GB

Forced draught gas burner

Modulating operation

CODE	MODEL
20171518	RS 200/E FGR

20171664 (4) - 03/2021

Original instructions

1 Information and general warnings

1.1 Information about the instruction manual

1.1.1 Introduction

The instruction manual supplied with the burner:

- ➤ is an integral and essential part of the product and must not be separated from it; it must therefore be kept carefully for any necessary consultation and must accompany the burner even if it is transferred to another owner or user, or to another system. If the manual is lost or damaged, another copy must be requested from the Technical Assistance 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.

1.1.2 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.

1.1.3 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

1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

➤ the instruction manual is delivered to the user by the system manufacturer, with the recommendation to keep it in the room where the heat generator is to be installed.

➤ The instruction manual shows:
– the serial number of the burner;

.....

– the address and telephone number of the nearest Assistance Centre.

.....
.....
.....

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

1.2 Guarantee and responsibility

The manufacturer guarantees its new products from the 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.

2 Safety and prevention

2.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known technical 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.

2.2 Personnel training

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

The user:

➤ undertakes to entrust the machine exclusively to suitably trained and qualified personnel;

➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, 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:

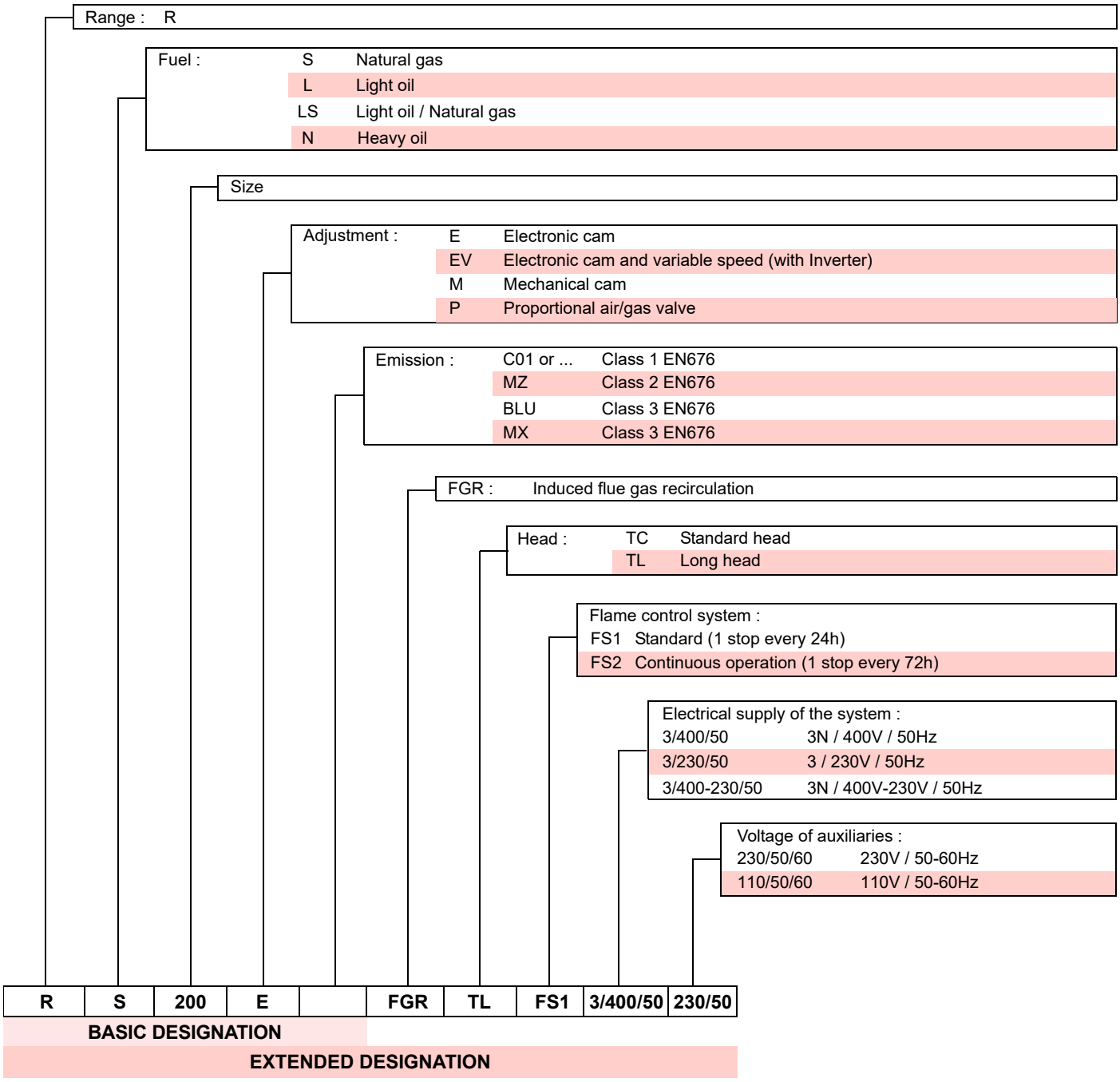
➤ the user must take all the measures necessary to prevent unauthorised people gaining access to the machine

➤ 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

3 Technical description of the burner

3.1 Burner designation



3.2 Models available

Designation	Voltage	Start-up	Code
RS 200/E FGR TL FS1	3 ~ 400V - 50Hz	Direct	20171518

Tab. A

3.3 Burner categories

Country of destination	Gas category
AT - CH - CZ - DK - EE - ES - FI - FR - GB - GR - HU - IE IT - LT - LV - NL - NO - PT - RO - SE - SI - SK	I2H
DE - LU - PL - RO	I2E

Tab. B

3.4 Technical data

Model			RS 200/E FGR
Output (1)	Max.	kW Mcal/h	1400 ÷ 2200 1204 ÷ 1892
	Min.	kW Mcal/h	400 344
Fuel			Natural gas: G20 (methane gas)
Gas pressure at max. output (2) - Gas: G20		mbar	12.0
Operation			– Intermittent (min. 1 stop in 24 hours) – Modulating
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)	83.0 94.0
Weight		kg	101

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. 28 on page 26) 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.

3.5 Electrical data

Model		RS 200/E FGR
Main electrical supply Control circuit power supply		3 ~ 400V +/-10% 50Hz 1N ~ 230V +/-10% 50Hz
Fan motor IE3	rpm V kW A	2935 400 5.5 10.2
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 35 mA
Absorbed electrical power	kW max	6.5
Protection level		IP 44

Tab. D

3.6 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 I.

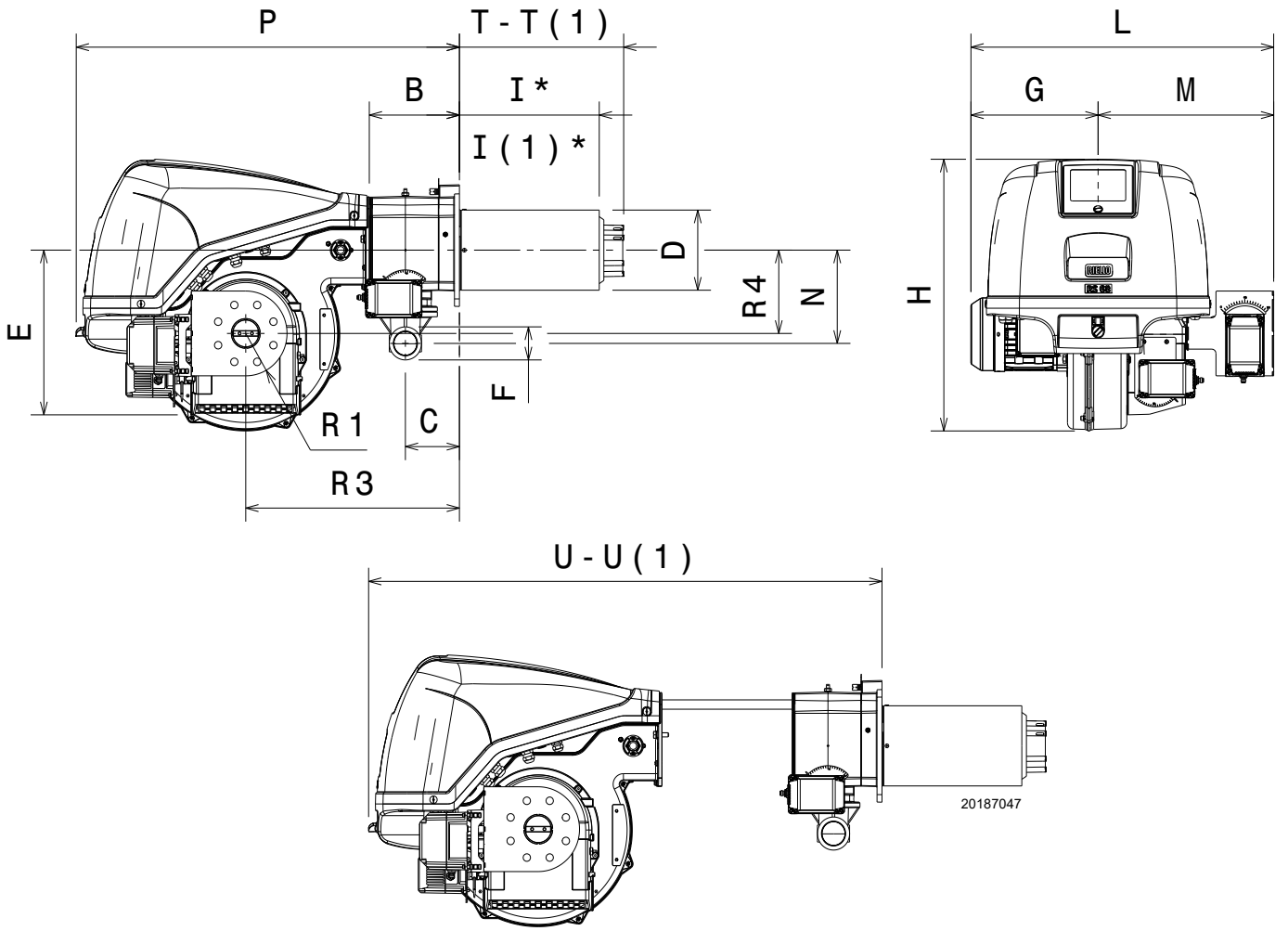


Fig. 1

mm	B	C	D	E	F	G	H	I - I (1)	L	M	N	P	R1	R3	R4
RS 200/E FGR	242	141	221	435	2”	428	647	310 - 440	864	436	261	953	DN100	541,5	198,5

mm	T - T (1)	U - U (1)
RS 200/E FGR	373-503	1475-1620

(1) Blast tube: short-long

(*) Maximum depth of the boiler door including the depth of the burner flange insulating gasket.

Tab. E

3.7 Burner equipment

The burner is supplied complete with:

Gas train flange . . . . . No. 1
Gasket for gas train flange . . . . . No. 1
Thermal insulation screen . . . . . No. 1
Screws M10x40 to fix the gas train flange . . . . . No. 4
Screws M16x50 to fix the burner flange to the boiler . . . . . No. 4
PVP kit for leak detection . . . . . No. 1
Extensions . . . . . No. 2
Instruction manual . . . . . No. 1
Spare parts list . . . . . No. 1

3.8 Firing rates

The **maximum output** is chosen within area A) of the diagram (Fig. 2).

The **minimum output** must not be lower than the minimum limit of the diagram.

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 18.

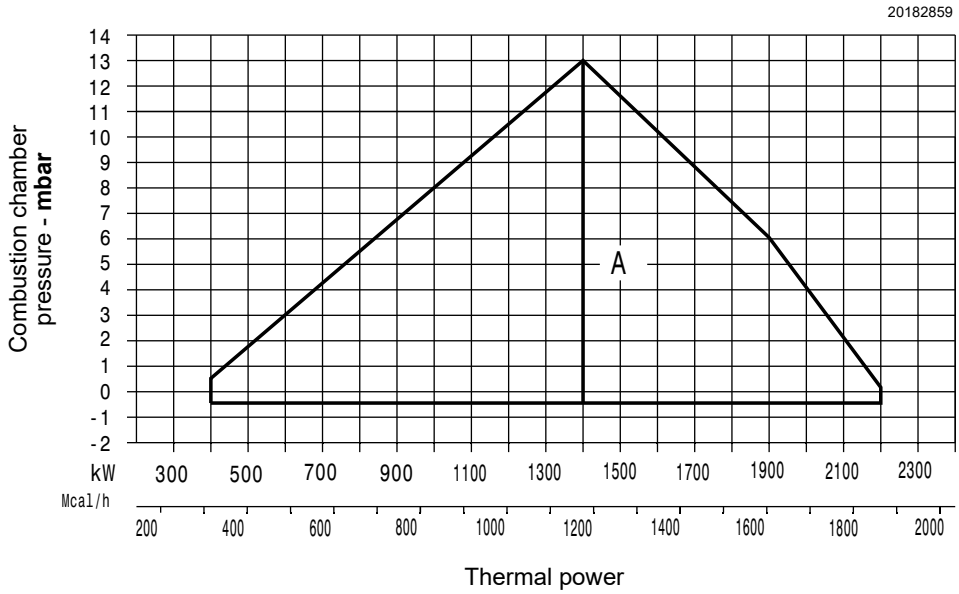


Fig. 2

3.9 Test boiler

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

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

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

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

Example:
Output 756 kW: diameter = 60 cm; length = 2 m.

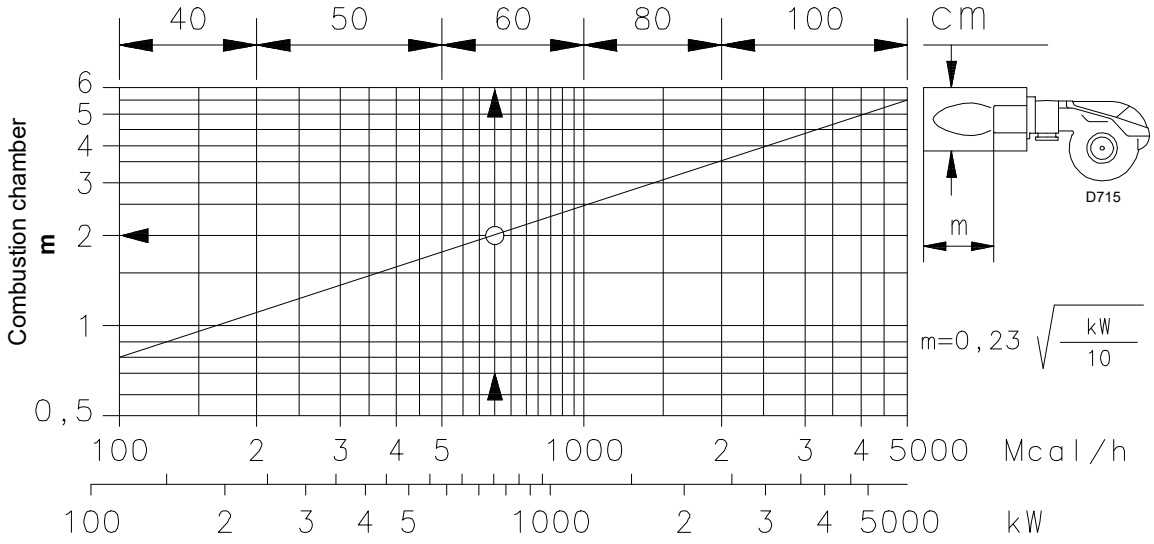


Fig. 3

3.9.1 Commercial boilers

The burners are suitable for operation on either flame-inversion boilers or boilers with combustion chambers featuring flow from the base (three flue passes) on which the best results are obtained in terms of low NOx emissions.

The burner-boiler match is assured where the boiler is EC type-approved; for boilers and furnaces with combustion chambers featuring dimensions differing considerably from those given in the diagram, it is advisable to perform preliminary tests.

* The maximum depth of the boiler door is referred to dimension "l" (Fig. 1 on page 8).

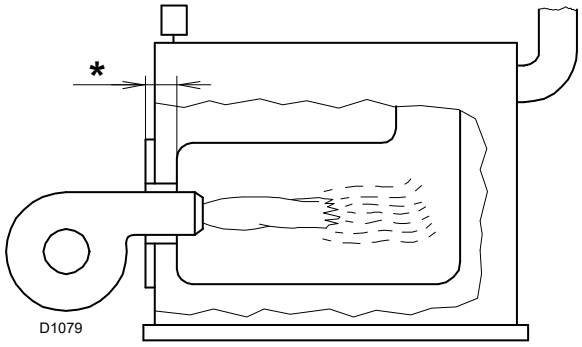


Fig. 4

3.10 Burner description

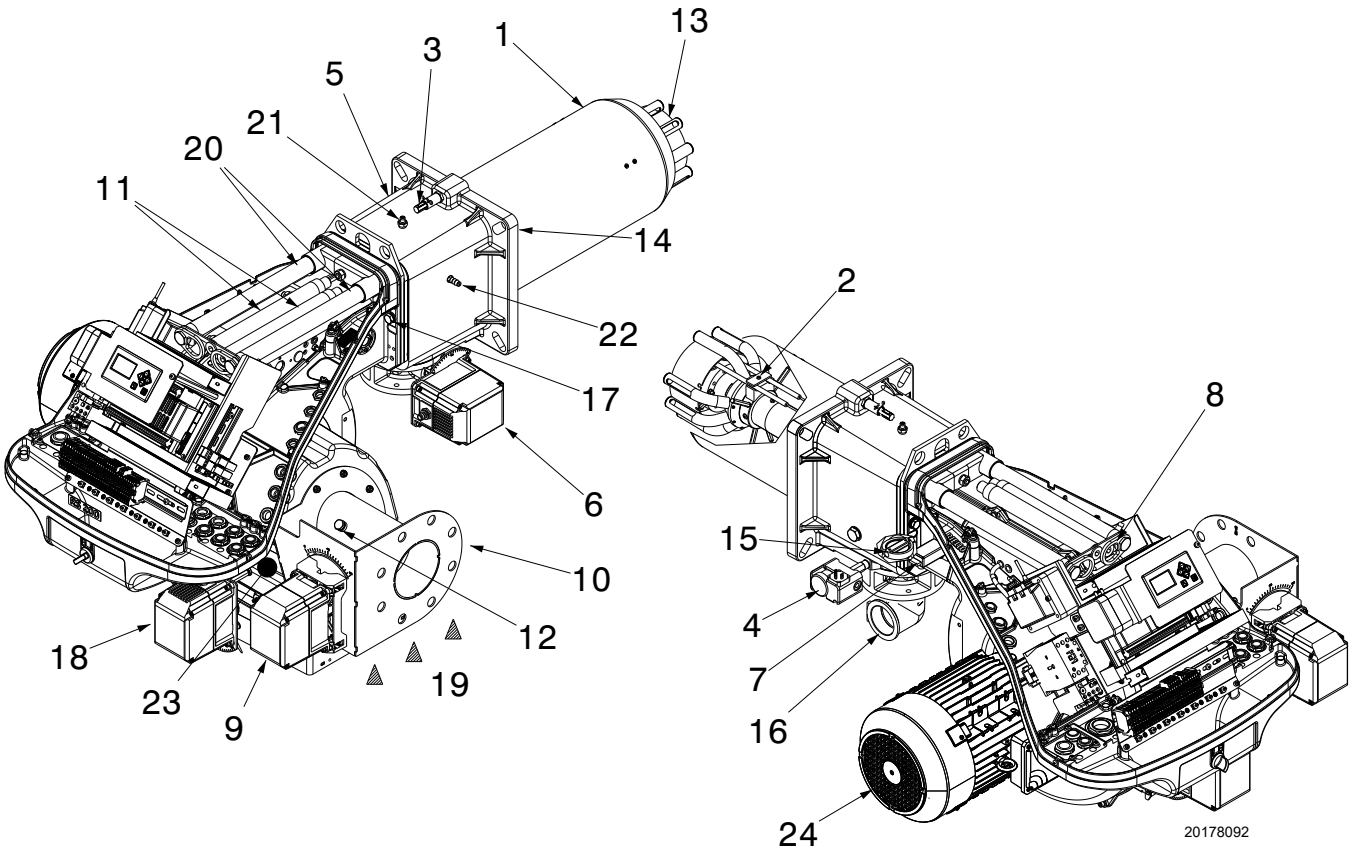


Fig. 5

1 Combustion head
2 Ignition electrode
3 Screw for combustion head adjustment
4 Maximum gas pressure switch
5 Pipe coupling
6 Gas servomotor
7 Flame sensor
8 Lifting rings
9 Flue gas recirculation servomotor
10 Flue gas recirculation butterfly valve
11 Extensions for guides
12 Connector G1/4
13 Flame stability disc
14 Filter to protect against radio disturbance
15 Gas butterfly valve
16 Gas input pipe
17 Screws to secure fan to pipe coupling
18 Air servomotor
19 Fan air inlet
20 Guides for opening the burner and inspecting the combustion head
21 Gas pressure test point and head fixing screw
22 Air pressure socket
23 Air damper
24 Fan motor

