

GB Heavy oil burners

Progressive two-stage or modulating operation



CODE	MODEL	TYPE
20169237	PRESS 140 P/N	471 M1
20169238	PRESS 140 P/N	471 M1
20169239	PRESS 200 P/N	472 M1
20169227	PRESS 200 P/N	472 M1
20169240	PRESS 300 P/N	473 M1
20169241	PRESS 300 P/N	473 M1
20169242	PRESS 450 P/N	474 M1
20169246	PRESS 450 P/N	474 M1



Translation of the original instructions

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1

Declarations

Declaration of conformity in accordance with ISO / IEC 17050-1

Manufacturer:	RIELLO S.p.A.		
Address:	Via Pilade Riello, 7 37045 Legnago (VR)		
Product:	Heavy oil burners		
Model and type:	PRESS 140 P/N	471 M1	
	PRESS 200 P/N	472 M1	
	PRESS 300 P/N	473 M1	
	PRESS 450 P/N	474 M1	
These products are in compliance with the following Technical Standards:			
EN 267			
EN 12100			
and according to the European Directives:			
MD	2006/42/EC	Machine Directive	
LVD	2014/35/EU	Low Voltage Directive	
EMC	2014/30/EU	Electromagnetic Compatibility	

The quality is guaranteed by a quality and management system certified in accordance with ISO 9001:2015.

Legnago, 03.05.2021

Research & Development Director
RIELLO S.p.A. - Burner Department

Mr. F. Maltempi



2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 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.

2.1.2 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.

2.1.3 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

2.1.4 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.

2.2 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.

3 Safety and prevention

3.1 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.

3.2 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.

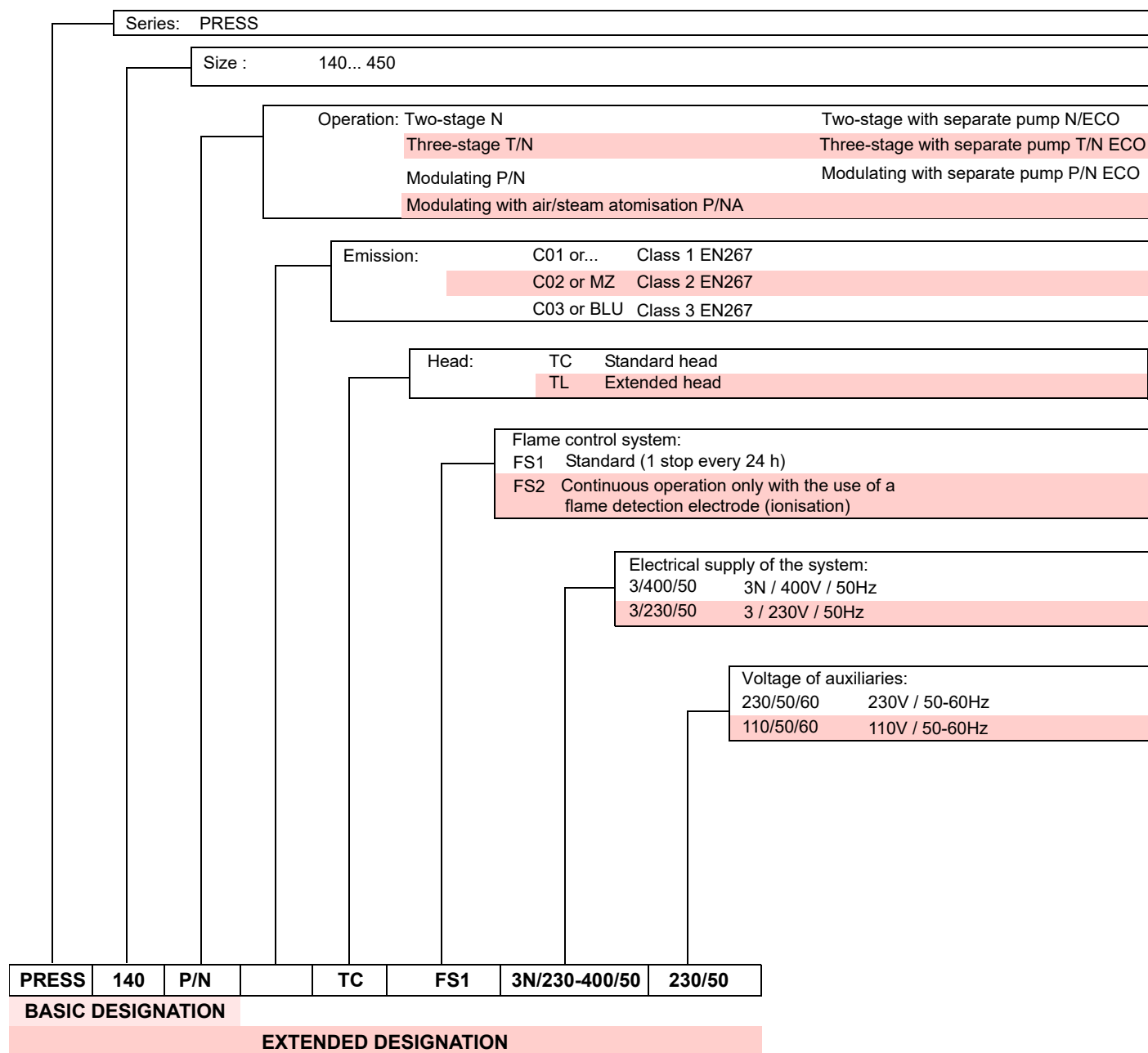
In addition:



- 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.

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation			Voltage	Start-up	Code
PRESS 140 P/N	TC	FS1	3/230-400/50	Direct	20169237
PRESS 140 P/N	TL	FS1	3/230-400/50	Direct	20169238
PRESS 200 P/N	TC	FS1	3/230-400/50	Direct	20169239
PRESS 200 P/N	TL	FS1	3/230-400/50	Direct	20169227
PRESS 300 P/N	TC	FS1	3/230-400/50	Direct	20169240
PRESS 300 P/N	TC	FS1	3N/400/50	Star/Triangle	20169241
PRESS 450 P/N	TC	FS1	3N/400/50	Star/Triangle	20169242
PRESS 450 P/N	TL	FS1	3N/400/50	Star/Triangle	20169246

5 Technical description of the burner

5.1 Technical data

MODEL		PRESS 140 P/N	PRESS 200 P/N	PRESS 300 P/N	PRESS 450 P/N
Output ⁽¹⁾	kW	400-1600	570-2280	683-3420	1140-5130
Delivery ⁽¹⁾	kg/h	35-140	50-200	60-300	100-450
Fuel		Heavy oil			
- max viscosity at 50 °C	mm ² /s	50 (7°E) up to 500 (65°E) with kit			
Operation		<ul style="list-style-type: none"> 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 flow rate	kg/h	310	470	690	940
pressure range	bar	25	25	25	25
fuel temperature	°C max	120	140	140	140
Weight of the burner (complete with packaging)	kg	180	220	238	300

Tab. A

⁽¹⁾ Reference conditions: Room temperature 20°C - Barometric pressure 1000 mbar – Altitude 100 m above sea level.

5.2 Electrical data

MODEL		PRESS 140 P/N		PRESS 200 P/N	
CODE		20169237 - 20169238		20169227 - 20169239	
Electrical power supply	V	3N ~ 230/400			
	Hz	50			
Electrical motor IE3	rpm	2900		2900	
	kW	3		4	
	V	230/400		230/400	
	A	9.7-5.6		13.3-7,7	
Heater	kW	14			
Ignition transformer		Primary: 2.3A - Secondary: 2x6 kV - 35 mA			
Absorbed electrical power	kW max	17.8		18.8	
Protection level	IP	40			

MODEL		PRESS 300 P/N		PRESS 300 P/N	
CODE		20169240		20169241	
Electrical power supply	V	3N ~ 230/400		3N ~ 400	
	Hz	50		50	
Electrical motor IE3	rpm	2930		2930	
	kW	9.2		9.2	
	V	230/400		400/690	
	A	28.6-16.5		16.5/9.6	
Heater	kW	19.6			
Ignition transformer		Primary: 2.3A - Secondary: 2x6 kV - 35 mA			
Absorbed electrical power	kW max	30.5			
Protection level	IP	40			

MODEL		PRESS 450P/N	
CODE		20169242 - 20169246	
Electrical power supply	V	3N ~ 400	
	Hz	50	
Electrical motor IE3	rpm	2915	
	kW	15	
	V	400/690	
	A	26.8-15.5	
Heater	kW	19.6	
Ignition transformer		Primary: 2.3A - Secondary: 2x6 kV - 35 mA	
Absorbed electrical power	kW max	36.7	
Protection level	IP	40	

Tab. B

5.3 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.

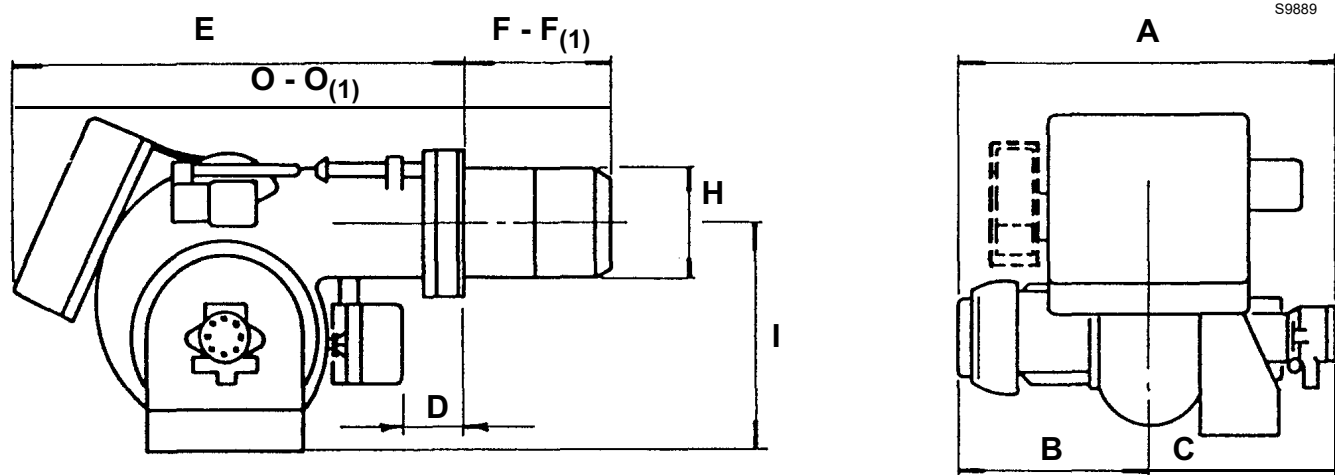


Fig. 1

mm	A	B	C	D	E	F - F ₍₁₎	H	I	O - O ₍₁₎
PRESS 140 P/N	796	396	400	99	910	323 - 433	222	467	1233 - 1343
PRESS 200 P/N	796	396	400	99	910	352 - 462	250	467	1262 - 1372
PRESS 300 P/N	858	447	411	128	1020	376 - 506	295	496	1396 - 1526
PRESS 450 P/N	950	508	442	128	1090	435 - 565	336	525	1525 - 1655

Tab. C

(1) Extended head

5.4 Standard equipment

Flexible hoses.....	No. 2
Grommet.....	No. 5
Screws.....	No. 4
Thermal flange gasket.....	No. 1
Nipples.....	No. 2
Extensions (for TL versions only)	No. 2
Starter (PRESS 300-450 P/N model only).....	No. 1
Installer booklet	No. 1
Spare parts list.....	No. 1

5.5 Firing rates

During operation, burner output varies within a minimum and a maximum limit.

MINIMUM OUTPUT: can drop down to:

PRESS 140 P/N	35 kg	Maximum modulating ratio is 1 - 3 (46 - 140 kg/h)
PRESS 200 P/N	50 kg	Maximum modulating ratio is 1 - 3 (66 - 200 kg/h)
PRESS 300 P/N	60 kg	Maximum modulating ratio is 1 - 3 (90 - 300 kg/h)
PRESS 450 P/N	100 kg	Maximum modulating ratio is 1 - 3 (150 - 450 kg/h)

MAXIMUM OUTPUT must be within the firing rate (Fig. 2).



ATTENTION

The FIRING RATE was obtained with an ambient temperature of 20°C and a barometric pressure of 1000 mbar (approx. 100m above sea level), with the combustion head adjusted as shown on page 22.

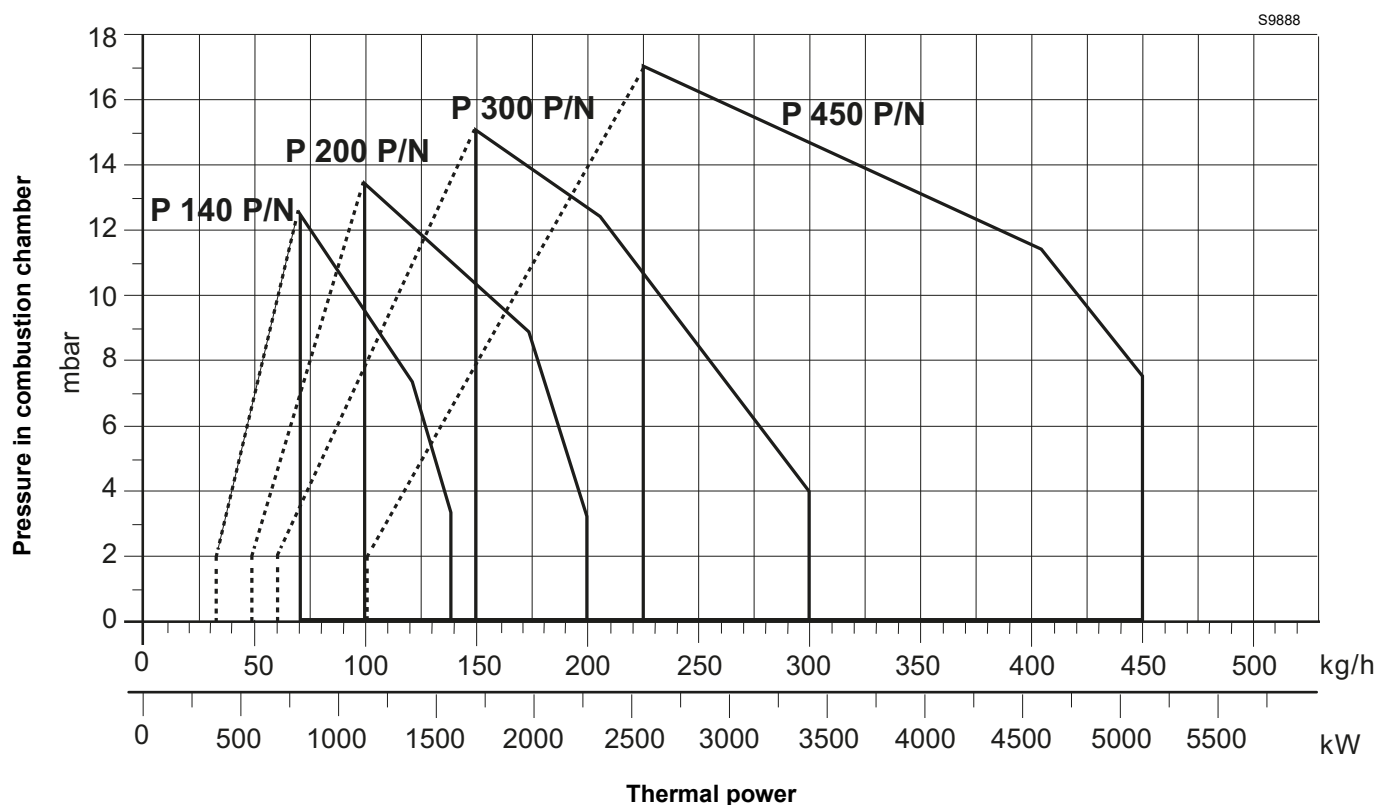


Fig. 2

5.6 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 650 Mcal/h (407 kW): diameter 60 cm - length 2 m.

MODULATING RATIO

The modulating ratio, obtained in test boilers according to standard (EN 267) is 4:1.

