GB

Forced draught gas burner

Modulating operation

CE

CODE	MODEL
20160126	ES 810/E BLU

20160897 (1) - 03/2019

Translation of the original instructions

Contents

Contents

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 Service 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.

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

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

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: 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 is present. An explosive atmosphere is defined as a mixture of dangerous substances with air, under atmospheric conditions, 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.

MOUNT CASING

This symbol indicates that it is mandatory to mount casing again after maintenance, cleaning or checks.

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 installation date, 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.

WARNING

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;
➤ use of the burner even following an error and/or an irregularity;
➤ 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;
➤ the 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 rules of safety 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.

In particular:

it can be applied to boilers operating with water, steam, diathermic oil, and to other users 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 room 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.

WARNING

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

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, he 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:

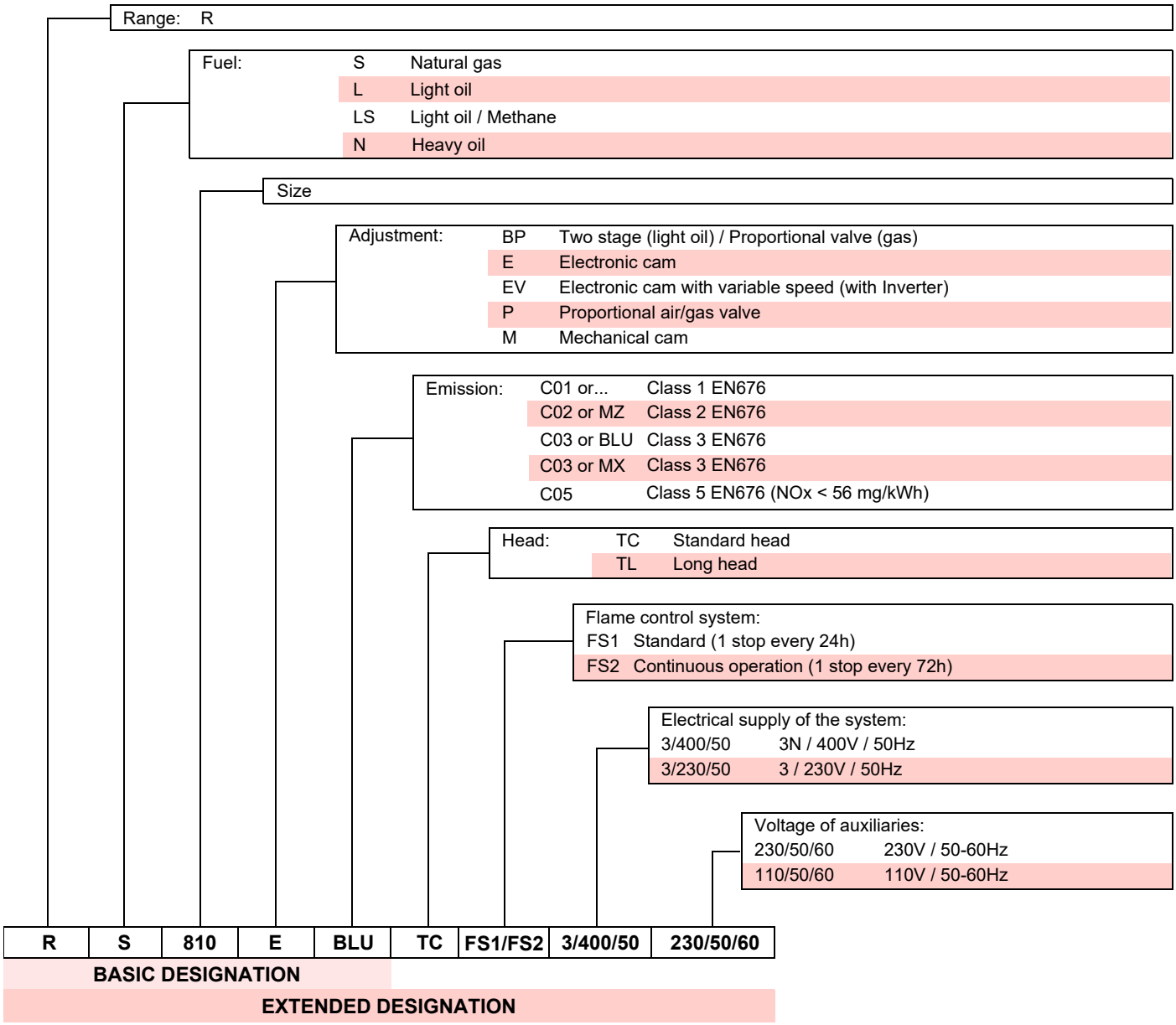
➤ the user must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ 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
ES 810/E BLU	3/400/50	Star/Delta	20160126

Tab. A

4.3 Burner categories - Countries of destination

Gas category	Destination country
I_{2H}	SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO
I_{2ELL}	DE
I_{2L} - I_{2E} - I_2 (43.46 ÷ 45.3 MJ/m3 (0°C))	NL
I_{2Er}	FR
$I_{2E(R)B}$	BE
I_{2E}	LU - PL

Tab. B

4.4 Technical data

Model			**ES 810/E BLU**
Power (1) Output (1)	min - max	kW	1200/3500 ÷ 8100
Fuels			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25
Gas pressure at max. output (2) - Gas: G20/G25		mbar	45.5/81.2
Operation			**FS1**: Intermittent (min. 1 stop in 24 hours) **FS2**: Continuous (min. 1 stop in 72 hours) The burner leaves the factory set for the continuous operation.
Standard applications			Boilers: water, steam, diathermic oil
Ambient temperature		°C	0 - 40
Combustion air temperature		°C max	60
Burner weight		Kg	300
Noise levels (3)	Sound pressure Sound power	dB(A)	88.1 99.1

Tab. C

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
(2) Pressure at the test point of the pressure switch (20)(Fig. 4) with zero pressure in the combustion chamber and at maximum burner output.
(3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the “Free Field” method, as per EN 15036, and according to an “Accuracy: Category 3” measuring accuracy, as set out in EN ISO 3746.

4.5 Electrical data

Model		**ES 810/E BLU**
Main electrical supply		3N ~ 400 / 230V +/-10% 50 Hz
Fan motor IE3	rpm V kW A	2950 400/690 22 39,4/22,7
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 8 kV 1 A - 20 mA
Absorbed electrical power	kW max	24,5
Protection level		IP 54

Tab. D

4.6 Burner equipment

Thermal insulation screen . . . . . No. 1
Gasket for gas train . . . . . No. 2
M 12 x 16 replacement screws to secure the combustion head . . No. 2
M18 x 70 screws to secure the burner to the boiler . . . . . No. 4
∅ 18 washer to secure the burner to the boiler . . . . . No. 4
M16 x 67 stud bolts to fix the gas elbow to the pipe coupling . . . . . No. 8
M16 nuts to fix the gas elbow to the pipe coupling. . . . . No. 8
∅ 16 washer to secure the gas flange . . . . . No. 8
Pressure kit switch . . . . . No. 1
Instructions . . . . . No. 1
Spare parts list . . . . . No. 1

4.7 Maximum dimensions

The maximum dimensions of the burner are shown in Fig. 1.

Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part turned on the hinge.

The maximum dimensions of the open burner are indicated by the A and R positions.

The I position is reference for the refractory thickness of the boiler door.

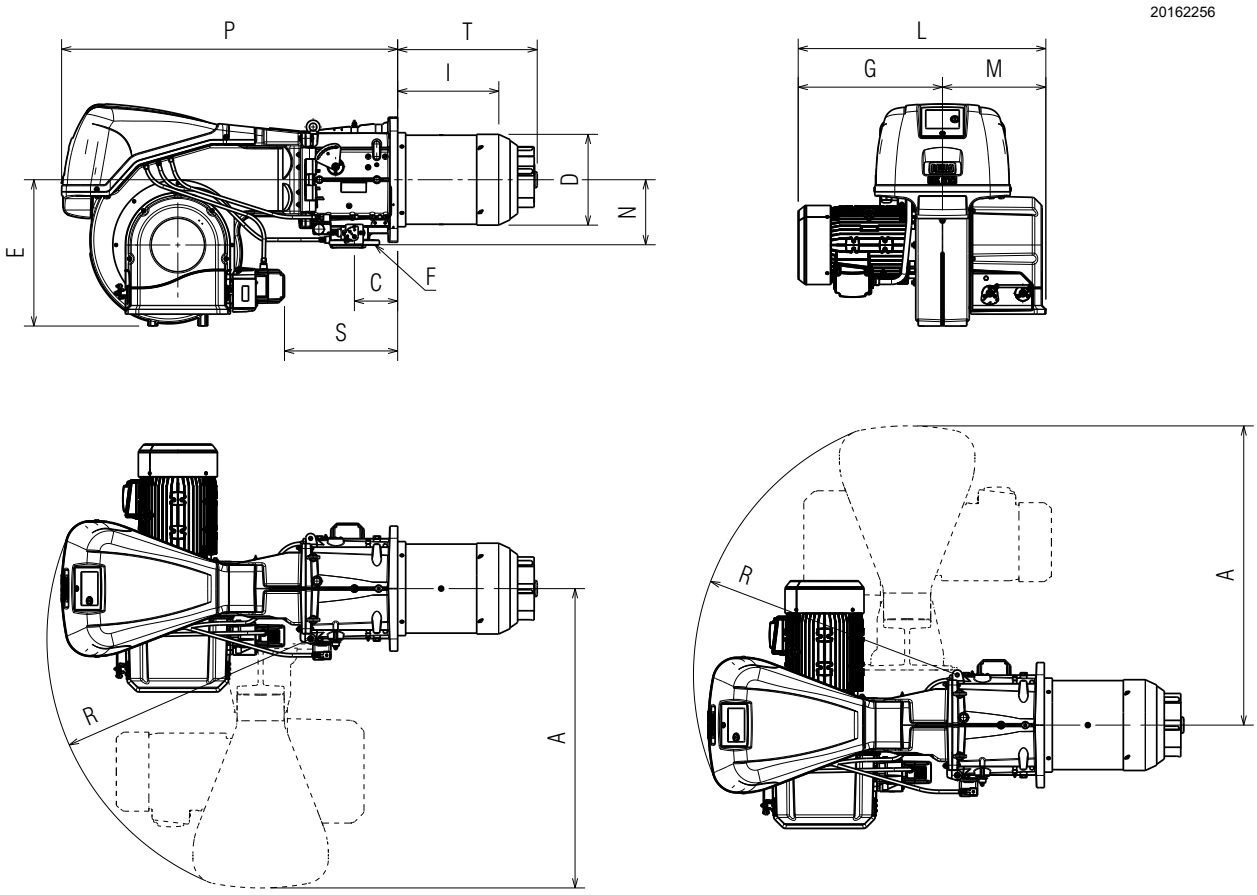


Fig. 1

mm	A	C	D	E	F	G	I	L	M	N	P	R	S	T
ES 810/E BLU	1197	173	363	585	DN80	577	405	990	413	260	1345	1055	420	558

Tab. E

4.8 Firing rates

The **MAXIMUM OUTPUT** is chosen from within the diagram area (Fig. 2).

The **MINIMUM OUTPUT** must not be lower than the minimum limit of the diagram:

Model	kW
ES 810/E BLU	1200

WARNING

The firing rate value (Fig. 2) has been obtained considering an ambient temperature of 20C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 23.

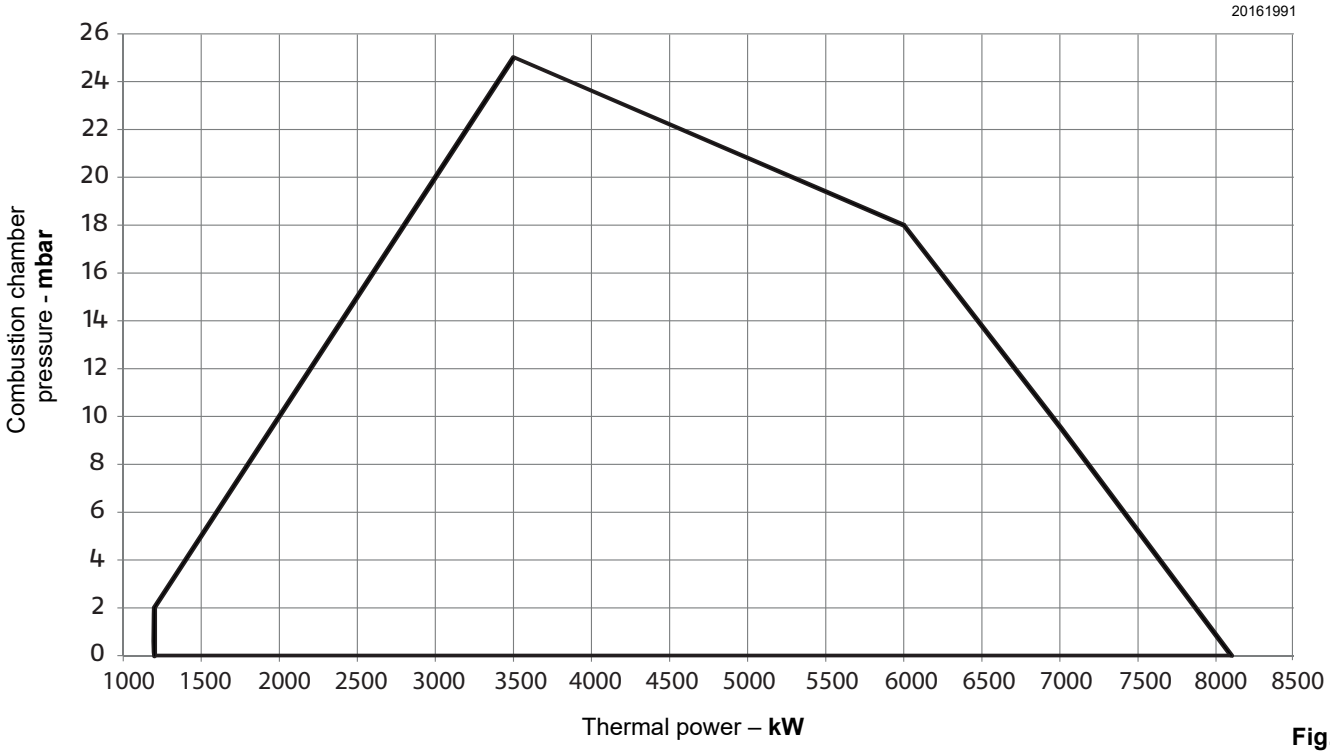


Fig. 2

4.9 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 676 regulations.

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

Example: ES 810/E BLU
Output 7000 kW - diameter 120 cm - length 6 m.