3.11 Electrical panel description

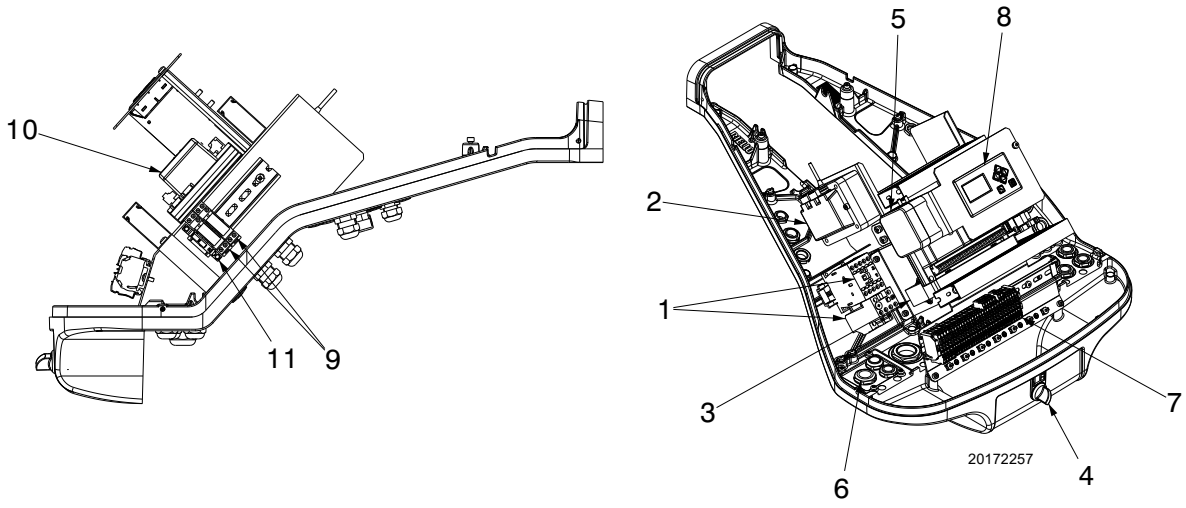


Fig. 6

1 Fan motor thermal relay and contactor
2 Ignition transformer
3 Suppressor
4 ON/OFF operation selector
5 Air pressure switch (differential type)
6 External connections passage by the installer
7 Terminal strip supply for electrical connection
8 Display
9 Relay with clean contacts
10 Electrical control box
11 Auxiliary circuits fuse

3.12 Control box for the air/fuel ratio (BT330)

Warnings

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 operating unit and incorrect settings of the fuel and / or air actuator positions can lead to dangerous burner operating conditions.

For the safety and reliability of the equipment, also follow these guidelines.

- ➤ After commissioning and after each maintenance action check the exhaust gas values across the entire power range!
- ➤ Qualified specialist staff are required to carry out all activities (assembly, installation, servicing, etc.).
- ➤ Before working in the connection area, switch off the power supply to the plant from all poles. Ensure that it cannot be switched back on and that the plant is voltage-free. There is a risk of electric shock when the plant is not switched off.
- ➤ Place and secure the protection against contact on the BT300 and on all connected electrical parts. The cover must fulfil the design, stability and protection requirements of EN 60730.
- ➤ After each activity (e.g. assembly, installation, servicing, etc.) check wiring and parameters to make sure it is in good working condition.
- ➤ If the equipment is dropped or suffers impact, you should no longer commission it. The safety functions may also be impaired but fail to show any obvious external damage.
- ➤ When the ratio curves are being programmed, the adjuster will continually monitor the quality of the plant's combustion (e.g. using an exhaust gas analysis station). In the event that the combustion values are inadequate or the conditions are potentially harmful, the adjuster will take suitable action, e.g. switch off the system manually.
- ➤ These operating instructions describe many possible applications and functions and should be used as guidelines. Carry out functional tests on the test bench and/or in the plant application to ensure correct functioning and document the results.
- ➤ Condensation and humidity are to be avoided. If necessary, make sure that the installation is sufficiently dry before you switch it on.
- ➤ Avoid static charge having a destructive effect in case of touching the device's electronic components.

S9619

Fig. 7

Technical data

Model	BT330
Power supply	230 V +10/-15% 50-60 Hz
Power consumption	max. 30 VA
Cable length: - control Load - external reset button - Fuel valve - other lines	 Max. 20 m Max. 20 m Max. 10 m Max. 20 m
Weight	1 kg
Environmental conditions: - climatic conditions - mechanic conditions - temperature range	 Class 3K5 (DIN EN 60721-3) Class 3M5 (DIN EN 60721-3) -20...+60 °C (condensation is prohibited)
Electronic safety	IP40 (housing) IP20 (terminals)

Tab. F

3.13 Burner operating sequence

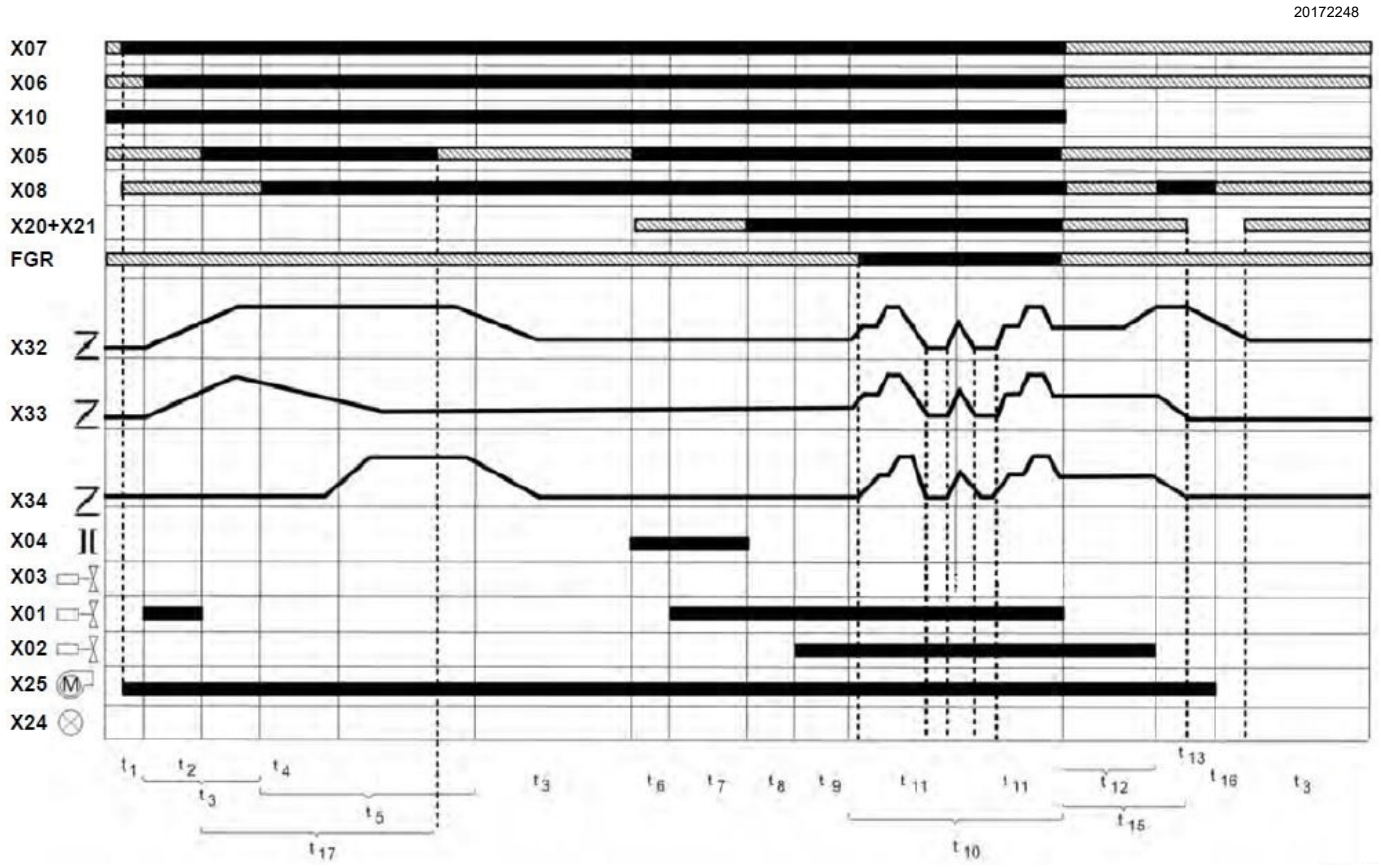


Fig. 8

Key to layout (Fig. 8)

▨	Any condition	
t1	Waiting time for safety circuits consent (boiler fuel)	
t2	Opening time of the gas valve (with sealing control active)	2.4 s
t3	Servomotor opening time	30/60 s
t4	Activation time FGR servomotor	0 - t5
t5	Pre-purge time	adjustable
t6	Pre-ignition time	adjustable
t7	Ignition flame safety time	3 s
t8	Flame stabilization time	adjustable
t9'	Safety time 2nd stage	3 s
t10	Modulation phase	
t11	Adjustment time	
t12	Opening time of the gas valve (with sealing control active)	3 s
t13	Post-purge time	adjustable
t15	Post-combustion time	adjustable
t16	Checking time for flame extinction	5 s
t17	Checking time for gas valve (with sealing control active)	30 s

Tab. G

Key to layout (Fig. 8)

FGR	FGR release
X01	Gas valve 1
X02	Gas valve 2
X04	Ignition transformer
X05	Gas pressure > min.
X06	Gas safety circuit
X07	Boiler safety circuit
X08	Air pressure switch
X10	Burner ON
X20+X21	Flame signal
X24	Fault
X25	Fan ON
X32	Air servomotor
X33	Fuel servomotor
X34	FGR servomotor

3.14 Servomotor (662R5...)

Warnings

WARNING

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

Avoid opening, modifying or forcing the actuators.

- ➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- ➤ Before modifying the wiring in the 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.
- ➤ After any operation (mounting, installation and service, etc.), check that the wiring is in order, so do the security checks.
- ➤ 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.

WARNING

Assembly notes

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

Installation notes

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

WARNING

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

WARNING

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

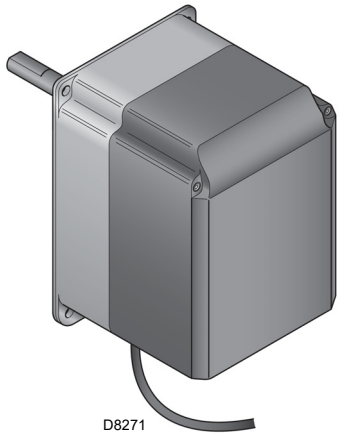


Fig. 9

Technical data

Model	662R5...
Floating time	5 sec / 90°
Direction of rotation 0° to 90°	left - seen from the drive shaft
Rated torque (max)	3 Nm
Static torque (max)	3 Nm
Weight	about 1,4 kg
Type of protection	IP54 as per DIN EN 60529-1
Environmental conditions:	
- climatic conditions - mechanic conditions - temperature range	Class 3K5 (DIN EN 60721-3) Class 3M5 (DIN EN 60721-3) -20...+60 °C (condensation is prohibited)
Electrical safety	Protection class 2 as per DIN EN 60730

Tab. H

4 Installation

4.1 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.

4.2 Handling

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

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.

4.3 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. 10), showing:

A the burner model
B the category of the appliance/countries of destination
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.

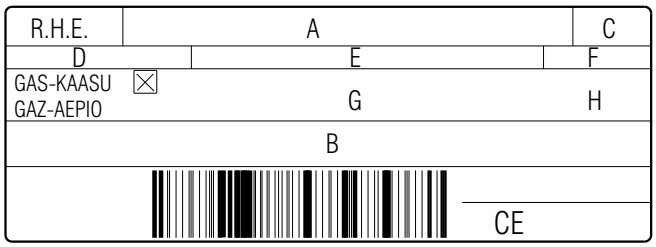


Fig. 10

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.

4.4 Operating position

WARNING

- The burner is designed to operate only in positions **1**, **2**, **3** and **4** (Fig. 11).
- 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.

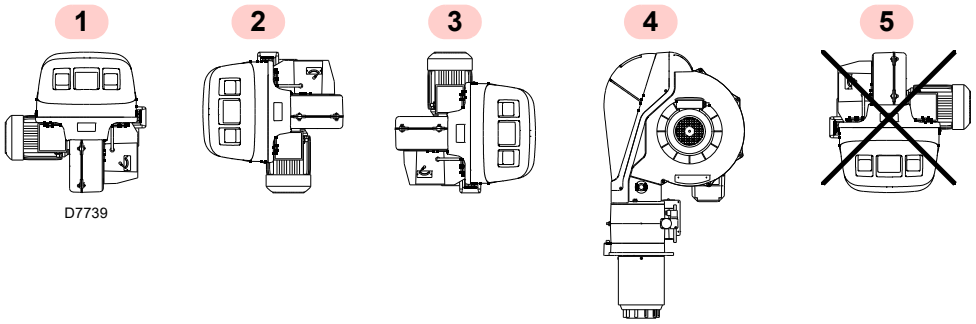


Fig. 11

4.5 Preparing the boiler

4.5.1 Boring the boiler plate

Drill holes in the plate shutting off the combustion chamber, as illustrated in Fig. 12. The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

4.5.2 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its refractory. The lengths L available are:

Blast tube	Short (mm)	Long (mm)
RS 200/E FGR	373	503

Tab. I

For boilers with front flue passes 13)(Fig. 15 on page 17), or flame inversion chambers, 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. 15), unless expressly requested by the boiler manufacturer.

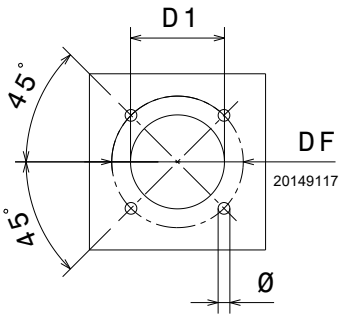


Fig. 12

mm	D1	DF	Ø
RS 200/E FGR	230	325 - 368	M 16

Tab. J

4.6 Positioning electrode

WARNING

Before fixing the burner to the boiler, check the correct positioning of the electrodes as in Fig. 14.

The following is required to perform the check:
- ➤ remove the screw 1)(Fig. 13);
- ➤ extract the inner part 2) of the head, and adjust them.

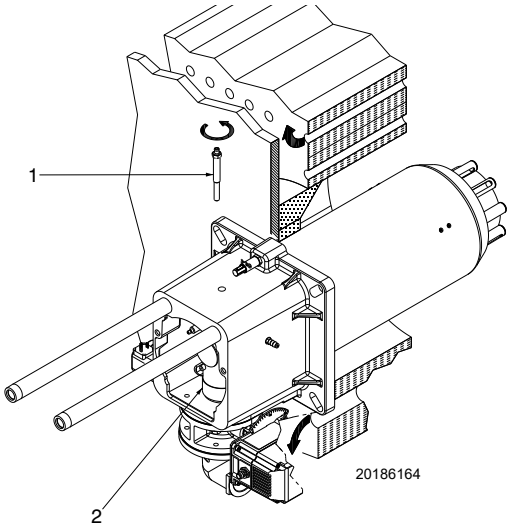


Fig. 13

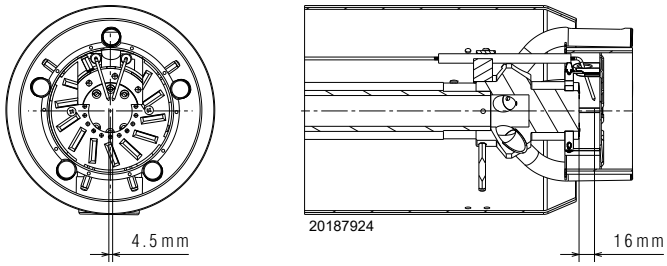


Fig. 14

4.7 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. 15; proceed as follows:
- ➤ loosen the 4 screws 3) and remove the hood 1);
- ➤ remove the screws 2) from the two guides 5);
- ➤ disconnect the plug 14);
- ➤ disconnect the socket from the maximum gas pressure switch;
- ➤ remove the two screws 4);
- ➤ pull back the burner on the guides 5) by about 100 mm;
- ➤ disconnect the electrode lead, then unthread the burner completely from the guides.
- ➤ Fix the flange 9) to the boiler plate, interposing the insulating gasket 8) supplied.
- ➤ 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.