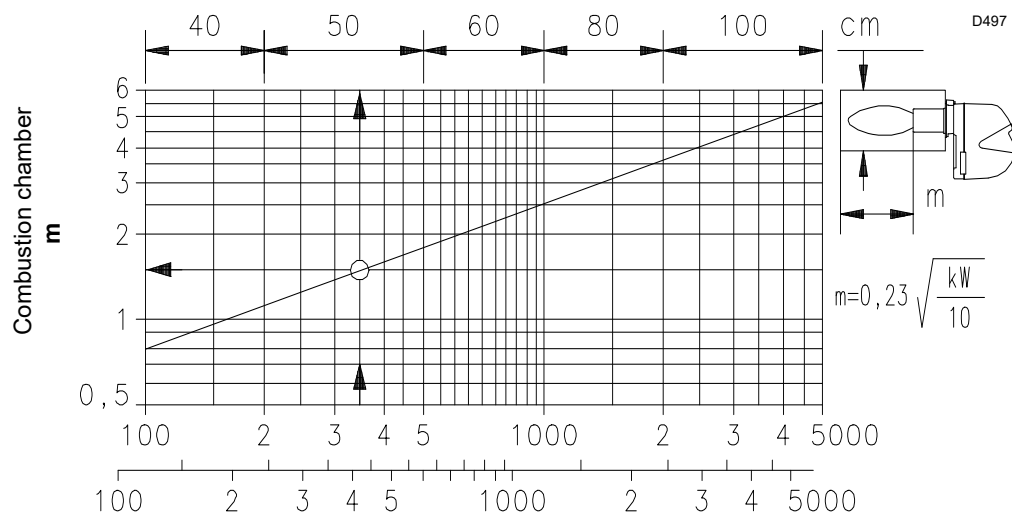
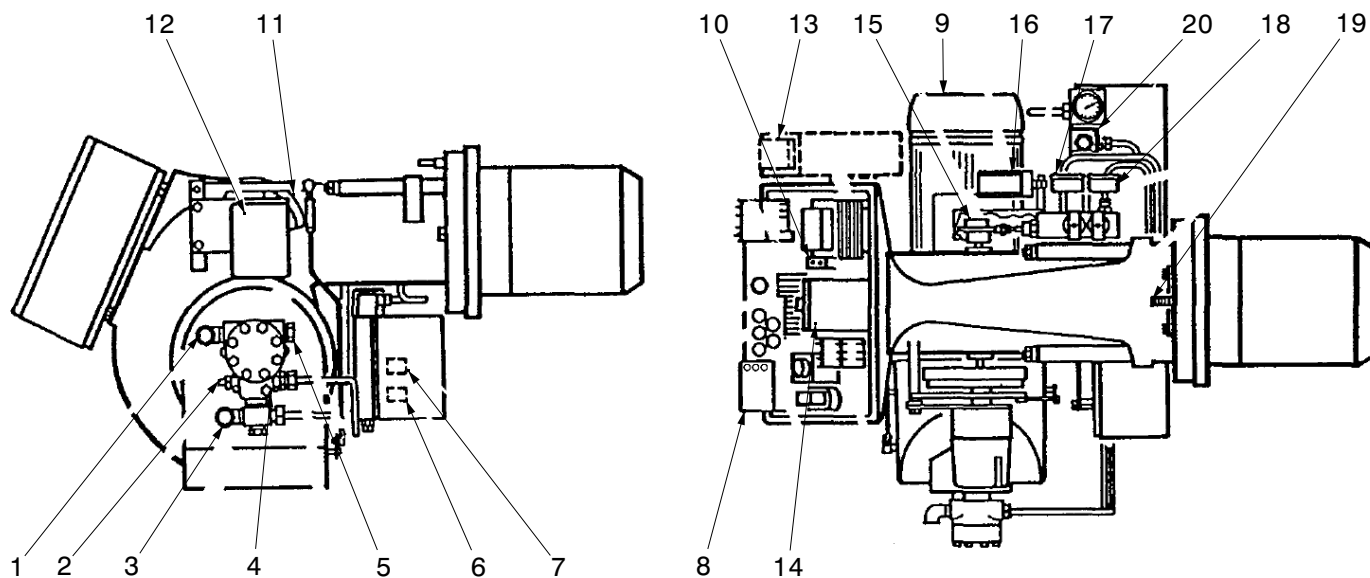


Fig. 3

5.7 Burner description

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Fig. 4

- 1 Suction connection
- 2 Pump pressure regulator
- 3 Return connection
- 4 Pressure gauge connection (PRESS 140 - G 1/8)
Pressure gauge connection (PRESS 200-300-450 - G 1/4)
- 5 Vacuum connection (PRESS 140 - G 1/2)
Vacuum connection (PRESS 200-300-450 - G 1/4)
- 6 Maximum temperature thermostat
- 7 Minimum temperature thermostat
- 8 Control box reset button with lockout signal
- 9 Fan motor
- 10 Setting thermostat
- 11 Air adjustment cam
- 12 Servomotor
- 13 Modulator (only for modulating units)
- 14 Nozzle rod opening magnet
- 15 Pressure adjustment eccentric on return line
- 16 Pressure switch
- 17 Return pressure gauge
- 18 Delivery pressure gauge
- 19 Combustion head adjustment screw
- 20 Filter

5.8 Electrical panel description

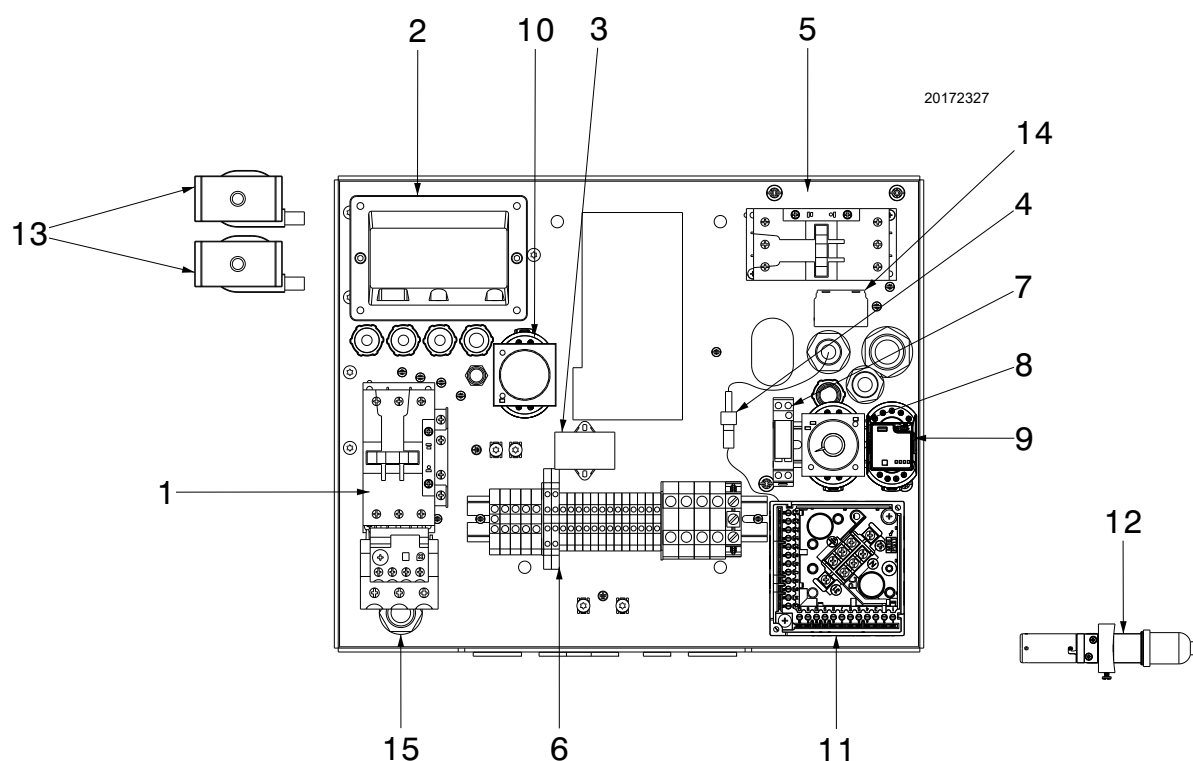


Fig. 5

- 1 Fan motor thermal relay and contactor (for direct starter version only)
- 2 Ignition transformer
- 3 Filter to protect against radio disturbance
- 4 Servomotor connector
- 5 Pre-heater contactor
- 6 Terminal board for electric connection
- 7 Relay
- 8 Timed relay
- 9 Relay
- 10 Electronic thermostat
- 11 Control box base
- 12 Flame sensor
- 13 Oil valve coils
- 14 Suppressor (PRESS 300-450 P/N models only)
- 15 Cable grommets for external connections (to be carried out by the installer)

5.9 Control box RFGO-A23

Important notes



ATTENTION

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

The control box is a safety device! Avoid opening or modifying it, or forcing its operation. The Manufacturer cannot assume any responsibility for damage resulting from unauthorised work!

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the control box connection area, fully disconnect the system from the power supply (omnipolar separation).
- Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions. In this case, the control box must not be operated, even if it displays no evident damage.

For safety and reliability, comply with the following instructions:

- avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire control box is perfectly dry!
- Static charges must be avoided since they can damage the control box's electronic components when touched.

Use

The control box is a control and supervision system of medium and large capacity forced draught burners.

If used with the flame detection electrode the system can operate continuously whereas, with the use of UV sensors it operates intermittently with stop and restart request at least once every 24h.

Installation notes

- Make sure that the electrical wiring inside the boiler complies with national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- When wiring the unit, make sure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.



20152163

Fig. 6

Technical data

Mains voltage	AC 230 V -15 % / +10 %
Mains frequency	50 / 60 Hz
Primary fuse (external)	Refer to the electric system
Weight	approx. 1.1 kg
Power absorption	approx. AC 7 VA
Protection level	IP40
Safety class	II
Environmental conditions	
Operation	DIN EN 60721-3-1
Climatic conditions	Class 1K2
Mechanical conditions	Class 1M2
Temperature range	-50...+85°C
Humidity	< 90% RH (non-condensing)

Tab. D

Electrical wiring of the flame detector

It is important for signal transmission to be almost totally free of any disturbances or loss:

- Always separate the detector cables from the other cables:
 - The capacitive reactance of the line reduces the size of the flame signal.
 - Use a separate cable.
- Respect the allowed cable lengths.
- The ionisation probe is not protected against the risk of electrocution. When connected to the electricity supply, the ionisation probe must be protected against any accidental contact.
- Position the ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

5.10 Servomotor SQM40 ...

Important notes



ATTENTION

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

Avoid opening, modifying or forcing the servomotor.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- 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.
- Fully disconnect the burner from the mains when working near terminals and servomotor connections.
- Condensation and exposure to water are not allowed.
- For safety reasons, the servomotor must be checked after long periods of non-use.



Fig. 7

S8907

Technical data

Mains voltage	230 V -15% +10%
Mains frequency	50 / 60 Hz
Power absorption	10 VA
Motor	Synchronous
Drive angle	Varying between 0° and 135°
Protection level	Max. IP 66, with appropriate cable entry
Cable entry	2 x M20
Cable connection	terminal board for 0.5mm ² (min.) and 2.5mm ² (max.)
Rotation direction	Anticlockwise
Rated torque (max.)	10 Nm
Holding torque	5 Nm
Operation time	30 s. at 90°
Weight	approx. 2 kg
Environmental conditions:	
Operation	-20...+60° C
Transport and storage	-20...+60°C

Tab. E

6 Installation

6.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner is to be installed, and arranging for the environment to be illuminated correctly, proceed with the installation operations.



All the installation, maintenance and disassembly operations must be carried out with the electricity supply disconnected.



The installation 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.



The combustion air inside the boiler must be free from hazardous mixes (e.g.: chloride, fluoride, halogen); if present, it is highly recommended to carry out cleaning and maintenance more frequently.

6.2 Handling

The burner packaging includes a wooden platform, it is therefore possible to handle the burner (still packaged) with a pallet truck or fork lift truck.



Burner handling operations can be highly dangerous if not carried out with the greatest attention: distance unauthorised personnel, check integrity and suitability of the means available. Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall). During handling, keep the load at no more than 20-25 cm from the ground.



After positioning the burner near the installation point, correctly dispose of all residual packaging, separating the various types of material.



Before proceeding with the installation operations, carefully clean all around the area where the burner will be installed.

6.3 Preliminary checks

Checking the consignment



After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.



The packaging elements (wooden cage or cardboard box, nails, clips, plastic bags, etc.) must not be abandoned as they are potential sources of danger and pollution; they should be collected and disposed of in the appropriate places.

Check the identification label of the burner, showing:

- the model (see **A** in Fig. 8) and the type of burner (**B**);
- the year of manufacture, in cryptographic form (**C**);
- the serial number (**D**);
- the absorbed electrical power (**E**);
- the types of fuel used and the relative supply pressures (**F**);
- the minimum and maximum possible output data of the burner (**G**) (see Firing rate).

D2582

N.	D	TIPO/TYP TYPE	A - B	C	V-50 Hz	E	kW
		kg/h				G	kW
Combus. Heizöl/Fuel		F	max. visc. @ °C	mm ² /s (E)			
						RBL	
REGOLAZIONE		X →	<input type="checkbox"/> DUE STADI PROGRESSIVI GLEITEND ZWEISTUFIG				
LEISTUNGSREGELUNG		X →	<input type="checkbox"/> MODULANTE MODULIEREND				



A burner label that has been tampered with, removed or is missing, along with anything else that prevents the definite identification of the burner makes any installation or maintenance work difficult.

6.4 Operating position



- The burner is designed to work only in positions **1** and **4** (Fig. 9).
- Installation **1** is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- The installation **4** permits the operation but makes the maintenance and inspection operations of the combustion head more difficult.



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

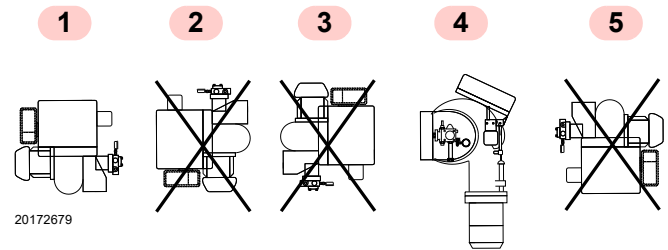


Fig. 9

6.5 Boiler plate

Pierce the closing plate of the combustion chamber, as in (Fig. 10). The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

For the combustion head protrusion follow the indications provided by the boiler manufacturer.

MODEL	L	M	N	P
PRESS 140 P/N	260	230	M 14	225
PRESS 200 P/N	260	-	M 16	255
PRESS 300 P/N	-	260	M 18	300
PRESS 450 P/N	-	310	M 20	350

Tab. F

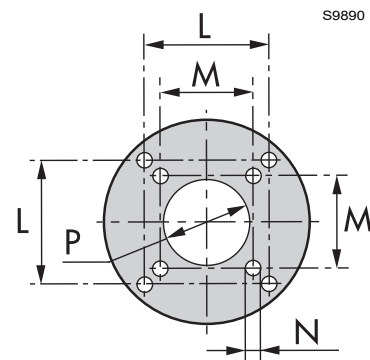


Fig. 10

6.6 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.

MODEL	MIN	MAX
PRESS 140 P/N TC	180	300
PRESS 200 P/N TC	200	340
PRESS 300 P/N TC	200	350
PRESS 450 P/N TC	250	400
PRESS 140 P/N TL	290	410
PRESS 200 P/N TL	310	450
PRESS 300 P/N TL	330	480
PRESS 450 P/N TL	380	530

Tab. G

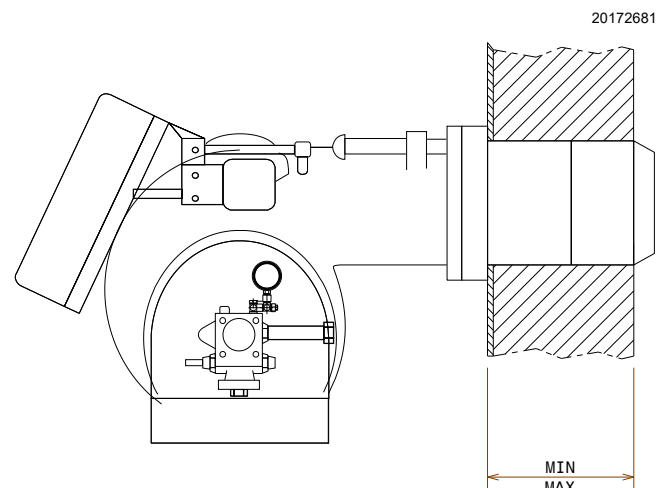


Fig. 11

6.7 Securing the burner to the boiler



Provide an adequate lifting system.



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

To separate the burner from the cast iron blast tube, proceed as follows:

- remove the cover 1)(Fig. 12), the split pin and pin 2), the nuts 3) and the screws 4).
- Pull out the blast tube from the burner by approx. 100÷120 mm and release the driving fork of the head 6) by removing the split pins 5).
- At this point, it is possible to fully pull out the blast tube from the pins 7).
- Fix the blast tube to the boiler by inserting the insulating seal 8) in-between.
- After fitting the selected nozzle, fit the burner on the pins 7) leaving it open by approx. 100 ÷ 120 mm.
- Refit the fork 6) fixing it with the split pins 5).
- Completely close the burner fastening it with screws 4), fit the nuts 3), the pin and split pin 2).

