously described instructions.

Display of software version :

The software version is shown by pushing Enter + UP arrow on the upper display.



Weather-compensated setpoint shifting(climatic regulation):

The RWF55 can be configured so that weather-compensated setpoint shifting is activated when an LG-Ni1000 outside sensor or a Pt1000 is connected (see parameter **InP3**).

To take into account the time response of a building, weather-compensated setpoint shifting uses the attenuated outside temperature rather than the current outside temperature

The minimum and maximum setpoints can be set using the lower setpoint limit **SPL** and the upper setpoint limit **SPH** of the menu **Crtr**.

The system also prevents the lower working range limit **oLLo** and upper working range limit **oLHi** from exceeding/dropping below the system temperature limits.

The heating curve describes the relationship between the boiler temperature setpoint and the outside temperature. It is defined by 2 curve points. For 2 outside temperatures, the user defines the boiler temperature setpoint that is required in each case. The heating curve for the weather-compensated setpoint is calculated on this basis. The effective boiler temperature setpoint is limited by the upper setpoint limit **SPH** and the lower setpoint limit **SPL**.



For setting climatic regulation function set:

PArA > parameters **At1**, **Ht1**, **At2**, **Ht2**

ConF > **InP** > **InP3** parameters **SEn3**, **FnC3** = 1 (Weather-compensated setpoint).

Modbus interface

The tables that follow in this chapter specify the addresses of the readable and writable words that the customer is able to access. The customer may read and/or write the values using SCADA programs, PLCs, or similar.

The entries under Access have the following meanings:

R/O Read Only, value can only be read

R/W Read/Write, value can be read and written

The number of characters specified under Data type in the case of character strings includes the final \0.

Char10 means that the text is up to 9 characters long. The final \0 character is then added to this

User level

Address	Access	Data type	Signal reference	Parameter
0x0000	R/O	Float	X1	Analog input InP1
0x0002	R/O	Float	X2	Analog input InP2
0x0004	R/O	Float	X3	Analog input InP2
0x0006	R/O	Float	WR	Actual setpoint
0x0008	R/W	Float	SP1	Setpoint 1
0x000A	R/W	Float	SP2 (= dSP)	Setpoint 2
0x1035	R/O	Float	---	Analog input InP3 (unfiltered)
0x1043	R/O	Float	---	Actual angular positioning
0x1058	R/O	Word	B1	Burner alarm

Parameter level

Address	Access	Data type	Signal reference	Parameter
0x3000	R/W	Float	Pb1	Proportional range 1
0x3004	R/W	Float	dt	Derivative action time
0x3006	R/W	Float	rt	Integral action time
0x300C	R/W	Float	db	Dead band
0x3012	R/W	Word	tt	Controlling element running time
0x3016	R/W	Float	HYS1	Switch-on threshold
0x3018	R/W	Float	HYS2	Switch-off threshold down
0x301A	R/W	Float	HYS3	Switch-off threshold up
0x301C	R/W	Float	HYS4	Switch-on threshold (cooling)
0x301E	R/W	Float	HYS5	Switch-off threshold down (cooling)
0x3020	R/W	Float	HYS6	Switch-off threshold up (cooling)
0x3022	R/W	Float	q	Reaction threshold
0x3080	R/W	Float	At1	Outside temperature 1
0x3082	R/W	Float	Ht2	Boiler temperature 1
0x3084	R/W	Float	At2	Outside temperature 2
0x3086	R/W	Float	Ht2	Boiler temperature 2

Configuration level

Address	Access	Data type	Signal reference	Parameter
0x3426	R/W	Float	SCL1	Start of display input 1
0x3428	R/W	Float	SCH1	End of display input 1
0x3432	R/W	Float	SCL2	Start value input 2
0x3434	R/W	Float	SCH2	End value input 2
0x3486	R/W	Float	SPL	Start of setpoint limitation
0x3488	R/W	Float	SPH	End of setpoint limitation
0x342A	R/W	Float	OFFS1	Offset input E1
0x3436	R/W	Float	OFFS2	Offset input E2
0x343A	R/W	Float	OFFS3	Offset input E3
0x1063	R/W	Word	FnCt	Ramp function
0x1065	R/W	Float	rASL	Ramp slope
0x1067	R/W	Float	toLP	Tolerance band ramp
0x1069	R/W	Float	rAL	Limit value
0x1075	R/W	Float	dtT	Remote Detection Timer
0x1077	R/W	Float	dF1	Filter constant input 1
0x1079	R/W	Float	dF2	Filter constant input 2
0x107B	R/W	Float	dF3	Filter constant input 3
0x107D	R/O	Float	oLLo	Lower working range limit
0x107F	R/O	Float	oLHi	Upper working range limit
0x106D	R/W	Word	FnCt	Alarm relay function
0x106F	R/W	Float	AL	Alarm relay limit value (limit value alarm)
0x1071	R/W	Float	HYSt	Alarm relay hysteresis

Remote operation

Address	Access	Data type	Signal reference	Parameter
0x0500	R/W	Word	REM	Activation remote operation *
0x0501	R/W	Word	rOFF	Controller OFF in remote setpoint **
0x0502	R/W	Float	rHYS1	Switch-on threshold remote
0x0504	R/W	Float	rHYS2	Switch-off threshold down remote
0x0506	R/W	Float	rHYS3	Switch-off threshold up remote
0x0508	R/W	Float	SPr	Setpoint remote
0x050A	R/W	Word	RK1	Burner release remote operation
0x050B	R/W	Word	RK2	Relay K2 remote operation
0x050C	R/W	Word	RK3	Relay K3 remote operation
0x050D	R/W	Word	RK6	Relay K6 remote operation
0x050E	R/W	Word	rStEP	Step-by-step control remote operation
0x050F	R/W	Float	rY	Angular positioning output remote operation
0x0511	R/W	Float	rHYS4	Switch-on threshold remote (cooling)
0x0513	R/W	Float	rHYS5	Switch-off threshold down remote (cooling)
0x0515	R/W	Float	rHYS6	Switch-off threshold up remote (cooling)

Legend

* = Local

** = Controller OFF

Dati dell'apparecchio

Address	Access	Data type	Signal reference	Parameter
0x8000	R/O	Char12	---	Software version
0x8006	R/O	Char14	---	VdN number

Stato dell'apparecchio

Address	Access	Data type	Signal reference	Parameter
0x0200	R/O	Word	---	Outputs and states
			Bit 0	Output 1
			Bit 1	Output 3
			Bit 2	Output 2
			Bit 3	Output 4
			Bit 8	Hysteresis limitation
			Bit 9	Control system
			Bit 10	Self-optimization
			Bit 11	Second setpoint
			Bit 12	Measuring range overshoot InP1
			Bit 13	Measuring range overshoot InP2
			Bit 14	Measuring range overshoot InP3
			Bit 15	Calibration mode
0x0201	R/O	Word	---	Binary signals and hardware detection
			Bit 0	Operation mode 2-stage
			Bit 1	Manual mode
			Bit 2	Binary input D1
			Bit 3	Binary input D2
			Bit 4	Thermostat function
			Bit 5	First controller output
			Bit 6	Second controller output
			Bit 7	Alarm relay
			Bit 13	Analog output available
			Bit 14	Interface available

Electric connections :

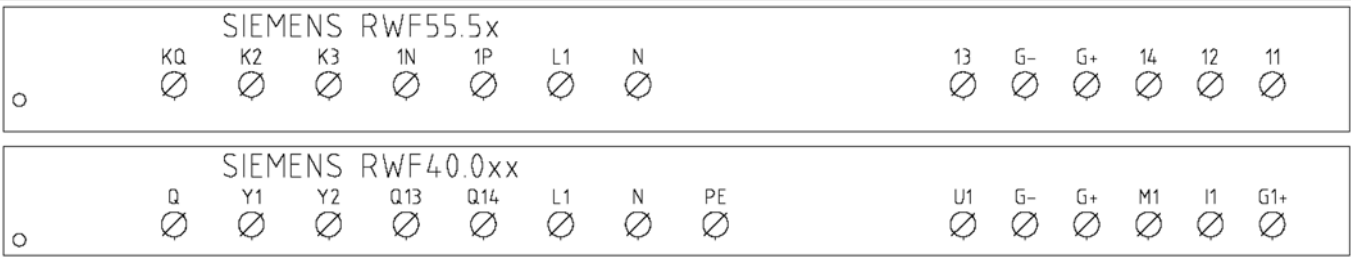
With 7 pins connector version



With terminals version



Correspondences bornes entre RWF55.5x y RWF40.0x0Matches terminals betweenRWF55.5x and RWF40.0x0



