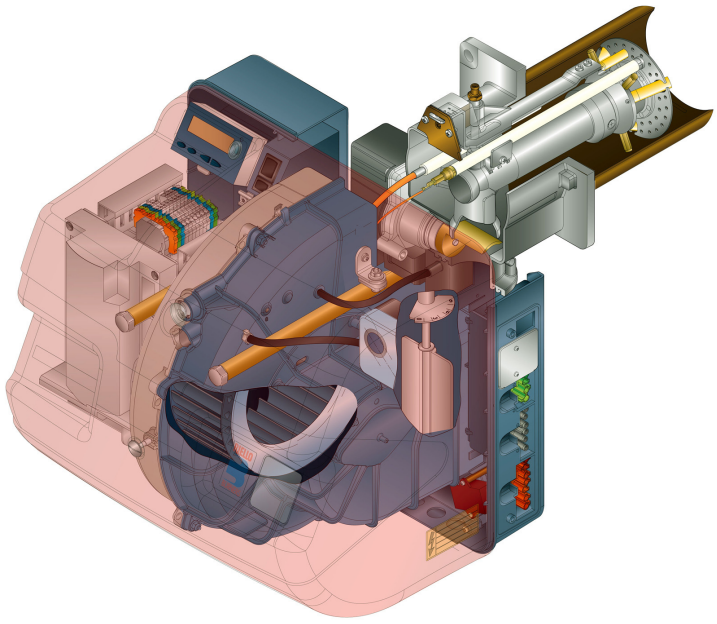
GB

Forced draught gas burners

Progressive two-stage or modulating operation



CODE	MODEL	TYPE
3789400 - 3789410	RS 34/E MZ	888 T
3789401 - 3789411	RS 34/E MZ	888 T
3789500 - 3789510	RS 44/E MZ	889 T
3789501 - 3789511	RS 44/E MZ	889 T
3789530 - 3789540	RS 44/E MZ	889 T
3789531 - 3789541	RS 44/E MZ	889 T

20068131 (6) - 03/2022

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:	Forced draught gas burners	
Model:	RS 34/E MZ RS 44/E MZ	
These products are in compliance with the following Technical Standards:		
EN 676		
EN 12100		
and according to the European Directives:		
GAR	2016/426/EU	Gas Appliances Regulation
MD	2006/42/CE	Machine Directive
LVD	2014/35/EU	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility
Such products are marked as follows:		
CE	CE-0085BS0378	

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

Declaration of Conformity A.R. 8/1/2004 & 17/7/2009 – Belgium		
Manufacturer:	RIELLO S.p.A. 37045 Legnago (VR) Italy Tel. ++39.0442630111 www.riello.com	
Distributed by:	VAN MARCKE HQ LAR Blok Z 5, B-8511 Kortrijk (Aalbeke) Belgio Tel. +32 56 23 7511 e-mail: riello@vanmarcke.be URL. www.vanmarcke.com	
It is hereby certified that the apparatuses specified below conform with the model of the type described n the CE conformity declaration and they are produced and placed in circulation in conformity with the provisions defined in L.D. dated January 8, 2004 and July 17, 2009.		
Type of product:	Forced draught gas burners	
Model:	RS 34/E MZ RS 44/E MZ	
Regulation applied:	EN 267 and A.R. dated January 8, 2004 - July 17, 2009	
Control body:	TÜV Industrie Service GmbH TÜV SÜD Gruppe Ridlerstrase, 65 80339 München DEUTSCHLAND	
	RS 34/E MZ	RS 44/E MZ
Measured value:	CO max: 7 mg/kWh NOx max: 103 mg/kWh	CO max: 2 mg/kWh NOx max: 89 mg/kWh

Manufacturer's Declaration			
RIELLO S.p.A. declares that the following products comply with the NOx emission limits specified by German standard "**1. BImSchV release 26.01.2010**".			
Product	Type	Model	Power
Forced draught gas burners	889T	RS 44/E MZ	80 - 550 kW

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 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 HOOD AND ALL THE SAFETY AND PROTECTION DEVICES

This symbol signals the obligation to reassemble the hood 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 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:

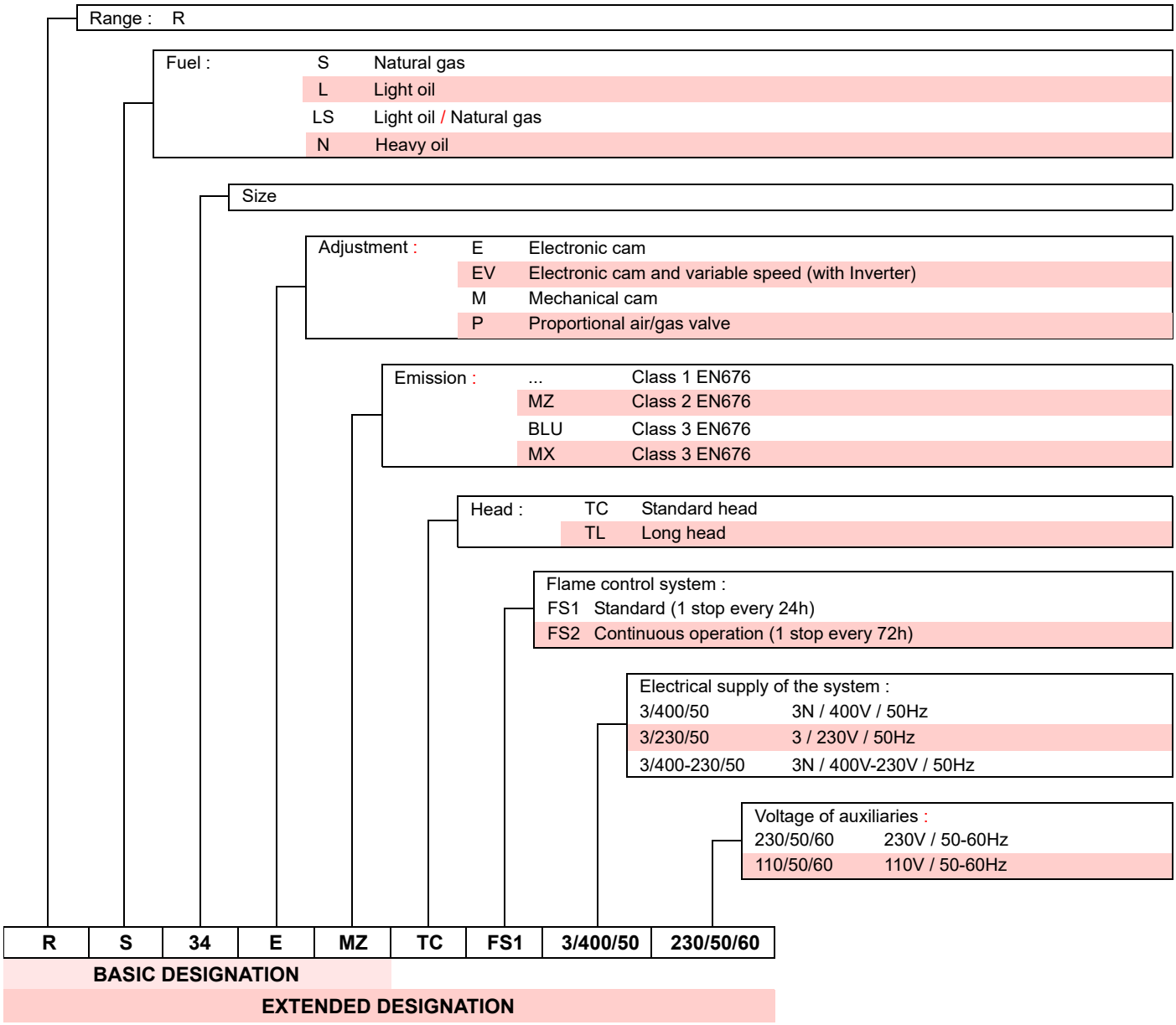
➤ the user must take all the measures necessary to prevent unauthorised people gaining access to the machine

➤ 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
RS 34/E MZ	TC	230V - 50/60Hz	Direct	3789400 - 3789410
RS 34/E MZ	TL	230V - 50/60Hz	Direct	3789401 - 3789411
RS 44/E MZ	TC	230V - 50/60Hz	Direct	3789500 - 3789510
RS 44/E MZ	TL	230V - 50/60Hz	Direct	3789501 - 3789511
RS 44/E MZ	TC	3 ~ 400/230V - 50/60Hz	Direct	3789530 - 3789540
RS 44/E MZ	TL	3 ~ 400/230V - 50/60Hz	Direct	3789531 - 3789541

Tab. A

4.3 Burner categories

Country of destination	Gas category
BE	I2E(R)
LV	I2H
CY, MT	I3B/P
BE	I3P
LU, PL	II2E3B/P
DE	II2ELL3B/P
FR	II2Er3P
AT, CH, CZ, DK, EE, FI, GR, HU, IS, IT, LT, NO, SE, SI, SK	II2H3B/P
ES, GB, IE, PT	II2H3P
NL	II2L3B/P

Tab. B

4.4 Technical data

Model			RS 34/E MZ	RS 44/E MZ	RS 44/E MZ
Output (1)	Max.	kW Mcal/h	125 ÷ 390 108 ÷ 336	203 ÷ 550 175 ÷ 473	203 ÷ 550 175 ÷ 473
	Min.	kW Mcal/h	45 39	80 69	80 69
Fuel			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25		
Gas pressure at max. output (2) - Gas: G20/G25		mbar	13,1 / 19,5	16,7 / 24,9	16,7 / 24,9
Operation			– Intermittent (min. 1 stop in 24 hours) – Two progressive or modulating stages with kit (see ACCESSORIES).		
Standard applications			Boilers: water, steam, diathermic oil		
Ambient temperature		°C	0 - 40		
Combustion air temperature		°C max	60		
Noise levels (3)	Sound pressure Sound power	dB(A)	68 79	70 81	70 81
Weight (4)		kg	32 - 34		

Tab. C

(1) Reference conditions: Room temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m above sea level.
(2) Pressure on the pressure switch socket (Fig. 31 at page 31) 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) Blast tube: short-long.

4.5 Electrical data

Model		RS 34/E MZ	RS 44/E MZ	RS 44/E MZ
Main electrical supply		230V ~ +/-10% 50/60 Hz single phase		230/400V with neutral ~ +/-10% 50/60Hz three-phase
Control circuit power supply		-		1N 230V ~ +/-10% 50/60Hz
Fan motor	Hz rpm V kW A	50 - 60 2800 - 3400 230 0,3 2,4 - 2,2	50 - 60 2800 - 3400 230 0,42 2,6 - 2,46	50 - 60 2800 - 3400 230/400 - 260/460 0,45 1,73/1 - 1,55/0,9
Motor capacitor	µF	12,5	12,5	-
Ignition transformer	V1 - V2 I1 - I2	230 V - 1 x 15 kV 1 A - 25 mA		
Absorbed electrical power	W max	600	700	750
Protection level		IP 40		

Tab. D

WARNING

For operating at 60Hz modify parameter 125, see section **"Parameter list"** at page 44.

4.6 Maximum dimensions

The 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 drawn back on the guides.

The dimensions of the open burner are indicated by position O.

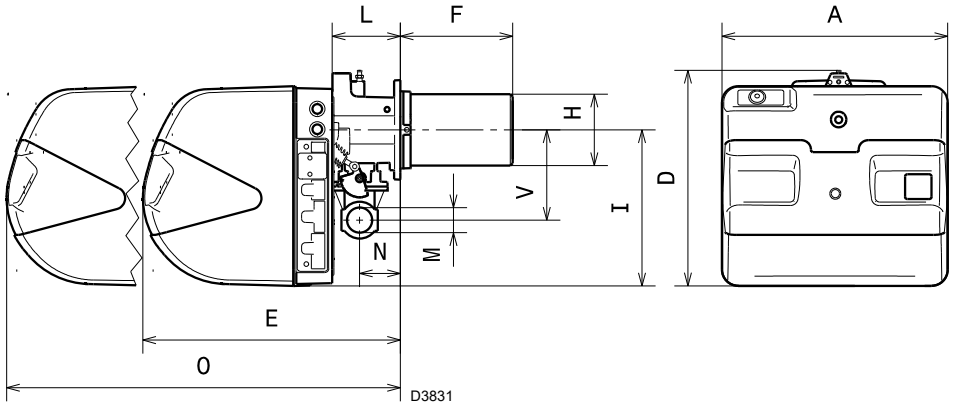


Fig. 1

mm	A	D	E	$F_{(1)}$	H	I	L	O	N	V	M
RS 34/E MZ	442	422	508	216-351	140	305	138	780	84	177	1”1/2
RS 44/E MZ	442	422	508	216-351	152	305	138	780	84	177	1”1/2

Tab. E

(1) Blast tube: short-long

4.7 Firing rates

The **maximum output** is chosen within area A.

The **minimum output** must not be lower than the minimum limit of the diagram:
RS 34/E MZ = 45 kW
RS 44/E MZ = 80 kW

WARNING

The firing rate (Fig. 2) was obtained considering a room temperature of 20°C and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level), with the combustion head adjusted as shown at page 24.

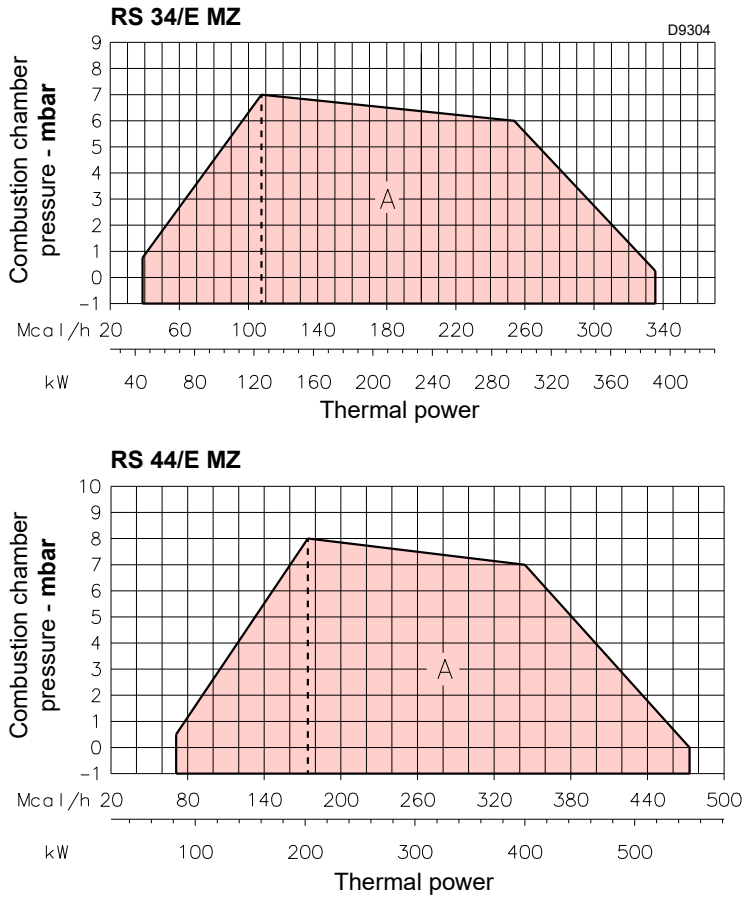


Fig. 2

4.7.1 Firing rate on basis of air density

The firing rate of the burner shown in the manual is valid for a room temperature of 20°C and an altitude of 0m above sea level (barometric pressure around 1013 mbar).

It may be that a burner has to operate with combustive air at a higher temperature and/or higher altitudes.

The heating of the air and the increase in altitude produce the same effect: the expansion of the air volume (i.e. the reduction of its density).

The delivery of the burner fan remains essentially the same, but the oxygen per m^3 of air, and the thrust (discharge head) of the fan are reduced.

It is therefore important to know if the maximum output requested from the burner at a determinate combustion chamber pressure remains within the firing rate of the burner even with the changed temperature and altitude conditions.

To check it, proceed as follows:

1 find the corrective factor F (relating to the air temperature and altitude of the system) in the Tab. F.

2 Divide the output Q required from the burner by F to obtain the equivalent output Qe:

Qe = Q : F (kW)

3 In the firing rate of the burner, mark the work point identified by:
Qe = equivalent output
H1 = pressure in combustion chamber
point A that must remain within the firing rate.

4 Trace a vertical line from point A)(Fig. 3), and find the maximum pressure H2 of the firing rate.

5 Multiply H2 by F to obtain the maximum lowered pressure H3 of the firing rate:

H3 = H2 x F (mbar)

If H3 is greater than H1)(Fig. 3), the burner can produce the delivery requested.

If H3 is less than H1, it is necessary to reduce the output of the burner. The reduction in output is accompanied by a reduction in the combustion chamber pressure:
Qr = reduced output
H1r = reduced pressure

$$H1r = H1 \times \left(\frac{Qr}{Q}\right)^2$$

Example, 5% reduction in output:

Qr = Q x 0,95
$H1r = H1 \times (0,95)^2$

With the new values - Qr and H1r - repeat steps 2 - 5.

WARNING

The combustion head should be adjusted in relation to the equivalent output Qe.

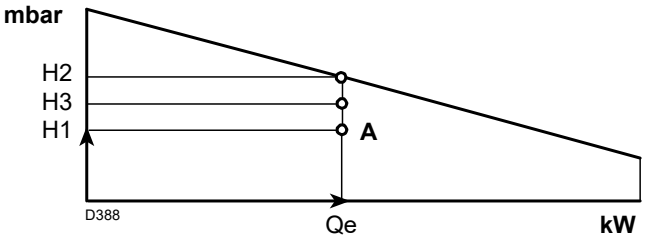


Fig. 3

Altitude	Average barometric pressure	F							
		Air temperature °C							
m a.s.l.	mbar	0	5	10	15	20	25	30	40
0	1013	1.087	1.068	1.049	1.031	1.013	0.996	0.980	0.948
100	1000	1.073	1.054	1.035	1.017	1.000	0.983	0.967	0.936
200	989	1.061	1.042	1.024	1.006	0.989	0.972	0.956	0.926
300	978	1.050	1.031	1.013	0.995	0.978	0.962	0.946	0.916
400	966	1.037	1.018	1.000	0.983	0.966	0.950	0.934	0.904
500	955	1.025	1.007	0.989	0.972	0.955	0.939	0.923	0.894
600	944	1.013	0.995	0.977	0.960	0.944	0.928	0.913	0.884
700	932	1.000	0.982	0.965	0.948	0.932	0.916	0.901	0.872
800	921	0.988	0.971	0.954	0.937	0.921	0.906	0.891	0.862
900	910	0.977	0.959	0.942	0.926	0.910	0.895	0.880	0.852
1000	898	0.964	0.946	0.930	0.914	0.898	0.883	0.868	0.841
1200	878	0.942	0.925	0.909	0.893	0.878	0.863	0.849	0.822
1400	856	0.919	0.902	0.886	0.871	0.856	0.842	0.828	0.801
1600	836	0.897	0.881	0.866	0.851	0.836	0.822	0.808	0.783
1800	815	0.875	0.859	0.844	0.829	0.815	0.801	0.788	0.763
2000	794	0.852	0.837	0.822	0.808	0.794	0.781	0.768	0.743
2400	755	0.810	0.796	0.782	0.768	0.755	0.742	0.730	0.707
2800	714	0.766	0.753	0.739	0.726	0.714	0.702	0.690	0.668
3200	675	0.724	0.711	0.699	0.687	0.675	0.664	0.653	0.632
3600	635	0.682	0.669	0.657	0.646	0.635	0.624	0.614	0.594
4000	616	0.661	0.649	0.638	0.627	0.616	0.606	0.596	0.577

Tab. F

4.8 Test boiler

The firing rates were obtained in special test boilers, according to EN 676 regulations.

Fig. 4 indicates the diameter and length of the test combustion chamber.

Example:
Output 407 kW (350 Mcal/h) - diameter 50 cm, length 1.5 m.

The coupling is ensured when the boiler is EC type-approved; for boilers or ovens with combustion chambers of very different dimensions compared to those shown in the diagram of Fig. 4, preliminary checks are recommended.

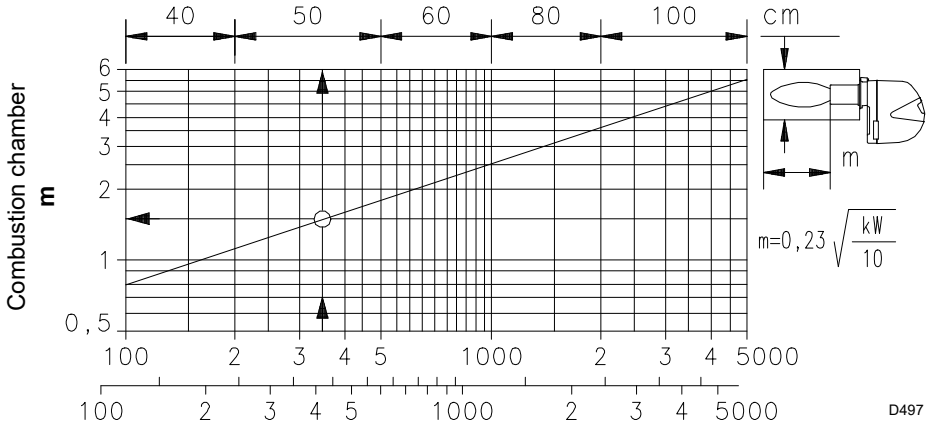


Fig. 4

4.9 Burner equipment

The burner is supplied complete with:

Gas train flange	No. 1
Gasket for gas train flange	No. 1
Screws M8 x 25 to fix the flange	No. 4
Screws M8 x 25 to fix the burner flange to the boiler	No. 4
Thermal insulation screen	No. 1
Plugs for electrical wiring (RS 34-44/E MZ single phase)	No. 3
Plugs for electrical wiring (RS 44/E MZ three-phase)	No. 4
Instruction manual	No. 1
Spare parts list	No. 1

4.10 Burner description

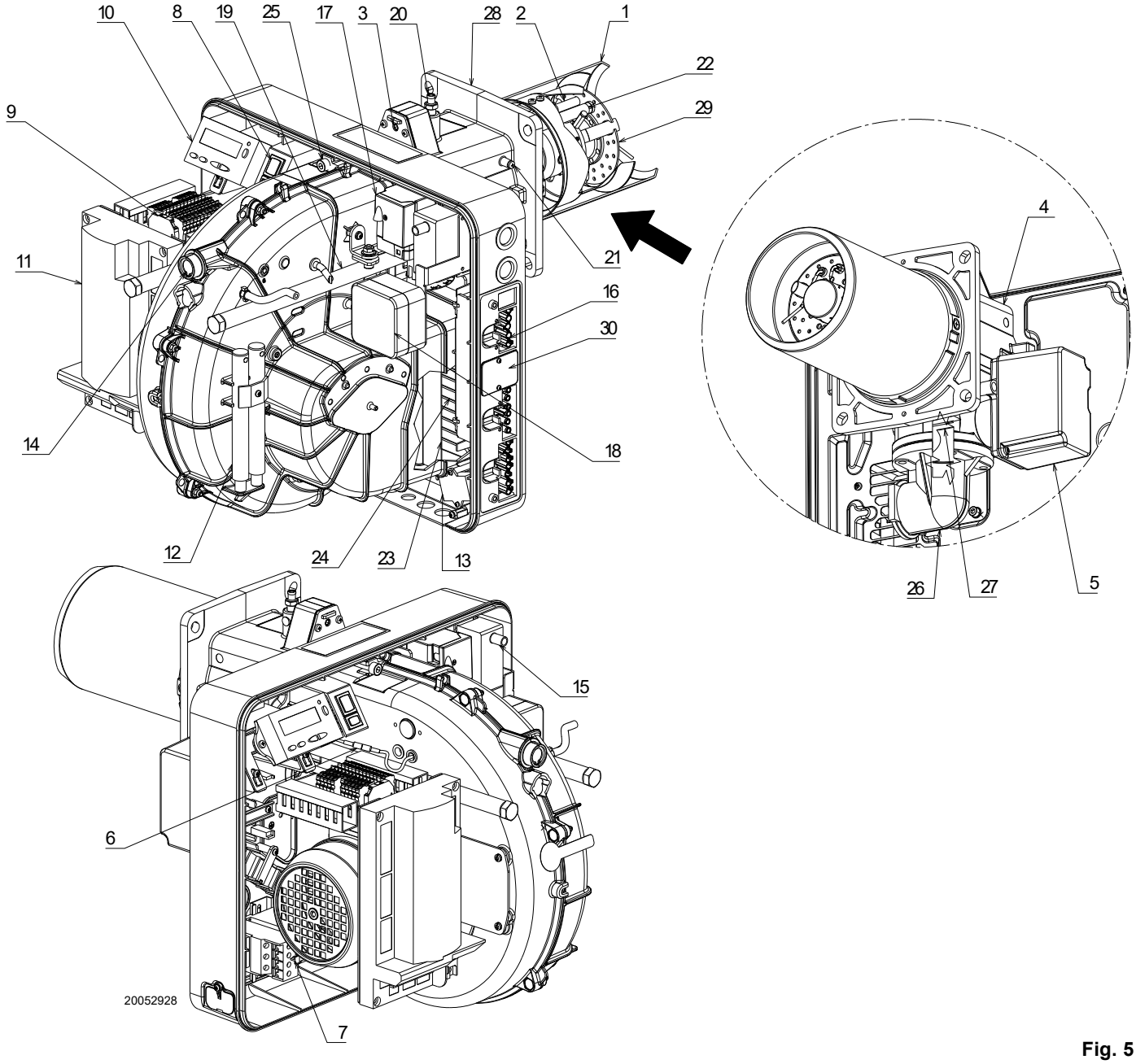


Fig. 5

1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 Pipe coupling
5 Gas servomotor
6 Plug-socket on ionisation probe cable
7 Motor contact maker and thermal relay with reset button
8 Operation on/off switch
9 Terminal board for electrical wiring
10 Operator panel with LCD display
11 Control box for checking flame and air/fuel ratio
12 Extensions for guides 20) - only for TL versions
13 Filter to protect against radio disturbance
14 Flame inspection window
15 Ignition transformer
16 Sockets for electrical wiring
17 Air servomotor
18 Air pressure switch (differential type)
19 Guides for opening the burner and inspecting the combustion head
20 Gas pressure test point and head fixing screw
21 Air pressure socket
22 Flame sensor probe
23 Air damper
24 Fan air inlet
25 Screws to secure fan to pipe coupling
26 Gas input pipe
27 Gas regulator
28 Boiler fixing flange
29 Flame stability disc
30 4-pole socket cover (see electrical panel appendix)

4.11 Control box for the air/fuel ratio (REC 27.100A2)

Important notes


WARNING

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. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!