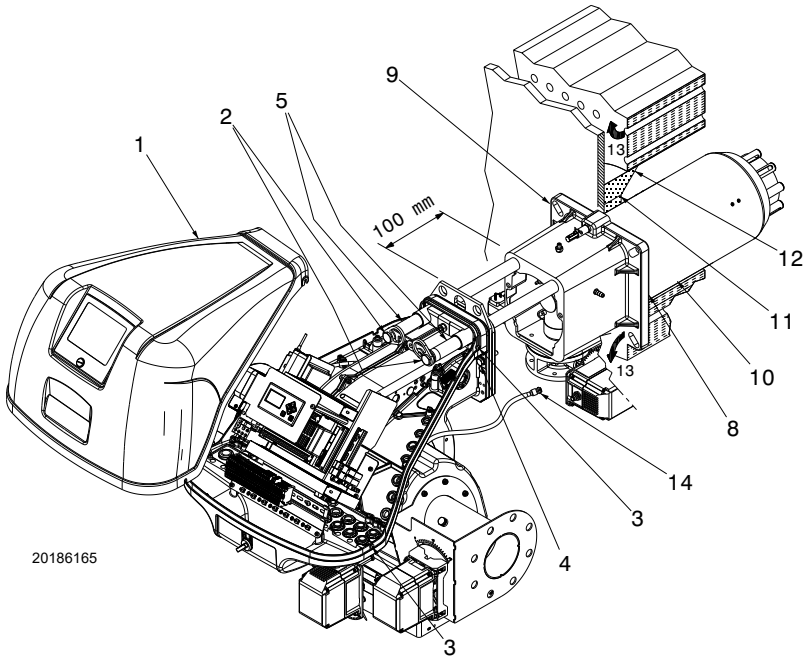


Fig. 15

4.8 Combustion head adjustment

At this point of the installation, the combustion head is fixed to the boiler as shown in Fig. 13. It is therefore especially easy to adjust, and this adjustment depends only on the maximum output of the burner.

In the diagram (Fig. 17) find the notch at which to adjust both air and central gas/air.

External air R1 adjustment

➤ Rotate the screw 4)(Fig. 16) until the notch you have found corresponds with the front surface 5) of the flange.

WARNING

To facilitate adjustment, loosen the screw 6), adjust and then lock.

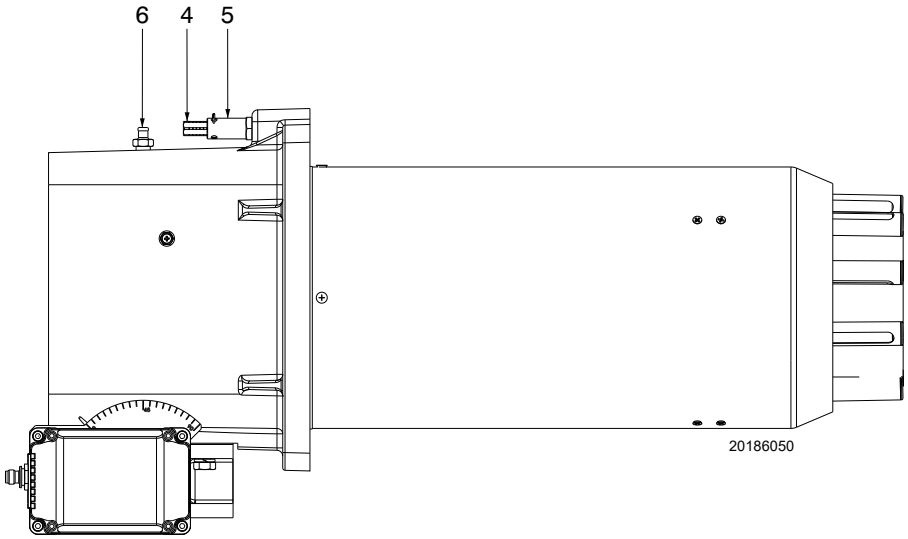


Fig. 16

NOTE:
the diagram (Fig. 17) indicates the optimum adjustment for a type of boiler according to Fig. 3 on page 9.

WARNING

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

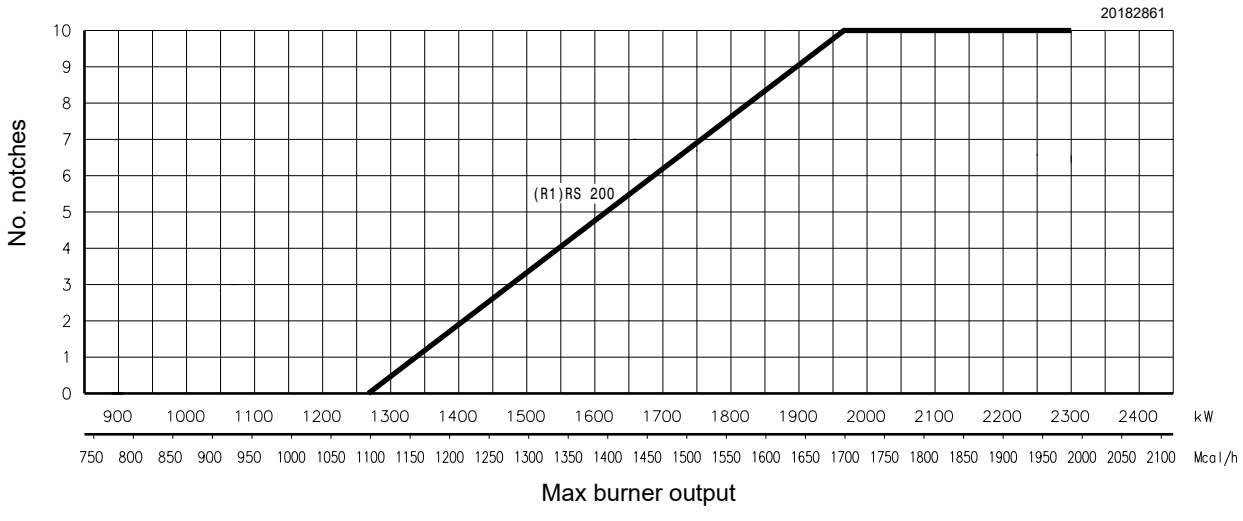


Fig. 17

4.9 FGR duct system

– Normally the duct would connect to the stack as shown in Fig. 18, with a 45° cut facing the flue gas flow and with the center of the cut centered in the stack.
The duct could be made to the smoke box, but must still be located with the same 45° cut facing the flue gas flow stream and with the center of the cut in the center of the stream.
– The duct should be routed in a manner that has the minimum number of elbows and provides for the normal expansion and contraction of the piping.
Long duct runs can change length by over 1” and can put an extreme load on the connecting points that could cause component failures.
The design must include offsets that will allow for the required movement of the piping without undue force on the burner or stack.
– Duct expansion and contraction can be managed by using two relatively long duct runs that are 90° opposed to each other.
A small movement in the angle between these two legs will provide the space needed to absorb the expansion and contraction. The ends of the FGR duct must be securely attached to allow this to work properly, and prevent high loads from being applied to the burner or stack.
– A condensation drip leg must be provided upstream of the FGR control valve and the FGR shut-off valve (if used). There must be sufficient condensate drip legs and catch space (volume of drip legs) to prevent the condensation from flowing through the control valves and into the fan.
In cases of heavy condensation, a condensate drip leg may be required on the bottom of the housing, to remove condensate.
– Determine if pipe reducers are needed for the connection to the FGR control valve and the FGR shut-off valve.
– The duct must be properly supported, handling both the weight of the duct and to control the thermal expansion and contraction. The supports may need to be anchored to provide this stability in the FGR duct.

CAUTION

Uncontrolled condensation can cause premature failure of the control valves, fan and motor.

Adequate means must be provided to remove condensation from the system.

Cold start-up will generate significant amounts of condensation.

– The FGR duct is normally made from schedule DN100 (for RS 200) pipe.
– The duct components must be seal welded, flanged or screwed together to provide an air tight duct.
Air leakage into the duct will prevent the system from working properly. It is sufficient to only inspect the welds for a proper seal, they do not need to be leak tested.

WARNING

The duct and connectors must be duly insulated to prevent accidental burns.

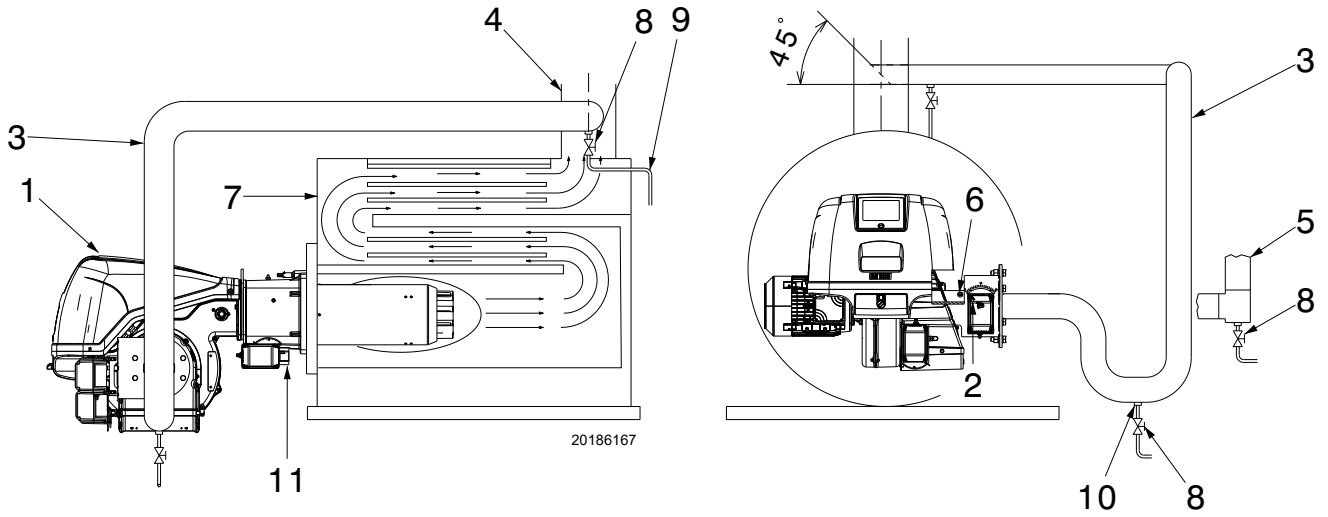


Fig. 18

Key (Fig. 18)
1 Burner
2 Inducted FGR modulating damper
3 Flue gas recirculation pipe
4 Boiler stack
5 Alternate construction using “T”
6 Flue pressure intake upstream of damper 2)
7 Boiler
8 Drain valve (manual ball valve, stainless steel)
9 Drain line
10 Condensate trap
11 Primary gas supply inlet

4.9.1 Flue gas recirculation line sizing

The Tab. K can be helpful to correctly size the FGR pipes taking flue gases from boiler stack base up to the burner intake port.

NOTE:
The typical recirculation percentage is between 10% and 15%.
A low recirculation percentage might cause a high Nox level.
A high recirculation percentage might cause flame instability and a CO level higher than normal.

4.9.2 Calculating the percentage of recirculated flue gas

As a general rule, recirculated flue gas quantity must be adjusted so as to recirculate the smallest quantity necessary to obtain the required NOx rate.

Adjustment is carried out through the throttle valve located on FGR pipe. It is necessary to consider that too high a quantity of recirculated flue gas could lead to flame instability and excessively high CO rate.

To calculate the % of recirculated flue gas, use the formula below: % IFGR= ($CO_{2\ R}$)/($CO_{2\ f}$) x 100. Where:
– ($CO_{2\ R}$) is the percentage of CO_2 measured at the burner coupling
– ($CO_{2\ f}$) is the percentage of CO_2 measured at the stack

	kW	Flue gas pressure intake 6)(Fig. 18)
RS 200/E FGR	1372	-2,8
	1400	-2,8
	1500	-2,9
	1600	-3,1
	1700	-3,5
	1800	-3,8
	1900	-4,3
	2000	-4,8
	2100	-5,2
	2200	-5,8
	2300	-6,0

Tab. K

4.10 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. 15;
➤ insert the electrode cable, then slide the burner as far as the pipe coupling - burner in the position shown in Fig. 19;
➤ connect the plug of the servomotor 14)(Fig. 15);
➤ connect the socket of the maximum gas pressure switch;
➤ refit the screws 2) on the guides 3);
➤ fix the burner to the pipe coupling with the screws 1).

WARNING

When fitting the burner on the two guides, it is advisable to gently draw out the high voltage cable until it is slightly taut.

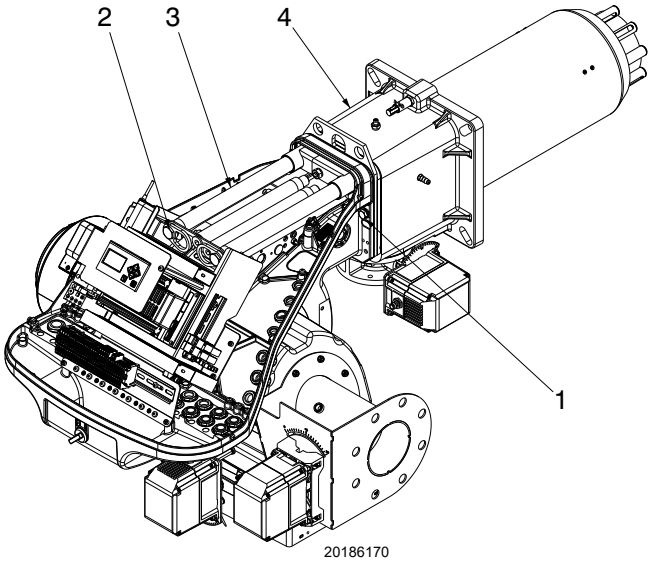


Fig. 19

4.11 Gas feeding

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

Precautions: avoid knocking, attrition, sparks and heat.

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

WARNING

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

4.11.1 Gas feeding line

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

1 Gas input pipe
2 Manual valve
3 Vibration damping joint
4 Pressure gauge with push-button cock
5 Filter

6A Includes:
– Filter
– working valve
– safety valve
– pressure adjuster

6C Includes
– safety valve
– working valve

6D Includes:
– safety valve
– working valve

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

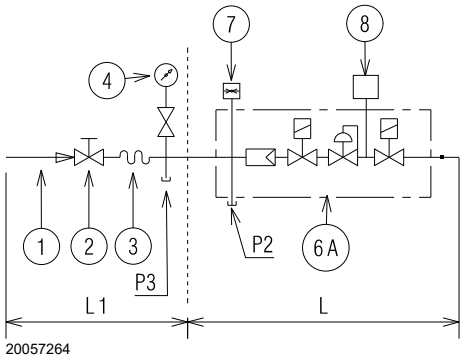


Fig. 20

MBC - VGD

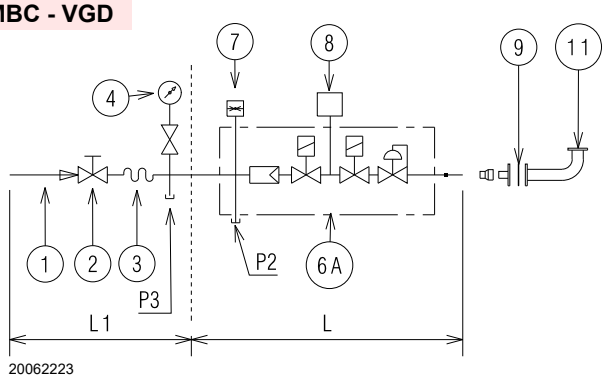


Fig. 21

DMV

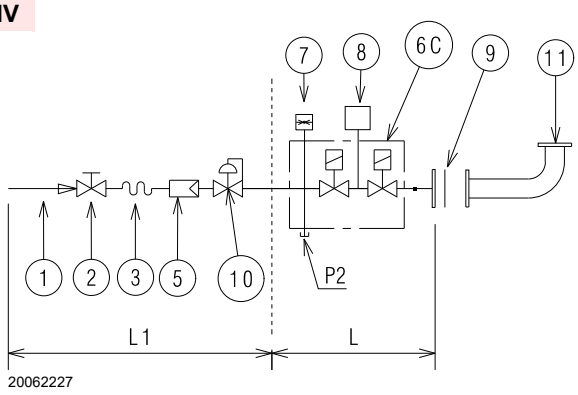


Fig. 22

CB

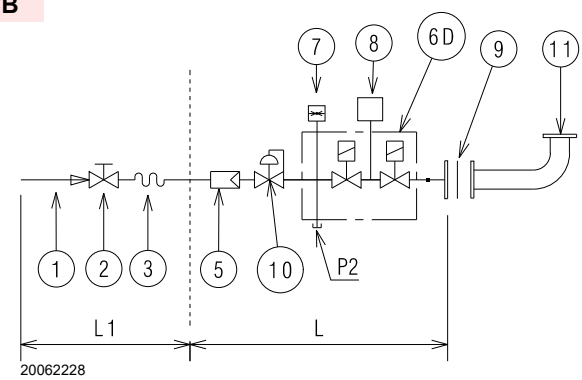


Fig. 23

4.11.2 Gas train

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

4.11.3 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. 24.

The gas train must be connected to the gas attachment 1)(Fig. 24), 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.

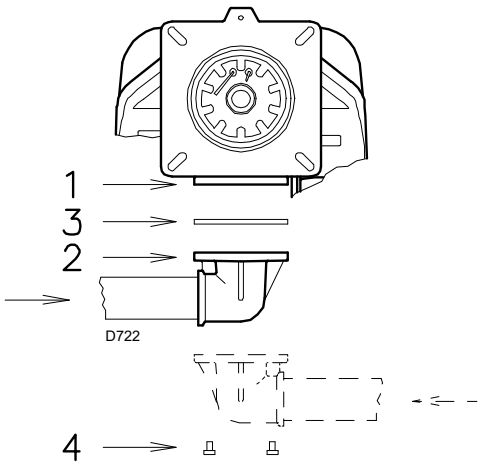


Fig. 24

4.11.4 Gas pressure

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

The values shown in refer to:

– Natural gas G 20 NCV 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)

Column 1

Load loss at combustion head.

Gas pressure measured at the test point 1)(Fig. 25), with:

- combustion chamber at 0 mbar;
- burner working at maximum output;

Column 2

Pressure loss at gas butterfly valve 2)(Fig. 25) 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. 25).
– Find, in the 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 200/E FGR:

Maximum output operation

Gas pressure at test point 1)(Fig. 25) = 13.1 mbar

Pressure in combustion chamber = 3.0 mbar

13.1 - 3.0 = 10.1 mbar

A maximum output of 2000 kW shown in corresponds to 10.1 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. 25), set the maximum output required from the burner operation, then:

– find the nearest output value in the for the burner in question.
– Read, on the right (column 1) the socket pressure 1)(Fig. 25).
– Add this value to the estimated pressure in the combustion chamber.

