

GB **Forced draught gas burners**

Modulating operation

**UK
CA**

CODE	MODEL	TYPE
20124422	RS 1300/E BLU	S008T1
20124358	RS 1600/E BLU	S009T1
20104154	RS 2000/E BLU	S010T1



Translation of the original instructions

1	Declarations	3
2	Information and general warnings	4
2.1	Information about the instruction manual	4
2.1.1	Introduction	4
2.1.2	General dangers	4
2.1.3	Other symbols	4
2.1.4	Delivery of the system and the instruction manual	5
2.2	Guarantee and responsibility	5
3	Safety and prevention	6
3.1	Introduction	6
3.2	Personnel training	6
4	Technical description of the burner	7
4.1	Burner designation	7
4.2	Models available	7
4.3	Burner categories - Countries of destination	8
4.4	Technical data	8
4.5	Electrical data	8
4.6	Packaging dimensions and burner weight	9
4.7	Maximum dimensions	9
4.8	Firing rates	10
4.9	Test boiler	10
4.10	Burner description	11
4.11	Electrical panel description	12
4.12	Burner equipment	12
4.13	AZL Display	13
4.14	Control box for the air/fuel ratio (LMV51...)	14
4.15	Servomotor	16
5	Installation	17
5.1	Notes on safety for the installation	17
5.2	Handling	17
5.3	Preliminary checks	17
5.4	Operating position	18
5.5	Removing the shutter lockout screws	18
5.6	Preparing the boiler	18
5.6.1	Boring the boiler plate	18
5.6.2	Blast tube length	19
5.7	Coupling of the burner - Centre of gravity position	19
5.8	Securing the burner to the boiler	19
5.9	Access to head internal part	20
5.10	Electrode positioning	20
5.11	Gas feeding	21
5.11.1	Gas feeding line	21
5.11.2	Gas train	22
5.11.3	Gas train installation	22
5.11.4	Gas pressure	22
5.11.5	Pilot - gas train connection	23
5.11.6	Ignition pilot burner	23
5.12	Electrical wiring	24
5.12.1	Supply cables and external connections passage	24
5.13	Calibration of the thermal relay	25
5.14	Motor rotation	25
6	Start-up, calibration and operation of the burner	26
6.1	Notes on safety for the first start-up	26
6.2	Adjustments prior to ignition	26
6.3	Burner start-up	26
6.4	Burner ignition	27

6.5	Combustion air adjustment	27
6.5.1	Air / gas adjustment and output modulation.....	27
6.6	Pressure switch adjustment	28
6.6.1	Air pressure switch - check CO.....	28
6.6.2	Maximum gas pressure switch.....	28
6.6.3	Minimum gas pressure switch.....	28
6.6.4	PVP pressure switch kit	29
6.7	Final checks (with burner operating).....	29
7	Maintenance	30
7.1	Notes on safety for the maintenance	30
7.2	Maintenance programme	30
7.2.1	Maintenance frequency.....	30
7.2.2	Safety test - with gas ball valve closed	30
7.2.3	Checking and cleaning.....	30
7.2.4	Electrical panel.....	31
7.2.5	Safety components	31
7.3	Opening the burner	32
7.4	Closing the burner.....	32
8	Faults - Possible causes - Solutions.....	33
A	Appendix - Accessories	34
B	Appendix - Electrical panel layout.....	35

1 **Declarations****Declaration of Conformity in accordance with ISO / IEC 17050-1**

These products are in compliance with the following Technical Standards:

- EN 12100
- EN 676

According to the European Directives:

MD	2006/42/EC	Machine Directive
LVD	2014/35/EU	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility

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

2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

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

Symbols used in the manual

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

2.1.2 General dangers

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



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



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



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

2.1.3 Other symbols



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



DANGER: FLAMMABLE MATERIAL
This symbol indicates the presence of flammable materials.



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



DANGER: CRUSHING OF LIMBS
This symbol indicates the presence of moving parts: danger of crushing of limbs.



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



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



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



OBLIGATION TO ASSEMBLE THE COVER AND ALL THE SAFETY AND PROTECTION DEVICES
This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



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



TRANSPORT
This symbol provides information on how to transport and lift the packaged burner.



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

- This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

.....

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

.....

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

2.2 Guarantee and responsibility

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



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;
- continuation of use of the burner when a fault has occurred;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
- use of non-original components, including spare parts, kits, accessories and optional;
- force majeure.

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

3 Safety and prevention

3.1 Introduction

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



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

3.2 Personnel training

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

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties.
- Personnel must follow 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 are obliged to 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 manufacturing company therefore accepts no responsibility whatsoever for any which may result from the use of non-original parts.