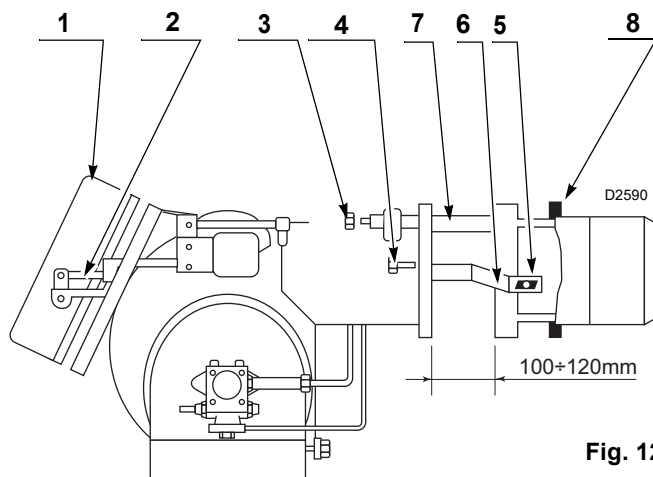


Fig. 12



ATTENTION

The seal between burner and boiler must be airtight.

6.8 Nozzle assembly

At this installation stage the burner is still separated from the blast tube; therefore it is possible to fit the nozzle with a 24mm wrench 3)(Fig. 13) after removing the screws 1) and the turbulator 2). Do not use any sealing products such as: gaskets, tape or sealants. Be careful to avoid damaging the nozzle sealing seat.



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.

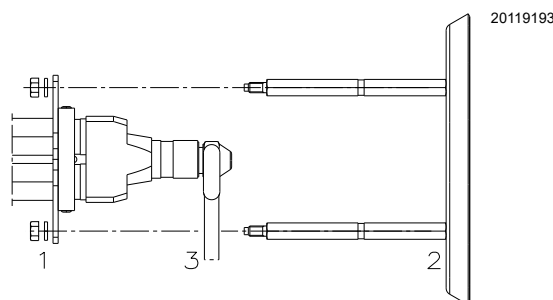


Fig. 13

6.9 Electrodes adjustment



ATTENTION

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

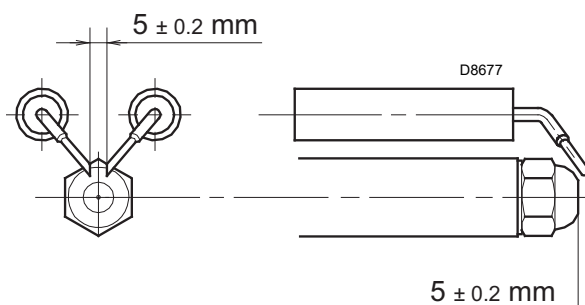


Fig. 14

6.10 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.



ATTENTION

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



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.

6.10.1 Nozzle selection

If you want a delivery somewhere between the two values shown in the diagram (Fig. 15), select a nozzle with a higher flow rate. The reduction in the flow rate is obtained with the pressure variator.

AVAILABLE NOZZLES

Bergonzo B5	
	kg/h
140	150
	125
	100
	90
	80
	70
200	200
	175
	150
	125
	100
300	300
	275
	250
	225
	200
	175
	150
450	450
	400
	350
	325
	300
	275
	250
	225

Tab. H

NOZZLES RECOMMENDED:

- Bergonzo type B5

To calibrate the delivery range of the nozzle, adequately adjust the fuel maximum and minimum pressure on the nozzle return line, as shown in diagrams (Fig. 15, Fig. 16, Fig. 17 and Fig. 18 on page 21).

- After fitting the nozzle, remove the servomotor protection cover, and turn the burner on.
- After turning on the burner, immediately disconnect the servomotor from the power supply by opening the connector located in the electrical control panel. In this way the burner remains in minimum flow rate operating mode.
- Unlock the motor cam of the servomotor by pressing the release.
- Manually and slowly rotate the variable profile cam, integrally connected to the eccentric. The pressure and the flow output of the nozzle are at their minimum level when the servomotor is at the 20° position. 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 and the nut with the lock nut.

6.10.2 Indicative relation between: nozzle type and flow rate - return line pressure

PRESS 140 P/N

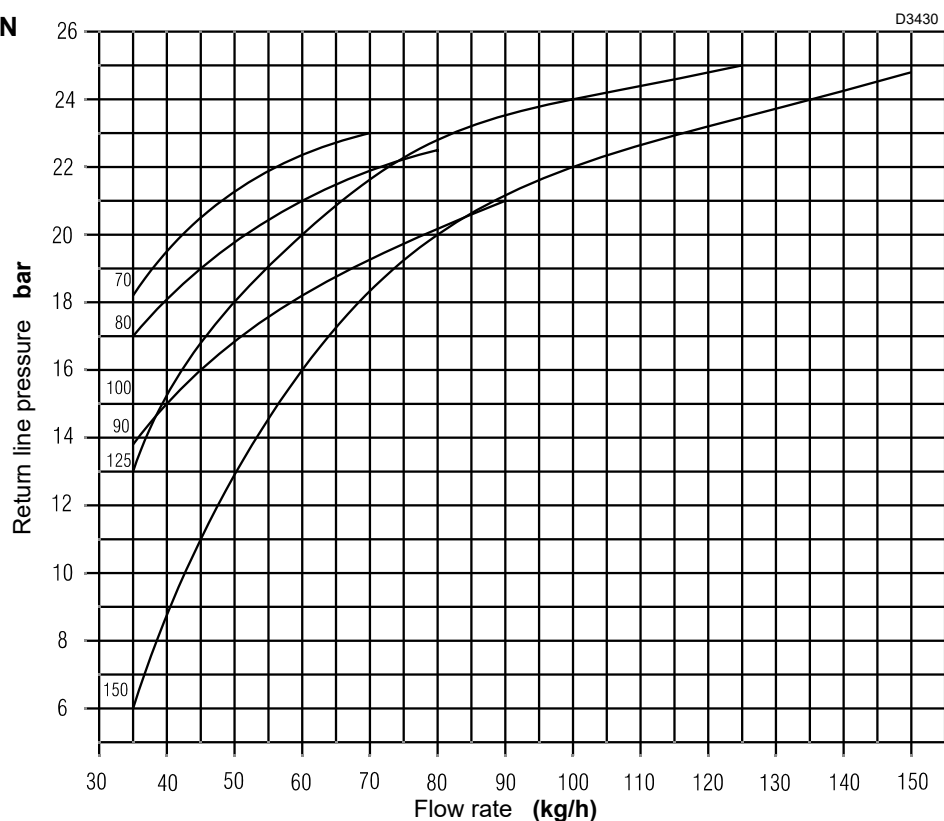


Fig. 15

PRESS 200 P/N

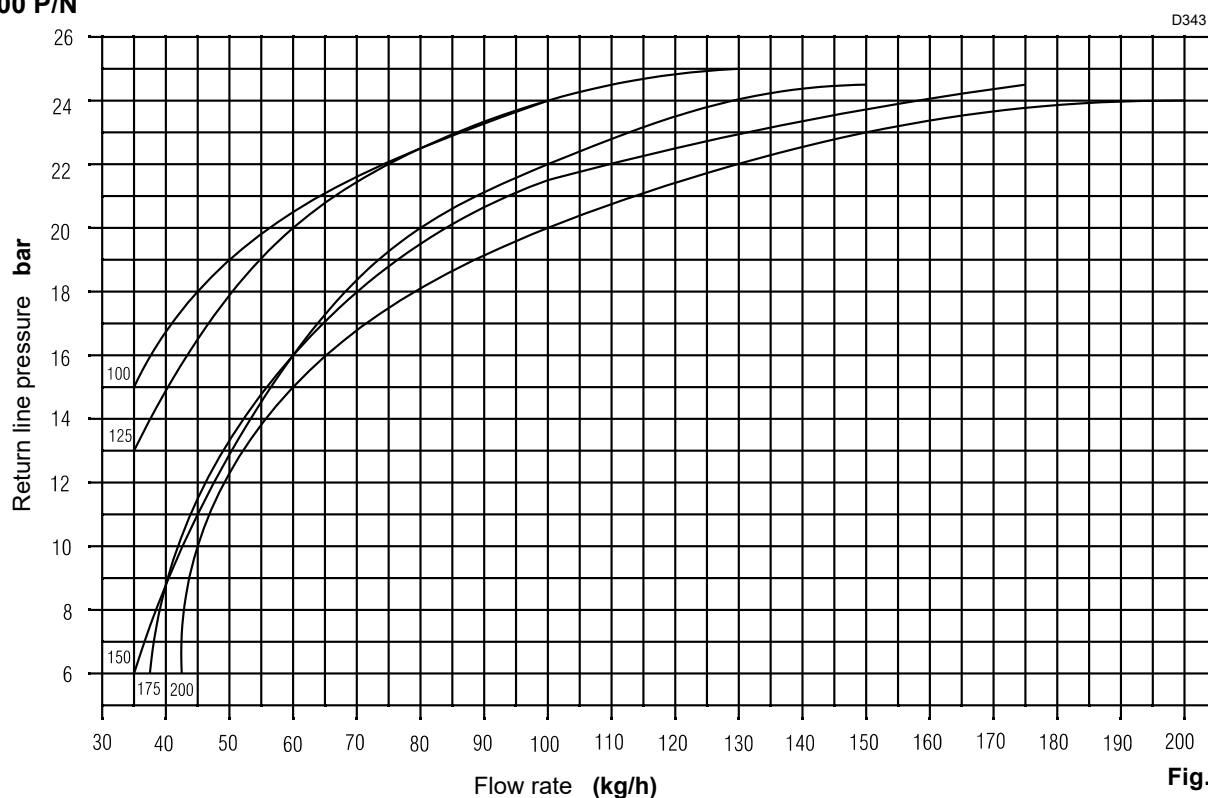


Fig. 16

Diagrams relating to nozzles:

BERGONZO type B5 - 50° with 25 bar delivery pressure.

- 50° recommended atomisation angles
- For narrow combustion chambers use nozzles at 35°.

PRESS 300 P/N

D3432

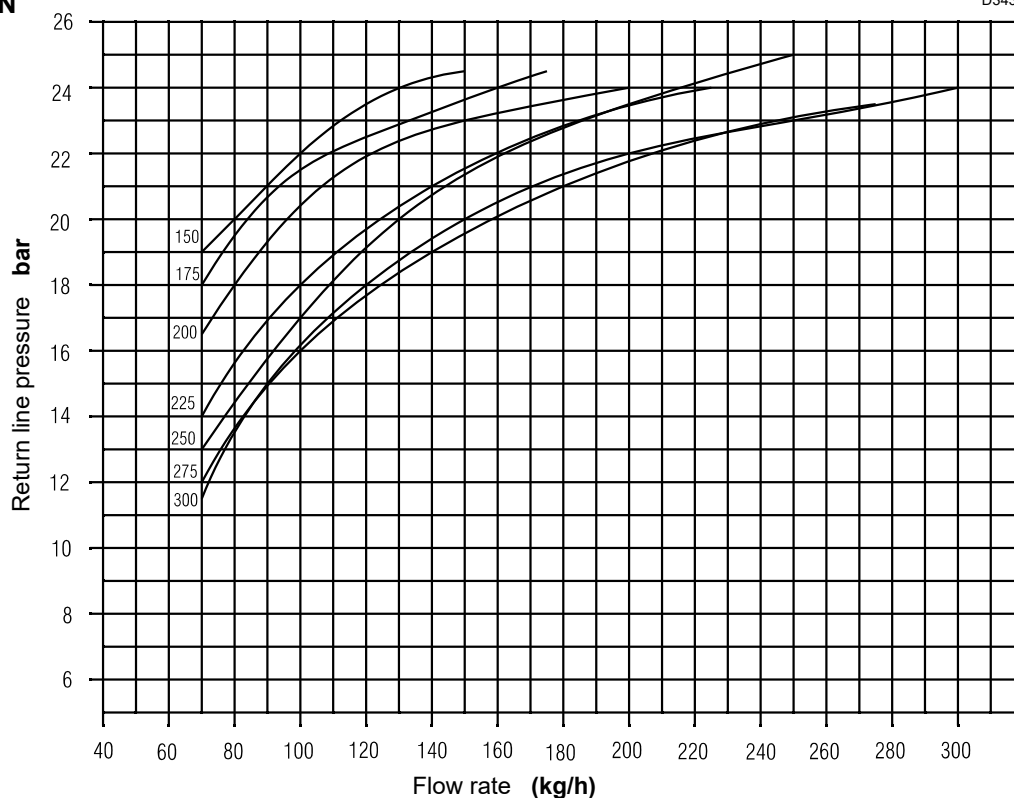


Fig. 17

PRESS 450 P/N

D3433

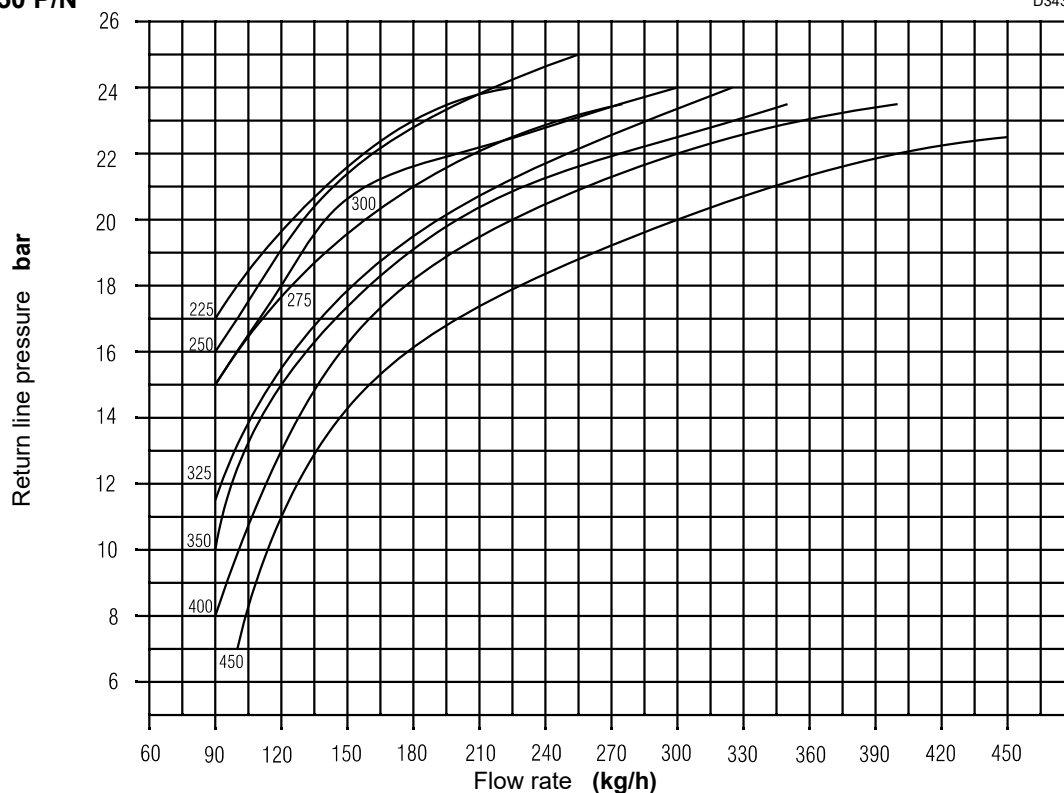


Fig. 18

Diagrams relating to nozzles:

BERGONZO type B5 - 50° with 25 bar delivery pressure.

- 50° recommended atomisation angles
- For narrow combustion chambers use nozzles at 35°.

6.11 Fuel 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.



ATTENTION

Before starting the burner make sure that the return pipe line is not clogged.

Any obstruction would cause the pump seals to break.

Oil pipes must be completely airtight.

- To facilitate the fuel flow, all pipes must be suitably dimensioned, insulated and heated (electrically or through vapour or hot water).
- To limit the formation of gas or vapour, the fuel pressure in the degassing unit 10) must be adjusted according to the supply temperature as per the table above.
- The transfer pump must have a flow rate that is at least twice the burner pump one.
- For several burners supplied by the same loop, the pump must ensure a supply of approx. 30% more than the sum of flow rates of the single burners.
- **For start-up:** with burner disabled through gate valves 5) make fuel flow in the supply loop. Once standard circulation is reached, open the gate valves and regularly supply the burner.