Example with natural gas G 20 for RS 200/E FGR:

Required burner maximum output operation: 2000 kW

Gas pressure at output of 2000 kW = 10.1 mbar

Pressure in combustion chamber = 3.0 mbar

10.1 + 3.0 = 13.1 mbar

pressure required at test point 1)(Fig. 25).

	kW	1 Δp (mbar)	2 Δp (mbar)
RS 200/E FGR	1400	5,1	2,3
	1500	5,8	2,7
	1600	6,6	3,1
	1700	7,4	3,5
	1800	8,2	3,9
	1900	9,2	4,3
	2000	10,1	4,7
	2100	10,9	5,1
	2200	12,0	5,5

Tab. L

WARNING

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

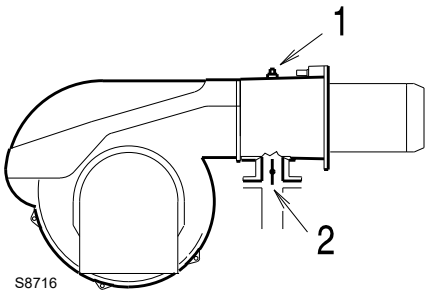


Fig. 25

4.12 Electrical wiring

Notes on safety for the electrical wiring

DANGER

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The 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:

DANGER

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

DANGER

Close the fuel interception tap.

DANGER

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.

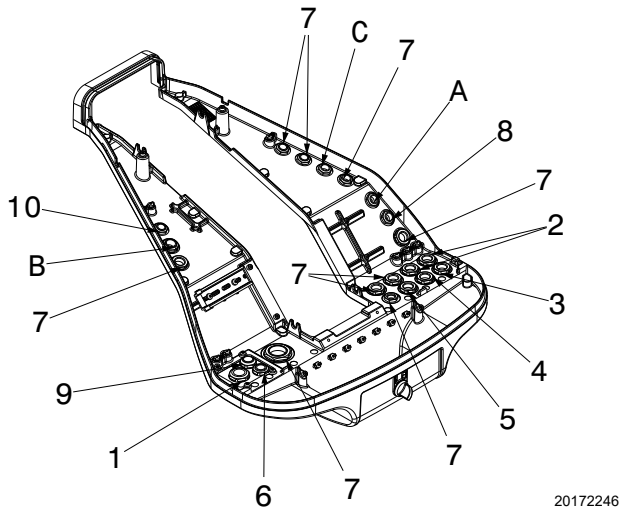


Fig. 26

4.12.1 Supply cables and external connections passage

All the cables to be connected to the burner are fed through the grommets. See Fig. 26.

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

1 Three-phase power supply
2 Consents/safety
3 Minimum gas pressure switch
4 Gas valves seal control kit
5 Gas train
6 Single-phase power supply
7 Available
8 FGR servomotor
9 Fan motor
10 Flame sensor

Cable grommets used in the factory:

A Air servomotor
B Maximum gas pressure switch
C Gas servomotor

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

4.13 Calibration of the thermal relay

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

For calibration 2), see the table in the wiring diagram.

To reset, in case of an intervention of the thermal relay, press the “RESET” button 1) of Fig. 27.

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

CAUTION

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

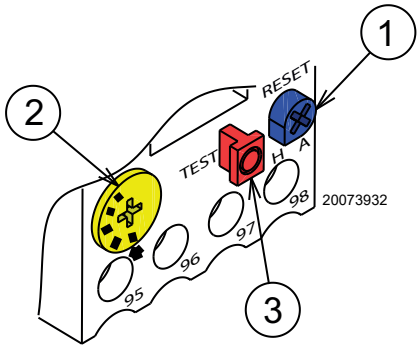


Fig. 27

5 Start-up, calibration and operation of the burner

5.1 Notes on safety for the first start-up

WARNING

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

WARNING

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

WARNING

Before igniting the burner, see the paragraph "Safety test - with gas feeding closed" on page 40.

5.2 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. 32 on page 28) to the start of the scale.
- Adjust the maximum gas pressure switch (Fig. 31 on page 28) to the end of the scale.
- Adjust the air pressure switch (Fig. 30 on page 27) to the start of the scale.
- Adjust the pressure switch for the valve leak detection control device (PVP Kit)(Fig. 33 on page 28), 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. 28) 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.

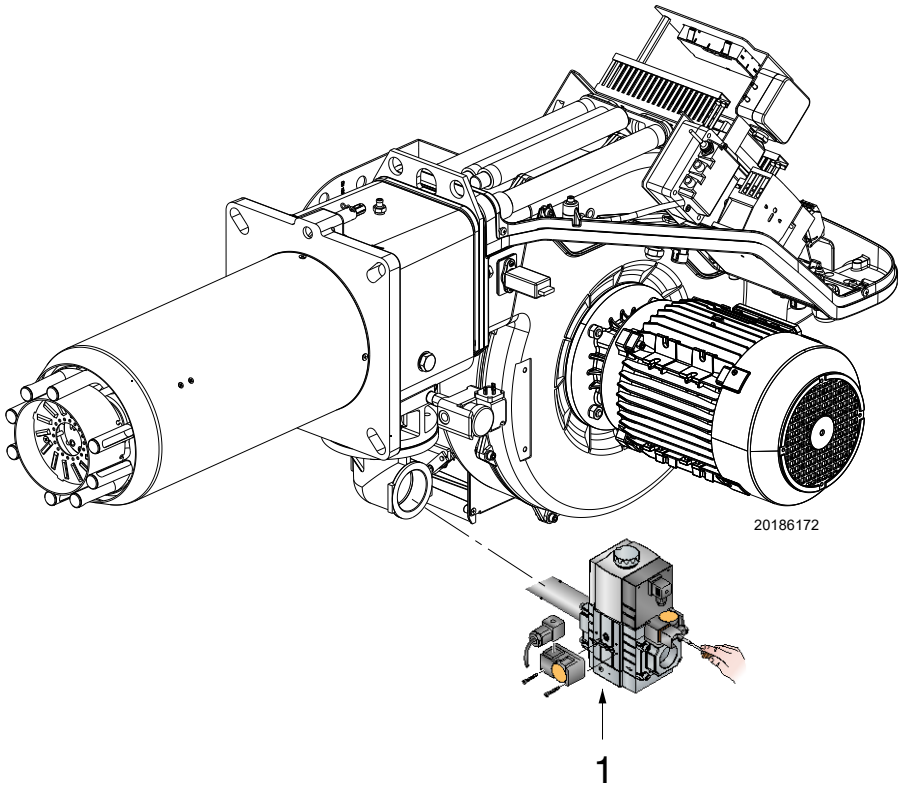


Fig. 28

5.3 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 4)(Fig. 6 on page 11) to position “**ON**”.

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

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. 29.

If this is not the case:

– place the switch 4)(Fig. 6 on page 11) in position “**OFF**” 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.

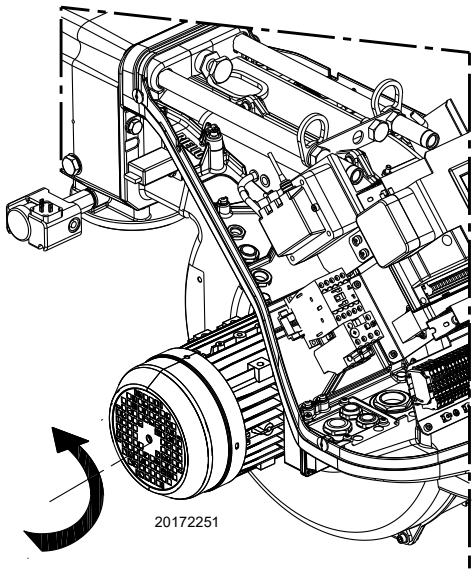


Fig. 29

5.4 Final calibration of the pressure switches

5.4.1 Air pressure switch

Adjust the air pressure switch (Fig. 30) 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. 30.
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. 30.

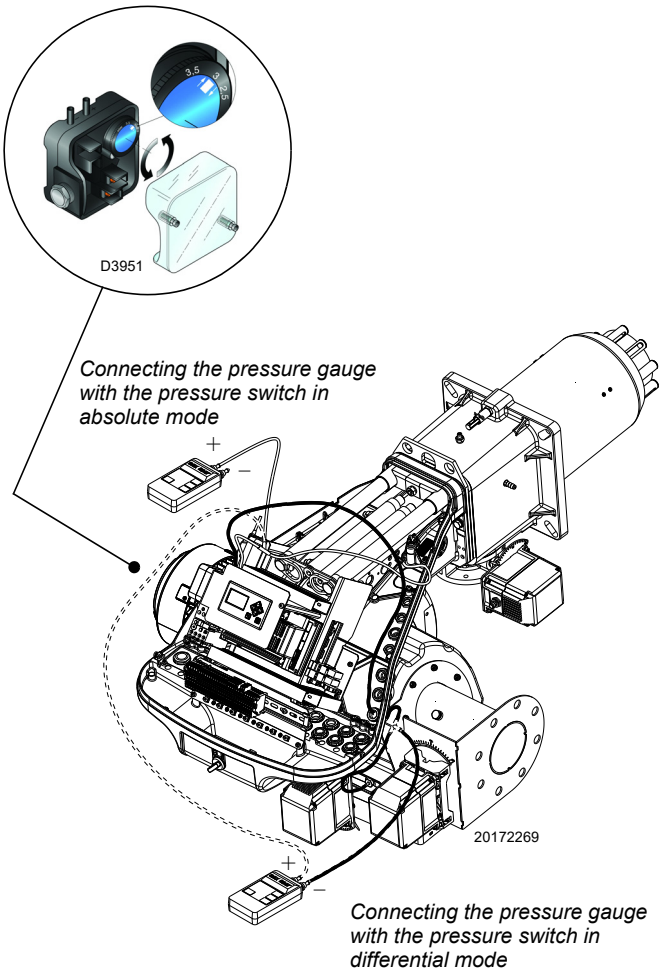


Fig. 30

5.4.2 Maximum gas pressure switch

Adjust the maximum gas pressure switch (Fig. 31) after making all other burner adjustments with the maximum gas pressure switch set to the end of the scale.

To calibrate the maximum gas pressure switch, open the tap and then connect a pressure gauge to its pressure test point.

The maximum gas pressure switch must be regulated to a value no higher than 30% of the measurement read on the gauge when the burner is working at maximum output.

After making the adjustment, remove the pressure gauge and close the tap.

5.4.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 32) after having performed all other burner adjustments with the pressure switch set to the start of the scale.

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

Then turn the knob anticlockwise by 0,2 kPa (2 mbar) and repeat the burner start-up to ensure it is regular.

If the burner locks out again, turn the knob anticlockwise again by 0,1 kPa (1 mbar).

WARNING

1 kPa = 10 mbar

5.4.4 PVP pressure switch kit

Adjust the pressure switch for the valve leak detection control device (PVP Kit)(Fig. 33), if present, according to the instructions supplied with the Kit itself.

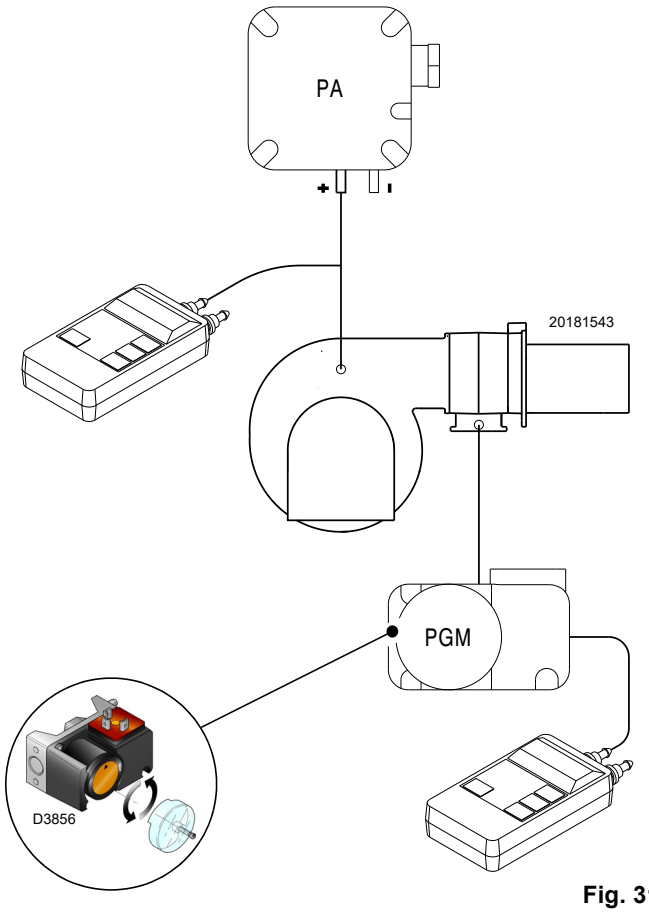


Fig. 31

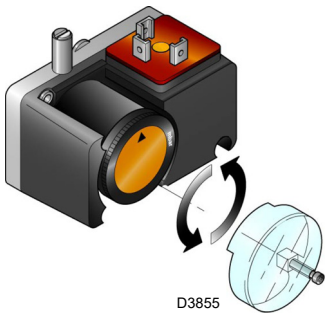


Fig. 32

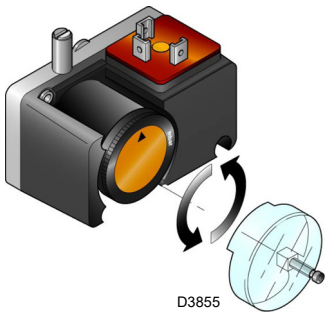
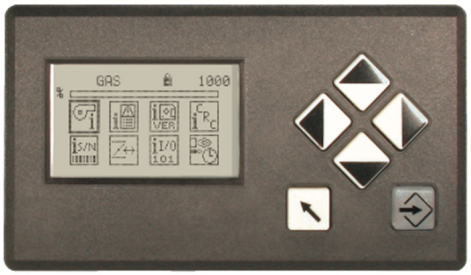


Fig. 33

6 E-display control

6.1 User interface UI300



S9620

Fig. 34

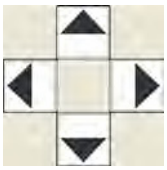
Display

The display guides the user through different menus with pictograms and it shows:
- menu structure
- operating statuses
- parameters
- error messages

Back key

Go back to the previous window

Cursor keys



Cursor keys are used to navigate inside the menu. Right arrow and left arrow keys are used to progressively move to the selected line. At the end of the selected line, the cursor goes to the lower line, if any.

In case of menus with several lines, it is possible to move to upper or lower lines by pressing the keys. As regards the screens with parameters, it is possible to move from one field to the other.

Enter key

With the Enter key it is possible to recall the menu in the boot screen. Therefore, it will be possible to open a selected sub-menu from a menu window. Using the Enter key in a parameter window, it is possible to transfer set values.

If the ENTER key lights up in red, it is possible to reset faults on BT330.

If the Enter key is steady red, a fault is displayed and an automatic restart is performed.

6.2 Menu features

The menu is divided into five paths:

INFO

MANUAL MODE

SETTINGS

DATA PROCESSING

INFO

By following the INFO path, it is possible to obtain information concerning:
- burner
- faults
- software version
- display of checksums
- serial number
- position of actuators (current position of valves for each duct)
- digital inputs/outputs

MANUAL MODE

MANUAL MODE should be used to:
- manually enable and disable the burner
- set the internal load

SETTINGS

By following the SETTINGS path it is possible to set the following items or obtain information about them:
- password
- burner settings (display and settings)
- settings of the actuators (display)
- adjustment of air/fuel
- delete a curve
- display settings

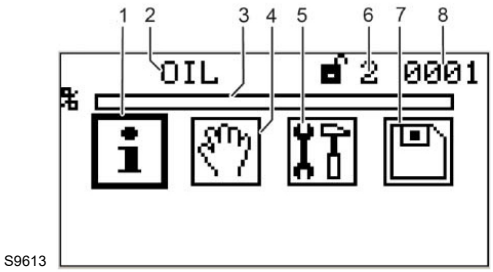
DATA PROCESSING (access level 1 required)

Use DATA PROCESSING to:
- make data backup from BT330 to user interface
- restore data from User Interface to BT330

6.3 Main menu

1 INFO menu path [selected]
2 Display of fuel used
3 Bar chart displaying the current performance of the burner (internal load) in % (0 - 100)
4 MANUAL MODE menu path
5 SETTINGS menu path
6 Access level 2
7 DATA PROCESSING menu path
8 Window number

Select a menu using cursor keys and confirm with ENTER .



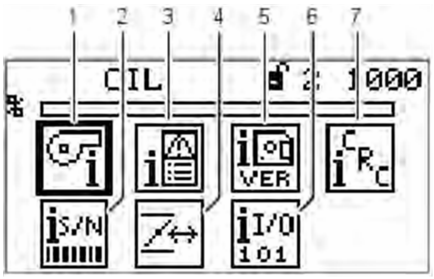
S9613

6.4 INFO menu path

INFO

Select path using cursor keys and confirm with ENTER .

The display shows the menu overview.



S9347

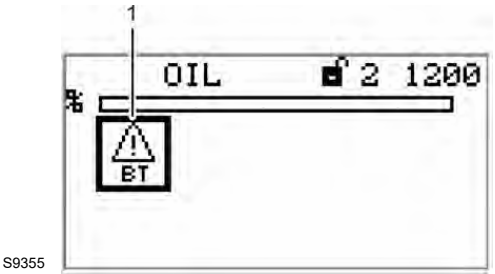
1 Information on the burner [selected]
2 Serial number
3 Fault history
4 Configuration of the actual value of adjustment outputs (display only)
5 Software version
6 Digital inputs/outputs
7 Checksum

6.4.1 Consulting the fault history

Displaying burner fault

Select menu using cursor keys and confirm with ENTER .

The display shows the Selection of fault history menu window.

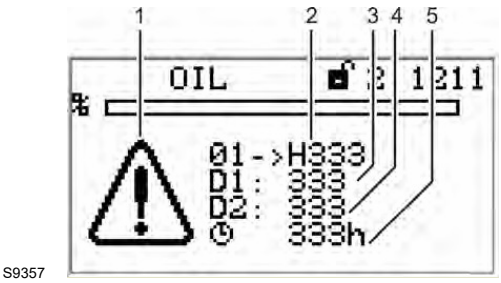


S9355

1 Burner fault pictogram [selected]

Select menu using keys and confirm with ENTER .

The display shows the Fault history menu window.



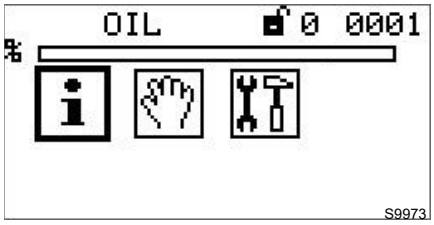
S9357

1 Fault code display pictogram
2 Fault code (the last 10 faults are stored) (the fault no. 01 is the most recent one)
3 Diagnosis code 1
4 Diagnosis code 2
5 Number of operating hours at the moment of the fault

NOTE:
fault and diagnosis codes can be found in paragraph “Faults - Probable causes - Solutions” on page 43.

6.5 Password access procedure

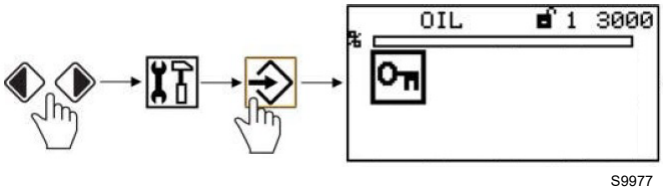
➤ The display shows the main screen.