Parameters summarising for RWF55.xx :

Navigation menù	ConF					ConF									Opr
	Inp							diSP							
	Inp1								Cntr		PArA				
	Types of probe	SEn1	OFF1	SCL	SCH	Unit	SPL	SPH	dECP	Pb. 1	dt	rt	tt	HYS1 (*)	
Siemens QAE2120...	6	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80 °C
Siemens QAM2120..	6	0	needless	needless	1	0	80	1	10	80	350	(#)	-2,5	2,5	40°C
Pt1000 (130°C max.)	4	0	needless	needless	1	30	95	1	10	80	350	(#)	-5	5	80°C
Pt1000 (350°C max.)	4	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Pt100 (130°C max.)	1	0	needless	needless	1	0	95	1	10	80	350	(#)	-5	5	80°C
Pt100 (350°C max)	1	0	needless	needless	1	0	350	1	10	80	350	(#)	-5	10	80°C
Probe4+20mA / 0÷1,6bar	16	0	0	160	needless	0	160	0	5	20	80	(#)	0	20	100 kPa
Probe4+20mA / 0÷3bar	16	0	0	300	needless	0	300	0	5	20	80	(#)	0	20	200 kPa
Probe 4+20mA / 0÷10bar	16	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Probe 4+20mA / 0÷16bar	16	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Probe 4+20mA / 0÷25bar	16	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Probe 4+20mA / 0÷40bar	16	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Probe 4+20mA / 0÷60PSI	16	0	0	600	needless	0	600	0	5	20	80	(#)	0	30	300 (30PSI)
Probe4+20mA / 0÷200PSI	16	0	0	2000	needless	0	2000	0	5	20	80	(#)	0	75	600 (60PSI)
Probe4+20mA / 0÷300PSI	16	0	0	3000	needless	0	3000	0	5	20	80	(#)	0	120	600 (60PSI)
Siemens QBE2002 P4	17	0	0	400	needless	0	400	0	5	20	80	(#)	0	20	200 kPa
Siemens QBE2002 P10	17	0	0	1000	needless	0	1000	0	5	20	80	(#)	0	50	600 kPa
Siemens QBE2002 P16	17	0	0	1600	needless	0	1600	0	5	20	80	(#)	0	80	600 kPa
Siemens QBE2002 P25	17	0	0	2500	needless	0	2500	0	5	20	80	(#)	0	125	600 kPa
Siemens QBE2002 P40	17	0	0	4000	needless	0	4000	0	5	20	80	(#)	0	200	600 kPa
Signal 0÷10V	17	0	needless	needless	needless	needless	needless	needless	5	20	80	(#)			
Signal 4÷20mA	16	0	needless	needless	needless	needless	needless	needless	5	20	80	(#)			

NOTE:

(#) tt – servo control run time

SQL33 ; STM30; SQM10; SQM40; SQM50; SQM54 = 30 (secondi) - STA12B3.41; SQN30.251; SQN72.4A4A20 = 12 (secondi)

(*)These values are factory set - values must be set during operation at the plant based on the real working temperature/pressure value.

WARNING :

With pressure probes in bar the parameters SP1, SCH, SCL, HYS1, HYS3 must be set and displayed in kPa (kilo Pascal); 1bar = 100,000Pa = 100kPa.

With pressure probes in PSI the parameters SP1, SCH, SCL, HYS1, HYS3 must be set and displayed in PSI x10 (example: 150PSI > I display 1500).

APPENDIX: PROBES CONNECTION

To assure the utmost comfort, the control system needs reliable information, which can be obtained provided the sensors have been installed correctly. Sensors measure and transmit all variations encountered at their location.

Measurement is taken based on design features (time constant) and according to specific operating conditions. With wiring run in raceways, the sheath (or pipe) containing the wires must be plugged at the sensor's terminal board so that currents of air cannot affect the sensor's measurements.

Ambient probes (or ambient thermostats)

Installation

The sensors (or room thermostats) must be located in reference rooms in a position where they can take real temperature measurements without being affected by foreign factors.



Outside probes (weather) Installation

In heating or air-conditioning systems featuring adjustment in response to outside temperature, the sensor's positioning is of paramount importance.

It's good to be admired ...even better to be effective

Heating systems: the room sensor must not be installed in rooms with heating units complete with thermostatic valves. Avoid all sources of heat foreign to the system.



General rule: en on the outer wall of the building where the living rooms are, never on the south-facing wall or in a position where they will be affected by morning sun. If in any doubt, place them on the north or north-east façade.

Positions to be avoided



Location

On an inner wall on the other side of the room to heating units height above floor 1.5 m, at least 1.5 m away from external sources of heat (or cold).



Installation position to be avoided

near shelving or alcoves and recesses, near doors or windows, inside outer walls exposed to solar radiation or currents of cold air, on inner walls with heating system pipes, domestic hot water pipes, or cooling system pipes running through them.

Avoid installing near windows, vents, outside the boiler room, on chimney breasts or where they are protected by balconies, cantilever roofs.

The sensor must not be painted (measurement error).

Duct or pipe sensors

Installing temperature sensors

For measuring outlet air:

"after delivery fan or

"after coil to be controlled, at a distance of at least 0,5 m

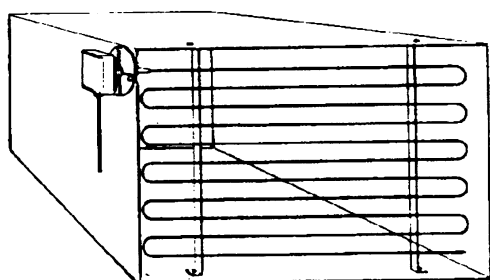
For measuring room temperature:

"before return air intake fan and near room's return airintake.

For measuring saturation temperature: after mist eliminator.



Bend 0.4m sensor by hand (never use tools) as illustrated .



Use whole cross-section of duct, min. distance from walls 50 mm, radius of curvature 10 mm for 2m or 6m sensors

Installing combined humidity sensors

As max. humidity limit sensor on outlet (steam humidifiers) .



Installing pressure sensors

A - installation on ducts carrying fluids at max. temperature 80°C

B - installation on ducts at temperature over 80°C and for refrigerants

C - installation on ducts at high temperatures :

· "increase length of siphon

"place sensor at side to prevent it being hit by hot air coming from the pipe.



Installing differential pressure sensors for water

Installation with casing facing down not allowed.

With temperature over 80°C, siphons are needed.

To avoid damaging the sensor, you must comply with the following instructions :

when installing: make sure pressure difference is not greater than the value permitted by the sensor

when there are high static pressures, make sure you insert shutoff valves A-B-C.

Putting into operation

Start disable

1=open C1=open C

2=open A2=close B

3=open B3=close A

4= close C



Immersion or strap-on sensors



Immersion probes installation

Sensors must be installed on the stretch of pipe in which fluid circulates all the time.

The rigid stem (sensing element doing the measuring) must be inserted by at least 75mm and must face the direction of flow.

Recommended locations: on a bend or on a straight stretch of pipe but tilted by 45° and against the flow of fluid.

Protect them to prevent water from infiltrating (dripping gates, condensation from pipes etc.) .

Installing QAD2.. strap-on sensors

Make sure fluid is circulating in the chosen location.

Eliminate insulation and paintwork (including rust inhibitor) on a min. 100mm length of pipe.

Sensors come with straps for pipes up to 100 mm in diameter .

Placing the probes (QAD22.../QAE21.../QAP21.../RCA...)

With pumps on outlet

with 3 ways valves / with 4 ways valves



Panel system / burner control



With pumps on return

with 3 ways valves / with 4 ways valves



Strap-on or immersion sensors?

QAD2.. strap-on sensors

Advantages :

- 10 sec. time constant
- Installed with system running (no plumbing work)
- Installation can be changed easily if it proves incorrect

ΠLimits:

- Suitable for pipe diameters max. 100 mm
- Can be affected by currents of air etc.

QAE2... immersion sensors

Advantages:

- Measure "mean" fluid temperature
- No external influence on measurement such as: currents of air, nearby pipes etc.