Risk of explosion!

An incorrect configuration can provoke fuel overcharging, with the consequential risk of explosion! Operators must be aware that incorrect settings made on the display and operating unit and incorrect settings of the fuel and / or air actuator positions can lead to dangerous burner operating conditions.

- ➤ 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). 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 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.
- ➤ During the programming of the control curves of the air-fuel ratio, the technician should constantly observe the quality of the combustion process (for example, using a gas analyser) and, if the combustion values are too low or if there are dangerous conditions, take the appropriate action, for example by manually switching off the system.
- ➤ The plugs of the connection cables or other accessories can be removed or changed when the system is off.
- ➤ The connections to the actuators do not provide a safe separation of the mains voltage. Before connecting or changing the actuators, the system should be switched off.

To ensure the safety and reliability of the control box, the following instructions must also be followed:

- – 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.

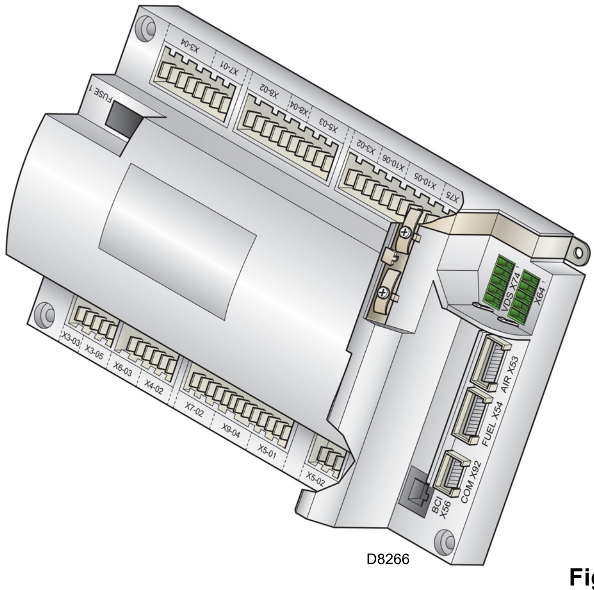


Fig. 6

Installation notes

- ➤ Arrange the HV ignition cables separately, as far as possible from the control box and the other cables.
- ➤ Check the electric wiring inside the boiler complies with the national and local safety regulations.
- ➤ Phase and neutral should not be exchanged (cause of dangerous malfunctions, loss of protection against electric shocks, etc..).
- ➤ Make certain that strain relief of the connected cables is in compliance with the relevant standards (e.g. as per EN60730 e EN60 335).
- ➤ Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- ➤ The mechanical connection between the actuators and the elements for controlling the fuel and air, or other control elements, should be rigid.
- ➤ 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.

Mechanical structure

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

The base control box of the control box incorporates the following components:

- – burner adjustment device with system for checking the seal of the gas valves;
- – electronic fuel/air ratio monitoring device with a maximum of 2 actuators;
- – Modbus interface.

Electrical connection of 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:
  – line capacitance reduces the magnitude of the flame signal.
  – Use a separate cable.
➤ Respect the allowed cable lengths.
➤ The ionisation probe is not protected against the risk of electrocution; it must be protected against any accidental contact.
➤ The grounding of the burner must be in compliance with the rules in force; the grounding of the boiler alone is not enough.
➤ Position the ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

Technical data

Control box	Mains voltage	AC 230 V -15 % / +10 %
	Mains frequency	50 / 60 Hz ±6 %
	Power absorption	< 30 W (normal)
	Safety class	I, with components in compliance with II and III, according to DIN EN 60730-1
Load on 'input' terminals	F1 unit fuse (internal)	6,3 AT
	Main fuse of perm. network (external)	Max. 16 AT
	Undervoltage	
	– Safety switch-off from operating position to mains voltage	< AC 186 V
	– Restart when mains voltage picks up	> AC 195 V
	Input currents and input voltages	
	– UeMax	UN +10%
	– UeMin	UN -15%
	– Iemax	1.5 mA peak
	– IeMin	0.7 mA peak
	Voltage detection	
	– On	AC 180...253 V
	– Off	< AC 80 V
Load on 'output' terminals	**Total load on the contacts**	
	– Mains voltage	AC 230 V, 50 / 60 Hz
	– Total unit input current (safety circuit)	Max. 5 A
	- Fan motor contactor	
	- Ignition transformer	
	- Valve	
	Single contact loading	
	Fan motor contactor	
	– Rated voltage	AC 230 V, 50 / 60 Hz
	– Nominal current	2A
	– Power factor	cosφ > 0.4
	Alarm output	
	– Rated voltage	AC 230 V, 50 / 60 Hz
	– Nominal current	1A
	– Power factor	cosφ > 0.4
	Ignition transformer	
	– Rated voltage	AC 230 V, 50 / 60 Hz
	– Nominal current	2A
	– Power factor	cosφ > 0.2
	Fuel valve	
	– Rated voltage	AC 230 V, 50 / 60 Hz
	– Nominal current	2A
	– Power factor	cosφ > 0.4
	Display operation	
	– Rated voltage	AC 230 V, 50 / 60 Hz
	– Nominal current	0,5A
	– Power factor	cosφ > 0.4

Cable lengths	– Main line AC 230 V	Max. 100 m (100 pF / m)
	– Display, BCI	For installation under the casing of the burner or in the control panel max. 3 m (100 pF / m)
	– Load control (LR) X5-03	Max. 20 m (100 pF/m)
	– External reset button	Max 20 m (100 pF/m)
	– Safety valve (SV)	Max 20 m (100 pF/m)
	– Load output	Max. 10 m (100 pF/m)
	– Fuel valve	Max. 3 m (100 pF/m)
	– Pilot valve	Max. 3 m (100 pF/m)
	– Ignition transformer	Max. 3 m (100 pF/m)
	– Other lines	Max. 3 m (100 pF/m)
Cross-sections of the power supply lines	They should be sized for rated currents as per the primary external fuse and the fuse of the internal unit.	
	– Min. cross-section	(max. 6.3 AT)
	– Fuses used inside the control box F1	0.75 mm² 6.3 AT DIN EN 60127 2 / 5
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. G

WARNING

Condensation, formation of ice and the entrance of water are not permitted!

4.12 Operation sequence of the burner

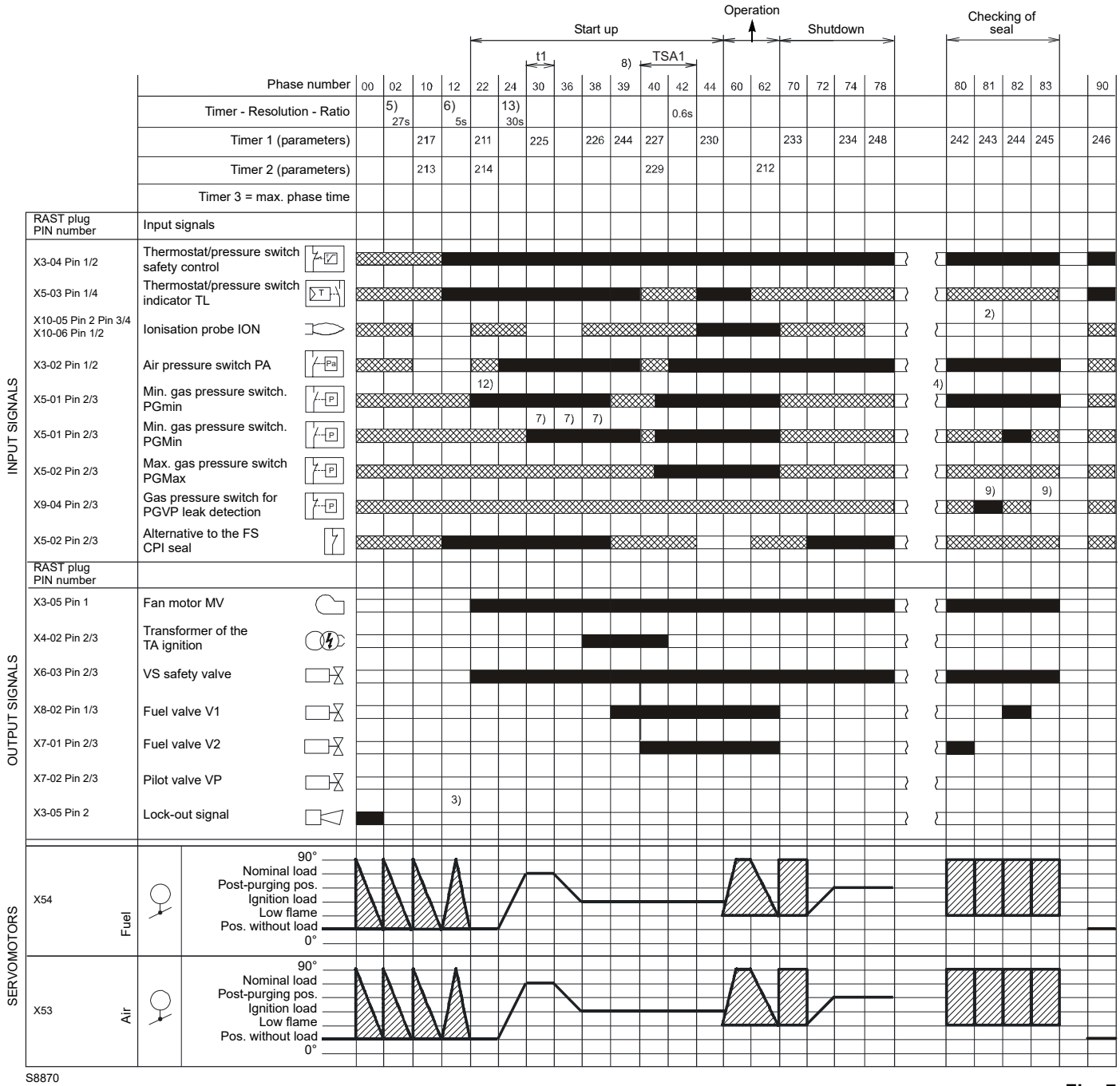


Fig. 7

ON Signal

OFF Signal

Any signal is allowed

4.12.1 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	Min. 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 test time (valve leak detection)
Ph82	Filling time (valve leak detection)
Ph83	Pressure test time (valve leak detection)
Ph90	Standby time due to lack of gas

4.13 Operator panel operation

The control box REC 27.100A2 is directly connected to the operator panel (Fig. 8).

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

The burner management system is visualised 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.

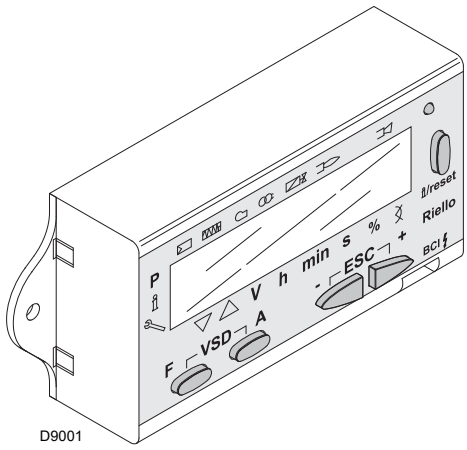


Fig. 8

4.13.1 Symbols description on the display

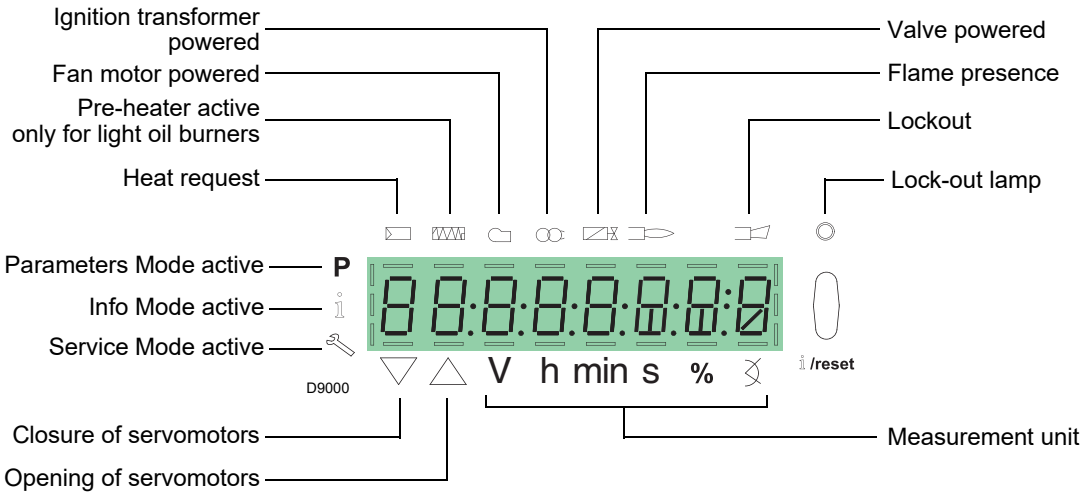
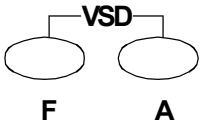
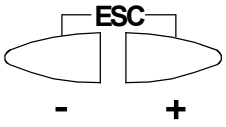


Fig. 9

The display brightness can be regulated from 0 ... 100% with parameter 126.

4.13.2 Buttons description

Button	Button	Function
 F	**Button F**	To regulate the fuel servomotor (keep pressed F and adjust the value by pressing - or +)
 A	**Button A**	To regulate the servomotor air (keep pressed A and adjust the value by pressing - or +)
 F A	**Button A and F VSD Function**	To modify the parameter for setting the P mode (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 **Service** or **Info Mode** and allows: – 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 -**	Reduction of the value – Access to a lower point of the modulation curve – Scrolling of the parameter list
 +	**Button +**	Increase of the value – Access to a higher point of the modulation curve – Scrolling of 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. H

4.14 Servomotors (SQN13...)

Introduction

The servomotors that equip the burners of the **RS** range work directly on the air damper and the gas butterfly valve, without mechanical leverages but via the interposition of an elastic coupling.

They are commanded by the control box, which constantly checks their position by means of a return signal from the optic sensor inside the servomotor.

Important notes

WARNING

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

Avoid opening, modifying or forcing the servomotor. The servomotor is equipped with a system of optical feedback.

- ➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- ➤ Before modifying the wiring in the servomotor 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.
- ➤ In the event of assembly, installation, maintenance, etc... it is necessary to check that the wiring and the parameterisation are in order.
- ➤ Falls and collisions can negatively affect the safety functions. In this case, the unit must not be operated, even if it displays no evident damage.

Installation notes

- ➤ Check the relevant national safety standards are respected.
- ➤ The connection between the actuator command shaft and the control element must be rigid, without any mechanical play.
- ➤ The tightening torque for the fixing screws should be 1.5 Nm. It is recommended that this value is not exceeded to prevent damaging the servomotor.
- ➤ To avoid an excessive load on the bearings due to rigid hubs, the use of compensation clutches without any mechanical play is recommended (e.g. metal bellows-type clutches).
- ➤ It is advisable to oversize the drive shaft in relation to the rated torque of the actuator.
- ➤ The static torque is reduced when the electrical supply of the actuator is switched off.
- ➤ Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.

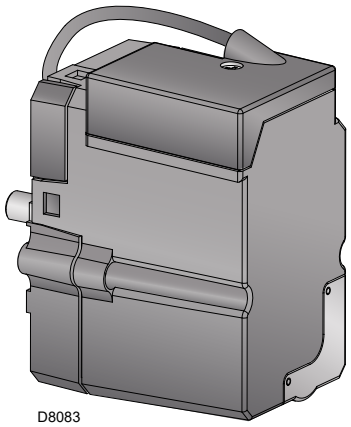


Fig. 10

Technical data

Power supply	AC / DC 24 V ± 20% (load interface)
Safety class	EN 60730 part 1-14
Power absorption	Max. 7.5 W
Angle adjustment, usable range	Max. 90°
Degree of protection	IP40
Work of field	0-90°
Opening time 0-90°	5 sec.
Direction of rotation	Anticlockwise
Torque operating	0.7 Nm
Torque off	0.4 Nm
Cable length	1.2 m
Radial load on the bearing	30 N
Axial load on the bearings	Max. 5 N
Weight	About 0.3 kg
Connecting cable	RAST2.5
Environmental conditions:	
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M3
Temperature range	-10 ... +60 °C
Humidity	< 95% RH

Tab. I

WARNING

Condensation, formation of ice and the entrance of water are not permitted!

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.

DANGER

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

WARNING

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.

DANGER

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 burner is shipped in cardboard packaging, so it is possible to move it when it is still packaged with a transpallet or fork lift truck.

WARNING

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.

CAUTION

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

CAUTION

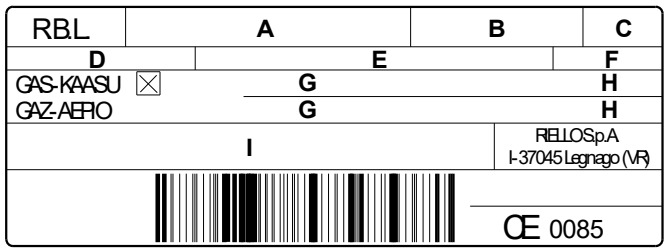
After removing all the packaging, check the integrity of the contents. In the event of doubt, do not use the burner; contact the supplier.

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 (Fig. 11), showing:

A the burner model
B the burner type
C the cryptographic year of manufacture
D the serial number
E the data for electrical supply and the protection level
F the electrical power consumption
G the types of gas used and the relative supply pressures
H the data of the burner's minimum and maximum output possibilities (see Firing rate)
Warning. The burner output must be within the boiler's firing rate
I the category of the appliance/countries of destination



D7738

Fig. 11

WARNING

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. 12).
- 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.

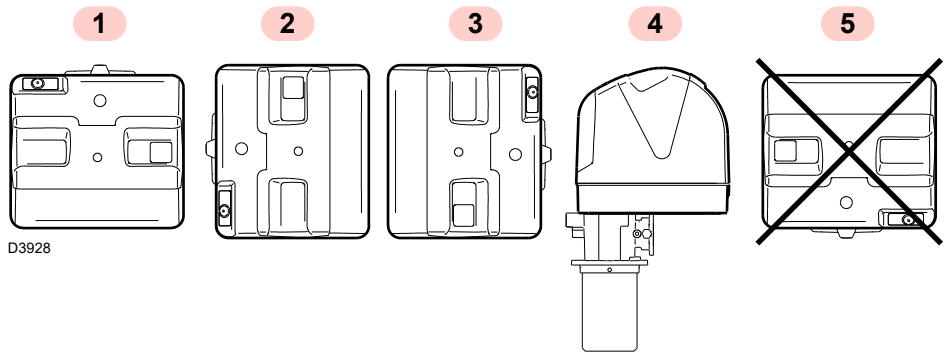


Fig. 12

5.5 Preparing the boiler

5.5.1 Introduction

The burners are suitable for working on both flame inversion boilers (in this case the long head model is recommended) and boilers with a combustion chamber with bottom runoff (three flue gas circulations), from which the best results of low NO_x emissions are obtained.

The maximum thickness of the front hatch of the boiler, complete with refractory, must not exceed the dimension indicated in Fig. 13.

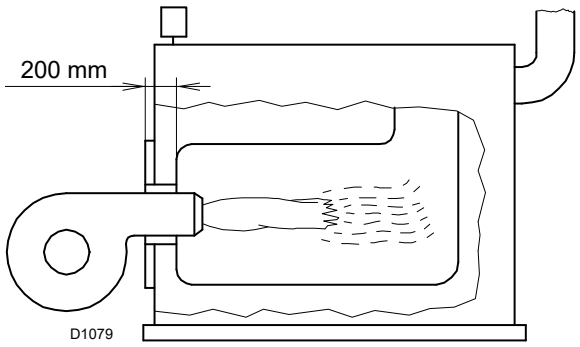


Fig. 13

5.5.2 Boring the boiler plate

Drill holes in the plate shutting off the combustion chamber, as illustrated in Fig. 14. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

5.5.3 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.

The lengths L available are:

Blast tube	Short (mm)	Long (mm)
RS 34-44/E MZ	216	351

For boilers with front flue passes 13)(Fig. 17), a protection in refractory material 11) must be inserted between the boiler refractory 12) and the blast tube 10).

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

For boilers with a water-cooled frontal, a refractory cover is not necessary 11)-12)(Fig. 17), unless expressly requested by the boiler manufacturer.

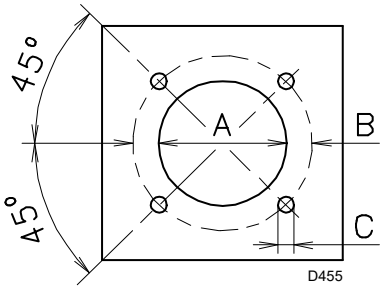


Fig. 14

mm	A	B	C
RS 34/E MZ	160	224	M 8
RS 44/E MZ	160	224	M 8

Tab. J

5.6 Positioning probe - electrode

WARNING

Before fixing the burner to the boiler, check from the opening of the blast tube that the probe and the electrode are correctly positioned, as in Fig. 16.

If, in the previous check, the position of the probe or electrode was not correct, is necessary:

- ➤ remove the screw 1)(Fig. 15)
- ➤ extract the inner part 2)(Fig. 15) of the head, and adjust them.

WARNING

Do not rotate the probe: leave it as in Fig. 16.

If it is located too close to the ignition electrode, the control box amplifier may be damaged.

WARNING

Observe the dimensions shown in Fig. 16.

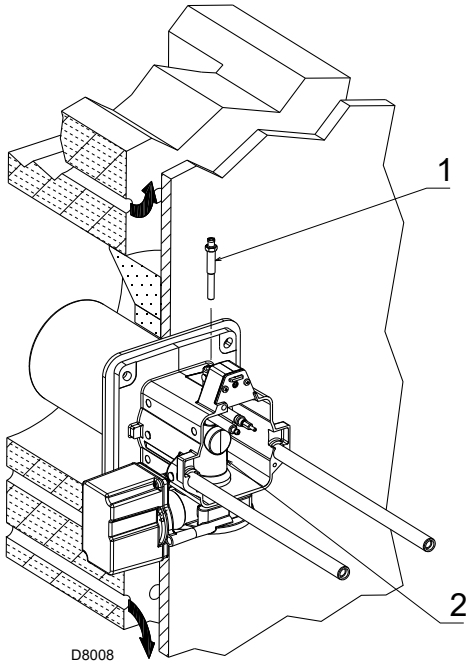


Fig. 15

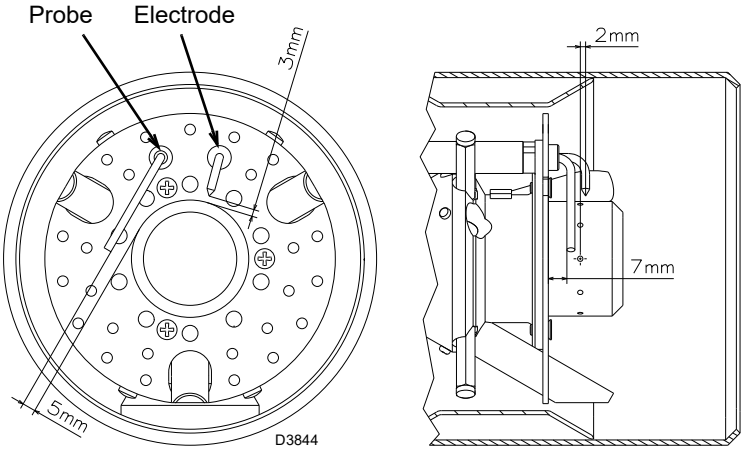


Fig. 16

5.7 Securing the burner to the boiler

Provide an adequate lifting system of the burner.

Separate the combustion head from the rest of the burner, as in Fig. 17; proceed as follows:
- ➤ loosen the screws 3) and remove the cover 1);
- ➤ remove the screws 2) from the two guides 5);
- ➤ disconnect the plug 14), unscrew the grommet 15);
- ➤ remove the screw 4);
- ➤ pull back the burner on the guides 5) by about 100 mm;
- ➤ disconnect the probe and electrode leads, then unthread the burner completely from the guides 5).
- ➤ Fix the flange 9) to the boiler plate, interposing the supplied insulating gasket 8).
- ➤ Use the 4 screws supplied, with a tightening torque of 35 ÷ 40 Nm, after protecting their thread with anti-seize products.

WARNING

The seal between burner and boiler must be air-tight; after the start-up, check there is no leakage of flue gases into the external environment.

