

GB **Light oil burners**

Progressive two-stage or modulating operation



CODE	MODEL
20208592	RL 55/M BLU
20208590	RL 85/M BLU



Translation of the original instructions

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1 Information and general warnings

1.1 Information about the instruction manual

1.1.1 Introduction

The instruction manual supplied with the burner:

- is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance Centre of the area;
- is designed for use by qualified personnel;
- offers important indications and instructions relating to the installation safety, start-up, use and maintenance of the burner.

Symbols used in the manual

In some parts of the manual you will see triangular DANGER signs. Pay great attention to these, as they indicate a situation of potential danger.

1.1.2 General dangers

The **dangers** can be of **3 levels**, as indicated below.



DANGER

Maximum danger level!

This symbol indicates operations which, if not carried out correctly, cause serious injury, death or long-term health risks.



ATTENTION

This symbol indicates operations which, if not carried out correctly, may cause serious injury, death or long-term health risks.



CAUTION

This symbol indicates operations which, if not carried out correctly, may cause damage to the machine and/or injury to people.

1.1.3 Other symbols



DANGER

DANGER: LIVE COMPONENTS

This symbol indicates operations which, if not carried out correctly, lead to electric shocks with lethal consequences.



DANGER: FLAMMABLE MATERIAL

This symbol indicates the presence of flammable materials.



DANGER: BURNING

This symbol indicates the risks of burns due to high temperatures.



DANGER: CRUSHING OF LIMBS

This symbol indicates the presence of moving parts: danger of crushing of limbs.



WARNING: MOVING PARTS

This symbol indicates that you must keep limbs away from moving mechanical parts; danger of crushing.



DANGER: EXPLOSION

This symbol signals places where an explosive atmosphere may be present. An explosive atmosphere is defined as a mixture - under atmospheric conditions - of air and flammable substances in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.



PERSONAL PROTECTION EQUIPMENT

These symbols indicate the equipment that must be worn and kept by the operator for protection against threats against safety and/or health while at work.



OBLIGATION TO ASSEMBLE THE COVER AND ALL THE SAFETY AND PROTECTION DEVICES

This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



ENVIRONMENTAL PROTECTION

This symbol gives indications for the use of the machine with respect for the environment.



IMPORTANT INFORMATION

This symbol indicates important information that you must bear in mind.



This symbol indicates a list.

Abbreviations used

Ch.	Chapter
Fig.	Figure
Page	Page
Sec.	Section
Tab.	Table

1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

- the instruction manual is delivered to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.
- The instruction manual shows:
 - the serial number of the burner;

- the address and telephone number of the nearest Assistance Centre;

- The system supplier must carefully inform the user about:
 - the use of the system;
 - any further tests that may be required before activating the system;
 - maintenance, and the need to have the system checked at least once a year by a representative of the manufacturer or another specialised technician. To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

1.2 Guarantee and responsibility

The manufacturer guarantees its new products from the date of installation, in accordance with the regulations in force and/or the sales contract. At the moment of the first start-up, check that the burner is integral and complete.



ATTENTION

Failure to observe the information given in this manual, operating negligence, incorrect installation and carrying out of non authorised modifications will result in the annulment by the manufacturer of the guarantee that it supplies with the burner.

In particular, the rights to the guarantee and the responsibility will no longer be valid, in the event of damage to things or injury to people, if such damage/injury was due to any of the following causes:

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of unauthorised modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- continuation of use of the burner when a fault has occurred;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
- use of non-original components, including spare parts, kits, accessories and optional;
- force majeure.

The manufacturer furthermore declines any and every responsibility for the failure to observe the contents of this manual.

2 Safety and prevention

2.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known technical safety rules and envisaging all the potential danger situations.

It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.

It is a good idea to remember the following:

- The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

Specifically:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly named by the manufacturer;

the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the ambient temperature must all be within the values indicated in the instruction manual.

- Modification of the burner to alter its performance and destinations is not allowed.
- The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.
- Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.
- Only those parts envisaged by the manufacturer can be replaced.



The manufacturer guarantees safety and proper operation only if all burner components are intact and correctly positioned.

2.2 Personnel training

The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties;
- Personnel must observe all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel must inform their superiors of every problem or dangerous situation that may arise.
- The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

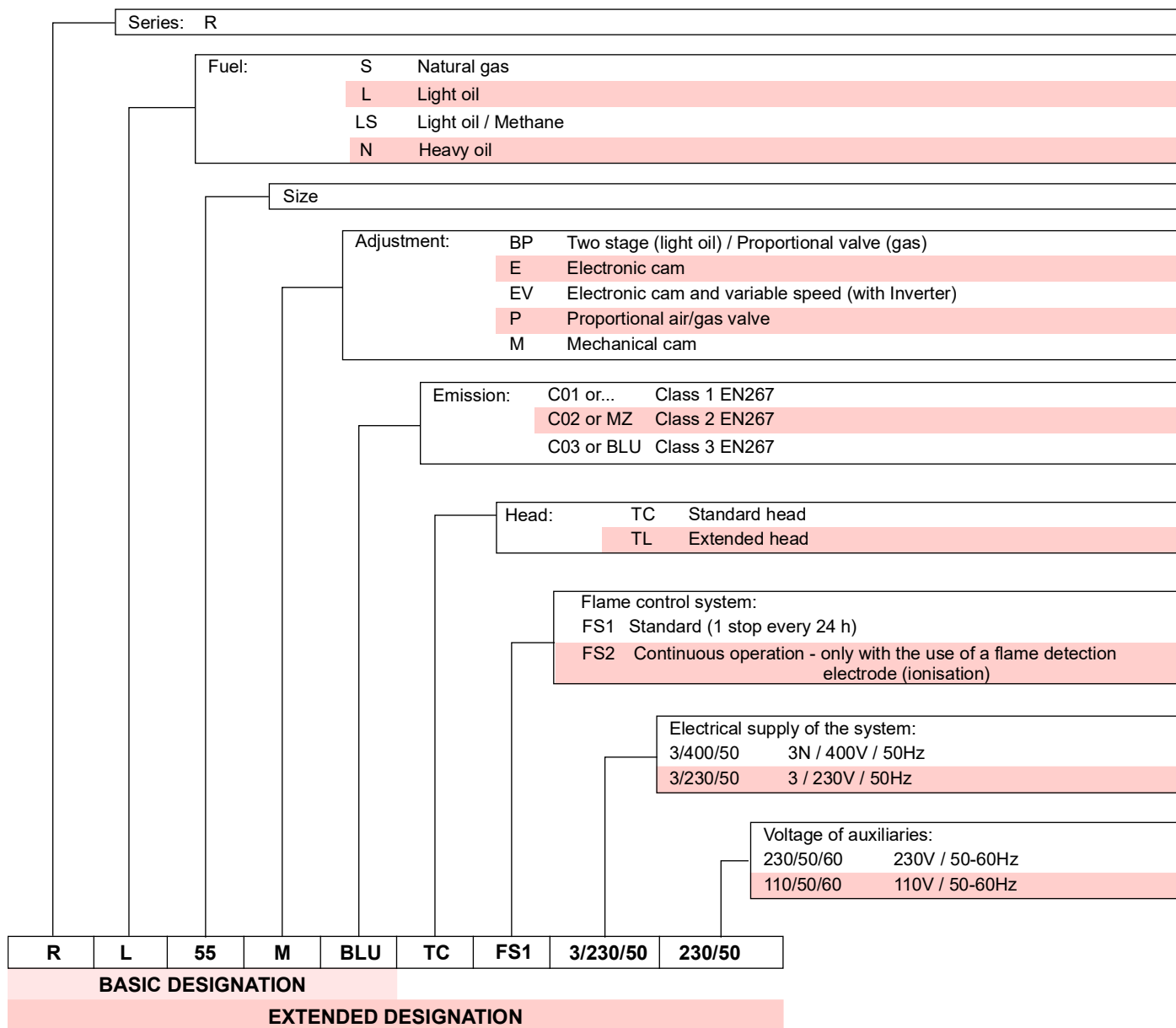
In addition:



- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- the user must inform the manufacturer if faults or malfunctioning of the accident prevention systems are noticed, along with any presumed danger situation;
- personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.

3 Technical description of the burner

3.1 Burner designation



3.2 Models available

Designation	Voltage	Start-up	Code
RL 55/M BLU	3/230-400/50	Direct	20208592
RL 85/M BLU	3/230-400/50	Direct	20208590

3.3 Technical data

Model			RL 55/M BLU	RL 85/M BLU
Type			969 T	952 T1
Output ⁽¹⁾	Max.	kW	356 - 712	594 - 1023
		Mcal/h	307 - 614	512 - 882
		kg/h	30 - 60	50 - 86.2
	Min.	kW	190 - 356	223 - 594
		Mcal/h	164 - 307	192 - 512
		kg/h	16 - 30	18.8 - 50
Fuel			Light oil	
- Net calorific value		kWh/kg Mcal/kg	11.86 10.2 (10.200 kcal/kg)	
- Density		kg/dm3	0.82 - 0.85	
- viscosity at 20 °C		mm2/s	max 6 (1,5 °E - 6 cSt)	
Operation			• Intermittent (min. 1 stop every 24 hours). • Progressive two-stage (modulating by kit).	
Nozzle		number	1 (nozzle with return line)	
Standard applications			Boilers: water, steam, diathermic oil	
Ambient temperature		°C	0 - 40	
Combustion air temperature		°C max	60	
Pump output (at 20 bar)		kg/h	163	
pressure range		bar	10 - 21	
fuel temperature		°C max	90	
Protection level			IP 44	
Noise level ⁽²⁾				
Sound pressure		dBA	78.5	78.5
Sound power			89.5	89.5
Weight with its packaging		kg	65	70

Tab. A

- (1) Reference conditions: Ambient temperature 20°C - Fuel temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
- (2) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum output. The sound power is measured using the "Free Field" method, required by the EN 15036 standard, and according to an "Accuracy: Category 3" measurement, as described in EN ISO 3746.

3.4 Electrical data

Model		RL 55/M BLU	RL 85/M BLU
Electrical power supply		230 - 400 ~ +/-10% 50 - three-phase	
Absorbed electrical power		2500	2900

Tab. B

3.5 Overall dimensions

The dimensions of the burner are given in Fig. 1.

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part drawn back on the slide bars.

The maximum dimensions of the open burner are indicated by the value **U**.

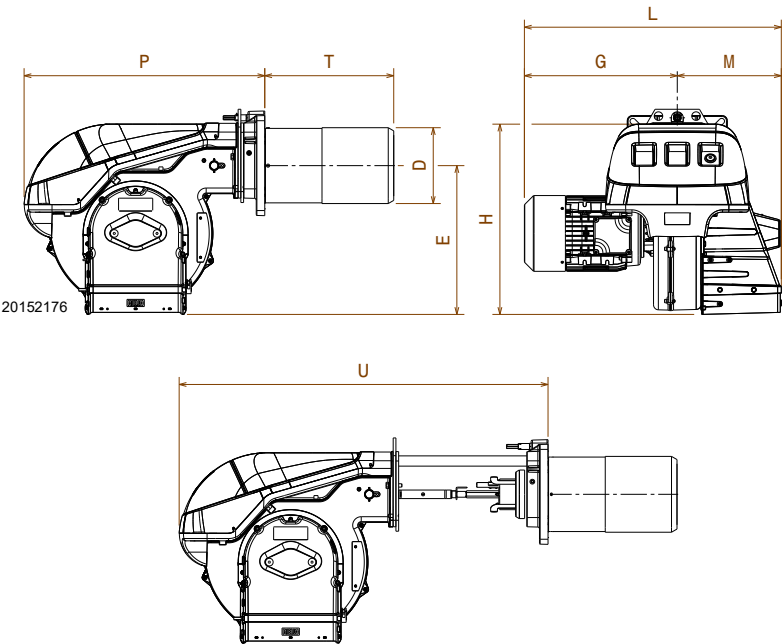


Fig. 1

mm	D	E	G	H	L	M	P	T	U
RL 55/M BLU	189	425	338	550	705	367	680	390	951
RL 85/M BLU	189	425	338	550	705	367	680	390	951

Tab. C

3.6 Standard equipment

- The burner is supplied complete with:
- Flexible hoses No. 2
 - Seal for flexible hoses No. 2
 - Nipples for flexible hoses No. 2
 - Thermal flange gasket No. 1
 - M12x35 screws to secure the burner flange to the boiler . No. 4
 - Spare parts list No. 1
 - Instructions No. 1

3.7 Firing rates

During operation, burner output varies between:

- a **MINIMUM OUTPUT**: area A;
- a **MAXIMUM OUTPUT**: area B.