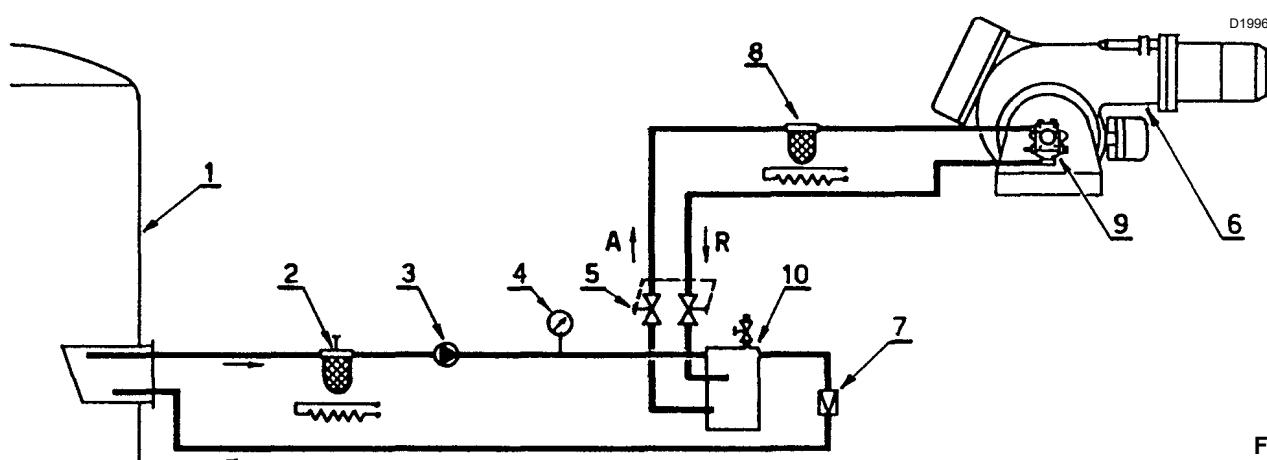


Fig. 19

Key

- 1 - Tank (heated for thick oil)
- 2 - Filter (oil resistance > 7°E / 50°C)
- 3 - Transfer pump
- 4 - Control pressure gauge
- 5 - Gate valves for burner disabling (coupled)
- 6 - Burner (with thick oil kit code **3000721**)
- 7 - Pressure regulator (calibrated according to Tab. I)
- 8 - Filter (oil resistance > 7°E / 50°C)
- 9 - Burner pump
- 10 - Degassing unit

HEAVY OIL TEMPERATURE	PRESSURE
°C	bar
up to 80	1
90	1.5
100	2
110	2.5
120	3

Tab. I

Variation for secondary power supply

The degassing unit for thick oil must be equipped with heater code **3010050**.

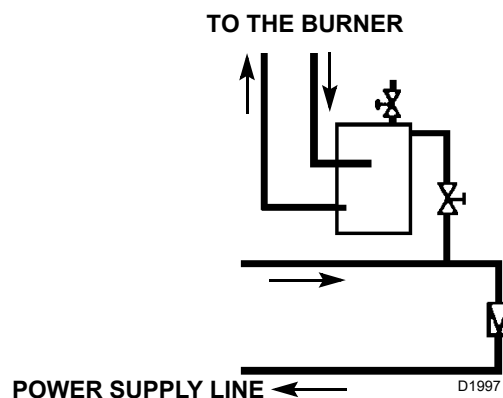


Fig. 20

6.11.1 Hydraulic connections



CAUTION

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

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



ATTENTION

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

Periodically clean the tank filter.

Make sure that the nozzle has no filter.

6.11.2 Hydraulic circuit diagram

D2009

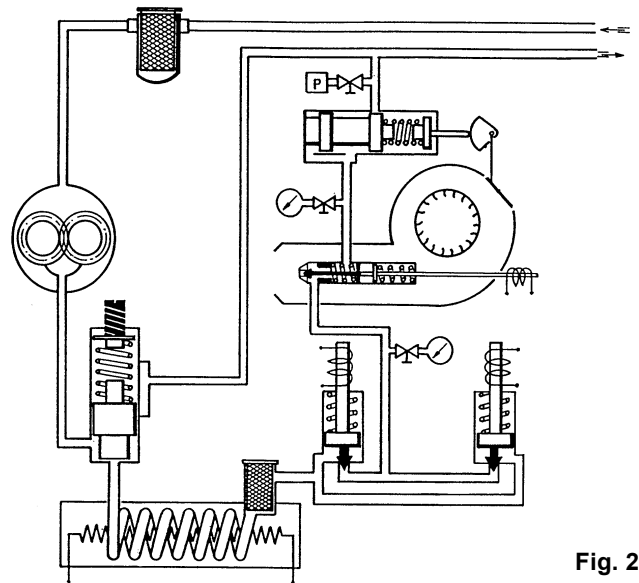


Fig. 21

- Burner stand-by conditions
- **P** oil pressure switch: it can be adjusted from 2 to 15 bar, in case of excessive back pressure on the fuel return line, it locks the burner (recommended calibration at 5 bar).

6.12 Pump

6.12.1 Technical data

Pump		E7NC1069-5P	TA2C4010-5	TA3C4010-5	TA4C4010-7
Burner		PRESS 140 P/N	PRESS 200 P/N	PRESS 300 P/N	PRESS 4500 P/N
Min. delivery rate at 30 bar pressure (140)					
Min. delivery rate at 40 bar pressure (200-300-450)	kg/h	235	350	540	730
Delivery pressure range	bar	14-30	7-40	7-40	7-40
Max. suction depression	cm Hg	30	30	30	30
Viscosity range	cSt	2.8-800	4-800	4-800	4-75
Maximum heavy oil temperature	°C	120	140	140	140
Max. suction and return pressure	bar	3.5	5	5	5
Pressure calibration in the factory	bar	30	25	25	25

Tab. J

6.12.2 Priming pump



ATTENTION

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.

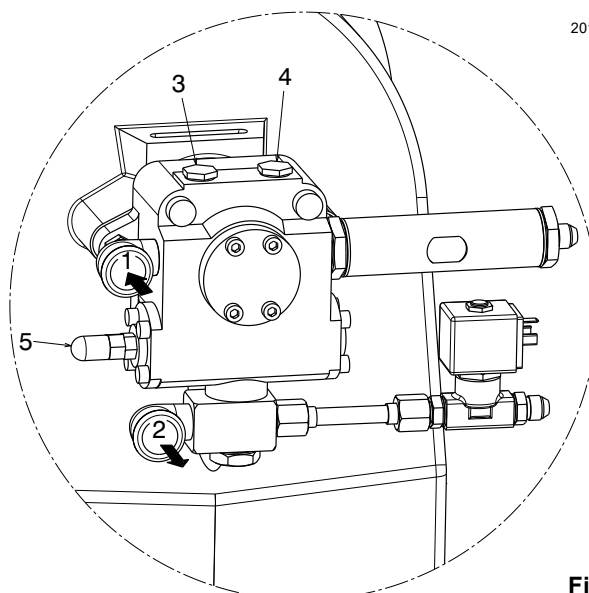
- In order for self-priming to take place, the cap 4) on the pump (Fig. 22) must be loosened to bleed off the air contained in the suction line.
- Start the burner by closing the remote controls. As soon as the burner starts, check the direction of rotation of the fan blade.
- The pump can be considered to be primed when the light oil starts coming out of the cap 4).
- Close the burner and tighten the cap 4).

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.

Do not light the photocell in order to prevent the burner lockout; the burner locks out in any case about ten seconds after its start.



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Fig. 22

- 1 Suction line
- 2 Return line
- 3 Vacuum connection
- 4 Pressure gauge connection
- 5 Pressure adjustment



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 vacuumeter 3)(Fig. 22) 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.

6.13 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 burners have been set for intermittent operation (FS1).
- The RFGO safety device features two built-in flame amplifiers which allow using it for applications with UV sensor only, FR sensor only or with both sensors (UV+FR). The FR amplifier circuit is subject to constant auto-control, which allows to use it for applications requiring a burner operating cycle longer than 24 hours. When it is used as a UV control, the system is considered as non-permanent, requiring one burner recycle every 24 hours. Normally, burner stopping is guaranteed by the boiler's thermostat/pressure switch. If this is not the case, a time switch must be applied to L-N in series, 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 input power of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - use an omnipolar switch, in compliance with the current safety standards.
- 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.

6.14 Calibration of the thermal relay

The thermal relay (Fig. 23) 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). In case of 230V power supply, change the motor connection from star to delta and replace the thermal relay with the one supplied with the burner.

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.

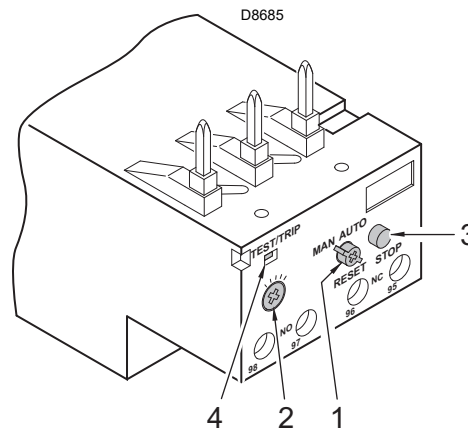


Fig. 23



The automatic reset can be dangerous.

This operation is not foreseen in the burner operation.

6.15 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.



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

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

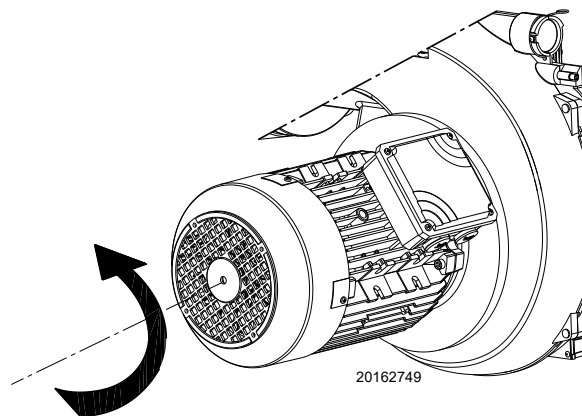


Fig. 24

7 Start-up, calibration and operation of the burner

7.1 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.

7.2 Adjustments prior to ignition

The optimum calibration of the burner requires an analysis of the flue gases at the boiler outlet and interventions on the following points.

7.2.1 Nozzle

See information on page 19.

7.2.2 Pump pressure

The pump leaves the factory set at 25 bar. It is activated by loosening the vacuumeter connection plug. See information on page 24.

7.3 Maximum fuel flow rate adjustment

It is carried out by choosing the right nozzle in Tab. K:

Model	Nozzle BERGONZO B5	Output Maximum flow rate kg/h	Fuel pressure at pressure gauge delivery bar	Fuel maximum pressure at pressure gauge return bar
140	150	150	25	24.5
	125	125	25	24.8
	100	100	25	24
	90	90	25	21
	80	80	25	22.5
200	200	200	25	24
	175	175	25	24.5
	150	150	25	24.5
	125	125	25	24.8
	100	100	25	24
300	300	300	25	24
	275	275	25	23.5
	250	250	25	25
	225	225	25	24
	200	200	25	24
	175	175	25	24.5
	150	150	25	24.5
450	450	450	25	22.5
	400	400	25	23.5
	350	350	25	23.5
	325	325	25	24
	300	300	25	24
	275	275	25	23.5
	250	250	25	25
	225	225	25	24

Tab. K

NOTE:

25 bar for fluid oil - up to 30 bar for thick oil (viscosity $\geq 20^\circ\text{E}$ at 50°C).

If you want a maximum flow rate somewhere between the two values shown in the table, select a nozzle with a higher flow rate. Flow rate can be decreased at a later time by acting on the pressure variator, as specified in page 28.



To prevent clogging, remove the filter from the nozzle.

7.4 Pressure variator adjustment

The pressure variation on the return line (pressure gauge, 3) Fig. 25 on page 28) changes the flow rate of the fuel coming out of the nozzle.

7.4.1 Pressure variator

To calibrate the eccentric (8), proceed as follow:

remove the cover (9), loosen the screws (7), turn the screw (4) until the desired eccentricity is obtained. By turning screw (4) to the right (+) the eccentricity increases, thereby increasing the difference between the maximum and minimum capacity of the nozzle. By turning screw (4) to the left (-) the eccentricity decreases, thereby decreasing the difference between the maximum and minimum capacity of the nozzle.

- For a correct calibration, the eccentric (8) must operate on the entire range of travel of the servomotor ($20^\circ \div 130^\circ$): a pressure variation must correspond to each servomotor variation.
- Never drive the variator piston fully home: the stop ring (5) determines the maximum stroke.
- At the end of the adjustment, manually check that between 20° and 130° there is no sticking and that the maximum and minimum pressures correspond to the one selected according the diagram of page 20.
- To control the outlet delivery of the nozzle, proceed as follows:
- Open the burner following the instructions of page 18, connect a pipe to the nozzle, simulate the ignition and proceed with the weighing 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 (3), slightly reduce the pressure until they disappear (Fig. 25).

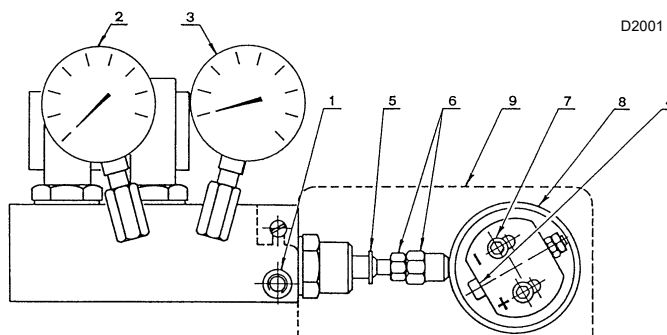


Fig. 25

Key (Fig. 25)

- 1 Pressure switch connection
- 2 Delivery pressure gauge
- 3 Return pressure gauge
- 4 Eccentric adjustment screw
- 5 Piston stop ring
- 6 Piston calibration nut and lock nut
- 7 Eccentric locking screws
- 8 Variable eccentric
- 9 Cover

7.5 Combustion head adjustment

The adjustment of the combustion head is obtained in function of the maximum output indicated in the diagrams.

Example with PRESS 140 P/N burner:

The burner must be combined with a 1,100,000 kcal/h boiler.

Considering a 90% efficiency, it is required to develop 1,450 kW, namely to burn approximately 125 kg/h.

Diagram in Fig. 15 on page 20 shows that with an average delivery pressure of 25 bar, you obtain for 125 kg/h:

- nozzle type W2 - 130 - 50°
- maximum pressure on return line of 19.2 bar.

Diagram Fig. 27 shows that the combustion head must be adjusted to notch **8.5**.

Burner	140	200	300	450
Notch	8.5	8	7	5.5

The adjustment is performed by turning the screw **A** until the notch, shown in the diagram, matches the surface of bush **B**.

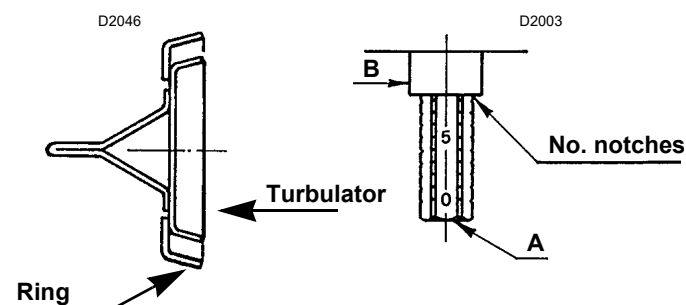


Fig. 26

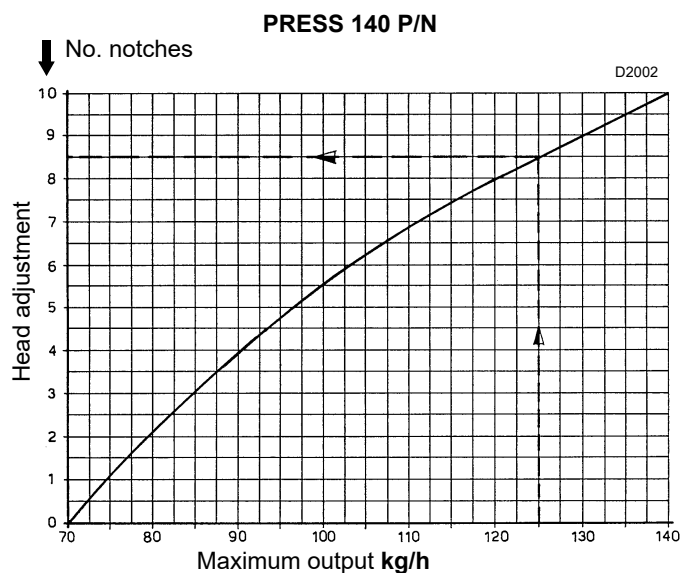


Fig. 27

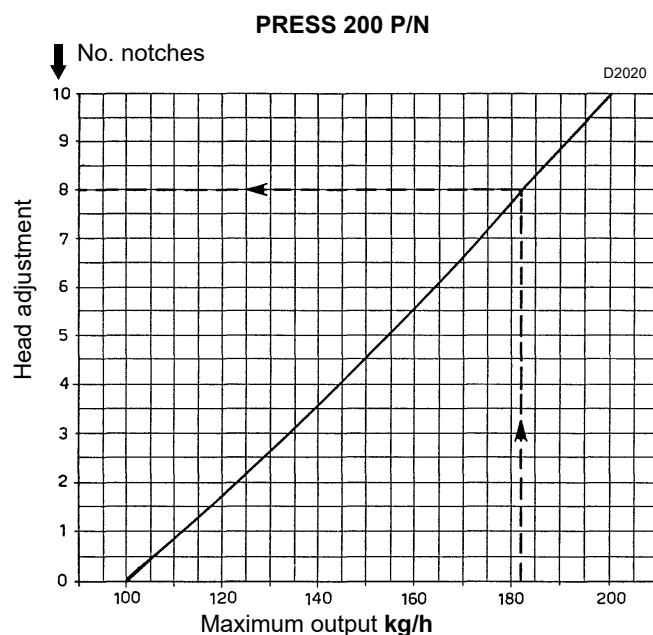


Fig. 28

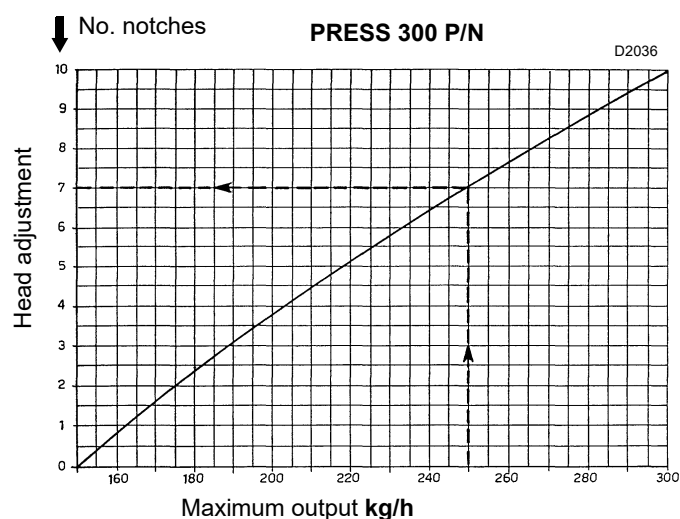


Fig. 29

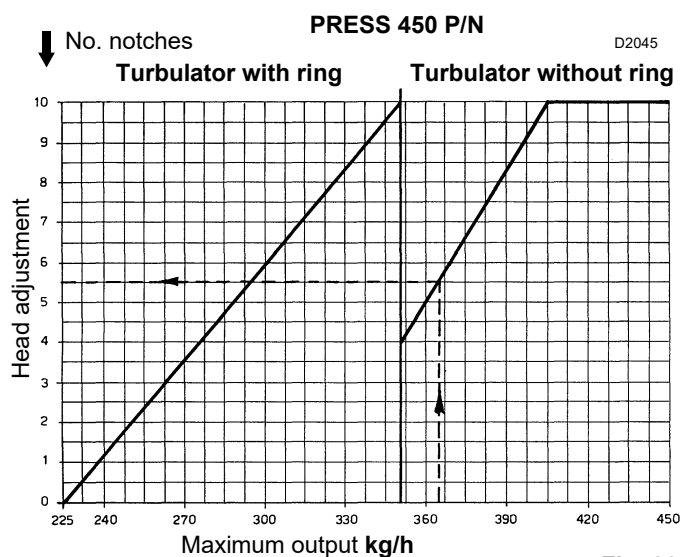


Fig. 30

7.6 Air damper setting

The setting of the air damper is carried out by acting on the variable profile cam 1)(Fig. 31). This operation must be performed after regulating the pressure variator and the combustion head. With burner on, disconnect the servomotor from the power supply and release it manually by pressing the release button placed on the lower side.