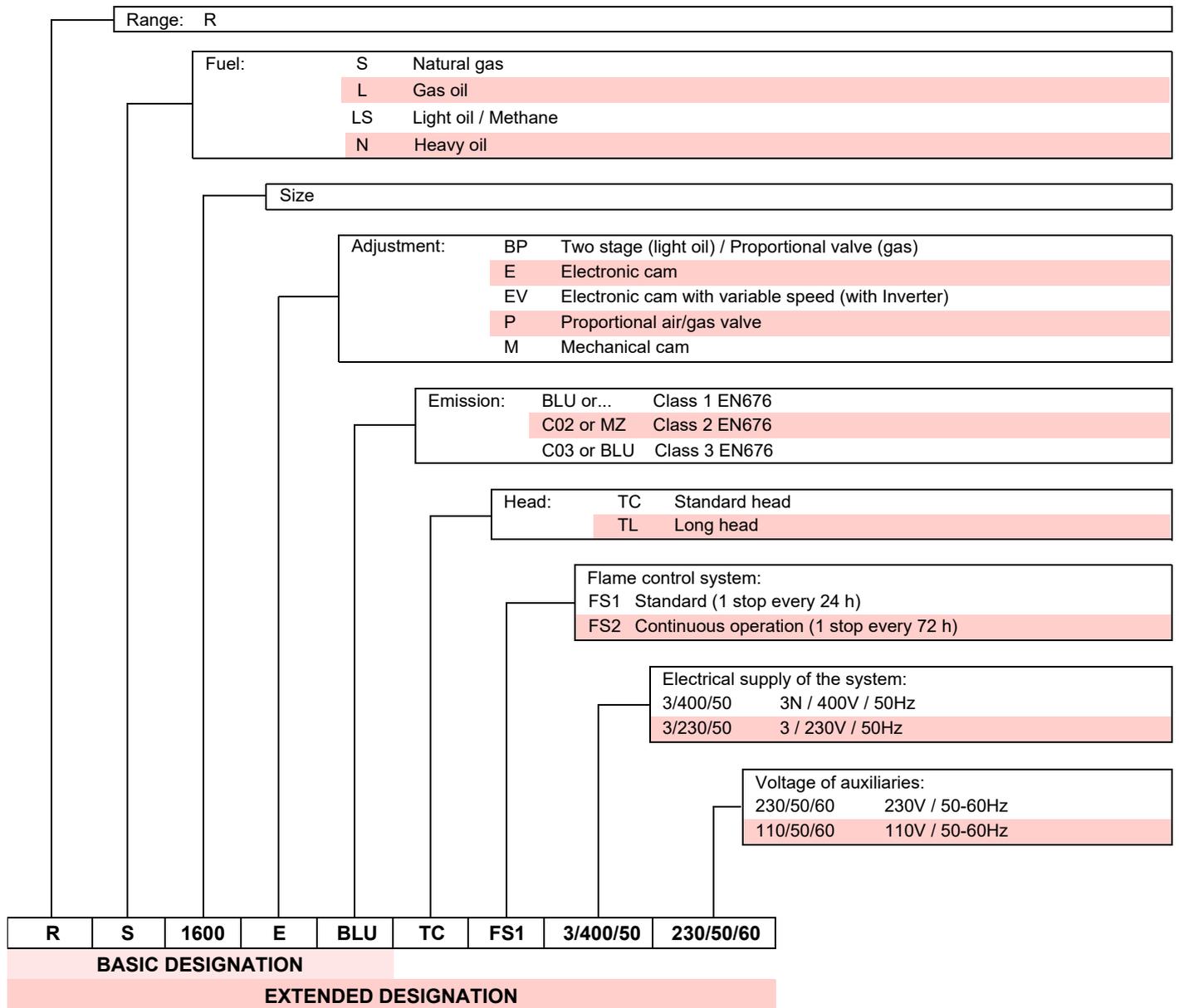
In addition:



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

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation		Voltage	Start-up	Code
RS 1300/E BLU FS1	TC	3/400/50	Direct/Inverter	20124422
RS 1600/E BLU FS1	TC	3/400/50	Direct/Inverter	20124358
RS 2000/E BLU FS1	TC	3/400/50	Direct/Inverter	20104154

Tab. A

4.3 Burner categories - Countries of destination

Gas category	Destination country
I _{2H}	SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO
I _{2ELL}	DE
I _{2L} - I _{2E} - I ₂ (43.46 ÷ 45.3 MJ/m ³ (0°C))	NL
I _{2Er}	FR
I _{2E(R)B}	BE
I _{2E}	LU - PL

Tab. B

4.4 Technical data

Model			RS 1300/E BLU FS1	RS 1600/E BLU FS1	RS 2000/E BLU FS1
Type			S008T1	S009T1	S010T1
Power ⁽¹⁾ Delivery ⁽¹⁾	min - max	kW	2500/7500 ÷ 13000	3065/9503 ÷ 15560	4000/12000 ÷ 19500
Fuels			Natural gas: G20 (methane gas) - G21 - G22 - G23 - G25		
Gas pressure at max. output ⁽²⁾ - Gas: G20/G25		mbar	43/65	70/104	92/141
Operation			- Intermittent (min. 1 stop in 24 hours) ⁽⁴⁾ - Modulating		
Standard applications			Boilers: water, steam, diathermic oil		
Ambient temperature		°C	0 - 50		
Combustion air temperature		°C max	60		
Noise levels ⁽³⁾	Sound pressure	dB(A)	95	95	95
	Sound power		106	106	106
Weight		Kg	950	1000	1050

Tab. C

- (1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
- (2) Pressure upstream of the gas train P3)(Fig. 18 on page 21) as declared by EN 676, with 0 mbar in the combustion chamber and the burner at maximum output.
- (3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on a test boiler and at maximum rated output. "The sound power is measured using the "Free Field" method, required by the EN 15036 standard, and according to an "Accuracy: Category 3" measurement, as described by the EN ISO 3746 Standard."
- (4) The burner is factory set for FS1 operation (1 stop every 24 hours); it can be converted to FS2 operation (continuous - 1 stop every 72 hours), by changing the parameters using the menu of the AZL Display.