Diagrams (Fig. 2):

Horizontal axis: Burner output

Vertical axis: Pressure in combustion chamber

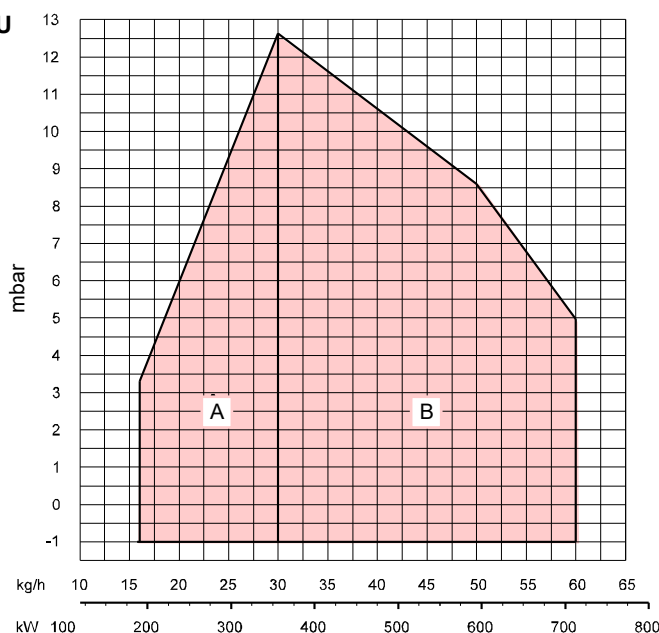
The work point is found by drawing a vertical line from the required output and an horizontal line from the corresponding pressure in the combustion chamber.

The intersection of these two lines is the work point which must lie within area A for the MINIMUM output and area B for the MAXIMUM output.



The FIRING RATE was obtained with an ambient temperature of 20°C and a barometric pressure of 1013 mbar (approx. 0m above sea level), with the combustion head adjusted as shown on page 18.

RL 55/M BLU



RL 85/M BLU

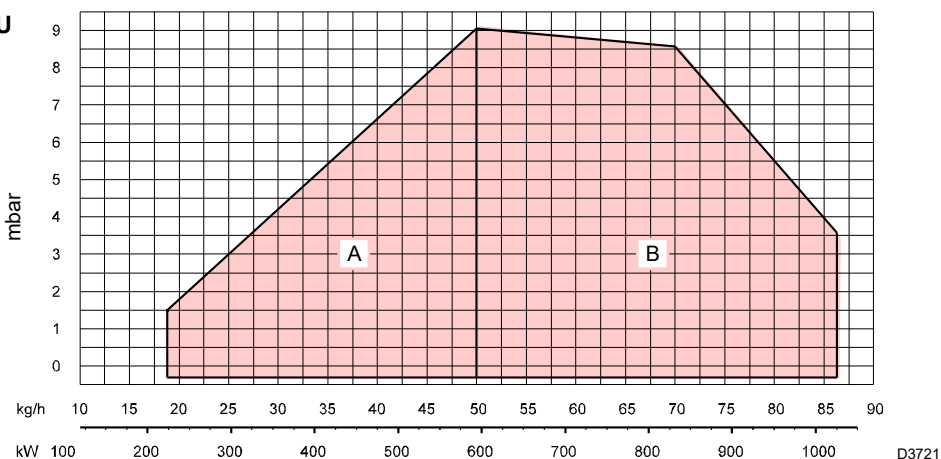


Fig. 2

3.8 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 3).

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

The firing rates were obtained in special test boilers, according to EN 267 standard.

In Fig. 3 you can see the diameter and length of the test combustion chamber.

Example:

Output 65 kg/h: diameter 60 cm - length 2 m.

MODULATING RATIO

The modulating ratio, obtained in test boilers in accordance with the norm (EN 267 for light oil) is 2:1.

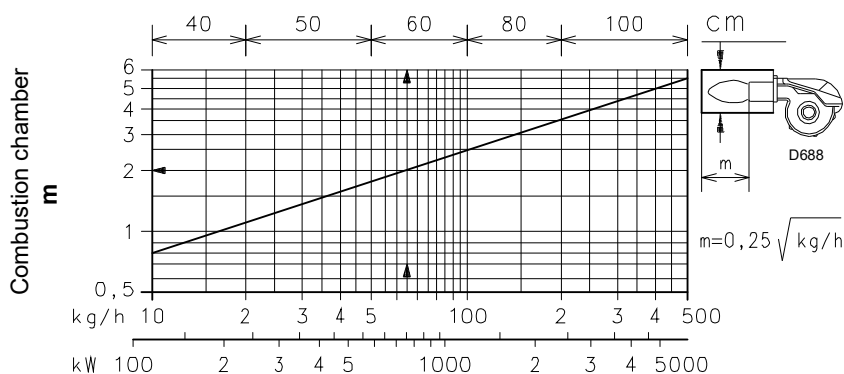


Fig. 3

3.9 Commercial boilers



Burners RL 55-85/M BLU have been designed only for combustion chambers with minimum dimensions in compliance with norm EN 304, with flue gases coming out from the bottom, for example three flue passes (not flue gas inversion boilers), accessible through the door. Maximum thickness of the boiler's front panel: 250 mm, see Fig. 4.

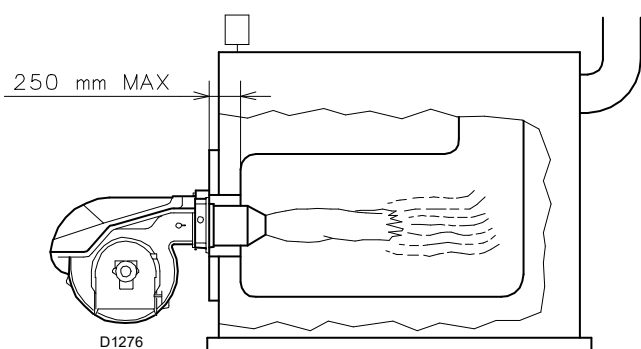


Fig. 4

3.9.1 Smoke ducts

Some norms provide indications for the correct installation of the smoke ducts, which connect the boiler to the flue pipe or the chimney.

At any rate we suggest following these indications:

- The smoke ducts must always have only an updraught;
- changes in direction are allowed only by using curved elements;
- The angle formed between the axis of the terminal entrance section and the axis of the flue pipe or the chimney must be greater than 45°.

3.10 Burner description

- 1 Ignition electrodes
- 2 Flame sensor
- 3 Combustion head
- 4 Screw for combustion head adjustment
- 5 Screw for fixing fan to flange
- 6 Oil pressure switch
- 7 Nozzle return pressure gauge
- 8 Pump
- 9 Air inlet to fan
- 10 Air damper
- 11 Fan pressure test point
- 12 Boiler fixing flange
- 13 Flame stability disc
- 14 Servomotor, controls the fuel flow rate variator and the air damper.
When the burner is not operating the air damper is fully closed in order to reduce heat dispersion from the boiler due to the flue draught, which draws air from the fan suction inlet
- 15 Slide bars for opening the burner and inspecting the combustion head
- 16 Electrical motor
- 17 Extensions for slide bars 15)
- 18 Flame control with lockout pilot light and reset button
- 19 Flame inspection window
- 20 Valve unit with nozzle return line pressure variator
- 21 Return safety valve (VR1)

Two types of burner lockout may occur:

Flame control lockout: if the control box 18)(Fig. 5) push-button lights up, it indicates that the burner is in lockout.

Press the push-button to reset.

Motor lockout: release by pressing the push-button on thermal relay 2)(Fig. 6 on page 12).

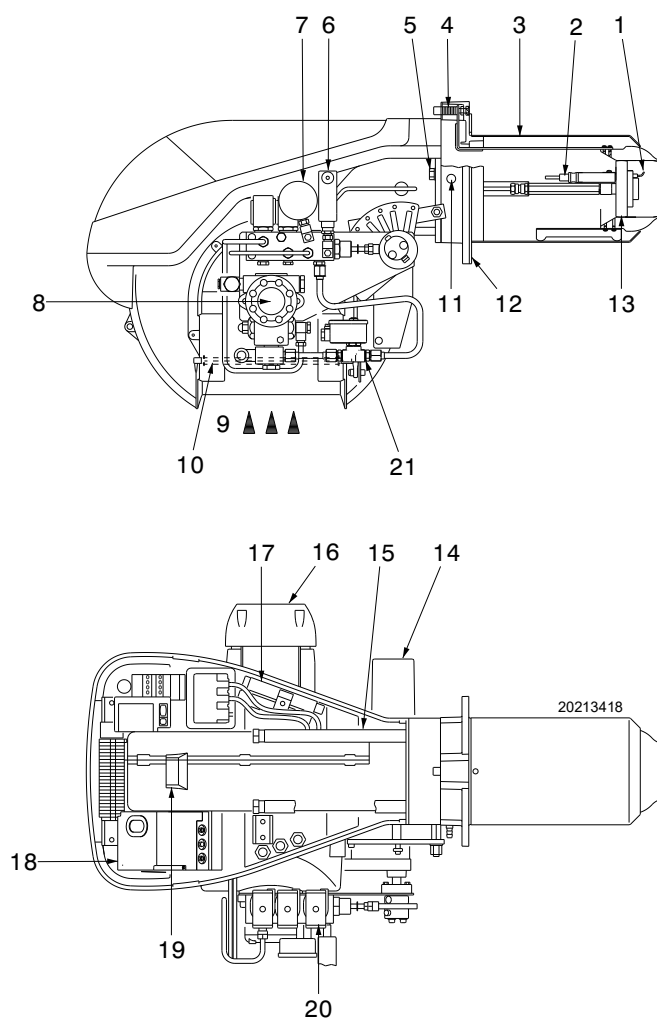
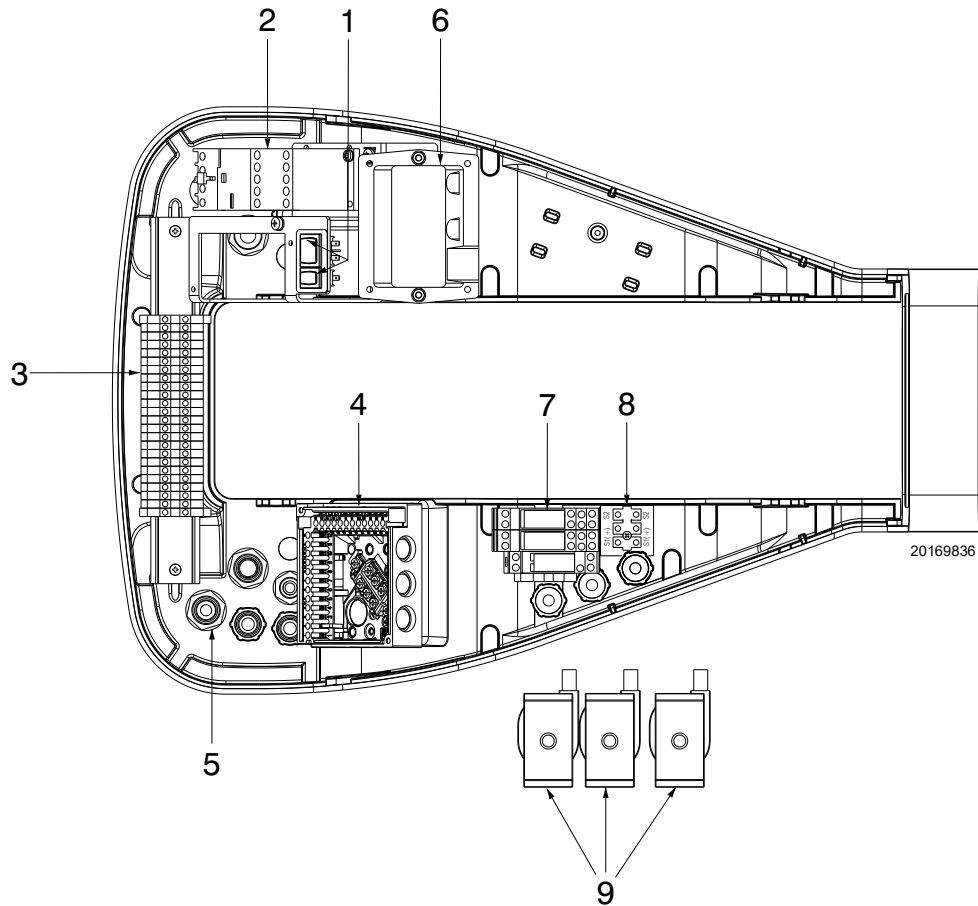


Fig. 5

3.11 Electrical panel description

Fig. 6

- 1 Power switch for:
automatic - manual - off operation
Button for:
power increase - power reduction
- 2 Motor contactor and thermal relay with reset button
- 3 Terminal board for electric connection
- 4 Flame control base
- 5 Cable grommets for external connections (to be carried out
by the installer)
- 6 Ignition transformer
- 7 Relay
- 8 Terminal board for flame sensor
- 9 Oil valve coils

3.12 Flame control (LAL1.25...)

Warnings



ATTENTION

To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

Do not open, interfere with or modify the unit! Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before making any wiring changes in the connection area, completely isolate the plant from mains supply (all-polar disconnection). Ensure that the plant cannot be inadvertently switched on again and that it is indeed dead. If not observed, there is a risk of electric shock hazard.
- Ensure protection against electric shock hazard by providing adequate protection for the burner control's connection terminals.
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring is in an orderly state and make the safety checks.
- Do not press the lockout reset button on the unit or the remote reset button for more than 10 seconds since this will damage the lockout relay in the unit.
- Fall or shock can adversely affect the safety functions. Such units must not be put into operation, even if they do not exhibit any damage.