Maximum output adjustment

Set the servomotor to 130°, lock it and change the profile 4) by gradually acting on the screws 2)(Fig. 31).

Minimum output adjustment

Unlock the servomotor again, set it manually to 20°, lock it and adjust the profile 4)(Fig. 31) by gradually acting on the screws 2).

Intermediate output adjustments

They are carried out in the same manner.

At the end of the operation, check all calibrations, restore the electrical connections of the servomotor and lock the adjustment screws 2) by means of the transversal screws 3).

7.6.1 Variation of the air damper tie-rod length

Lengthening the tie-rod is recommended when the air damper moves within a reduced angle (air damper approx. halfway its stroke at the maximum output). In this way, a too curved cam profile 4)(Fig. 31) can be avoided.

With the burner off, proceed as follows:

- Disengage the articulated coupling 2)(Fig. 32) from the lever 1).
- Loosen the extension 3) from the tie-rod 4) by some turns.
- Reconnect the articulated coupling to the lever and lift the profile 4) until setting the index of the air damper to 0 with servomotor at 0°.

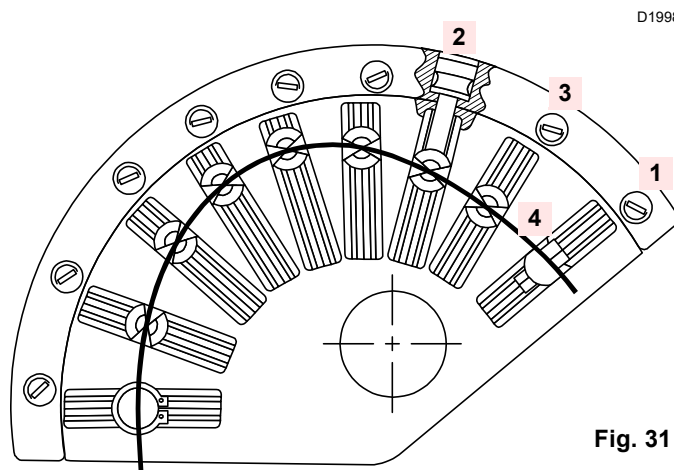


Fig. 31

- 1 - Cam
- 2 - Adjustment screws
- 3 - Locking screws
- 4 - Adjustable profile

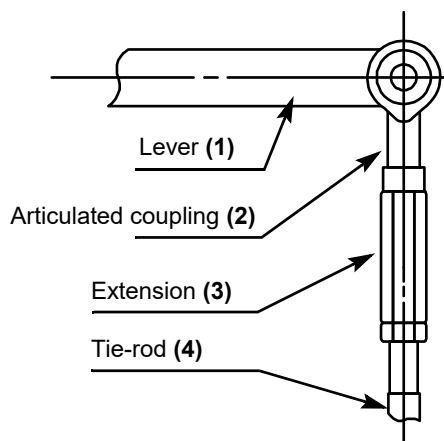


Fig. 32

7.7 Atomising temperature setting

7.7.1 Minimum - maximum temperature - setting thermostat

The electronic setting thermostat, by means of a PT100 probe immersed in the fuel oil delivery manifold, adjusts the atomising temperature. (For a correct atomisation, see the temperature/viscosity diagram Fig. 34).

Example: a fuel oil 7 °E at 50 °C must be pre-heated to about 110 °C.

NOTE:

The temperature set on the thermostat corresponds to the fluid temperature, check in any case the correspondence using the thermometer after a few minutes of operation. The LED on indicates that heating elements are correctly enabled.

The **minimum temperature thermostat**, besides stopping the burner in the case that the fuel temperature drops below a critical value, in order to ensure a good combustion, enables the burner start-up phase. (It is factory set at about 80 °C and can be adjusted by removing the pre-heater cover and the relevant plate).

The **maximum temperature thermostat** disables heating elements when, due to a fault of the setting thermostat, a significant increase is detected in the pre-heater temperature; any alarm (high temperature) is provided on the burner terminal strip. (It is factory set at 180°C).

Replacing minimum and maximum temperature thermostats

Reposition the probes of the new thermostats after having loosened the fastening screws of the plate pack, making sure that the probe is in contact with the pipes and the heating element as shown in the figure on the side. Use the same precautions for the replacement of heating elements in contact with thermostat probes. In case of malfunction, check the continuity of the heating elements in contact with temperature probes using an ohmmeter (value of approximately 35 Ohm).

Replacing PT100 probe in the delivery manifold

Insert nut and bicone connection (supplied as standard) in the new heating element and insert it into the manifold connection by approximately 40 mm, then tighten strongly. The external part can be folded as required (without damaging the heating element).

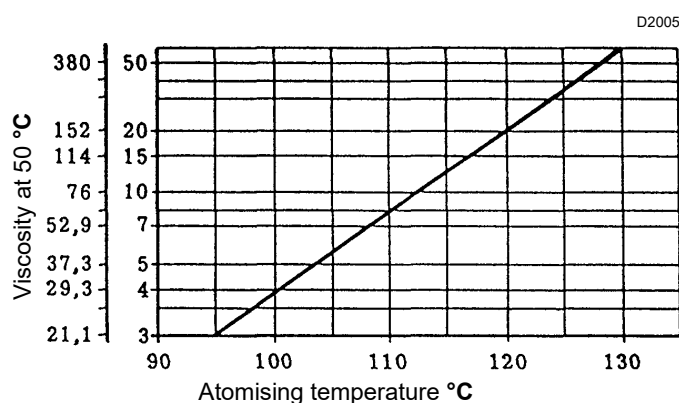


Fig. 34

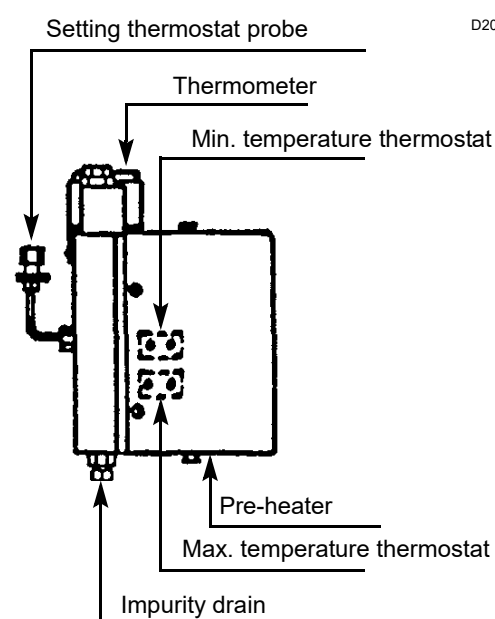


Fig. 35

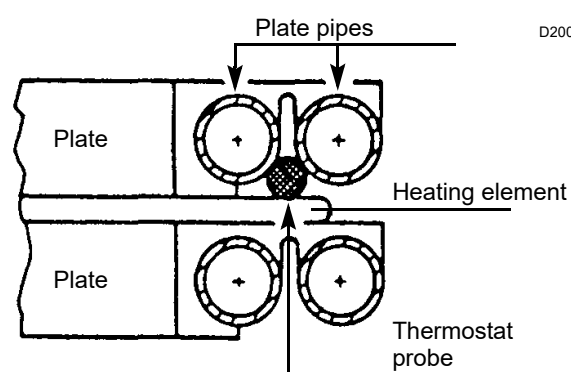


Fig. 36

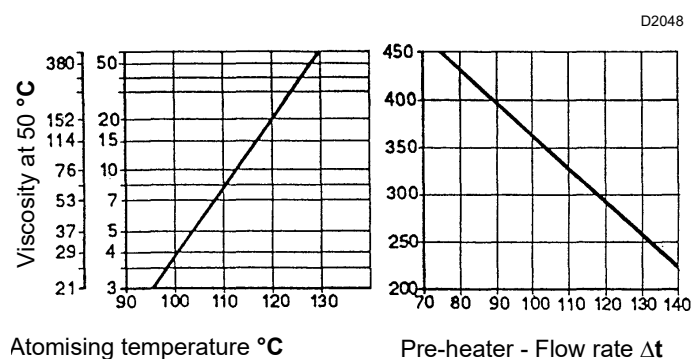


Fig. 33

7.8 Servomotor adjustment

The servomotor adjusts simultaneously, through driving gears, the output and pressure of the air and the delivery of the fuel in use. It performs a 135° rotation in 45s. After the adjustment made in the factory to its 6 cams to allow an initial ignition.

Check that they are as shown below.

In the event of a modification, follow what is described below for each cam:

Cam I (RED): **135°** (The same for all models).
Limits rotation toward maximum position.



ATTENTION

Do not make any adjustments.

Cam II (BLUE): **0°** (The same for all models).
Limits rotation toward minimum position. With the burner off, the air damper is completely closed: 0°



ATTENTION

It is recommended that no adjustments are made.

Cam III: Not used.

Cam IV: Not used.

Cam V (BLACK): **20°** (The same for all models).
Adjusts the ignition position and the minimum output.

Cam VI (GREEN): **130°** (The same for all models).
Adjusts the position of the maximum output.

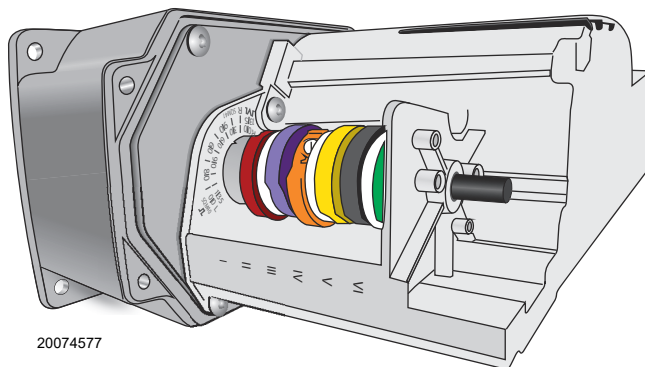


Fig. 37

7.9 Pressure switch adjustment

7.9.1 Oil pressure switch

It triggers the lockout condition of the burner in case of too much counter-pressure on the fuel return line.

Recommended calibration (recommended values with return line resistance in tank of ≤ 0.5 bar): **3.0 ÷ 3.5 bar**.

In case of control box lockout (in position "P") calibrate the pressure switch again with incremental values of 0.5 bar.

To adjust the pressure switches, use a tool to operate the adjustment screw, see Fig. 38.

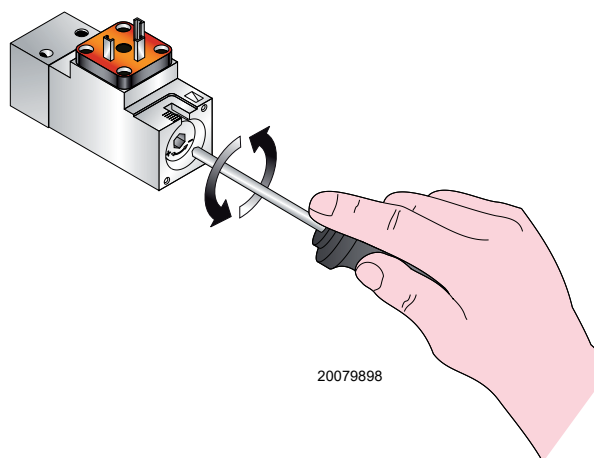


Fig. 38

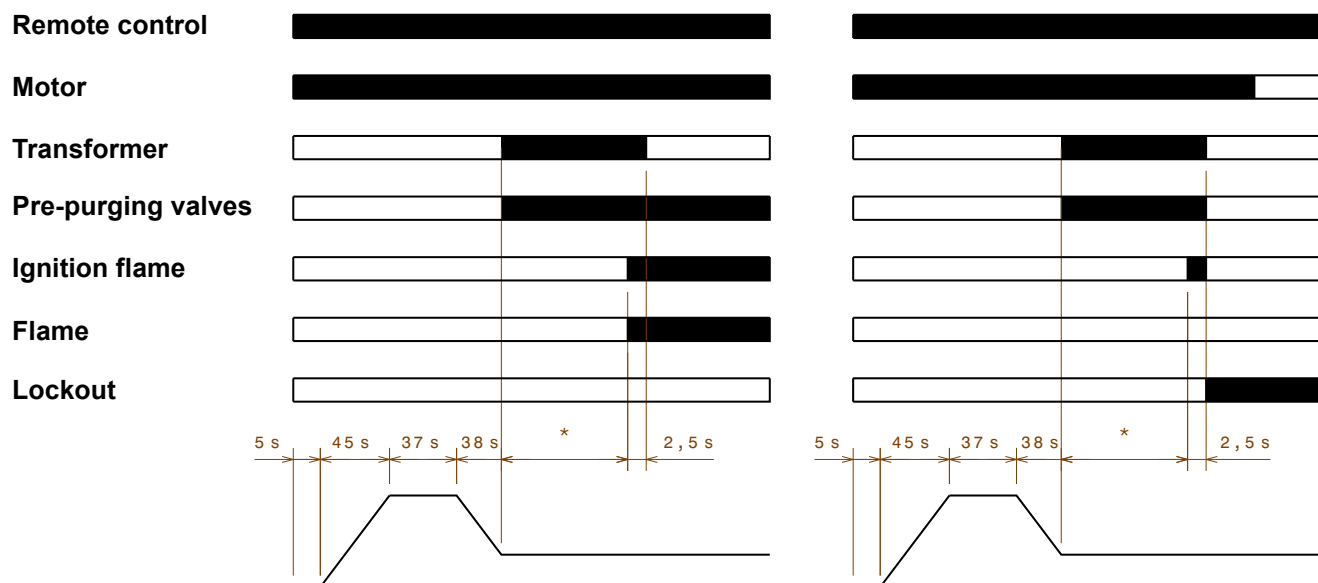
7.10 Operation sequence of the burner

7.10.1 Burner start-up program

Standard

Lock-out because of no ignition

20172329



* Adjustable from the timer

Fig. 39

7.11 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 3 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.

8 Maintenance

8.1 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.

8.2 Maintenance programme

8.2.1 Maintenance frequency



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

8.2.2 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. L

Burner

Make sure that the screws are well secured.

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.

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.

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.

Actions on the nozzle holder

After any disassembly of the nozzle holder, it is necessary to correctly calibrate the shaft that controls the nozzle rod. With a nozzle fitted, screw the fork 1) (Fig. 40) by hand until any gap is eliminated, without tensioning the shaft 3); now unscrew the fork by a turn and lock it with the nut 2).

NOTE:

For "BERGONZO" nozzles unscrew the fork by 2 turns.