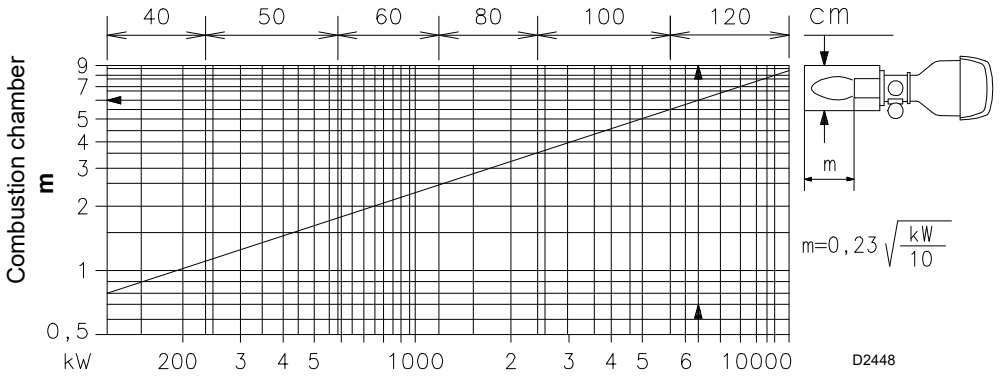


Fig. 3

4.10 Burner description

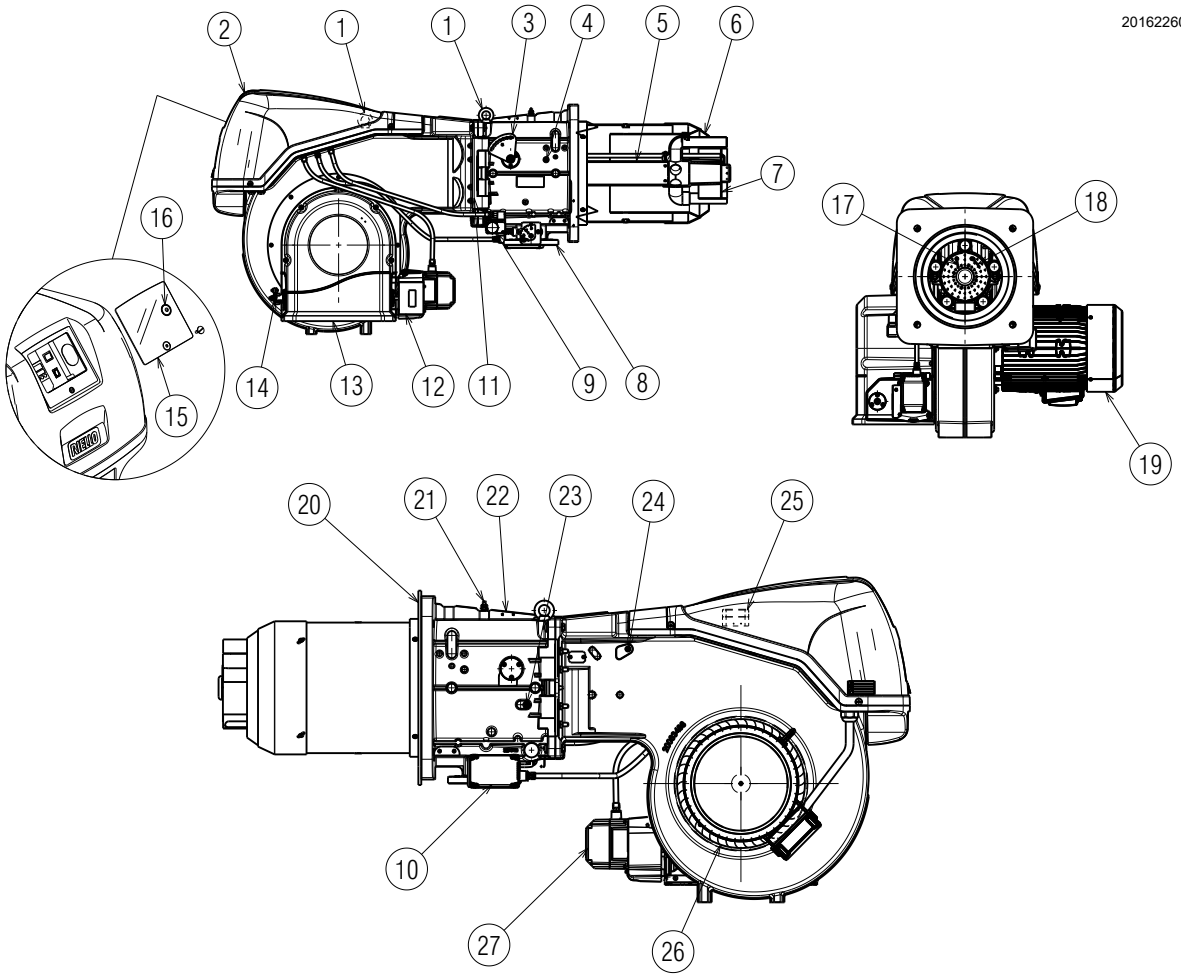


Fig. 4

1 Lifting rings
2 Cover for electrical panel
3 Lever for combustion head movement
4 Air pressure test point for combustion head
5 Combustion head
6 Shutter
7 Flame stability disc
8 Gas inlet flange
9 Maximum gas pressure switch
10 Gas servomotor
11 Hinge for burner opening
12 Protection
13 Air inlet for fan
14 Air damper control lever
15 Protection for viewing port
16 Reset button
17 Ignition electrode
18 Flame sensor probe
19 Fan motor
20 Gasket for boiler fixing
21 Gas pressure test point for combustion head
22 Pipe coupling
23 Air pressure test point for combustion head
24 Pressure test point for air pressure switch “+”
25 Air pressure switch
26 Fan
27 Servomotor for air dampers

CAUTION

The burner can be opened to the right or to the left without links to the fuel supply side.

When the burner is closed, the hinge can be refitted on the opposite side.

4.11 Electrical panel description

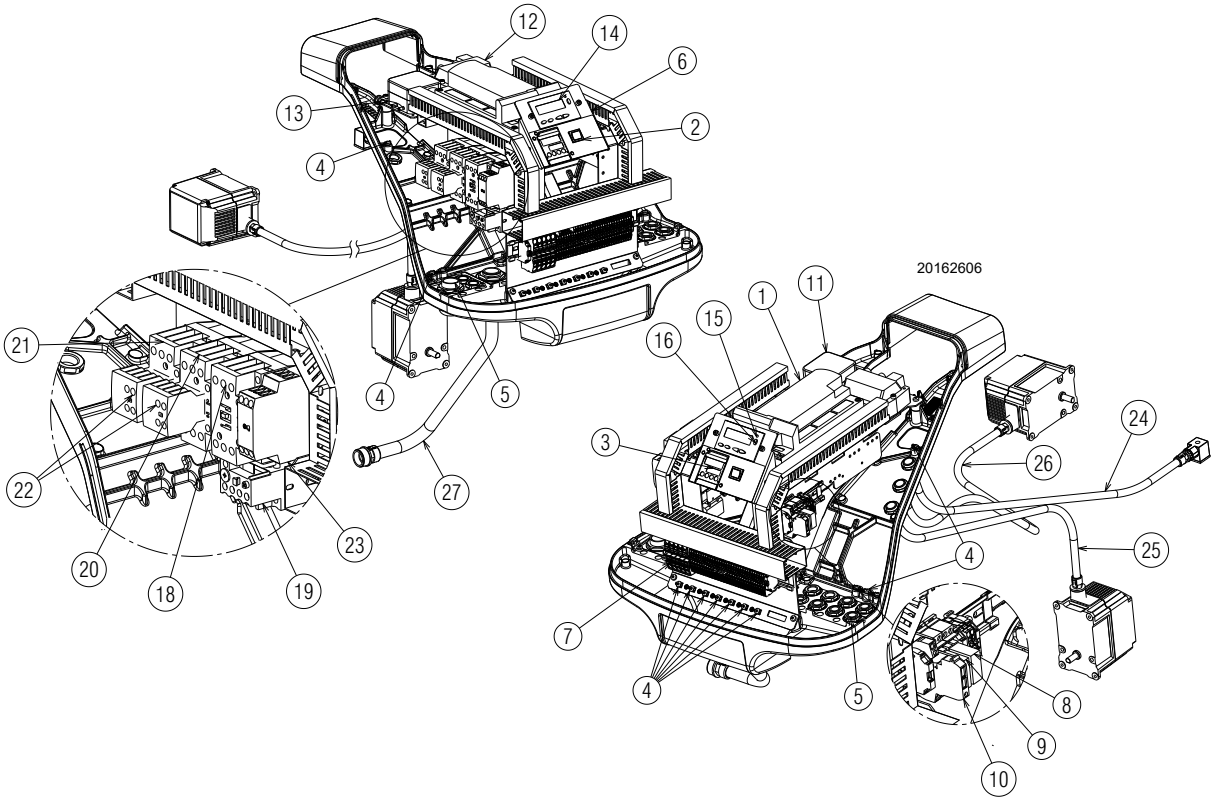


Fig. 5

1 Electrical control box
2 ON/OFF selector
3 Output regulator
4 Earth terminal
5 Supply cables and external connections passage. See section “Electrical wiring” on page 26.
6 Bracket for applying the kits
7 Main terminal supply board
8 Relay with clean contacts for signalling the burner is in lockout
9 Relay with clean contacts for signalling the burner is operating
10 Auxiliary circuits fuse (includes a spare fuse)
11 Air pressure switch
12 Ignition transformer
13 Ionisation probe cable
14 Operator panel with LCD display
15 Light signalling burner lockout
16 Reset button
17 Control terminal board 4-20 mA
18 Star/triangle start-up line contactor
19 Thermal relay (with RESET button)
20 Triangle contactor
21 Star contactor
22 Auxiliary contacts
23 Timer for star/triangle start up
24 Sheath for maximum gas pressure switch
25 Sheath for air servomotor
26 Sheath for gas servomotor
27 Sheath for motor cables

4.12 Control box for the air/fuel ratio (REC37...)

Warnings

WARNING

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

The control box is a safety device! Avoid opening or modifying it, or forcing its operation.

Risk of explosion!

An incorrect configuration can provoke fuel overcharging, with the consequential risk of explosion! The operators must be aware that the incorrect setting of the visualisation and operation control box, and of the positions of the fuel and/or air actuators, can cause dangerous conditions during burner operation.

The control box is a system to check the burners, based on a microprocessor and equipped with components to adjust and supervise medium and large capacity forced draught burners.
The control box contains the following components:

– burner management system with valve leak detection control device;
– electronic device to check the fuel/air ratio with a maximum of 2 actuators;
– Modbus interface.

WARNING

For the safety and reliability of the control box, comply with the following instructions:

➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
➤ Before carrying out any checks on the wiring, fully isolate the system from the electric mains (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
➤ Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
➤ After every intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then perform 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.
➤ During the programming of the air-fuel ratio control curves, the technician should constantly observe the quality of the combustion process (for example using a gas analyser) and, in the event of inadequate combustion values or dangerous conditions, should take appropriate action, for example shutting down the system manually.
➤ The plugs of the connection cables or other accessories can be disconnected when the system has been switched off.

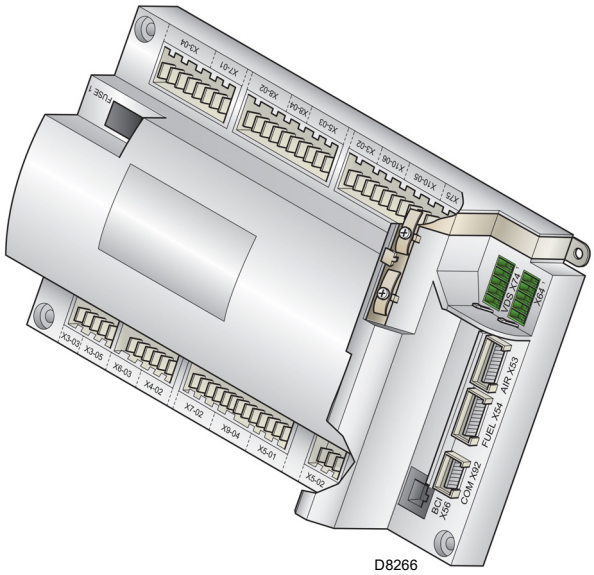


Fig. 6

➤ The connections to the actuators do not provide a secure separation from the mains voltage.Before connecting or changing the actuators the system should be off to avoid any conditions that could cause the formation of condensation or 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.
➤ Static charges must be avoided since they can damage the control box's electronic components when touched.

Technical data

Control box	Mains voltage	AC 230 V -15% / +10%
	Mains frequency	50 / 60 Hz ±6%
	Power absorption	< 30 W
	Safety class	I, with components in compliance with II and III, according to DIN EN 60730-1
Load on 'input' terminals	Fuse on the control box (can be inspected)	6.3 AT
	Undervoltage	
	– Safety switch-off from operating position to mains voltage	< AC 186V
	– Restart when mains voltage picks up	> AC 195V
Cable length	– Main line AC 230 V	Max. 100 m (100 pF / m)
	– Control load (TL1-TL2)	Max. 20 m (100 pF/m)
	– External reset button (RS)	Max 20 m (100 pF/m)
	– Load exit (DC 0/2...10V)	Max. 10 m (100 pF/m)
	– Fuel valve	Max. 3 m (100 pF/m)
	– Other lines	Max. 3 m (100 pF/m)
Environmental conditions	**Storage**	DIN EN 60721-3-1
	– Climatic conditions	Class 1K3
	– Mechanical conditions	Class 1M2
	– Temperature range	-20 ... +60 °C
	– Humidity	< 95% RH
	Transport	DIN EN 60721-3-2
	– Climatic conditions	Class 2K2
	– Mechanical conditions	Class 2M2
	– Temperature range	-30 ... +60 °C
	– Humidity	< 95% RH
	Operation	DIN EN 60721-3-3
	– Climatic conditions	Class 3K3
	– Mechanical conditions	Class 3M3
	– Temperature range	-20 ... +60 °C
	– Humidity	< 95% RH

Tab. F

WARNING

Condensation, the formation of ice and the entry of water are prohibited!

4.13 Operation sequence of the burner

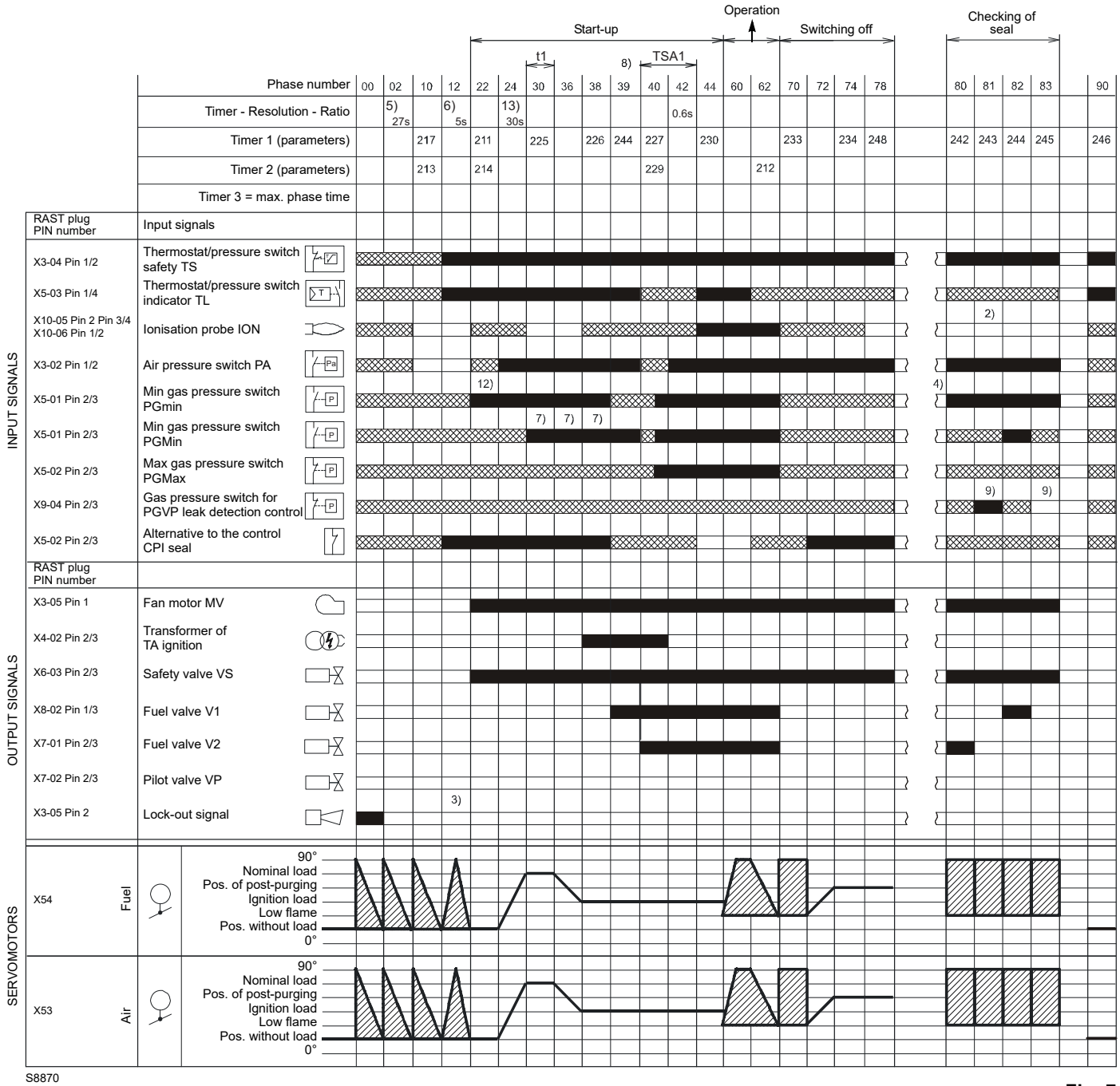


Fig. 7

Signal ON

Signal OFF

Both states are allowed

4.13.1 List of phases

Phase	Description
Ph00	Lockout phase
Ph02	Safety phase
Ph10	Closing paused
Ph12	Standby
Ph22	Fan motor (MV) = ON Safety valve (VS) = ON
Ph24	The burner moves to the pre-purging position
Ph30	Pre-purging time
Ph36	The burner moves to the ignition position
Ph38	Ignition phase (TA) = ON
Ph39	Minimum gas pressure switch test (PGmin.)
Ph40	Fuel valve (V) = ON
Ph42	Ignition (TA) = OFF

Phase	Description
Ph44	t44 = interval time 1
Ph60	Operation
Ph62	The burner moves to the switching off position
Ph70	t13 = post-combustion time
Ph72	The burner moves to the post-purging position
Ph74	t8 = post-purging time
Ph78	t3 = post-purging time
Ph80	Emptying time (valve leak detection)
Ph81	Atmospheric time test (valve leak control)
Ph82	Filling time (valve leak detection)
Ph83	Pressure test time (valve leak detection)
Ph90	Standby time due to lack of gas

4.14 Operator panel operation

The control box REC37 ... is connected directly to the operator panel (Fig. 8).