Installation notes

- Always run high-voltage ignition cables separately, with the greatest possible distance to the unit and to other cables.
- Live and neutral conductors must not be mixed up.

Electrical wiring of the flame detector

It is important to achieve practically disturbance-free signal transmission:

- Never run the detector cable together with other cables:
 - Line capacitance reduces the magnitude of the flame signal
 - Use a separate cable
- Observe the permissible cable lengths

Use

- For the control and supervision of oil atomization burners
- For burners of medium to high capacity
- For intermittent operation (at least one controlled shut-down every 24 hours)
- Can be universally used with multistage or modulating burners
- Suited for use with stationary air heaters



ATTENTION

Condensation, formation of ice and ingress of water are not permitted!



S8987

Fig. 7

Technical data

Mains voltage	AC 220 V –15 / +10 %
Mains frequency	50...60 Hz ±6 %
Fuse (Internal)	T6.3H250V
Primary fuse (external)	max. 10 A
Weight	approx. 1 kg
Power consumption	Approx. AC 3.5 VA
Degree of protection	IP40
Safety class	II
Perm. input current at terminal 1	Max. 5 A (peaks of 20 A / 20 ms)
Perm. current rating of control terminals 3, 6, 7, 9...11 and 15...20	Max. 4 A (peaks of 20 A / 20 ms)
Environmental conditions	
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K5
Mechanical conditions	Class 3M2
Temperature range	-20...+60°C
Humidity	< 95% RH

Tab. D

3.13 Servomotor (SQN31...)

Important notes



To avoid accidents, material or environmental damage, observe the following instructions!

Avoid opening, modifying or forcing the actuators.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the connection area of the servomotor, fully disconnect the burner control device from the power supply (omnipolar separation).
- To avoid the risk of electrocution, protect the connection terminals in a suitable manner and correctly fix the cover.
- Check the wiring is in order.
- Falls and collisions can negatively affect the safety functions. In this case, the servomotor must not be operated, even if it displays no evident damage.

Assembly notes

- Check the relevant national safety standards are respected.
- When assembling the servomotor and connecting the damper, the gears can be disengaged by means of a lever, allowing the drive shaft to be easily adjusted in both directions of rotation.



20160309

Fig. 8

Technical data

Operating voltage	AC 220...240 V - 15% / +10% AC 100...110 V - 15% / +10%
Mains frequency	50...60 Hz $\pm$ 6%
Switching capacity of auxiliary devices and limit switches	10 (3) A, AC 24...250 V
Angle positioning	up to 160° (full scale)
Assembly position	option
Protection level	IP 54, DIN 40050
Safety class	I
Weight	approx. 0.8 kg
Actuator motor	synchronous motor
Power absorption	6.5 VA
Environmental conditions:	
Operation	DIN EN 60 721-3-1
Climatic conditions	Class 1K2
Mechanical conditions	Class 1M2
Temperature range	-20...+60°C
Humidity	< 95% RH

Tab. E

4.4 Operating position



ATTENTION

- The burner is set up to operate only in positions **1**, **2**, **3** and **4** (Fig. 10).
- Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- Installations **2**, **3** and **4** permit operation but make maintenance and inspection of the combustion head more difficult.



DANGER

- Any other position could compromise the correct operation of the appliance.
- The installation **5** is prohibited for safety reasons.

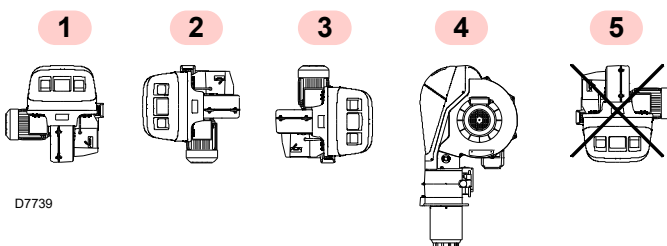


Fig. 10

4.5 Boiler plate

Pierce the closing plate of the combustion chamber, as in (Fig. 11). The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

mm	A	B	C
RL 55/M BLU	195	275-325	M 12
RL 85/M BLU	195	275-325	M 12

Tab. F

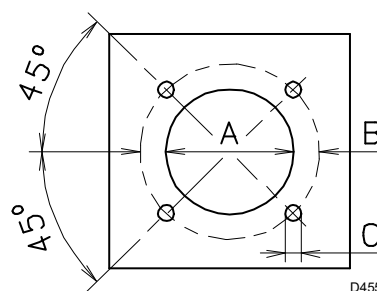


Fig. 11

4.6 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling. The range of lengths available, L (mm), is as follows:

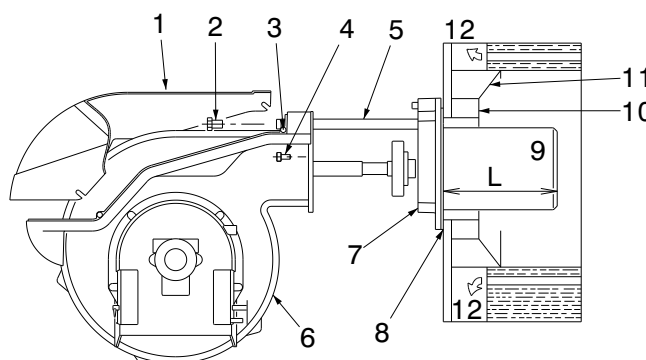
Blast tube 9)	RL 55/M BLU	RL 85/M BLU
	365	365

Tab. G

For boilers with front flue passes 12) or flame inversion chambers, a protection in heat-resistant material 10) must be inserted between the boiler refractory 11) and the blast tube 9).

This protection must not compromise the extraction of the blast tube.

For boilers with a water-cooled front piece, a refractory lining 10)-11)(Fig. 12) is not necessary, unless expressly requested by the boiler manufacturer.



20175868

Fig. 12

4.7 Securing the burner to the boiler



Provide an adequate lifting system.



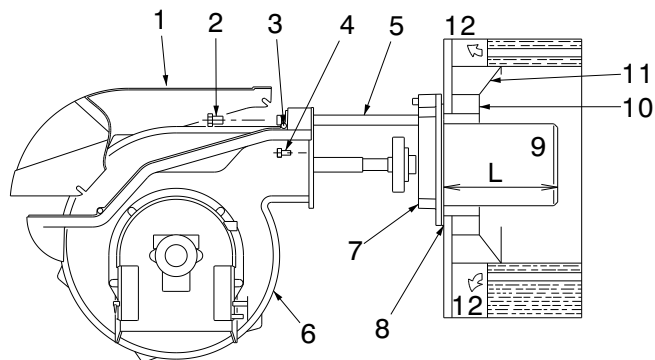
Be careful as some drops of fuel may leak out during this phase.

Remove blast tube 9)(Fig. 13) from the burner 6):

- loosen the 4 screws 3) and remove the cover 1);
- remove screws 2) from the two slide bars 5);
- remove the 2 screws 4) retaining the burner 6) to the flange 7);
- remove the blast tube 9) complete with flange 7) and slide bars 5).

Fix the flange 7)(Fig. 13) to the plate of the boiler interposing the seal 8)(Fig. 13) supplied with the unit.

Use the 4 screws, also supplied, after protecting their thread with an anti-locking product.



20175868

Fig. 13



ATTENTION

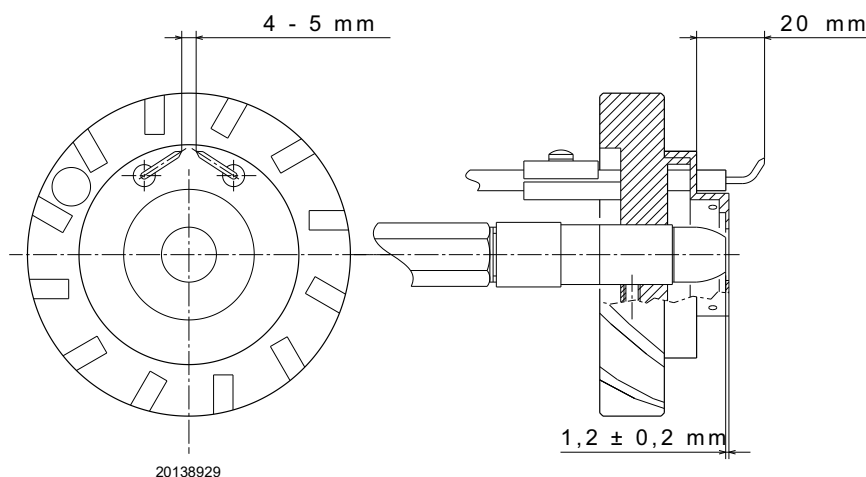
The seal between burner and boiler must be airtight.

4.8 Electrode positions



ATTENTION

Check that the electrodes are positioned correctly, as in Fig. 14, complying with the dimensions indicated.



20138929

Fig. 14

4.9 Nozzle installation

The burner complies with the emission requirements of the EN 267 standard.

In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the instruction and warning booklet should be used.



CAUTION

The use of nozzles other than those specified by Riello S.p.A. and inadequate regular maintenance may result into emission limits non-conforming to the values set forth by the regulations in force, and in extremely serious cases, into potential hazards to people and objects.

The manufacturing Company shall not be liable for any such damage arising from non-observance of the requirements contained in this manual.



ATTENTION

It is advisable to replace the nozzle once a year during periodical maintenance.

4.9.1 Nozzle selection

See diagram (Fig. 26 on page 24).

If you want a delivery somewhere between the two values shown in the diagram (Fig. 26 on page 24), select a nozzle with a higher flow rate.

The reduction in the flow rate is obtained with the pressure variator.

NOZZLES RECOMMENDED:

- RL 55/M BLU:
Bergonzo type A3 - 60° angle
- RL 85/M BLU:
Bergonzo type A3 - 60° angle

4.10 Nozzle assembly

At this installation stage the burner is still separated from the blast tube; therefore it is possible to fit the nozzle by loosening the grub screws 1)(Fig. 15) and removing the swirl turbulator 2)(Fig. 15). Do not use any sealing products such as: gaskets, tape or sealants. Be careful to avoid damaging the nozzle sealing seat.

Finally remount the burner 3)(Fig. 16) on the slide bars 2) and slide it up to the flange 5), **keeping it slightly raised to prevent the flame stability disk from pressing against the blast tube.**

Tighten the screws 1) on the slide bars 2) and the screws 4) that fix the burner to the flange.

If it proves necessary to change a nozzle with the burner already fitted to the boiler, proceed as outlined below:

- open the burner on the slide bars 2)(Fig. 16) as shown in Fig. 12 on page 16.



ATTENTION

- Do not use any sealing products such as: gaskets, tape or sealants.
- Be careful to avoid damaging the nozzle sealing seat.
- The nozzle must be screwed into place tightly but not to the maximum torque value provided by the wrench.