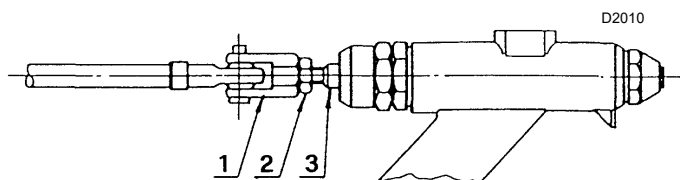


Fig. 40

Flame presence check

Check the level of the flame detection signal with the "Check mode" function from the flame control: LEDs from 2 to 6 indicate the flame signal level, respectively. "LED indicator and special function" on page 36.

Check Mode

With burner flame on:

- hold the reset button on the flame control pressed for at least 3 sec.;
- the button colour will change from green to yellow;
- each operating status signalling LED will be compared to 20% of the maximum brightness;
- press the reset button again (<0.5sec) to reset the standard operation of the signalling LEDs.

8.2.3 Safety components

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

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
Flexible hoses (if present)	5 years or 30.000 pressurised cycles
Fan impeller	10 years or 500.000 start-ups

Tab. M

8.3 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 indicated in paragraph "Securing the burner to the boiler" on page 18.

8.4 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.

9 LED indicator and special function

9.1 Description of LED lamps

 S9740	Fan	It turns on when the fan motor is powered (T6) and blinks when RUN/CHECK switch is set to "CHECK" during damper movement phases, PTFI AND MTFI.
 S9741	Damper open	It blinks when the air damper is moving towards the maximum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on for the time set by the flame control.
 S9742	Damper closed	It blinks when the air damper is moving towards the minimum opening position until the position-reached feedback sent by the servomotor is received, then it stays steadily on until the end of the pre-purging time.
 S9743	Auto	It indicates that the burner is ready for the output modulation.
 S9744	Ignition	It blinks during the ignition phase (1st safety time) and stays steadily on during the MTFI.
	Flame	It blinks during the first safety time and stays steadily on if the flame detection has been correctly performed.
 S9746	Alarm	It turns on in red when a lock-out condition occurs. Together with the other indicators, it indicates the type of fault during the lock-out phase. Together with the other LEDs, it indicates the operating status during the normal cycle.

Tab. N

9.2 Check mode function

By means of the reset button on-board the flame control, it is possible to use a control function during start-up phases. (pre-purging, ignition, 1st safety time and 2nd safety time).

This function, indicated as CHECK MODE, is designed to facilitate checking the phases of the burner and of the safety devices monitored by the flame control.

This function is particularly useful during the burner first commissioning or during maintenance.

To enable the check mode function:

- keep the reset button pressed, see chapter 8 for more details, for at least 3 seconds, the status LED changes from green to yellow to signal that the control device is in check mode.
- the control device locks out during pre-purging, after a timeout of max 30 minutes the flame control will automatically exit the check mode function.


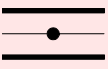
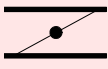

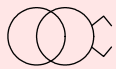


- check mode has a 2 minute timeout during the 2nd safety time. When it ends, the flame control goes back to the normal operating status.
- check mode has a 2 minute timeout during the MTFI status. When it ends, the flame control goes back to the normal operating status.
- During the check mode 1st or 2nd safety time, the flame signal level can be indicated by the 5 central LEDS on the flame control central panel, which turn on proportionally. Each lit LED (starting from the flame LED) represents 20% of the signal power.
To exit the check mode function, press the reset button; the flame control will go back to the normal operating mode.

9.3 Flame control lock-out or emergency stop condition

The RFGO control device can be locked out (emergency stop) at any time during the operating cycle and unlocked when already locked (lock-out) by simply pressing the key on the front panel or by means of the terminal T21 on the support base.

9.4 LED lamps: burner operating status

OPERATING STATUSES INDICATED BY LEDS DURING NORMAL OPERATION AND CHECK MODE

Operation LED ● = ON	Fan	Damper open	Damper closed	Modulation	Ignition	Flame	Status
Icon	 S9740	 S9741	 S9742	 S9743	 S9744	 S9745	 S9746
Power OFF/ON							OFF
Not ready/ Diagnostics							Green
Standby			●				Green
Servomotor movement (Note 3)	●	OFF Flashing ●	● Flashing OFF				Green
Waiting for closing	Green blinking						Green
OPEN (before ignition)	●	●					Green
Minimum (before ignition)	●		●				Green
Ignition	●		●		●		Green
PTFI	●		●		●	Green blinking	Green
MTFI	●		●			●	Green
Active modulation	●			●		●	Green
Minimum output position	●		●			●	Green
With flame present	●	●				●	Green
Economy mode	●		●				Green
Check during maximum opening phase	Flashing	●					Yellow
Check during minimum closing phase	Flashing		●				Yellow
Check during ignition phase with pilot PTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Check during ignition phase with main fuel valve MTFI	Flashing	● Note 1	● Note 1	● Note 1	● Note 1	● Note 1	Yellow
Fault/lock-out	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	● Note 2	Red
End of the cycle	●		●	●			Green

Tab. O

1. LEDs form a progress bar which indicates the Flame Signal Power in order to orientate the sensors during commissioning (LEDs "Grow" upwards, moving away from the Status at 20% intervals of flame power.)
2. LEDs indicate the error or lock-out code for troubleshooting.
3. LEDs change from ON to BLINKING to OFF showing the servomotor movement control until the position-reached feedback is received See paragraph **"Problems - Causes - Remedies signalled by LED indicators"** on page 38.

10 Problems - Causes - Remedies signalled by LED indicators

When an emergency stop occurs, the control device LEDs indicate the cause of the stop.

The terminal T3 is not powered.

The device operating status is internally memorised in case of any lack of power supply.

The device lock-out condition can be caused by pressing (<1sec.) the reset button on the flame control front side or through the remote reset - terminal T21 on the base.

Since the reset button is very sensitive, do not press it strongly during the reset operation.

Unlocking the control device

The RFGO control device can be reset in two ways: reset button and remote reset terminal.

The remote reset must be a normally open connected button between T21 and flame control power supply voltage (see illustrative diagrams):

- the reset is performed when a faulty condition is detected by the flame control.
- Press the reset button to reset the system after a lock-out.
- Pressing the reset button during operation will cause an emergency stop.
- The reset or emergency stop condition can be obtained also by using the remote reset with the same modalities.
- The number of reset attempts is limited to a maximum of 5 within 15 minutes.

Error / RFGO LED lock-out Codes

During an alarm condition, the status LED becomes steady red. The remaining LEDs turn on according to a coded sequence which identifies the lock-out cause.

The following table shows the different LED Lock-out codes.



ATTENTION

Thermal unit's operation, maintenance and troubleshooting interventions must be carried out by trained personnel.

The persons who solve lock-out problems or reset the control device must observe the error codes to solve the problems described in this product technical data sheet.

It is not admitted to tamper with or act on the system or control in a way that could compromise the product safety or warranty.

Any tests on safety devices or on loads, such as fan motor, valves, igniter, flame sensors, must be performed with the shut-off valves closed and by qualified personnel.

Do not by-pass nor exclude the safety devices connected to the flame control.

Failure to observe these guidelines will exclude any liability.



ATTENTION

The regulation prohibits the system from allowing more than 5 remote reset attempts within a 15 minute time window.

If more than 5 attempts are performed without solving the lock-out, the system will prevent the user to perform further remote resets and force him/her to wait for the 15 minutes to elapse.

The remote reset operation will be restored at the end of the waiting time.

It is recommended that qualified personnel evaluate the lock-out condition and implement the solution which is suitable for the fault to be solved.




ATTENTION

The device described in this manual can cause material problems, severe injuries or death.

It is the owner or user's responsibility to make sure that the equipment described is installed, used and commissioned in compliance with the requirements provided both by national and local law. The lock-out condition indicates the presence of a fault which occurred during the operating cycle or during stand-by mode.

Before performing an unlock attempt, it is necessary to restore the original optimal operating conditions.

Error / RFGO LED lock-out codes

No.	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
	Operation LED ● = ON	Fan	Open damper	Closed damper	Auto	Ignition	Flame	Status
	Icon	 S9740	 S9741	 S9742	 S9743	 S9744	 S9745	 S9746
1	Post-diagnostics fault	●						Red
2	Local reset		●					Red
3	Combustion air fan fault	●	●					Red
4	Supervisor processor diagnostics fault			●				Red
5	FR- NO Flame at the end of the 2 nd safety time (MTFI)	●		●				Red
6	FR: internal circuit fault		●	●				Red
7	Internal communication fault	●	●	●				Red
8	Remote reset				●			Red
9	FR: internal fault	●			●			Red
10	Main processor fault		●		●			Red
11	Data memory test fault	●	●		●			Red
12	Data memory test fault			●	●			Red
13	Mains voltage or frequent fault	●		●	●			Red
14	Internal processor fault		●	●	●			Red
15	Internal processor fault	●	●	●	●			Red
16	No flame: 1 st safety time (PTFI)	●				●		Red
17	Wiring fault		●			●		Red
18	Safety relay fault	●	●			●		Red
19	Combustion airflow switch fault in the rest position			●		●		Red
20	UV: no flame at the end of the 2 nd safety time (MTFI)	●		●		●		Red
21	Safety relay fault		●	●		●		Red
22	Supervisor processor fault	●	●	●		●		Red
23	Supervisor memory test fault				●	●		Red
24	Flame loss during the operation (AUTO)	●			●	●		Red
25	Supervisor processor data memory fault		●		●	●		Red
26	Supervisor processor internal fault	●	●		●	●		Red
27	Not used							
28	Not used							
29	Operating temperature out of range		●	●	●	●		Red
30	Code memory fault	●	●	●	●	●		Red
31	FR: external short circuit						●	Red
32	Check mode timeout (manual)	●					●	Red
33	False flame in stand-by mode		●				●	Red
34	Not used							
35	Internal processor timeout			●			●	Red
36	Internal processor timeout	●		●			●	Red
37	Combustion air check timeout		●	●			●	Red
38	Internal processor timeout	●	●	●			●	Red
39	Internal processor timeout				●		●	Red
40	Internal hardware fault	●			●		●	Red
41	Internal hardware fault		●		●		●	Red
42	Main processor fault	●	●		●		●	Red
43	Supervisor processor fault			●	●		●	Red
44	Supervisor processor timeout	●		●	●		●	Red
45	Off-specification mains voltage		●	●	●		●	Red

No.	Faults	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7
46	Off-specification mains voltage	•	•	•	•		•	Red
47	UV: Internal fault					•	•	Red
48	Supervisor processor fault	•				•	•	Red
49	Main processor fault		•			•	•	Red
50	Ignition feedback fault	•	•			•	•	Red
51	Pilot feedback fault			•		•	•	Red
52	Piloted valve feedback fault	•		•		•	•	Red
53	Actuator feedback waiting time expired		•	•		•	•	Red
54	Direct ignition valve feedback fault	•	•	•		•	•	Red
55	Internal processor fault				•	•	•	Red
56	UV: false flame during operation			•	•	•	•	Red
57	FR: false flame during operation	•		•	•	•	•	Red
58	T8 inlet fault		•	•	•	•	•	Red
59	Internal hardware fault	•			•	•	•	Red
60	Local reset fault	•	•	•	•	•	•	Red
61	Open POC fault		•		•	•	•	Red
62	UV: strong UV flame fault	•	•		•	•	•	Red
63	Internal hardware fault					•		Red

Tab. P
Fault explanation

No.	Faults	Cause	Solution
1	Post-diagnostics fault	Initial power diagnostics fault Make sure that the status of inlets and outlets is correct upon ignition	Check T12, T13 and T14
2	Local reset	The user started the manual reset or the reset switch is faulty	Check T21 inlet or reset for normal operation
3	Combustion air fan fault	No Air Check signal (T14) during the bleed cycle or Air Check signal loss during the burner operation	Check the fan or the air pressure switch
4	Supervisor processor diagnostics fault	The system detected the presence of voltage on T16, T17, T18 or T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
5	FR- No flame at the end of the 2 nd safety time (MTFI)	No flame at the end of the second safety time	Inspect the system, check the gas pressure, inspect the flame detection electrode, check the wiring, etc.
6	FR: internal circuit fault	Internal fault	Replace the control device
7	Internal communication fault	Internal fault	Replace the control device
8	Remote reset	The user pressed the remote reset button or the reset switch is discontinuous/dynamic	Check the remote switch
9	FR: internal fault	Internal fault	Replace the control device
10	Main processor fault	Internal fault	Replace the control device
11	Data memory test fault	Internal fault	Replace the control device
12	Data memory test fault	Internal fault	Replace the control device
13	Mains voltage or frequent fault	Off-specification power supply voltage and/or frequency	Check the input power supply
14	Internal processor fault	Internal fault	Replace the control device
15	Internal processor fault	Internal fault	Replace the control device
16	No flame: 1 st safety time (PTFI)	No flame at the end of the first safety time	Inspect the system, check the gas pressure, check the UV scanner, check the wiring, etc.
17	Wiring fault	The system detected the presence of voltage on critical terminals (T16, T17, T18 or T19) at the wrong moment or there is no voltage when necessary	Inspect the wiring and make sure that the system is operating on a single-phase line (50/60Hz)
18	Safety relay fault	Internal fault	Replace the control device
19	Combustion airflow switch fault in the rest position	Open the circuit upon T13 start-up	Check the wiring for the air pressure switch

No.	Faults	Cause	Solution
20	UV: no flame at the end of the 2 nd safety time (MTFI)	No flame at the end of the 2 nd safety time	Inspect the system, check the gas pressure, check the UV scanner, check the wiring, etc.
21	Safety relay fault	Internal fault	Replace the control device
22	Supervisor processor fault	Internal fault	Replace the control device
23	Supervisor memory test fault	Internal fault	Replace the control device
24	Flame loss during the operation (AUTO)	Loss of flame	Check the scanner or the fuel flow line
25	Supervisor processor data memory fault	Internal fault	Replace the control device
26	Supervisor processor internal fault	Internal fault	Replace the control device
27	Not used		
28	Not used		
29	Operating temperature out of range	Operating temperature below -40°C or above 70°C	Bring the control device within the specified temperature nominal values
30	Code memory fault	Internal fault	Replace the control device
31	FR: external short circuit	External short circuit between T24 and EARTH	Inspect the flame detection electrode
32	Check mode timeout (manual)	The interval for the manual mode (30 minutes) to end has elapsed	Exit the manual mode correctly to avoid timeout
33	False flame in stand-by mode	Unexpected flame (false or parasitic flame) detected during the Stand-by status	Check scanner or interference
34	Not used		
35	Internal processor timeout	Internal fault	Replace the control device
36	Internal processor timeout	Internal fault	Replace the control device
37	Combustion air check timeout	The system could not perform verification tests of the combustion air during the burner sequence	Check the wiring or the air pressure switch
38	Internal processor timeout	Internal fault	Replace the control device
39	Internal processor timeout	Internal fault	Replace the control device
40	Internal hardware fault	Internal fault	Replace the control device
41	Internal hardware fault	Internal fault	Replace the control device
42	Main processor fault	Internal fault	Replace the control device
43	Supervisor processor fault	Internal fault	Replace the control device
44	Supervisor processor timeout	Internal fault	Replace the control device
45	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
46	Off-specification mains voltage	Off-specification mains voltage/frequency	Check the mains voltage level or the frequency. Contact the factory if the problem persists
47	UV: Internal fault	Internal fault	Replace the control device
48	Supervisor processor fault	Internal fault	Replace the control device
49	Main processor fault	Internal fault	Replace the control device
50	Ignition feedback fault	The system detected the presence of voltage on T16 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
51	Pilot feedback fault	The system detected the presence of voltage on T17 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory
52	Piloted valve feedback fault	The system detected the presence of voltage on T19 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate If the problem persists, contact the distributor/factory
53	Actuator feedback waiting time expired	No actuator feedback on T8 for more than 10 minutes	Check the wiring Check the modulation equipment
54	Direct ignition valve feedback fault	The system detected the presence of voltage on T18 at the wrong moment or there is no voltage when necessary	Check the wiring and make sure that the earthing is appropriate. If the problem persists, contact the distributor/factory

No.	Faults	Cause	Solution
55	Internal processor fault	Internal fault	Replace the control device
56	UV: false flame during operation	False flame detected before ignition	Check the scanner
57	FR: false flame during operation	False flame detected before ignition	Check the wiring Check the scanner Make sure that earthing is appropriate
58	T8 inlet fault	The system detected the presence of voltage on T8 at the wrong moment or there is no voltage when necessary	Check the wiring Check the actuator
59	Internal hardware fault	Internal fault	Replace the control device
60	Local reset fault	Local reset button pressed for more than 10 seconds or reset button locked	If the problem persists, replace the control device
61	Open POC fault	The fuel valve is open at the wrong moment	Check the wiring
62	UV: strong UV flame fault	The scanner is too close to the flame	Increase the distance between the scanner and the flame OR use an orifice to reduce the view field
63	Internal hardware fault	Internal fault	Replace the control device

Tab. Q

A Appendix - Accessories**Soundproofing box kit**

Burner	Type	dB(A)	Code
PRESS 140 P/N PRESS 200 P/N	C4/5	10	3010404
PRESS 300 P/N PRESS 450 P/N	C7	10	3010376