Limits:

- Time constant with sheath: 20 sec.
- Hard to change installation position if it proves incorrect

Installing differential pressure probes for air



A - Control a filter (clogging)



B - Control a fan (upstream/downstream)



C - Measurement of difference in pressure between two ducts



D - Measurement of difference in pressure between two rooms or of inside of duct and outside

Basic principles

Measuring static pressure(i.e. pressure exerted by air on pipe walls)



Measuring dynamic pressure



$$P_d = \frac{\gamma q^2}{2g}$$

Legend

- γ Kg/m³, specific weight of air
- q m/s, air speed
- g 9.81 m/s² gravity acceleration
- P_d mm C.A., dynamic pressure

Measuring total pressure



Note: Specifications and data subject to change. Errors and omissions excepted.

MANUALE USER SUPPORT

MULTI-THERMOSTAT

MCX06C

MCX06C is a multi-thermostat with four 100k NTC inputs. It can control up to 4 temperatures showing them (not more than 2 at the same time) on a couple of displays.

It is used to check and adjust oil heater temperatures. it works as follows:

as soon as the burner control gives the GO to the digital 1 input (terminals DI1-COM), the adjustment program runs (the relevant LED is ON). Reading the outlet temperature through the probe **Pb3** (terminals AI3-COM), a PID signal is produced. This signal becomes the set-point for the electric resistors. The electric resistors temperature is read through the probe **Pb1** (terminals AI1-COM) so that a second PID signal is produced. This second PID drives a couple of SCR by means of 0-10 V impulses in order to control the electric resistors temperature.

When the burner is in stand-by, resistor set-point is kept at the temperature set in parameter "**p30**" (see parameter group **REG**).

Probe **Pb4** (terminals AI4-COM) controls the inner heater temperature. As soon the relevant set-point is got, it drives the output number 4 (terminals C4-NO4) linked to the relais KTCN. This allows the oil pump to start and also the burner control proceeds with its cycle.

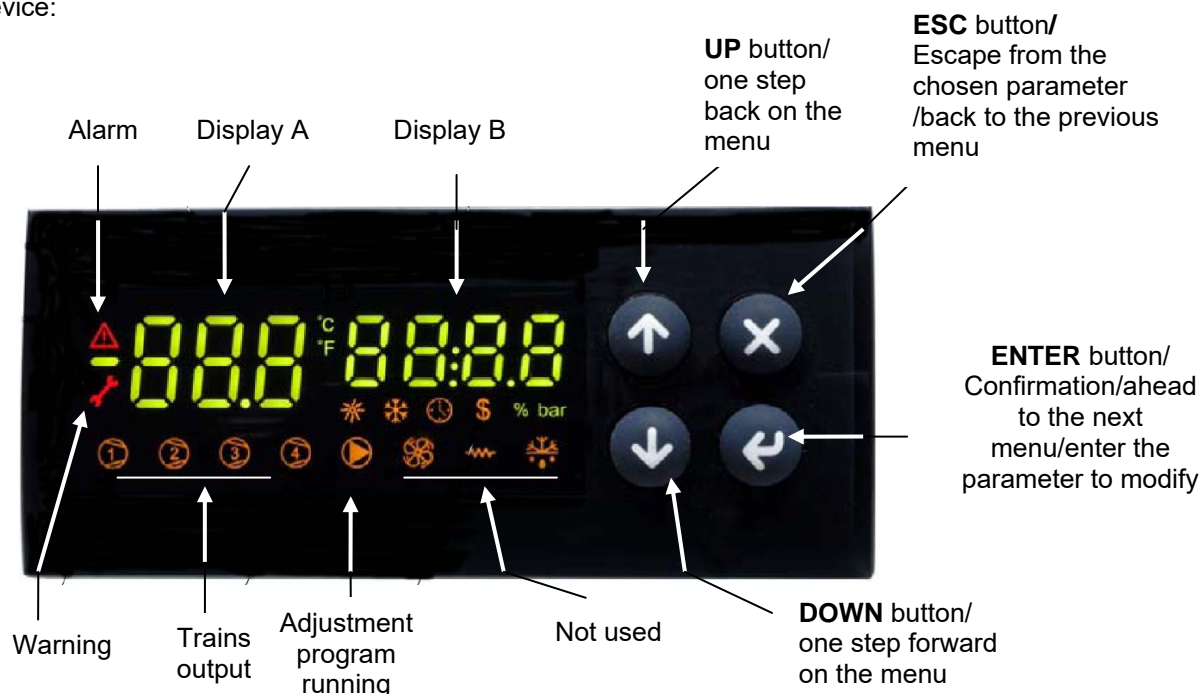
When set-point **trS** is got to, output number 5 is ON (terminals C5-NO5) linked to the relais KTRS. It switches the resistors off and activates an alarm on the device.

Probe **Pb2** (terminals AI2-COM), when fitted, drives output number 2 (terminals C2-NO2) linked to the relais KTCI. This allows the burner control to proceed with ignition.

See below the set-point recommended figures.

User interface:

Device:

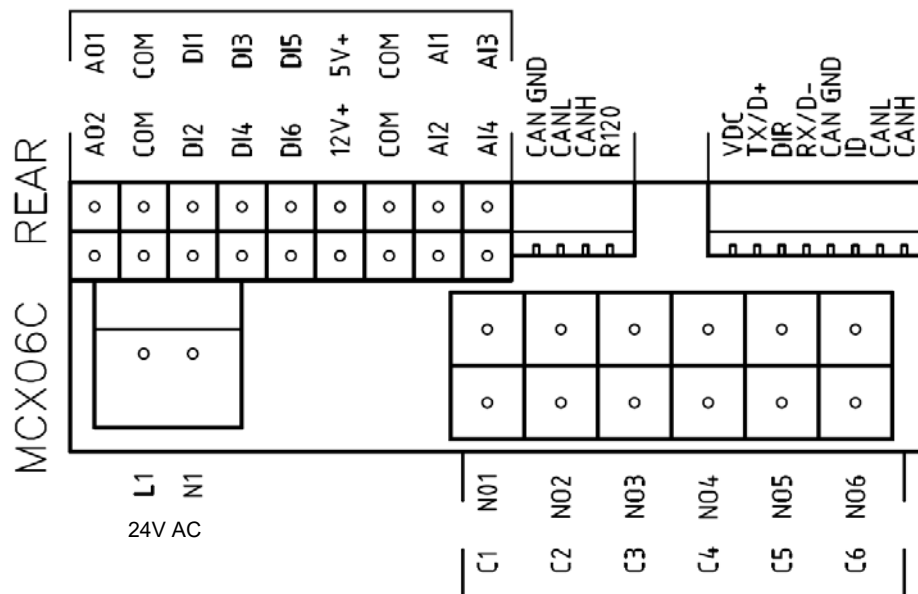


Note :

In normal operation, the display A shows the oil tank resistor temperature (probe Pb1).

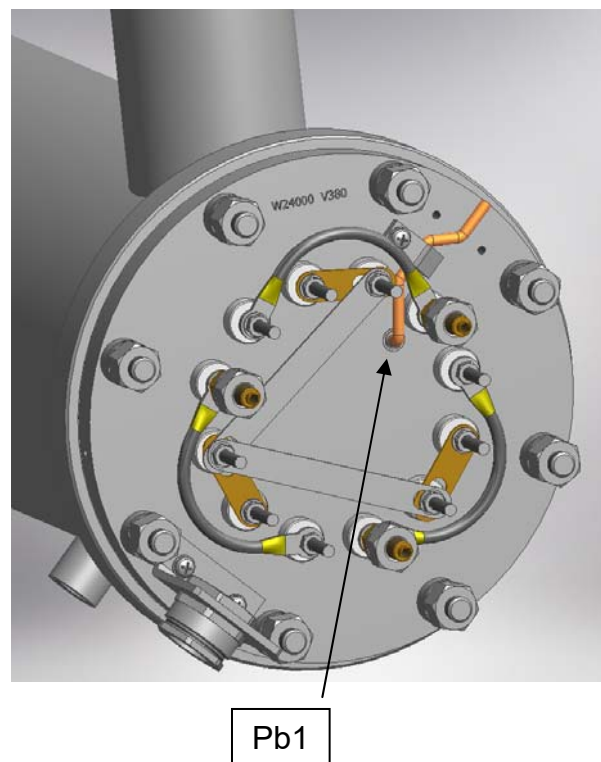
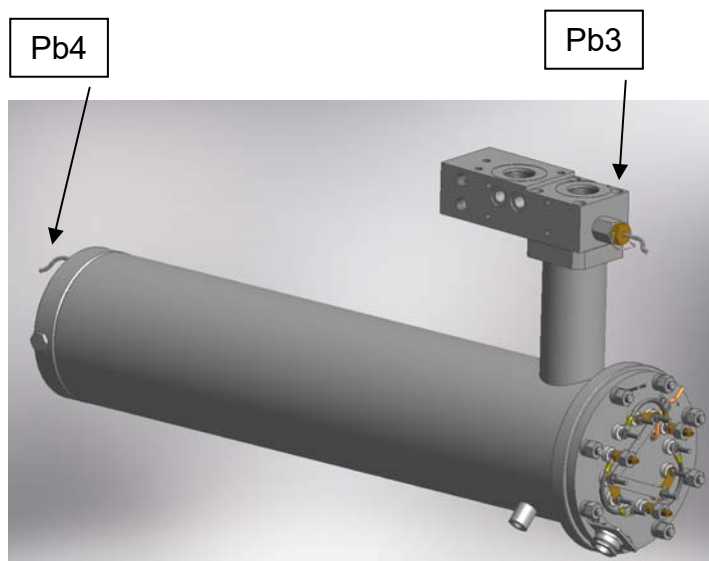
In normal operation, the display B shows the oil output temperature (probe Pb3).