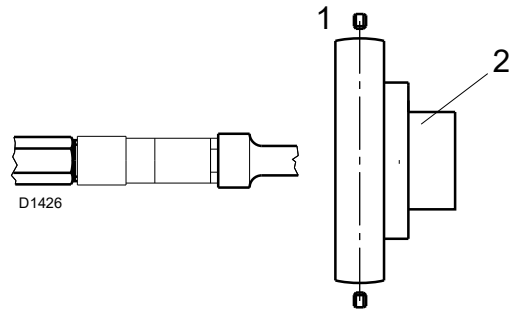


Fig. 15

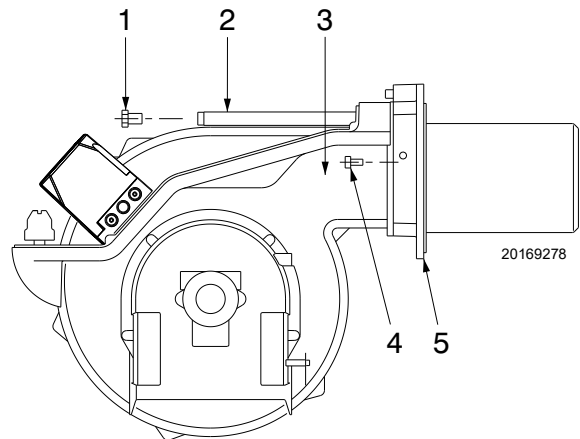


Fig. 16

4.11 Combustion head adjustment

The recommended combustion head adjustment is at notch 3, as shown in Fig. 17.

Rotate the screw 4) until notch 3 corresponds with the front flange surface 5).

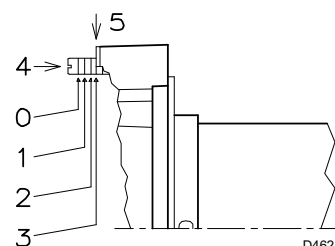


Fig. 17

4.12 Light oil supply



Explosion danger due to fuel leaks in the presence of a flammable source.

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel shut-off valve is closed before performing any operation on the burner.



ATTENTION

The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.

The burner is equipped with a self-priming pump which is capable of feeding itself within the limits listed in the table at the side.

Double-pipe circuit (Fig. 18)

The burner is equipped with a self-priming pump which is capable of feeding itself within the limits listed in the table at the side.

The tank is higher than the burner A

The distance P must not exceed 10 meters in order to avoid subjecting the pump seal to excessive strain; the distance V must not exceed 4 meters in order to permit pump self-priming even when the tank is almost completely empty.

The tank is lower than the burner B

The pump depression value must not exceed 0.45 bar (35 cm Hg). Because at higher levels gas is released from the fuel; the pump becomes noisy and its lifetime is shortened. It is good practice to ensure that the return and suction lines enter the burner from the same height; the suction line is more difficult to disconnect.

Loop circuit

The loop circuit is composed of a duct starting from the tank and going back to it, in which an auxiliary pump makes the pressurised fuel flow.

A branch from the loop supplies the burner. This circuit is extremely useful whenever the burner pump does not succeed in self-priming because the tank distance and/or height difference are higher than the values listed in Tab. H.

+ H - H (m)	L (m)		
	Ø (mm)		
	12	14	16
+ 4.0	71	138	150
+ 3.0	62	122	150
+ 2.0	53	106	150
+ 1.0	44	90	150
+ 0.5	40	82	150
0	36	74	137
- 0.5	32	66	123
- 1.0	28	58	109
- 2.0	19	42	81
- 3.0	10	26	53
- 4.0	-	10	25

Tab. H

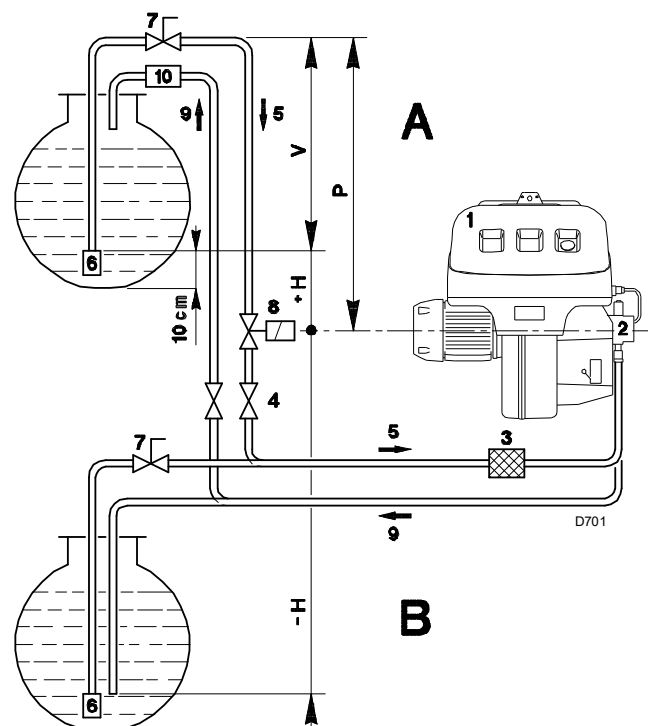


Fig. 18

Key

- H = Pump/Foot valve height difference
- L = Piping length
- Ø = Inside pipe diameter
- 1 = Burner
- 2 = Pump
- 3 = Filter
- 4 = Manual on/off valve
- 5 = Suction line
- 6 = Foot valve
- 7 = Quick closing manual valve with remote control (Italy only)
- 8 = On/off solenoid valve (Italy only)
- 9 = Return pipe
- 10 = Check valve (only Italy)

4.12.1 Hydraulic connections



- Make sure that the hoses to the pump supply and return line are installed correctly.

Double-pipe circuit

The pumps are equipped with a by-pass that connects return line with suction line.

They are installed on the burner with the by-pass closed by screw 6)(Fig. 20).

It is therefore necessary to connect both hoses to the pump.

The pump will break down immediately if it is run with the return line closed and the by-pass screw inserted.

Remove plugs from suction and return connectors of the pump.

Insert the hose connections with the supplied seals into the connections and screw them down.

Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler.

Finally, connect the other end of the hoses to the suction line and return line ducts using the nipples supplied with the equipment.



- During the installation, hoses must not be stressed with twisting.

Single-pipe circuit (not recommended)

If the pump is fed with a single-pipe circuit, it is necessary to:

- remove the screw 6)(Fig. 20) (open by-pass) before making the hydraulic connections;
- insert a degasser in the circuit (refer to kit list).

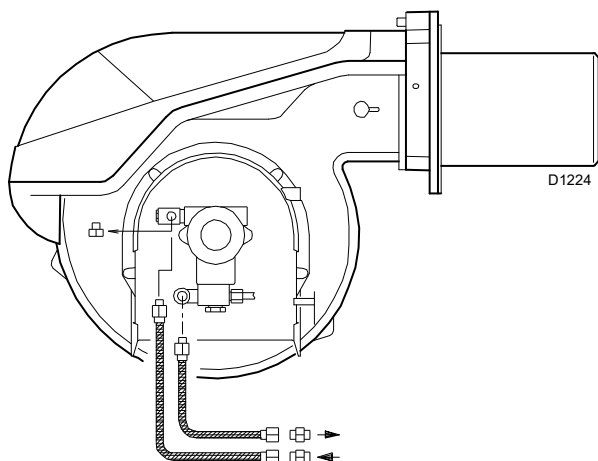


Fig. 19

4.12.2 Hydraulic circuit diagram

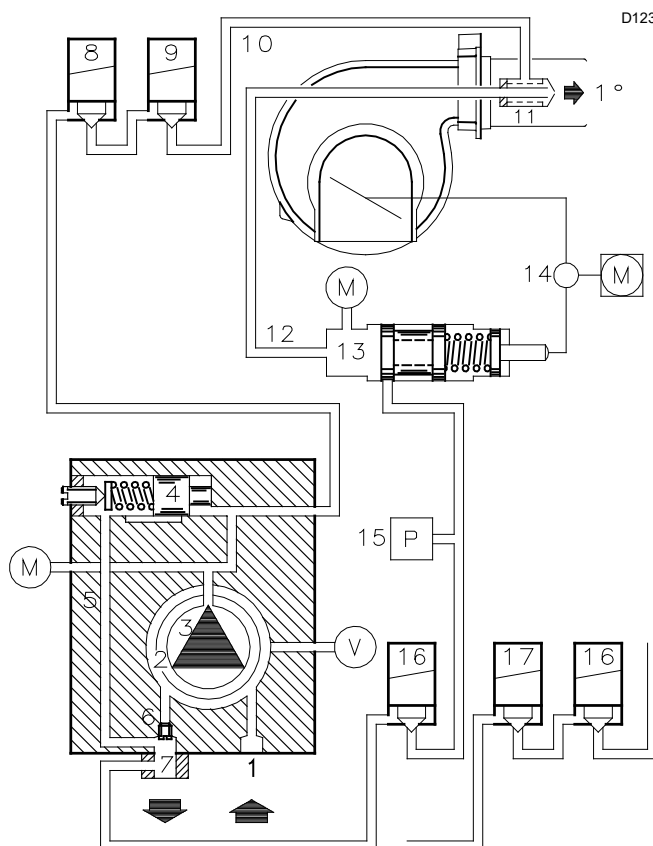


Fig. 20

- 1 Pump suction line
- 2 Filter
- 3 Pump
- 4 Pressure adjuster
- 5 Pressure test point
- 6 Bypass screw
- 7 Pump return line
- 8 Safety valve
- 9 Working valve
- 10 Delivery line
- 11 Nozzle
- 12 Return line
- 13 Pressure adjuster
- 14 Pressure adjustment eccentric
- 15 Maximum oil pressure switch
- 16 Return valve
- 17 Return safety valve (VR1)
- M Pressure gauge
- V Vacuumeter

4.13 Pump

4.13.1 Technical data

Pump		J6
Min. delivery rate at 20 bar pressure	kg/h	163
Delivery pressure range	bar	10 - 21
Max. suction depression	bar	0.45
Viscosity range	cSt	2.8 - 200
Max. light oil temperature	°C	90
Max. suction and return pressure	bar	1.5
Pressure calibration in the factory	bar	20
Filter mesh width	mm	0.170

Tab. I

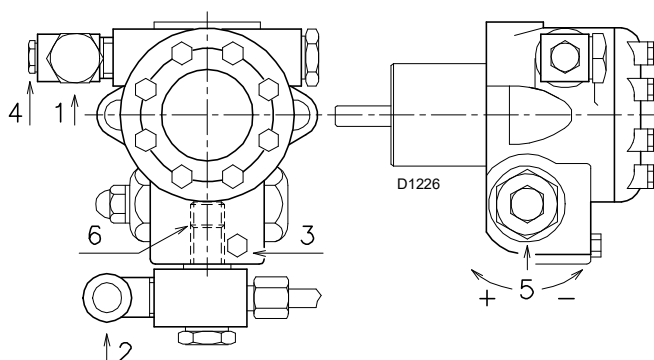


Fig. 21

- | | | |
|---|---------------------------|--------|
| 1 | Suction line | G 1/2" |
| 2 | Return line | G 1/2" |
| 3 | Pressure gauge connection | G 1/8" |
| 4 | Vacuumeter connection | G 1/8" |
| 5 | Pressure adjustment | |
| 6 | By-pass screw | |

4.13.2 Priming pump

- Before starting the burner, make sure that the tank return line is not clogged. Obstructions in the line could cause the sealing organ located on the pump shaft to break.
- In order for self-priming to take place, the screw 3)(Fig. 21) of the pump must be loosened in order to bleed off the air contained in the suction line.
- Start the burner by closing the control devices and with the switch 1)(Fig. 25 on page 24) in "MAN" position. As soon as burner starts, check the fan rotation direction through the flame inspection window 25).
- The pump can be considered to be primed when the light oil starts coming out of the screw 3). Stop the burner: set switch 1)(Fig. 25 on page 24) to "OFF" and tighten the screw 3).

The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at first start-up and the burner locks out, wait approx. 15 seconds, reset the burner, and then repeat the start-up operation. And so on. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.



ATTENTION

The above-mentioned operation is possible because the pump is already full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize.

Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump.

4.14 Electrical connections

Notes on safety for the electrical wiring

**DANGER**

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent use.
This means they should compulsorily be stopped at least once every 24 hours to enable the flame control to perform checks of its own start-up efficiency. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch.
- If this is not the case, a time switch should be fitted in series to TL to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - make provisions for an omnipolar switch with a gap between the contacts of at least 3 mm (over-voltage category III), as required by current safety regulations.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:

**DANGER**

Disconnect the electrical supply from the burner by means of the system main switch.