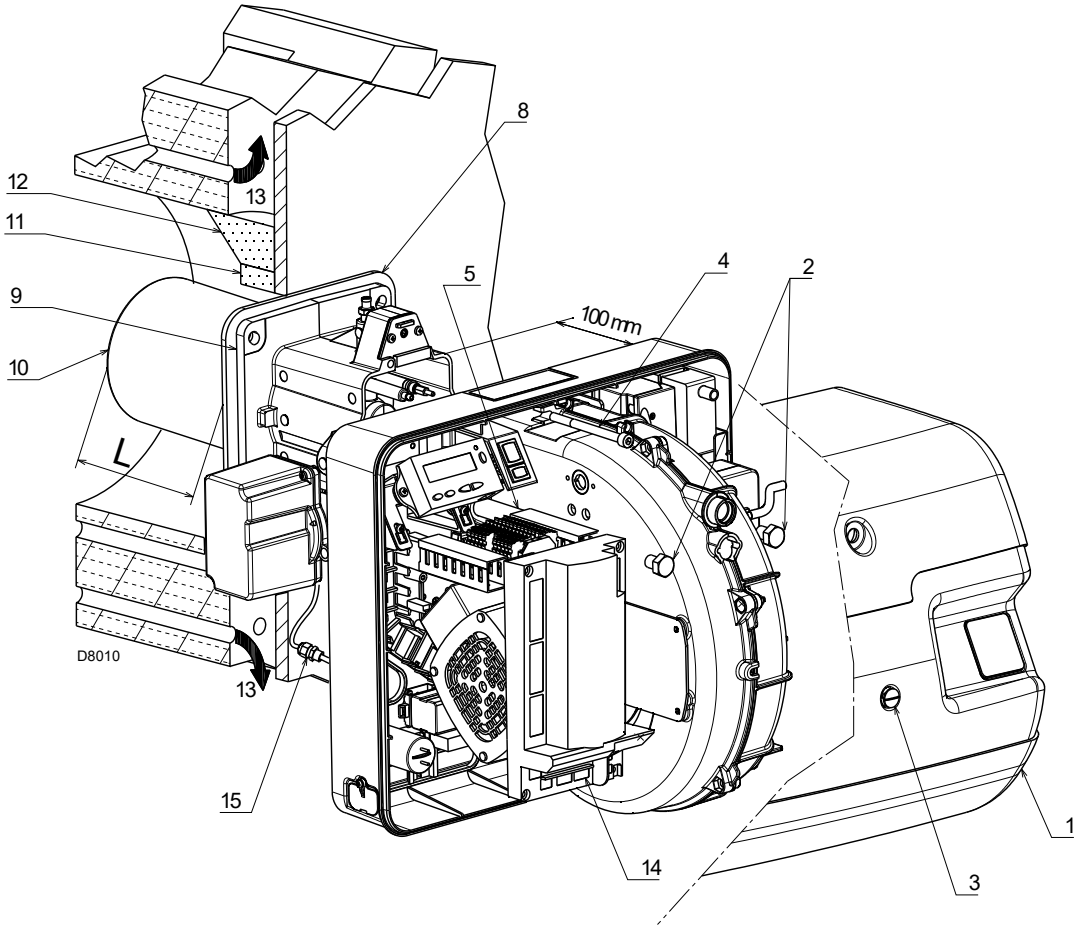


Fig. 17

5.8 Combustion head adjustment

At this point of the installation, the combustion head is fixed to the boiler as shown in Fig. 15.

It is therefore especially easy to adjust, and this adjustment depends only on the maximum output of the burner.

In the diagram (Fig. 18) find the notch at which to adjust the combustion head.

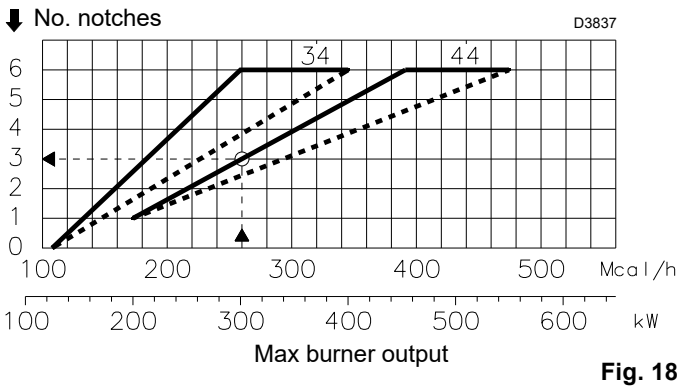


Fig. 18

Air adjustment

Rotate the screw 4)(Fig. 19) until the notch you have found corresponds with the front surface 5) of the flange.

WARNING

To facilitate the adjustment, loosen the screw 6)(Fig. 19), adjust, then block.

Example:
RS 44/E MZ, burner output = 300 kW.
From diagram (Fig. 18) you can see that for this output the air should be adjusted at notch 3, subtracted from the value of the pressure in the chamber.

WARNING

If the chamber pressure is equal to 0 mbar, the air adjustment is made referring to the dotted line of diagram (Fig. 18).

Central air adjustment

In case the application needs a particular setup, it is possible to modify the central air delivery using the ring nut 7)(Fig. 19) up to the notch indicated in diagram (Fig. 20).

In order to carry out this operation, unscrew the screws 8)(Fig. 19) and lift up the ring nut 7).

At the end, tighten the screws 8) again.

NOTE:
The adjustments indicated can be modified during the initial start-up.

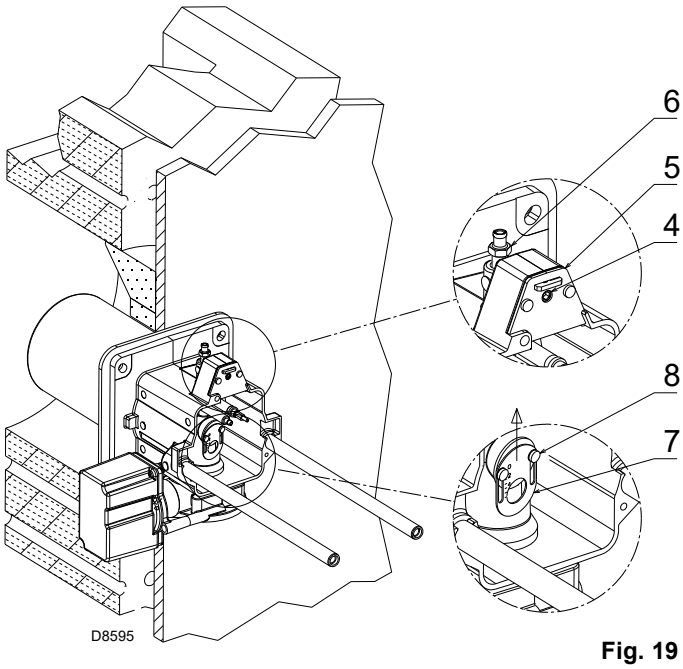


Fig. 19

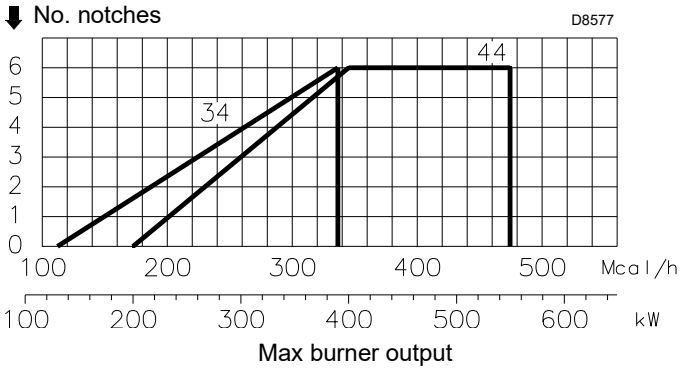


Fig. 20

5.9 Burner closing

Once the combustion head adjustment is completed:

- ➤ reassemble the burner on the guides 3) at about 100 mm from the pipe coupling 4) - burner in the position shown in Fig. 17;
- ➤ insert the probe and electrode cables, then slide the burner as far as the pipe coupling - burner in the position shown in Fig. 21;
- ➤ connect the plug of the servomotor 14)(Fig. 17) and tighten the grommet 15);
- ➤ refit the screws 2) on the guides 3);
- ➤ fix the burner to the pipe coupling with the screw 1).

WARNING

When fitting the burner on the two guides, it is advisable to gently draw out the high voltage cable and flame detection probe cable until they are slightly taut.

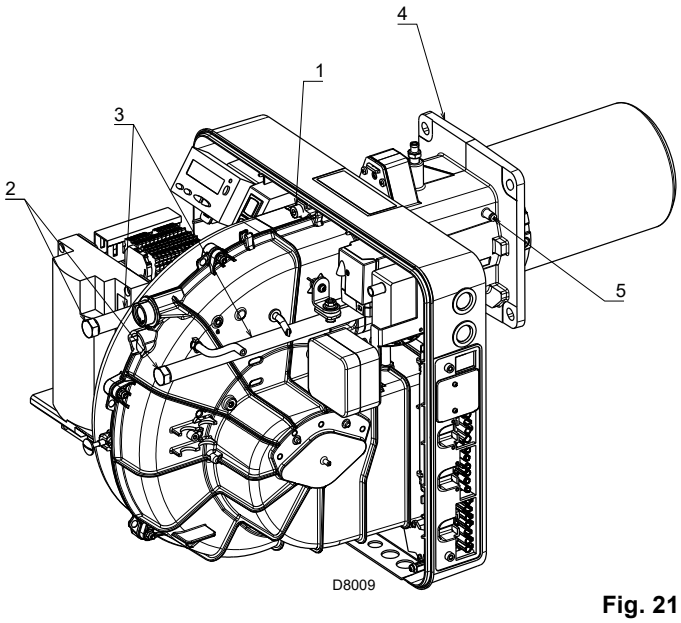


Fig. 21

5.10 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.

5.10.1 Gas feeding line

Key (Fig. 22 - Fig. 23 - Fig. 24 - Fig. 25)

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

6C Includes
- safety valve
- working valve

6D Includes:
- safety valve
- working valve
- pressure adjuster
- filter

7 Minimum gas pressure switch
8 Leak detection device, supplied as an accessory or incorporated, 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
11 Train-burner adaptor, supplied separately
P2 Upstream pressure of valves/adjuster
P3 Upstream pressure of the filter
L Gas train supplied separately
L1 The responsibility of the installer

MB

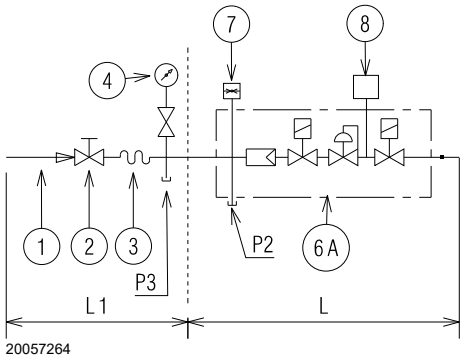


Fig. 22

MBC - VGD

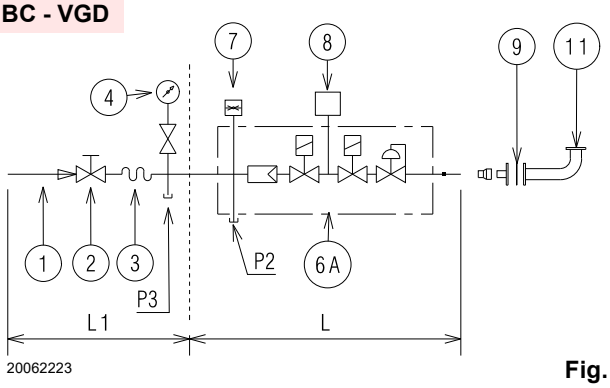


Fig. 23

DMV

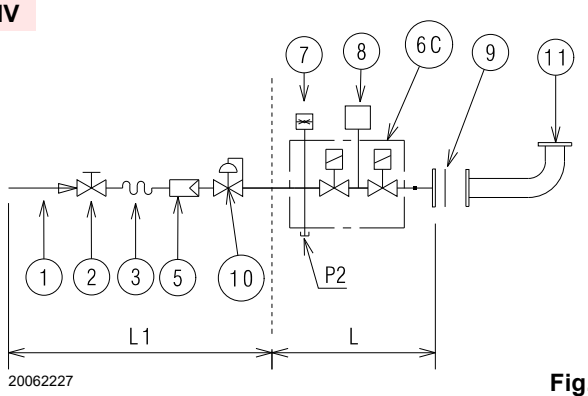


Fig. 24

CB

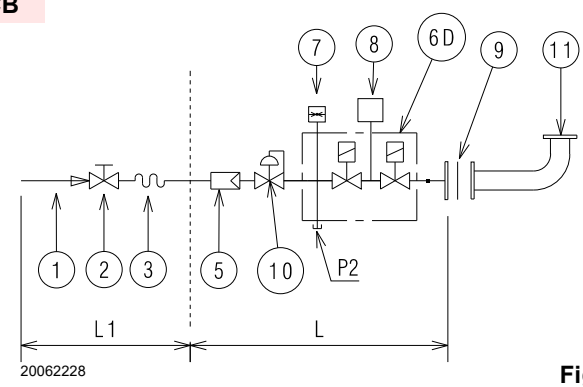


Fig. 25

5.10.2 Gas train

Type-approved in accordance with EN 676 and supplied separately from the burner.

5.10.3 Gas train installation


DANGER

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.

The gas train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 26.

The gas train must be connected to the gas attachment 1)(Fig. 26), with the flange 2), the gasket 3) and the screws 4) supplied with the burner.


WARNING

The gas solenoids must be as close as possible to the burner, to ensure that the gas reaches the combustion head within the safety time of 3s.

Ensure that the maximum pressure to the burner is within the calibration range of the pressure regulator.

See the accompanying instructions for the adjustment of the gas train.

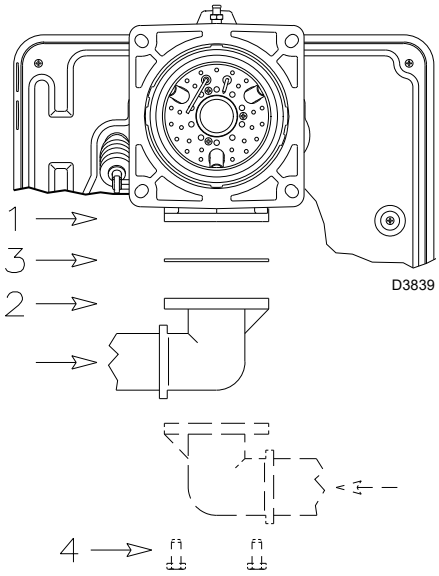


Fig. 26

5.10.4 Gas pressure

Tab. K indicates the pressure drop of the combustion head and the gas butterfly valve depending on the operating output of the burner.

	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 34/E MZ	130	1.5	2.2	0.4	0.6
	180	3.8	5.7	0.7	1.0
	260	7.3	10.9	1.9	2.8
	340	10.9	16.3	1.6	2.4
	390	13.1	19.5	3.4	5.1
RS 44/E MZ	200	3.0	4.5	0.6	0.9
	300	6.9	10.3	0.4	0.6
	400	10.8	16.1	2.4	3.6
	500	14.7	21.9	3.8	5.7
	550	16.7	24.9	4.6	6.9

Tab. K


WARNING

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

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

Load loss at combustion head.
Gas pressure measured at the test point 1)(Fig. 27), with:
- combustion chamber at 0 mbar;
- burner working at maximum output;

Column 2

Pressure loss at gas butterfly valve 2)(Fig. 27 at page 28) with maximum opening: 90°.

To know the approximate output at which the burner is operating at its maximum:
– Subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 27 at page 28).
– Find, in the Tab. K relating to the burner concerned, column 1, the pressure value closest to the result you want.
– Read the corresponding output on the left.

Example with natural gas G 20 for RS 44/E MZ:

Maximum output operation

Gas pressure at test point 1)(Fig. 27)	=	12.8 mbar
Pressure in combustion chamber	=	2.0 mbar
12.8 - 2.0	=	10.8 mbar

A maximum output of 400 kW shown in Tab. K corresponds to 10.8 mbar pressure, column 1.

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

To know the required gas pressure at test point 1)(Fig. 27), set the maximum output required from the burner operation, then:

– find the nearest output value in the Tab. K at page 27 for the burner in question.
– Read, on the right (column 1) the socket pressure 1)(Fig. 27).
– Add this value to the estimated pressure in the combustion chamber.

Example with natural gas G 20 for RS 44/E MZ:

Maximum output required: 400 kW

Gas pressure at output of 400 kW	=	10.8 mbar
Pressure in combustion chamber	=	2.0 mbar
10.8 + 2.0	=	12.8 mbar

gas pressure at test point 1)(Fig. 27).

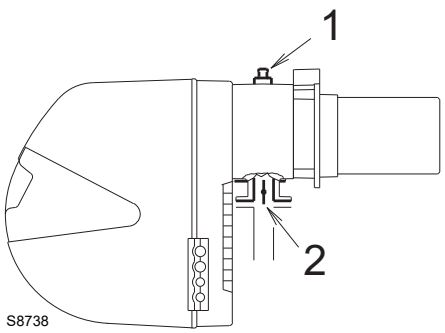


Fig. 27

5.11 Electrical wiring

Notes on safety for the electrical wiring

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

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.

Avoid condensate, ice and water leaks from forming.

If the hood 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.

NOTE

The RS 44/E MZ three-phase model leaves the factory for **400V** power supplies.

If the power supply is **230V**, change the motor connection (from star to triangle) and the thermal relay setting

Modulating operation

If connecting the output power regulator kit RWF, the TR thermostat/pressure switch and the TL thermostat/pressure switch must be removed.

If the 4-pole socket becomes unhooked, apply the supplied cover, as in Fig. 29.

5.11.1 Supply cables and external connections passage

All cables to connect to the burner are connected to the appropriate sockets on the side of the burner (Fig. 28), (use the supplied plugs for the connections).

The use of the cable grommets can take various forms. By way of example we indicate the following mode:

RS 34-44/E BLU single phase

1 7 pole socket for single phase power supply, thermostat/ pressure switch TL
2 6 pole socket for gas valves, gas pressure switch or the valve leak detection device
3 4 pole socket for thermostat/pressure switch TR (with removable cover)
4 5 pole socket not used
5 2 pole socket for maximum gas pressure switch accessory
6-6A Prepared for pipe unions (drill if 6A pipe unions are required)

RS 44/E MZ three-phase

1 7 pole socket for single phase power supply, thermostat/ pressure switch TL
2 6 pole socket for gas valve, gas pressure switch or the valve leak detection device
3 4 pole socket for thermostat/pressure switch TR (with removable cover)
4 5 pole socket for three-phase power supply
5 2 pole socket for maximum gas pressure switch accessory
6-6A Prepared for pipe unions (drill if 6A pipe unions are required)

DANGER

The socket cover 3)(Fig. 29) must only be removed when the 4-pole socket is in use.

When the 4-pole socket is not in use the cover must be in place.

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

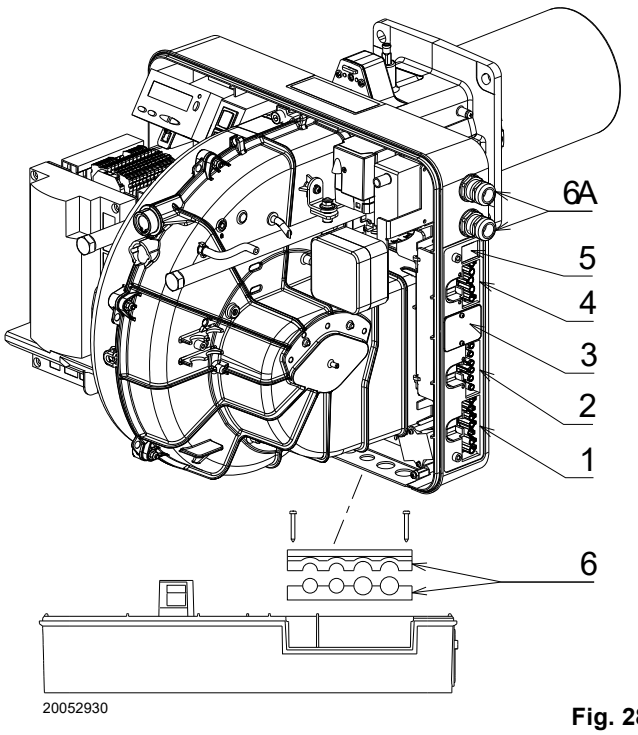


Fig. 28

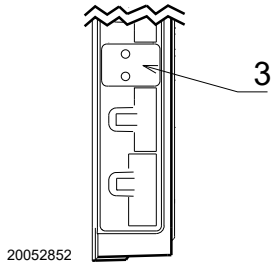


Fig. 29

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

5.12 Calibration of the thermal relay (only for RS 44/E MZ three-phase)

The thermal relay is used to avoid damage to the motor owing to a strong increase in absorption or the lack of a phase. For the calibration, refer to the electrical wiring.

If the minimum value of the scale of the thermal relay is greater than the rating absorption of the motor, protection is still ensured. This arises when the power supply of the motor is 400 V.

To reset, in the case of an intervention of the thermal relay, press the button 1)(Fig. 30).

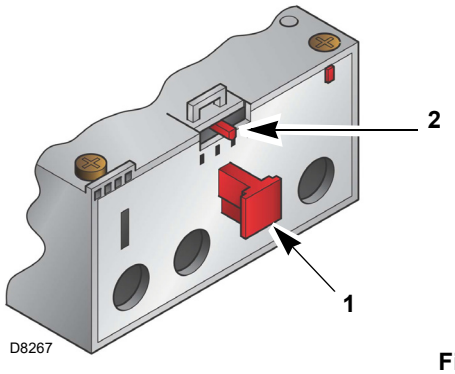


Fig. 30

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 ball valve closed" on page 50.

6.2 Adjustments prior to ignition

The adjustments to be carried out are:

- ensure that the gas supply company has carried out the supply line vent operations, eliminating air or inert gases from the piping.
- Slowly open the manual valves situated upstream of the gas train.
- Adjust the minimum gas pressure switch (Fig. 34 at page 33) to the start of the scale.
- Adjust the air pressure switch (Fig. 33 at page 33) to the start of the scale.
- Adjust the pressure switch for the valve leak detection control device (PVP kit)(Fig. 35 at page 33), if present, according to the instructions supplied with the kit itself.
- Check the gas supply pressure by connecting a pressure gauge to the pressure test point 1)(Fig. 31) of the minimum gas pressure switch: it must be lower than the maximum allowed pressure of the gas train, as shown on the characteristics label.

An excessive gas pressure can damage the components of the gas train and lead to a risk of explosion.

- Bleed the air from the piping of the gas train, connecting a plastic tube to the pressure test point 1)(Fig. 26) of the minimum gas pressure switch.
  Take the vent tube outside the building so you can notice the smell of gas.
- Connect two lamps or testers to the two gas line solenoids to check the exact moment at which voltage is supplied.
  This operation is unnecessary if each of the two solenoids is equipped with an indicator 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.

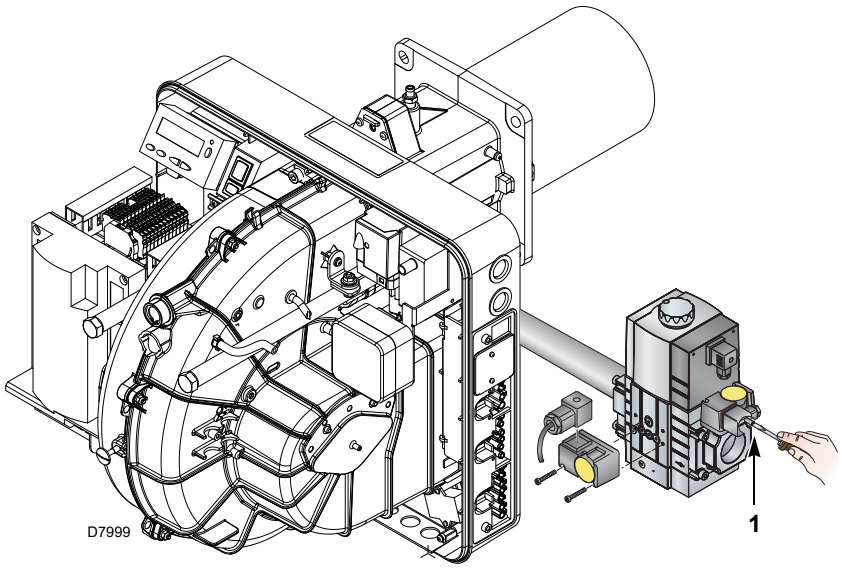


Fig. 31

6.3 Burner start-up

Feed electricity to the burner via the disconnecting switch on the boiler panel.

Close the thermostats/pressure switches and turn the switch of Fig. 32 to position "1".

DANGER

Make sure that the lamps or testers connected to the solenoids, or indicator lights on the solenoids themselves, show that no voltage is present.

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

Only for RS 44/E MZ three-phase

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

As soon as the burner starts up, go in front of the cooling fan of the fan motor and check it is rotating anticlockwise. See Fig. 32.

If this is not the case:
– place the switch of Fig. 32 in position **"0"** and wait for the control box to carry out the switch-off phase;
– disconnect the burner from the electrical supply;
– Invert the phases on the three-phase power supply of the inverter (see the specific inverter manual).

DANGER

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

Follow the **"Start-up procedure"** at page 39.

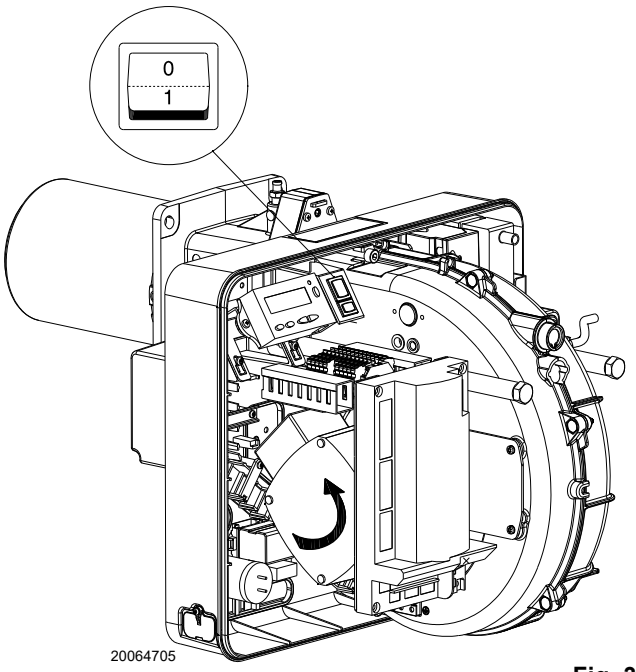


Fig. 32

6.4 Burner adjustment

6.4.1 Firing output

According to the regulation EN 676.