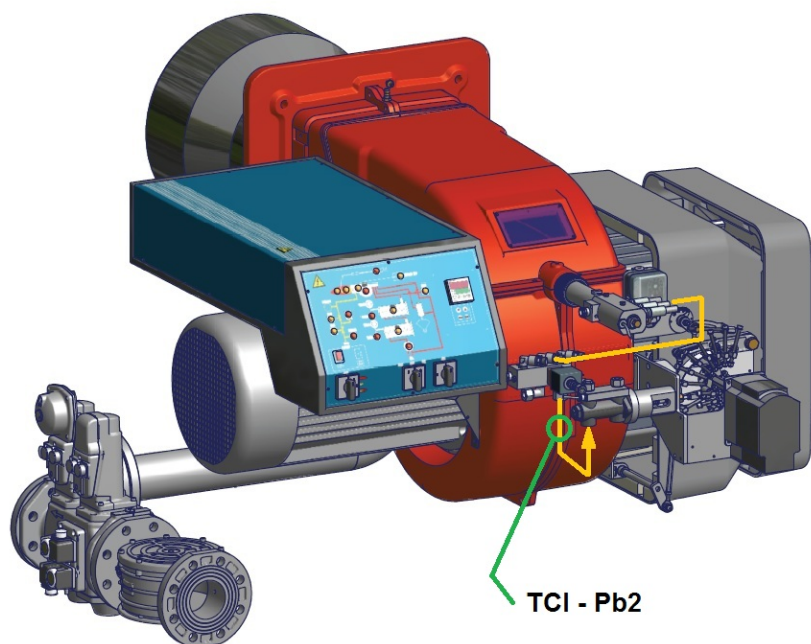
Connections from terminal side :



Probe connection:

input **AI1** = probe **Pb1** = set-point "**tr**" = oil heater temperature probe;
input **AI2** = probe **Pb2** = set-point "**tCl**" = plant consent temperature probe (when installed);
input **AI3** = probe **Pb3** = set-point "**OIL**" = oil heater output temperature probe (PID regulation);
input **AI4** = probe **Pb4** = set-point "**tcn**" = oil heater consent temperature probe.





(tCI - Pb2 probe only for mechanical atomizing burners)

Menu :

To enter the menu below, keep pushing **ENTER** for more than 3 s.

Menu code	Sub-menu code	Function	Notes
Prb		Probes values	You can see in sequence the 4 probe values (UP and DOWN keys): the probe code is on display A (Pb1,..., Pb4) and the probe value is on display B (not fitted or out of work probes show "----").
Log		Login	It defines the access level to menu and parameters (password)
	PAS	Password	Password input
Par		Parameters menu	Access to parameters (you have to login first)
	CnF	Configuration menu	Parameter configuration
	rEG	Regulation menu	Set to set-point, probe, thresholds etc.
ALA		Alarm menu	Access to alarm management
	Act	Active alarms	Show the active alarms
	rES	Reset alarms	Reset of the manual reset alarms
Loc		Lock/Unlock functions	Not used
InF	rEL	Software version	Installed software version
tUN		Autotuning	Activation On, deactivation ESC PID parameter autotuning

Login:

All the parameters inside the **Par** menu are locked by a password.

Without password, only set-points can be modified.

To login, on the log menu, press **ENTER** for more than 3 s. Input your password (level 2 or 3) inside **PAS**

With password for level 3 all the data can be set.

submenu **CnF** - configuration parameters group :

Menu	Parameter	Description	Additional description	Min	Max	Default	U.M.	Visibility condition	Password level	Modbus index
CnF		CONFIGURATION							0	
AI1		Analog Input 1							1	
	A1P	Probe 1 Presence	This parameter enables or disables the probe	0	1	1			2	1
	A1C	Calibration Probe 1	Don't modify it	-20,0	20,0	0,0	°C	A1P >0	3	2
AI2		Analog Input 2							1	
	A2P	Probe 2 Presence	This parameter enables or disables the probe	0	1	1			2	3
	A2C	Calibration Probe 2	Don't modify it	-20,0	20,0	0,0	°C	A2P >0	3	4
AI3		Analog Input 3							1	
	A3P	Probe 3 Presence	This parameter enables or disables the probe	0	4	1			2	5
	A3L	Min. Value conversion AI3	Don't modify it	-999,9	999,9	0,0		A3P >2	3	6
	A3H	Max. Value conversion AI3	Don't modify it	-999,9	999,9	30,0		A3P >2	3	7
	A3C	Calibration Probe 3	Don't modify it	-20,0	20,0	0,0	°C	A3P >0	3	8
AI4		Analog Input 4							1	
	A4P	Probe 4 Presence	This parameter enables or disables the probe	0	4	1			2	9
	A4L	Min. Value conversion AI4	Don't modify it	-999,9	999,9	0,0		A4P >2	3	10
	A4H	Max. Value conversion AI4	Don't modify it	-999,9	999,9	30,0		A4P >2	3	11
	A4C	Calibration Probe 4	Don't modify it	-20,0	20,0	0,0	°C	A4P >0	3	12
dl		Digital input							1	
	dl1	Input 1 polarity (Pump)	Change type of digital input (NC o NO)	0	1	1			3	13
	dl2	Alarm polarity from input 2	Change type of digital input (NC o NO)	0	2	2			2	14
	dl3	Alarm polarity from input 3	Change type of digital input (NC o NO)	0	2	2			2	15
	dl4	Alarm polarity from input 4	Change type of digital input (NC o NO)	0	2	2			2	16
	dl5	Alarm polarity from input 5	Change type of digital input (NC o NO)	0	2	2			2	17
	dl6	Alarm polarity from input 6	Change type of digital input (NC o NO)	0	2	2			2	18
dl		Digital output Alarm and Warning							1	
	dO5	Polarity output Warning	Change type of digital input (NC o NO)	0	1	0			3	19
	dO6	Polarity output Alarm	Change type of digital input (NC o NO)	0	1	0			3	20
SIC		Safety probe							1	
	Slp	Selection of safety probe	Probe which also activates the relay Warning (ns. KTRS)	0	4	4			3	21
SyS		System							0	
	dSA	display A output	Probe temperature or set-point to be displayed in the left display	0	8	1			3	22
	dSb	display B output	Probe temperature or set-point to be displayed in the right display	0	8	3			3	23
PAS		Password							1	
	PL1	Password level 1		0	9999	0			1	32
	PL2	Password level 2		0	9999				2	33
	PL3	Password level 3		0	9999				3	34

Menu	Parameter	Description	Additional description	Min	Max	Default	U.M.	Visibility condition	Level	Modbus index
tUN		Autotuning							3	
	tU1	Output temperature hysteresis	Don't modify it	0	50,0	0,5	°C		3	35
	tU2	Startup number	Don't modify it	0	5	2			3	36
	tU3	Measurement cycles number	Don't modify it	1	4	2			3	37
	tU4	Max. differential command exit	Don't modify it	0,01	10,00	10,00	V		3	38
	tU5	Differential reduction exit command (%)	Don't modify it	0	100	15			3	39
	tU6	Calculating mode: 0= Symmetrical; 1=Asymmetrical; 2=Simple	Don't modify it	0	2	2			3	40
	tU7	Enabling	Don't modify it	0	1	1			3	41

Submenu **REG** – regulation parameters group :