**DANGER**

Close the fuel shut-off valve.

**DANGER**

Avoid condensate, ice and water leaks from forming.

If the cover is still present, remove it and proceed with the electrical wiring according to the wiring diagrams.

Use flexible cables according to EN 60 335-1 standard.

4.14.1 Supply cables and external connections passage

All the cables to be connected to the burner terminal board 8)(Fig. 22) must be threaded through cable grommets.

The use of the cable grommets and the pre-blanked holes can be done in different manners; for example:

- | | | |
|---|---------|----------------------------------|
| 1 | Pg 13.5 | three-phase power supply |
| 2 | Pg 11 | single-phase power supply |
| 3 | Pg 13.5 | TL remote control |
| 4 | Pg 9 | TR remote control or probe (RWF) |
| 5 | Pg 9 | Preparing for pipe union |
| 6 | Pg 11 | Preparing for pipe union |
| 7 | Pg 13.5 | Preparing for pipe union |



After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

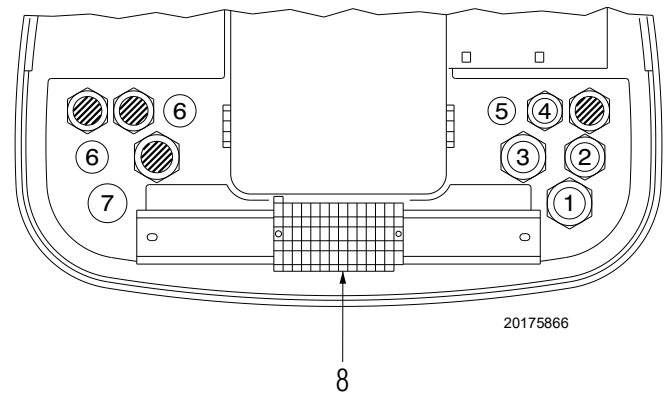


Fig. 22

4.15 Calibration of the thermal relay

The thermal relay serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing.

For calibration 2), refer to the table indicated in the electrical layout (electrical wiring by the installer).

To reset, in case of an intervention of the thermal relay, press button "RESET" 1).

The button "STOP" 3) opens the NC contact (95-96) and stops the motor.

Insert a screwdriver in the window "TEST/TRIP" 4) and move it in the arrow direction (to the right) to carry out the thermal relay test.

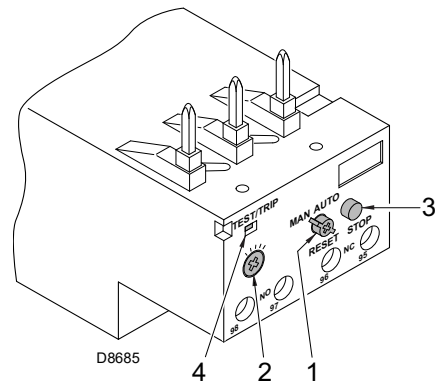


Fig. 23



ATTENTION

The automatic reset can be dangerous. This operation is not foreseen in the burner operation.

4.16 Motor rotation

As soon as the burner starts, place yourself in front of the cooling fan of the fan motor and check that it turns anticlockwise (Fig. 24).

If this is not the case:

- put the switch of the burner to "0" (off) and wait until the control box carries out the switching off phase.



DANGER

Disconnect the electrical supply from the burner by means of the system main switch.

- Invert the phases on the three-phase motor power supply.

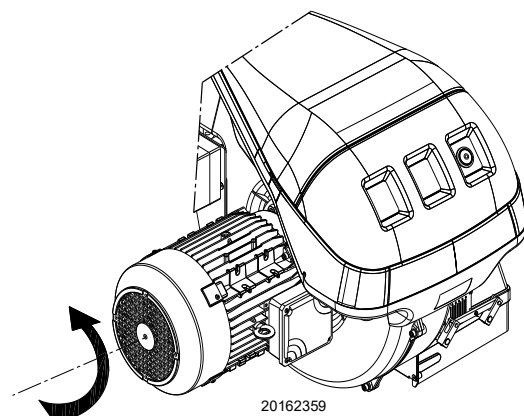


Fig. 24

5 Start-up, calibration and operation of the burner

5.1 Notes on safety for the first start-up



The first start-up of the burner must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and regulations of the laws in force.



Check the correct working of the adjustment, command and safety devices.

5.2 Burner ignition

Turn off the remote controls and set the switch 1)(Fig. 25) to "MAN".

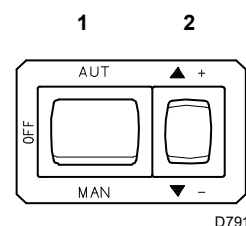


Fig. 25

5.3 Operation

The optimum adjustment of the burner requires an analysis of flue gases at the boiler outlet.

The adjustments that have already been performed and generally do not need variations are:

- Combustion head
- Servomotor, cams I - II - III - IV - V

Whereas the following must be adjusted one after the other:

- 1 MAX burner output;
- 2 MIN burner output;
- 3 Intermediate outputs between the two.

5.3.1 MAX output

MAX output must be selected within the firing rate range shown on page 9.

In the above instructions we left the burner running at the MIN output.

Now press the button 2)(Fig. 25) "+" and keep it pressed until the servomotor has reached 130°.

Nozzle output adjustment

The nozzle output varies depending on the light oil pressure on the nozzle return line.

The diagram (Fig. 26) indicates this relation for Bergonzo type A2 nozzles with a 20 bar pump delivery pressure.

Diagram:

- Horizontal axis : bar, nozzle return line pressure
Vertical axis : kg/h, nozzle output

NOTE:

with a 20 bar pump delivery pressure we strongly advise against a nozzle return line pressure greater than 17 bar. The pressure difference between pump delivery and nozzle return line must be at least 3 bars. With smaller pressure differences, the nozzle return line pressure may be unstable.

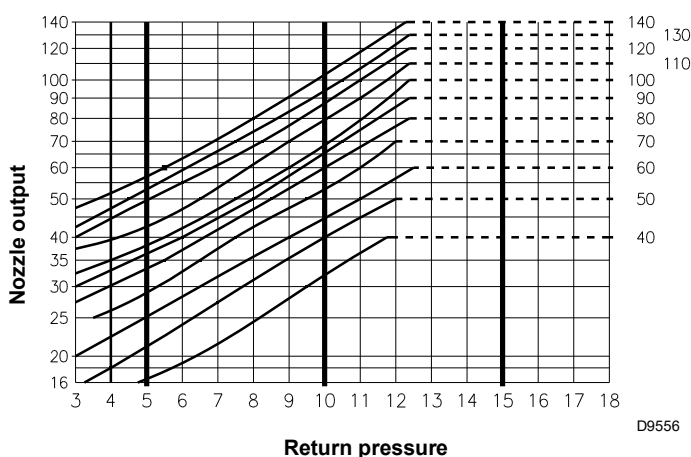


Fig. 26

Pressure variator

The value of the pressure on the return line of the nozzle is shown on the pressure gauge 1)(Fig. 27).

The pressure and the flow output of the nozzle are at their maximum when the servomotor is at the 130° position.

The return line pressure corrections are possible by changing the eccentric 6)(Fig. 27) and the nut with the lock nut 4)(Fig. 27).

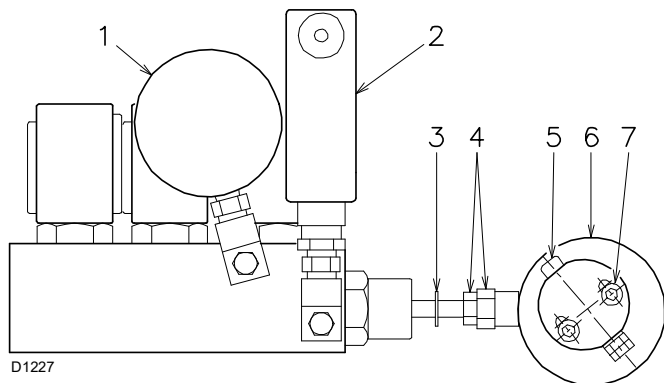


Fig. 27

- 1 Nozzle return pressure gauge
- 2 Oil pressure switch
- 3 Piston stop ring
- 4 Piston calibration nut and lock nut
- 5 Eccentric adjustment screw
- 6 Variable eccentric
- 7 Eccentric locking screws

NOTE:

- **For a correct calibration, the eccentric 6) must operate on the entire range of travel of the servomotor (30° ÷ 130°): a pressure variation must correspond to each servomotor variation.**
- **Never drive the variator piston fully home: the stop ring 3)(Fig. 27) determines the maximum stroke.**
- **At the end of the adjustment, manually check, after unlocking the servomotor (refer to page 26), that between 0° and 130° there is no sticking and that the maximum and minimum pressures correspond to the one selected according the diagram (Fig. 26 page 24).**
- **If you want to check the output delivery of the nozzle, open the burner, connect a pipe to the nozzle, simulate the ignition and proceed with the weighing of the fuel at the maximum and minimum pressures.**

If at the maximum delivery of the nozzle (maximum pressure on the return line) pressure oscillations can be seen on the pressure gauge 1), slightly reduce the pressure until they disappear.

To calibrate the eccentric, loosen screws 7), and turn screw 5) until the desired eccentricity is obtained. Turning the screw 5) to the right the eccentricity increases, thus widening the difference between maximum and minimum nozzle flow output; whereas turning the screw 5) to the left the eccentricity decreases, thus reducing the difference between maximum and minimum nozzle flow output.

Air adjustment

Progressively adjust the end profile of cam 2)(Fig. 28) by turning the screws 5).

- Turn the screws clockwise to increase air delivery.
- Turn the screws anticlockwise to reduce air delivery.

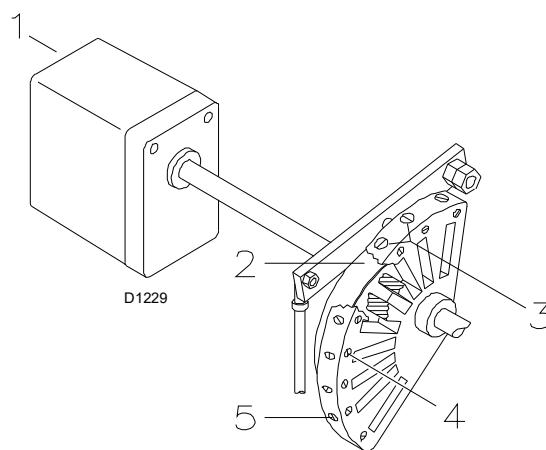


Fig. 28

- 1 Servomotor
- 2 Variable profile cam
- 3 Screws for adjusting the cam's adjustable profile
- 4 Screws for fixing the adjustment
- 5 Screws for adjusting the cam's adjustable profile

5.3.2 MIN output

MIN output must be selected within the firing rate range indicated on page 9.

Press button 2)(Fig. 25 page 24) "Output decrease" and keep it pressed until the servomotor reaches 30° (factory adjustment).

Nozzle output adjustment

The nozzle flow output is given in the diagram (Fig. 26 on page 24) in correspondence with the nozzle return line pressure, measured with the pressure gauge 1)(Fig. 27).

The pressure and the flow output of the nozzle are at their minimum level when the servomotor is at the 30° position.

For calibrating the return line pressure, refer to page 24.

Air flow adjustment

Progressively adjust the initial profile of cam 2)(Fig. 28) by turning the screws 3).

If possible, do not turn the first screw, since this is used to set the air damper to its fully closed position.

5.3.3 Intermediate outputs light oil/air delivery adjustment

Lightly press the "increase output" button 2)(Fig. 25 on page 24) so the servomotor rotates by about 15°. Adjust the screws until optimal combustion is obtained.

Proceed in the same way with the other screws.

Take care that the cam profile variation is progressive.

Switch the burner off with switch 1)(Fig. 28), OFF position. Release cam 2)(Fig. 28) from the servomotor by pressing and shifting button 3)(Fig. 29 on page 26) to the right, and check several times that by rotating cam 2) forwards and backwards by hand, the movement is soft and smooth, without jamming.

Join the cam 2) to the servomotor again by shifting the button 2)(Fig. 29 on page 26) to the left.

As far as is possible, try not to move those screws at the ends of the cam that were previously adjusted for the opening of the air damper to MAX and MIN output.

Once MAX - MIN - INTERMEDIATE outputs have been adjusted, recheck the ignition: its noise must be equal to the one of the following operation. If you notice any sign of pulsations, reduce the ignition output.