Burners with MAX output up to 120 kW

Ignition can be performed at the maximum operation output level.
Example:
– max. operation output: 120 kW
– max. firing output: 120 kW

Burners with MAX output above 120 kW

Ignition must be performed at a lower output than the max. operation output.
If ignition output does not exceed 120 kW, no calculations are required. If ignition output exceeds 120 kW, the regulations prescribe that the value be defined according to the control box safety time "ts":
for ts = 3 s, ignition output must be equal to, or lower than, 1/3 of max. operation output.

Example:
MAX operation output of 450 kW.
The ignition output must be equal to, or less than, 150 kW with ts = 3 s

In order to measure the ignition output:
➤ disconnect the plug-socket 6)(Fig. 5 at page 13) on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
➤ perform 10 ignitions with consecutive 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 = 3 s:

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

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 G 20 (9.45 kWh/Sm^3):
ignition output 150 kW corresponding to 15.87 Sm^3/h.
After 10 ignitions with lockout, the delivery indicated on the meter must be equal to, or less than:

$$Vg = \frac{15.87 \times 10 \times 3}{3600} = 0.132\ Sm^3$$

6.4.2 Maximum output

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

Gas adjustment

Measure the gas delivery on the meter.
As a general rule, this value can be found on Tab. K at page 27, just read the gas pressure on the pressure gauge (Fig. 39 at page 51) and follow the indications given on page 27.
– If it is necessary to reduce it, lower the output gas pressure via the pressure adjuster located beneath the gas valve.
– If it needs to be increased, increase the output gas pressure via the adjuster.

Air adjustment

If necessary vary the degrees of the air servomotor.

6.4.3 Minimum output

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

6.5 Final calibration of the pressure switches

6.5.1 Air pressure switch

Adjust the air pressure switch (Fig. 33) after having performed all other burner adjustments with the air pressure switch set to the start of the scale.

With the burner working at MIN 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.

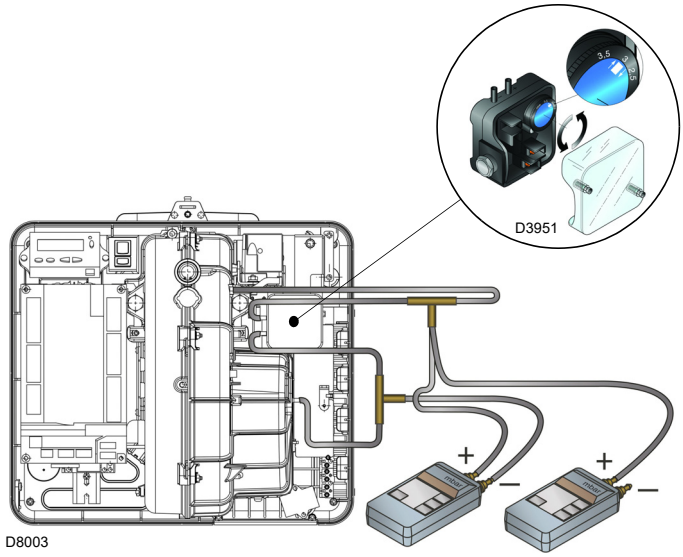
Slowly turn the appropriate knob clockwise until the burner goes into lockout.

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 slightly anticlockwise. 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. 33.
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. 33.



Connecting the pressure gauge with the pressure switch in differential mode

Connecting the pressure gauge with the pressure switch in absolute mode

Fig. 33

6.5.2 Minimum gas pressure switch

The purpose of the minimum gas pressure switch is to prevent the burner from operating in an unsuitable way due to too low gas pressure.

Adjust the minimum gas pressure switch (Fig. 34) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

– install a pressure gauge downstream of the gas train stabiliser (for example at the gas pressure test point on the burner combustion head);
– choke slowly the manual gas cock until the pressure gauge detects a decrease in the pressure read of about 0.1 kPa (1 mbar). In this phase, verify the CO value which must always be less than 100 mg/kWh (93 ppm).
– Increase the adjustment of the gas pressure switch until it intervenes, causing the burner shutdown;
– remove the pressure gauge and close the cock of the gas pressure test point used for the measurement;
– open completely the manual gas cock.

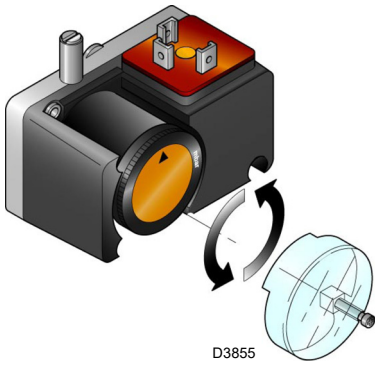


Fig. 34

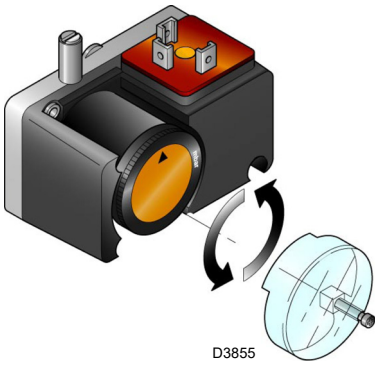


Fig. 35

6.5.3 PVP pressure switch kit

Adjust the pressure switch for the valve leak detection control device (PVP Kit) (Fig. 35), if present, according to the instructions supplied with the Kit itself.

WARNING

1 kPa = 10 mbar

6.6 Visualisation and programming mode

6.6.1 Normal mode

The Normal mode is the standard operation mode visualised on the operator panel display. It is the main level of the menu.

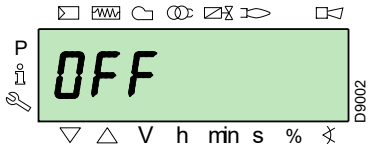
➤ Visualises the operation conditions and allows you to modify the operation point of the burner manually.
➤ It does not require any use of the keys of the operator panel.
➤ It allows access to the other visualisation and programming modes.

From Normal mode you can access other levels:
– Info mode (**InFo**)
– Service mode (**SEr**)
– Parameter mode (**PArA**)

Some examples in the standard conditions are given below.

6.6.1.1 Burner display in stand-by

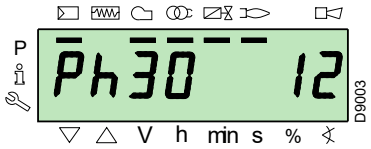
The burner is in the heat request waiting mode, or the selector "**0-1**" (Fig. 32 at page 32) is in the "0" position.



6.6.1.2 Display during the start up / stop

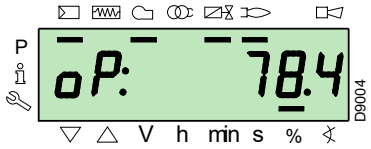
The display visualises the various phases of the start-up, ignition and switch-off of the burner.

In the example, the display indicates that the burner is in **Phase 30** (see diagram Fig. 36) and there are 12s to the successive stage.



6.6.1.3 Display of the work position

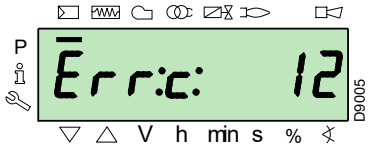
The burner is working in the requested load position (in the example alongside, **78.4%**).

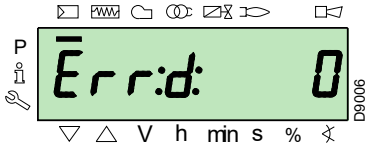


6.6.1.4 Condition error message, display of the errors and information

The display visualises alternately the error code (in the example **c: 12**) and the relative diagnostic (in the example **d: 0**).

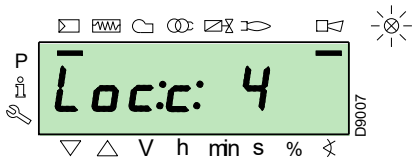
The system goes into safety mode and the message shown in the next figure appears.

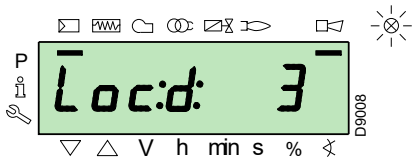




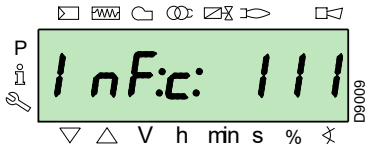
The burner goes into lockout.

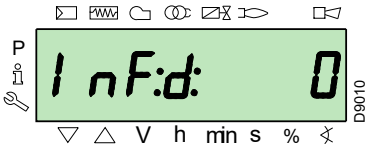
The display visualises alternately the lockout code (in the example alongside **c: 4**) and the relative diagnostic (in the example **d: 3**). The red lockout lamp is on.





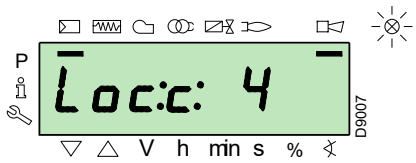
The display visualises alternately an error code and a diagnostic, which does not take the system into safety mode.

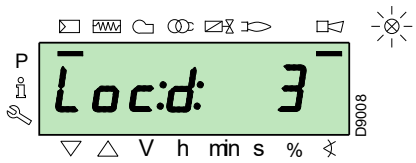




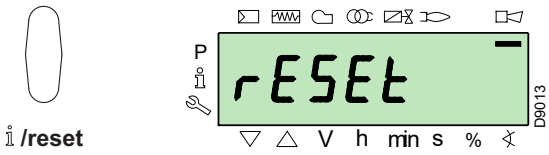
6.6.1.5 Reset procedure

The burner is in lockout when the red indicator light on the operator panel is lit up, and the display visualises the lockout code (in the example alongside **c: 4**) and the relative diagnostics (in the example **d: 3**) alternately.





To reset, press the **"i/reset"** key for 1s: the display will show **"rESEt"**. When the key is released, the lockout signal will disappear and the red indicator light will switch off.
The control box is reset.



6.6.1.6 Manual lockout procedure

If necessary, it is possible to manually block the control box and, consequently, the burner, by pressing the key **"i/reset"** simultaneously with any other key of the operator panel.

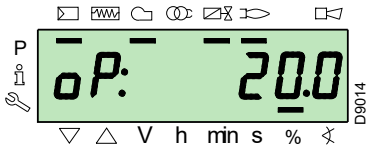
CAUTION

With the selector "**0-1**" (Fig. 32 at page 32) the burner does not stop immediately, but the switch-off phase is activated.

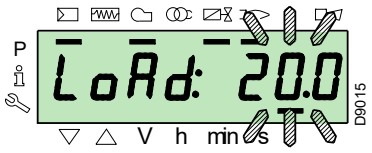
6.6.1.7 Manual operation procedure

After the adjustment of the burner and the setting of the points on the modulation curve, it is possible to manually check the operation of the burner along the entire curve.

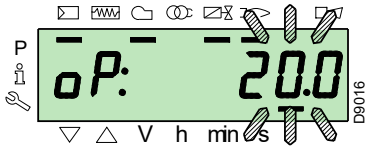
Example:
the burner is working at the requested load percentage: 20%.



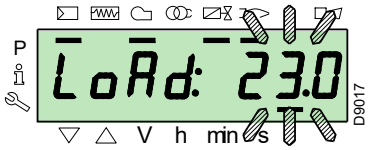
Press the **"F"** key for 1 second: "**LoAd**" is displayed and the load percentage flashes.



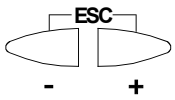
Releasing the key "**F**" the standard visualisation appears, with the current load percentage flashing: this means that the burner is working in Manual mode (any outside adjustment is excluded and only the safety devices are active).



Keep the **"F"** key pressed and, with the keys "**+**" or "**–**", increase or decrease the load percentage.



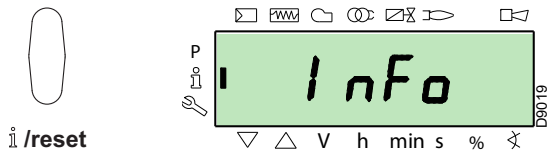
To exit manual mode, press the keys "**+**" and "**-**" (**ESC**) simultaneously for 3 seconds: the burner will work in Automatic mode and the output will depend on the thermostat/adjustment pressure switch (TR).



6.6.2 Info mode

The **Info mode** (**InFo**) visualises general system information. To access this level you must:

➤ press the "**i/reset**" key for 1-3 s.
➤ Release the key immediately when the display shows **"InFo"**.



The list of parameters (in the sequence in which they are displayed) is shown in Tab. L.

No.	Parameter
167	Volumetric delivery of fuel in the unit of measurement selected
162	Operation time with flame
163	Operation time
164	No. of resettable ignitions
166	Total no. of ignitions
113	Identification code of the burner
107	Software version
108	Software variation
102	Control box test date
103	Identification code of the control box
104	Identification number of the group of parameters set
105	Version of the group of parameters
143	Reserved
End	

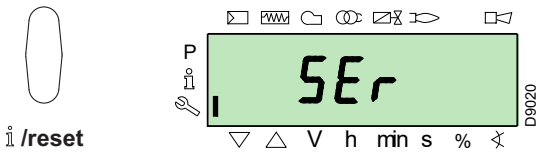
Tab. L

6.6.3 Service mode

The **Service mode** (**SEr**) visualises the error log and certain technical information about the system. To access this level you must:

➤ press the **"i/reset"** key for more than 3 s.

➤ Release the key immediately when the display shows **"SEr"**.



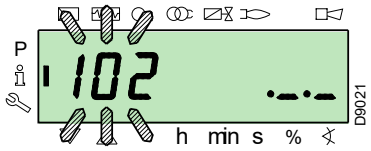
The list of parameters (in the sequence in which they are displayed) is shown in Tab. M.

No.	Parameter
954	Flame intensity (%)
960	Actual fuel which passes in units of volume / h (m³/h, l/h, ft³/h, gal/h)
121	Manual setting of output Not defined = automatic operation
922	Position of the servomotors (expressed in degrees, symbol ∢) 0 = fuel 1 = air
161	Number of errors
701÷725	Log of the errors: 701-725.01, Code

Tab. M

6.6.3.1 Operating mode on Info Mode and Service Mode

After access to these levels, the display visualises the number of the parameter (flashing) on the left, and the corresponding value on the right.



If the value is not displayed, press the **"i/reset"** key for a period of 1 - 3s.

To return to the Parameter List, press the **"i/reset"** key for more than 3s, or press the keys **"+"** and **"-"** (**ESC**) simultaneously.

To move on to the next parameter, press the **"+"** or **"i/reset"** key for less than 1 s. At the end of the list, the display visualises **"End"**.

To move back to the previous parameter, press the key **"-"**.

To return to the Normal/Standard visualisation mode, press the **"i/reset"** key for more than 3s, or press the keys **"+"** and **"-"** (**ESC**) simultaneously.

For a moment the display will show **"OPErAte"**.

6.6.4 Parameter mode

The **Parameters Mode** (**PArA**) displays, and allows to be modified/programmed, the list of parameters indicated on page 44.

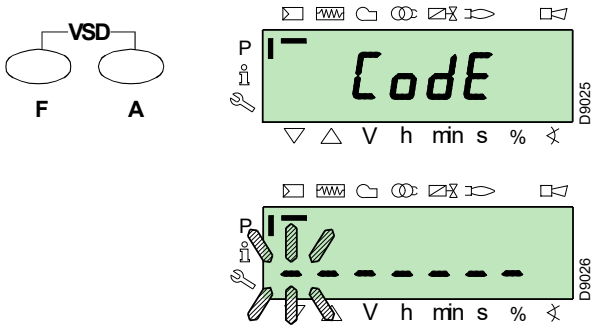
The factory-set parameters are not visible.

To access this level you must follow **"Access procedure with password"**.

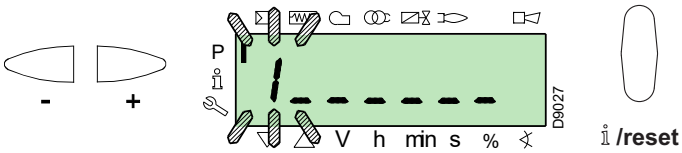
6.6.4.1 Access procedure with password

Press the **"F"** and **"A"** keys simultaneously for 1s.

For a moment the display will show **"CodE"**, and immediately after you will see 7 dashes, the first one flashing.



With the keys **"+"** and **"–"** select the first character of the password (letter or number), and confirm by pressing the key **"i/reset"**.

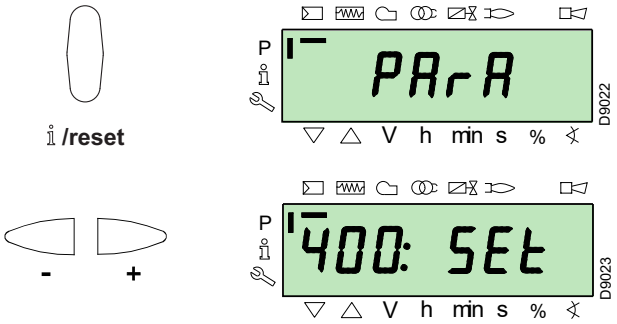


Once you have confirmed, the sign **"–"** will appear.

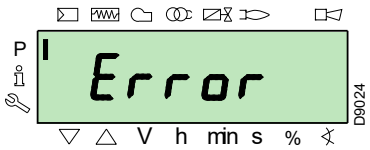
Continue in the same way for the other characters.

After inserting the last character of the password, confirm by pressing the key **"i/reset"**: if the password inserted is correct you will see **"PArA"** for a few seconds, then you can access the various groups of parameters.

With the keys "**+**" and "**–**" select the group you require.



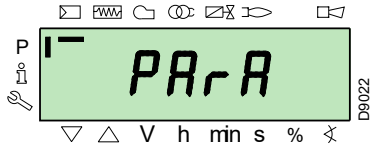
If the password inserted is incorrect, the message **"Error"** will appear for a moment. It is then necessary to repeat the procedure.



WARNING

The password must only be communicated to the qualified personnel or the Technical Assistance Service, and must be kept in a safe place.

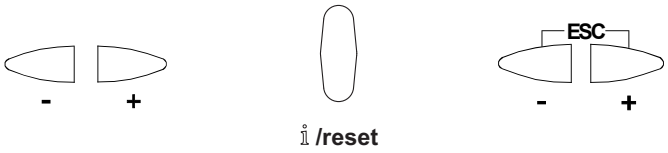
Once the access procedure has been carried out, the display will show **"PArA"** for a few seconds.



Select the group of parameters with keys **"+"** and **"-"**, and confirm by pressing the **"i/reset"** key.

Within the group you have chosen, scroll through the list with the keys **"+"** and **"-"**. At the end of the list, the display visualises **"End"**.

To return to Normal visualisation mode, simultaneously press the keys **"+"** and **"-"** (**ESC**) twice.



6.6.4.2 Allocating the levels of the parameters

The parameters' level is subdivided into groups as shown in Tab. N.

No.	Parameter
100: ParA	**General parameters** Information and identification data of the system.
200: ParA	**Checks on the burner** Type of operation, intervention and safety times of the various phases.
400: Set	**Air/fuel modulation curve** Setting of air/fuel adjustment points
500: ParA	**Positioning of servomotors** Choice of positions of the air/fuel servomotors in the various phases.
600: ParA	**Servomotors** Setting and addressing of the servomotors.
700: HISt	**Log of the errors:** Choice of different visualisation modes for the errors log.
900: dAtA	**Process information** Visualisation of information for the remote management of the burner.

Tab. N

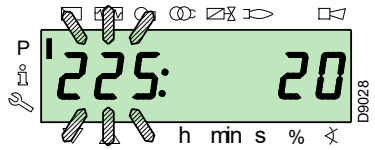
WARNING

All the parameters are checked in the factory. Modification/tampering may compromise the good operation of the burner and cause injury to people or damage to things. In any case, modifications must be carried out by qualified personnel.

To modify a parameter, refer to the **"Parameter modification procedure"**.

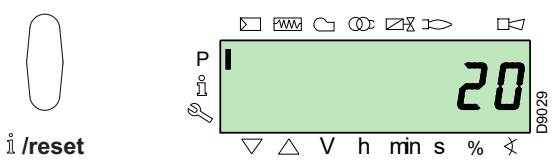
6.7 Parameter modification procedure

After accessing the level and group of parameters, the display visualises the number of the parameter (flashing) on the left, and the corresponding value on the right.

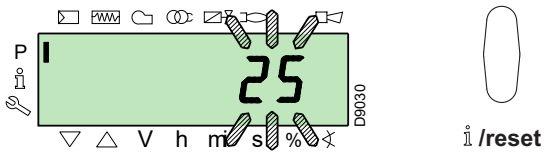


If the value is not visualised, press the key **"i/reset"** for 1 - 3s.
An example of how to modify the parameter relating to **pre-purging time** (no.225) is given below.
Press the key **"i/reset"**: the value **20** (seconds) will appear.

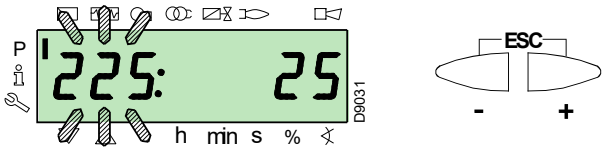
NOTE:
The unit of measurement of the time is not visualised but is understood in seconds.



Press the key **"+"** and increase the value to **25** seconds (flashing). Press the key **"i/reset"** to confirm and store.



To return to the list of parameters, press the keys **"+"** and **"-"** (**ESC**) simultaneously.



6.7.0.1 Procedure for inserting and adjusting points on the modulation curve

Nine adjustment/calibration points (P1 ÷ P9) can be inserted in the control box for each servomotor, varying their position by degrees and, consequently, the quantity of air and fuel introduced.

The **ignition point P0** is independent of the minimum modulation value. This means that, in the event of difficulty, it is possible to switch on the burner at a value other than the modulation minimum (**P1**).

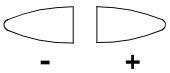
To access the **Parameter mode** (group 400) referring to the **"Access procedure with password"** at page 36.

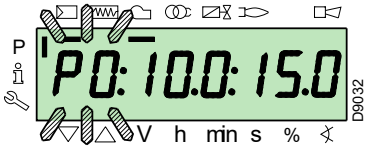
To insert or adjust a point, proceed as follows.

Using the keys **"+"** and **"-"** insert/select the curve point you want and wait for it to flash: this means that the servomotors are now positioned on the values shown on the display and which correspond to the point previously set.

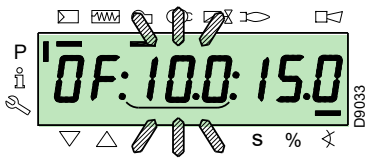
It is now possible to insert/modify the position by degrees.

The set value does not require confirmation.

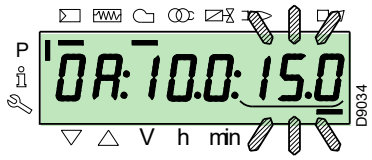




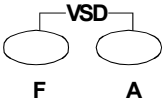
For the fuel servomotor, keep the key **"F"** pressed (the position in degrees flashes) and press the keys **"+"** or **"-"** to increase or decrease the value.

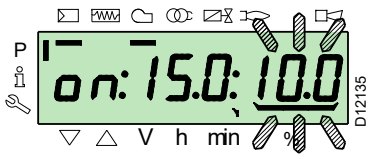


For the air servomotor, keep the key **"A"** pressed (the position in degrees flashes) and press the keys **"+"** or **"-"** to increase or decrease the value.

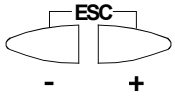


To adjust the speed of the inverter (expressed in **%** and that is **50 Hz = 100 %**), keep the buttons **"F"** and **"A"** simultaneously pressed, the percentage position blinks and press buttons **"+"** or **"-"** to increase or decrease the value.





Select another point, or exit this area by pressing the keys **"+"** and **"-"** (**ESC**) simultaneously.



6.7.0.2 CALC function

The diagram (Fig. 36) shows how the fuel modulation curve is modified if the values of point "**P5**" are changed.
By keeping the **"+"** key pressed for more than 3s, the points from "**P6**" to "**P8**" are recalculated.
By keeping the **"-"** key pressed for more than 3s, the points from "**P4**" to "**P2**" are recalculated.

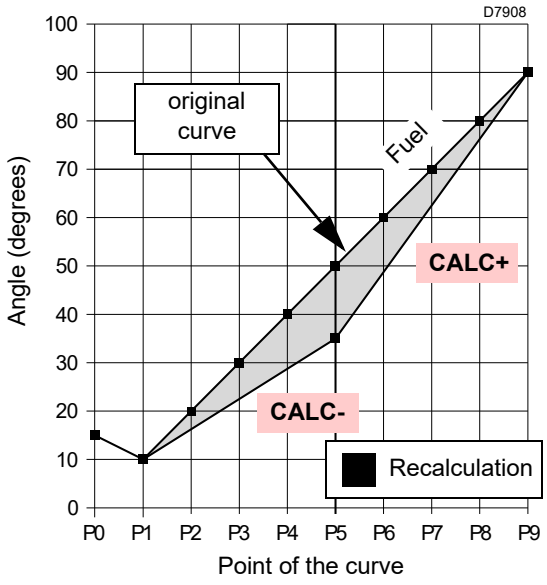


Fig. 36

The diagram of (Fig. 37) shows the fuel modulation curve when, after the modification of point "**P5**", the recalculation of all the other points is not carried out.

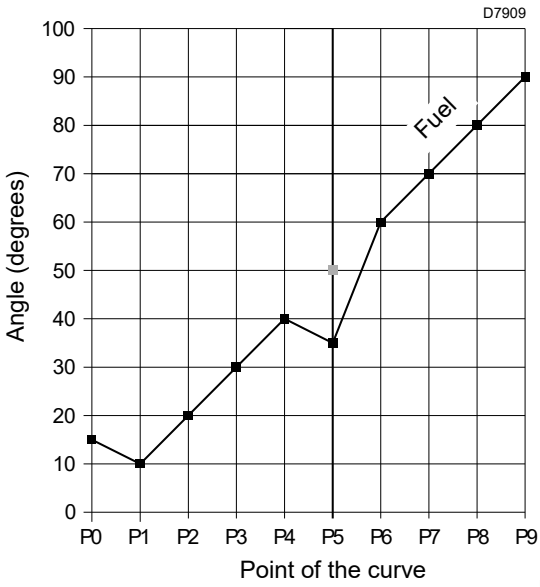
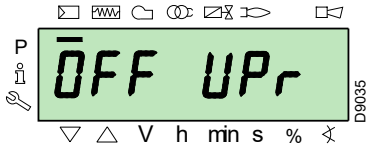


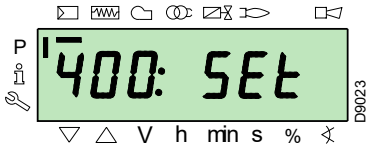
Fig. 37

6.8 Start-up procedure

Check that the operator panel display shows the heat request and **"OFF Upr"**: this means it is necessary to set the modulation curve of the burner.