The buttons allow you to programme the operation and diagnostics menus.

The burner management system is shown on the LCD display (Fig. 9). To simplify the diagnostics, the display shows the operating status, type of problem, and when the problem arose.

WARNING

- ➤ Observe the procedures and adjustments shown below.
- ➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- ➤ If the display and operator panel are dirty, clean them with a dry cloth.
- ➤ Protect the panel from excessive temperatures and liquids.

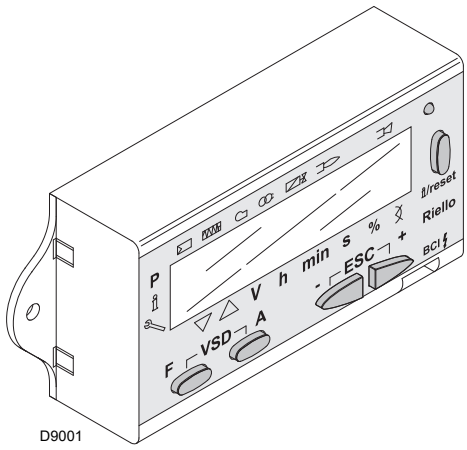


Fig. 8

4.14.1 Description of the symbols on the display

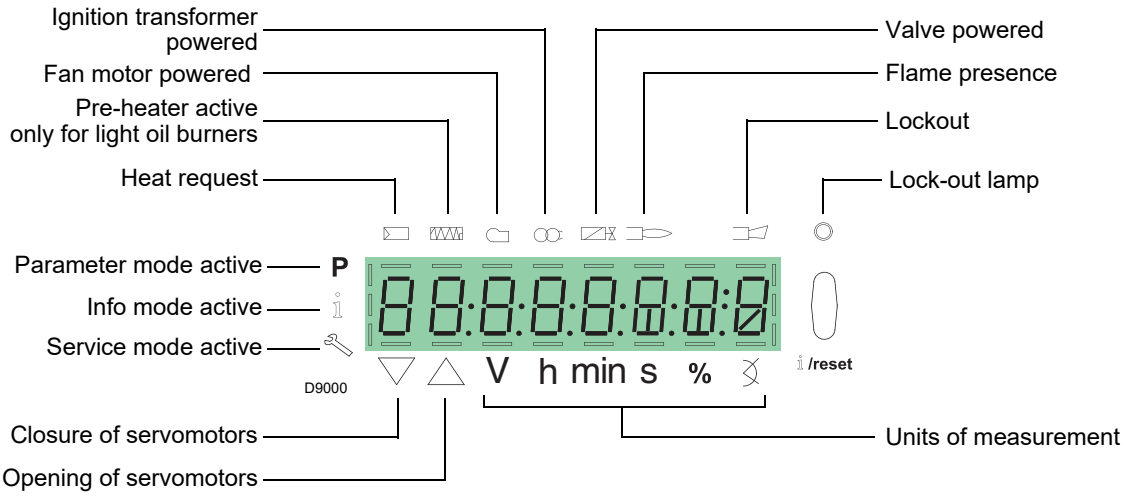
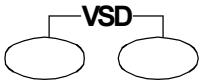
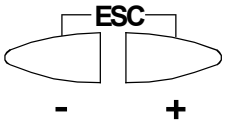


Fig. 9

The brightness of the display can be adjusted from 0 ... 100% with the parameter 126.

4.14.2 Description of the buttons

Button	Button	Function
 F	**Button F**	To adjust the fuel servomotor (keep F pressed and adjust the value by pressing - or +)
 A	**Button A**	To adjust the air servomotor (keep A pressed and adjust the value by pressing - or +)
 F A	**Buttons A and F VSD function**	To change the mode setting parameter P (simultaneously press F and A plus - or +)
 i /reset	**Button Info and Enter**	• **Enter** in Parameters Mode • **Reset** in the event of a lockout • Access to a lower level of the menu • To navigate in **Mode Info** or **Service** and permits: – the selection of the parameter (flashing symbol)(press for <1 s) – access to a lower level of the menu (press from 1...3 s) – access to a higher level of the menu (press from 3...8 s) – access to another Mode (press for > 8 s)
 -	**Button -**	Lowering the value – Access to a lower point of the modulation curve – Scrolling the parameter list
 +	**Button +**	Increasing the value – Access to a higher point of the modulation curve – Scrolling the parameter list
 - +	**Buttons - and +**	Quit function (ESC) (press - and + simultaneously) – Does not confirm the value – Access to a higher level of the menu

Tab. G

4.15 Servomotor (SQM33....)

Warnings

WARNING

To avoid accidents, material or environmental damage, observe the following instructions!
Do not open, modify or force the actuators.

- ➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- ➤ Before modifying the wiring of the servomotor in the connection area, 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.
- ➤ After every intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order, then make the safety checks.
- ➤ 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.

WARNING

Assembly notes

The connection between the actuator command shaft and the control element must be rigid, without any mechanical play.

Installation notes

➤ The static torque is reduced when the electrical supply of the actuator is switched off.

WARNING

During the maintenance or replacement of the actuators, be careful not to invert the connectors.

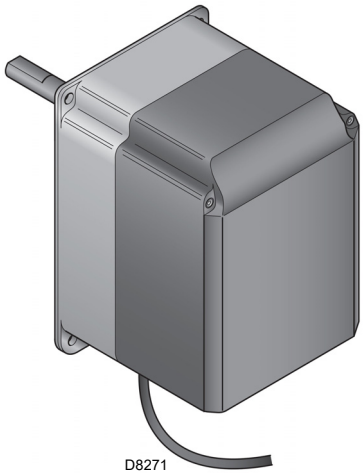


Fig. 10

Technical data

Model	SQM33.5...
Operating voltage	AC / DC 24V ± 20%
Safety class	2 according to EN 60 730
Power absorption	Max. 10 W
Protection level	IP54 in compliance with EN 60 529-1
Cable connection	RAST2,5, connectors
Rotation direction	- GAS servomotor: clockwise - Air servomotor: anticlockwise
WARNING The rotation direction is set in the factory using the control box parameter REC ...	
Rated torque (max.)	3 Nm
Static torque (max.)	3 Nm
Running time (min.) for 90°	5....120 s.
Weight	approx. 1.4 kg
Environmental conditions:	
Operation	DIN EN 60 721-3-3
Climatic conditions	Class 3K5
Mechanical conditions	Class 3M4
Temperature range	-20...+60°C
Humidity	< 95% rh

Tab. H

WARNING

Condensation, the formation of ice and the entry of water are prohibited!

4.16 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), see the table in the wiring diagram.

To reset, in case of an intervention of the thermal relay, press the “RESET” button 1) of Fig. 11.

The red “TEST” button 3) opens the NC (95-96) contact and stops the motor.

CAUTION

The automatic reset (Position “A” button 1) can be dangerous. This operation is not anticipated in the burner's operation, leave it always on “H”. **Therefore do not position the “RESET” button 1) on “A”.**

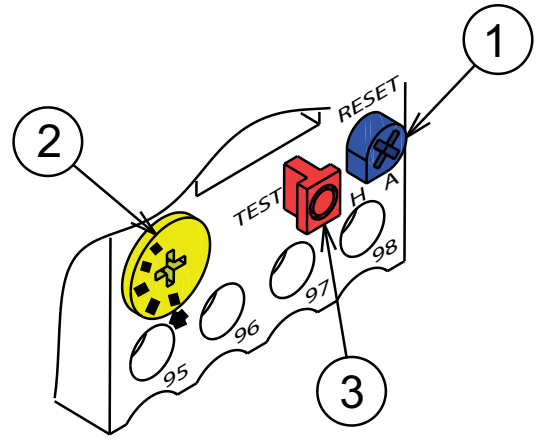


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Fig. 11

5 Installation

5.1 Notes on safety for the installation

After carefully cleaning all around the area where the burner will be installed, and arranging the correct lighting of the environment, 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.

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.

5.2 Handling

The packaging of the burner includes a wooden platform, so it is possible to move the burner (still packaged) with a transpallet truck or fork lift truck.

The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitableness of the available means of handling.
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).
When handling, keep the load at not 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.

5.3 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.

Checking the characteristics of the burner

Check the identification label of the burner, showing:
- ➤ the model (**A**) (Fig. 12) and type of burner (**B**);
- ➤ the year of manufacture, in cryptographic form (**C**);
- ➤ the serial number (**D**);
- ➤ the data for electrical supply and the protection level (**E**);
- ➤ the absorbed electrical power (**F**);
- ➤ the types of gas used and the relative supply pressures (**G**);
- ➤ the data of the burner's minimum and maximum output possibilities (**H**) (see Firing rate)
  Warning. The burner output must be within the boiler's firing rate;
- ➤ the category of the appliance/countries of destination (**I**).

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

5.4 Operating position

WARNING

- ➤ The burner is designed to operate only in positions **1**, **2**, **3** and **4** (Fig. 13).
- ➤ 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.
- ➤ Installation **5** is prohibited for safety reasons.

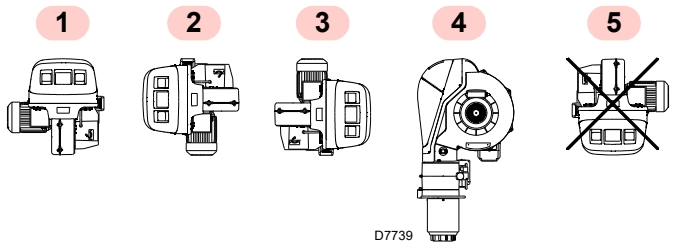

Fig. 13

5.5 Removal of the locking screws from the shutter

WARNING

Remove the screws and the nuts 1)-2)(Fig. 14), before installing the burner on the boiler.

Replace them with the screws 3) M12 X 16 supplied with the burner.

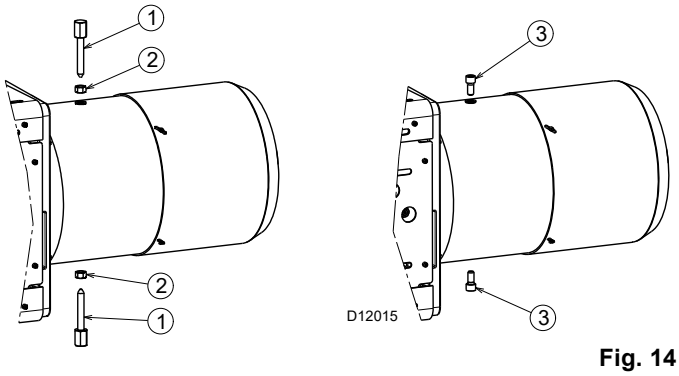

Fig. 14

5.6 Preparing the boiler

5.6.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 15. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

5.6.2 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 refractory.

For boilers with front flue passes 1) (Fig. 16) or flame inversion chamber, a protection in refractory material 5) must be inserted between the boiler fettling 2) and the flame funnel 4).

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

For boilers with a water-cooled frontpiece, a refractory lining 2)-5) (Fig. 16) is not necessary, unless expressly requested by the boiler manufacturer.

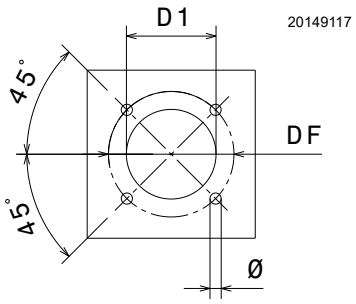

Fig. 15

mm	D1	DF	∅
ES 810/M BLU	400	495	M18

Tab. I

5.7 Securing the burner to the boiler

Prepare a suitable lifting system using rings 3)(Fig. 16).

➤ Fit the heat insulation supplied onto the blast tube (4) (Fig. 16).
➤ Fit the entire burner onto the boiler hole prepared previously (Fig. 15), and fasten with the screws supplied.

WARNING

The seal between burner and boiler must be airtight.

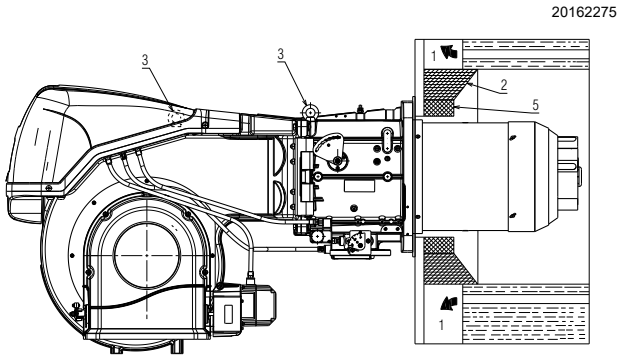

Fig. 16

5.8 Access to head internal part

➤ Remove the gas servomotor
➤ Disconnect the socket 2) of the gas pressure switch.
➤ Remove the 4 fixing screws 3).
➤ Open the burner on the hinge as in Fig. 17.
➤ Unhook the probe cables and electrode 4).
➤ Turn the underneath part of the elbow 5) anticlockwise up to release it from its housing.
➤ Undo the screw 6) with pressure test point.
➤ Remove the internal part of the head 7).

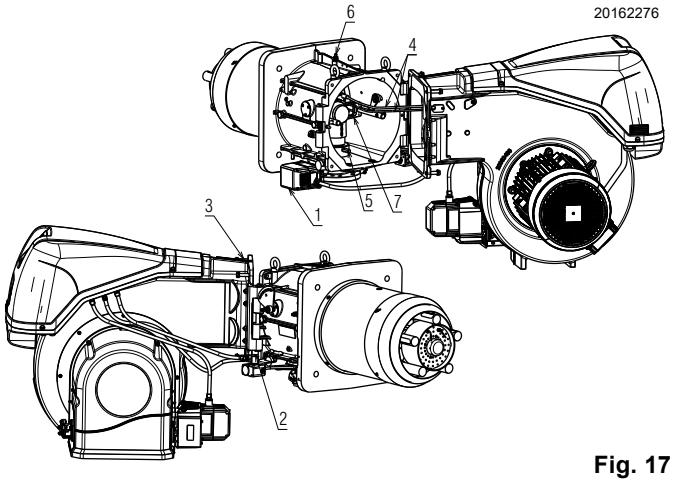

Fig. 17

5.9 Probe-electrode position

WARNING

Check that the probe and the electrode are placed as in Fig. 18, according to the dimensions indicated.