Burner support kit

Burner	Code
PRESS 300-450 P/N	3000731

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	RWF50.2 RWF55.5	20100018 20101965
Pressure	0...2.5 bar	Output probe 4...20 mA	3010213		
	0...16 bar		3010214		
	0...25 bar		3090873		

Self-cleaning filter kit

Burner	Code
All models	Diameter 1" 1/2 (60° E at 50°C)
	Thermostatic heater with LED
	Heater
	Thermostat (two-stage/modulating)
	3010022
	3010060
	3010061
	3010062

Degasser kit

Burner	Code
PRESS 140 P/N PRESS 200 P/N	3000748
PRESS 300 P/N PRESS 450 P/N	3010012

Heavy oil kit

Burner	Code
All models	3000721

Cartridge filter kit

Burner	Code
All models	3005209

Potentiometer kit

Burner	Code
All models	20096322

Spacer kit

Burner	Code
PRESS 140 P/N	3000722
PRESS 200 P/N	3000722
PRESS 300 P/N	3000723
PRESS 450 P/N	3000751

Heavy oil pre-circulation kit

Burner	Code
PRESS 140-200 P/N	3000749
PRESS 300-450 P/N	3000750

Thermal relay kit

Burner	Code
PRESS 300 P/N	20163347



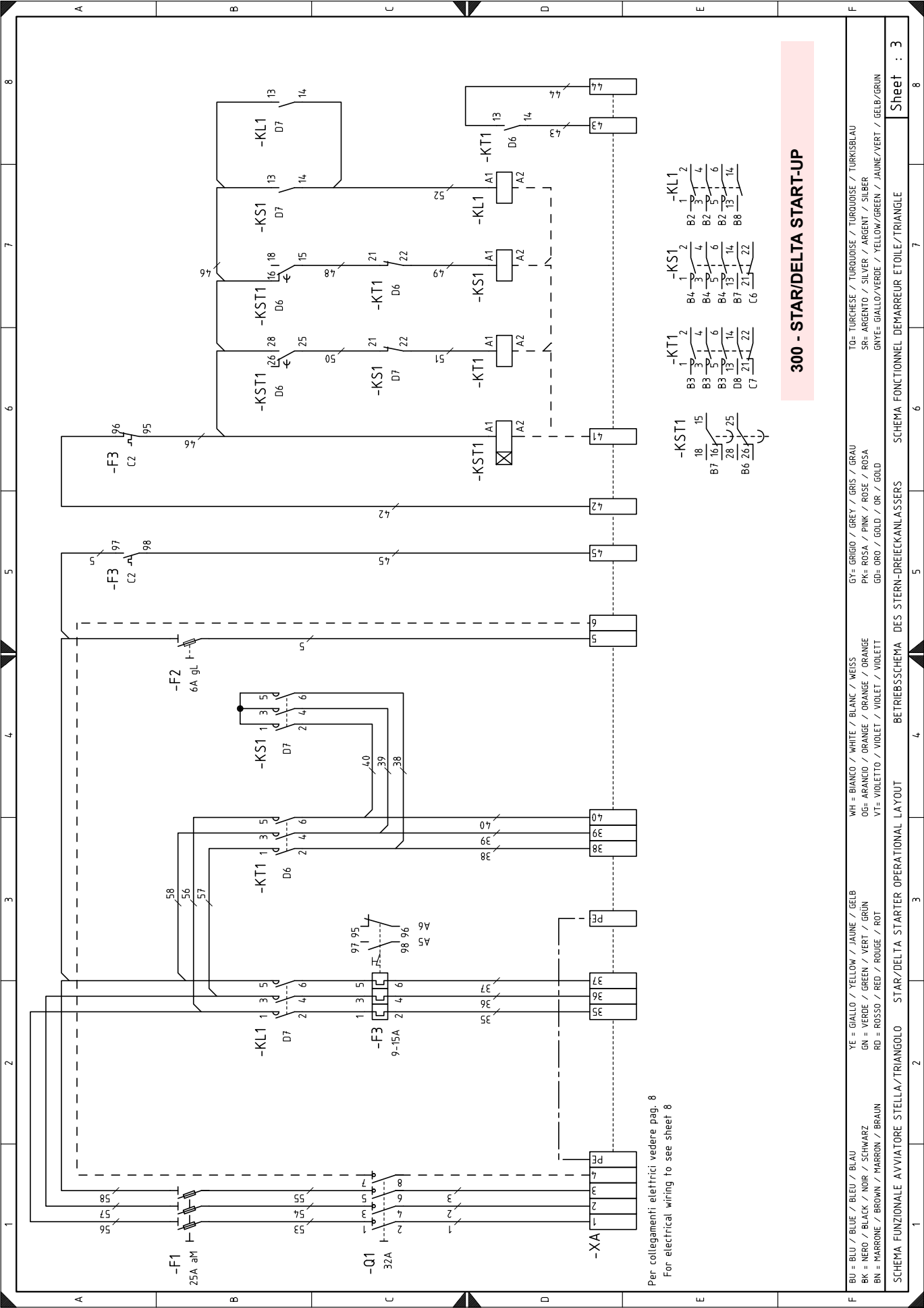
ATTENTION

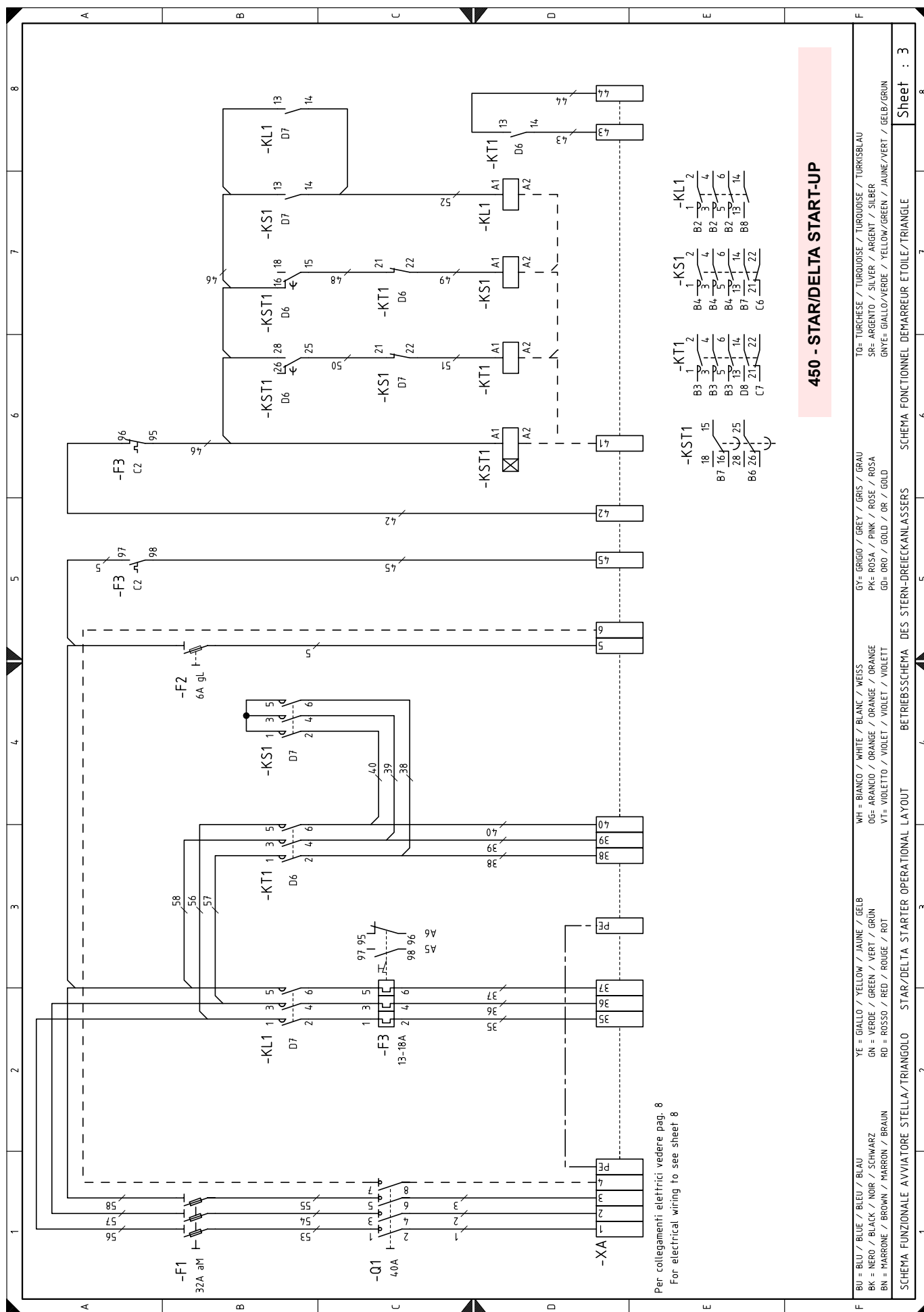
The installer is responsible for the addition of any safety device not foreseen in this manual.

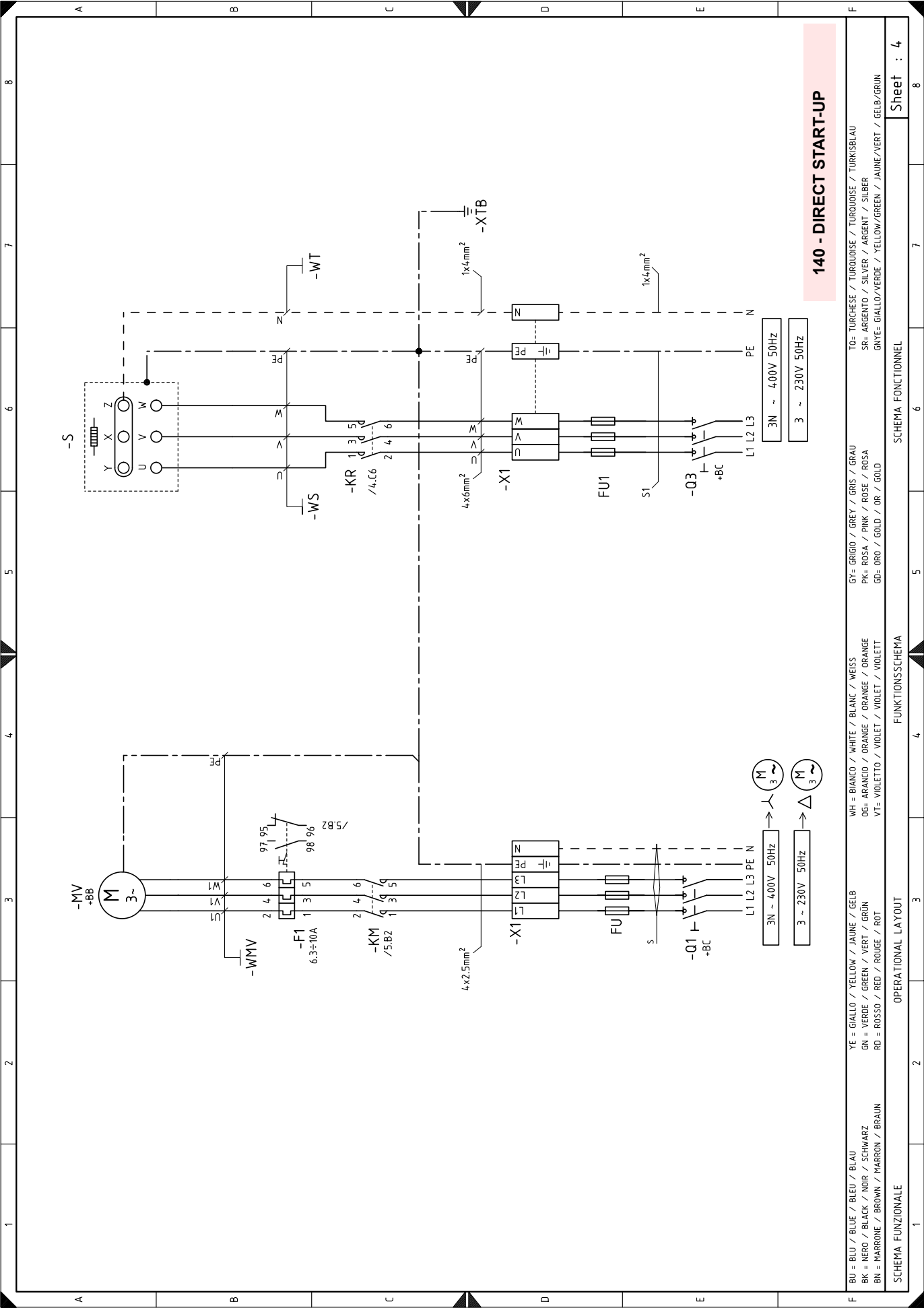
B Appendix - Electrical panel layout

1	Index of layouts
2	Reference indication
3	Functional layout Star/delta start-up
4	Functional layout
5	Functional layout RFGO-A23
6	Functional layout RFGO-A23
7	Functional layout RFGO-A23
8	Electrical wiring that is the responsibility of the installer
9	Electrical wiring that is the responsibility of the installer
10	Functional layout RWF50