4.5 Electrical data

Model			RS 1300/E BLU FS1	RS 1600/E BLU FS1	RS 2000/E BLU FS1
Main electrical supply			3 ~ 400V 50 Hz		
Auxiliary circuit electrical supply			1 ~ 230V 50 Hz		
Fan motor (Motor premium efficiency IE3)	rpm		2960	2965	2965
	V		400/690	400/690	400/690
	kW		30	37	45
	A		51.6/29.8	63.4/36.6	76/43.9
Ignition transformer		V1 - V2 I1 - I2	230V - 1 x 8 kV 1A - 20mA		
Maximum absorbed electric power		kW max	34.5	41.5	49.3
Protection level			IP 55		

Tab. D

4.6 Packaging dimensions and burner weight

The maximum dimensions of the burner including packaging are given in Fig. 1. The weight of the burner is shown in Tab. E.

Burner (kg)	Burner + packaging (kg)
1100	approx. 1180

Tab. E

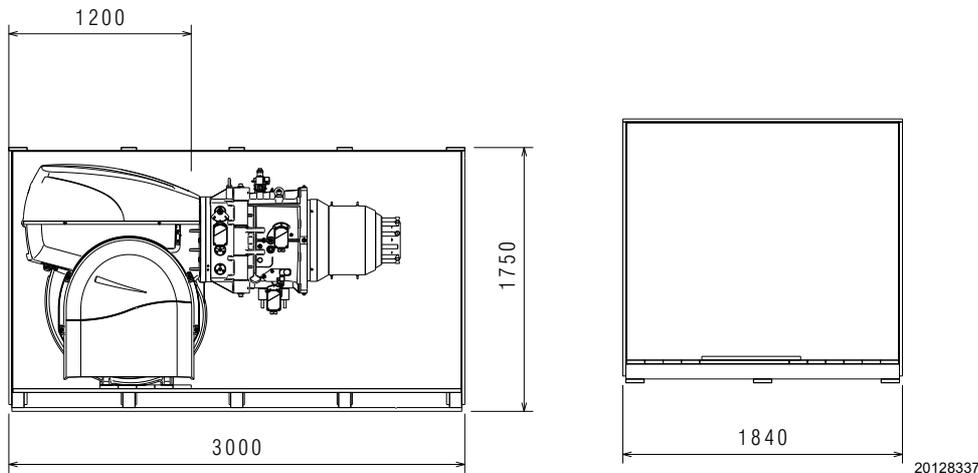


Fig. 1

4.7 Maximum dimensions

The maximum dimensions of the burner are given in Fig. 2. Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part turned on the hinge.

The maximum dimensions of the open burner are indicated by the L and R positions. The I position is reference for the refractory thickness of the boiler door.