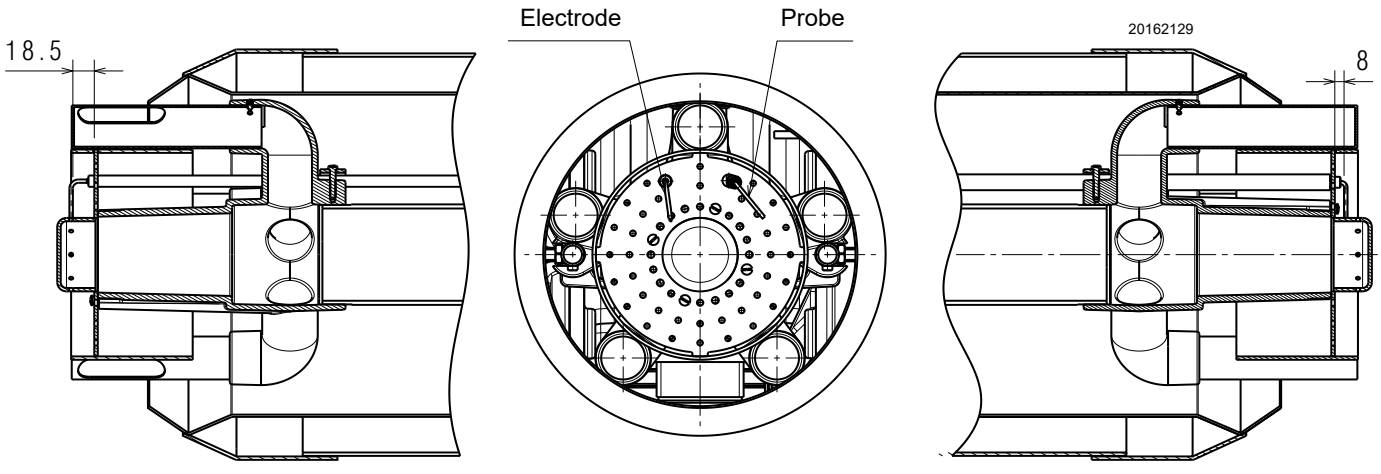

Fig. 18

5.10 Combustion head adjustment

In order to optimise performance, the burner is equipped with a variable geometry combustion head which operates on the basis of the delivered output.

According to the same rotation of the air servomotor, it is possible to change the combustion head opening by moving the lever 2)(Fig. 19) on the holes (1-2-3-4-5-6), after loosening the screw 1). The choice of the hole (1-2-3-4-5-6) to use is based on the following table, according to the required output.

These output values may not match with the actual values as the combustion conditions change according to the plant.

The factory regulation corresponds to the minimum output (coupling position: **1)**.

Coupling position	Output (kW)
1	1800
2	2300
3	3900
4	6500
5	7200
6	8100

Tab. J

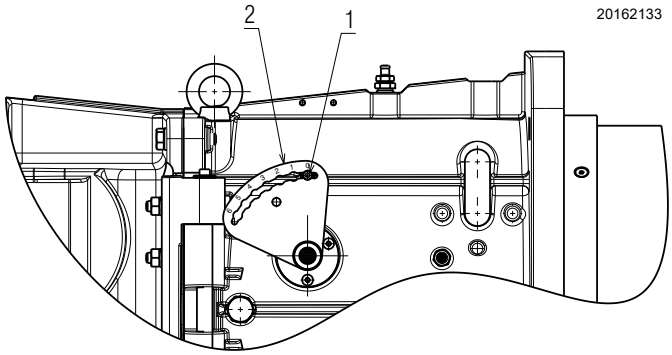

Fig. 19

5.11 Gas feeding

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

Precautions: avoid knocking, attrition, sparks and heat.

Make sure that the fuel interception tap is closed before performing any operation on the burner.

WARNING

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

5.11.1 Gas feeding line

Key (Fig. 20 - Fig. 21 - Fig. 22 - Fig. 23)

1 Gas input pipe
2 Manual valve
3 Vibration damping joint
4 Pressure gauge with push-button cock
5 Filter
6A Includes:
- filter
- working valve
- safety valve
- pressure adjuster

6B Includes
- working valve
- safety valve
- pressure adjuster

6C Includes
- safety valve
- working valve

6D Includes:
- safety valve
- working valve

7 Minimum gas pressure switch
8 Leak detection control, provided as an accessory or integrated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
9 Gasket, for “flanged” versions only
10 Pressure adjuster
P2 Up-line pressure of valves/adjuster
P3 Upstream pressure of the filter
L Gas train, supplied separately
L1 The responsibility of the installer

WARNING

For applications according to the Pressure Equipment Directive PED 2014/68/EU, the installer is required to provide:
- suitable means for draining and venting as defined in clause K.10 of DIN EN 676;
- valve proving system as defined in clause K. 14.4 of DIN EN 676.

MBC “threaded”

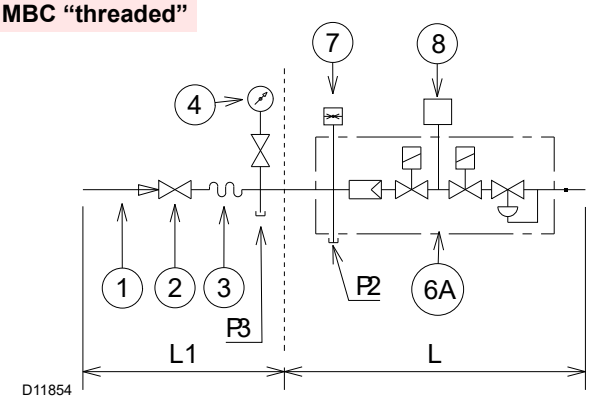

Fig. 20

MBC “flanged”

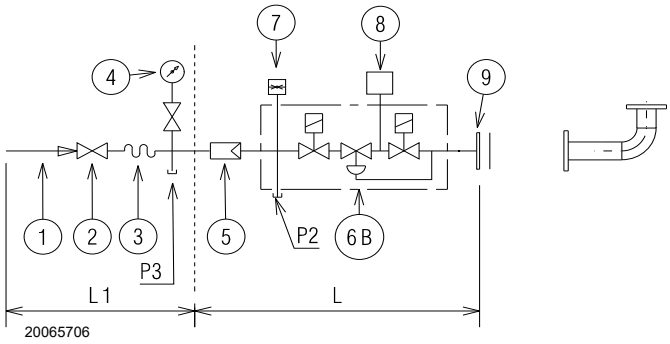

Fig. 21

DMV “flanged or threaded”

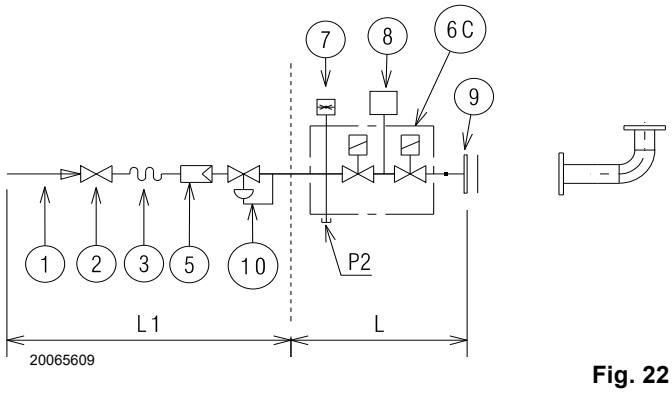

Fig. 22

CB “flanged or threaded”

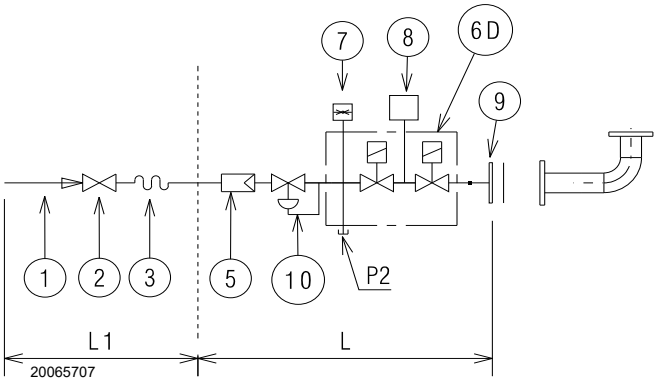

Fig. 23

5.11.2 Gas train

Approved according to standard EN 676 and provided separately from the burner.

To select the correct gas train model, refer to the supplied “Burner-gas train combination” manual.

5.11.3 Gas train installation

Disconnect the electrical power using the main system switch.

Check that there are no gas leaks.

Beware of train movements: danger of crushing of limbs.

Make sure that the gas train is properly installed by checking for any fuel leaks.

The operator must use appropriate tools for installation.

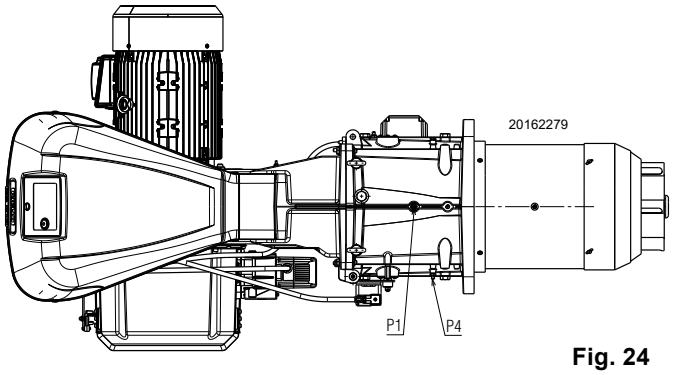

Fig. 24

5.11.4 Gas pressure

Tab. K indicates the minimum pressure drops along the gas supply line, depending on the maximum burner output.

The values shown in Tab. K refer to:
– Natural gas G 20 NCV 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
– Natural gas G 25 NCV 8.13 kWh/Sm^3 (7.0 Mcal/Sm^3)

Column 1

Pressure drop on combustion head.
Gas pressure measured at the test point P1) (Fig. 24), with:
- Combustion chamber at 0 mbar;
- Burner working at maximum output;
- Combustion head adjusted as in page 23.

Column 2
Pressure loss at gas butterfly valve 10) (Fig. 22) with maximum opening: 90°.

Calculate the approximate maximum output of the burner in this way:
– subtract the combustion chamber pressure from the gas pressure measured at test point P1) (Fig. 24).
– Find, in the table Tab. K related to the burner concerned, the pressure value closest to the result of the subtraction.
– read the corresponding output on the left.

Example for ES 810/E BLU with G20 natural gas:
Maximum output operation

Gas pressure at test point P1)(Fig. 24)	=	37.5 mbar
Pressure in combustion chamber	=	2 mbar
37.5 - 2	=	35.5 mbar

A pressure of 35.5 mbar, column 1, corresponds in the table Tab. K to an output of 7.000 kW.

This value serves as a rough guide; the effective output must be measured at the gas meter.

To calculate the required gas pressure at test point P1) (Fig. 24), set the MAX output required from the burner operation:
– find the nearest output value in the table Tab. K for the burner in question.
– read, on the right (column 1), the pressure at the test point P1)(Fig. 24).
– Add this value to the estimated pressure in the combustion chamber.

Example for ES 810/E BLU with G20 natural gas:
Required burner maximum output operation: 7.000 kW

Gas pressure at an output of 4,500 kW	=	35.5 mbar
Pressure in combustion chamber	=	2 mbar
35.5 + 2	=	37.5 mbar

Pressure required at test point P1)(Fig. 24).

The heat output and gas pressure data in the head refer to operation with gas butterfly valve fully open (90°).

kW	**1** Δp (mbar)		**2** Δp (mbar)	
	G 20	G 25	G 20	G 25
3500	9.4	12.8	0.6	0.7
4000	12.8	17.7	0.7	0.9
4500	16.2	22.5	0.9	1.1
5000	19.6	27.3	1.2	1.4
5500	23.0	32.1	1.4	1.7
6000	26.4	37.0	1.7	2.0
6500	30.9	44.7	2.0	2.3
7000	35.5	52.4	2.3	2.7
7500	40.9	59.8	2.6	3.1
8100	46.3	67.1	3.0	3.5

Tab. K

5.12 Electrical wiring

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 ES 810/E BLU burners equipped with REC 37... can operate in FS1 or FS2 mode. See the specific REC 37... manual for continuous/intermittent operation (FS2/FS1). Refer to the following notes for the type of operation that has been set.
- The FS1 burners have been set for intermittent operation. This means that the burner should compulsorily be stopped at least once every 24 hours to enable the electric control box to check its own safety and efficiency at start-up. Normally the boiler's thermostat/pressure switch ensures that the burner stops. If this is not the case, a time switch should be fitted in series to TL to stop the FS1 burner at least once every 24 hours. Refer to the wiring diagrams.
- The FS2 burners have been set for continuous operation. This means that the burner should compulsorily be stopped at least once every 72 hours to enable the electric control box to check its own safety and efficiency at start-up. 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 FS2 burner at least once every 72 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;
  - use a multiple pole switch with at least a 3 mm gap between the contacts (overvoltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.
- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Live and neutral should not be mixed up (this could cause dangerous malfunctions, a loss of protection against electric shocks, etc..).
- Make sure the cable grommets of the connected cables comply with the relevant standards (e.g.EN60730 and EN60 335).
- When wiring the unit, make sure that AC 230V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Before carrying out any maintenance, cleaning or checking operations:


DANGER

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


DANGER

Turn off the fuel interception tap.


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 in compliance with the EN 60 335-1 standard.

5.12.1 Supply cables and external connections passage

All the cables to be connected to the burner must be threaded through cable grommets. The use of the cable grommets can take various forms; by way of example see Fig. 25.

Key (Fig. 25)

1 Electrical supply - Bore for M32
2 Consents and safety devices - Bore for M20
3 Minimum gas pressure switch - Bore for M20
4 VPS gas valve leak detection control kit- Bore for M20
5 Gas train - Bore for M20
6 Available - Bore for M20
7 Available - Bore for M16

A Fan motor
B Maximum gas pressure switch
C GAS servomotor
D AIR servomotor

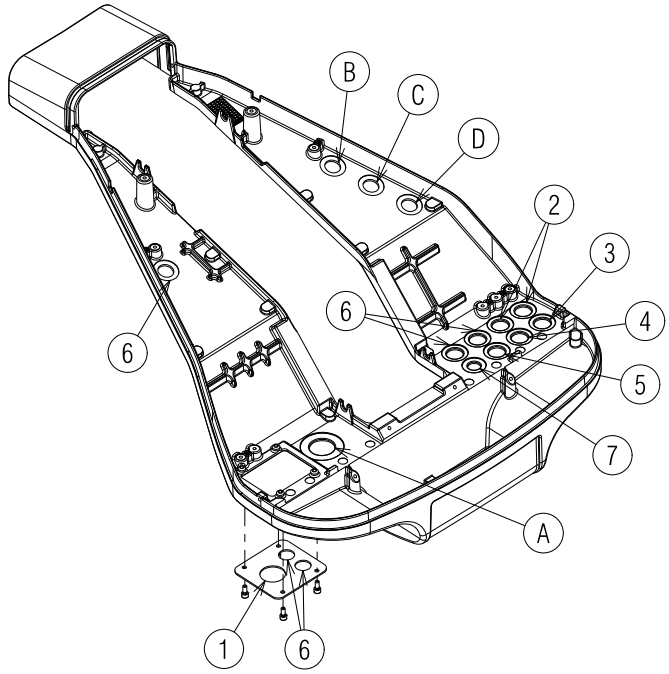

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Fig. 25

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

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up

WARNING

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.

WARNING

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

WARNING

Before igniting the burner, see the paragraph "Safety test - with gas feeding closed" on page 47.

6.2 Adjustments prior to ignition

Combustion head adjustment is already described on page 23.