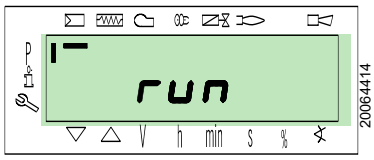
Access the Parameters Level referring to **"Access procedure with password"** at page 36.
The display screen displays the parameters group **400**.



Confirm with the key **"i/reset"**

i /reset

The display visualises **"run"**



Confirm with the key **"i/reset".** The burner starts up.

The display visualises all the phases and relative times in sequence. The phases are listed in section **"List of phases"** at page 18.

Phase 22:

Start of the fan motor.

Phase 24:

The burner goes to the pre-purging position, the air servomotor opens the damper at 90°.

Phases 80, 81, 82, 83:

These phases relate to the valve seal test.

Phase 30:
The count of the pre-purging time pre-set in the factory begins.

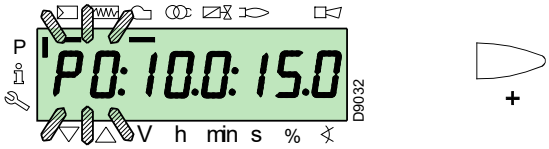
Phase 36:

The burner goes to its switch-on position, point "**P0**", defined in Tab. O at page 40: the display shows a flashing "**P0**" indicator.

If the set value is adequate, **confirm using the button "+"**.

The control box will automatically report the same values set at

Otherwise, modify the ignition point, see the section **"Procedure for inserting and adjusting points on the modulation curve"** at page 38).



WARNING

The values shown in the figure are purely for indication purposes.

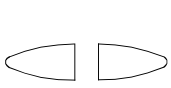
Phase 38:

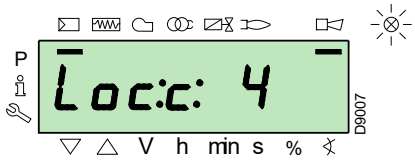
The ignition phase begins and the spark goes off.

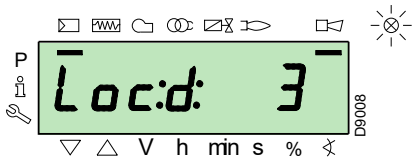
Phase 40:

The gas valves open (the count of the safety time begins). Check the presence of the flame from the special inspection window, and that the combustion parameters are correct. if necessary, vary the degrees of opening/closing of the air and fuel servomotors.

If the control box goes into lockout, press the keys **"+"** and **"-"** (**ESC**) simultaneously: the display visualises alternately the lockout code for flame absence **c: 4**) and the relative diagnostic (**d: 3**).







Solve the problem, referring to the paragraph **"Ignition failure"** at page 48.

To unlock, see **"Reset procedure"** at page 35. The display visualises **"OFF Upr"**.

Repeat the **"Start-up procedure"**.

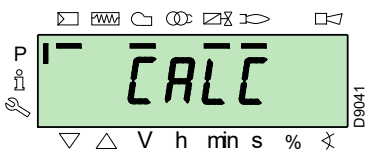
WARNING

The values previously inserted remain stored.

Once it has ignited (point **"P0"**), proceed with the calibration of the modulation curve.

Press the button "**+**": the display visualises the flashing "**P1**" indicator and proposes the same settings as for point "**P0**".

Press the button"**+**" again: "**CALC**" appears on the display for a few seconds.



the points "**P0**" and "**P1**" to points "**P2**" to "**P8**".

IMPORTANT

The purpose is to reach the point “**P9**” to adjust/fix the maximum operating power.

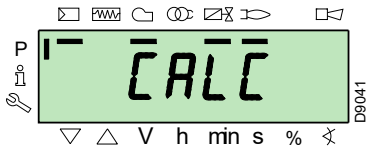
Press the key “**+**” until point “**P9**” has been reached.

Once “**P9**” has been reached wait until the display visualises the flashing indictor “**P9**” proposing the same settings as point “**P0**”.

Now it is possible to change this value to attain the desired maximum operating power.

If the gas pressure is too low, despite opening the gas servomotor to the maximum 90°, it is necessary to use the stabiliser of the gas valve.

After adjusting point “**P9** keep the key “**+**” pressed for about 5 seconds, the display shows “**CALC**” for a few seconds.



The control box will automatically calculate the points from “**P8**” to “**P2**”, distributing them in a line. These are theoretical and must be checked.

Check that the settings of point “**P8**” are adequate.

If not, modify the point.

Proceed in sequence, with the button “**-**” , up to point “**P1**”.

It is possible to modify point “**P1**” to obtain a different minimum modulation point to the ignition point (“**P0**”).

IMPORTANT

Before moving on from one point to the next, wait for the servomotors to reach the position visualised on the display.

During the adjustment of each point, work on the air and gas servomotors, without modifying the position of the gas valve stabiliser.

Halfway through the procedure (i.e. around point **P4** or **P5**), you are advised to measure the gas delivery and check that the output is about 50% of the maximum output.

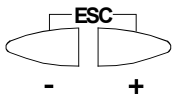
If this is not the case, work also on the gas valve stabiliser: in this case however, it is necessary to revise the calibrations of all the points previously set.

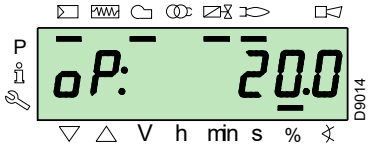
Once the calibration of point “**P1**” is finished, confirm by simultaneously pressing keys “**+**” and “**-**” (**ESC**): the parameter “**546**” appears.

If you want to make the burner work on the entire modulation curve, press the “**+**” and “**-**” (**ESC**) keys simultaneously: in this way, parameter “**546**” will automatically be assigned the value of 100% and parameter “**545**” will have a value of 20%.

If you want to make the burner work on just a part of the modulation curve, modify parameters “**546**” and “**545**” according to the **"Parameter modification procedure"** at page 37.

Simultaneously press the keys “**+**” and “**-**” (**ESC**) twice, the display will show the position of the current load.





Factory settings

Point of the curve		Burner	
		RS 34/E MZ	RS 44/E MZ
P0	air	13°	18°
	gas	20°	30°

Tab. O

WARNING

At the end of the **"Start-up procedure"** it is necessary to carry out a **"Backup"**, which is used to memorise the parameters and the data in the control box inside the RDI21 display …

This operation allows the parameters and the points of the modulation curve to be restored in case of problems.

It is advisable to perform a backup every time that a parameter is changed!

For the procedure refer to the section **"Backup"** at page 41.

6.9 Backup / Restore procedure

At the end of the **"Start-up procedure"** it is opportune to make a backup, creating a copy of the data memorised on the REC, in the display panel RDI 21.

This will allow the data be used to programme a new REC or to return to the memorised settings of the same REC.

WARNING

We suggest carrying out this operation at the end of each intervention that modifies what has been set on the cam.

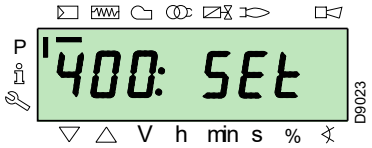
This will allow a restore to be easily carried out on a new cam supplied as a replacement part, without having to reprogramme the system.

6.9.1 Backup

To perform the backup, proceed as follows:

➤ access the Parameters Level referring to **"Access procedure with password"** at page 36.

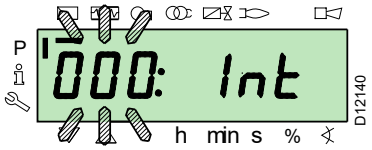
The display screen displays the parameters group **400**.



With the key **"-"**:

-

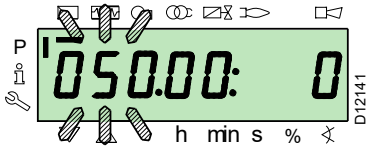
Select the parameters group **000**:



The **000** parameter blinks, confirm using the **"i/reset"** key:

i /reset

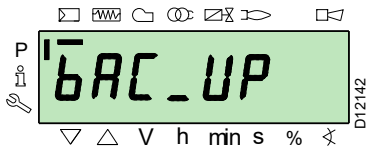
The display screen shows parameter **050** blinking:



Confirm with the key **"i/reset"**:

i /reset

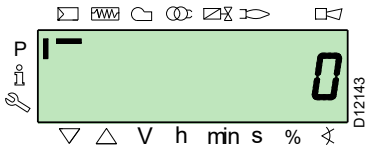
The parameter **bAC_UP** appears on the display screen:



confirm with the key **"i/reset"**:

i /reset

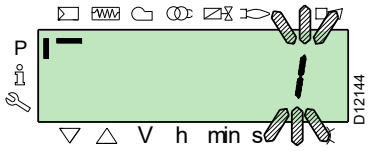
The display screen shows the following value:



Use the button **"+"**:

+

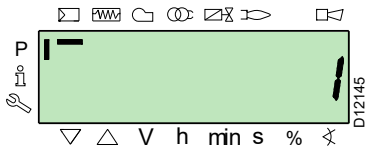
The value will be set to **1**. Value 1 is flashing:



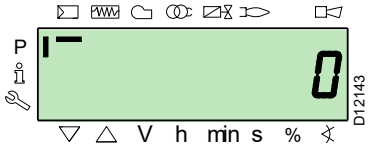
confirm with the button **"i/reset"** to activate the **backup** process.

i /reset

The value **1** appears on the display screen:



After approx 5 seconds (it depends on the duration of the programme), the 0 value appears on the display screen, this is to indicate that the backup process has been completed correctly.



NOTE:
If an error occurs during the backup process, the display screen shows a negative value.
To determine the cause of the error refer to diagnostic code 137 (see section "Error codes list" at page 53).

6.9.2 Restore

WARNING

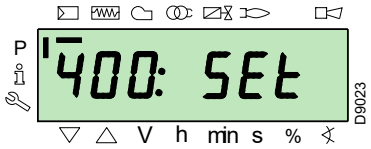
Use this procedure when replacing equipment with a parts code. In this way it is possible to have the default parameters already memorised or those memorised during the start-up.

The procedure cannot be carried out on equipment coming from other burners.

To perform the restore procedure, proceed as follows:

➤ access the Parameters Level referring to **"Access procedure with password"** at page 36.

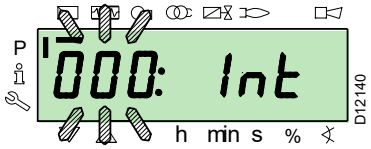
The display screen displays the parameters group **400**.



With the key **"-"**:

-

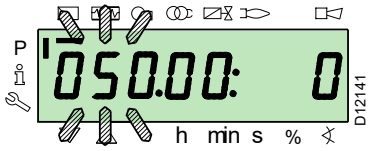
Select the parameters group **000**:



The **000** parameter blinks, confirm using the **"i/reset"** key:

i /reset

The display screen shows parameter **050** blinking:



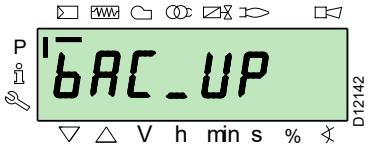
Confirm with the key **"i/reset"**:

i /reset

WARNING

It is advisable to perform a backup every time that a parameter is changed, after checking the modification carried out is correct.

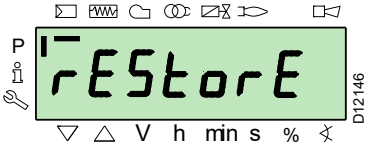
The parameter **bAC_UP** appears on the display screen:



With the key **"+"**

+

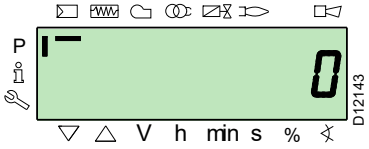
Select the**rEStorE** parameter



Confirm with the key **"i/reset"**:

i /reset

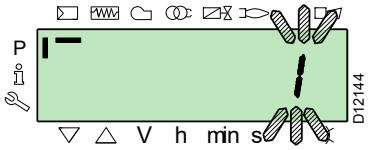
The display screen shows the following value.



Use the button **"+"**:

+

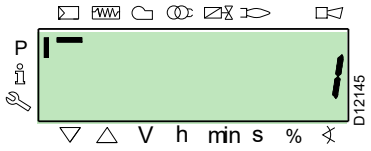
The value will be set to **1**. Value 1 is flashing:



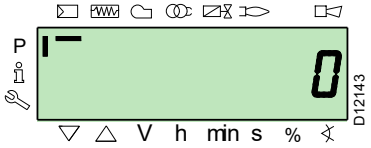
confirm with the button **"i/reset"** to activate the **restore** process.

i /reset

The value **1** appears on the display screen:



After approx 8 seconds (it depends on the duration of the programme), the **0** value appears on the display screen, this is to indicate that the restore process has been completed correctly.



NOTE:
When the restore process is successfully completed, the 0 value is shown on the display screen.
Err C information: 136 D: 1 (restore process initialised) is displayed for a brief moment.

IMPORTANT

At the end of the restore process, it is necessary to check the sequence of functions and the list of parameters.

6.9.3 Parameter list

Parameter		No. elements	Unit of measure	Modification	Value range		Degree of accuracy	Default setting	Acces mode
No.	Description				Min.	Max.			
000	**INTERNAL PARAMETERS**								
050	Start backup/restore process via RDI21... / PC TOOL (set the parameter to 1) Index 0 = create backup Index 1 = perform restore Negative values indicate errors	2	-	Modification	-99	2	1	0; 0	Service mode
055	Burner identification number created from the backup on RDI21...	1	-	Reading only	0	99999999	1	0	Service mode
056	ASN number created by the backup on RDI21...	8	-	Reading only	0	127	1	0	Service mode
057	Software Version created by the backup on RDI21...	1	-	Reading only	0x100	0xFFF9	1	0	Service mode
100	**GENERAL PARAMETERS**								
102	Control box identification date	1	-	Reading only	0	255	1		Info mode
103	Control box identification number	1	-	Reading only	0	65535	1		Info mode
104	Identification number of the group of parameters set	1	-	Reading only	0	255	1	30	Info mode
105	Version of the group of parameters set	1	-	Reading only	0	0xFFFF	1	V 01.08	Info mode
107	Software version	1	-	Reading only	0	0xFFF9	1	V 03.30	Info mode
108	Software variation	1	-	Reading only	0	225	1	1	Info mode
111	ASN number to verify the ASN number created by the backup on RDI 21…	8	-	Reading only	0	127	1	0	Service mode
113	Burner identification	1	-	Modification	0	99999999	1	Not defined	Info Mode with password Service Mode
121	Manual setting of output Not defined = automatic operation	1	%	Modification / zero setting	0%	100%	0.1%	Not defined	Info mode
123	Minimum output step position Index 0: BACS output Index 1: output of the external load regulator, analogue. Index 2: output of the external load regulator contacts.	3	%	Modification	0%	100%	0.1%	0% ; 1%; 0%	Service mode
124	Beginning flame loss test (TÜV test) (define the parameter at 1) (switch of flame loss fuel valves) A negative value indicates an error (see code 150)	1	-	Modification	-6	1	1	0	Service mode
125	Frequency of main power supply 0 = 50 Hz 1 = 60 Hz	1	-	Modification	0	1	1	0	Service mode
126	Brightness of display	1	%	Modification	0%	100%	1%	75%	Service mode
128	Fuel meter: Led pulse valence (led pulses / volumetric flow units)	1	-	Modification	0	400	0.01	0	Service mode
130	Eliminate visualisation error chronology To eliminate the visualisation, set the parameter to 1, then to 2 Answer 0: process successful Answer -1: time-out of 1_2 - sequence	1	-	Modification	-5	2	1	0	Service mode
133	Default output for TÜV test: TÜV test not valid when output is activated 2,000 ..... 10,000 = low flame or first / second / third stage	1	%	Modification / zero setting	20%	100%	0.1%	Not defined	Service mode
141	Remote management of control box 0 = off 1 = Modbus 2 = reserved	1	-	Modification	0	2	1	0	Service mode
142	Standby time before a new attempt in event of communication fault Values set: 0 = not active 1 = ... 7200 s	1	s	Modification	0s	7200s	1s	120s	Service mode
143	Reserved	1	-	Modification	1	8	1	1	Info mode
144	Reserved	1	s	Modification	10s	60s	1s	30s	Service mode
145	Peripheral address for Modbus Values set: 1 ... 247	1	-	Modification	1	247	1	1	Service mode

Parameter		No. elements	Unit of measure	Modification	Value range		Degree of accuracy	Default setting	Acces mode
No.	Description				Min.	Max.			
146	Baud Rate for Modbus Values set: 0 = 9600 1 = 19200	1	-	Modification	0	1	1	1	Service mode
147	Parity for Modbus 0 = none 1 = odd 2 = even	1	-	Modification	0	2	1	0	Service mode
148	Selection of the burner operation during the interruption of the switch-over with the system of remote management. Values set: With **modulating operation** the settings of the values are the following: 0...19.9 = burner switched off 20...100 = 20...100% modulation field of the burner. With **stage operation**: 0 = burner off P1, P2, P3 No setting = no function in the event of communication interruption	1	%	Modification / zero setting	0%	100%	0.1%	Not defined	Service mode
161	Total number of errors	1	-	Reading only	0	65535	1	0	Info mode
162	Hours of operation (that can be reset)	1	h	Reset	0h	999999 h	1h	0h	Info mode
163	Total hours of power supply to control box	1	h	Reading only	0h	999999h	1h	0h	Info mode
164	Total number of start-ups (that can be reset)	1	-	Reset	0	999999	1	0	Info mode
166	Total number of start-ups	1	-	Reading only	0	999999	1	0	Info mode
167	Volumetric delivery of fuel in the selected unit of measurement (that can be reset)	1	m^3, l, ft^3, gal	Reset	0	99999999	1	0	Info mode
200	**CHECKS ON THE BURNER**								
201	Burner operation mode (fuel supply line, modulating/stage, servomotors, etc.) -- = not defined (eliminate curves) 1 = Gmod 2 = Gp1 mod 3 = Gp2 mod 4 = Lo mod 5 = Lo 2 stage 6 = Lo 3 stage 7 = Gmod pneu 8 = Gp1 mod pneu 9 = Gp2 mod pneu 10 = LoGp mod 11 = LoGp 2-stage 12 = Lo mod 2 fuel valves 13 = LoGp mod 2 fuel valves 14 = G mod pneu without actuator 15 = Gp1 mod pneu without actuator 16 = Gp2 mod pneu without actuator 17 = Lo 2-stage without actuator 18 = Lo 3-stage without actuator 19 = G mod only gas actuator 20 = Gp1 mod only gas actuator 21 = Gp2 mod only gas actuator 22 = Lo mod only oil actuator	1	-	Modify/set to zero	1	22	1	Not defined	Service mode
208	Stopping of the program 0 = deactivated 1 = pre-purging (Ph24) 2 = Ignition (Ph36) 3 = Interval 1 (Ph44) 4 = Interval 2 (Ph52)	1	-	Modification	0	4	1	0	Service mode
210	Alarm as the pre-purging phase begins; 0 = Deactivated; 1 = Activated	1	-	Modification	0	1	1	0	Service mode
211	Uphill train fan motor	1	s	Modification	2s	60s	0.2s	2s	Service mode
212	Maximum time to reach low flame	1	s	Modification	0.2s	10 min	0.2s	45s	Service mode
215	Maximum repeats of safety circuit 1 = No repetition 2...15 = Number of repetitions 16 = Constant repetitions	1	-	Modification	1	16	1	16	Service mode

Parameter		No. elements	Unit of measure	Modification	Value range		Degree of accuracy	Default setting	Acces mode
No.	Description				Min.	Max.			
221	Gas: selection of flame sensor 0 = QRB.../ QRC 1 = ION / QRA	1	-	Modification	0	1	1	1	Service mode
222	Gas: Selection of the pre-purging function 0 = deactivated 1 = activated	1	-	Modification	0	1	1	1	Service mode
223	Maximum repeats of minimum gas pressure switch intervention 1 = No repetition 2...15 = Number of repetitions 16 = Constant repetitions	1	-	Modification	1	16	1	16	Service mode
225	Gas: pre-purging time	1	s	Modification	20s	60 min	0.2s	20s	Service mode
226	Gas: pre-ignition time	1	s	Modification	0.4 s	60 min	0.2s	2s	Service mode
230	Gas: interval 1	1	s	Modification	0.4 s	60s	0.2s	2s	Service mode
232	Gas: interval 2	1	s	Modification	0.4 s	60s	0.2s	2s	Service mode
233	Gas: post-combustion time	1	s	Modification	0.2s	60s	0.2s	8s	Service mode
234	Gas: Post-purging time (no extraneous light test)	1	s	Modification	0.2s	108 min	0.2s	0.2s	Service mode
236	Gas: Minimum gas pressure switch input 0 = deactivated 1 = minimum gas pressure switch (upstream of the fuel valve 1 (V1)) 2 = valve control via the minimum pressure switch (between fuel vale 1 (V1) and 2 (V2))	1	-	Modification	1	2	1	1	Service mode
237	Gas: Maximum gas pressure switch / POC Input 0 = deactivated 1 = Maximum gas pressure switch 2 = POC	1	-	Modification	1	2	1	1	Service mode
241	Gas: Valve leak detection test 0 = test deactivated 1 = valve leak detection test at start-up 2 = valve leak detection test at shut-down 3 = valve leak detection test at start-up and at shut-down	1	-	Modification	0	3	1	2	Service mode
248	Gas: Post-purging time (t3) (at deactivation of the load (LR)) - ON	1	s	Modification	1s	108 min	0.2s	1s	Service mode
261	Oil: selection of flame sensor 0 = QRB.../ QRC... 1 = ION / QRA...	1	-	Modification	0	1	1	0	Service mode
265	Oil: pre-purging time	1	s	Modification	15s	60 min	0.2s	15s	Service mode
266	Oil: pre-ignition time	1	s	Modification	0.6s	60 min	0.2s	2s	Service mode
270	Oil: interval 1	1	s	Modification	0.4 s	60 min	0.2s	2s	Service mode
272	Oil: interval 2	1	s	Modification	0.4 s	60 min	0.2s	2s	Service mode
273	Oil: post-combustion time	1	s	Modification	0.2s	60s	0.2s	8s	Service mode
274	Oil: Post-purging time (no extraneous light test)	1	s	Modification	0.2s	108 min	0.2s	0.2s	Service mode
276	Oil: Minimum input oil pressure switch 0 = deactivated 1 = activated from phase 38 2 = activated from safety time (TSA)	1	-	Modification	1	2	1	1	Service mode
277	Oil: Maximum oil pressure switch / POC Input 0 = deactivated 1 = Maximum oil pressure switch 2 = POC	1	-	Modification	1	2	1	1	Service mode
281	Oil: selection transformer ignition phase TA 0 = brief pre-ignition (Ph38) 1 = long pre-ignition (with fan) (Ph22)	1	-	Modification	0	1	1	1	Service mode
284	Oil: Post-purging time (t3) (at deactivation of the load (LR)) - ON	1	s	Modification	1s	108 min	0.2s	1s	Service mode
400	**AIR/FUEL MODULATION CURVES**								
401	Checking fuel servomotor (only setting of the curve)	13	(°)	Modification	0°	90°	0.1°	0°; 0°; 15°; Not defined	Service mode
402	Checking air servomotor (only setting of the curve)	13	(°)	Modification	0°	90°	0.1°	0°; 90°; 45°; Not defined	Service mode
500	**POSITIONING OF SERVOMOTORS**								

Parameter		No. elements	Unit of measure	Modification	Value range		Degree of accuracy	Default setting	Acces mode
No.	Description				Min.	Max.			
501	Position of the fuel servomotor in absence of flame Index 0 = standby position Index 1 = pre-purging position Index 2 = post-purging position	3	(°)	Modification	0°	90°	0.1°	0°; 0°; 15°	Service mode
502	Position of the air servomotor in absence of flame Index 0 = standby position Index 1 = pre-purging position Index 2 = post-purging position	3	(°)	Modification	0°	90°	0.1°	0°; 90°; 45°	Service mode
545	Minimum modulation limit Not defined = 20%	1	%	Modification / zero setting	20%	100%	0.1%	Not defined	Service mode
546	Maximum modulation limit Not defined = 100%	1	%	Modification / zero setting	20%	100%	0.1%	Not defined	Service mode
600	**SERVOMOTORS**								
606	Tolerance limit for position check (0.1°) Index 0 = fuel Index 1 = air More serious position error, where a defect has certainly been detected - > Stop range: (P 606 - 0.6°) a P606	2	(°)	Modification	0.5°	4°	0.1°	1.7°; 1.7°	Service mode
645	Analogue exit configuration 0 = DC 0...10 V 1 = DC 2...10 V 2 = DC 0 / 2...10 V	1	-	Modification	0	2	1	2	Service mode
700	**LOG OF THE ERRORS**								
701	Error chronology: 701-725.01.Code	25	-	Reading only	0	255	1	0	Info mode
•	Error chronology: 701-725.02.Diagnostic code	25	-	Reading only	0	255	1	0	Info mode
•	Error chronology: 701-725.03.Error class	25	-	Reading only	0	6	1	0	Info mode
•	Error chronology: 701-725.04.Phase	25	-	Reading only	0	255	1	0	Info mode
•	Error chronology: 701-725.05.Start-up meter	25	-	Reading only	0	99999999	1	0	Info mode
725	Error chronology: 701-725.06.Load	25	%	Reading only	0%	100%	0.1%	0%	Info mode
900	**PROCESS INFORMATION**								
903	Actual output Index 0 = fuel Index 1 = air	2	%	Reading only	0%	100%	0.1%	0%	Info mode
922	Position of the servomotors Index 0 = fuel Index 1 = air	2	(°)	Reading only	-50°	150°	0.01°	0°	Info mode
942	Heat source active 1 = output during the definition of the curves 2 = manual output 3 = BACS output 4 = analogue input output 5 = output of the external load regulator contacts	1	-	Reading only	0	255	1	0	Service mode
947	Result of the sampling of the contact (codified in bits) Bit 0.0 = 1: Minimum pressure switch Bit 0.1 = 2: Maximum pressure switch Bit 0.2 = 4: Pressure switch control valves Bit 0.3 = 8: Air pressure switch Bit 0.4 = 16: Open load check Bit 0.5 = 32: ON load check Bit 0.6 = 64: Closed load check Bit 0.7 = 128: Safety circuit Bit 1.0 = 1: Safety valve Bit 1.1 = 2: Ignition Bit 1.2 = 4: Fuel valve 1 Bit 1.3 = 8: Fuel valve 2 Bit 1.4 = 16: Fuel valve 3/ pilot valve Bit 1.5 = 32: Reset	2	-	Reading only	0	255	1	0	Info mode
950	Relay request status (coded in bits) Bit 0 = 1: Alarm Bit 1 = 2: Safety valve Bit 2 = 4: Ignition Bit 3 = 8: Fuel valve 1 Bit 4 = 16: Fuel valve 2 Bit 5 = 32: Fuel valve 3/ pilot valve	1	-	Reading only	0	255	1	0	Info mode
954	Flame intensity	1	%	Reading only	0%	100%	1%	0%	Info mode

Parameter		No. elements	Unit of measure	Modification	Value range		Degree of accuracy	Default setting	Acces mode
No.	Description				Min.	Max.			
960	Actual output	1	m^3/h, l, h, ft^3/h, gal/h	Reading only	0	6553.5	0.1	0	Info mode
961	Status of external modules and visualisation	1	-	Reading only	0	255	1	0	Info mode
981	Memory error: Code	1	-	Reading only	0	255	1	0	Info mode
982	Memory error: diagnostic code	1	-	Reading only	0	255	1	0	Info mode
992	Error indicators	10	-	Reset	0	0xFFFFFFFF	1	0	Service mode

Tab. P

6.10 Steady-state operation

Burner without modulating operation kit

Once the start-up cycle is completed, the servomotor command moves on to the thermostat/pressure switch TR that controls the pressure or the temperature in the boiler.