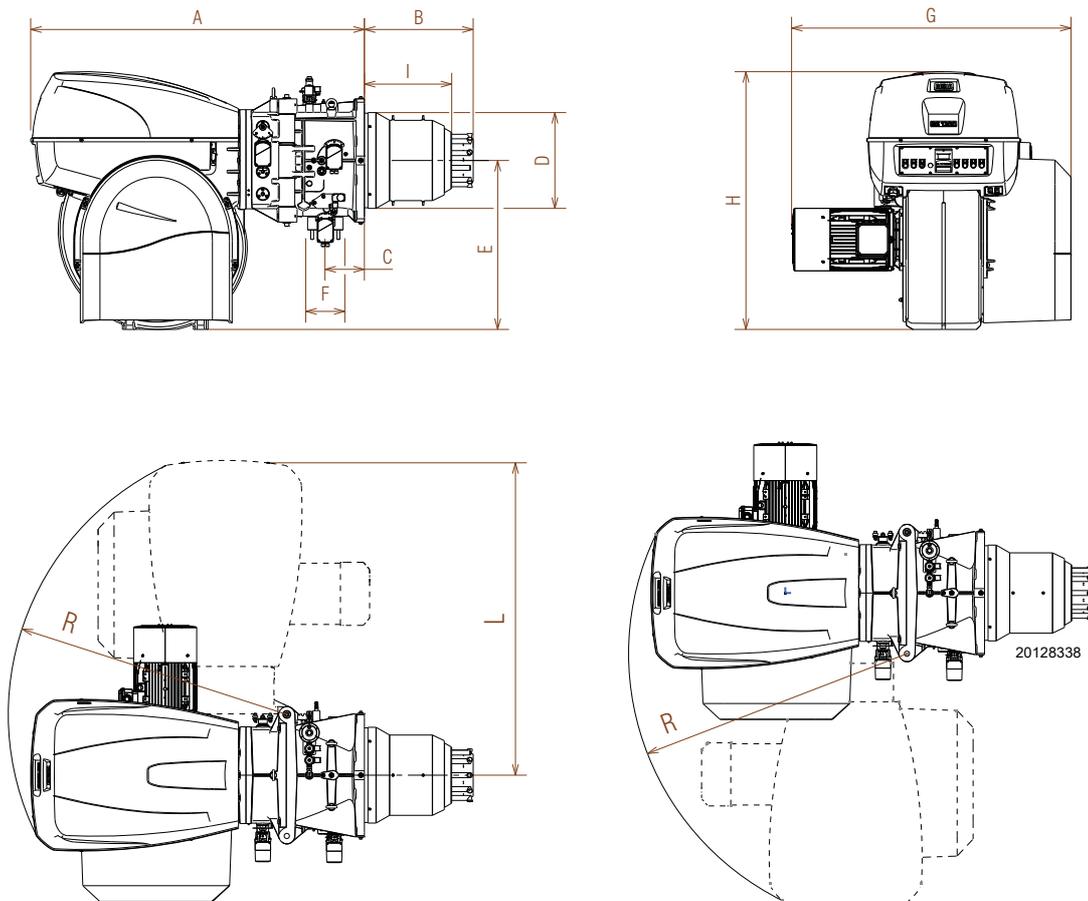


Fig. 2

mm	A	B	C	D	E	F	G	H	I	L	R
RS 1300/E BLU FS1	1880	613	220	544	960	DN 80	1585	1463	383	1782	1565
RS 1600/E BLU FS1	1880	852	220	544	960	DN 100	1530	1463	544	1785	1565
RS 2000/E BLU FS1	1880	852	220	590	960	DN 100	1560	1463	562	1782	1565

Tab. F

4.8 Firing rates

The **MAXIMUM OUTPUT** is chosen from within the continuous diagram area (Fig. 3).

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

- RS 1300/E BLU FS1 = 2500 kW
- RS 1600/E BLU FS1 = 3065 kW
- RS 2000/E BLU FS1 = 4000 kW



The firing rate value (Fig. 3) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 21.

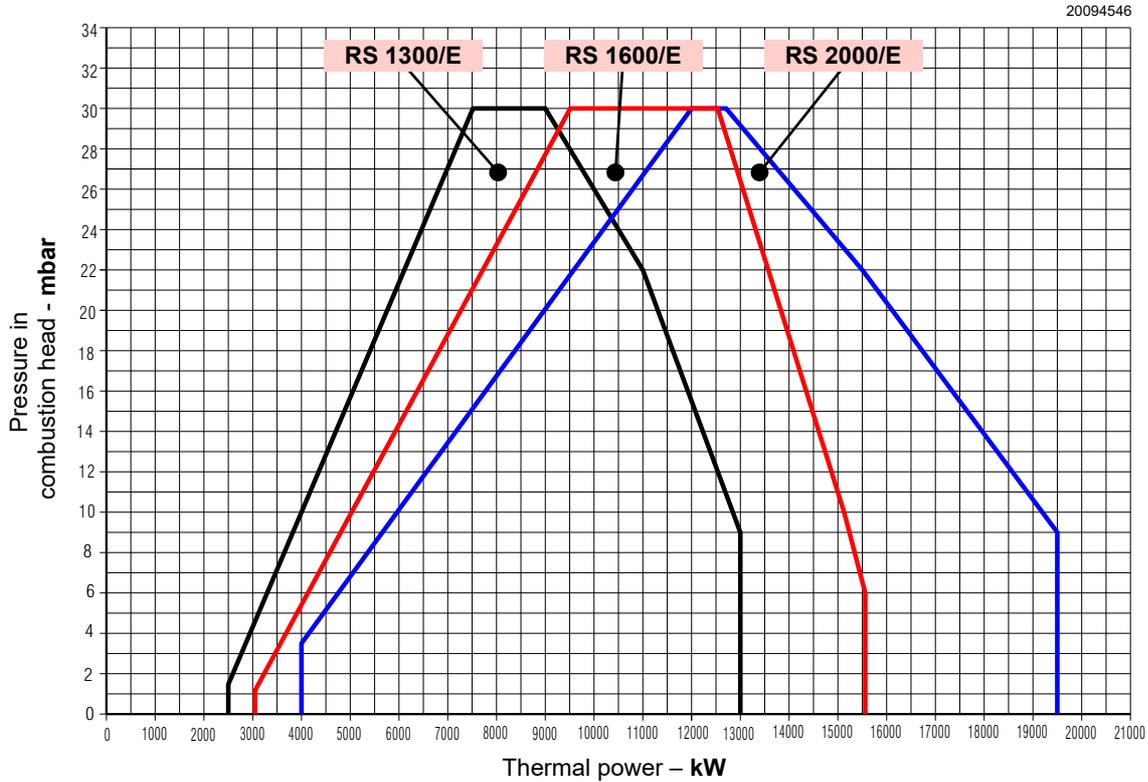


Fig. 3

4.9 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 4).