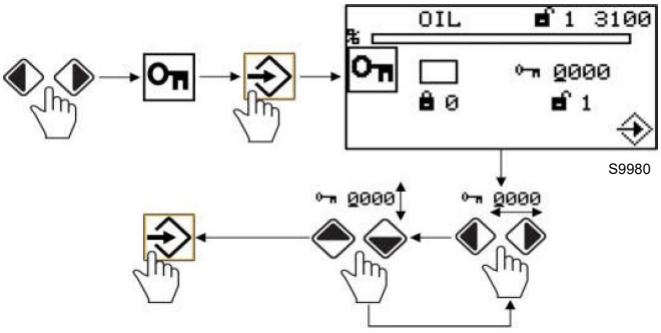
WARNING

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

➤ Select the **SETTINGS** menu.

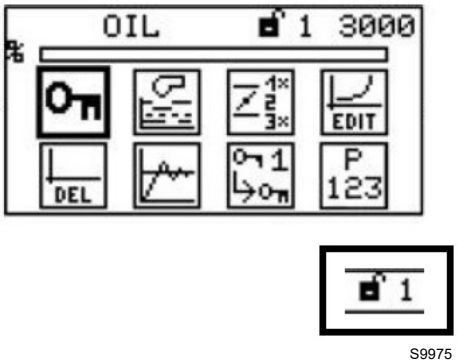


➤ Select the **PASSWORD** menu and enter the password.



The menu allows selecting other functions.

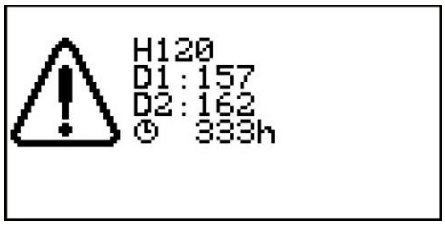
The number next to the key indicates the access level (0=user; 1=service; 2=OEM).



If it is not the desired level, repeat the procedure.

6.6 Unlock procedure

The burner is in lockout when the red light of **ENTER** button is on and the display shows the lockout code.



S9970

H120: Error code

D1: Diagnosis code 1

D2: Diagnosis code 2

Time when the error occurred.

Refer to paragraph **"Faults - Probable causes - Solutions"** on page 43 to identify the problem.

Release by pressing **"ENTER"** key.

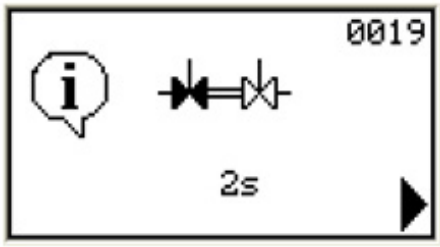
When the button is released, the lockout signal will disappear and the red pilot light will go out.

The control box is unlocked.

6.7 Start-up procedure

Make sure that the Operator Panel displays the heat demand and OFF: this means that it is necessary to set the burner modulation curve.

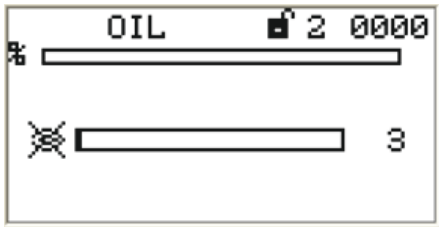
S9985



S9988

Access by referring to **"Password access procedure"** on page 31

➤ The display shows the burner status.

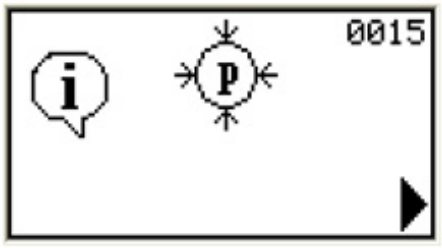


S9986

➤ Fan motor start.

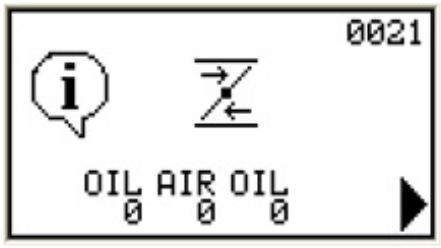
➤ The valve leak detection test is carried out.

➤ The air pressure switch test is carried out.



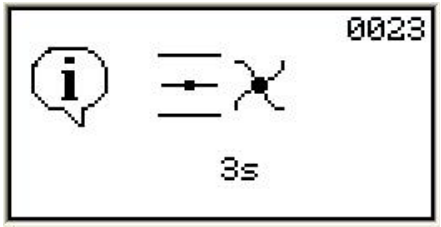
S9989

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



S9990

➤ Factory pre-set pre-purging time starts.



S9968

➤ Burner goes to ignition position.

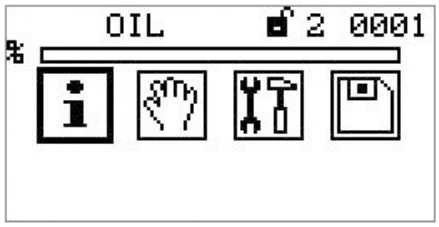
S9991

➤  The ignition step starts; spark lights up.

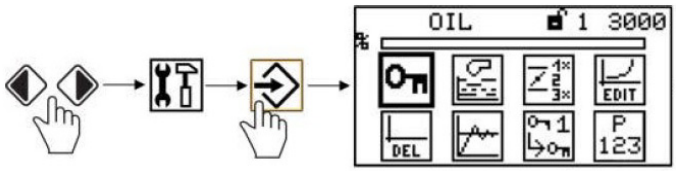
➤ The gas valves open (the safety time count starts).
➤ Verify if the flame is present through the special window and if combustion parameters are correct.
➤ If the control box locks out, the display shows the lockout code.

➤ Solve the problem, referring to paragraph **"Ignition failure"** on page 39.
To unlock, refer to **"Unlock procedure"** on page 32.
➤ After ignition, the burner goes to the minimum point.
Continue with the calibration of ignition point and modulation curve.

➤ Select the **SETTINGS** menu.

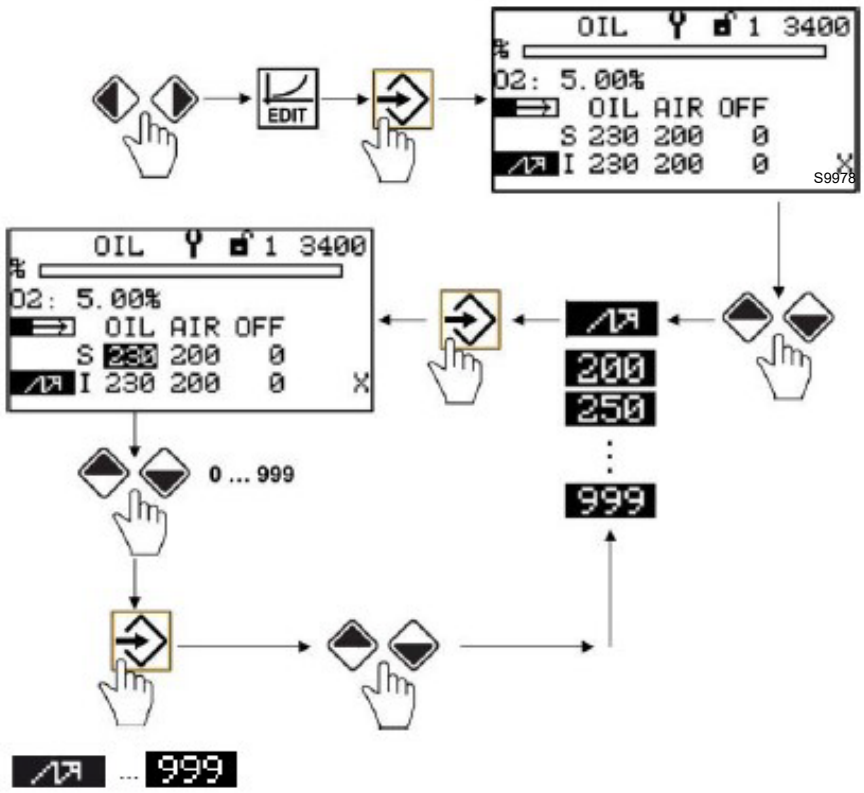


S9993



S9976

➤ Select the **EDIT** menu.



S9978

➤ Select the point to be edited.

Ignition point ... maximum loading point

Select the loading point using cursor keys ◆◆ and confirm with ENTER ⏎.

The duct 1 nominal value is selected and displayed inverted.

Adjust the current duct position using cursor keys ◆◆.

Go to the next duct using cursor keys ◆◆.

Adjust the actuator duct position at the selected loading point using cursor keys ◆◆.

6.7.1 Adjusting the servomotors

S = Nominal value of the channel
I = Actual value of the channel
X = Curve data for this point already available

Upon every change the actuators move to the new set position.

If present, to set channel 4 (VSD), the fan motor must be operating. The nominal value feedback curve of channel 4 must always rise.

➤ Confirm the point by pressing **ENTER**.

The purpose is to reach point "**999**" to adjust/set the maximum operating output.

This value can be modified to obtain the desired maximum operating output.

If the gas pressure is not sufficient, despite the maximum 90° opening of the gas servomotor, it is necessary to act on the gas valve stabiliser.

When adjusting each point, act on the air and gas servomotor, but do not modify the gas valve stabiliser position.

In the middle of the procedure (i.e. at points "**400**" or "**500**"), it is advisable to measure the gas flow and check that the output is about 50% of the maximum output.

If this is not the case, also act on the gas valve stabiliser: in this case, however, the settings of all the previously set points must be re-checked.

When the calibration of minimum point "**200**" is complete, exit the menu and return to the main screen.

At the end of the “Start-up procedure” it is necessary to proceed to execute a **“Backup”** which is necessary to store the parameters and data present in the control box inside the display.

This operation allows restoring the parameters and the modulation curve points in case of problems.

It is recommended to backup every time a parameter is edited!

For the procedure refer to paragraph **“Backup / Restore Procedure”** on page 36.

6.8 Backup / Restore Procedure

When the **"Start-up procedure"** on page 32 has been completed, make a backup, creating a copy of the data stored on the BT, in the UI display panel.

This will allow using data to program a new BT or going back to the stored settings of the same BT.

WARNING

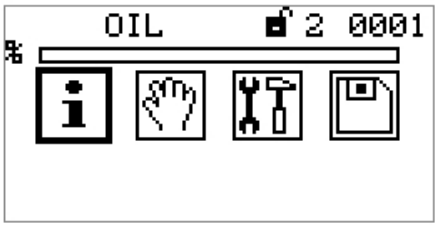
We suggest performing this operation at the end of each action involving cam setting editing.
This will allow to easily restore a new cam supplied as a spare part, without having to reprogram the system.

6.8.1 Backup

Proceed as follows to perform the backup procedure:

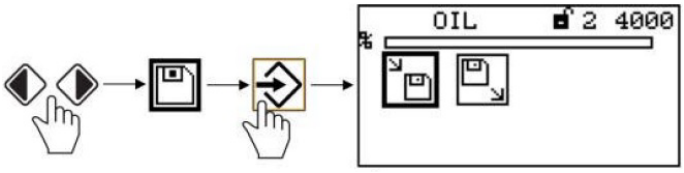
➤ access the Parameter Level by referring to **"Password access procedure"** on page 31.

➤ The display shows the screen.



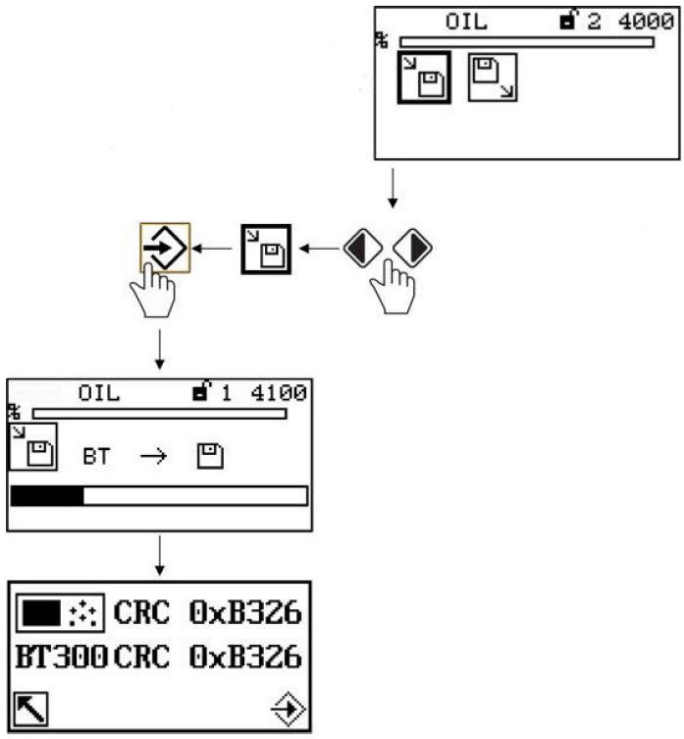
S9994

➤ Select the **Backup-restore** menu icon.



S9972

➤ Select the **Backup** icon.



S9969

➤ Press the **ENTER** key.

6.8.2 Restore

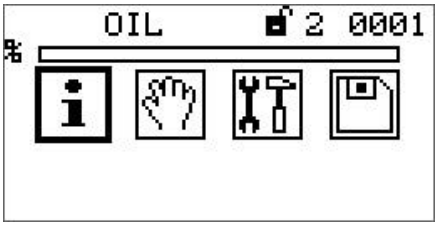
WARNING

Use this procedure when replacing the control box with a spare part code.
In this way it is possible to use the already stored default parameters or those stored during start-up.

Proceed as follows to perform the restore procedure:

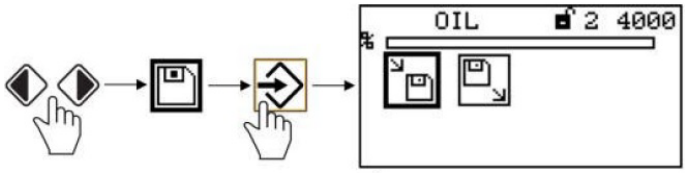
➤ access the Parameter Level by referring to **"Password access procedure"** on page 31.

➤ The display shows the screen.



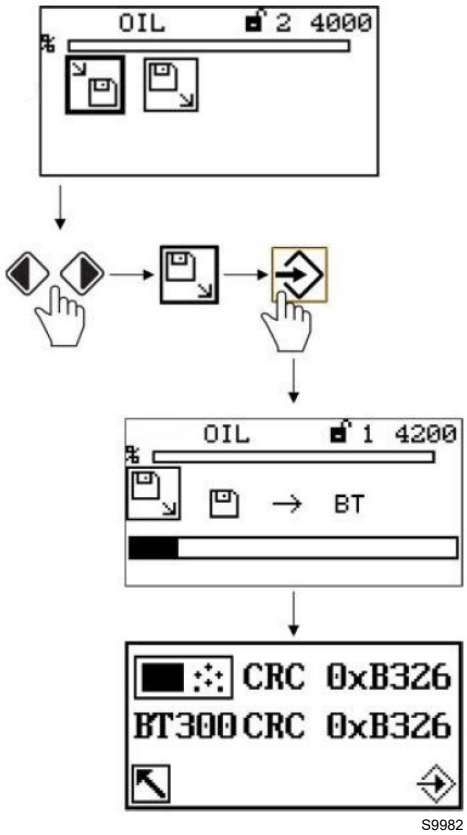
S9974

➤ Select the **Backup-restore** menu icon.



S9972

➤ Select the **Restore** icon.



S9982

➤ Press the **ENTER** key.

6.9 Commissioning of flue gas recirculation system

The purpose of the flue gas recirculation function is to reduce the amount of NOx contained in the flue gas. For this purpose, part of the flue gas is fed back into the combustion chamber, resulting in a temperature drop.

The amount of recirculated flue gas is set via channel 3 of the actuator.


WARNING

During adjustment, bear in mind that excessive amounts of recirculated flue gas can cause the flame to rise above the burner head (flame stability limit).

NOTE:

Reducing the maximum burner output

The use of the flue gas recirculation (FGR) function or the introduction of the flue gas mass into the supply air duct could reduce the maximum burner output.

This means that the maximum amount of combustion air that can be supplied will be reduced.

Therefore it is necessary to reduce the amount of fuel for high-speed operation to ensure correct combustion values.

The control box supports the flue gas recirculation (FGR) function, without temperature compensation.

With these operating principles, the positions of channel 3 of FGR actuator can only vary between CLOSED (ignition position) and the positions on the ratio control curves.

First configuration

Commissioning of the system without influence from flue gas recirculation.

This allows adjusting the fuel/air ratio control system as if it were operating without flue gas recirculation.

When the settings for fuel/air ratio control curves without flue gas recirculation have been completed, it is possible to move to the settings with a channel 3 of FGR actuator.

Since this may affect the combustion settings, the fuel and air adjustment actuators may need to be readjusted.

First FGR configuration

Channel 3 of the FGR actuator is kept in the ON position until an adjustable time is reached.

During operation, check the temperature value of flue gas recirculation (FGR). It must be equal to 100-130 °C to reduce condensate in the burner or in the intake duct.

Configuration of FGR operation

Channel 3 of the FGR actuator is kept in the ON position until an adjustable delay time is reached.

When starting the flue gas recirculation (FGR) for the first time, we recommend setting the FGR delay time of the control box. Use a value between 5 and 15 minutes.

Make sure that the flue gas temperature reaches the value within the set time.

If necessary, the FGR temperature of the control box can be adjusted with a start value.
In this case, an LCM regulator kit and the FGR probe kit must be installed.

– Factory setting time (default): 300 sec.
– FGR default temperature: 50° C


WARNING

Check the air temperature when the flame sensor is fitted. If the temperature exceeds 50-60°C, the flame sensor could be damaged.

During burner operation with flue gas recirculation, a high temperature may be reached.

6.10 Steady state operation

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

➤ If the temperature or the pressure is low, the burner progressively increases the output up to the MAX value.
➤ If then the temperature or the pressure increases, the burner progressively lowers the output to the MIN value. And so on.
➤ The burner stops when the heat request is less than the heat supplied by the burner at MIN output.
➤ The thermostat/pressure switch TL opens, the control box carries out the switching off phase.
➤ The air damper closes completely to reduce heat losses to a minimum.

6.11 Ignition failure

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

In this case increase gas ignition flow rate.

WARNING

In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row.

If the burner locks out for a third time, contact the customer service.

DANGER

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

6.12 Burner flame goes out during operation

If the flame should accidentally go out during operation, the control box will lock out.

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;
- ➤ using the switch “**OFF-ON**” 4)(Fig. 6 on page 11).