- ➤ If the temperature or the pressure is low (so the thermostat/pressure switch TR is closed), the burner progressively increases the output as far as the MAX value (point “P9”).
- ➤ If the temperature or the pressure increases as far as the opening of the thermostat/pressure switch TR, the burner progressively reduces the output as far as the MIN value (point “P1”). And so on.
- ➤ The burner switches off when the request for heat is lower than the heat supplied by the burner at MIN output.
- ➤ The thermostat/pressure switch TL opens and the control box carries out the switching off phase.
- ➤ The damper closes completely to reduce thermal dispersions to a minimum.

Burner with modulating operation kit

See the manual supplied with the regulator.

6.11 Ignition failure

If the burner does not switch on, there is a lockout within 3s of the electrical supply reaching the gas valve.

It may be that the gas does not arrive at the combustion head within the safety time of 3 s.

In this case, increase gas delivery upon ignition.

The arrival of the gas at the pipe coupling is shown on the pressure gauge of Fig. 39 at page 51.

WARNING

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.

DANGER

If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

6.12 Burner flame goes out during operation

If the flame accidentally goes out during operation, the control box carries out a recycle (i.e. it repeats the start-up phase once, and makes a further ignition attempt).

If the flame is still absent, the control box goes into lockout.

6.13 Stopping of the burner

The burner can be stopped by:

- ➤ intervening on the disconnecting switch of the electrical supply line, located on the boiler panel;
- ➤ removing the cover and working on the switch “**0-1**” of Fig. 32 at page 32;
- ➤ removing the transparent protection that covers the Operator Panel, after loosening the relative screw, and using the panel itself according to **"Manual lockout procedure"** at page 35.

6.14 Final checks (with burner operating)

➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS	⇨	The burner must stop
➤ Turn the gas maximum pressure switch knob to the minimum end of scale position ➤ Turn the air pressure switch to the maximum end of scale position.	⇨	The burner must stop in lockout
➤ Switch off the burner and disconnect the voltage. ➤ Disconnect the minimum gas pressure switch connector.	⇨	The burner must not start
➤ Disconnect the ionisation probe wire	⇨	The burner must stop in lockout due to firing failure

Tab. Q

WARNING

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

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 ball valve closed

It is fundamental to ensure the correct execution of the electrical connections between the gas solenoid valves and the burner to perform safely the commissioning.

For this purpose, after checking that the connections have been carried out in accordance with the burner's electrical diagrams, an ignition cycle with closed gas ball valve -dry test- must be performed.

1 The manual ball gas valve must be closed
2 The electrical contacts of the burner limit switch need to be closed
3 Ensures closed the contact of the low gas pressure switch
4 Make a trial for burner ignition

The start-up cycle must be as follows:

– Starting the fan for pre-ventilation
– Performing the gas valve seal control, if provided
– Completion of pre-ventilation
– Arrival of the ignition point
– Power supply of the ignition transformer
– Electrical Supply of solenoid gas valves

Since the manual gas ball valve is closed, the burner will not light up and its control box will go to a safety lockout condition.

The actual electrical supply of the solenoid gas valves can be verified by inserting a tester. Some valves are equipped with light signals (or close/open position indicator) that turn on at the same time as their power supply.

IF THE ELECTRICAL SUPPLY OF THE GAS VALVES OCCURS AT UNEXPECTED TIMES, DO NOT OPEN MANUAL GAS BALL VALVE, SWITCH OFF POWER LINE; CHECK THE WIRES; CORRECT THE ERRORS AND REPEAT THE COMPLETE TEST.

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

Combustion
The optimum calibration of the burner requires an analysis of the flue gases. Significant differences with respect to the previous measurements indicate the points where more care should be exercised during maintenance.

Combustion head
Open the burner and make sure that all the components of the combustion head are undamaged, not deformed due to high temperature, free of ambient dirt or dust, free of rusted materials and adequately positioned.

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.

Burner
Clean the outside of the burner.

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.

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.

Combustion

If the combustion values found at the start of the intervention do not satisfy current standards or anyway indicate a poor state of combustion (consult the table below), contact the Technical Assistance Service for the necessary adjustments.

EN 676		Air excess		CO
		Max. output $\lambda \leq 1.2$	Max. output $\lambda \leq 1.3$	
GAS	Theoretical max. CO_2 0 % O_2	CO_2 % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

Tab. R

7.2.4 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)(if present)	10 years or 250.000 operation cycles
Oil valve (solenoid) (if present)	10 years or 250.000 operation cycles
Oil regulator (if present)	10 years or 250.000 operation cycles
Oil pipes/ couplings (metallic)(if present)	10 years
Flexible hoses (if present)	5 years or 30.000 pressurised cycles
Fan impeller	10 years or 500.000 start-ups

Tab. S

7.2.5 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 visualises “30%” (see **"Parameter list"** at page 44, 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 - see Fig. 38.

WARNING

Carefully check the polarities!

7.2.6 Checking the air and gas pressure on the combustion head

To carry out this operation a pressure gauge must be used to mesure the air and gas pressure at the combustion head, as shown in Fig. 39.

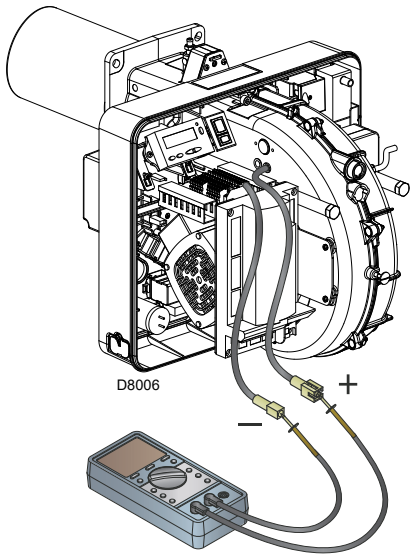


Fig. 38

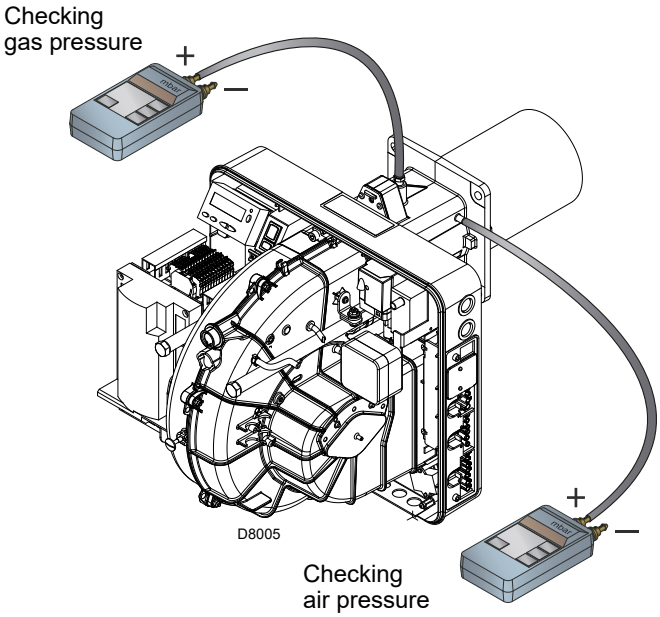


Fig. 39

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.

- ➤ Loosen the screws 1)(Fig. 40)and remove the cover 2).
- ➤ Remove the nuts 2)(Fig. 17 at page 24) fit them on the supplied extensions and screw them on guides 3) (only for TL versions).
- ➤ Disconnect the plug 14)(Fig. 17 at page 24) and loosen the grommet 15).
- ➤ Remove the screw 5)(Fig. 40) and pull back the burner on the guides 3) by about 100 mm.
- ➤ Disconnect the cables of the probe and electrode, then pull the burner back completely.
- ➤ At this point it is possible to extract the inner part 4) after having removed the screw 6).

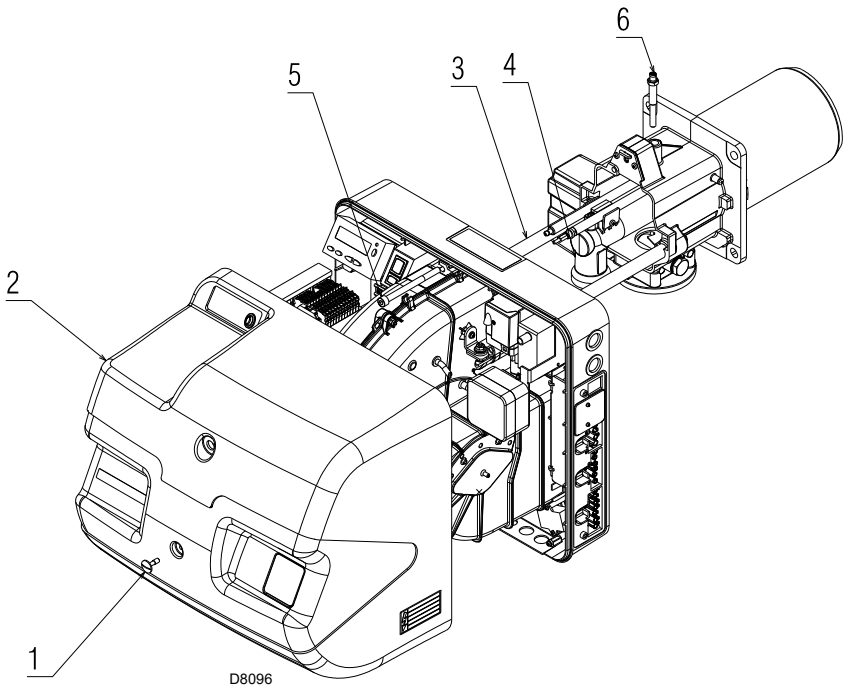


Fig. 40

7.4 Closing the burner

- ➤ Push the burner up to approximately 100 mm from the pipe coupling.
- ➤ Reinsert the cables and slide the burner as far as the stop.
- ➤ Connect the plug of the servomotor 14)(Fig. 17 at page 24) and tighten the grommet 15).
- ➤ Tighten the screws 5)(Fig. 40) and carefully pull the probe and electrode cables outwards until they are slightly taut.
- ➤ Remove the two extensions from the guides 3), fix them in their original positions and replace the nuts 2)(Fig. 17 at page 24)(only for TL versions).

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

8 Faults - Probable causes - Solutions

If faults arise in ignition or operations, the burner performs a "safety stop", which is signalled by the red burner lockout LED.

The display of the operator panel visualises alternately the lock-out code and the relative diagnostic.

To restore start-up conditions, refer to the **"Reset procedure"** at page 35.

When the burner starts up again, the red LED goes out.

WARNING

In the event of a burner lockout, more than two consecutive burner reset operations could cause damage to the installation. On the third lockout, contact the Aftersales Service.

DANGER

If further lockouts or burner faults occur, interventions must only be made by qualified, authorised personnel (as indicated in this manual, and in compliance with the laws and regulations currently in force).

8.1 Error codes list

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
NoComm		**No communication betweenREC 27.100A2 and RDI21…**	Check the wiring between the control box REC 27.100A2 and the display RDI21…
2	**#**	**No flame at the end of TSA1**	
	1	No flame at the end of safety time 1 (TSA1)	
	2	No flame at the end of safety time 2 (TSA2)	
	4	No flame at the end of safety time 1 (TSA1) (software version ≤ V02.00)	
3	**#**	Air pressure error	
	0	Air pressure switch off	
	1	Air pressure switch on	
	4	Air pressure on – Lockout alarm at start	
	20	Air pressure, fuel pressure on - Alarm lock at start	
	68	Air pressure, POC on – Alarm lockout at start	
	84	Air pressure, fuel pressure, POC on - Alarm lockout at start	
4	**#**	**Extraneous light**	
	0	Extraneous light during start-up	
	1	Extraneous light during switch-off	
	2	Extraneous light during start-up – Lockout alarm at start	
	6	Extraneous light during start-up, air pressure - Alarm lockout at start	
	18	Extraneous light during start-up, fuel pressure - Alarm lockout at start	
	24	Extraneous light during start-up, air pressure, fuel pressure - Alarm lockout at start	
	66	Extraneous light during start-up, POC – Alarm lockout at start	
	70	Extraneous light during start-up, air pressure, POC - Alarm lockout at start	
	82	Extraneous light during start-up, fuel pressure, POC - Alarm lockout at start	
	86	Extraneous light during start-up, air pressure, fuel pressure, poc - Alarm lockout at start	
7	**#**	**Loss of flame**	
	0	Loss of flame	
	3	Flame loss (software version ≤ V02.00)	
	3…255	Flame loss during TÜV test (flame loss test)	The diagnostics covers the period of time from the closure of the fuel valves at the point the flame loss was detected (resolution 0.2 s → value 5 = 1 s).
12	**#**	**Valve leak detection control:**	
	0	V1 leaks	Leak test Check if the valve on the side of the gas has any leaks. Check the wiring and check that the circuit is open.
	1	V2 leaks	Leak test Check if the valve on the side of the burner has any leaks. Check if the pressure switch for the leak test (PGVP) is closed when gas pressure is not present. Check the wiring and check if there is any short-circuit.

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
	2	Valve leak detection test not possible	The valve leak detection is active, but the minimum gas pressure switch is selected as input for X9-04 (check parameters 238 and 241)
	3	Valve leak detection test not possible	The valve leak detection is active, but no input has been assigned (check parameters 236 and 237)
	4	Valve leak detection not possible	Valve leak detection is active, but 2 inputs have already been assigned (configure parameter 237 or maximum gas Pressure switch or POC)
	5	Valve leak detection not possible	The valve leak detection is active, but 2 inputs have been assigned (check parameters 236 and 237)
14	**#**	**POC**	
	0	POC Open	Check if the closure contact of the valve is closed
	1	POC Closed	Check the wiring Check if the closure contact of the valve opens when the valve is checked
	64	POC Open - Alarm lockout at start	Check the wiring Check if the closure contact of the valve is closed
19	80	Fuel pressure, POC - Alarm lockout at start	Check that the pressure switch is closed when no pressure is present from the fuel Check that there are no short-circuits
20	**#**	**Pmin**	
	0	Minimum gas/oil pressure absent	Check that there are no line interruptions
	1	Scarcity of gas - Alarm lockout at start	Check that there are no line interruptions
21	**#**	**Pmax/POC**	
	0	Pmax: Max. gas/oil pressure exceeded POC: POC open (software version ≤ V02.00)	Check the wiring. POC: check if the closure contact of the valve is closed
	1	POC closed (software version ≤ V02.00)	Check the wiring. Check if the closure contact of the valve opens when the valve is checked
	64	POC Open - Alarm lockout at the start (software version ≤ V02.00)	Check the wiring. Check if the contact of the valve opens when the valve is checked
22 OFF S	**#**	**Safety circuit/Burner flange**	
	0	Safety circuit open /Burner flange open	
	1	Safety circuit open /Burner flange open - Alarm lockout at start	
	3	Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start	
	5	Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start	
	17	Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start	
	19	Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start	
	21	Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start	
	23	Safety circuit open /Burner flange open, extraneous light, air pressure, fuel pressure - Alarm lockout at start	
	65	Safety circuit /Burner flange open, POC - Alarm lockout at start	
	67	Safety circuit open /Burner flange open, extraneous light, POC - Alarm lockout at start	
	69	Safety circuit open /Burner flange open, air pressure, POC - Alarm lockout at start	
	71	Safety circuit open /Burner flange open, extraneous light, air pressure, POC - Alarm lockout at start	
	81	Safety circuit open /Burner flange open, fuel pressure, POC - Alarm lockout at start	
	83	Safety circuit open /Burner flange open, extraneous light, air pressure, POC - Alarm lockout at start	
	85	Safety circuit open /Burner flange, air pressure, fuel pressure, POC - Alarm lockout at start	
	87	Safety circuit open /Burner flange, extraneous light, air pressure, fuel pressure, POC - Alarm lockout at start	

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
50 ÷ 58	**#**	**Internal error**	Carry out a reset; if the error arises repeatedly, replace the control box
60	**0**	**Internal error: no valid load checking device**	Carry out a reset; if the error arises repeatedly, replace the control box
65 ÷ 67	**#**	**Internal error**	Carry out a reset; if the error arises repeatedly, replace the control box
70	**#**	**Fuel/air checking error: Calculation position in modulation**	
	23	Invalid load	No valid load
	26	Curve points not defined	Adjust the curve points of all the actuators
71	**#**	**Special position not defined**	
	0	Standby position	Set the standby position of all the servomotors used
	1	Pre-purging position	Set the pre-purging position of all the servomotors used
	2	Post-purging position	Set the post-purging position of all the servomotors used
	3	Ignition position	Set the ignition position of all the servomotors used
72	**#**	**Fuel/air internal checking error:**	Carry out a reset; if the error arises repeatedly, replace the control box
73	**#**	**Fuel/air internal checking error: multistep calculation position**	
	23	Position calculation, invalid stage load	No valid load
	26	Position calculation, stage curve points not defined	Adjust the curve points of all the servomotors
75	**#**	**Fuel/air ratio internal checking error: cyclical data check**	
	1	Check synchronisation data, different current load	
	2	Check synchronisation data, different target load	
	4	Check synchronisation data, different target positions	
	16	Check synchronisation data, different positions reached	
76	**#**	**Fuel/air internal checking error:**	Carry out a reset; if the error arises repeatedly, replace the control box
85	**#**	**Reference error of a servomotor**	
	0	Reference error of the fuel servomotor	The reference of the fuel servomotor was not successful. It was not possible to reach the reference point. 1. Check if the servomotors have been inverted. 2. Check if the servomotor is blocked or overloaded.
	1	Reference error of the air servomotor	The reference of the air servomotor was not successful. It was not possible to reach the reference point. 1. Check if the servomotors have been inverted. 2. Check if the servomotor is blocked or overloaded.
	Bit 7 Valence ≥ 128	Reference error owing to parameter modification	The parameterisation of an actuator (e.g. the reference position) has been modified. This error will be visualised to start up a new reference.
86	**#**	**Fuel servomotor error**	
	0	Position error	It was not possible to reach the target position within the requested tolerance range. 1. Check if the servomotor is blocked or overloaded.
	Bit 0 Valence 1	Circuit open	Circuit open shown on the servomotor connection. 1. Check the wiring (the voltage between pin 5 or 6 and 2 of the X54 connector must be > 0.5 V).
	Bit 3 Valence ≥ 8	Curve too steep in terms of train ratio	The slope of the curve can correspond to a maximum position modification of 31° between 2 points of the modulation curve.
	Bit 4 Valence ≥ 16	Deviation of section compared with the last reference	Overloading of the servomotor or servomotor subjected to mechanical torsion. 1. Check if the servomotor is blocked in any point along its range of action. 2. Check if the torque is sufficient for the application.
87	**#**	**Air servomotor error**	
	0	Position error	It was not possible to reach the target position within the requested tolerance range. 1. Check if the servomotor is blocked or overloaded.
	Bit 0 Valence 1	Circuit open	Circuit open shown on the servomotor connection. 1. Check the wiring (the voltage between pin 5 or 6 and 2 of the X54 connector must be > 0.5 V).
	Bit 3 Valence ≥ 8	Curve too steep in terms of train ratio	The slope of the curve can correspond to a maximum position modification of 31° between 2 points of the modulation curve.

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
	Bit 4 Valence ≥ 16	Deviation of section compared with the last reference	Overloading of the servomotor or servomotor subjected to mechanical torsion. 1. Check if the servomotor is blocked in any point along its range of action. 2. Check if the torque is sufficient for the application.
90 - 91	**#**	**Burner internal checking error**	
93	**#**	**Flame signal acquisition error**	
	3	Short circuit of the sensor	Short circuit in the QRB sensor... 1. Check the wiring. 2. Flame detector probably faulty.
95	**#**	**Relay supervision error**	
	3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	External power supply - Contact active	Check the wiring
96	**#**	**Relay supervision error**	
	3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	The relay contacts have joined together	Check the contacts: 1. Control box connected to the power supply: the fan output must be without voltage. 2. Disconnect the power supply. Disconnect the fan. The resistive connection between the fan output and the neutral wire is not allowed. If one of the 2 tests fails, replace the control box because the contacts are definitively joined together and it is no longer possible to guarantee safety.
97	**#**	**Relay supervision error**	
	0	The safety relay contacts have joined together or the safety relay has been powered by an external power supply	Check the contacts: 1. Control box connected to the power supply: the fan output must be without voltage. 2. Disconnect the power supply. Disconnect the fan. The resistive connection between the fan output and the neutral wire is not allowed. If one of the 2 tests fails, replace the control box because the contacts are definitively joined together and it is no longer possible to guarantee safety.
98	**#**	**Relay supervision error**	
	2 – Safety valve 3 Ignition transformer 4 Fuel valve 1 5 Fuel valve 2 6 Fuel valve 3	The relay does not start up	Carry out a reset; if the error arises repeatedly, replace the unit
99	**#**	**Relay internal checking error**	Carry out a reset; if the error arises repeatedly, replace the control box
	3	Relay internal checking error	Carry out a reset; if the error arises repeatedly, replace the control box Software version V03.10: If error C:99 D:3 occurs during the standardisation of the VSD, temporarily deactivate the Alarm function at the start of the pre-purging phase (parameter 210 = 0) or interrupt the signal controller-ON
100	**#**	**Relay internal checking error**	Carry out a reset; if the error arises repeatedly, replace the control box
105	**#**	**Contact sampling internal error**	
	0 Min. pressure switch 1 Max. pressure switch 2 Valve operation test pressure switch 3 Air pressure 4 Load controller open 5 Load controller on/off 6 Load controller closed 7 Safety loop / burner flange 8 Safety valve 9 Ignition transformer 10 Fuel valve 1 11 Fuel valve 2 12 Fuel valve 3 13 Reset	Blocked upon irregularity	Can be caused by capacitive loads or presence of DC voltage on the main power supply of the control box. The diagnostic code indicates the input in which the problem arose
106 ÷ 108	**#**	**Contact request internal error**	Carry out a reset; if the error arises repeatedly, replace the control box
110	**#**	**Voltage monitoring test internal error**	Carry out a reset; if the error arises repeatedly, replace the control box