Once optimum adjustment has been reached, fix it with the screws 4)(Fig. 28 on page 25).

NOTE:

The servomotor only follows the adjustment of cam III when the angle of the cam is reduced. If it is necessary to increase the angle of the cam, you must first increase the angle of the servomotor by means of the "output increase" key, then increase the angle of cam III, and finally bring the servomotor to the position of MIN output, with the "output reduction" key.

For any necessary adjustment of cam III, especially for small movements, use the specific key 10)(Fig. 29) held in place beneath the servomotor with the aid of a magnet.

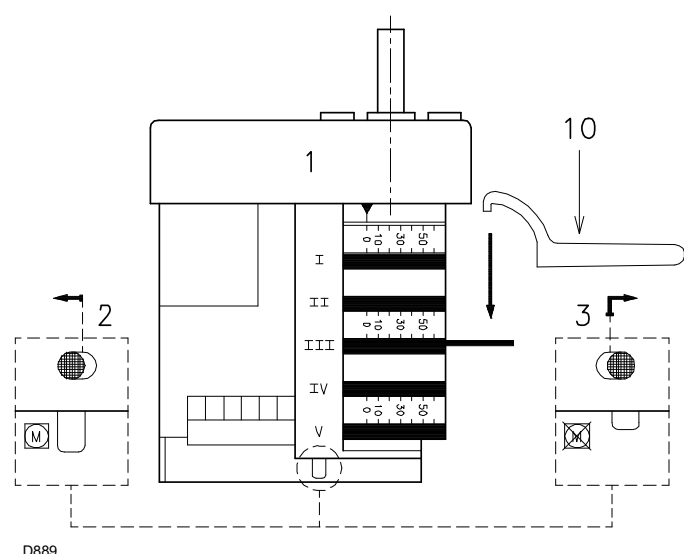


Fig. 29

5.3.4 Servomotor

The servomotor provides simultaneous adjustment of the air damper, by means of the variable profile cam and the pressure variator. The servomotor's rotation angle is 130° in 42 s.

Do not alter the factory setting for the 5 cams; just check that they are as specified below:

Cam I:	130°	Limits rotation toward maximum position.
Cam II:	0°	Limits rotation toward minimum position. With burner off, the air damper must be closed: 0°.
Cam III:	15°	Adjusts the ignition position and the MIN output.
Cam IV:	30°	Regulates the MIN modulating output.
Cams V:	35°	It is used for reaching MIN output at start-up. Its calibration must be greater than the one pertaining to cam IV.

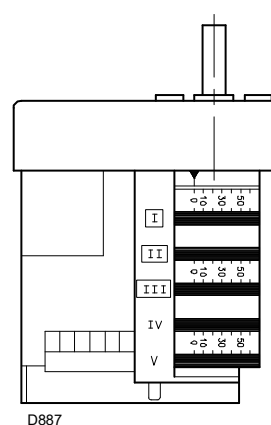


Fig. 30

5.4 Pressure switch adjustment

5.4.1 Oil pressure switch

The pressure switch 5)(Fig. 5 on page 11) is adjusted in the factory at 3 bar. If the light oil pressure reaches this value in the return duct, the pressure switch stops the burner.

The burner restarts automatically if the pressure goes back to less than 3 bar after stopping.

If the burner is fed by a loop circuit with a pressure of P_x , the pressure switch must be adjusted at $P_x + 3$ bar.

To adjust the pressure switches, use a tool to operate the adjustment screw, see Fig. 31.

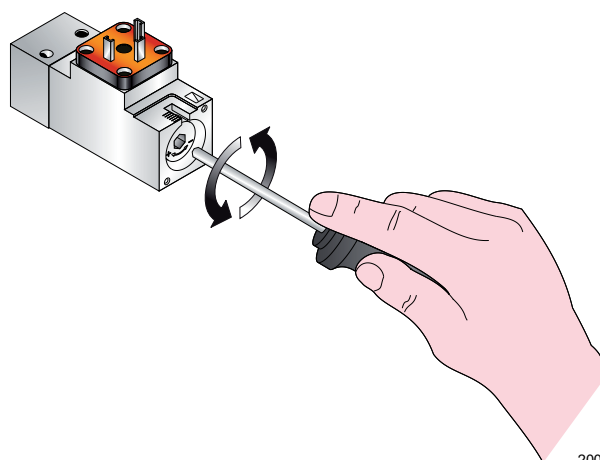


Fig. 31

5.5 Operation sequence of the burner

5.5.1 Burner start-up

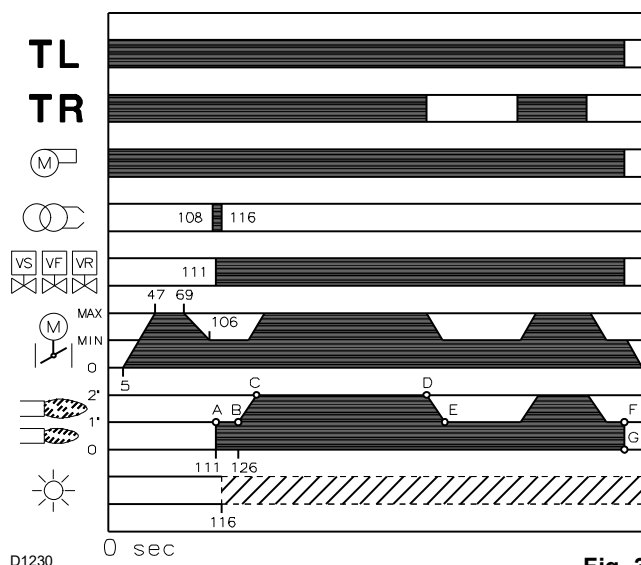


Fig. 32

- 0 s :** TL remote control closing, motor starting. The pump 3)(Fig. 20 on page 20) sucks the fuel from the tank through the piping 1) and the filter 2) and pumps it under pressure to delivery. The piston 4) rises and the fuel returns to the tank through the piping 5) - 7). The screw 6) closes the by-pass towards the suction line and the solenoid valves 8)-9)-16)(Fig. 20 on page 20), de-energised, closing the path towards the nozzle.
- 5 s :** Servomotor start-up: turn to the right by 130°, i.e. until the contact intervenes on cam I (Fig. 29 on page 26). The air damper is positioned to MAX output.
- 47 s :** Pre-purging stage with MAX output air flow.
- 69 s :** The servomotor rotates to the left until the contact on cam 3) activates (Fig. 29 on page 26).
- 106 s :** The air damper and the pressure variator go to the ignition output position.
- 108 s :** Ignition electrode strikes a spark.
- 111 s :** Solenoid valves 8)-9)-16)(Fig. 20 on page 20) open; the fuel goes through the duct 10), passing through the filter 11) and enters the nozzle. A part of the fuel is sprayed out of the nozzle and when it reaches the spark ignites: low output flame, point A; the rest of the fuel goes through the duct 12 at the pressure preset by the variator 13, then it goes back to the tank through the duct 7).
- 116 s :** The spark goes out.
- 126 s :** The start-up cycle ends.

5.6 Final checks

- **Block the flame sensor and turn off the remote controls:** the burner must start and then stop in lockout after approximately 5 s after start-up.
- **Free the flame sensor and turn off the remote controls:** the burner must stop in lockout.
- **Block the flame sensor when the burner is operating:** the flame must turn off and the burner stop in lockout within 1 s.
- **Turn on the remote control TL followed by TS while the burner is operating:** the burner must stop.



ATTENTION

Make sure that the mechanical locking systems on the adjustment devices are fully tightened.

5.5.2 Steady state operation

Burner without output regulator RWF

Once the start-up cycle is completed, the servomotor command moves on to the TR remote control that controls the pressure or the temperature in the boiler, point B.

- If the temperature or pressure is low (so the TR remote control is closed), the burner progressively increases the output up to the MAX value (section B-C).
- If subsequently the temperature or pressure increases until TR opens, the burner progressively decreases its output to the MIN value (section D-E). And so on.
- The burner locks out when the heat request is less than the heat supplied by the burner at MIN output, (section F-G). The TL remote control opens, the servomotor returns to angle 0° limited by the contact of cam II (Fig. 29 on page 26). The air damper closes completely to reduce heat losses to a minimum.

With each change of output, the servomotor automatically modifies the light oil output (pressure variator) and the air flow rate (fan damper).

Burner with output regulator RWF

See the manual supplied with the regulator.

5.5.3 Ignition failure

If the burner does not ignite, it locks out within 5 seconds after the light oil valve opens.

5.5.4 Burner flame goes out during operation

If the flame should accidentally go out during operation, the burner will lock out within 1s.

6 Maintenance

6.1 Notes on safety for the maintenance

The periodic maintenance is essential for the good operation, safety, yield and duration of the burner.

It allows you to reduce consumption and polluting emissions and to keep the product in a reliable state over time.



The maintenance interventions and the calibration of the burner must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

Before carrying out any maintenance, cleaning or checking operations:



Disconnect the electrical supply from the burner by means of the system main switch.



Close the fuel shut-off valve.



Wait for the components in contact with heat sources to cool down completely.

6.2 Maintenance programme

6.2.1 Maintenance frequency



The gas combustion system should be checked at least once a year by a representative of the manufacturer or another specialised technician.

6.2.2 Checking and cleaning



The operator must use the required equipment during maintenance.

Combustion

Carry out an analysis of the combustion flue gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

If the combustion values measured before starting maintenance do not comply with applicable Standards or do not indicate efficient combustion, consult the table below or contact our Technical Support Service to implement the necessary adjustments.

EN 267	Air excess		CO
	Max. output $\lambda \leq 1.2$	Min. output $\lambda \leq 1.3$	
Theoretical max CO ₂ 0 % O ₂	CO ₂ % Calibration		mg/kWh
	$\lambda = 1.2$	$\lambda = 1.3$	
15.2	12.6	11.5	≤ 100

Tab. J

Combustion head

Check to make sure that all the parts of the combustion head are in good condition, positioned correctly, free of all impurities, and that no deformation has been caused by operation at high temperatures.

Pump

The delivery pressure must be stable at 20 bar.

The depression must be less than 0.45 bar.

Unusual noise must not be evident during pump operation.

If the pressure is unstable, or the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner. This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.

If the pump is found to be responsible, check to make sure that the filter is not dirty. The vacuumeter is installed upstream from the filter and consequently will not indicate whether the filter is clogged or not.

Contrarily, if the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

Servomotor

Release cam 2)(Fig. 28 page 25) from the servomotor, by pressing and shifting button 3)(Fig. 29 on page 26) to the right. Manually rotate it backwards and forwards to make sure it moves smoothly.

Now engage the cam again by shifting the button 2)(Fig. 29 on page 26) to the left.

Nozzle

It is advisable to replace nozzles once a year during periodical maintenance.

Do not clean the nozzle openings.

Flexible hoses

Check to make sure that the hoses are still in good condition.

Fuel tank

Approximately every 5 years, or whenever necessary, suck any water or other impurities present on the bottom of the tank using a separate pump.

Filters

Check the following filter boxes:

- on line 1) • in the pump 2) • at the nozzle 3), and clean or replace as required.

If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank (Fig. 33).

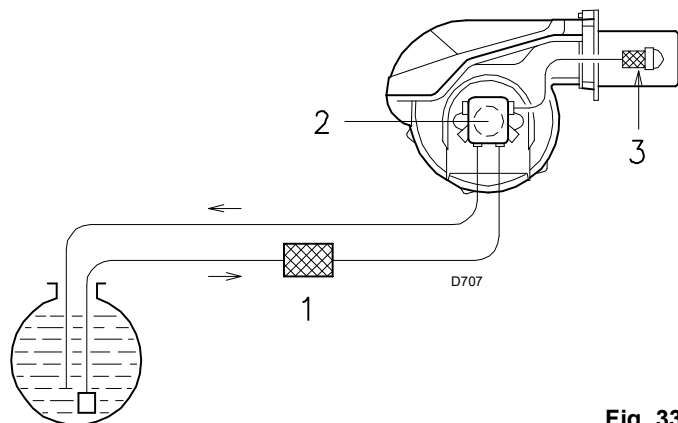


Fig. 33

Flame inspection window

Clean the viewing port (Fig. 34).

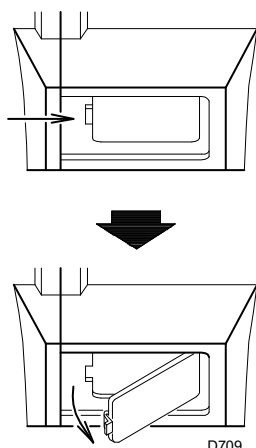


Fig. 34

Burner

Make sure that the screws are well secured.