In addition, the following adjustments must also be made:

- ➤ Open manual valves up-line from the gas train.
- ➤ Adjust the minimum gas pressure switch to the start of the scale.
- ➤ Adjust the maximum gas pressure switch to the end of the scale.
- ➤ Adjust the air pressure switch to the start of the scale.
- ➤ Purge the air from the gas line.
  We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- ➤ Fit a U-type pressure gauge or a differential pressure gauge (Fig. 26), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber.
  The manometer readings are used to calculate MAX burner output using the Tab. K.
- ➤ Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied. This operation is unnecessary if each of the two solenoids is equipped with a pilot light that signals voltage passing through.

CAUTION

Before starting up the burner, it is good practice to adjust the gas train so that ignition takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.

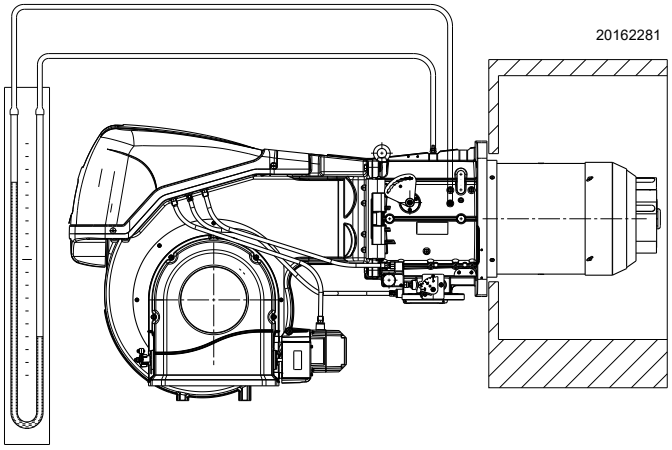


Fig. 26

6.3 Burner start-up

Electrically power the burner using the disconnecting switch

on the boiler panel.

Close the thermostats/pressure switches and set the switch of Fig. 27 to "1/ON".

DANGER

Make sure that the lights or testers connected to the solenoids, or the pilot lights on the solenoids themselves, indicate that no voltage is present.

If voltage is present, stop the burner immediately and check the electrical connections.

As the burner is not fitted with a device to check the sequence of the phases, it may be that the rotation of the motor

is incorrect.

As soon as the burner starts up, go in front of fan motor cooling fan and check it is rotating anticlockwise or else in the direction of the arrow shown in the diagram Fig. 4.

If this is not the case:

– put the switch of Fig. 27 to "0/OFF" and wait until the control box carries out the switching off phase;
– disconnect the burner form the electrical supply.

DANGER

Invert the phases on the three-phase power supply.

This operation must be carried out with the electrical supply disconnected.

Follow the Start-up procedure.

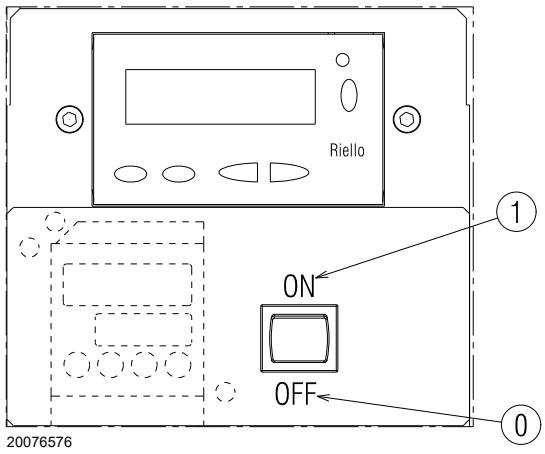


Fig. 27

6.4 Air / fuel adjustment

Air/fuel synchronisation is carried out with the relevant air and gas servomotors by logging a calibration curve by using the electronic cam.

It is advisable, to reduce the loss and for a wide calibration field, to adjust the servomotors to the maximum of the output used, the nearest possible to the maximum opening (90°).

The choking of the air, taking into account the maximum combustion output, takes place by varying the adjustment of the combustion head (See “Combustion head adjustment” on page 23.).

On the gas butterfly valve, the fuel step according to the burner output required, with servomotor completely open, is carried out by the pressure stabiliser on the gas train.

6.4.1 Air adjustment for maximum output

➤ Adjust the servomotor to maximum opening (nearly 90°) so that the air butterfly valves are entirely open 17) Fig. 4 on page 11.

6.4.2 Air/fuel adjustment and output modulation system

The air/gas regulator and output modulation system equipping **RS/E** series burners performs a number of integrated functions to optimise burner function, in both individual installations and in combination with other units (e.g. double furnace boiler or multiple heat generators in parallel).

The basic system functions control:

1 The dosage of the air and fuel through positioning using direct servocommands of the relevant valves eliminating the possible play in the calibration systems with mechanical cam lever mechanisms, used on traditional modulating burners.
2 The modulation of the burner output in accordance with the load required by the system, with maintenance of the pressure or temperature of the boiler at the operating values set.
3 The sequence (cascade adjustment) of more than one boiler through the suitable connection of the various units and the activation of the internal software of the individual systems (option).

Further interfaces and communication functions with computers, for remote control or integration in central supervision systems are available on the basis of the configuration of the system.


WARNING

The first start up and every further internal setting operation of the adjustment system or the expansion of the base functions require access by means of password and are to be carried out by service personnel who are especially trained for the internal programming of the instrument and the specific application created with this burner.

6.4.3 Burner adjustment

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

Adjust in sequence:
1 - Output upon ignition
2 - MAX output
3 - MIN output
4 - Intermediate outputs between Min. and Max.
5 - Air pressure switch
6 - Maximum gas pressure switch
7 - Minimum gas pressure switch

6.4.4 Output upon ignition

Ignition must occur at a lower output than the max. operation output. Regulations provide that the ignition output of this burner must be equal to or less than 1/3 of the MAX operation output.

Example:
MAX operation output of 8100 kW.
The ignition output must be equal to or less than 2700 kW with ts = 3s

In order to measure the ignition output:
➤ disconnect the plug-socket 13)(Fig. 4 on page 11) on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
➤ perform 10 consecutive ignitions with lockouts;
➤ on the meter, read the quantity of gas burned:
This quantity must be equal to, or lower than, the quantity given by the formula, for ts = 3s:

$$\mathbf{Vg} = \frac{\mathbf{Qa}\ \text{(max. burner delivery)}\ \mathbf{x\ n\ x\ ts}}{\mathbf{3600}}$$

Vg volume supplied in ignitions carried out (Sm^3)
Qa ignition delivery (Sm^3/h)
n number of ignitions (10)
ts safety time (sec)

Example for gas G20 (9.45 kWh/Sm^3):
ignition output 8100 kW corresponding to 857 Sm^3/h.

$$\frac{\mathbf{200}}{\mathbf{9.45}} = \mathbf{21.16\ Sm^3/h}$$

After 10 ignitions with their lockouts, the delivery indicated on the meter must be equal to or less than: 857 : 360 = 2.38 Sm^3.

Air adjustment

The adjustment of the air is carried out by changing the angle of the air damper (17) Fig. 4 on page 11) changing the degrees of the air servomotor inside the electronic cam programme.

6.4.5 Maximum output

The MAX output must be set within the firing rate (Fig. 2 on page 10).

Adjustment of gas delivery

Measure the gas delivery on the gas meter.
As an indicative guide it can be taken from Tab. O on page 38, just read the gas pressure on the pressure gauge (shown in Fig. 34 on page 48) and follow the instructions given on page 25.
– If it is necessary to reduce it, lower the output gas pressure via the pressure adjuster located beneath the gas valve.
– If delivery needs to be increased, increase the adjuster outlet gas pressure.

Air adjustment

If necessary vary the degrees of the air servomotor.

6.4.6 Minimum output

The MIN output must be set within the firing rate (Fig. 2 on page 10).

6.5 Final adjustment of the pressure switches

6.5.1 Air pressure switch

Adjust the air pressure switch (Fig. 28) after performing all other burner adjustments with the air pressure switch set to the start of the scale.

With the burner operating at minimum output, insert a combustion analyser in the stack, slowly close the suction inlet of the fan (for example, with a piece of cardboard) until the CO value does not exceed 100 ppm.

Slowly turn the appropriate knob clockwise until the burner goes into lockout.

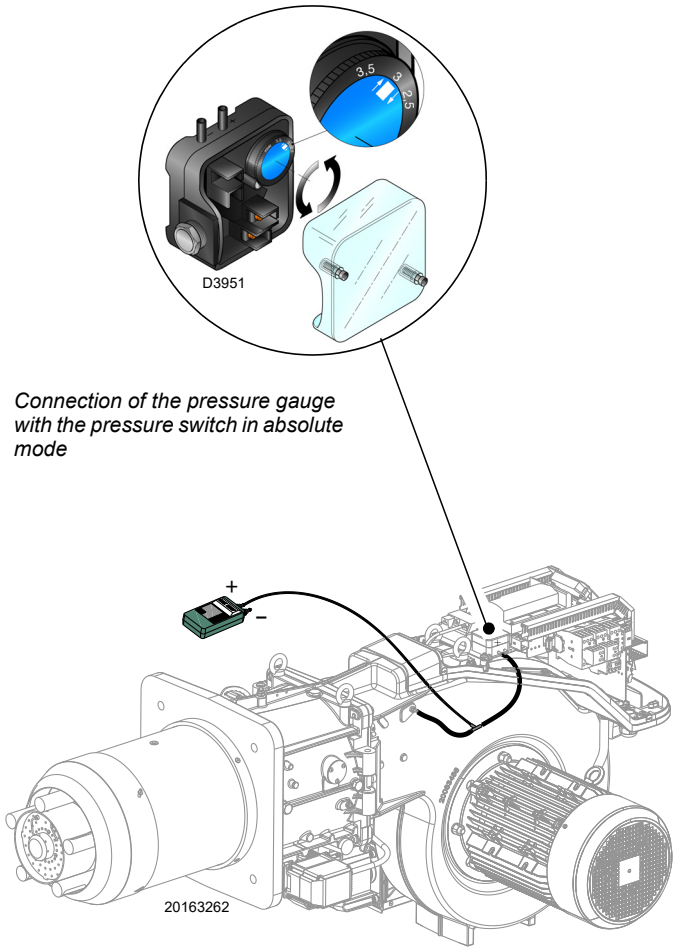
Check the indication of the arrow pointing upwards on the graduated scale. Turn the knob clockwise again, until the value shown on the graduated scale corresponds with the arrow pointing downwards, and so recovering the hysteresis of the pressure switch (shown by the white mark on a blue background, between the two arrows).

Now check the correct start-up of the burner. If the burner locks out again, turn the knob anti-clockwise a little bit more. During these operations it may be useful to measure the air pressure with a pressure gauge.

The connection of the pressure gauge is shown in Fig. 28. The standard configuration is that with the air pressure switch connected in absolute mode. Note the presence of a “T” connection, not supplied.

In certain applications in strong depression situations, the connection of the pressure switch does not allow it to change over.
In this case it is necessary to connect the pressure switch in differential mode, applying a second tube between the air pressure switch and the fan suction line mouth.
In this case also, the pressure gauge must be connected in differential mode, as shown in Fig. 28.

On **ES 810/E BLU** burners the air pressure switch is fitted in an “absolute” mode, that is, connected only to the pressure test point “+” 22) (Fig. 4 on page 11).



Connection of the pressure gauge with the pressure switch in absolute mode

Fig. 28

6.5.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 29) after performing all other burner adjustments with the maximum gas pressure switch set to the end of the scale.

With the burner operating at maximum output, lower the adjustment pressure by slowly turning the relative knob anticlockwise until the burner locks out.

Now turn the knob clockwise by 0.2 kPa (2 mbar) and repeat burner start-up to ensure it is uniform.

If the burner locks out again, turn the knob clockwise again by 0.1 kPa (1 mbar).

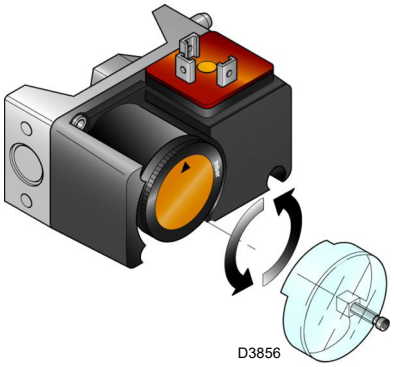


Fig. 29

WARNING

1 kPa = 10 mbar

6.5.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 30) after performing all the other burner adjustments with the pressure switch set to the start of the scale.

With the burner operating at maximum output, increase adjustment pressure by slowly turning the relative knob clockwise until the burner stops.

Now turn the knob anticlockwise by 0.2 kPa (2 mbar) and repeat burner start-up to ensure it is uniform.

If the burner locks out again, turn the knob anticlockwise again by 0.1 kPa (1 mbar).

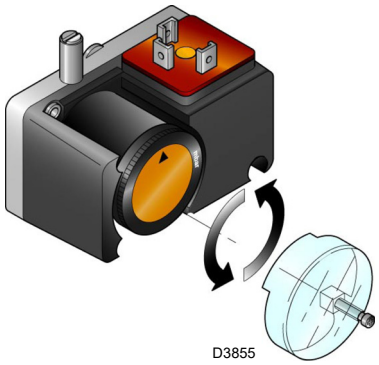


Fig. 30

6.5.4 PVP pressure switch kit

Adjust the pressure switch for the leak detection control (PVP kit)(Fig. 31) according to the instructions supplied with the kit.

WARNING

1 kPa = 10 mbar

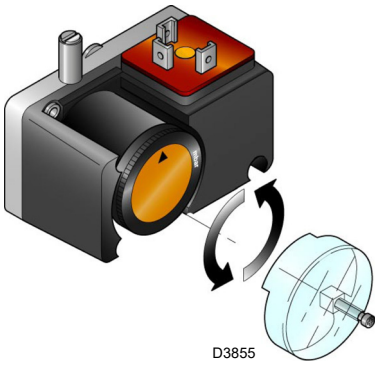


Fig. 31

7 Maintenance

7.1 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 main system switch.

Close the fuel interception tap.

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

7.2 Maintenance programme

7.2.1 Maintenance frequency

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

7.2.2 Safety test - with gas feeding closed

For its safe commissioning it is very important to make sure that the electrical wiring has been carried out correctly between the gas valves and the burner.

To this end, after checking that the connections have been made in conformity with the burner's wiring diagram, a starting cycle should be carried out with the gas tap closed (dry test).

1 The manual gas valve should be closed with the locking/releasing device (“lock-out / tag out” procedure).
2 Make sure the limit electric contacts of the burner close
3 Make sure the contact of the minimum gas pressure switch closes
4 Proceed with a tentative start up of the burner.

The starting cycle should occur with the following phases:

– Starting the fan motor for pre-purging
– Carrying out the gas valve leak detection control, if applicable
– Completing the pre-purging
– Reaching the ignition point
– Power supply of the ignition transformer
– Power supply the gas valves.

Since the gas is closed, the burner will not be able to start and its control box will stop or go into a safety lockout.

The effective supplying of the gas valves can be checked with the insertion of a tester; some valves are fitted with light signals (or closure/opening position indicators) that are activated when the electrical supply arrives.

IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT AN UNEXPECTED MOMENT, DO NOT OPEN THE MANUAL VALVE, DISCONNECT THE ELECTRICAL SUPPLY, CHECK THE WIRING; CORRECT THE ERRORS AND CARRY OUT THE ENTIRE TEST AGAIN.

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

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

Combustion head
Open the burner and make sure that all components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned.

Burner
Check that there are not excess wear or loosen screws.
Clean the outside of the burner.

Fan
Check to make sure that no dust has accumulated inside the fan or on its blades, as this condition will cause a reduction in the air flow rate and provoke polluting combustion.

Boiler
Clean the boiler as indicated in its accompanying instructions in order to maintain all the original combustion characteristics intact, especially the flue gas temperature and combustion chamber pressure.