Menu	Parameter	Description	Additional description	Min	Max	Default	U.M.	Visibility condition	Level	Modbus index
REG		REGULATION							0	
Pb1		Probe 1							0	
	rES	Set-point Probe 1 (Tank resistor)	Don't modify it	-50,0	200,0	0,0	°C		3	42
	AL1	Probe 1 - Low Temperature Alarm Threshold	Don't modify it	-50,0	200,0	-50,0	°C		3	43
	AH1	Probe 1 - High Temperature Alarm Threshold	Don't modify it	-50,0	200,0	200,0	°C		3	44
	d01	Probe 1 differential		0,0	20,0	3,0	°C		3	45
Pb2		Probe 2							0	
	tCI	Set-point Probe 2 (Plant Consent)	Plant consent according to table "Set point adjustment"	-50,0	200,0	120,0	°C		0	46
	AL2	Probe 2 - Low Temperature Alarm Threshold	Don't modify it	-50,0	200,0	-50,0	°C		2	47
	AH2	Probe 2 - High Temperature Alarm Threshold	Don't modify it	-50,0	200,0	200,0	°C		2	48
	d02	Probe 2 differential		0,0	20,0	3,0	°C		2	49
Pb3		Probe 3							0	
	rE3	Type of regulation of probe 3 (Oil tank exit)	Type of regulation 0= thermostat; 1= PID (don't modify)	0	1	1			3	50
	OIL	Set-point Probe 3 (Oil tank exit)	Nozzle oil temperature according to the table "Set point adjustment"	-50,0	200,0	130,0	°C		0	51
	AL3	Probe 3 - Low Temperature Alarm Threshold (Oil tank exit)	Don't modify it	-50,0	200,0	-50,0	°C		2	52
	AH3	Probe 3 - High Temperature Alarm Threshold (Oil tank exit)	Don't modify it	-50,0	200,0	200,0	°C		2	53
	Pb3	Proportional band for PID Probe 3 (Oil tank exit)	Proportional band for first PID regulation	0,0	200,0	60,0			3	54
	db3	Dead Zone for PID Probe 3 (Oil tank exit)	Dead zone for first PID regulation	0,0	20,0	0,0	°C	rE3 =1	3	55
	rt3	Integral Time (Ti) for PID Probe 3 (Oil tank exit)	Integral time for first PID regulation	0,0	1000,0	120,0	s	rE3 =1	3	56
	dt3	DerivativeTime (Td) for PID Probe 3 (Oil tank exit)	Derivative time for first PID regulation (~ ¼ di rt3)	0,0	300,0	30,0	s	rE3 =1	3	57
	db3	Dead Zone for PID Probe 3 (Oil tank exit)	Dead zone for first PID regulation	0,0	20,0	0,0	°C	rE3 =1	3	55

Menu	Parameter	Description	Additional description	Min	Max	Default	U.M.	Visibility condition	Level	Modbus index
	pi1	Overshooting for Integral action (Oil tank exit)	Don't modify it	100	1000	200		rE3 =1	3	58
	pi2	Derivative action enabling (Oil tank exit)	Don't modify it	0	1	1		rE3 =1	3	59
	pi3	Filtering factor for derivative action (Oil tank exit)	Don't modify it	1	100	20		rE3 =1	3	60
	pi4	Duty cycle PWM for output DO3 and/or AO1 (0-10V)	Don't modify it	1	300	5	s	rE3 =1	3	61
	SL3	Output selection DO3 and/or AO1 (0-10V)	Digital selection output for control thyristors; Don't modify it	0	2	AO1			3	62
	p21	Proportional band for PID Probe 1 (Tank resistor)	Proportional band for second PID regulation	0,0	200,0	50,0		rE3 =1	3	63
	p22	Dead Zone for PID Probe 1 (Tank resistor)	Dead zone for second PID regulation	0,0	20,0	0,0	°C	rE3 =1	3	64
	p23	Integral Time (Ti) for PID Probe 1 (Tank resistor)	Integral time for second PID regulation	0,0	1000,0	110,0	s	rE3 =1	3	65
	p24	DerivativeTime (Td) for PID Probe 1 (Tank resistor)	Derivative time for second PID regulation	0,0	300,0	23,0	s	rE3 =1	3	66
	p25	Overshooting for Integral action (Tank resistor)	Don't modify it	100	1000	200		rE3 =1	3	67
	p26	Derivative action enabling (Tank resistor)	Don't modify it	0	1	1		rE3 =1	3	68
	p27	Filtering factor for derivative action (Tank resistor)	Don't modify it	1	100	20		rE3 =1	3	69
	p28	Min Output PID Probe 3 (Oil tank exit)	Minimum value tank resistor set-point (delta of 100°C above p29)	0,0	1000,0	80,0	°C	rE3 =1	3	70
	p29	Max Output PID Probe 3 (Oil tank exit)	Maximum value tank resistor set-point	0,0	1000,0	180,0	°C	rE3 =1	3	71
	SP0	Set-point Tank Resistor with oil pump stops (stand by)	Set-point of maintaining resistance during stand by "Set point adjustment"	-50,0	200,0	140,0	°C	rE3 =1	0	72
Pb4		Probe 4							0	
	tcn	Setpoint Probe 4 (Oil consent)	Oil consent according table "Set point adjustment"	-50,0	200,0	110,0	°C		0	73
	AL4	Low Threshold Probe 4		-50,0	200,0	-50,0	°C		2	74
	trS	Probe 4 - High Temperature Alarm Threshold (Safety Thermostat)	Tank resistor safety temperature according table "Set point adjustment"	-50,0	200,0	190,0	°C		0	75
	d04	Probe 4 differential		0,0	20,0	3,0	°C		2	76

Alarms & Warning:

When the red triangle on the top left lights, one or more alarms are activated.

When the red key on the left lights, the output N05-C5 is active and the relay **KTRS** switches the resistors OFF. Check the reason, correct the failure and, as soon as the temperature is lower than **trS**, reset it through **ALA/rES**. In order to show active alarms and warnings, select the relevant menu through **ALA/Act.** and, using the **UP** and **DOWN** buttons, scroll the lines.

In order to perform the manual reset, select **ALA/rES**.

Code	Description	Source	Active simbol	Reset type
trS	High temperature resistors alarm	probe Pb4 > value trS	red key	Manual
EP1	Probe Pb1 fault	Probe Pb1 fault	red triangle	Automatic
EP2	Probe Pb2 fault	Probe Pb2 fault	red triangle	Automatic
EP3	Probe Pb3 fault	Probe Pb3 fault	red triangle	Automatic
EP4	Probe Pb4 fault	Probe Pb4 fault	red triangle	Automatic

Set point adjustment:

All the parameters inside the **Par** menu are locked by a password. The user can modify only set points, without using any passwords.

The oil viscosity at the nozzle, should be about 1,5°E, which guarantees correct and safe functioning of the burner. The temperature values in the table, guarantee the respect of that parameter and are valid when the pre heating tank is installed on the burner. For different configurations, please refer to the chapter "Recommendations to design heavy oil feeding plants" on the burner manual

Here below recommended set points:

Menu path				Oil viscosity at 50 °C according to the letter shown in the burner model				
				P	N	E	D	H
				89 cSt	< 50 cSt	> 50 cSt < 110 cSt	> 110 cSt < 400 cSt	> 400 cSt < 4000 cSt
				12 °E	< 7°E	> 7 °E < 15 °E	> 15 °E < 50 °E	> 50 °E < 530 °E
Par								
rEG	Pb1	tr	Oil heater temperature probe	parameter not visible				
	Pb2	tCl	Plant consent temperature probe (when installed)	20 °C	70 °C	70 °C	70 °C	---
	Pb3	Oil	oil heater output temperature probe (PID regulation);	60-70 °C	110-120 °C	120-130 °C	130-140 °C	140-150 °C
		SP0	Set-point oil heater with oil pump stopped (stand-by)	45 °C	120 °C	130 °C	140 °C	150 °C
	Pb4	tcn	Oil heater consent temperature probe	40 °C	100 °C	100 °C	110 °C	120 °C
		trS	Safety temperature tank resistors (manual reset)	120 °C	190-200 °C	190-200 °C	190-200 °C	190-200 °C

The above temperature values are suggested and refer to a plant designed according to the prescriptions in the burner user manual.

The suggested values can change in reference to the fuel oil specifications.

USER MANUAL OF MULTI-THERMOSTAT MCX06C

MCX06C is a multi-thermostat with four 100k NTC inputs. It can control up to 4 temperatures showing them (not more than 2 at the same time) on a couple of displays.
It is used to check and adjust oil heater temperatures.