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
111	**0**	**Low level of power supply**	Insufficient mains voltage. Conversion of the diagnostic code Voltage value (230 V AC : 1,683)
112	**0**	**Reset power supply voltage**	Error code for the carrying out of a reset in the event of power supply restoration (absence of error)
113	**#**	**Mains voltage supervision internal error**	Carry out a reset; if the error arises repeatedly, replace the control box
115	**#**	**Control box meter internal error**	
116	**0**	**Life cycle of the control box in the critical interval (250,000 Start ups)**	The envisaged life cycle of the control box has been exceeded. Replace it.
117	**0**	**Life cycle of the control box exceeded**	The switch-off threshold has been reached.
120	**0**	**Interruption of fuel limiting meter input**	Too many disturbance impulses on the input of the fuel meter. Improve the electromagnetic compatibility.
121 ÷ 124	**#**	**EEPROM access internal error**	Carry out a reset, repeat and check the last setting of the parameters. Restore the group of parameters: if the error arises repeatedly, replace the control box.
125	**#**	**EEPROM reading access internal error**	Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the control box.
126	**#**	**EEPROM writing access internal error**	Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the control box.
127	**#**	**EEPROM access internal error**	Carry out a reset, repeat and check the last setting of the parameters. Restore the group of parameters: if the error arises repeatedly, replace the control box.
128	**0**	**EEPROM access internal error - synchronisation during the initialisation**	Perform a reset; if the error arises repeatedly, replace the control box.
129	**#**	**EEPROM access internal error – command synchronisation**	Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the control box.
130	**#**	**EEPROM access internal error - time-out**	Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the control box.
131	**#**	**EEPROM access internal error - page interrupted**	Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the control box.
132	**#**	**EEPROM register initialisation internal error**	Perform a reset; if the error arises repeatedly, replace the control box.
133 ÷ 135	**#**	**EEPROM access internal error – request synchronisation**	Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the control box.
136	**1**	**Restoration started**	The restoration of a backup has been started (no error)
137	**#**	**Internal error – backup / restoration**	
	157 (-99)	Restoration – OK, but backup < compared with set data of current system	Restoration successful, but the backup data installed are fewer than those currently present in the system.
	239 (-17)	Backup - logging of the backup on RDI21… failed	Perform the reset and repeat backup
	240 (-16)	Reset - no backup in RDI21…	No backup in RDI21…
	241 (-15)	Reset - Interruptions relating to impracticable ASN	The backup has an impracticable ASN and cannot reset the unit
	242 (-14)	Backup – the backup carried out is contradictory	The backup is irregular and cannot be transferred again
	243 (-13)	Backup – the data comparison between the internal microprocessors is irregular	Repeat the reset and backup
	244 (-12)	The backup data are incompatible	The backup data are incompatible with the current version of the software; the restoration is not possible
	245 (-11)	Error in access to the parameter Restore_Complete	Repeat the reset and backup
	246 (-10)	Restoration – time-out during logging in EEPROM	Repeat the reset and backup
	247 (-9)	The data received are contradictory	The series of backup data is not valid; restoration is not possible
	248 (-8)	The restoration cannot currently be carried out	Repeat the reset and backup
	249 (-7)	Restoration – interruption caused by inadequate identification of the burner	The backup has an inadequate identification of the burner and must not be transferred to the control box
	250 (-6)	Backup – the CRC of a page is not correct	The series of backup data is not valid; restoration is not possible
	251 (-5)	Backup – the identification of the burner is not defined	Define the identification of the burner and repeat the backup
	252 (-4)	After restoration, the pages are still in INTERRUPTION	Repeat the reset and backup
	253 (-3)	The restoration cannot currently be carried out	Repeat the reset and backup

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
	254 (-2)	Interruption owing to transmission error	Repeat the reset and backup
	255 (-1)	Interruption owing to time-out during the restoration	Carry out a reset, check the connections and repeat the backup
146	**#**	**Time-out of the system automation interface**	Refer to the Modbus User Documentation (A7541)
	1	Modbus time-out	
150	**#**	**TÜV test**	
	1 (-1)	Invalid phase	The TÜV test can only be started in phase 60 (operation)
	2 (-2)	The TÜV test default output is too low	The output of the TÜV test must be lower than the minor output limit
	3 (-3)	The TÜV test default output is too high	The output of the TÜV test must be greater than the upper output limit
	4 (-4)	Manual interruption	No error: Manual interruption of the TÜV test by the user
	5 (-5)	TÜV test time-out	No flame loss after the fuel valves have been closed 1. Check for potential extraneous lights 2. Check that there are no short-circuits 3. Check that one of the valves is leaking
165	**#**	**Internal error**	
166	**0**	**Watchdog reset internal error**	
167	**#**	**Manual lockout**	The control box has been manually blocked (no error)
	1	Manual lockout from remote reset command	
	2	Manual lockout from RDI21…	
	3	Manual lockout from PC interface	
	8	Manual lockout from RDI21… Time-out/interrupted communication	During a regulation of the curve via the operating panel RDI21…the time-out for the operating menu is passed (setting via the 127 parameter), or the communication between REC 27.100A2... and RDI21 has been interrupted
	9	Manual lockout from PC interface Communication interrupted	During an adjustment of the curve via the PC interface, the communication between REC 27.100A2 and the operating panel has been interrupted for more than 30 s
	33	Manual lockout after the PC tool has performed a tentative reset	The PC tool has performed a tentative reset, even if the system has worked correctly
168 ÷ 171	**#**	**Internal error management**	Carry out a reset; if the error arises repeatedly, replace the control box
200 off	**#**	**System free of errors**	No error
201 off VA	**#**	**Lockout or error at start**	Lockout or error due to lack of unit parameter settings
	Bit 0 Valency 1	No valid operation mode	
	Bit 1 Valency 2..3	No fuel train defined	
	Bit 2 Valency 4..7	No curve defined	
	Bit 3 Valency 8..15	Standardisation speed not defined	
	Bit 4 Valency 16..31	Backup / Reset impossible	
202	**#**	**Selection of internal operation mode**	Redefine the operation mode (parameter 201)
203	**#**	**Internal error**	Redefine the operation mode (parameter 201) Carry out a reset; if the error arises repeatedly, replace the control box
204	**Phase number**	**Program stop**	The program stop is active (no error)
205	**#**	**Internal error**	Carry out a reset; if the error arises repeatedly, replace the control box
206	**0**	**Combination of control box and operator panel not allowed**	
207	**#**	**Compatibility of control box with operator panel**	
	0	Obsolete version of control box	
	1	Obsolete version of operator panel	
208 - 209	**#**	**Internal error**	Carry out a reset; if the error arises repeatedly, replace the control box
210	0	The selected operating mode is not released for the standard unit	Select an operating mode released for the standard unit
240	**#**	**Internal error**	Carry out a reset; if the error arises repeatedly, replace the control box

Error code	Diagnostic code	Meaning of the REC 27.100A2 system	Recommended measures
245	#	Internal error	Carry out a reset; if the error arises repeatedly, replace the control box
250	#	Internal error	Carry out a reset; if the error arises repeatedly, replace the control box

Tab. T

A Appendix - Accessories

Long head kit

Burner	Standard head length (mm)	Extended head length (mm)	Code
RS 34/E MZ	216	351	3010428
RS 44/E MZ	216	351	3010429

Spacer kit

Burner	Thickness (mm)	Code
RS 34-34/E MZ	100	3010095

Continuous purging kit

Burner	Code
RS 34-34/E MZ	3010449

Soundproofing chamber kit

Burner	Type	dB(A)	Code
RS 34-34/E MZ	C1/3	10	3010403

Output power regulator kit for modulating operation

With the modulating operation, the burner continually adapts the power to the heat request, ensuring a high level of stability for the parameter controlled: temperature or pressure.

Two components should be ordered:
– the output power regulator to be installed on the burner;
– the probe to be installed on the heat generator.

Parameter to be checked		Probe		Output regulator	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100 ÷ 500° C	PT 100	3010110	RWF50.2 RWF55.5	20083339 20098541
Pressure	0 ÷ 2,5 bar	4 ÷ 20 mA	3010213		
	0 ÷ 16 bar	4 ÷ 20 mA	3010214		
	0 ÷ 25 bar	4 ÷ 20 mA	3090873		

Connection flange kit

Burner	Code
RS 34-34/E MZ	3010138

Kit for LPG operation

Burner	Output kW	Code
RS 34/E MZ	80/125 - 390	3010423
RS 44/E MZ	120/200 - 530	3010424

Town gas kit

Burner	Output kW	Code
RS 34/E MZ	70/130 - 390	3010502
RS 44/E MZ	120/200 - 550	3010503

Differential switch kit

Burner	Code
RS 34-34/E MZ	3010448

Maximum gas pressure switch

Burner	Code
RS 34-34/E MZ	3010418

Clean contacts kit

Burner	Code
RS 34-34/E MZ	3010419

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

Burner	Code
RS 34-34/E MZ	3010436

Modbus interface kit

Burner	Model	Code
RS 34-34/E MZ	OCI412	3010437

PVP kit (Pressure Valve Proving)

Burner	Gas train type	Code
RS 34-34/E MZ	MB - CB	3010344

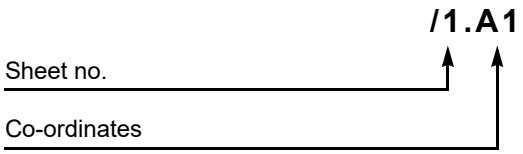
Gas trains in compliance with EN 676

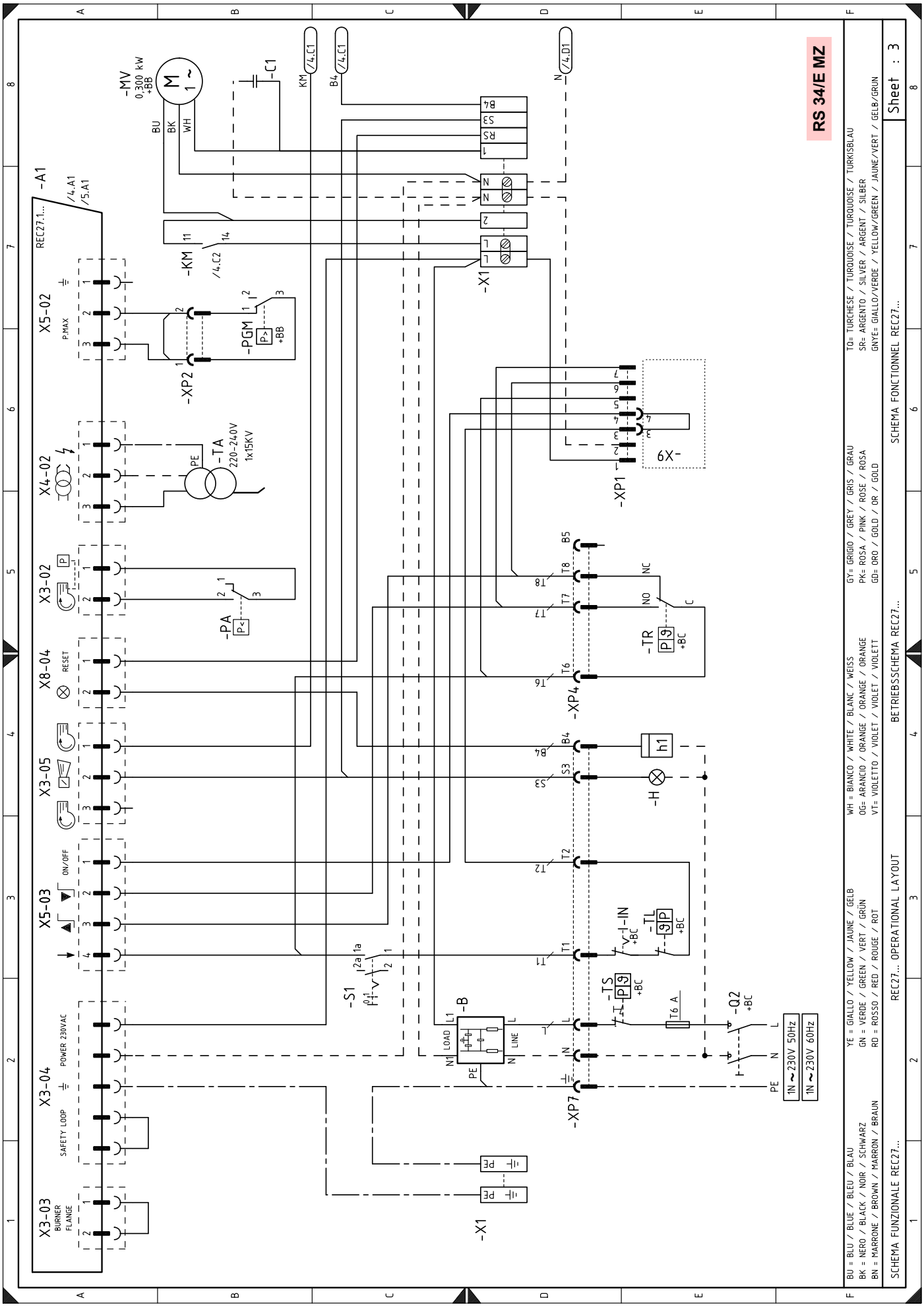
Please refer to manual.

B Appendix - Electrical panel layout

1	**Index of layouts**
2	Indication of references
3	REC27... operational layout
4	REC27... operational layout
5	REC27... operational layout
6	Electrical connections set by installer
7	Electrical connections for kit
8	Electrical connections for external RWF... kit

2 Indication of references




RS 34/E MZ
SCHEMA FUNZIONALE REC27...
REC27... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC27...
SCHEMA FONCTIONNEL REC27...
Sheet : 3
-A1
-MV
-C1
-KM
-PGM
-XP2
-TA
-PA
-XP1
-XP4
-TR
-H
-S1
-B
-TS
-TL
-Q2
-XP7
-X1
X3-03
X3-04
X5-03
X3-05
X8-04
X3-02
X4-02
X5-02
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
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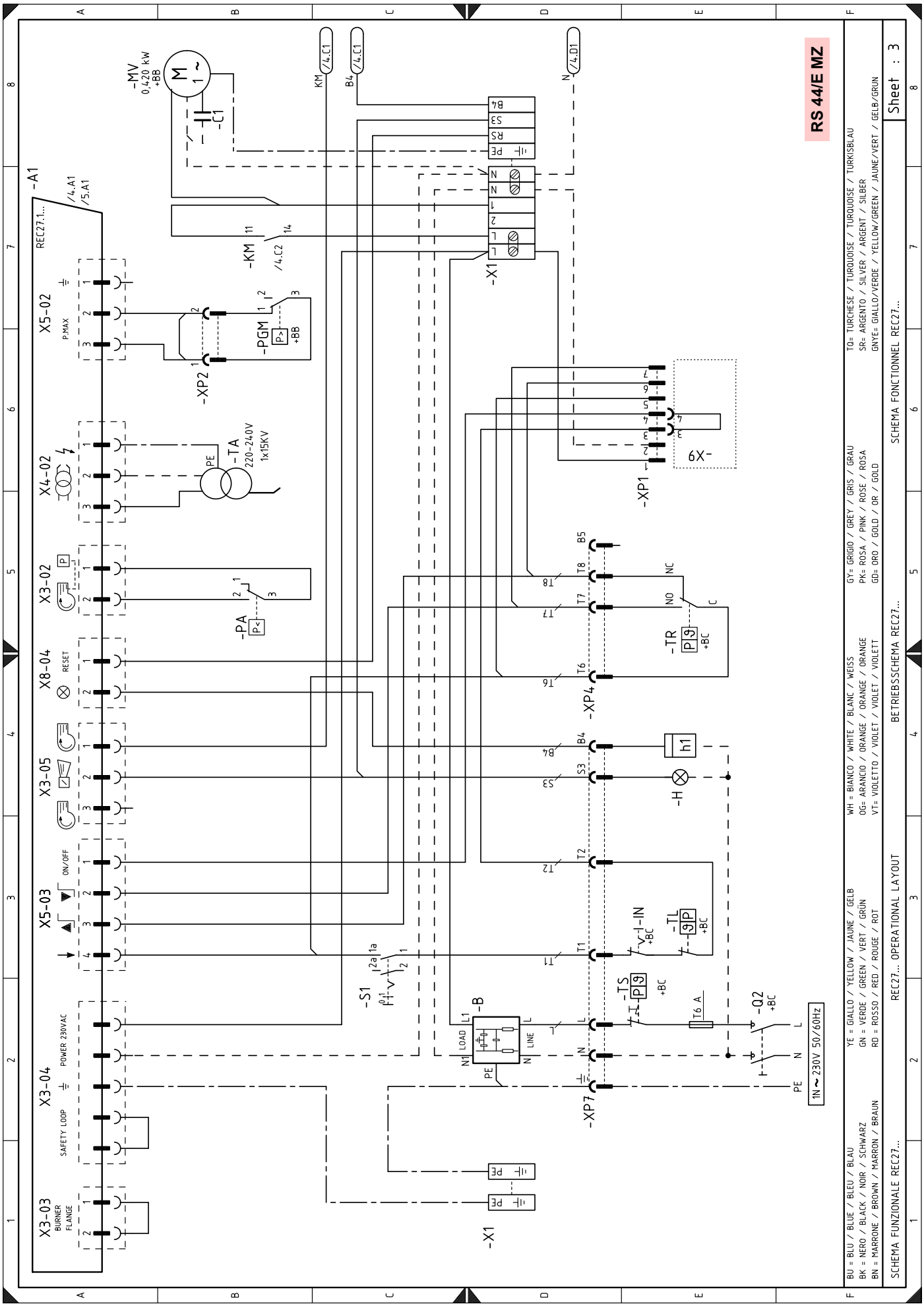
RS 44/E MZ
SCHEMA FUNZIONALE REC27...
REC27... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC27...
SCHEMA FONCTIONNEL REC27...
Sheet : 3
-A1
REC27.1...
-MV
0,420 kW
+BB
-C1
-KM
-PGM
-XP2
-TA
220-240V
1x15KV
-PA
-X1
-XP1
-XP4
-TR
-H
h1
-S1
-B
-TS
-TL
-Q2
-XP7
T6 A
1N~ 230V 50/60Hz
X3-03
X3-04
X5-03
X3-05
X8-04
X3-02
X4-02
X5-02
BURNER FLANGE
SAFETY LOOP
POWER 230VAC
ON/OFF
RESET
P.MAX
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
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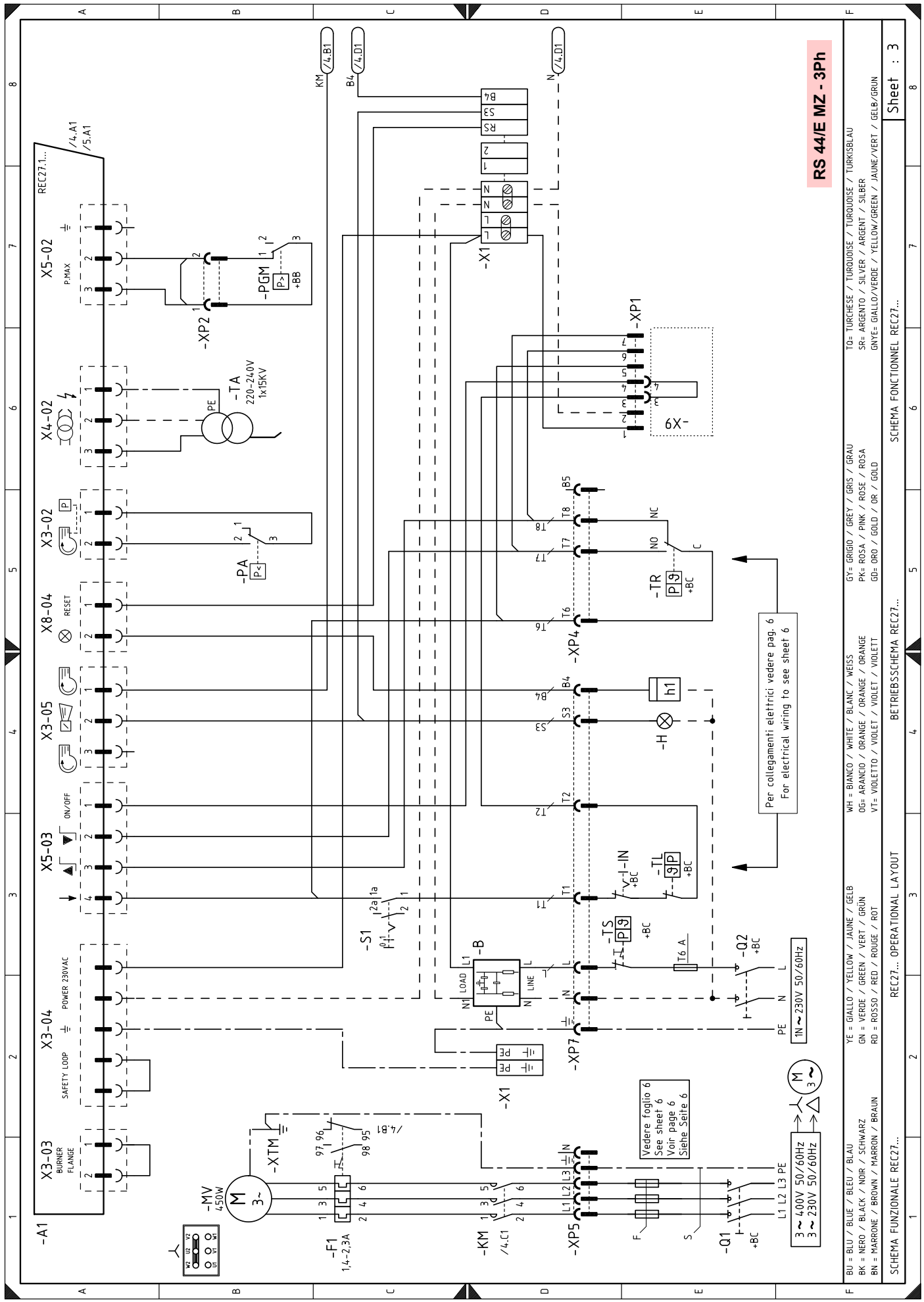
RS 44/E MZ - 3Ph
-A1
REC27.1...
X3-03 BURNER FLANGE
X3-04 SAFETY LOOP POWER 230VAC
X5-03 ON/OFF
X3-05
X8-04 RESET
X3-02
X4-02
X5-02 P.MAX
-XP2
-PGM
-TA 220-240V 1x15KV
-PA
-X1
-XP1
-XP4
-TR
-H h1
-S1
-B LOAD LINE
-TS
-TL
-I-IN
-Q2
-XP7
-X1
-XTM
-MV 450W
-F1 1,4-2,3A
-KM
-XP5
-Q1
Per collegamenti elettrici vedere pag. 6
For electrical wiring to see sheet 6
Vedere foglio 6
See sheet 6
Voir page 6
Siehe Seite 6
1N ~ 230V 50/60Hz
3 ~ 400V 50/60Hz
3 ~ 230V 50/60Hz
BU = BLU / BLUE / BLEU / BLAU
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
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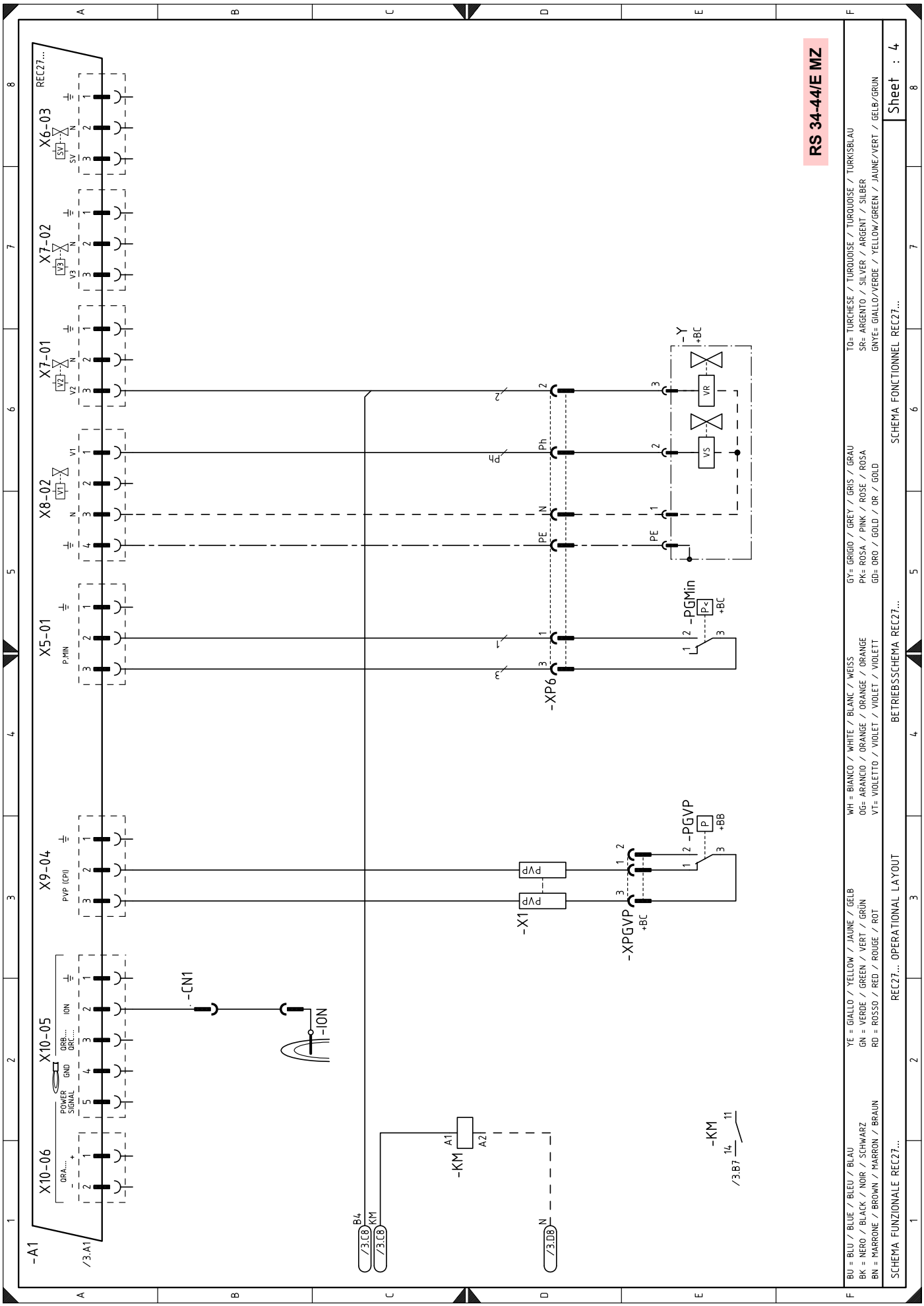
REC27... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC27...
SCHEMA FONCTIONNEL REC27...
Sheet : 3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X10-06
X10-05
X9-04
X8-02
X7-01
X7-02
X6-03
X5-01
-CN1
-IGN
-KM
-XP6
-X1
-XPGVP
-PGVP
-PGMin
-Y
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REC27... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC27...
SCHEMA FONCTIONNEL REC27...
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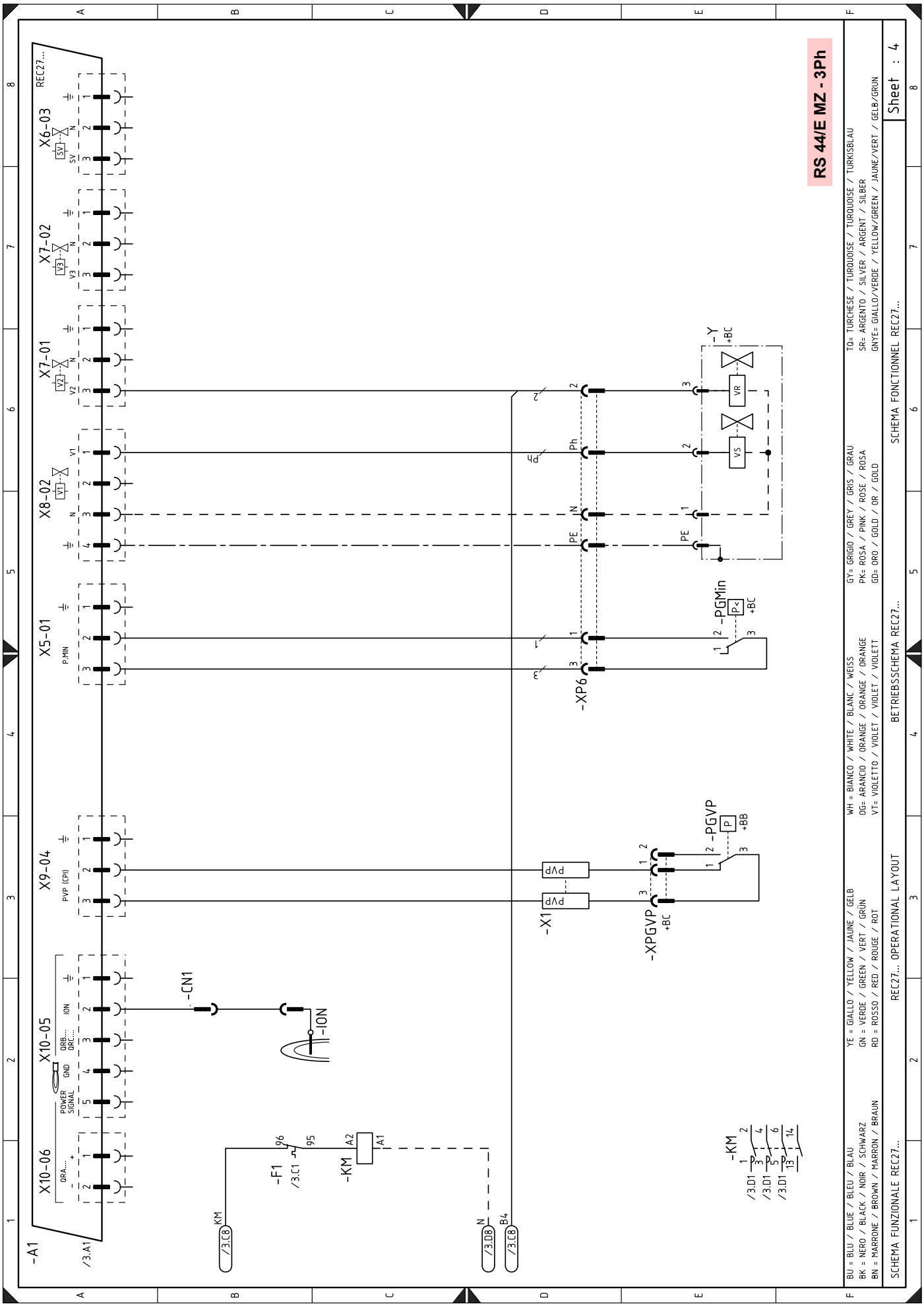
RS 44/E MZ - 3Ph
SCHEMA FUNZIONALE REC27...
REC27... OPERATIONAL LAYOUT
BETRIEBSSCHEMA REC27...
SCHEMA FONCTIONNEL REC27...
Sheet : 4
-A1
X10-06
X10-05
X9-04
X8-02
X7-01
X7-02
X6-03
X5-01
-CN1
-ION
-F1
-KM
-XP6
-X1
-XPGVP
-PGVP
-PGMin
-Y
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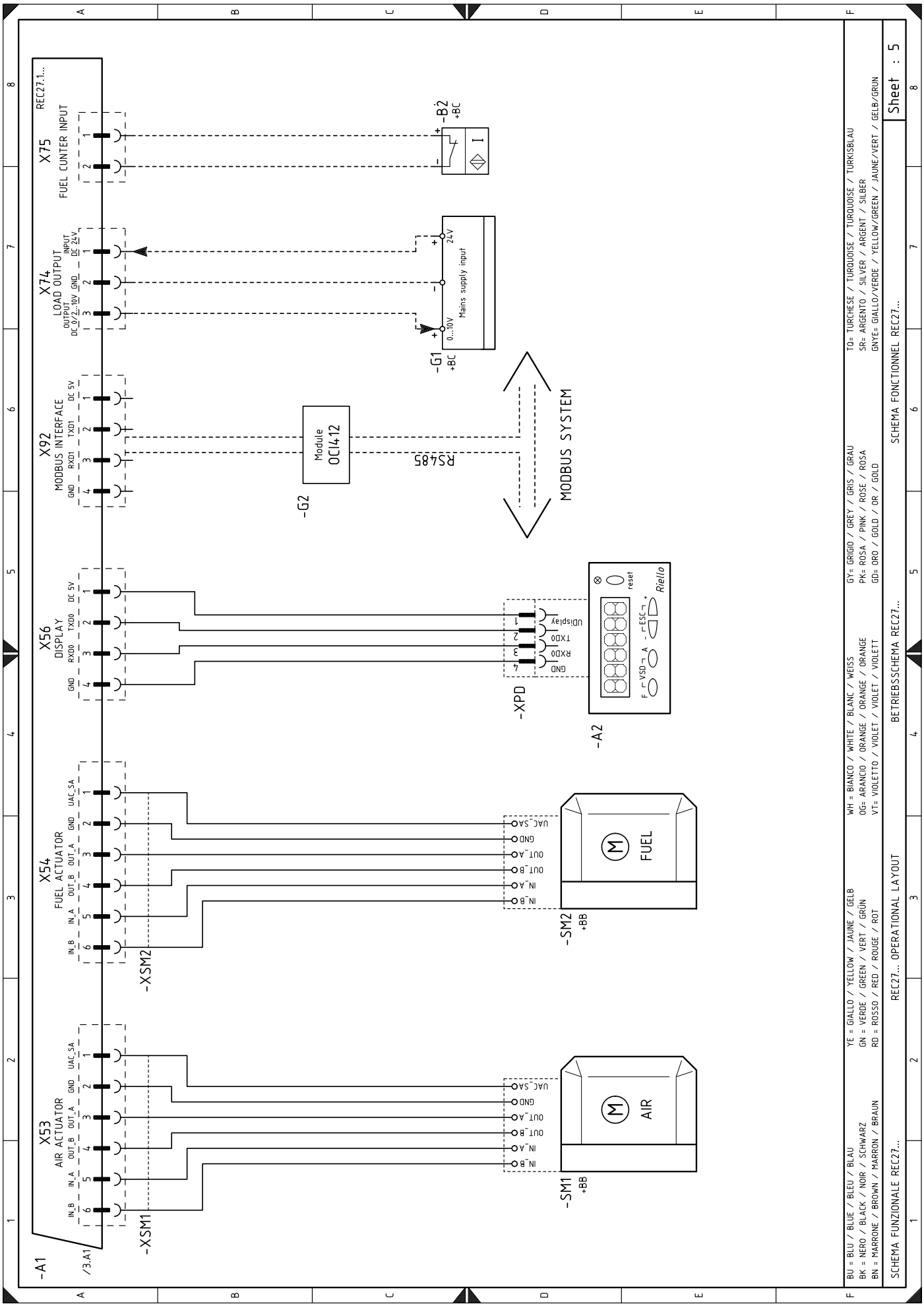
-A1
/3.A1
X53
AIR ACTUATOR
IN_B
IN_A
OUT_B
OUT_A
GND
UAC_SA
-XSM1
X54
FUEL ACTUATOR
-XSM2
X56
DISPLAY
GND
RXD0
TXD0
DC 5V
-XPD
-A2
X92
MODBUS INTERFACE
RXD1
TXD1
-G2
Module
OCI412
RS485
MODBUS SYSTEM
X74
LOAD OUTPUT
OUTPUT
DC_0/2..10V
INPUT
DC 24V
-G1
+BC
Mains supply input
0...10V
24V
X75
FUEL CUNTER INPUT
-B2
REC27.1...
-SM1
+BB
AIR
-SM2
FUEL
BU = BLU / BLUE / BLEU / BLAU
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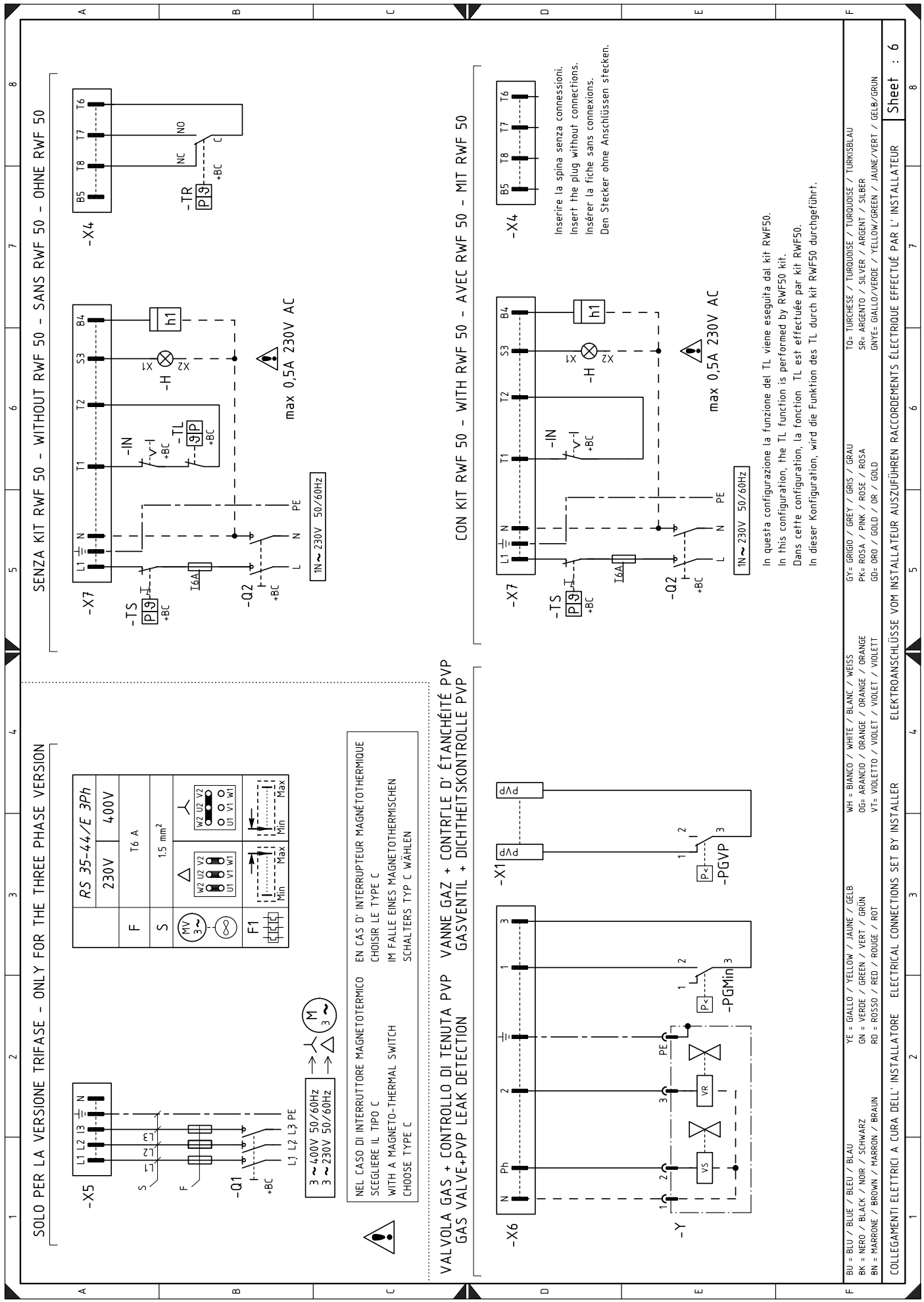
BETRIEBSSCHEMA REC27...
SCHEMA FONCTIONNEL REC27...
Sheet : 5