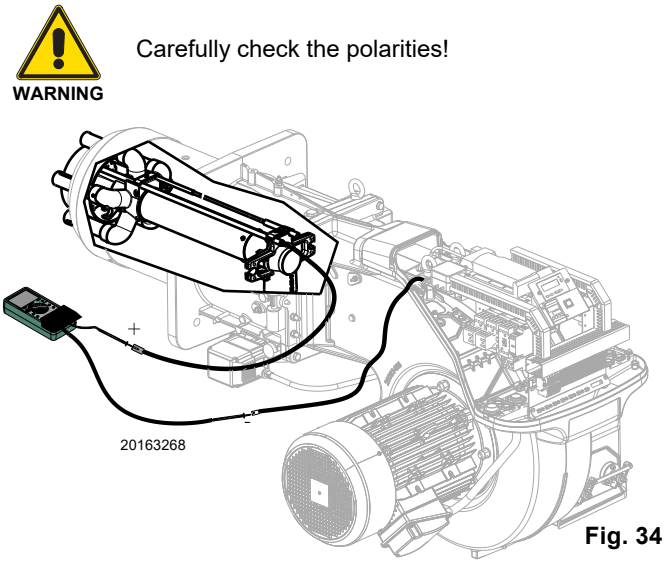
7.2.4 Measuring the ionisation current

The burner is fitted with an ionisation system to check that a flame is present.

The minimum current for control box operation is 4 µA. The operator panel displays “30%” (see List of parameters, parameter no. 954).

The burner provides a much higher current, so controls are not normally required.

However, if it is necessary to measure the ionisation current, disconnect the plug-socket on the ionisation probe cable and insert a direct current microammeter with a base scale of 100 µA, as shown in Fig. 34.



Carefully check the polarities!

Fig. 34

Gas leaks
Make sure that there are no gas leaks on the pipes between the gas meter and the burner.

Gas filter
Replace the gas filter when it is dirty.

Combustion
If the combustion values measured before starting maintenance do not comply with applicable legislation or do not indicate efficient combustion, consult the Tab. R or contact our Technical Support Service to implement the necessary adjustments.
It is advisable to set the burner according to the type of gas used and following the indications in Tab. R.

EN 676		Air excess			
		Max. output $\lambda \leq 1.2$		Min. output $\lambda \leq 1.3$	
GAS	CO_2 theoretical max. 0% O_2	CO_2 % Calibration		CO	NO_X
		$\lambda = 1.2$	$\lambda = 1.3$	mg/kWh	mg/kWh
G 20	11.7	9.7	9.0	≤ 100	≤ 170
G 25	11.5	9.5	8.8	≤ 100	≤ 170
G 30	14.0	11.6	10.7	≤ 100	≤ 230
G 31	13.7	11.4	10.5	≤ 100	≤ 230

Tab. R

7.2.5 Safety components

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

7.3 Opening the burner

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

Close the fuel interception tap.

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

See “Access to head internal part” on page 22.

7.4 Closing the burner

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

Carry out all maintenance work and mount the casing again.

A Appendix - Accessories

Kit for modulating operation

Burner	Output regulator	Code
ES 810/E BLU	RWF 50.2 3-POINT OUTLET	20085417
	RWF 55.5 COMPLETE WITH RS-485 INTERFACE	20074441
	RWF 55.6 COMPLETE WITH RS-485/PROFIBUS INTERFACE	20074442

Burner	Probe	Adjustment field	Code
ES 810/E BLU	PT 100 temperature	- 100...+ 500°C	3010110
	4 - 20 mA pressure	0...2.5 bar	3010213
	4 - 20 mA pressure	0...16 bar	3010214

UV sensor kit

Burner	Code
ES 810/E BLU	20077814

Soundproofing box kit

Burner	Type	dB(A)	Code
ES 810/E BLU	C7	10	3010376

Continuous purging kit

Burner	Code
ES 810/E BLU	20077810

Software interface kit (ACS410 + OCI410.30) - Service Level

Burner	Code
ES 810/E BLU	3010436

Modbus interface kit

Burner	Model	Code
ES 810/E BLU	OCI412	3010437

PVP kit (Seal control function - See gas train booklet)

Burner	Ramp type	Code
ES 810/E BLU	MB - CB	3010344

Gas trains in compliance with EN 676

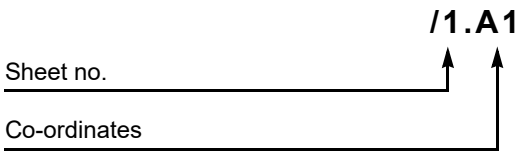
Please refer to manual.

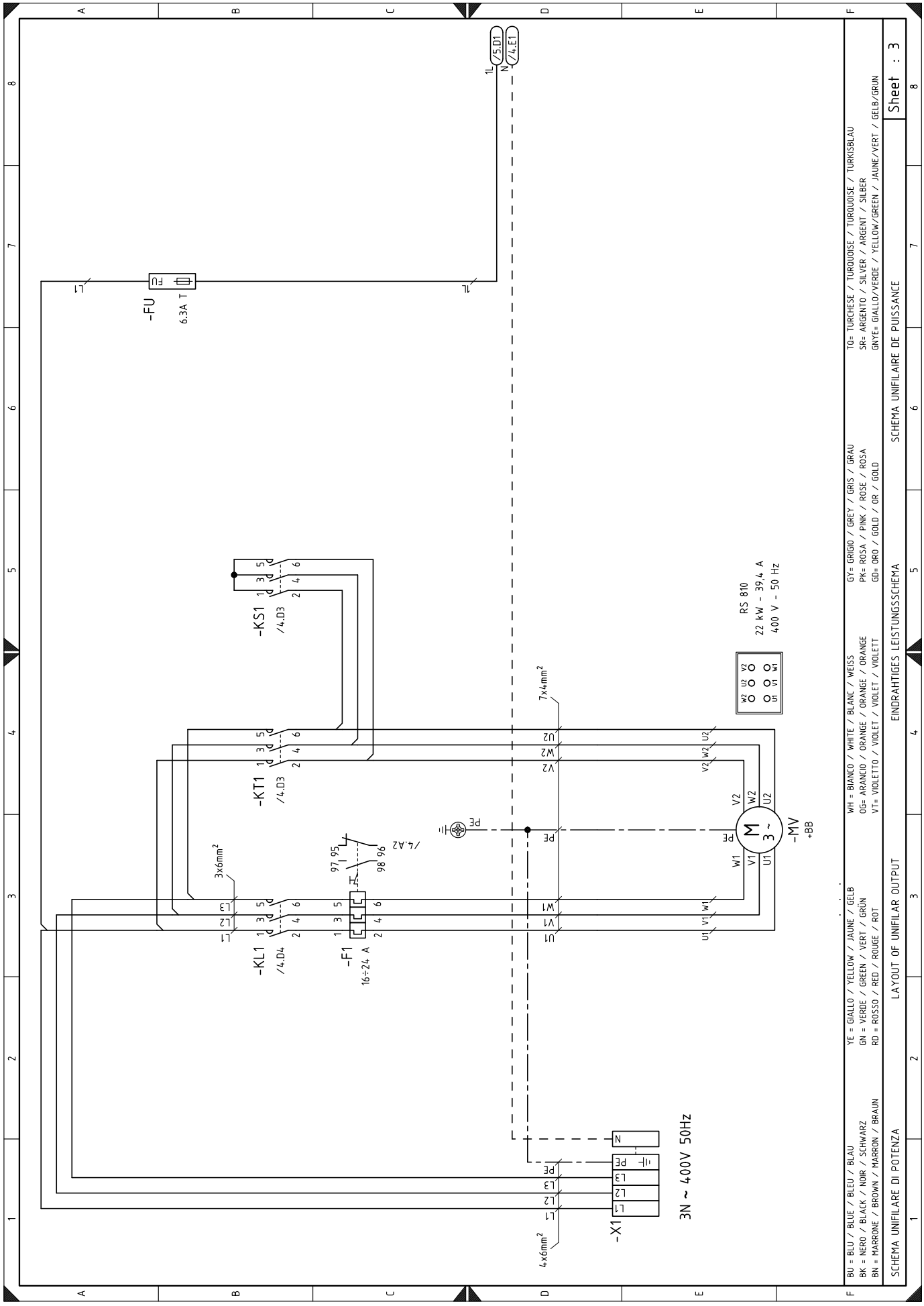
WARNING

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

B Appendix - Electrical panel layout

2 Indication of references




-FU
6.3A T
-KS1
/4.D3
-KT1
/4.D3
-KL1
/4.D4
-F1
16÷24 A
/4.A2
-MV
+BB
RS 810
22 kW - 39,4 A
400 V - 50 Hz
-X1
3N ~ 400V 50Hz
3x6mm²
7x4mm²
4x6mm²
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
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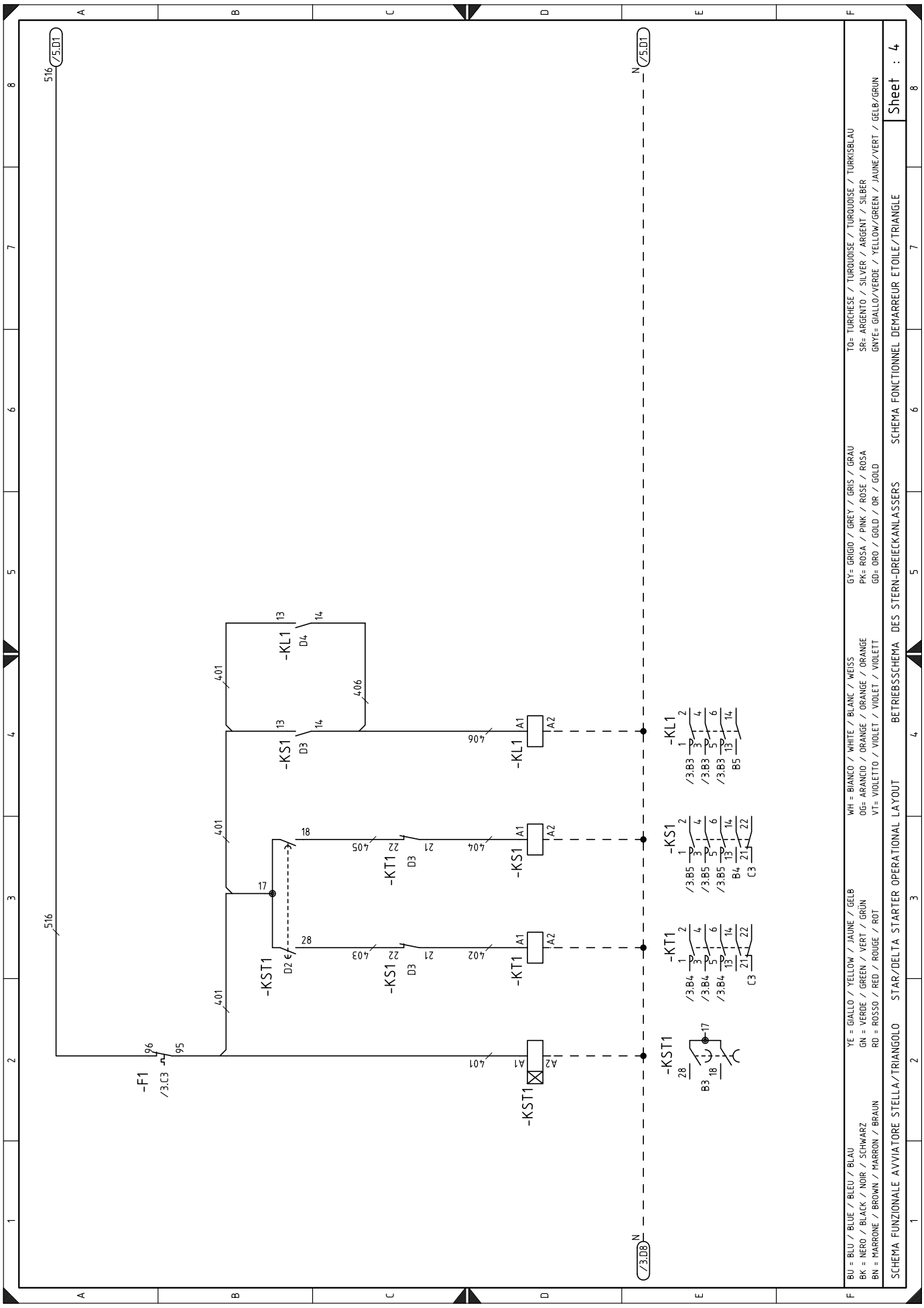
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA UNIFILARE DI POTENZA
LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
Sheet : 3


SCHEMA FUNZIONALE AVVIATORE STELLA/TRIANGOLO
STAR/DELTA STARTER OPERATIONAL LAYOUT
BETRIEBSSCHEMA DES STERN-DREIECKANLASSERS
SCHEMA FONCTIONNEL DEMARREUR ETOILE/TRIANGLE
Sheet : 4
BU = BLU / BLUE / BLEU / BLAU
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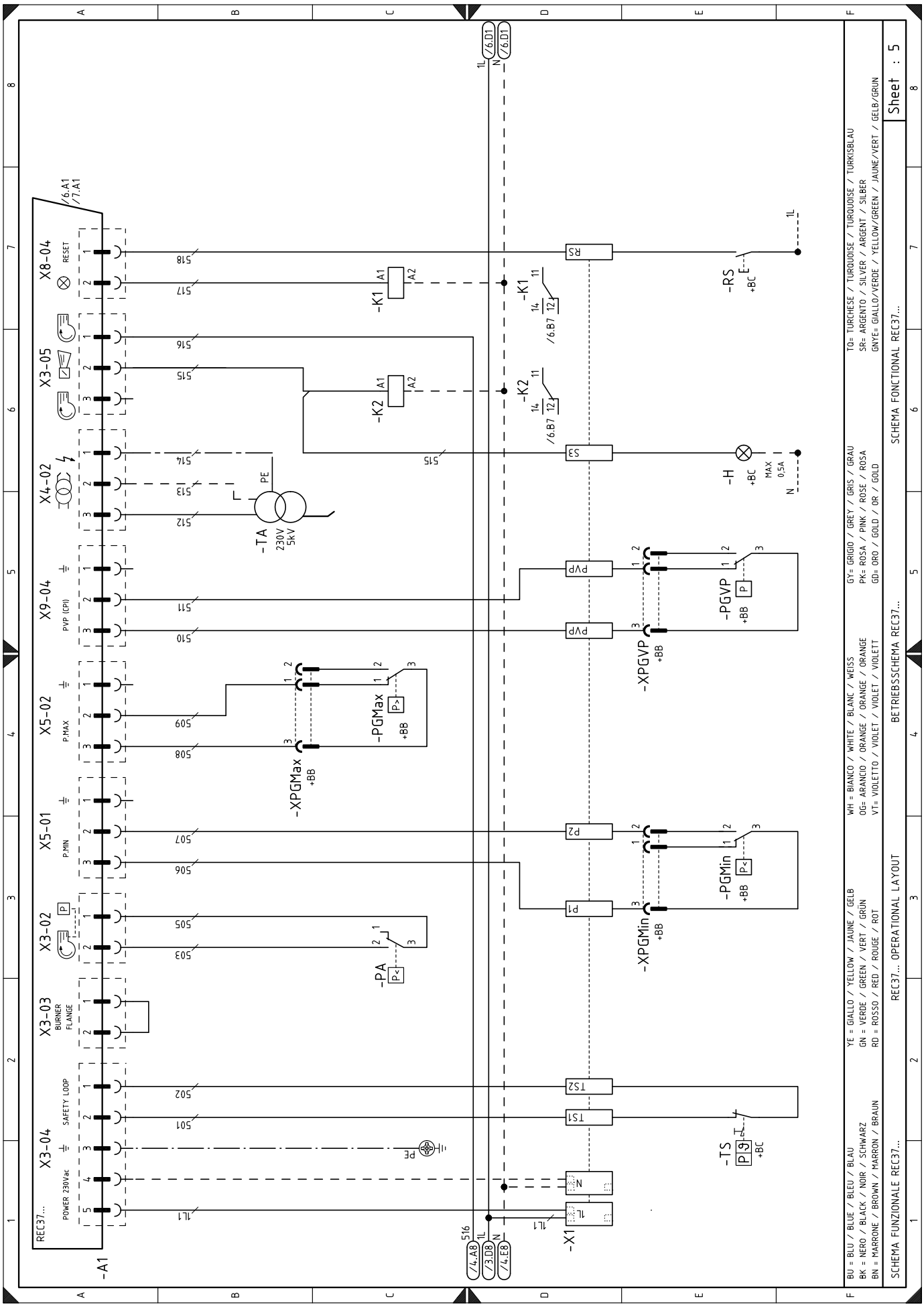
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-F1
-KST1
-KT1
-KS1
-KL1
/5.D1
/3.D8
/3.C3
/3.B3
/3.B4
/3.B5