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 knob to the maximum end of scale position		The burner must stop in lockout
➤ Turn off the burner and cut off the power ➤ Disconnect the minimum gas pressure switch connector		The burner must not start
➤ Obscure the flame sensor		The burner must stop in lockout due to ignition failure

Tab. M

WARNING

Make sure that the mechanical locking systems on the 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 feeding closed

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

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

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

The starting cycle should occur with the following phases:

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

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

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

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

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

Combustion
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.

Make sure that the gas outlet holes for the start-up, on the combustion head distributor, are free of dirt or rust deposits.
If in doubt, disassemble the elbow (Fig. 38 on page 42).

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.

Clean UV sensor

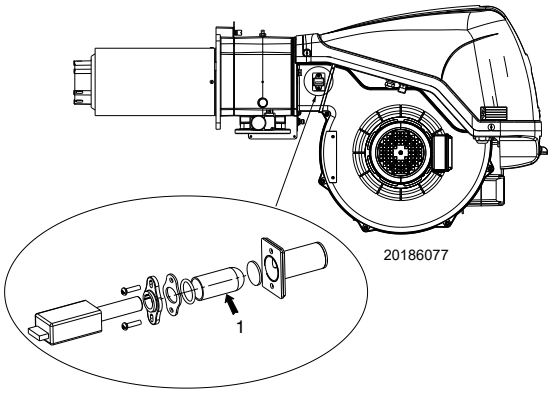


Fig. 35

Periodically clean the bulb to ensure correct operation of the UV sensor.

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.

Flame inspection window
Clean the glass of the flame inspection window.

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

Tab. N

Gaskets
It is advisable to replace at each opening the following seals:
1 - gasket between shell and motor
2 - gasket between shell and fairing
3 - gaskets between casing and pipe coupling
4 - gasket between pipe coupling and front piece

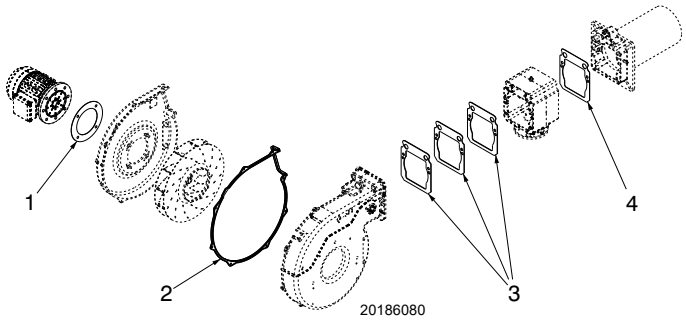


Fig. 36

7.2.4 Checking the air and gas pressure on the combustion head

To carry out this operation a pressure gauge must be used to measure the air and gas pressure at the combustion head, as shown in Fig. 37.

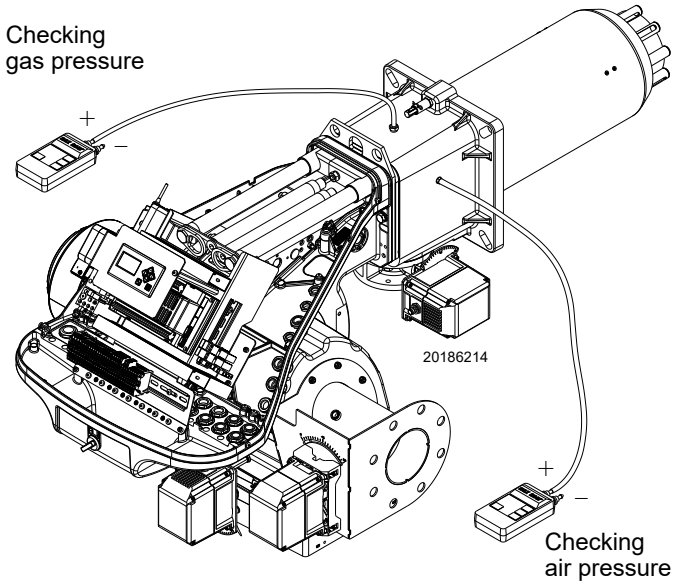


Fig. 37

7.2.5 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. O

7.3 Opening the burner

DANGER

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

DANGER

Close the fuel interception tap.

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

- ➤ Loosen the 4 screws 1)(Fig. 38) and remove the hood 2).
- ➤ Assemble the two extensions supplied on the guides 4).
- ➤ Disconnect the plug 7).
- ➤ Disconnect the socket of the maximum gas pressure switch.
- ➤ Remove the screws 3) and pull back the burner on the guides 4) by about 100 mm.
- ➤ Disconnect the cable of the electrode, then pull the burner back completely.
- ➤ At this point it is possible to extract the inner part 5) after having removed the screw 6).

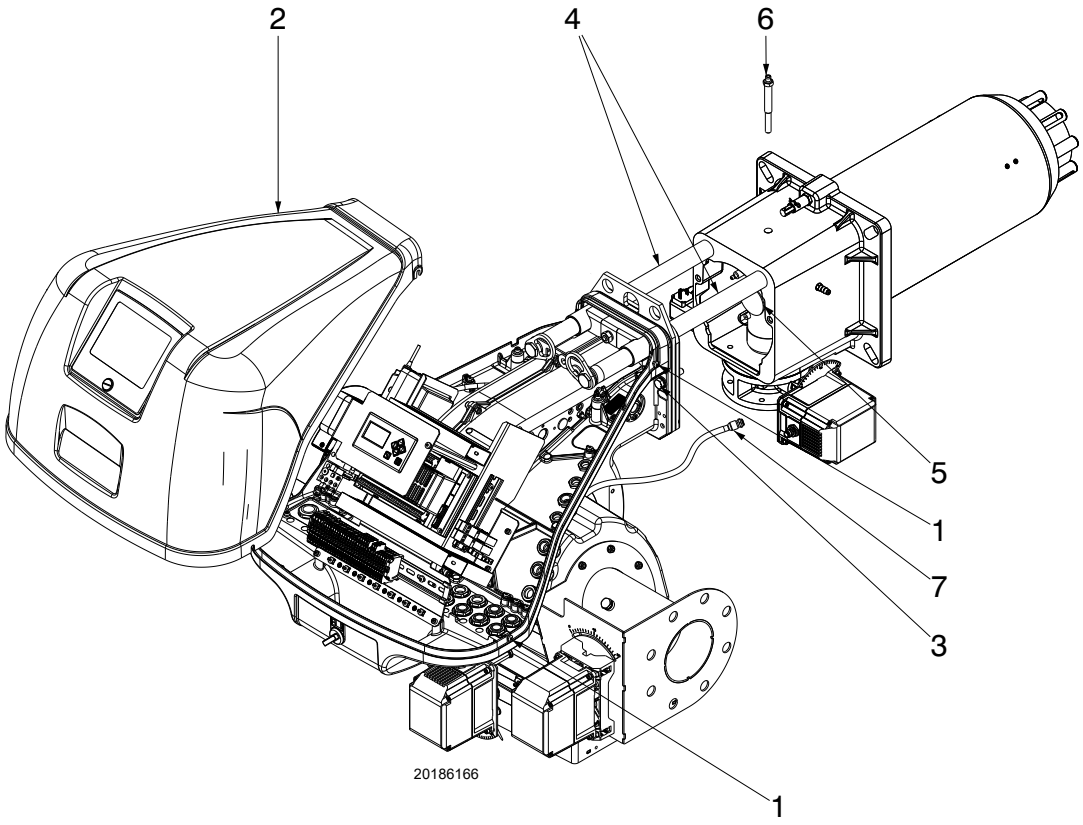


Fig. 38

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 7).
- ➤ Connect the socket of the maximum gas pressure switch.
- ➤ Replace the screws 3) and carefully pull the electrode cable outwards until they are slightly taut.
- ➤ Disassemble the two extensions from the guides 4).

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 the lockout code.

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

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.

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 List of fault codes

Fault code	TRD P301=0 P328>0	EN67 P301=2 P328>0	Description	D1	D2
0	0	0	Unknown fault (internal error)		
1	0	3	Flame fault		
2	0	0	Parasitic light detected		
3	0	3	General flame failure during ignition		
4	1	1	Flame blow-off during operation		
5	0	3	Flame signal does not appear during the first safety time		
6	0	3	Flame signal extinguishes during stabilization time		
7	0	3	Flame signal does not appear during first safety time		
8	0	0	Flame signal does not appear at the end of the second safety time		
9	0	0	Flame signal does not appear during the first safety time		
10	0	0	Flame signal does not appear at the end of the first safety time		
11	0	0	Monitoring for parasitic light does not last the required 5 seconds		
13	1	0	Flame signal appears during ignition (pilot burner)		
103	0	0	Miscellaneous data invalid		
105	Unlimited	0	Curve data are invalid or not available	Curve set / Fuel number	
106	0	0	Difference in parameter value between HP and UP.	Parameter No.	
			Possible cause of error: You have uploaded a normal data set (unprotected) and an error occurred during the data transfer. The dataset was not save correctly.		
107	0	0	Configuration is not valid; contact the Aftersales Service		
120	1	1	Different operation modes on both controllers		
121	0	0	Correction is out of range.	Channel	
141	0	0	Variation of speed feedback is to big.	Channel	
			Parameter set is based on an old, invalid factory setting. Update the factory setting of the BT300.		
151	Unlimited	3	Recirculation damper is still OPEN 240 s after recirculation release is OFF.	Channel	
170	0	0	Short circuit of LDR flame detector		
191	1	1	First monitoring band exceeded for too long: channel	Channel	
201	1	1	First monitoring band fall short for too long: channel	Channel	
211	0	0	Second monitoring band exceeded for too long: channel	Channel	
221	0	0	Second monitoring band fall short for too long: channel	Channel	
231	Unlimited	3	Fuel/air ratio control is blocked: channel	Channel	

Fault code	TRD P301=0 P328>0	EN67 P301=2 P328>0	Description	D1	D2
241	0	0	Actuator does not move, i.e. no position feedback.	Channel	Direction: P 2 = backward, forward
			If this indication is shown, the monitoring of fault 271 is damaged.		
251	0	0	Actuator cannot find reference position	Channel	
			Direction: 0 backward 1 forward Check the flap's smooth-running to reference position.		
261	Unlimited	3	Actuator returns invalid position (difference to target position too large)	Channel	
271	Unlimited	3	Actuator feedback remains constantly for too long, even when actuator has moved	Channel	
281	1	1	Feedback signal of at least 1 actuator is incorrect	Channel	
			To identify the actuator's direction of rotation two pulse form signals, offset 90 degrees, are returned by the actuator. If fault 281 occurs, these signals are not identified correctly. Cause of error: – back lash – actuator 0,8 Nm: external torque clockwise >0.2 Nm – actuator 9 Nm: external torque clockwise >1 Nm		
291	Optional	3	Actuator does not reach the final position, because of mixed- up detection.	Channel	
			Actuators are mixed up while reconnecting. The test for recognising this fault is described in the manual of the BT300 - print no. DLT1201. At least one actuator does not reach it's test position: – 2 actuators are mixed up – another problem inhibits the actuator to reach it's test position		
320	1	1	Open broken wire at firing rate input		
321	1	1	Open broken wire at feedback channel: channel	Channel	
351	1	1	Invalid fuel change while burner is running		
352	Optional	3	Invalid combination of fuel signals (no signals)		
353	Optional	3	Invalid combination of fuel signals (several signals)		
360	0	0	Air deficiency causes a fault shut-down by O_2 trim.		
362	0	0	Fault shut-down due to a missing burner maintenance		
363	1	1	Smallest valid O_2 value decided		
371	0	0	Output for internal firing rate is defective		
372	0	0	Difference of the burner firing rate values between main processor and watchdog processor is too large		
381	0	0	Deviation between main processor and watchdog controller is too large	Correction channel	
391	0	0	Curve set has changed during programming		
393	0	0	Emergency shut-down activated		
394	0	0	Burner ON/OFF signal from the user interface turned off unexpectedly		
451	1	1	Being operating mode for ignition not all channels are in ignition position	Channel	
600	0	0	Program monitoring time (FAT) exceeded	Indication number	
601	0	0	Failure during leakage test: gas pressure still active		
602	0	0	Failure during leakage test: no gas pressure detected		
603	0	0	Manual venting of the gas line required		
606	0	0	CPI/POC signal in unexpected state		

Fault code	TRD P301=0 P328>0	EN67 P301=2 P328>0	Description	D1	D2
608	1 *1)	1 *1)	Invalid drop of the boiler safety interlock chain		
609	1 *1)	1 *1)	Invalid drop of the gas safety interlock chain		
610	Optional *1)	3 *1)	Invalid drop of the oil safety interlock chain		
611	Optional	3	Gas pressure too low		
613	0	0	Air pressure signal is missing		
617	1	1	Flame signal extinguishes during operation		
624	Optional	3	Oil pressure too low		
711	0	0	Invalid change of the operation mode		
713	0	0	Invalid signal combination in operating mode BURNER OFF		
714	0	0	Invalid signal combination in operating mode BURNER READY		
715	0	0	Invalid signal combination in operating mode PRE-PURGE		
716	0	0	Invalid signal combination in operating mode IGNITION POSITION		
717	0	0	Invalid signal combination in operating mode IGNITION		
719	0	0	Fuel valves are open for too long without a flame		
720	0	0	Ignition transformer activated too long		
721	0	0	Ignition valve openes for too long		
722	0	0	Fuel valves open in maintenance mode		
723	0	0	Ignition process needs too much time		
724	0	0	Gas valve open with fuel oil		
725	0	0	Oil valves are open while gas is selected		
727	0	0	Main gas 1 opens unexpectedly		
728	0	0	All three gas valves open for too long		
729	0	0	Ignition process lasts for too long (without pilot burner)		
730	0	0	Maintenance mode without pilot burner		
731	0	0	Ignition valve opens without pilot burner		
732	0	0	Invalid signal combination at input terminals during operation		
734	0	0	Pre-ventilation period not respected		
739	0	0	Leakage test: main gas valve 2 opens for too long		
740	0	0	Leakage test: main gas valve 1 leaky		
741	0	0	Leakage test: main gas valve 1 opens for too long		
742	0	0	Leakage test: main gas valve 2 leaky		
743	0	0	Flame monitoring: flame burns for too long after shutdown		
745	0	0	Program monitoring time exceeded		
746	0	0	Solenoid valve cannot be switched off		
747	0	0	Leakage test: Venting into the burner is not allowed		
759	0	0	BT300 leaves SETTING mode automatically after 24 hours		
763	0	0	Different curve selection on main processor and watchdog processor		
764	1	1	CO-controller - internal curve set failure	Curve set	
800	0	0	Parameter defective	Parameter No.	
801	0	0	Channel control mode is inconsistent between main processor and watchdog processor (fatal error, no automatic restart possible)	Channel	
802	1	1	Integration of a channel into the fuel/air ratio control takes too long (only one automatic restart possible)	Channel	
803	0	0	Channel is out of 1st monitoring band for too long	Channel	
804	0	0	Channel mode of the fuel/air ratio control does not match to the activation type	Channel	
805	0	0	Directly controlled channel runs to an invalid position, i.e. a channel that is not deactivated or controlled by fuel/air ratio control	Channel + set point position	

Fault code	TRD P301=0 P328>0	EN67 P301=2 P328>0	Description	D1	D2
806	0	0	Implausible channel set point of the main controller	Channel + set point position + actual value + programming tolerance	
807	1	1	Time out of LSB message (message no. = parameter)		
			Possible cause of error: – connection between VSM/LCM GND and protective earth PE – acknowledgment of speed change too fast / fault of VSM – error at LSB (red LED flashes or is permanently ON)		
889	0	0	The gap between two remote fault releases is too short		
			EN 14459 allows only 4 remote fault resets every 15 min. Fault release is monitored by remote control software, LAMTEC SYSTEM BUS and field bus. Exceeding the number of fault releases causes the fault shot-down H889 and further remote fault releases are ignored. After a delay time another remote fault release is possible. The fault shut-down H889 also occurs, if fault release is sent without any reason. A reset by terminal is always possible. How to reset this fault: – wait for 15 minutes until you try to reset the fault again – cut off the power supply from BT300 for a moment, reconnect it and reset the fault subsequently.		
921	0	0	Relay driver self-test: output oil valve defect		
922	0	0	Relay driver self-test: output ignition transformer defect		
923	0	0	Relay driver self-test: output gas valve 1 defect		
924	0	0	Relay driver self-test: output gas valve 2 defect		
925	0	0	Relay driver self-test: output ignition transformer defect		
928	0	0	Relay driver self-test: output terminal 41 for oil pump defective		
929	0	0	Relay driver self-test: output fan defect		
985	0	0	VSM diagnosis error		
			Possible cause of error: BurnerTronic expects a VSM module but the exchange of diagnosis data with the module fails		
986	0	0	Dynamic range test recognizes an invalid feedback	Channel	Actual value
987	0	0	Change-over during staged operation takes too much time		
988	0	0	Fuel selection relay in the DFM is defective or inconsistent feedback from DFM		
989	0	0	Plausibility test of actuator feedback in programmed curve failed		
990	Optional *1)	3	Power failure		
996	0	0	Secure parameter writing could not be finished. Device is blocked		
999			Contact the Aftersales Service		

Tab. P

*1) The system will be restarted not before the condition of the fault is eliminated (i.e. the dropped safety interlock chain (SIC) or the low voltage).

A Appendix - Accessories

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.

Parameter to be checked		Probe		LCM100 Regulator Kit	
	Adjustment field	Type	Code	Type	Code
Temperature	- 100 ÷ 500° C	PT 100	3010110	LCM100	20174135
Pressure	0 ÷ 2,5 bar	4 ÷ 20 mA	3010213		
	0 ÷ 16 bar	4 ÷ 20 mA	3010214		
	0 ÷ 25 bar	4 ÷ 20 mA	3090873		

Gas flange DN80 kit

Burner	Code
RS 200/E FGR	3010439

Software interface kit

Burner	Code
RS 200/E FGR	20130843

O2 - CO control kit

Burner	Code
RS 200/E FGR	20101753

O2 - CO control kit high efficiency

Burner	Code
RS 200/E FGR	20125127

Kit probe FGR*

Burner	Code
RS 200/E FGR	20173754

* For its use, it requires the LCM100 regulator kit.

Gas trains in compliance with EN 676

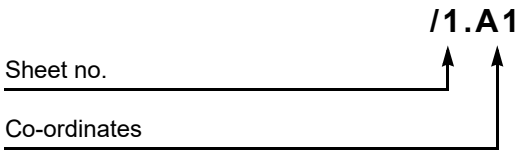
Please refer to manual.