User interface:

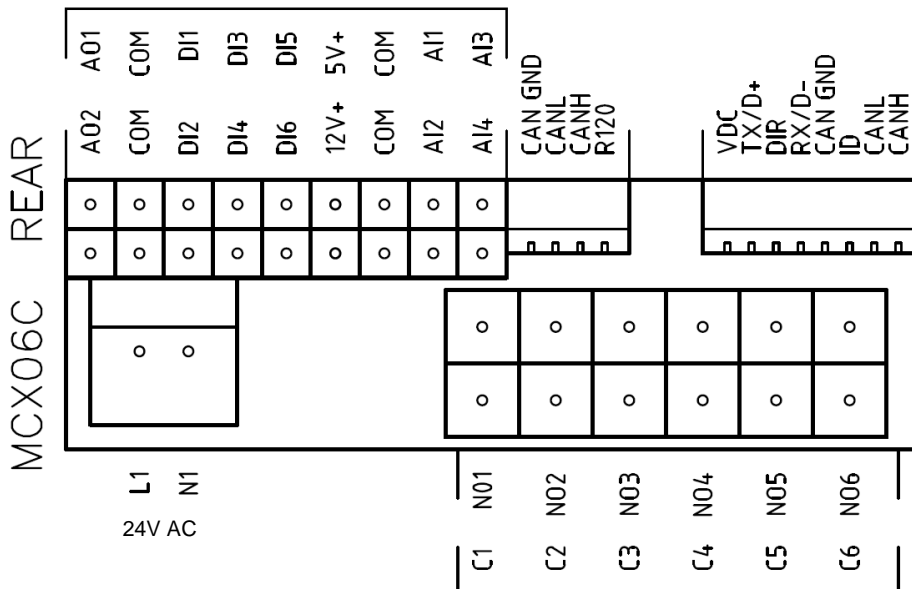
Device:



Note :

In normal operation, the display A shows the oil tank resistor temperature (probe Pb1).
In normal operation, the display B shows the oil output temperature (probe Pb3).

Connections from terminal side:



Probe connection:

input **AI1** = probe **Pb1** = set-point "tr" = oil heater temperature probe;
input **AI2** = probe **Pb2** = set-point "tCl" = plant consent temperature probe (when installed);
input **AI3** = probe **Pb3** = set-point "OIL" = oil heater output temperature probe (PID regulation);
input **AI4** = probe **Pb4** = set-point "tcn" = oil heater consent temperature probe.

Menu:

To enter the menu below, keep pushing **ENTER** for more than 3 s.

Menu code	Sub-menu code	Function	Notes
Prb		Probes values	You can see in sequence the 4 probe values (UP and DOWN keys): the probe code is on display A (Pb1,..., Pb4) and the probe value is on display B (not fitted or out of work probes show "----").
Log		Login	It defines the access level to menu and parameters (password)
	PAS	Password	Password input
Par		Parameters menu	Access to parameters (you have to login first)
	CnF	Configuration menu	Parameter configuration
	rEG	Regulation menu	Set to set-point, probe, thresholds etc.
ALA		Alarm menu	Access to alarm management
	Act	Active alarms	Show the active alarms
	rES	Reset alarms & Warning	Reset of the manual reset alarms and warning
Loc		Lock/Unlock functions	Not used
InF	rEL	Software version	Installed software version
tUN		Autotuning	Activation On, deactivation ESC PID parameter autotuning

Alarms & Warning:

When the red triangle on the top left lights, one or more alarms are activated.

When the red key on the left lights, the output N05-C5 is active and the relay **KTRS** switches the resistors OFF.

Check the reason, correct the failure and, as soon as the temperature is lower than **trS**, reset it through **ALA/rES**.

In order to show active alarms and warnings, select the relevant menu through **ALA/Act**.and, using the **UP** and **DOWN** buttons, scroll the lines.

In order to perform the manual reset, select **ALA/rES**.

Code	Description	Sourse	Active simbol	Reset type
trS	High temperature resistors alarm	probe Pb4 > value trS	red key	Manual
EP1	Probe Pb1 fault	Probe Pb1 fault	red triangle	Automatic
EP2	Probe Pb2 fault	Probe Pb2 fault	red triangle	Automatic
EP3	Probe Pb3 fault	Probe Pb3 fault	red triangle	Automatic
EP4	Probe Pb4 fault	Probe Pb4 fault	red triangle	Automatic

Set point adjustment:

All the parameters inside the **Par** menu are locked by a password.

The user can modify only set points (menu **rEG**), without using any passwords.

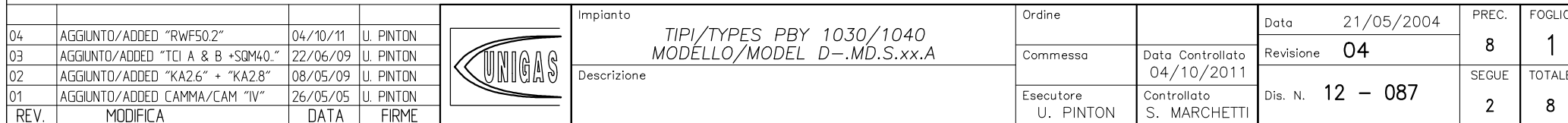
The oil viscosity at the nozzle, should be about 1,5^{°E}, which guarantees correct and safe functioning of the burner.

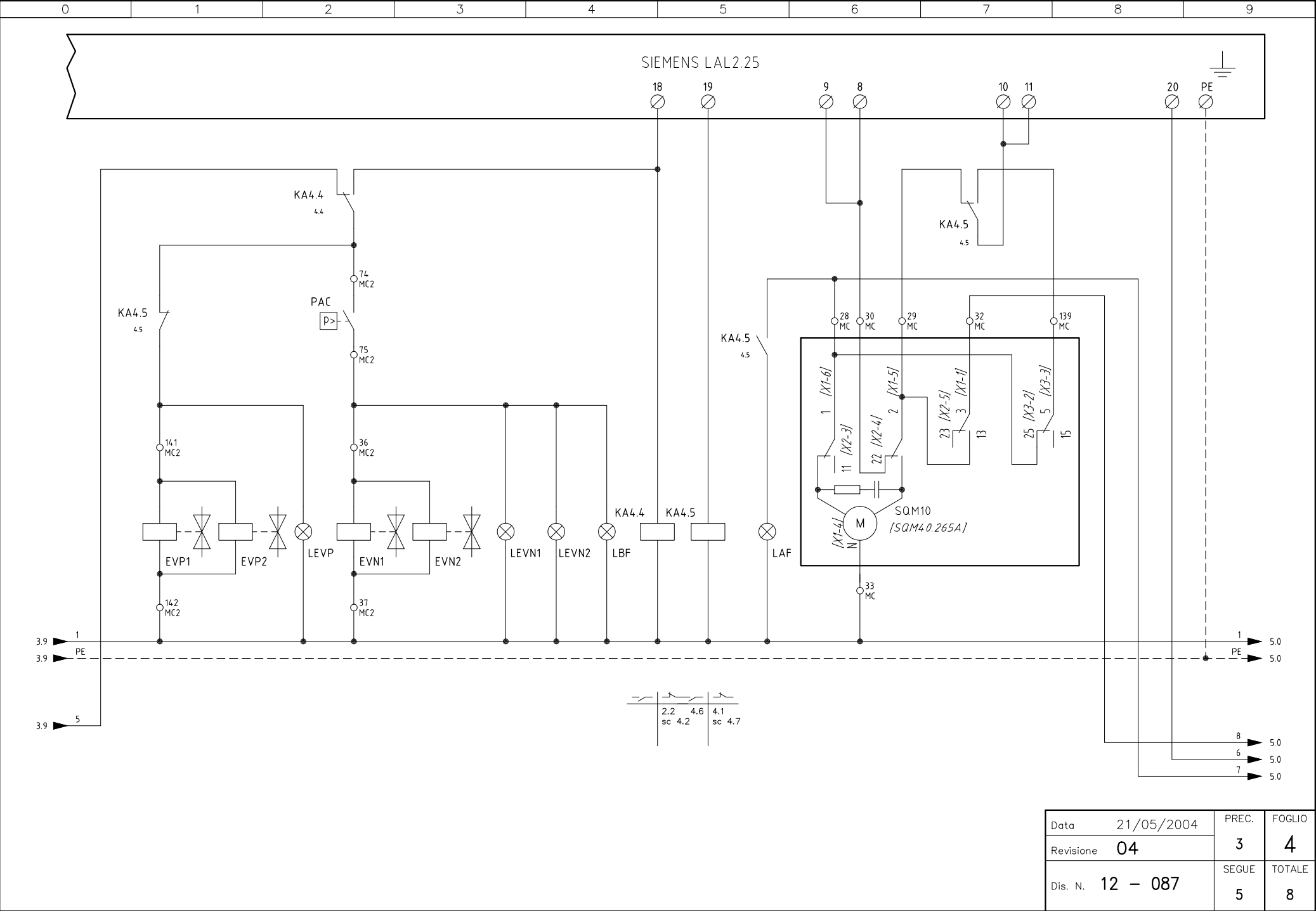
The temperature values in the table, guarantee the respect of that parameter and are valid when the pre heating tank is installed on the burner. For different configurations, please refer to the chapter "Recommendations to design heavy oil feeding plants" in the burner manual.