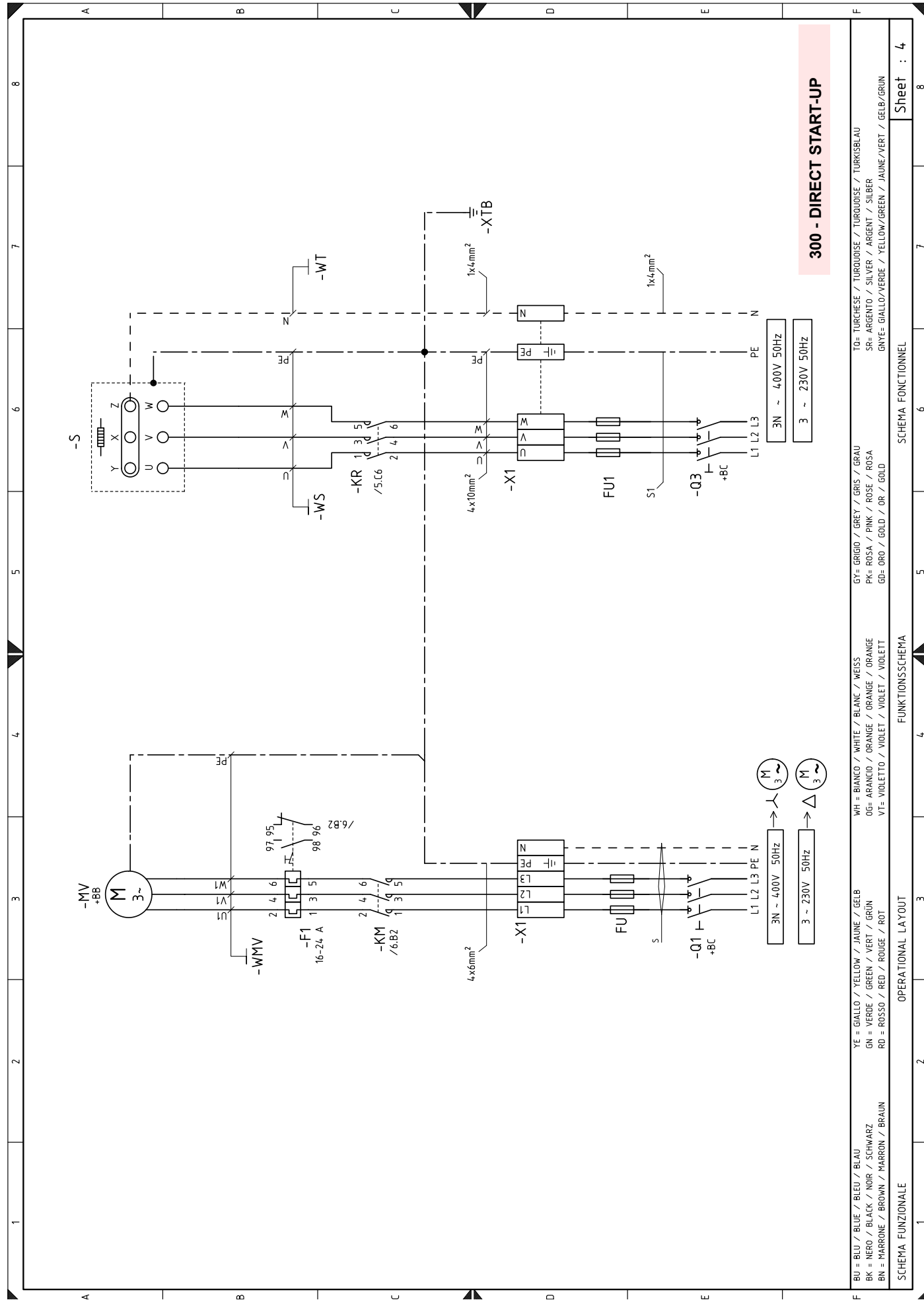
2 Reference indication

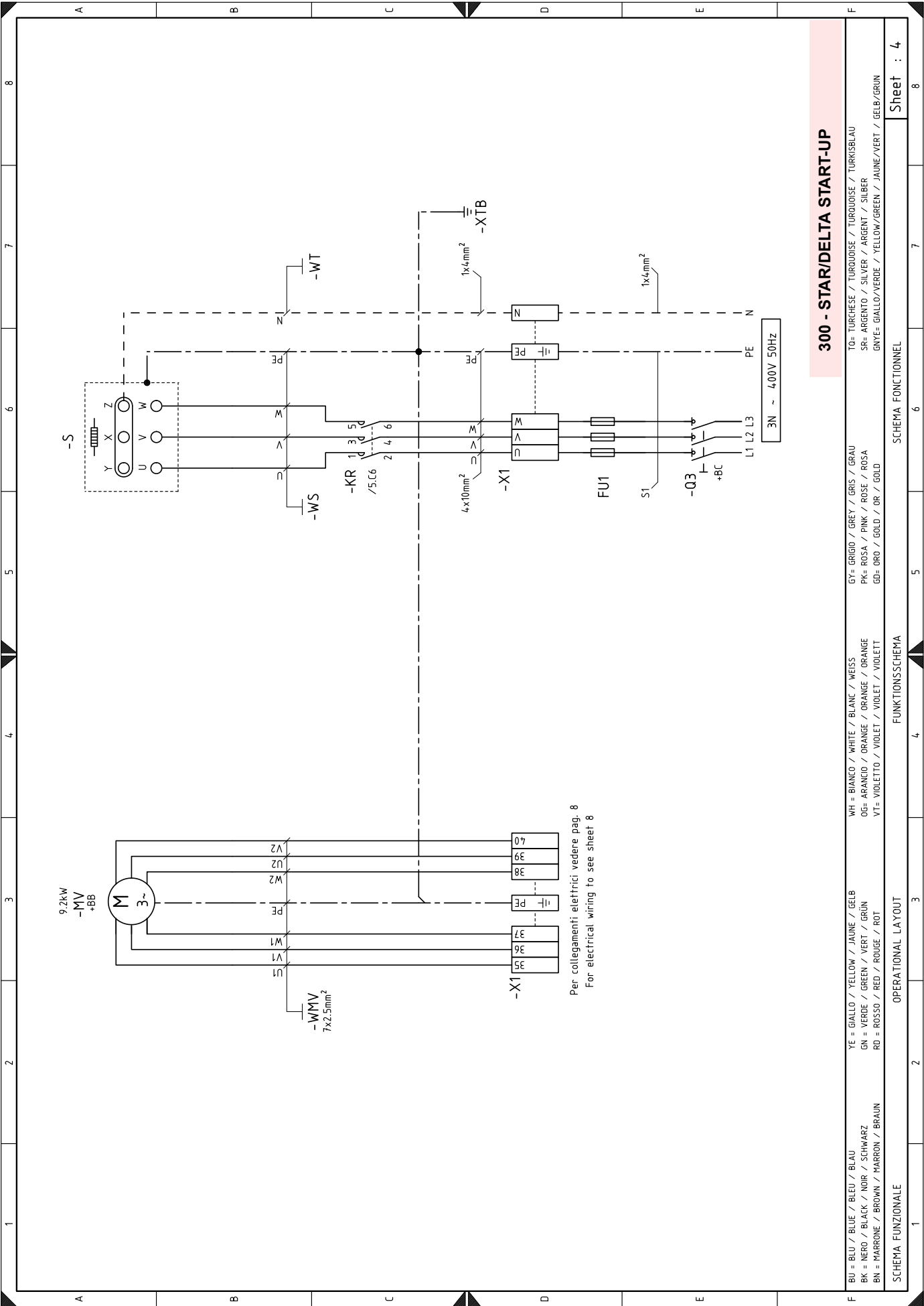


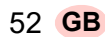




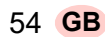




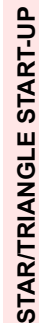


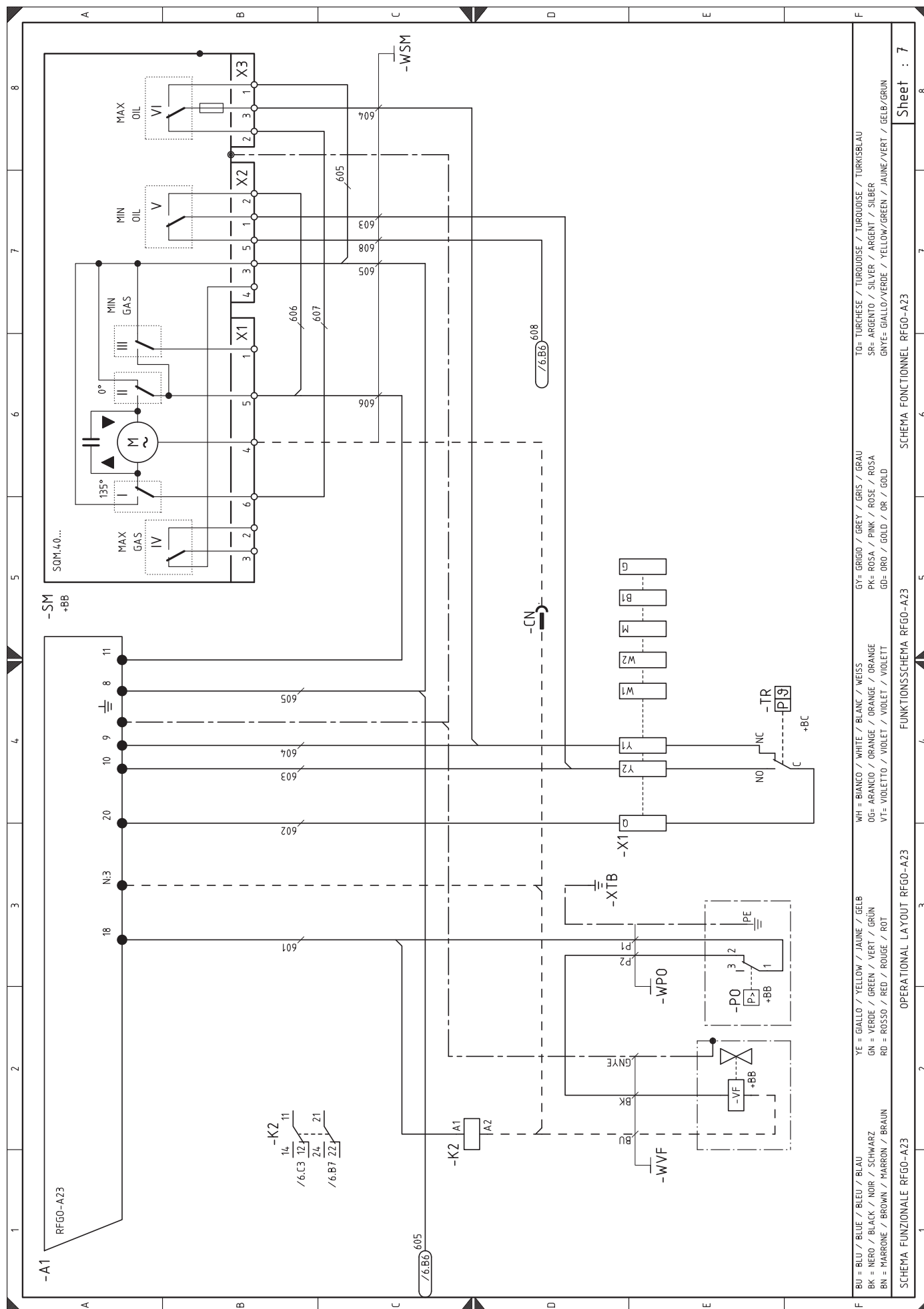




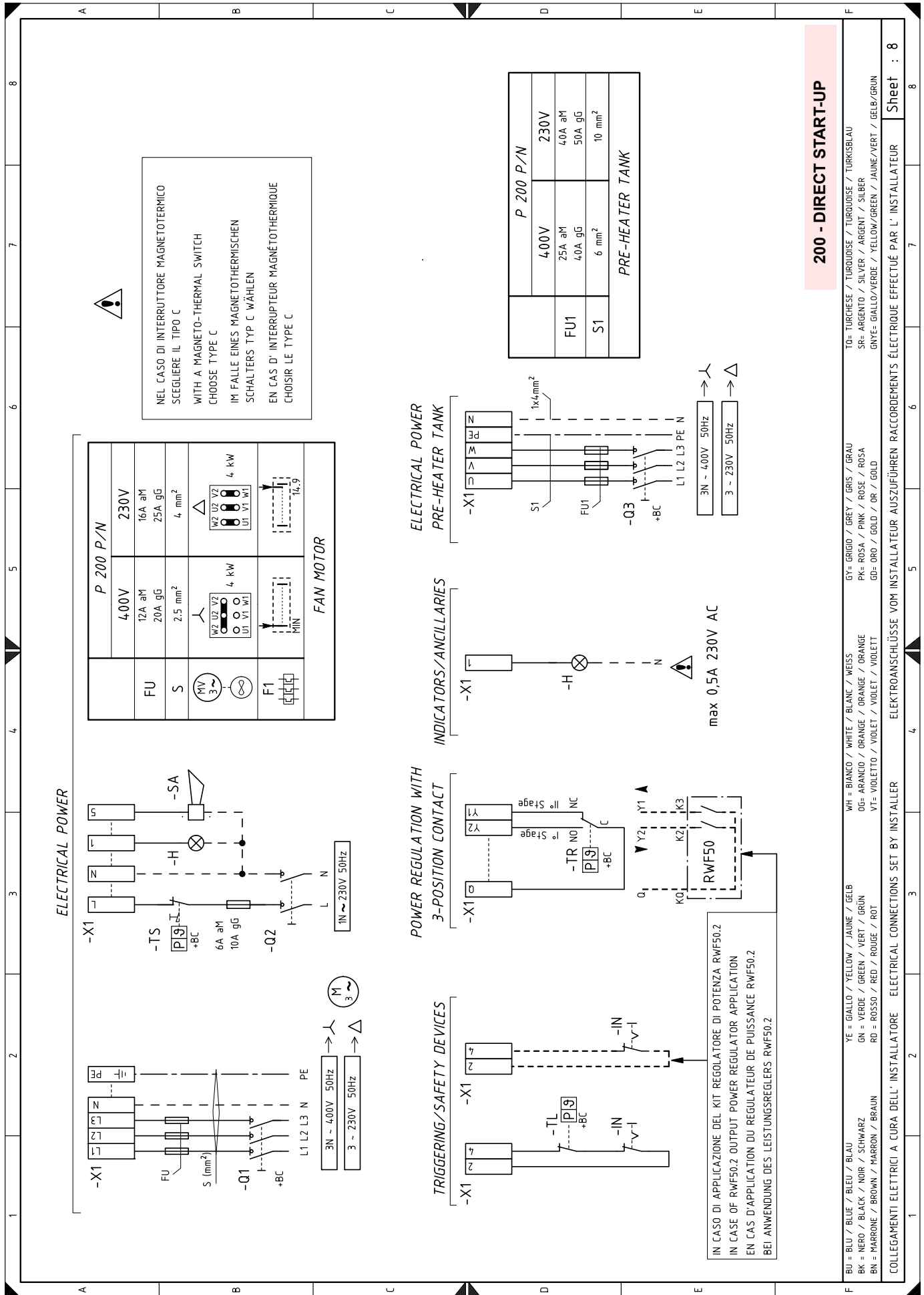




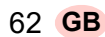


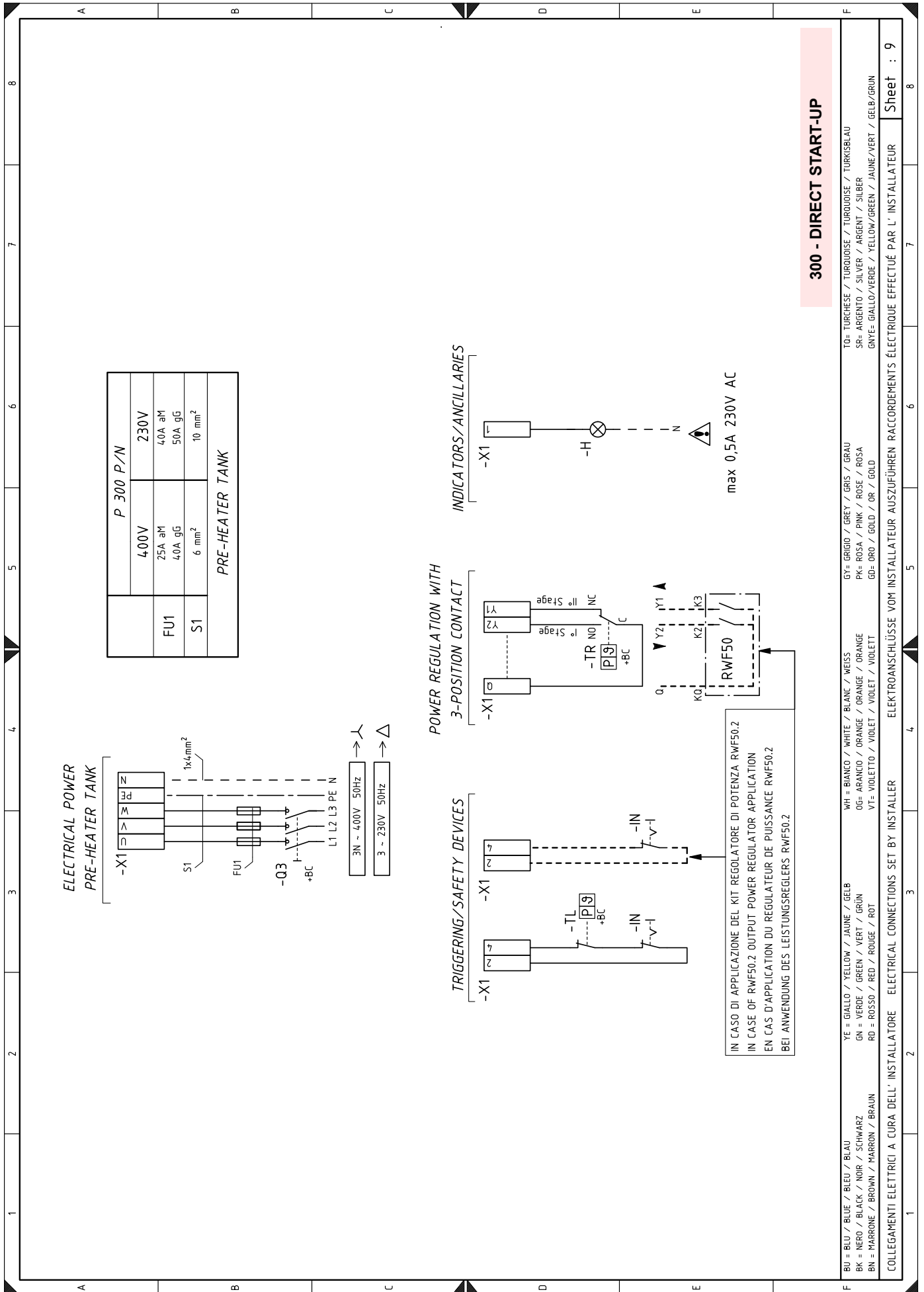


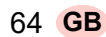












WIRING DIAGRAM KEY

A1	Electrical control box
B	Filter to protect against radio disturbance
B1	RWF50 output power regulator
BA	Current input DC 4...20mA
BA1	Current input DC 4...20mA for remote setpoint change
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 set- point
BV	Voltage input DC 0...10V
BV1	Voltage input DC 0...10V for remote setpoint change
C	Suppressor
CN	Servomotor connector
F1	Three-phase line fuses, fan motor thermal relay
F2	Single-phase line fuses
F3	Fan motor thermal relay
FU	Three-phase line fuses
FU1	Three-phase line fuses
K1	Relay
K2	Relay
KT	Timer relay
KL1	Line contactor
KM	Fan motor contactor
KR	Pre-heater contactor
KS1	Star contactor
KT1	Triangle contactor
KST1	Timer
MV	Fan motor
IN	Burner manual stop switch
H	Lockout signalling
H1	Lockout signalling
Q1	Three-phase disconnecting switch
Q3	Three-phase disconnecting switch
Q2	Single-phase disconnecting switch
Q4	Three-phase disconnecting switch
VF	Working valve
PO	Oil pressure switch
TA	Ignition transformer
TE	Electronic thermostat
TM	Maximum temperature thermostat
Tm	Minimum temperature thermostat
TL	Limit thermostat/pressure switch
TS	Safety thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
UV	Flame sensor
XPE	Control box earth
XRWF	RWF50 terminal board
S	Pre-heater
SA	High oil temperature alarm
SM	Servomotor
VS1	Safety valve 1
VS2	Safety valve 2
X1	Burner terminal strip
XA	Starter terminal strip
XBT4	3-wire probe Pt100 connector
XTB	Burner earth

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

RIELLO S.p.A.
I-37045 Legnago (VR)
Tel.: +39.0442.630111
[http:// www.riello.it](http://www.riello.it)
[http:// www.riello.com](http://www.riello.com)