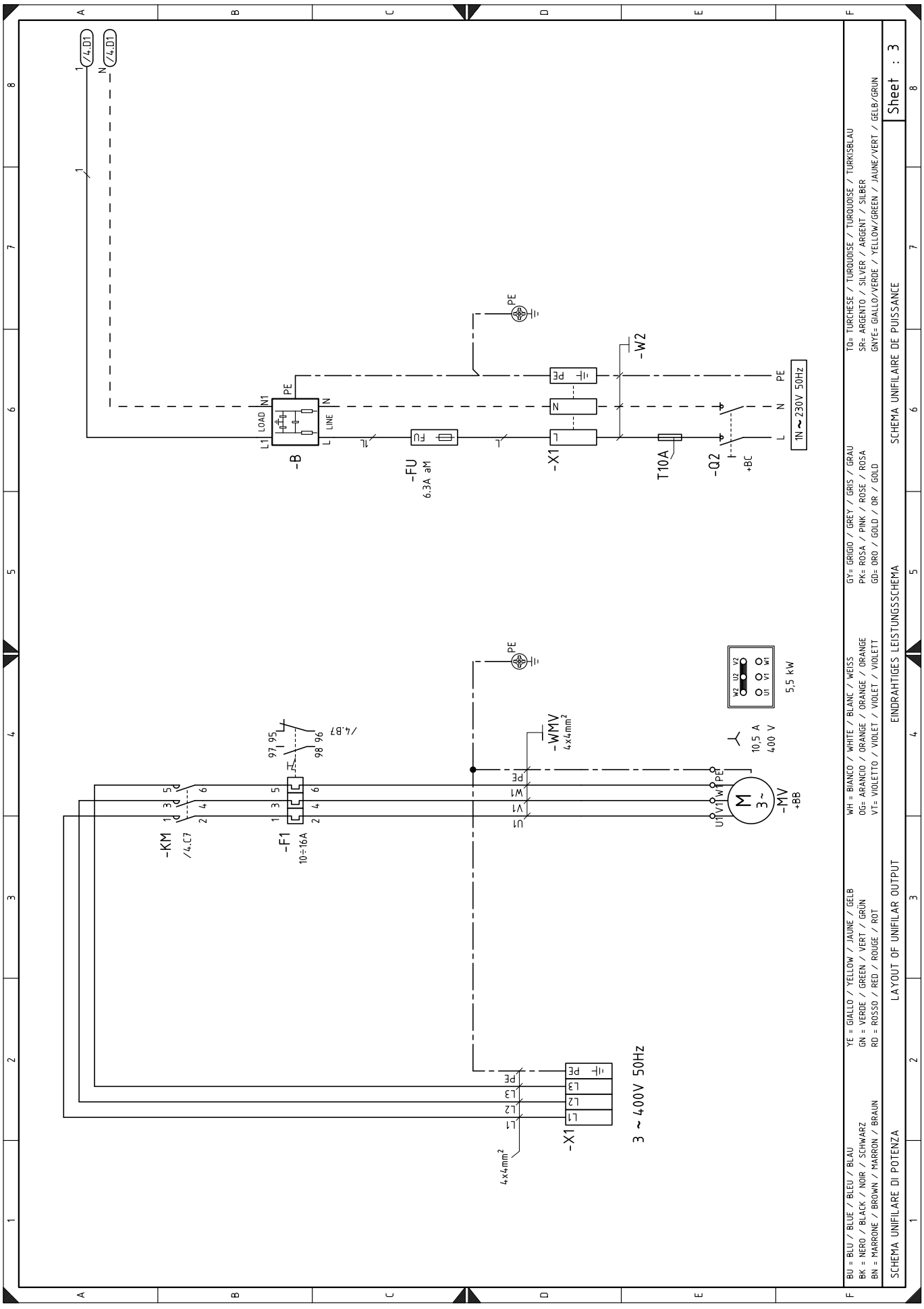
WARNING

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

B Appendix - Electrical panel layout

2 Indication of references

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LAYOUT OF UNIFILAR OUTPUT
EINDRAHTIGES LEISTUNGSSCHEMA
SCHEMA UNIFILAIRE DE PUISSANCE
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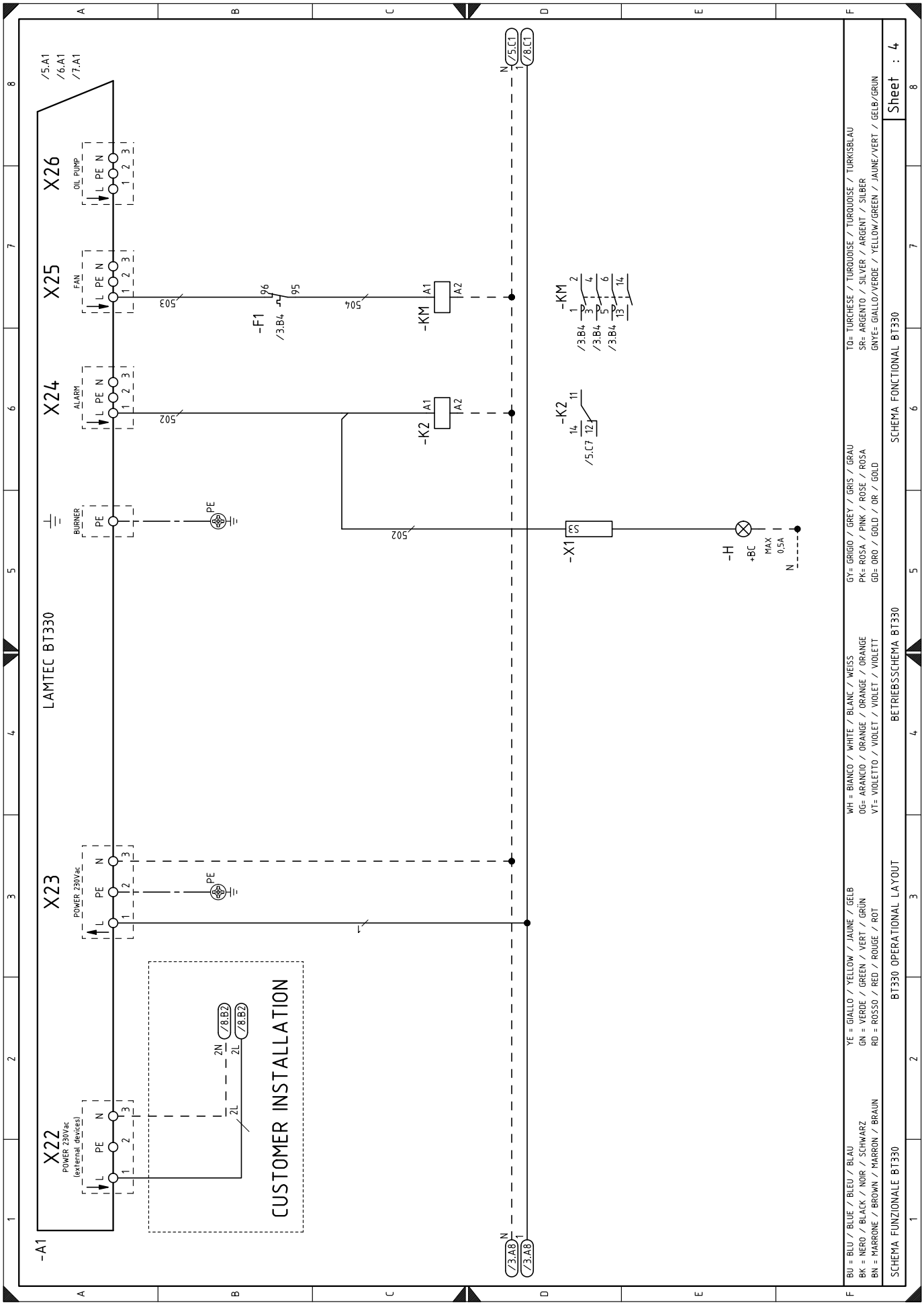
BK = NERO / BLACK / NOIR / SCHWARZ
BN = MARRONE / BROWN / MARRON / BRAUN
YE = GIALLO / YELLOW / JAUNE / GELB
GN = VERDE / GREEN / VERT / GRÜN
RD = ROSSO / RED / ROUGE / ROT
WH = BIANCO / WHITE / BLANC / WEISS
OG= ARANCIO / ORANGE / ORANGE / ORANGE
VT= VIOLETTO / VIOLET / VIOLET / VIOLETT
GY= GRIGIO / 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
-B
-FU
6.3A aM
-X1
-W2
T10A
-Q2
+BC
1N ~ 230V 50Hz
-KM
/4.C7
-F1
10÷16A
/4.B7
-WMV
4x4mm²
-MV
+BB
10,5 A
400 V
5,5 kW
3 ~ 400V 50Hz
4x4mm²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POWER 230Vac
(external devices)
X23
POWER 230Vac
X24
ALARM
X25
FAN
X26
OIL PUMP
BURNER
CUSTOMER INSTALLATION
-F1
-KM
-K2
-X1
-H
+BC
MAX
0,5A
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GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
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BT330 OPERATIONAL LAYOUT
BETRIEBSSCHEMA BT330
SCHEMA FONCTIONAL BT330
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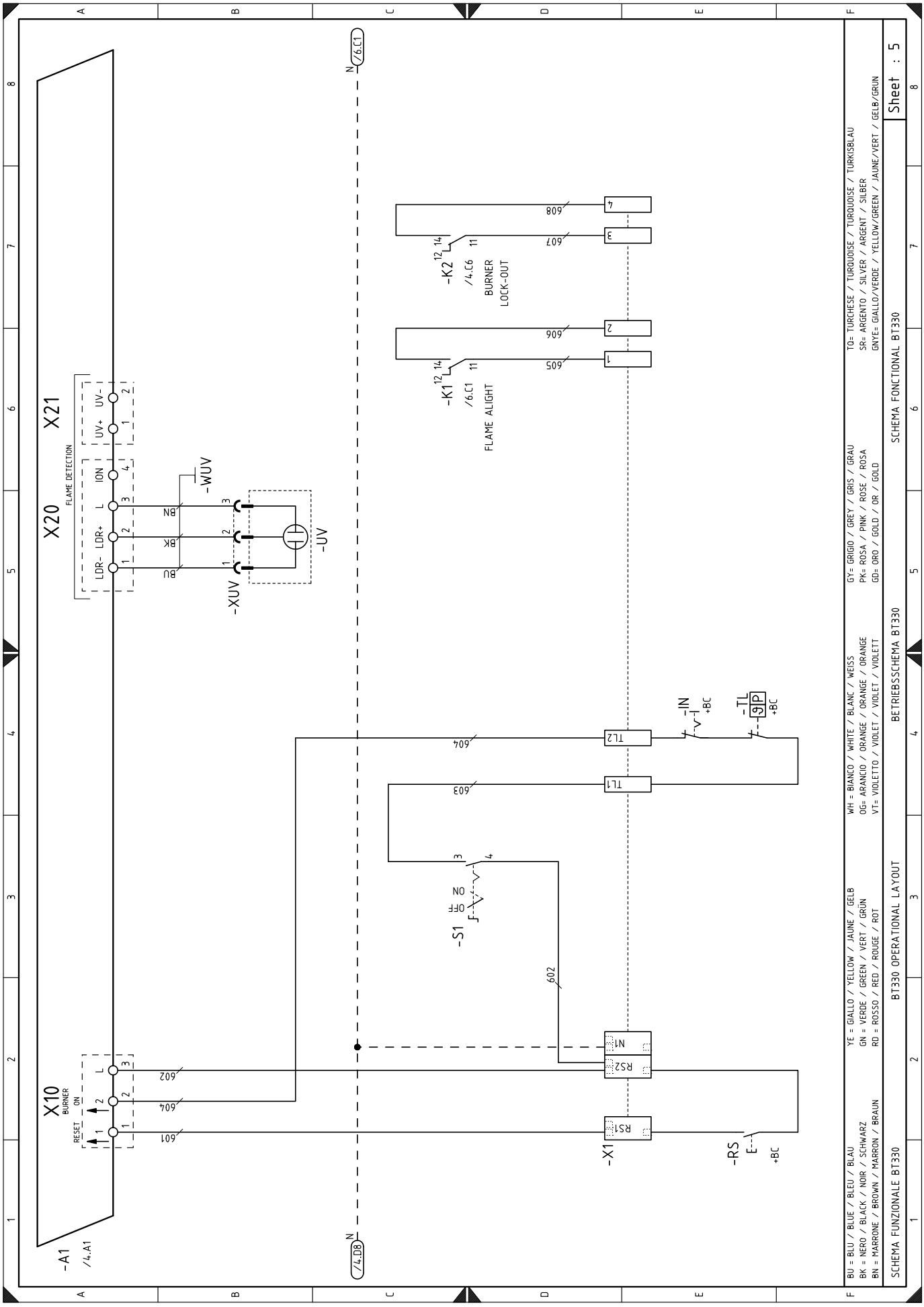
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SR= ARGENTO / SILVER / ARGENT / SILBER
GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN
-A1
/4.A1
X10
BURNER
RESET
ON
X20
X21
FLAME DETECTION
LDR- LDR+ L ION UV+ UV-
-WUV
-XUV
-UV
-K1
/6.C1
FLAME ALIGHT
-K2
/4.C6
BURNER
LOCK-OUT
-S1
ON
OFF
-IN
-TL
-X1
-RS
N1
R52
R51
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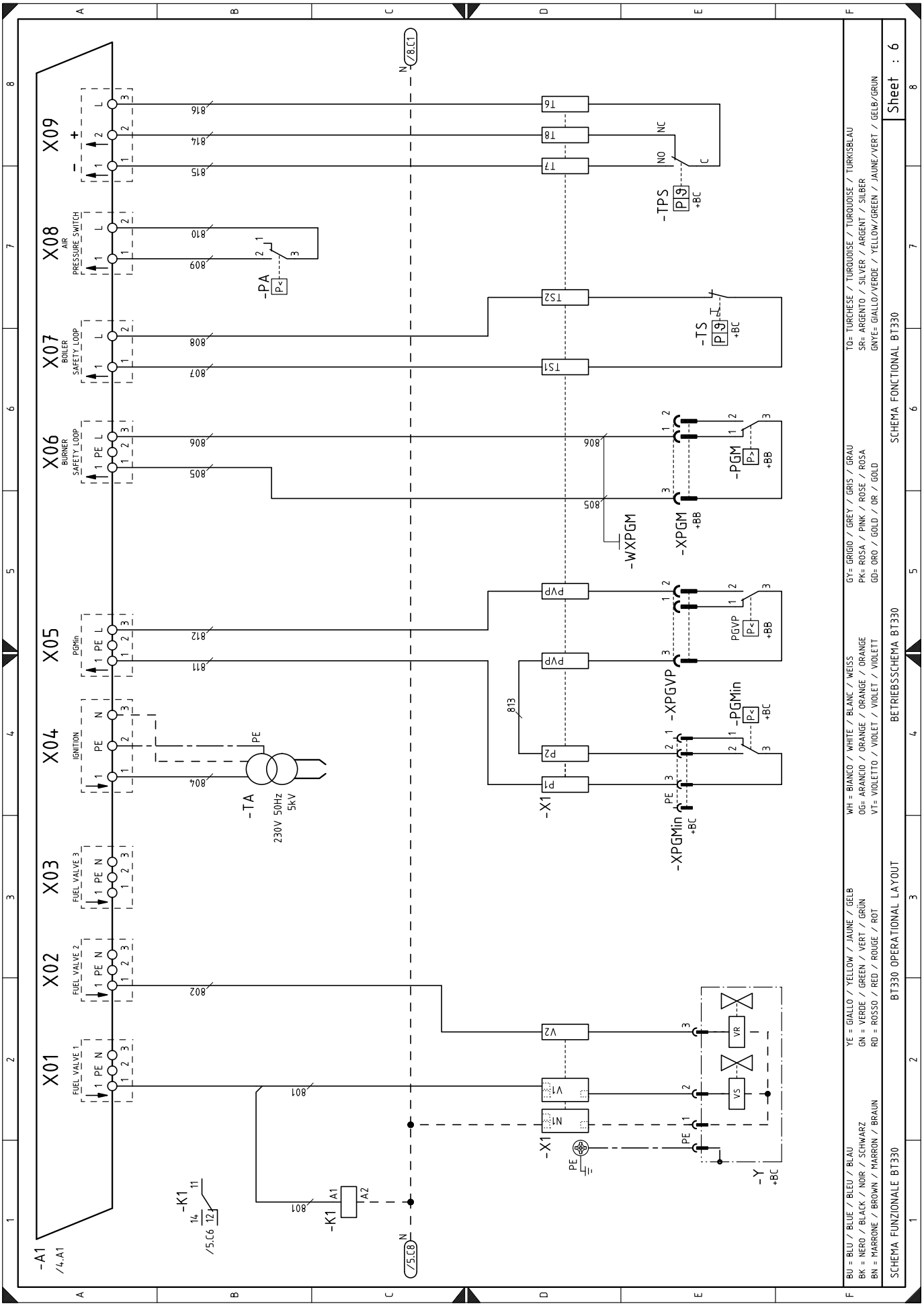
/6.C1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X04
X05
X06
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FUEL_VALVE_2
FUEL_VALVE_3
IGNITION
PGMin
BURNER SAFETY_LOOP
BOILER SAFETY_LOOP
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/5.C8
/8.C1
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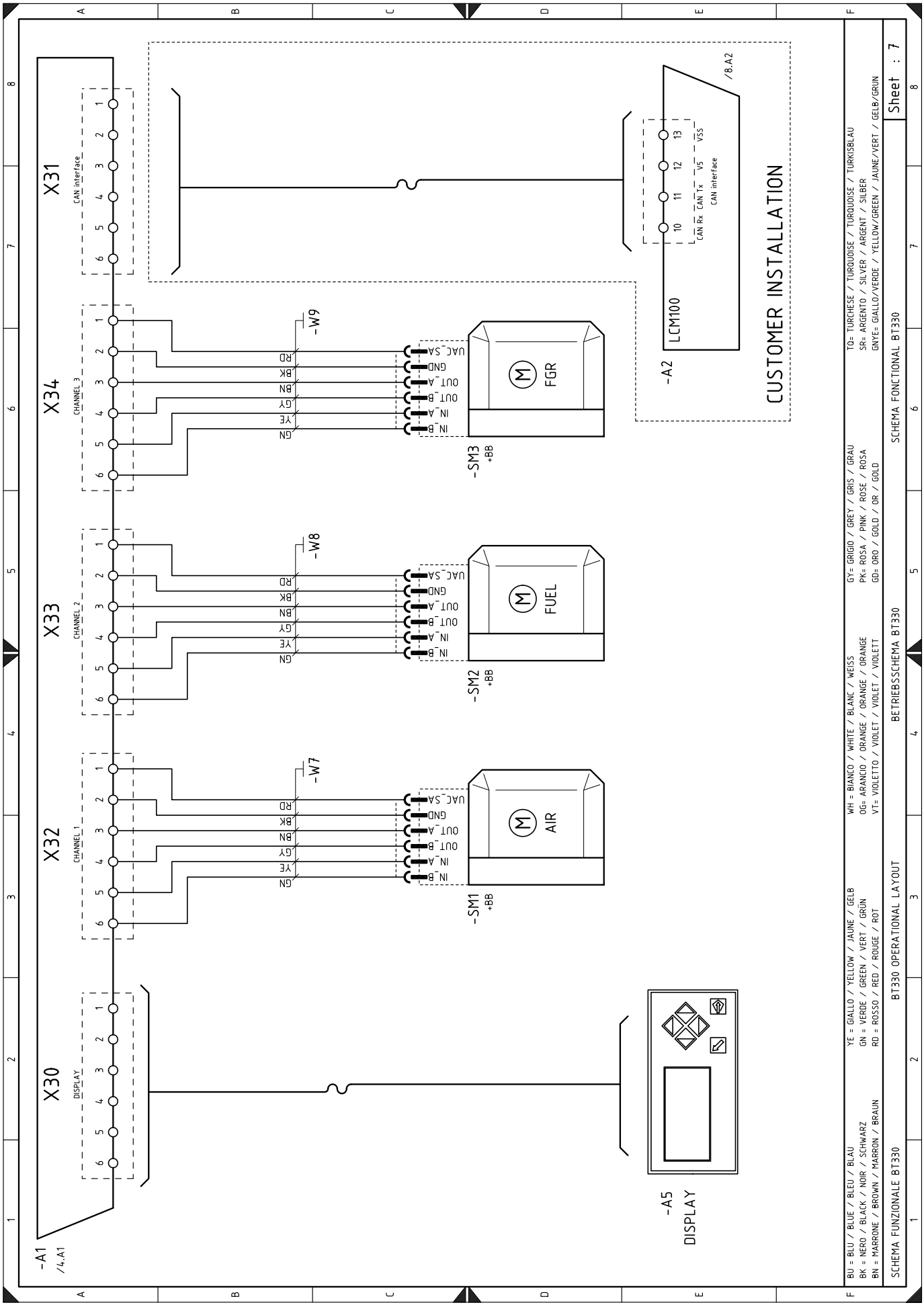
+BB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DISPLAY
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CAN interface
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CHANNEL 1
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CHANNEL 2
X34
CHANNEL 3
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/4.A1
-A5
DISPLAY
-A2
LCM100
CAN Rx CAN Tx V5 VSS
CAN interface
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CUSTOMER INSTALLATION
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-W9
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+BB
AIR
-SM2
+BB
FUEL
-SM3
+BB
FGR
IN_B
IN_A
OUT_B
OUT_A
GND
VAC_SA
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RD
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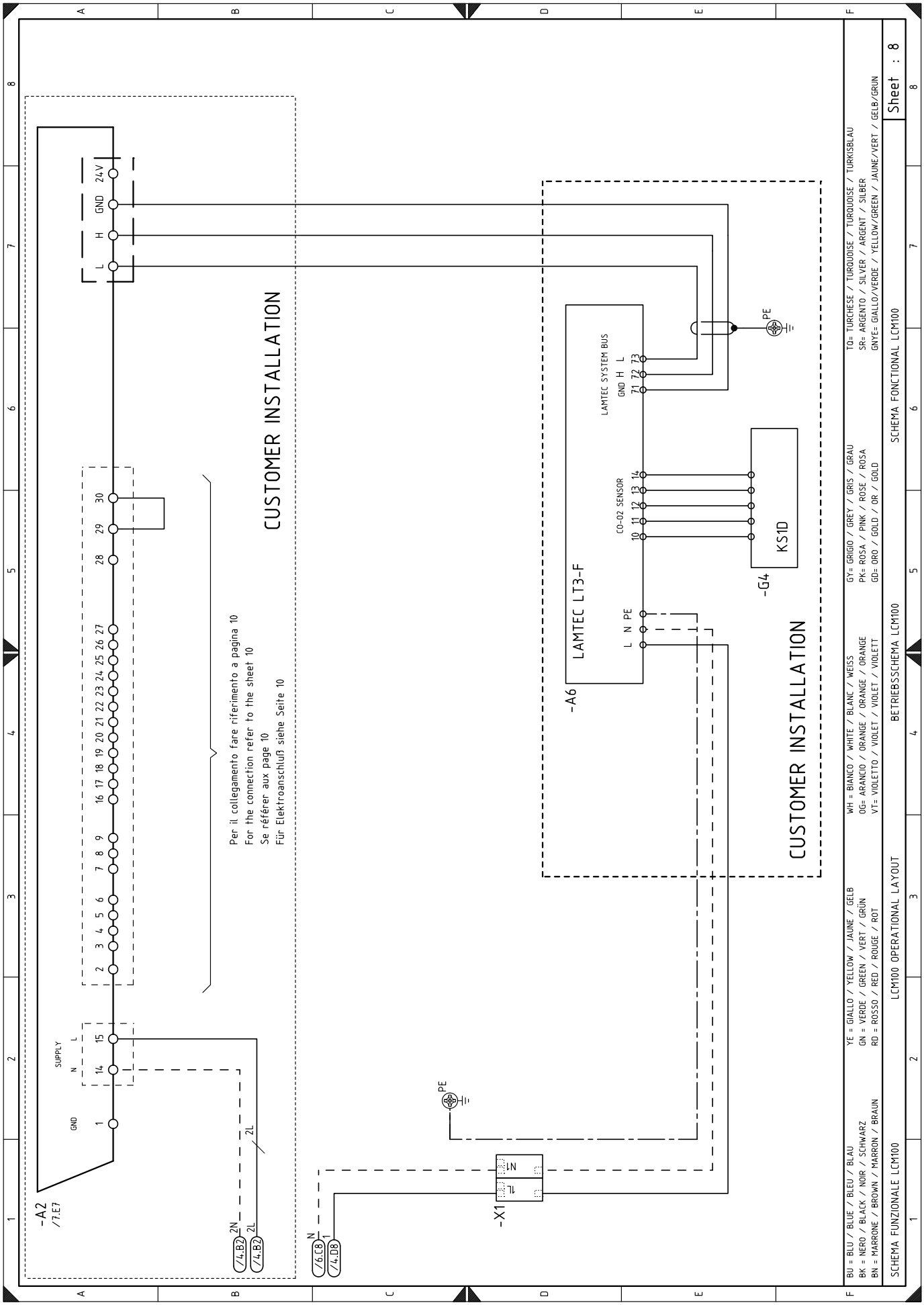
BT330 OPERATIONAL LAYOUT
BETRIEBSSCHEMA BT330
SCHEMA FONCTIONAL BT330
Sheet : 7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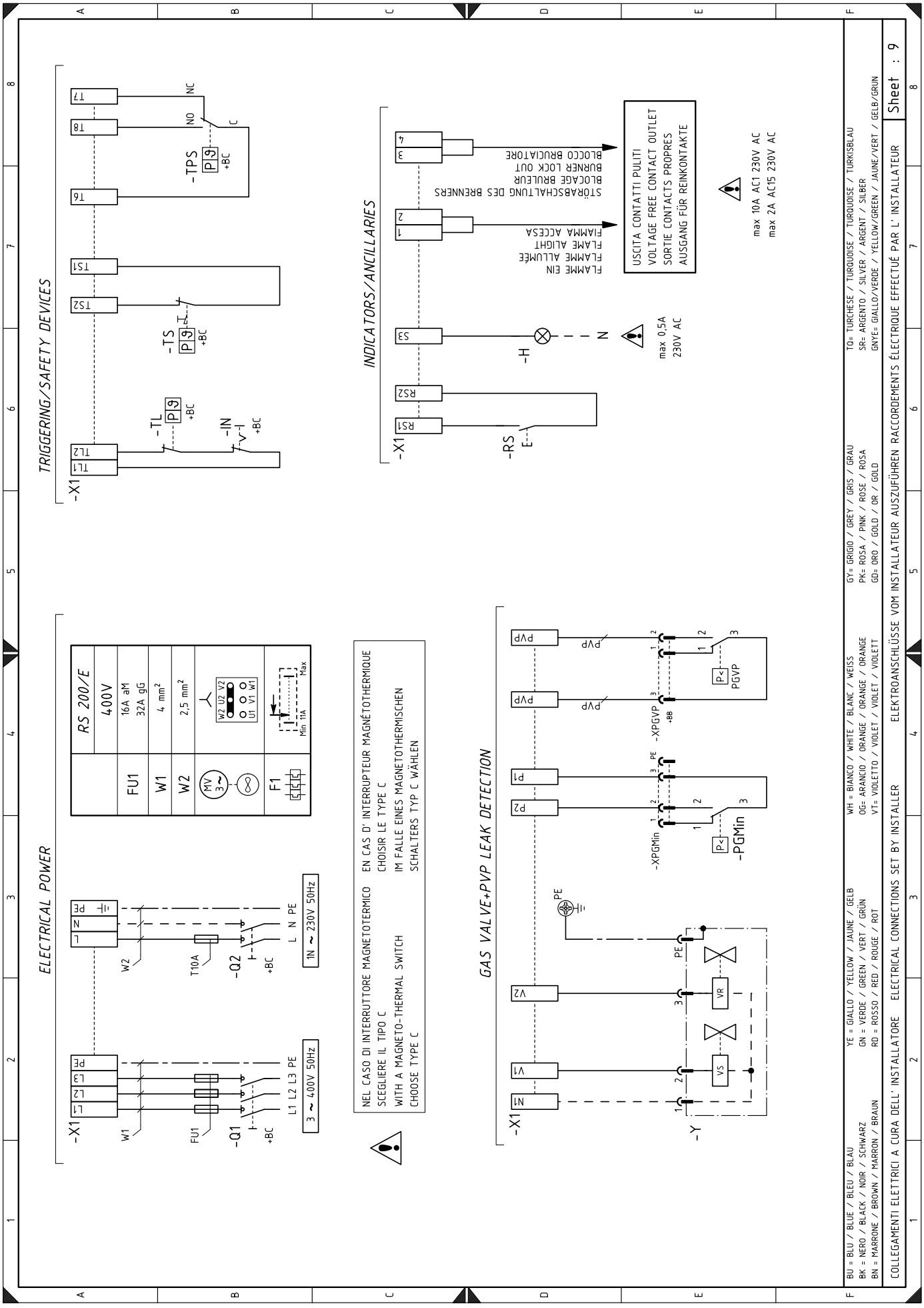
For the connection refer to the sheet 10
Se référer aux page 10
Für Elektroanschluß siehe Seite 10
-A2
/7.E7
SUPPLY
GND
N
L
1 14 15
2 3 4 5 6 7 8 9 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
L
H
GND
24V
/4.B2
2N
2L
/6.C8
/4.D8
N
-X1
PE
-A6
LAMTEC LT3-F
L N PE
CO-02 SENSOR
10 11 12 13 14
LAMTEC SYSTEM BUS
GND H L
71 72 73
-G4
KS1D
CUSTOMER INSTALLATION
BU = BLU / 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
SCHEMA FUNZIONALE LCM100
LCM100 OPERATIONAL LAYOUT
BETRIEBSSCHEMA LCM100
SCHEMA FONCTIONAL LCM100
Sheet : 8