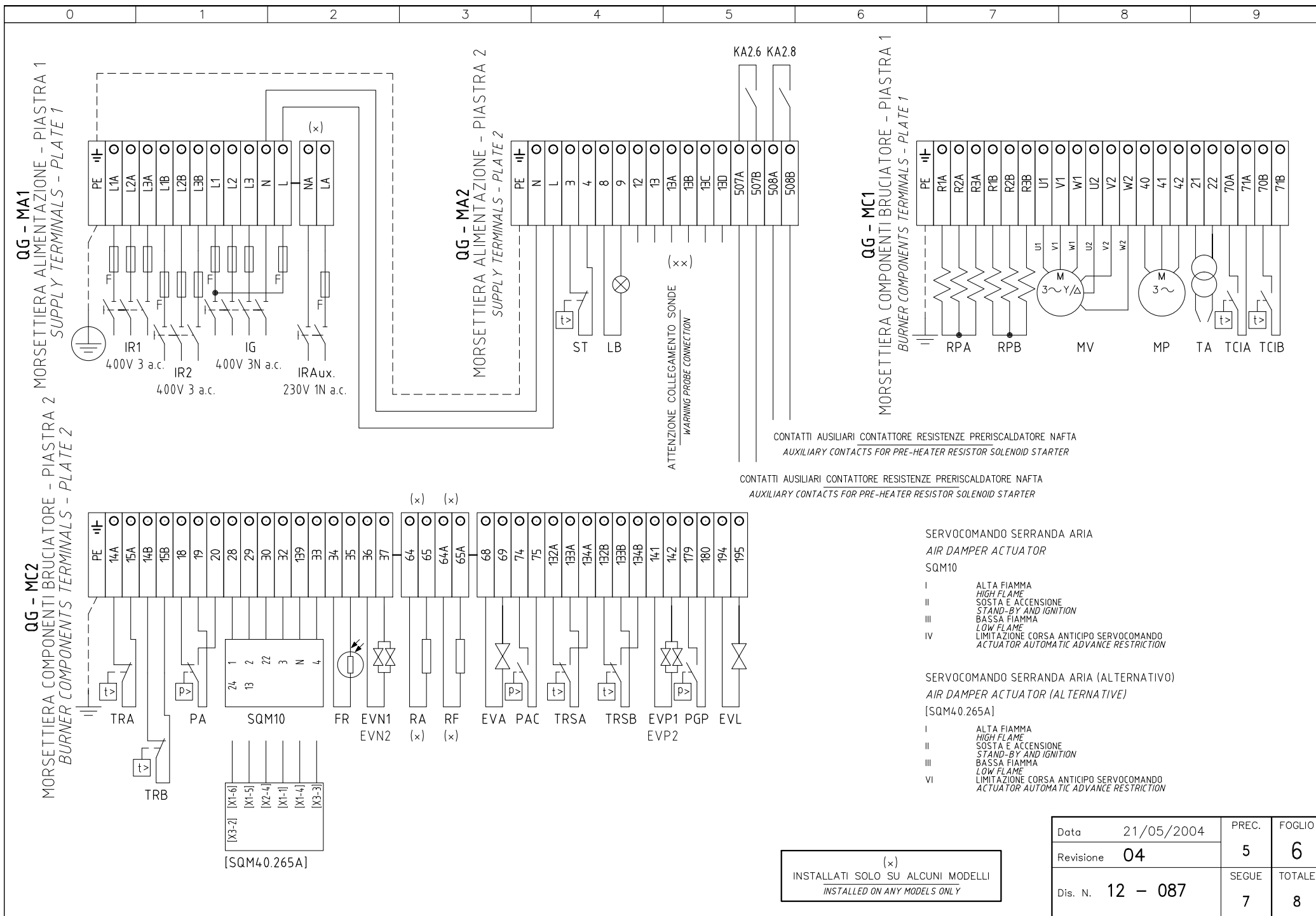
Here below recommended set points:

Menu path				Oil viscosity at 50 °C according to the letter shown in the burner model				
				P	N	E	D	H
				89 cSt	< 50 cSt	> 50 cSt < 110 cSt	> 110 cSt < 400 cSt	> 400 cSt < 4000 cSt
				12 °E	< 7°E	> 7 °E < 15 °E	> 15 °E < 50 °E	> 50 °E < 530 °E
Par								
rEG	Pb1	tr	Oil heater temperature probe	parameter not visible				
	Pb2	tCl	Plant consent temperature probe (when installed)	20 °C	70 °C	70 °C	70 °C	---
	Pb3	Oil	oil heater output temperature probe (PID regulation);	60-70 °C	110-120 °C	120-130 °C	130-140 °C	140-150 ° C
		SP0	Set-point oil heater with oil pump stopped (stand-by)	45 °C	120 °C	130 °C	140 °C	150 °C
	Pb4	tcn	Oil heater consent temperature probe	40 °C	100 °C	100 °C	110 °C	120 °C
		trS	Safety temperature tank resistors (manual reset)	120 °C	190-200 °C	190-200 °C	190-200 °C	190-200 °C

The above temperature values are suggested and refer to a plant designed according to the prescriptions in the burner user manual. The suggested values can change in reference to the fuel oil specifications.







SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
CMF	5	COMMUT. MANUALE FUNZ. 0)FERMO 1)ALTA FIAMMA 2)BASSA FIAMMA 3)AUTOMATICO	MANUAL SWITCH 0)OFF 1)HIGH FLAME 2)LOW FLAME 3)AUTOMATIC
EVA	3	ELETTROVALVOLA ARIA COMPRESSA	COMPRESSED AIR SOLENOID VALVE
EVL	2	ELETTROVALVOLA LAVAGGIO LANCIA	OIL GUN CLEAN SOLENOID VALVE
EVN1	4	ELETTROVALVOLA NAFTA	OIL SOLENOID VALVE
EVN2	4	ELETTROVALVOLA NAFTA DI SICUREZZA	OIL SAFETY SOLENOID VALVE
EVP1	4	ELETTROVALVOLA PILOTA GAS	PILOT GAS SOLENOID VALVE
EVP2	4	ELETTROVALVOLA PILOTA GAS	PILOT GAS SOLENOID VALVE
FR	3	FOTORESISTENZA RILEVAZIONE FIAMMA	PHOTORESISTOR FLAME DETECTOR
FU1.0	1	FUSIBILI LINEA PRERISCALDATORE [RPA]	LINE PRE-HEATING [RPA] FUSES
FU1.1	1	FUSIBILI LINEA PRERISCALDATORE [RPB]	LINE PRE-HEATING [RPB] FUSES
FU1.2	1	FUSIBILI LINEA BRUCIATORE	BURNER LINE FUSES
FU1.6	1	FUSIBILI LINEA POMPA	PUMP LINE FUSES
FU1.7	1	FUSIBILE LINEA AUSILIARI	AUXILIARY LINE FUSE
FU1.8	1	FUSIBILE LINEA RESISTENZE AUSILIARIE	LINE AUXILIARY RESISTORS FUSE
FU1.9	1	FUSIBILE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS FUSE
FU5.6	5	FUSIBILE	FUSE
IG	1	INTERRUTTORE LINEA BRUCIATORE	BURNER LINE SWITCH
IL	1	INTERRUTTORE LINEA AUSILIARI	AUXILIARY LINE SWITCH
IP	2	INTERRUTTORE POMPA NAFTA	OIL PUMP SWITCH
IR1	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE	PRE-HEATING RESISTORS LINE SWITCH
IR2	1	INTERRUTTORE LINEA RESISTENZE PRERISCALDATORE	PRE-HEATING RESISTORS LINE SWITCH
IRA	1	INTERRUTTORE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS SWITCH
IRAux.	1	INTERRUTTORE RESISTENZE AUSILIARIE	AUXILIARY RESISTORS SWITCH
KA2.6	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE	AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE
KA2.8	2	RELE' AUSILIARIO SEGNALAZIONE GUASTO CONTATTORE RESISTENZE	AUXILIARY RELAY FOR TRIM HEATER CONTACTOR FAILURE
KA4.4	4	RELE' AUSILIARIO	AUXILIARY RELAY
KA4.5	4	RELE' AUSILIARIO	AUXILIARY RELAY
KM2.1	2	CONTATTORE MOTORE POMPA NAFTA	OIL PUMP MOTOR CONTACTOR
KM2.6	2	CONTATTORE RESISTENZE PRERISCALDATORE [RP]	PRE-HEATING RESISTORS [RP] CONTACTOR
KM2.8	2	CONTATTORE RESISTENZE PRERISCALDATORE [RPA]	PRE-HEATING RESISTORS [RPA] CONTACTOR
KM3.4	3	CONTATTORE MOTORE VENTILATORE (LINEA)	FAN MOTOR CONTACTOR (LINE)
KM3.4S	3	CONTATTORE MOTORE VENTILATORE (TRIANGOLO)	FAN MOTOR CONTACTOR (DELTA)
KM3.4T	3	CONTATTORE MOTORE VENTILATORE (STELLA)	FAN MOTOR CONTACTOR (STAR)
KT2.2	2	RELE' TEMPORIZZATORE	DELAYED RELAY
KT3.5	3	TEMPORIZZATORE STELLA/TRIANGOLO	STAR/DELTA DELAYED RELAY
LAF	4	LAMPADA SEGNALAZIONE ALTA FIAMMA BRUCIATORE	BURNER IN HIGH FLAME INDICATOR LIGHT
LB	3	LAMPADA SEGNALAZIONE BLOCCO BRUCIATORE	INDICATOR LIGHT FOR BURNER LOCK-OUT
LBF	4	LAMPADA SEGNALAZIONE BASSA FIAMMA BRUCIATORE	BURNER IN LOW FLAME INDICATOR LIGHT
LEVA	3	LAMPADA SEGNALAZIONE APERTURA [EVA]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVA]
LEVN1	4	LAMPADA SEGNALAZIONE APERTURA [EVN1]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVN1]
LEVN2	4	LAMPADA SEGNALAZIONE APERTURA [EVN2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVN2]
LEVP	4	LAMPADA SEGNALAZIONE APERTURA [EVP1-EVP2]	INDICATOR LIGHT FOR OPENING OF ELECTRO-VALVE [EVP1-EVP2]

(x)

INSTALLATI SOLO SU ALCUNI MODELLI
INSTALLED ON ANY MODELS ONLY

Data	21/05/2004	PREC.	FOGLIO
Revisione	04	6	7
Dis. N.	12 - 087	SEGUE	TOTAL
		8	8

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SIGLA/ITEM	FOGLIO/SHEET	FUNZIONE	FUNCTION
LP	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO POMPA	INDICATOR LIGHT FOR PUMP OPERATION
LPAC	3	LAMPADA SEGNALAZIONE INTERVENTO PRESSOSTATO PAC	INDICATOR LIGHT FOR OPERATING PRESSURE SWITCH PAC
LGP	2	LAMPADA SEGNALAZIONE PRESSOSTATO GAS PILOTA	INDICATOR LIGHT FOR PRESENCE OF GAS IN THE PILOT NETWORK
LRPA	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RPA]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RPA] OPERATION
LRPB	2	LAMPADA SEGNALAZIONE FUNZIONAMENTO PRERISCALDATORE [RPB]	INDICATOR LIGHT FOR PRE-HEATING RESISTOR [RPB] OPERATION
LS	2	LAMPADA SEGNALAZIONE SOSTA BRUCIATORE	INDICATOR LIGHT FOR BURNER STAND-BY
LT	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO MOTORE VENTILATORE	INDICATOR LIGHT FOR FAN OVERLOAD TRIPPED
LTA	3	LAMPADA SEGNALAZIONE TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER INDICATOR LIGHT
LTCI	3	LAMPADA SEGNALAZIONE CONSENSO TERMOSTATO [TCI]	INDICATOR LIGHT FOR [TCI] CONSENT
LTP	2	LAMPADA SEGNALAZIONE BLOCCO TERMICO POMPA	INDICATOR LIGHT FOR PUMP OVERLOAD TRIPPED
LTRSA	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRSA]	INDICATOR LIGHT FOR [TRSA] SAFETY THERMOSTAT
LTRSB	2	LAMPADA SEGNALAZIONE BLOCCO TERMOSTATO DI SICUREZZA [TRSB]	INDICATOR LIGHT FOR [TRSB] SAFETY THERMOSTAT
MP	1	MOTORE POMPA NAFTA	OIL PUMP MOTOR
MV	1	MOTORE VENTILATORE	FAN MOTOR
PA	2	PRESSOSTATO ARIA	AIR PRESSURE SWITCH
PAC	4	PRESSOSTATO ARIA DI POLVERIZZAZIONE	POLVERIZATION AIR PRESSURE SWITCH
PGP	2	PRESSOSTATO PILOTA GAS	PILOT MINIMUM GAS PRESSURE SWITCH
PS	2	PULSANTE SBLOCCO FIAMMA	LOCK-OUT RESET BUTTON
PT100	5	SONDA DI TEMPERATURA	TEMPERATURE PROBE
RA	1	RESISTENZE AUSILIARIE	AUXILIARY RESISTORS
RF	1	RESISTENZA AUSILIARIA FILTRO NAFTA	OIL FILTER AUXILIARY RESISTOR
RPA	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
RPB	1	RESISTENZE PRERISCALDATORE NAFTA	PRE-HEATING TANK RESISTORS
SD-PRESS	5	SONDA DI PRESSIONE	PRESSURE PROBE
SD-PRESS	5	SONDA DI PRESSIONE	PRESSURE PROBE
SD-TEMP.	5	SONDA DI TEMPERATURA	TEMPERATURE PROBE
SD - 4÷20mA	5	TRASDUTTORE USCITA IN CORRENTE	TRANSDUCER CURRENT OUTPUT
SIEMENS LAL2.25	2	APPARECCHIATURA CONTROLLO FIAMMA	CONTROL BOX
SIEMENS RWF40.0x0	5	REGOLATORE MODULANTE	BURNER MODULATOR
SIEMENS RWF50.2	5	REGOLATORE MODULANTE (ALTERNATIVO)	BURNER MODULATOR (ALTERNATIVE)
SQM10	4	SERVOCOMANDO SERRANDA ARIA	AIR DAMPER ACTUATOR
ST	3	SERIE TERMOSTATI/PRESSOSTATI	SERIES OF THERMOSTATS OR PRESSURE SWITCHES
TA	3	TRASFORMATORE DI ACCENSIONE	IGNITION TRANSFORMER
TCIA	3	TERMOSTATO CONSENSO IMPIANTO [RPA]	PLANT CONSENT THERMOSTAT [RPA]
TCIB	3	TERMOSTATO CONSENSO IMPIANTO [RPB]	PLANT CONSENT THERMOSTAT [RPB]
TP	1	TERMICO MOTORE POMPA	PUMP MOTOR THERMAL
TRA	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RPA]	REGULATION THERMOSTAT FOR PRE-HEATING [RPA] RESISTORS
TRB	2	TERMOSTATO DI REGOLAZIONE PRERISCALDATORE [RPB]	REGULATION THERMOSTAT FOR PRE-HEATING [RPB] RESISTORS
TRSA	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RPA]	PRE-HEATING [RPA] A SAFETY THERMOSTAT
TRSB	2	TERMOSTATO DI SICUREZZA PRERISCALDATORE [RPB]	PRE-HEATING [RPB] A SAFETY THERMOSTAT
TV	1	TERMICO MOTORE VENTILATORE	FAN MOTOR THERMAL
[SQM40.265A]	4	SERVOCOMANDO SERRANDA ARIA (ALTERNATIVO)	AIR DAMPER ACTUATOR (ALTERNATIVE)

(x)
INSTALLATI SOLO SU ALCUNI MODELLI
INSTALLED ON ANY MODELS ONLY

Data	21/05/2004	PREC.	FOGLIO
Revisione	04	7	8
Dis. N.	12 - 087	SEGUE /	TOTALE 8