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. 4 you can see the diameter and length of the test combustion chamber.

Example:

Output 13000 kW - diameter 120 cm - length 9 m

MODULATING RATIO

The modulating ratio, obtained in test boilers in accordance with EN 676, is 1:5.

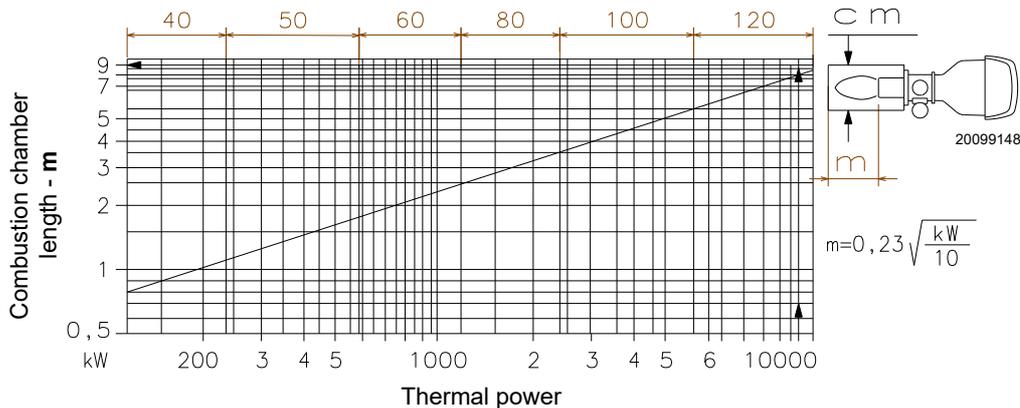


Fig. 4

4.10 Burner description

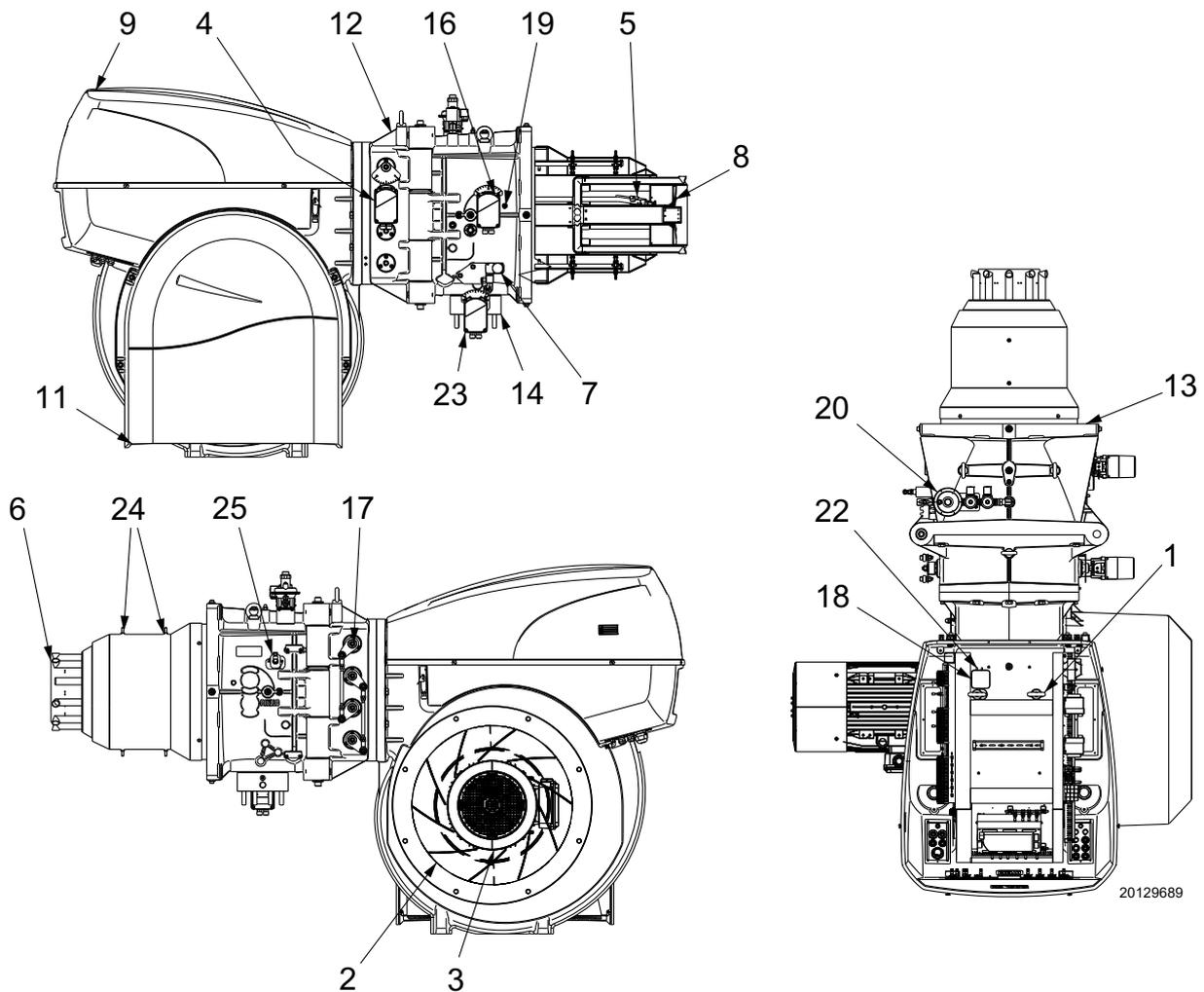


Fig. 5

- 1 Lifting rings
- 2 Fan
- 3 Fan motor
- 4 Air damper servomotor
- 5 Ignition pilot burner
- 6 Combustion head
- 7 Combustion head gas pressure test point of the maximum gas pressure switch
- 8 Flame stability disk
- 9 Electrical panel casing
- 10 Hinge pin for opening the burner
- 11 Fan air inlet
- 12 Pipe coupling
- 13 Gasket for boiler fixing
- 14 Gas regulator
- 15 Shutter
- 16 Combustion head movement servomotor
- 17 Air damper movement levers
- 18 Minimum air pressure switch (differential operating type)
- 19 Combustion head air pressure test point
- 20 Pilot gas train
- 21 Flame sensor
- 22 Pressure test point for air pressure switch “+”
- 23 Gas butterfly valve servomotor
- 24 Screws to lock the shutter during transportation (replace them with the M8x20 screws supplied as standard)
- 25 QRI photocell



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