TRIGGERING/SAFETY DEVICES
-X1
T1
T2
T52
T51
T6
T8
T7
-TL
-TS
-TPS
-IN
NO
NC
C
+BC
INDICATORS/ANCILLARIES
-X1
R51
R52
S3
S2
S1
-H
-RS
N
FLAMME EIN
FLAMME ALLUMÉE
FLAME ALIGHT
FLAMMA ACCESA
STÖRABSCHALTUNG DES BRENNERS
BLOCAGE BRULEUR
BURNER LOCK OUT
BLOCCO BRUCIATORE
USCITA CONTATTI PULITI
VOLTAGE FREE CONTACT OUTLET
SORTIE CONTACTS PROPRES
AUSGANG FÜR REINKONTAKTE
max 0,5A
230V AC
max 10A AC1 230V AC
max 2A AC15 230V AC
ELECTRICAL POWER
-X1
L1 L2 L3 PE
3 ~ 400V 50Hz
W1
FU1
-Q1
+BC
W2
T10A
-Q2
L N PE
1N ~ 230V 50Hz
RS 200/E
400V
FU1
16A aM
32A gG
W1
4 mm²
W2
2,5 mm²
MV
3~
W2 U2 V2
U1 V1 W1
F1
Min 1A
Max
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
GAS VALVE+PVP LEAK DETECTION
-X1
N1
V1
V2
PE
-Y
VS
VR
-XPGMin
-XPGVP
P1
P2
PVP
P<
-PGMin
PGVP
+BB
BU = BLU / BLEU / BLAU
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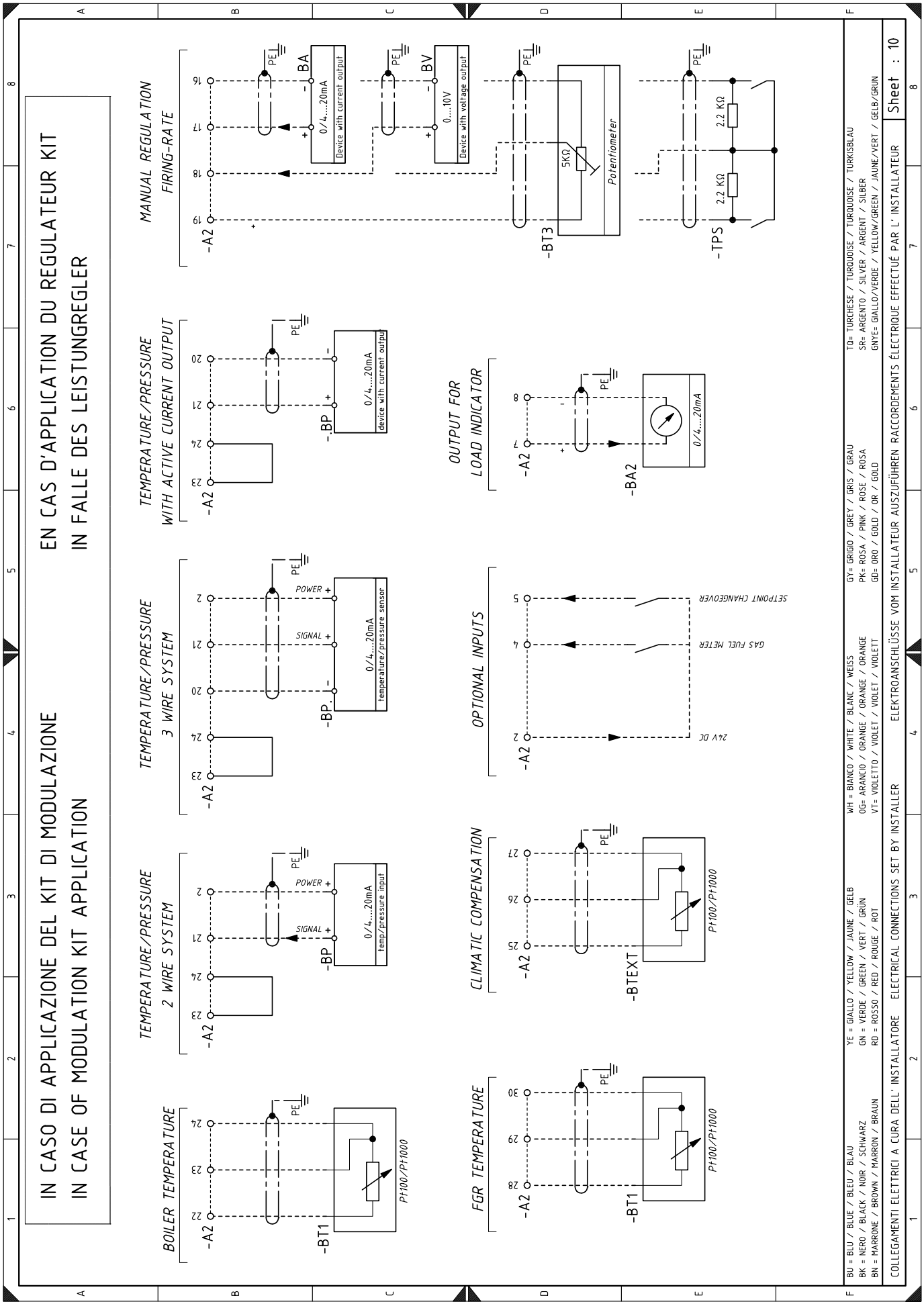
COLLEGAMENTI ELETTRICI A CURA DELL' INSTALLATORE ELECTRICAL CONNECTIONS SET BY INSTALLER ELEKTROANSCHLÜSSE VOM INSTALLATEUR AUSZUFÜHREN RACCORDEMENTS ÉLECTRIQUE EFFECTUÉ PAR L' INSTALLATEUR
Sheet : 9


IN CASO DI APPLICAZIONE DEL KIT DI MODULAZIONE
IN CASE OF MODULATION KIT APPLICATION
EN CAS D'APPLICATION DU REGULATEUR KIT
IN FALLE DES LEISTUNGREGLER
BOILER TEMPERATURE
TEMPERATURE/PRESSURE 2 WIRE SYSTEM
TEMPERATURE/PRESSURE 3 WIRE SYSTEM
TEMPERATURE/PRESSURE WITH ACTIVE CURRENT OUTPUT
MANUAL REGULATION FIRING-RATE
FGR TEMPERATURE
CLIMATIC COMPENSATION
OPTIONAL INPUTS
OUTPUT FOR LOAD INDICATOR
-A2
-BT1
-BTEXT
-BP
-BA
-BV
-BT3
-TPS
-BA2
P100/PT1000
0/4....20mA
0....10V
5KΩ
Potentiometer
2.2 KΩ
POWER
SIGNAL
temp./pressure input
temperature/pressure sensor
device with current output
Device with current output
Device with voltage output
24V DC
GAS FUEL METER
SETPOINT CHANGEOVER
BU = BLU / BLEU / BLAU
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Sheet : 10

Wiring layout key

+BB	Burner components
+BC	Boiler components
A1	Control box for the air/fuel ratio
A2	LCM 100 module
A5	Operator panel
A6	O2 - CO control module
B	Filter to protect against radio disturbance
BA	Input in current DC 4...20 mA
BA2	Load indicator
BP	Pressure probe
BT1	Boiler temperature probe
BT3	Output potentiometer
BTEXT	External probe for climatic compensation of the set-point
BV	Input in voltage DC 0...10V
FU	Fuse auxiliary circuits
FU1	Three-phase line fuse
F1	Fan motor thermal relay
G4	O2 - CO probe
H	Remote lockout signal
IN	Manual burner arrest switch
K1	Clean contacts output relay burner switched on
K2	Clean contacts output relay burner lockout
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
SM3	Flue gas recirculation servomotor
TA	Ignition transformer
TL	Limit thermostat/pressure switch
TPS	Output three point step
TS	Safety thermostat/pressure switch
UV	UV flame sensor
X1	Burner terminal strip
XPGM	Maximum gas pressure switch connector
XPGMin	Minimum gas pressure switch connector
XPGVP	Gas pressure switch connector for valve leak detection control device
XUV	Flame sensor connector
Y	Gas adjustment valve + gas safety valve

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上海市金山工业区金百路 388 号