Current to the flame sensor (Fig. 35)

Clean the glass cover from any dust that may have accumulated. Flame sensor is held in position by a pressure fit and can therefore be removed by pulling it outward forcefully.

Min value for a good work: 8 μ A.

If the value is lower, it can depend on:

- exhausted sensor;
- low current (lower than 187 V);
- bad regulation of the burner.

In order to measure the current, use a microammeter of 100 μ A c.c., connected to the flame sensor, as in the scheme.

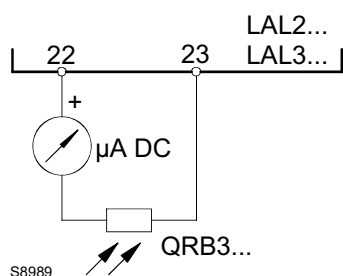


Fig. 35

Possible pump and/or coupling replacement

Carry out the fitting following the instructions in the Fig. 36.

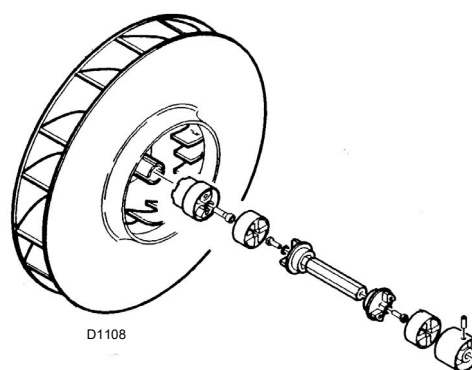


Fig. 36

6.2.3 Safety components

The safety components should be replaced at the end of their life cycle indicated in the Tab. K.

The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

Safety component	Life cycle
Flame control	10 years or 250,000 operation cycles
Flame sensor	10 years or 250,000 operation cycles
Gas valves (solenoid)	10 years or 250,000 operation cycles
Pressure switches	10 years or 250,000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam)	10 years or 250,000 operation cycles
Oil valve (solenoid)	10 years or 250,000 operation cycles
Oil regulator	10 years or 250,000 operation cycles
Pipes/ oil fittings (metallic)	10 years
Fan impeller	10 years or 500,000 start-ups

Tab. K

6.3 Opening the burner



Disconnect the electrical supply from the burner by means of the system main switch.



Close the fuel shut-off valve.



Wait for the components in contact with heat sources to cool down completely.

To open the burner, proceed as follows:

- loosen the screws 1)(Fig. 37) and remove the hood 2);
- loosen the screws 3);
- assemble the two extensions 4) supplied on the slide bars 5);
- pull part A backward keeping it slightly raised to avoid damaging the disk 6) on blast tube 7) and disconnecting the start-up electrode cables.

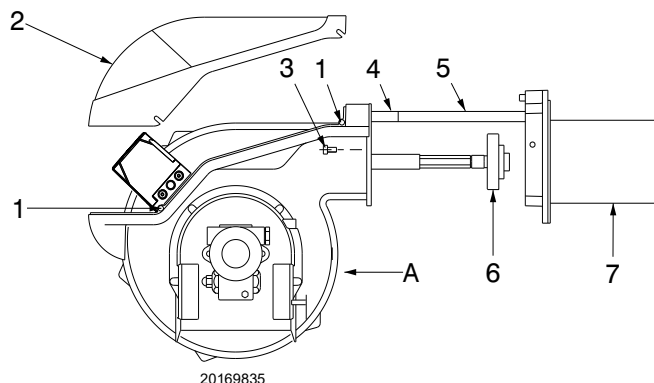


Fig. 37

6.4 Closing the burner

Refit following the steps described but in reverse order; refit all burner components as they were originally assembled.



After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

7 Faults - Possible causes - Solutions

The LFL1... flame control is equipped with a lockout indicator (Fig. 38) that turns during the start-up programme, and is visible from the small lockout window.

When the burner does not start or stops, due to a failure, the symbol that appears on the indicator indicates the type of interruption.

The positions of the lockout indicator are shown in Fig. 39.



Lockout indicator

- a-b Start-up sequence
- b(b') Idle stages (without contact confirmation)
- b(b')-a Post-purging programme

Fig. 38

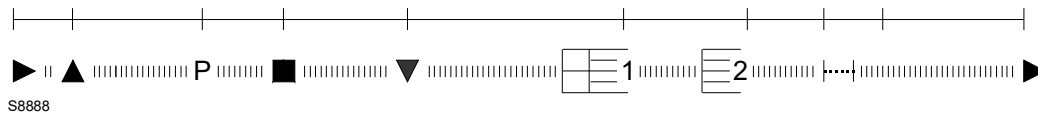


Fig. 39

Fuse replacement

The fuse 2)(Fig. 40) is in the rear part of the flame control. A spare fuse 1) is also available: it can be extracted after breaking the panel tab A) that houses it. In the event that fuse 2) has been tripped, replace it as shown in Fig. 40.

Find a list of faults, causes and possible solutions for a set of failures that may occur and result in irregular burner operation or no functioning at all.

If a burner malfunction is detected, first of all:

- check that the electrical wiring is adequately connected;
- check whether fuel is delivered;
- check that every adjustment parameter is adequately set.



ATTENTION

In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row. If the burner locks out for a third time, contact the customer service.



DANGER

In the event there are further lockouts or faults with the burner, the maintenance interventions must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

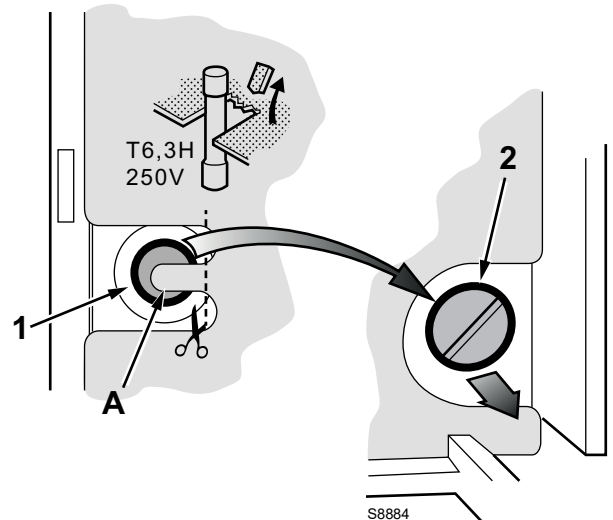


Fig. 40

7.1 Light oil operation

Symbol	Problem	Probable cause	Suggested remedy
◀	The burner does not start	Limiter or safety control device open	Adjust or replace
		Flame control lockout	Release
		Fan motor lockout	Release the thermal relay
		No electrical power supply	Close all switches - check connections
		No light oil	Check the light oil supply circuit
		Flame control fuse interrupted	Replace
		Pump is jammed	Replace
		Faulty motor remote control switch	Replace
		Defective flame control	Replace
		Faulty electrical motor	Replace
		Defective safety solenoid valve	Replace
	The burner does not come on and the lockout appears	Flame simulation	Replace the flame control
		Flame sensor short circuit	Replace flame sensor
		Two-phase electrical supply, thermal relay steps in	Reset the thermal relay at return of the three phases
▲	The burner starts but stops at maximum air damper setting	The servomotor contact does not intervene	Adjust cam or replace servomotor
P	The burner starts and then goes into lockout	Air pressure switch poorly adjusted	Adjust it
		Pressure switch pressure point pipe blocked	Clean
■	The burner starts and then goes into lockout	Failure to the flame detection circuit	Replace flame control
▼	The burner remains in pre-purging phase	The servomotor contact III does not intervene	Adjust cam or replace servomotor
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	No fuel in the tank, or water on the bottom	Refill with fuel, or remove the water
		Bad head and damper adjustments	Adjust
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Bad electrical wiring on valves or transformer	Check
		Pump unprimed	Prime it
		Pump suction line connected to return line	Correct connection
		Soiled filters (nozzle line)	Clean
		Valves up-line from pump closed	Open them
		Opposite motor rotation	Change electrical wiring to the motor
		Light oil solenoid valves do not open	Check connections and solenoids
		Pilot burner does not work	Check
		Defective flame control	Replace
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Motor/pump coupling broken	Replace
		Faulty ignition transformer	Replace
	The flame ignites regularly but the burner goes into lock out at the end of the safety time	Faulty flame sensor or defective flame control	Replace flame sensor or flame control
		Dirty flame sensor	Clean
	Smoke in flame (dark Bacharach)	Little air	Adjust the fan head and damper
		Incorrect pump pressure	Adjust
		Nozzle filter clogged	Clean or replace
		Boiler room air vents insufficient	Increase
		Dirty or worn nozzle	Replace
		Flame disk soiled, loose or deformed	Clean it, tighten it or replace it
	Smoke in flame (yellow Bacharach)	Too much air	Adjust head and air dampers

Symbol	Problem	Probable cause	Suggested remedy
	Ignition with pulses or flame failure, delayed ignition	Poorly adjusted head	Adjust
		Incorrectly adjusted fan air damper: too much air	Adjust
		Nozzle not fit for burner or boiler	See nozzle table
		Defective nozzle	Replace
		Unsuitable pump pressure	Adjust
		Ignition electrode not adjusted correctly or soiled	Adjust it
		Output during ignition phase is too high	Reduce
	The burner does not pass to the 2nd stage	Remote control device TR fails to close	Adjust or replace
		Defective flame control	Replace
	Uneven fuel supply	Understand whether the cause lies in the pump or the fuel supply system	Supply fuel to the burner from a tank positioned near the burner itself
	Pump rusty on the inside	Water in the tank	Remove the water with a pump
	Noisy pump, unstable pressure	Air has entered the suction line	Block the couplings
		Depression value too high (higher than 35 cm Hg):	
		Excessive difference of level between burner and tank	Power the burner from a loop circuit
		Piping diameter too small	Increase
		Dirty suction line filters	Clean
		Suction line valves closed	Open them
		The paraffin solidifies due to the low temperature	Put additive in the light oil
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel	Bring it to the same height as the suction line
		Air in the suction line	Block the couplings
	Pump leaks light oil	Loss of sealing organ	Replace the pump
	Dirty combustion head	Dirty nozzle or nozzle filter	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Block it
		Environmental impurities on flame stability disc	Clean
		Incorrect head adjustment, or little air	Adjust it, opening the damper
		Blast tube length not suitable for the boiler	Contact the boiler manufacturer
I	Burner goes into lockout during operation	Flame sensor faulty or dirty	Replace it or clean it
		Air pressure switch faulty	Replace

Tab. L

A Appendix - Accessories
Kit for modulating operation

The parts to be ordered are two:

- output regulator to be installed to the burner;
- probe to be installed to heat generator.