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

4.11 Electrical panel description

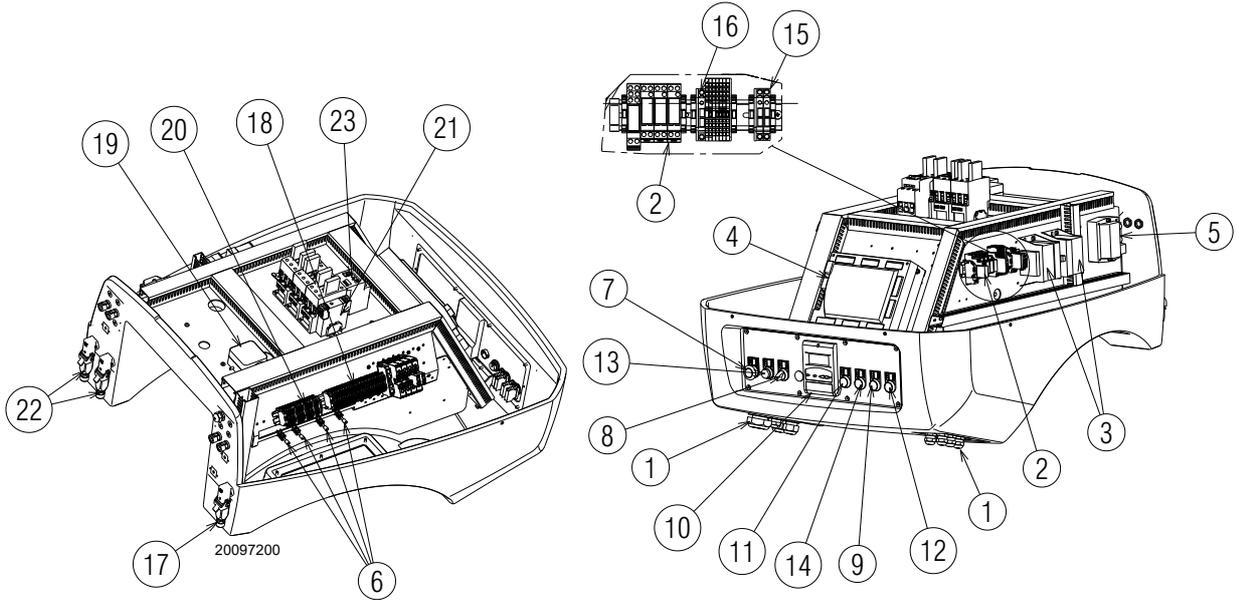


Fig. 6

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Supply cables, external connections and kits 2 Volt-free contacts output relay 3 Electronic cam transformer 4 Electronic control box 5 Ignition transformer 6 Shielding terminals 7 Stop/emergency push-button 8 Off-automatic selector 9 Light signalling of main fuel valve open 10 AZL display 11 Light signalling of mains live state 12 Fan motor lockout warning lamp 13 Burner lockout warning lamp and reset switch 14 Heat request signal 15 Servomotors axillary transformer fuses 16 Auxiliary circuits fuse | <ul style="list-style-type: none"> 17 Flame sensor plug/sensor socket 18 Main terminal supply board 19 Air pressure switch 20 Kit terminal board 21 Timer 22 Servomotor Plug/ socket 23 Fan motor contactor and thermal relay, star-triangle starter |
|--|---|

NOTE

- Two types of burner failure may occur:
- **Control box lockout:** switching on of button 13)(Fig. 6) (**red led**) signals that the burner is in lockout. release by pressing the pushbutton 13)(Fig. 6).
 - **Motor lockout:** release by pressing the button on the relevant thermal relay.