SOLO PER LA VERSIONE TRIFASE - ONLY FOR THE THREE PHASE VERSION
RS 35-44/E 3Ph
230V
400V
F
T6 A
S
1.5 mm²
F1
-X5
-Q1
3 ~ 400V 50/60Hz
3 ~ 230V 50/60Hz
NEL CASO DI INTERRUTTORE MAGNETOTERMICO SCEGLIERE IL TIPO C
WITH A MAGNETO-THERMAL SWITCH CHOOSE TYPE C
EN CAS D' INTERRUPTEUR MAGNÉTOTHERMIQUE CHOISIR LE TYPE C
IM FALLE EINES MAGNETOTHERMISCHEN SCHALTERS TYP C WÄHLEN
VALVOLA GAS + CONTROLLO DI TENUTA PVP
GAS VALVE+PVP LEAK DETECTION
VANNE GAZ + CONTRÎLE D' ÉTANCHÉITÉ PVP
GASVENTIL + DICHTHEITSKONTROLLE PVP
-X6
-Y
-X1
-PGMin
-PGVP
SENZA KIT RWF 50 - WITHOUT RWF 50 - SANS RWF 50 - OHNE RWF 50
-X7
-TS
-IN
-TL
-H
h1
-Q2
max 0,5A 230V AC
1N~ 230V 50/60Hz
-X4
-TR
CON KIT RWF 50 - WITH RWF 50 - AVEC RWF 50 - MIT RWF 50
Inserire la spina senza connessioni.
Insert the plug without connections.
Insérer la fiche sans connexions.
Den Stecker ohne Anschlüssen stecken.
In questa configurazione la funzione del TL viene eseguita dal kit RWF50.
In this configuration, the TL function is performed by RWF50 kit.
Dans cette configuration, la fonction TL est effectuée par kit RWF50.
In dieser Konfiguration, wird die Funktion des TL durch kit RWF50 durchgeführt.
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
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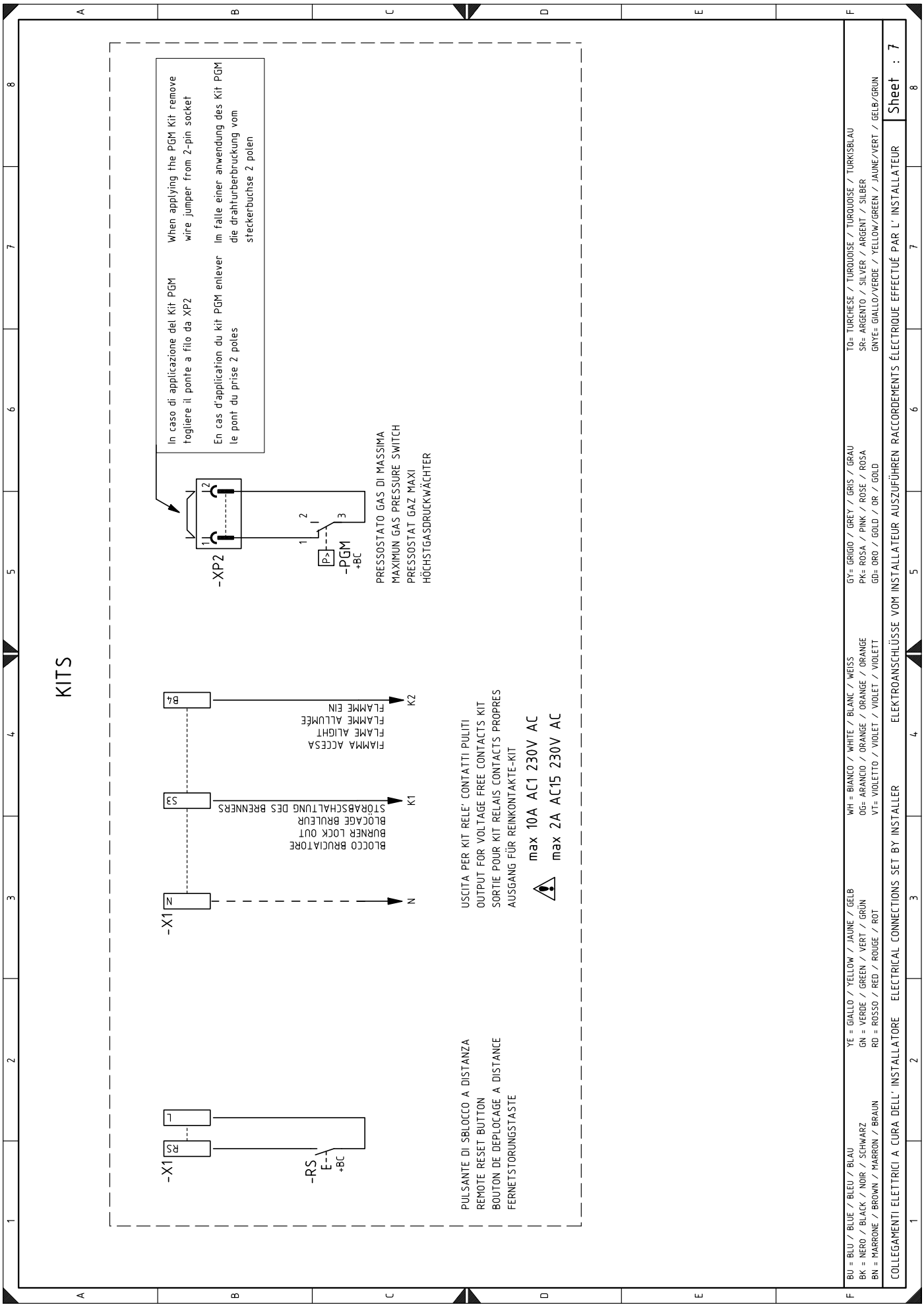
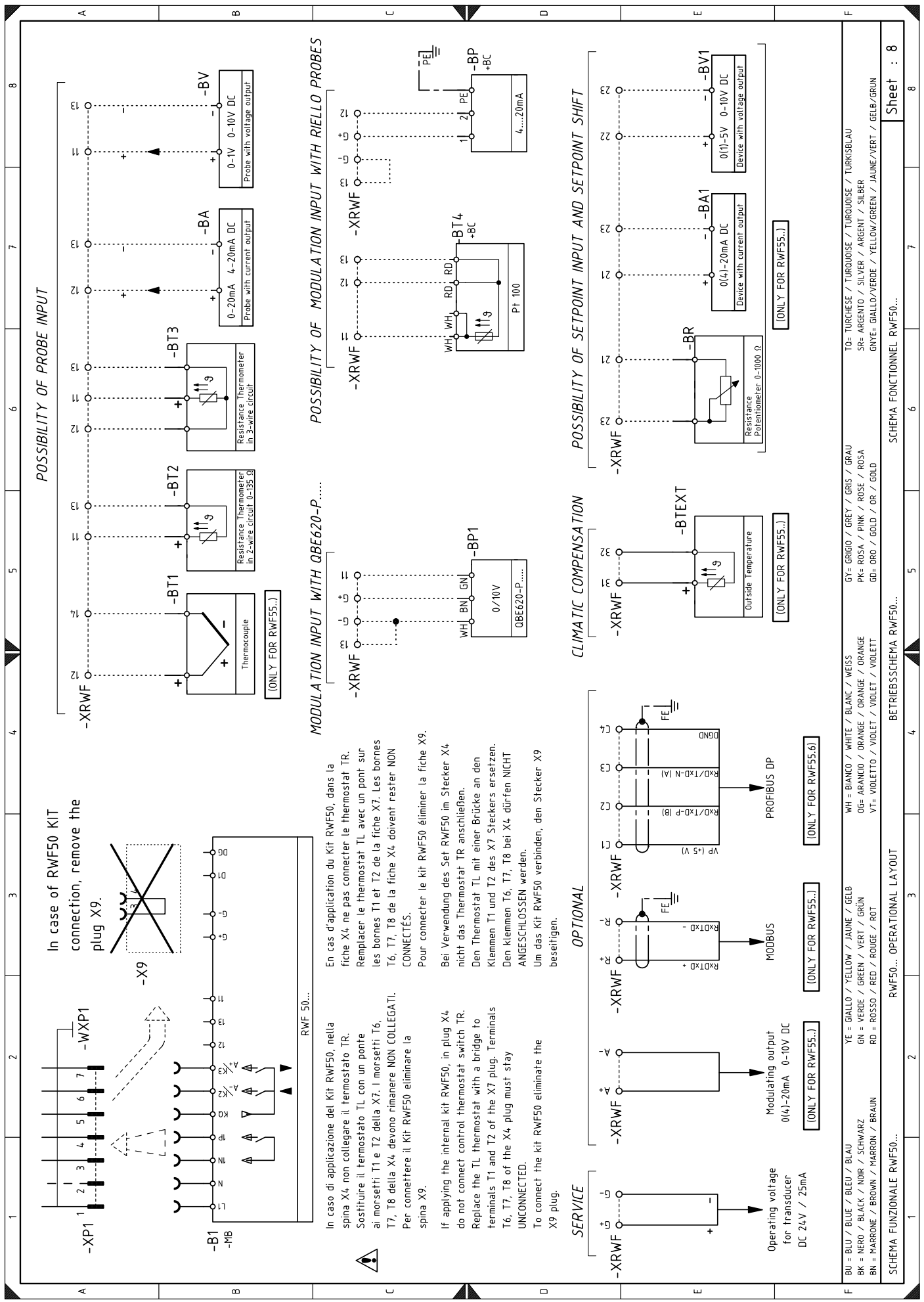
GY= GRIGIO / GREY / GRIS / GRAU
PK= ROSA / PINK / ROSE / ROSA
GO= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE
ELECTRICAL CONNECTIONS SET BY INSTALLER
ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN
RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 6


KITS
In caso di applicazione del Kit PGM togliere il ponte a filo da XP2
When applying the PGM Kit remove wire jumper from 2-pin socket
En cas d'application du kit PGM enlever le pont du prise 2 poles
Im falle einer anwendung des Kit PGM die drahturberbruckung vom steckerbuchse 2 polen
-XP2
-PGM
+BC
PRESSOSTATO GAS DI MASSIMA
MAXIMUN GAS PRESSURE SWITCH
PRESSOSTAT GAZ MAXI
HÖCHSTGASDRUCKWÄCHTER
-X1
RS
L
-RS
E-
+BC
PULSANTE DI SBLOCCO A DISTANZA
REMOTE RESET BUTTON
BOUTON DE DEPLOCAGE A DISTANCE
FERNETSTORUNGSTASTE
-X1
N
S3
B4
BLOCCO BRUCIATORE
BURNER LOCK OUT
BLOCAGE BRULEUR
STÖRABSCHALTUNG DES BRENNERS
FIAMMA ACCESA
FLAME ALIGHT
FLAMME ALLUMÉE
FLAMME EIN
N
K1
K2
USCITA PER KIT RELE' CONTATTI PULITI
OUTPUT FOR VOLTAGE FREE CONTACTS KIT
SORTIE POUR KIT RELAIS CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE-KIT
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
GD= ORO / GOLD / OR / GOLD
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 : 7


POSSIBILITY OF PROBE INPUT
-XRWF
-BT1
Thermocouple
-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
-BV
0-1V 0-10V DC
Probe with voltage output
(ONLY FOR RWF55..)
In case of RWF50 KIT connection, remove the plug X9.
-X9
-XP1
-WXP1
-B1
-MB
RWF 50...
MODULATION INPUT WITH QBE620-P.....
POSSIBILITY OF MODULATION INPUT WITH RIELLO PROBES
-BP1
QBE620-P.....
0/10V
-BT4
Pt 100
4....20mA
-BP
CLIMATIC COMPENSATION
-BTEXT
Outside Temperature
POSSIBILITY OF SETPOINT INPUT AND SETPOINT SHIFT
-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
SERVICE
OPTIONAL
Operating voltage for transducer DC 24V / 25mA
Modulating output 0(4)-20mA 0-10V DC
MODBUS
PROFIBUS DP
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
GO= ORO / GOLD / OR / GOLD
TQ= TURCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
SCHEMA FUNZIONALE RWF50...
RWF50... OPERATIONAL LAYOUT
BETRIEBSSCHEMA RWF50...
SCHEMA FONCTIONNEL RWF50...
Sheet : 8

Wiring layout key

A1	Control box for the air/fuel ratio
A2	Operator panel
B	Filter to protect against radio disturbance
+BB	Burners components
+BC	Boiler components
B1	Output regulator RWF
B2	Fuel meter
BA	Input in current DC 4...20 mA
BA1	Input in current DC 4...20 mA to modify remote set-point
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	Input in voltage DC 0...10V
BV1	Input in voltage DC 0...10V to modify remote setpoint
C1	Capacitor
CN1	Ionisation probe connector
F1	Fan motor thermal relay
G1	Load indicator
G2	Communication interface for Modbus system
h1	Hour counter
H	Remote lockout signal
ION	Ionisation probe
IN	Manual burner arrest switch
KM	Fan motor contact maker
MV	Fan motor
PA	Air pressure switch
PE	Burner earth
PGM	Maximum gas pressure switch
PGMin	Minimum gas pressure switch
PGVP	Gas pressure switch for valve leak detection control device
Q1	Three-phase disconnecting switch
Q2	Single phase disconnecting switch
RS	Remote burner reset button
S1	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
X1	Burner terminal strip
X4	4 pin plug
X5	5 pin plug
X6	6 pin plug
X7	7 pin plug
X9	9 pin plug
XP1	Connector for output power regulator kit RWF
XP4	4 pole socket
XP5	5 pole socket
XP6	6 pole socket
XP7	7 pole socket
XPD	Operator panel connector
XP2	Maximum gas pressure switch connector
XPGVP	Gas pressure switch connector for valve leak detection control device
XRWF	Terminal board for output power regulator RWF
XSM1	Gas servomotor connector
XSM2	Air servomotor connector
XTM	Burner shelf
Y	Gas adjustment valve + gas safety valve

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