REC37...
POWER 230Vac
SAFETY LOOP
BURNER FLANGE
P.MIN
P.MAX
PVP (CPI)
RESET
X3-04
X3-03
X3-02
X5-01
X5-02
X9-04
X4-02
X3-05
X8-04
-A1
-TA 230V 5kV
-K1
-K2
-PA
-PGMax
-PGMin
-PGVP
-XPGMax
-XPGMin
-XPGVP
-RS
-H
-TS
-X1
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SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
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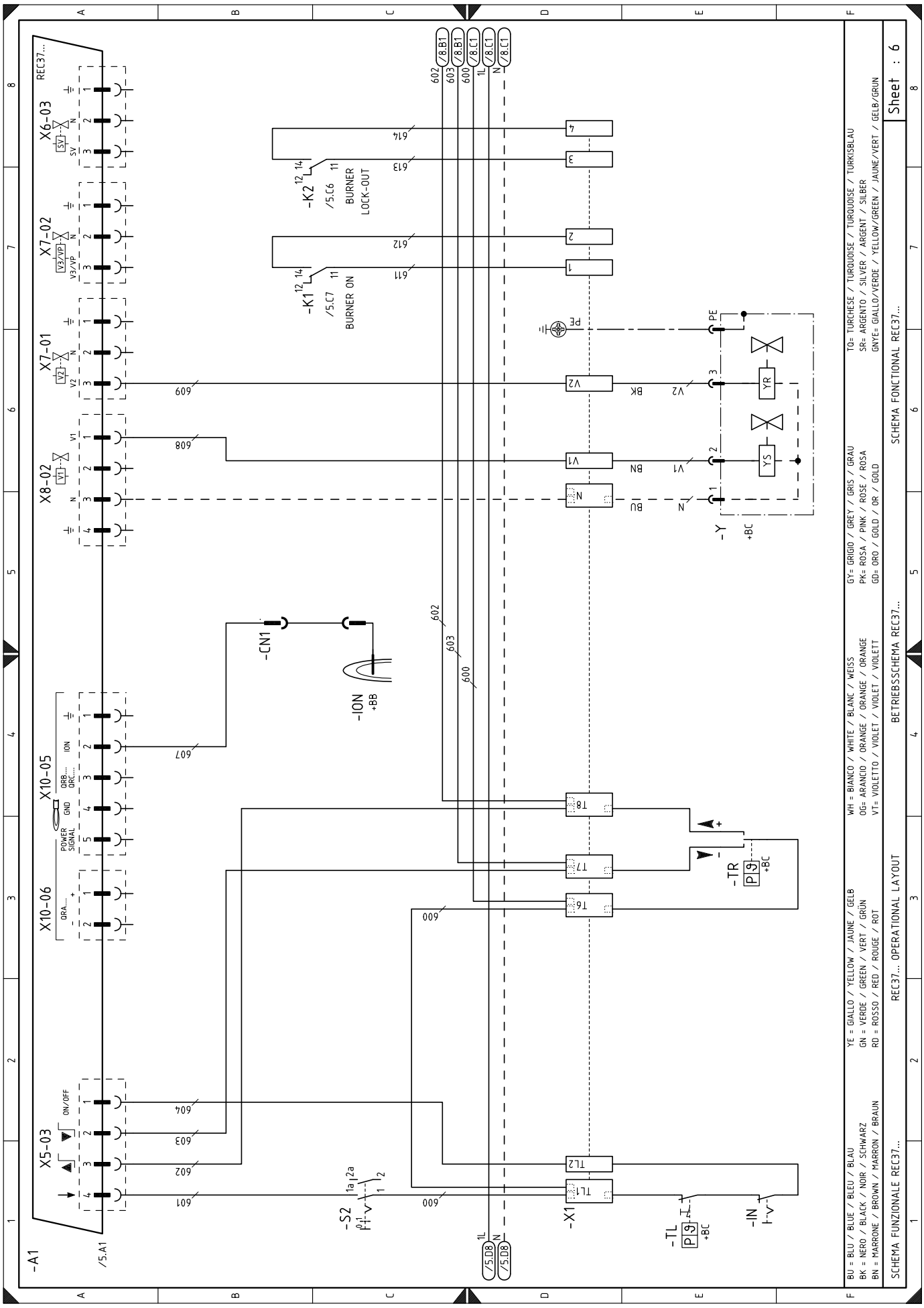
REC37... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC37...
SCHEMA FONCTIONAL REC37...
Sheet : 5


-A1
/5.A1
X5-03
ON/OFF
X10-06
QRA...
X10-05
POWER SIGNAL
GND
ION
X8-02
X7-01
X7-02
X6-03
REC37...
-K1
/5.C7
BURNER ON
-K2
/5.C6
BURNER LOCK-OUT
-CN1
-ION
+BB
-S2
-X1
-TL
-IN
-TR
+BC
-Y
YR
YS
SCHEMA FUNZIONALE REC37...
REC37... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC37...
SCHEMA FONCTIONAL REC37...
Sheet : 6
BU = BLU / BLUE / BLEU / BLAU
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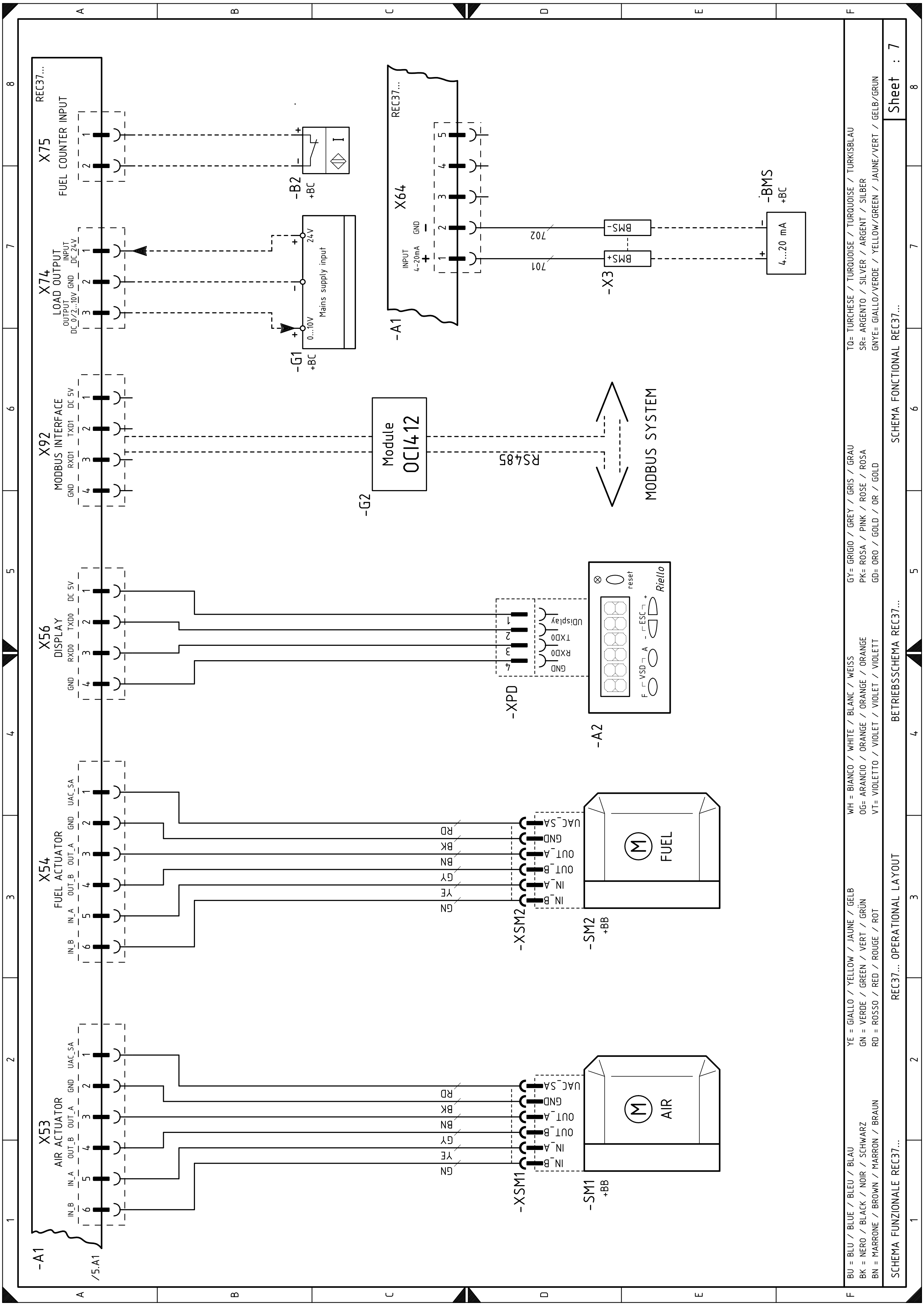
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN


X75
FUEL COUNTER INPUT
X74
LOAD OUTPUT
X92
MODBUS INTERFACE
X56
DISPLAY
X54
FUEL ACTUATOR
X53
AIR ACTUATOR
X64
REC37...
-A1
-B2
-G1
Mains supply input
-G2
Module
OCI412
RS485
MODBUS SYSTEM
-X3
BMS+
BMS-
-BMS
4...20 mA
-XPD
-A2
Riello
reset
-XSM2
-SM2
FUEL
-XSM1
-SM1
AIR
UAC_SA
GND
OUT_A
OUT_B
IN_A
IN_B
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
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SR = ARGENTO / SILVER / ARGENT / SILBER
GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
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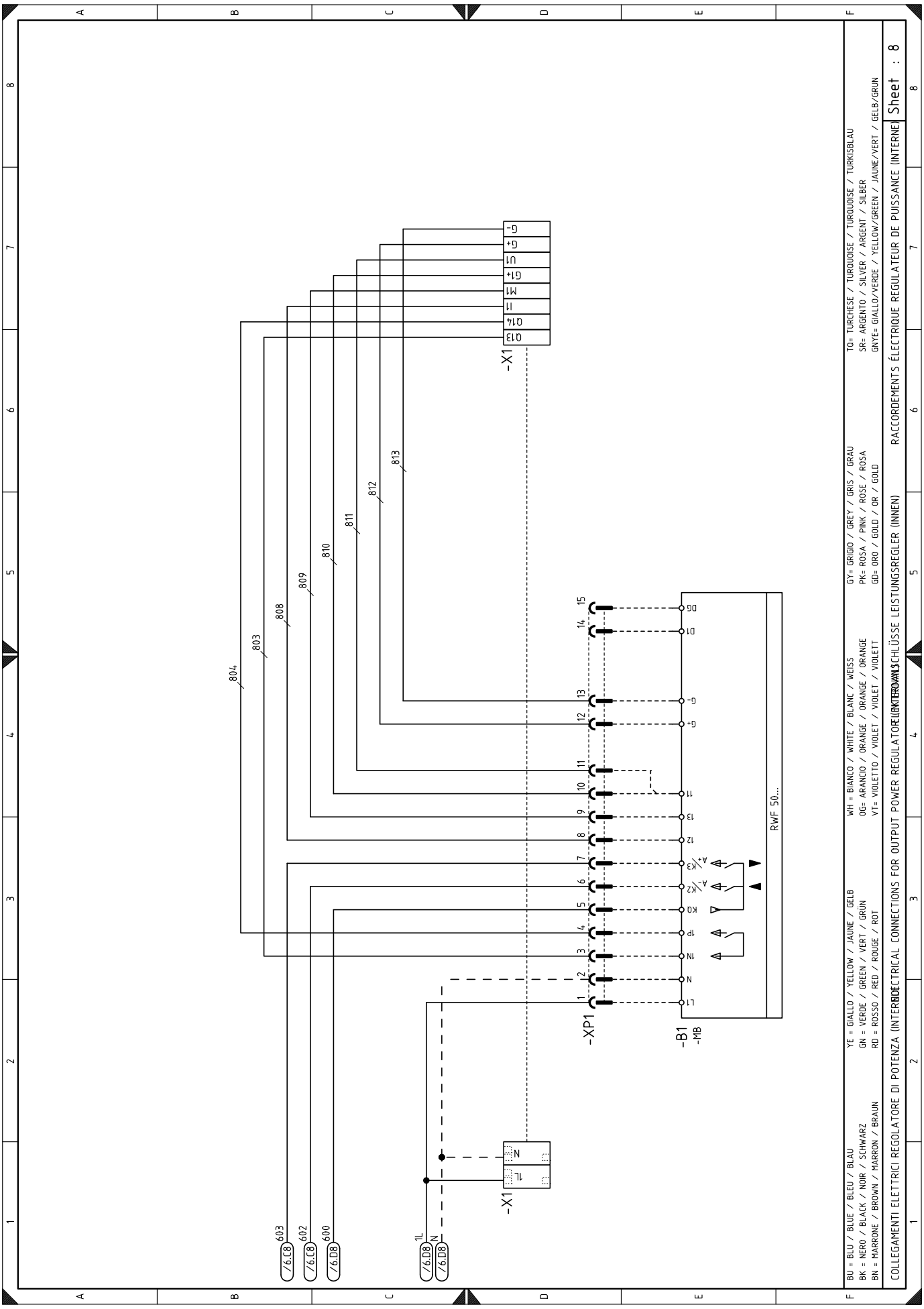
REC37... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC37...
SCHEMA FONCTIONAL REC37...
Sheet : 7