4.12 Burner equipment

Gasket for gas train flange	No. 1
Thermal insulation screen	No. 1
M8x20 screws	No. 2
M16x50 screws to fix the gas flange	No. 8
M20x70 bolts to fix the burner flange to the boiler	No. 12
M20 nut to fix the gas flange	No. 12
Instructions	No. 1
Spare parts list	No. 1

4.13 AZL Display...

Warnings



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

The AZL ... display 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!

The electronic cam is operated and programmed through the AZL5 interface... or with the aid of a PC.

The AZL5 has a backlit LCD display with clear reading of the menu text and diagnostics.

The Modbus function of the AZL display integrates the electronic cam LMV5 and through data management allows the diagnostic of the burner.

The display shows the operating status, the types of errors and lockouts. Used to parameterize and monitor data.



Fig. 7

Technical data

Operating voltage	AC 24 V - 15% / +10%
Power consumption	< 5W (typical)
Protection level of the container	
– Rear	IP00 according to IEC 529
– Front	IP54 according to IEC 529 (if installed)
Safety class	I with parts II and III according to DIN EN 60730-1
Battery - Manufacturer:	Type reference:
VARTA	CR 2430 (LF-1/2 W)
DURACELL	DL 2430
SANYO ELECTRIC, Osaka/ Japan	CR 2430 (LF-1/2 W)
RENATA AG, Itingen/CH	CR 2430

Tab. G

4.14 Control box for the air/fuel ratio (LMV51...)

Warnings



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

The LMV51 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 AZL5... display and operating unit and incorrect settings of the fuel and / or air actuator positions can lead to dangerous burner operating conditions.

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring in the LMV52 control box connection area, fully disconnect the system from the power supply (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- Protection against electrocution from the LMV5... control box and all connected electric components is obtained with correct assembly.
- Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
- Falls and collisions can negatively affect the safety functions.
In this case, the control box must not be operated, even if it displays no evident damage.
- In programming mode, the position check of actuators and VSD (checking electronic fuel / air ratio control) is different from the check during automatic operation.

As for automatic operation, the actuators are guided together to the positions requested and, if an actuator does not reach the position requested, adjustments are made until the position is actually reached. However, in contrast to automatic operation, there are no time limits to these corrective actions.

The other actuators maintain their positions until all actuators have reached the positions currently required.

This is absolutely important to set the fuel / air ratio control system.

During the time the fuel / air ratio curves are being programmed, the person making the plant settings must continuously monitor the quality of the combustion process (e.g. by means of a flue gas analyser).

Also, if combustion levels are poor, or in the event of dangerous situations, the commissioning engineer must take appropriate action (e.g. switching off manually).

To ensure the safety and reliability of the LMV5... system, the following instructions must also be followed:

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



D9301

Fig. 8

Mechanical structure

The LMV5... control box is a system to check the burners, based on a microprocessor and equipped with components to adjust and monitor medium and large capacity forced draught burners. The base control box of the LMV5... system incorporates the following components:

- Burner adjustment device with system for checking the seal of the gas valves
- Electronic device to check the fuel/air ratio with a maximum of 4 actuators
- Optional PID temperature / pressure controller (load controller)
- Optional VSD module Mechanical design

Installation notes

- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- Make sure the cable grommets of the connected cables comply with the relevant standards (e.g. DIN EN 60730 and DIN EN 60 335).
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- The burner manufacturer must protect unused AC 230V terminals with dummy plugs (refer to sections Suppliers of other accessory items).
- When wiring the unit, make sure that AC 230V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Electrical wiring of the flame detector

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

- Always separate the detector cables from the other cables:

- Line capacitance reduces the magnitude of the flame signal.
- Use a separate cable.
- Respect the allowed cable lengths.