Parameter to be controlled		Probe		Output regulator	
Adjustment field		Type	Code	Type	Code
Temperature	- 100...+ 500 °C	PT 100	3010110	RWF50 RWF55	20082208
Pressure	0...2.5 bar	Output probe 4...20 mA	3010213		20099657
	0...16 bar		3010214		

Soundproofing box kit

Burner	Type	dB(A)	Code
All models	C4/5	10	3010404

Degasser kit

Burner	Filter	Code
All models	with filter	3010055
All models	without filter	3010054

Spacer kit

Burner	Code
All models	3010129

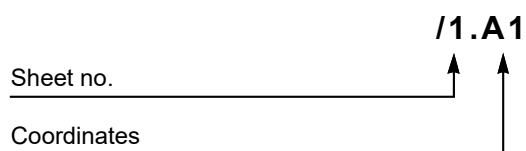
Potentiometer kit

Burner	Code
All models	3010021

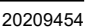
B Appendix - Electrical panel layout

1	Index of layouts
2	Reference indication
3	Functional layout
4	Functional layout
5	Functional layout
6	Electrical wiring that is the responsibility of the installer
7	Electrical wiring that is the responsibility of the installer
8	Functional layout RWF

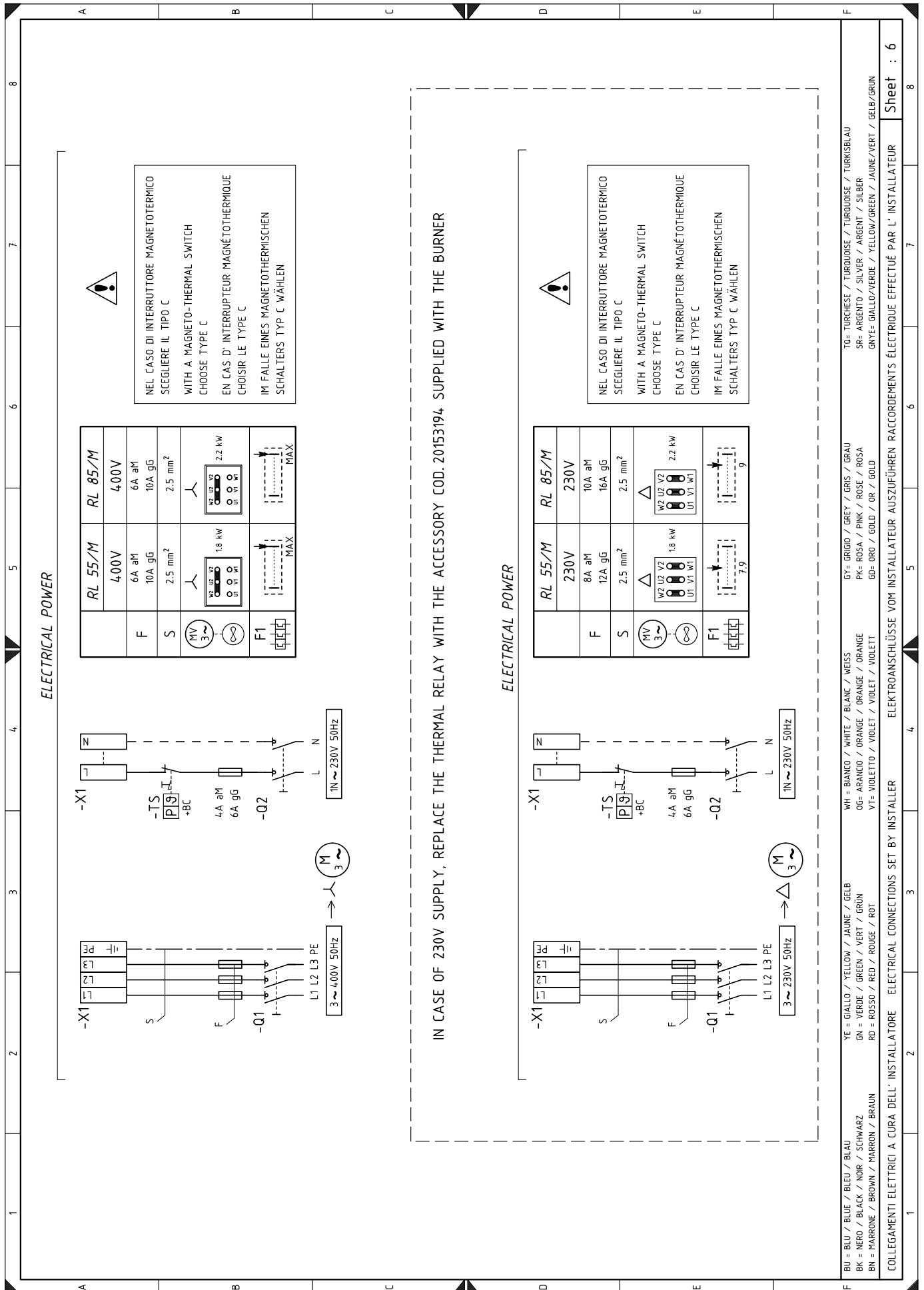
2 Reference indication

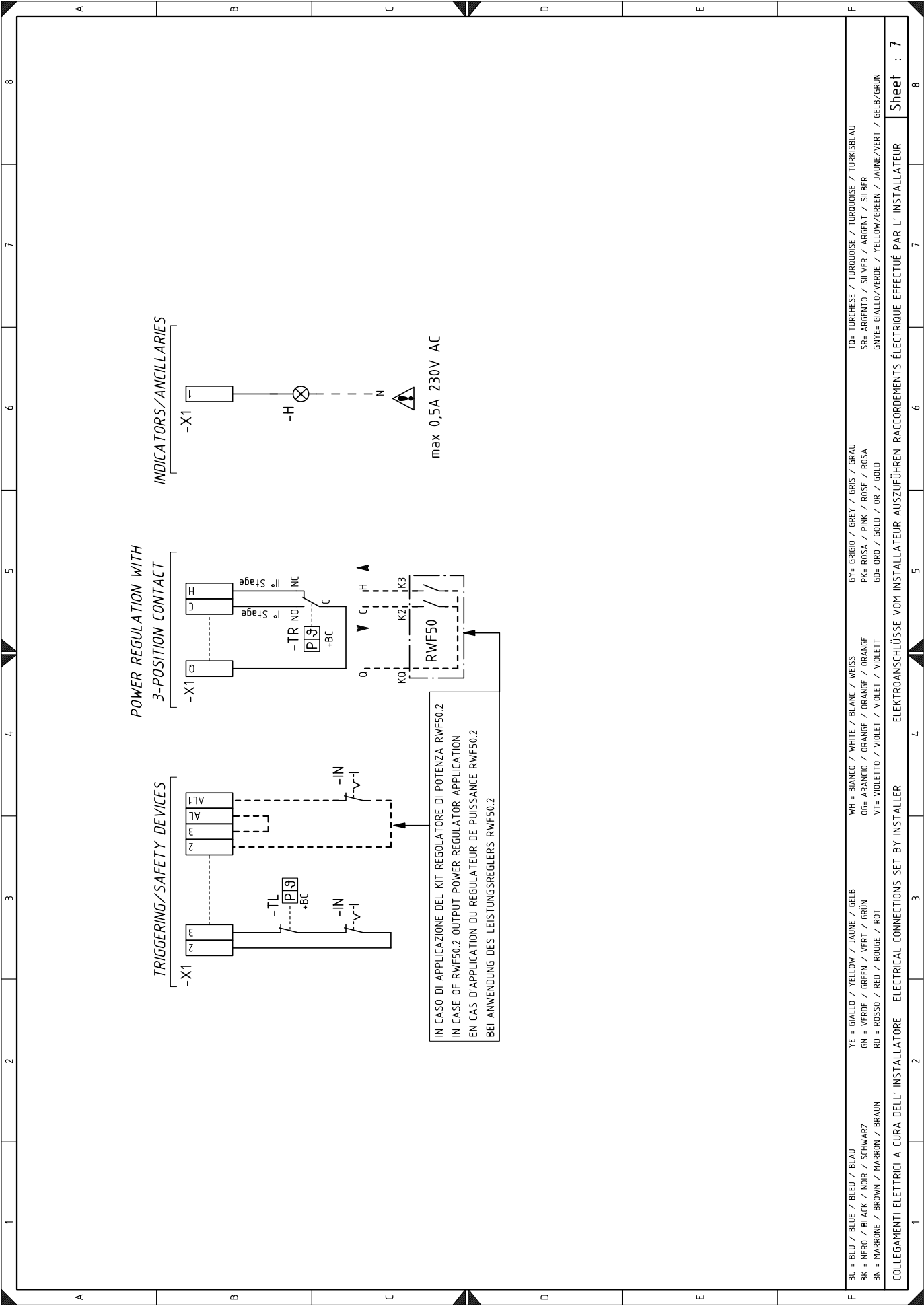
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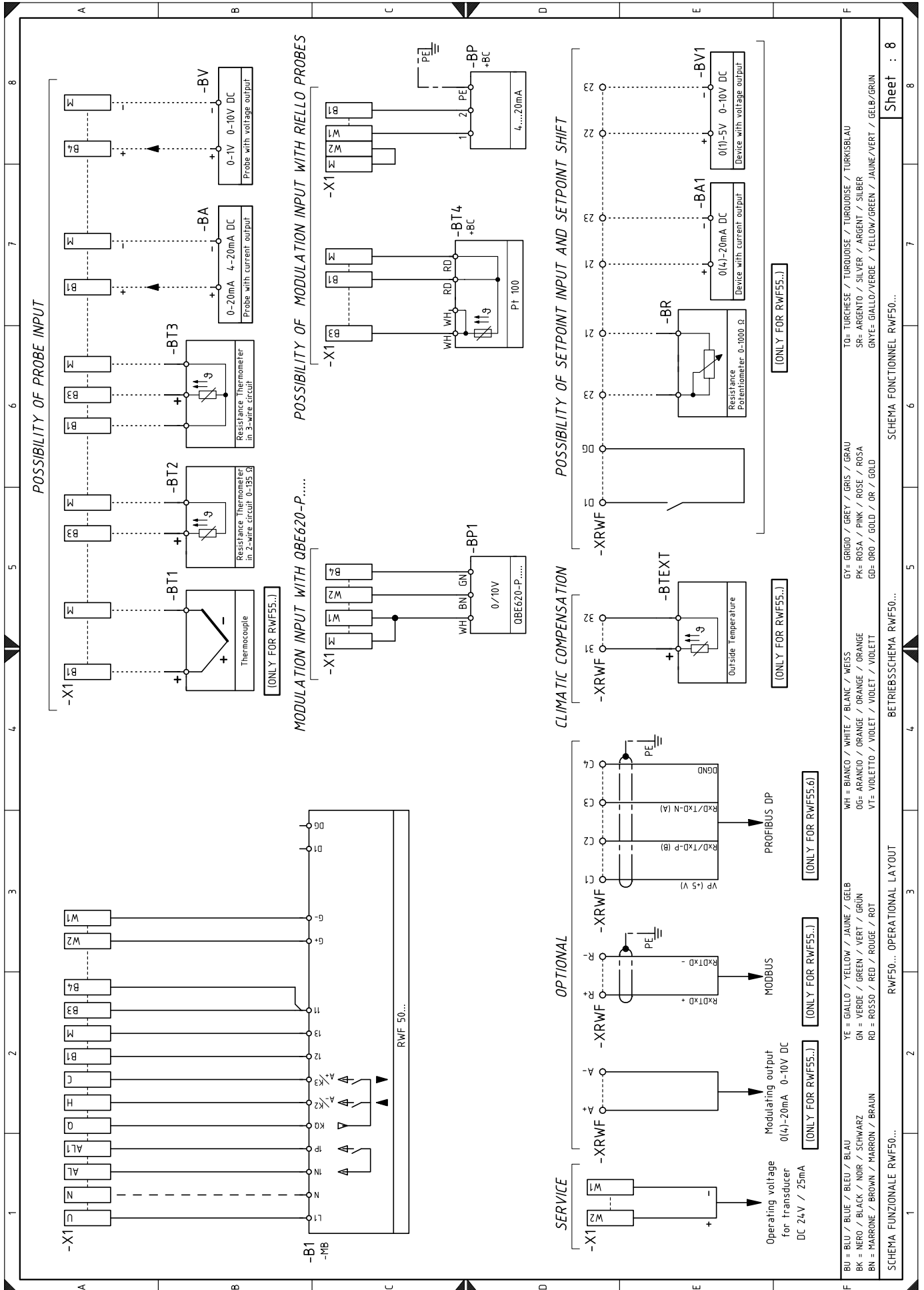












WIRING DIAGRAM KEY

A1	Flame control
B1	RWF Output power regulator
BA	Probe with output under current
BA1	Device with output under current for change of remote setpoint
BP	Pressure probe
BP1	Pressure probe
BR	Remote setpoint potentiometer
BT1	Thermocouple probe
BT2	Probe Pt100, 2 wires
BT3	Probe Pt100, 3 wires
BT4	Probe Pt100, 3 wires
BTEXT	External probe for climatic compensation of the setpoint
BV	Probe with output under voltage
BV1	Device with output under voltage for change of remote setpoint
CN	Servomotor connector
F	Three-phase line fuses
F1	Fan motor thermal relay
H	Remote lockout signalling
IN	Burner manual stop switch
KO	Relay
K1	Relay
K2	Relay
KM	Fan motor contactor
FM	Fan motor
Q1	Three-phase line disconnecting switch
Q2	Single-phase line disconnecting switch
S1	Off / automatic / manual switch
S2	Button for
	- = power reduction
	+ = power increase
SM	Servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
ST	Safety thermostat
X1	Terminal board
XS	Flame sensor terminal board
XPE	Flame control earth
XTB	Burner earth
QRC	Flame sensor
PO	Oil pressure switch
XPO	Oil pressure switch connector
VS	Safety valve
VF	Working valve
VR	Adjustment valve
VR1	Return safety valve

The logo consists of the word "RIELLO" in a bold, red, sans-serif typeface.

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