COLLEGAMENTI ELETTRICI REGOLATORE DI POTENZA (INTERNO)
ELECTRICAL CONNECTIONS FOR OUTPUT POWER REGULATOR (INTERNAL)
RACCORDEMENTS ÉLECTRIQUE REGULATEUR DE PUISSANCE (INTERNE)
SCHLÜSSE LEISTUNGSREGLER (INNEN)
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BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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RD = ROSSO / RED / ROUGE / ROT
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GY= GRIGIO / GREY / GRIS / GRAU
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GD= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
RWF 50...
-B1
-MB
-XP1
-X1
-X1
603
602
600
1L
N
/6.C8
/6.C8
/6.D8
/6.D8
/6.D8
804
803
808
809
810
811
812
813
G-
G+
U1
G1+
M1
11
Q14
Q13
L1
N
1N
1P
K0
K2
K3
12
13
11
G+
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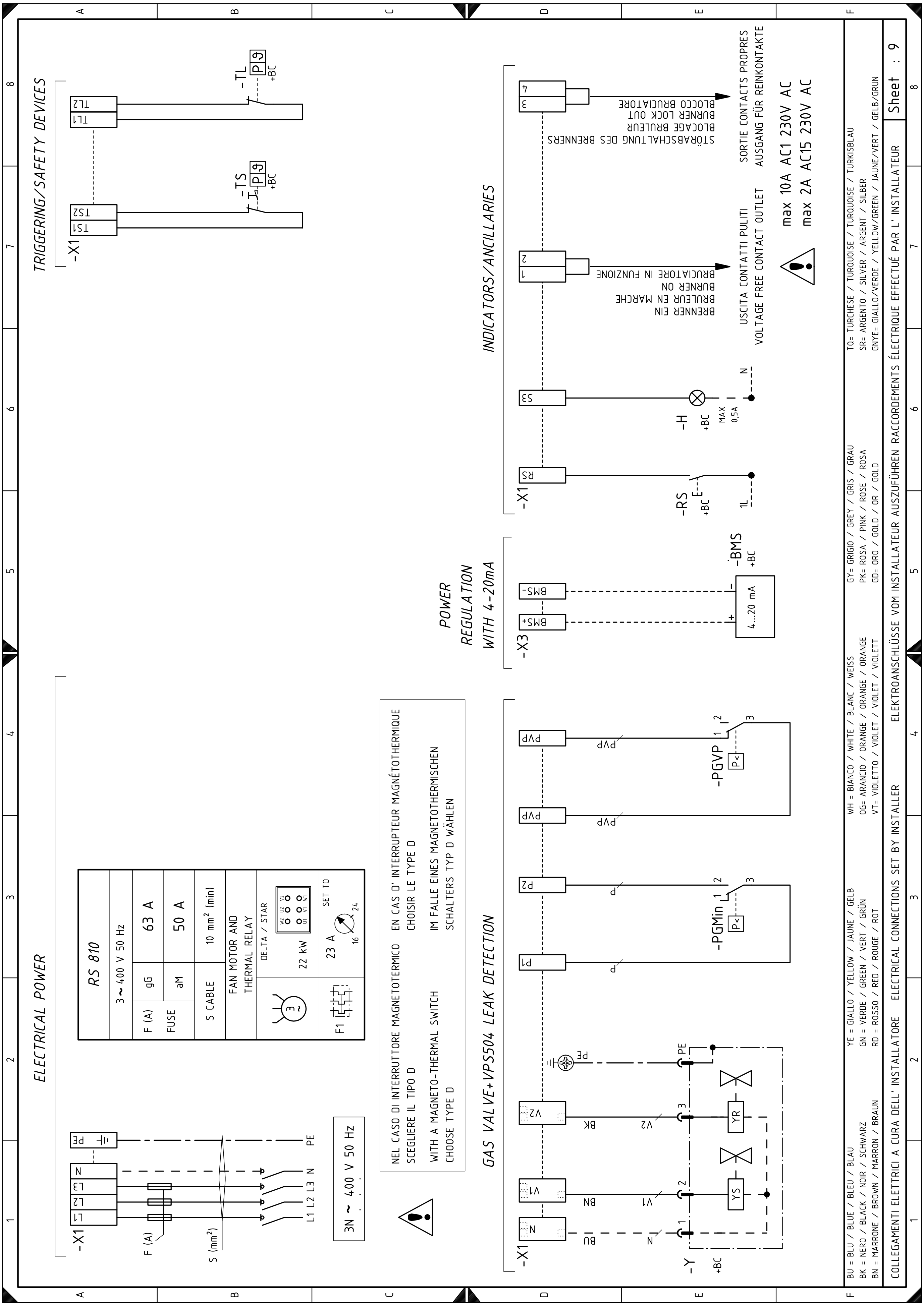
TRIGGERING/SAFETY DEVICES
ELECTRICAL POWER
GAS VALVE+VPS504 LEAK DETECTION
POWER REGULATION WITH 4-20mA
INDICATORS/ANCILLARIES
RS 810
3 ~ 400 V 50 Hz
F (A)
FUSE
gG
aM
63 A
50 A
S CABLE
10 mm² (min)
FAN MOTOR AND THERMAL RELAY
DELTA / STAR
22 kW
23 A
SET TO
3N ~ 400 V 50 Hz
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO D
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE D
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE D
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP D WÄHLEN
BRENNER EIN
BRULEUR EN MARCHE
BURNER ON
BRUCIATORE IN FUNZIONE
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
max 10A AC1 230V AC
max 2A AC15 230V AC
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
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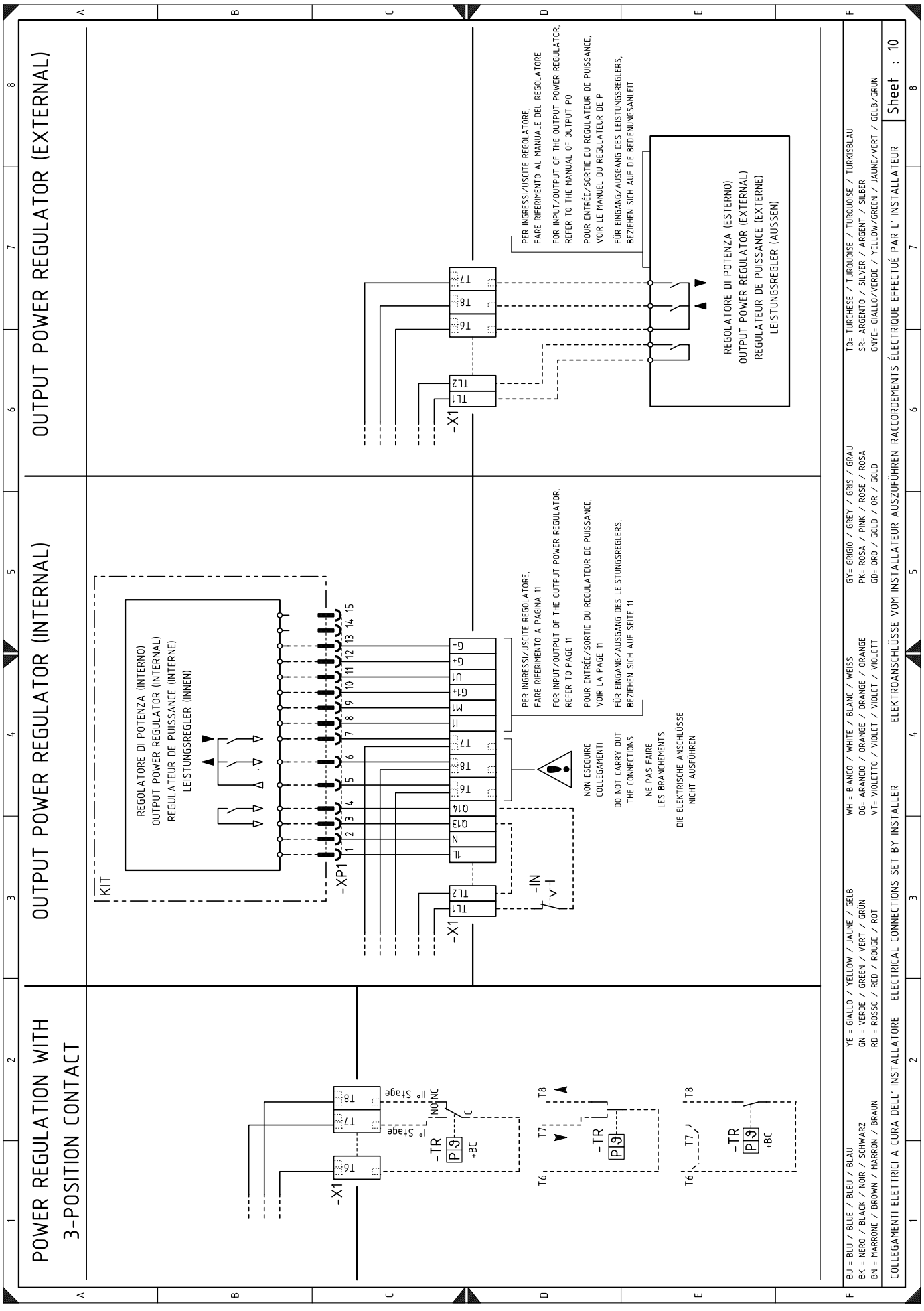
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN
RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 9


POWER REGULATION WITH
3-POSITION CONTACT
OUTPUT POWER REGULATOR (INTERNAL)
OUTPUT POWER REGULATOR (EXTERNAL)
KIT
REGOLATORE DI POTENZA (INTERNO)
OUTPUT POWER REGULATOR (INTERNAL)
REGULATEUR DE PUISSANCE (INTERNE)
LEISTUNGSREGLER (INNEN)
-XP1
-X1
-IN
PER INGRESSI/USCITE REGOLATORE,
FARE RIFERIMENTO A PAGINA 11
FOR INPUT/OUTPUT OF THE OUTPUT POWER REGULATOR,
REFER TO PAGE 11
POUR ENTRÉE/SORTIE DU REGULATEUR DE PUISSANCE,
VOIR LA PAGE 11
FÜR EINGANG/AUSGANG DES LEISTUNGSREGLERS,
BEZIEHEN SICH AUF SEITE 11
NON ESEGUIRE
COLLEGAMENTI
DO NOT CARRY OUT
THE CONNECTIONS
NE PAS FAIRE
LES BRANCHEMENTS
DIE ELEKTRISCHE ANSCHLÜSSE
NICHT AUSFÜHREN
PER INGRESSI/USCITE REGOLATORE,
FARE RIFERIMENTO AL MANUALE DEL REGOLATORE
FOR INPUT/OUTPUT OF THE OUTPUT POWER REGULATOR,
REFER TO THE MANUAL OF OUTPUT PO
POUR ENTRÉE/SORTIE DU REGULATEUR DE PUISSANCE,
VOIR LE MANUEL DU REGULATEUR DE P
FÜR EINGANG/AUSGANG DES LEISTUNGSREGLERS,
BEZIEHEN SICH AUF DIE BEDIENUNGSANLEIT
REGOLATORE DI POTENZA (ESTERNO)
OUTPUT POWER REGULATOR (EXTERNAL)
REGULATEUR DE PUISSANCE (EXTERNE)
LEISTUNGSREGLER (AUSSEN)
-TR
-BC
T6
T7
T8
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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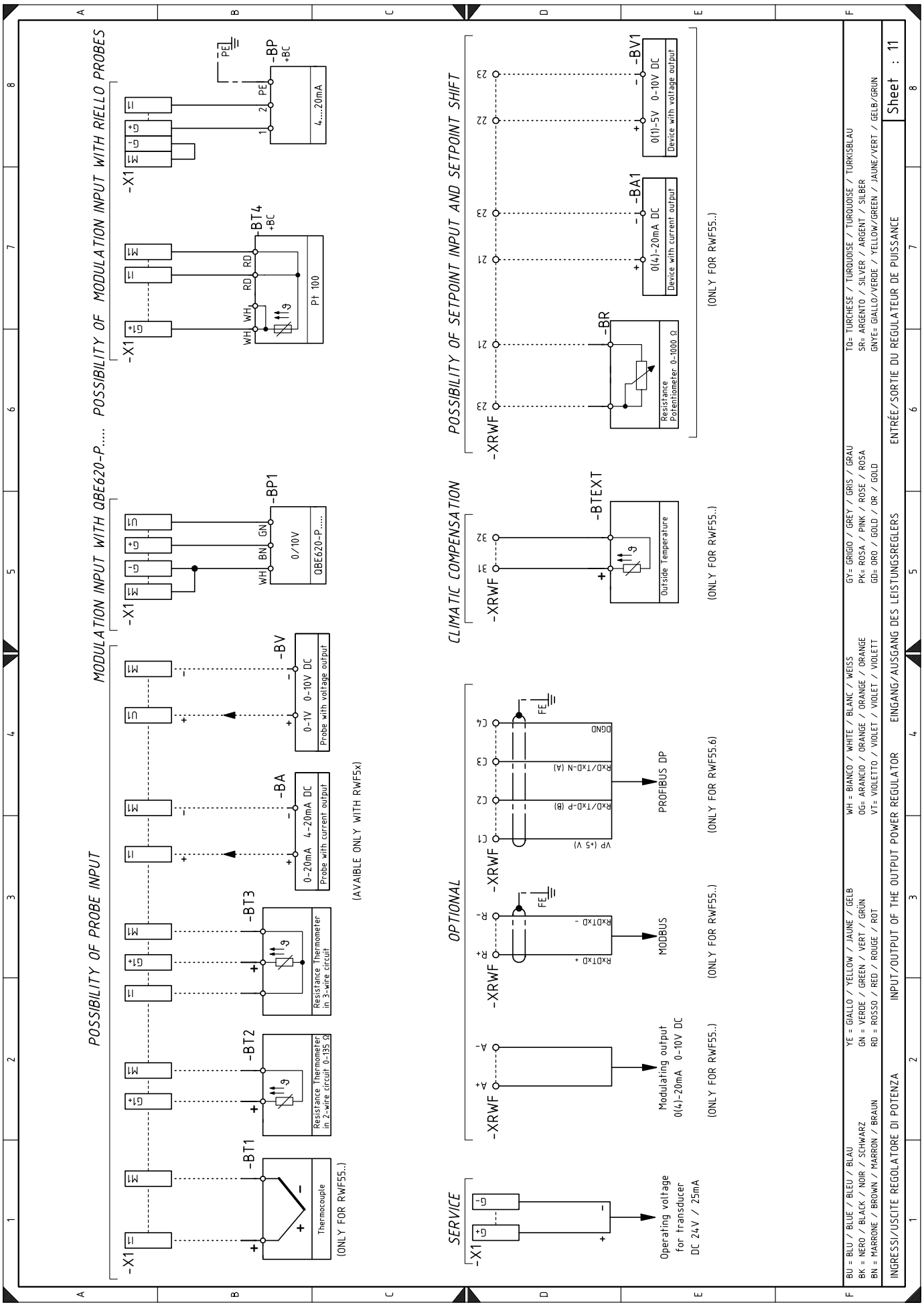
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN
RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 10


POSSIBILITY OF PROBE INPUT
MODULATION INPUT WITH QBE620-P..... POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
CLIMATIC COMPENSATION
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
OPTIONAL
SERVICE
-X1
-BT1
Thermocouple
(ONLY FOR RWF55..)
-BT2
Resistance Thermometer in 2-wire circuit 0-135 Ω
-BT3
Resistance Thermometer in 3-wire circuit
-BA
0-20mA 4-20mA DC
Probe with current output
(AVAIBLE ONLY WITH RWF5x)
-BV
0-1V 0-10V DC
Probe with voltage output
-BP1
QBE620-P.....
0/10V
-BP
4....20mA
-BT4
Pt 100
-BTEXT
Outside Temperature
-XRWF
-BR
Resistance Potentiometer 0-1000 Ω
-BA1
0(4)-20mA DC
Device with current output
-BV1
0(1)-5V 0-10V DC
Device with voltage output
Modulating output 0(4)-20mA 0-10V DC
MODBUS
PROFIBUS DP
Operating voltage for transducer DC 24V / 25mA
BU = BLU / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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INGRESSI/USCITE REGOLATORE DI POTENZA
INPUT/OUTPUT OF THE OUTPUT POWER REGULATOR
EINGANG/AUSGANG DES LEISTUNGSREGLERS
ENTRÉE/SORTIE DU REGULATEUR DE PUISSANCE
Sheet : 11

Wiring layout key

A1	Electronic cam
A2	Display and calibration unit
B1	Output regulator RWF50 internal
B2	Fuel meter
BA	Probe with output under current
BA1	Device with output under current, for modifying remote setpoint
BMS	Modulation control 4-20mA
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	Output probe in voltage
BV1	Output device in voltage to modify remote setpoint
F1	Fan motor thermal relay
FU	Auxiliary circuits safety fuse
G1	Load indicator
G2	Communication interface for Modbus system
H	Burner working lighting signal output
IN	Burner manual stop electric switch
ION	Ionisation probe
KL1	Star/triangle starter line contactor
KT1	Star/triangle starter triangle contactor
KS1	Start/triangle starter star contactor
KST1	Star/triangle starter timer
K1	Clean contacts output relay burner switched on
K2	Clean contacts output relay burner lockout
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGMax	Maximum gas pressure switch
PGMin	Minimum gas pressure switch
PGVP	Gas pressure switch for valve leak detection control device
RS	Burner reset switch
S2	ON/OFF selector
SM1	Air servomotor
SM2	Gas servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TR	Adjustment thermostat/pressure switch
TS	Safety thermostat/pressure switch
Y	Gas regulator valve + gas safety valve
X1	Terminal board for main supply
X3	Terminal board for modulation control 4-20mA
XPD	Plug for on board display
XPGMax	Maximum gas pressure switch connector
XPGMin	Minimum gas pressure switch connector
XPGVP	Gas pressure switch connector for valve leak detection control device
XRWF	Terminal board for output power regulator RWF50