Technical data

LMV51... base control box	Mains voltage	AC 230V -15% / +10%
	Mains frequency	50 / 60 Hz ±6%
	Power absorption	< 30W (normal)
	Safety class	I, with components in compliance with II and III, according to DIN EN 60730-1
Load on 'input' terminals	F1 unit fuse (internal)	6.3 AT
	Primary perm. mains fuse (external)	Max. 16 AT
	Undervoltage	
	• Safety switch-off from operating position to mains voltage	< AC 186V
	• Restart when mains voltage picks up	> AC 188V
	Oil pump / magnetic clutch (nominal voltage)	
• Nominal current	2A	
• Power factor	cosφ > 0.4	
Air pressure switch test valve (nominal voltage)	• Nominal current	0.5A
	• Power factor	cosφ > 0.4
	Total load on the contacts:	
Load on 'output' terminals	• Mains voltage	AC 230V -15 % / +10%
	• Total unit input current (safety circuit)	Max. 5 A
	load on contacts due to:	
	- Fan motor contactor	
	- Ignition transformer	
	- Valve	
	- Oil pump / magnetic clutch	
	Single contact loading:	
	Fan motor contactor (nominal voltage)	
	• Nominal current	1A
	• Power factor	cosφ > 0.4
	Alarm output (nominal voltage)	
	• Nominal current	1A
	• Power factor	cosφ > 0.4
Ignition transformer (nominal voltage)		
• Nominal current	2A	
• Power factor	cosφ > 0.2	
Fuel gas valve (nominal voltage)		
• Nominal current	2A	
• Power factor	cosφ > 0.4	
Fuel oil valve (nominal voltage)		
• Nominal current	1A	
• Power factor	cosφ > 0.4	
Cable length	Main line	Max. 100 m (100 pF / m)
Environmental conditions	Operation	DIN EN 60721-3-3
	Climatic conditions	Class 3K3
	Mechanical conditions	Class 3M3
	Temperature range	-20...+60°C
	Humidity	< 95% RH

Tab. H

4.15 Servomotor

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 SQM4... system 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.
- Check the wiring is in order.
- Falls and collisions can negatively affect the safety functions. In this case, the unit must not be operated, even if it displays no evident damage.

Assembly notes

- Check the relevant national safety standards are respected.
- The connection between the actuator command shaft and the control element must be rigid, without any mechanical play.
- To avoid an excessive load on the bearings due to rigid hubs, the use of compensation clutches without any mechanical play is recommended (e.g. metal bellows-type clutches).

Installation notes

- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- To avoid the risk of electrocution, make sure that the 230V AC section of the SQM4... unit is fully separated from the functional low-voltage section.
- The static torque is reduced when the electrical supply of the actuator is switched off.
- The housing cover may only be removed for short periods of time for wiring or when making the addressing. In similar cases, make sure that dust or dirt does not penetrate inside the actuator.
- The actuator comprises a PCB with ESD-sensitive components.
- The top side of the board carries a cover which affords protection against direct contact. This protective cover must not be removed! The underside side of the board must not be touched.



WARNING

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

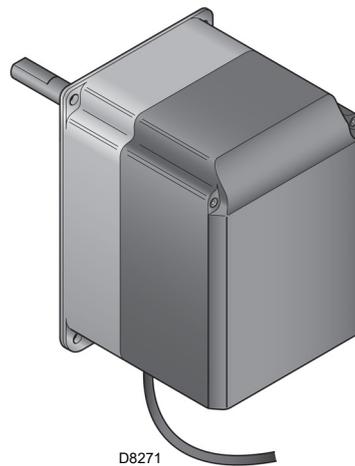


Fig. 9

Technical data

Operating voltage	AC 2 x 12V via bus cable from the base unit or via a separate transformer
Safety class	extra low-voltage with safe isolation from mains voltage
Power absorption	
– SQM45...	9...15 VA
– SQM48...	26...34 VA
Degree of protection	to EN 60 529, IP 54, provided adequate cable entries are used
Cable connection	RAST3,5 connectors
Rotation direction	- Anticlockwise (standard) - Clockwise (inverted rotation)
Rated torque (max.)	
– SQM45...	3 Nm
– SQM48...	20 Nm
Static torque (max.)	
– SQM45...	1.5 Nm
– SQM48...	20 Nm
Running time (min.) for 90°	
– SQM45...	10 s.
– SQM48...	30 s.
Weight	
– SQM45...	approx. 1 kg
– SQM48...	approx. 1.6 kg
Environmental conditions:	
Operation	DIN EN 60 721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M3
Temperature range	-20...+60°C
Humidity	< 95% RH

Tab. I

5 Installation

5.1 Notes on safety for the installation

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



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



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



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

5.2 Handling

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



The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitability 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.



Lifting and transport of wooden crate must be done with caution to avoid falling or tipping. A forklift of adequate capacity can be used for lifting. The position of the centre of gravity is shown in Fig. 14 (packaged burner) which helps the positioning of the lifting forks of said burner.



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



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

5.3 Preliminary checks

Checking the consignment



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



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

RBL	A	B	C
D	E		F
GAS-KAASU	<input checked="" type="checkbox"/>	G	H
GAZ-AERIO		G	H
I			RIELLOSpA I-37045 Legnago (VR)
			CE

D10411

Fig. 10

Checking the characteristics of the burner

Check the identification label of the burner (Fig. 10), showing:

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



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.



STORAGE

In the event that the burner is not installed immediately, it is recommended that the storage takes place in a sheltered environment relative to the protection level required. Check that the support surface of the burner is able to support it. Do not lay crates or heavy equipment on the packaging. Position the burner away from flammable materials.

5.4 Operating position



- The burner is designed to work only in positions 1 and 4 (Fig. 11).
- Installation 1 is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- The installation 4 permits the operation, but makes the maintenance and inspection operations of the combustion head more difficult.



- Any other position could compromise the correct operation of the appliance.
- Installations 2, 3 and 5 are forbidden for safety reasons.

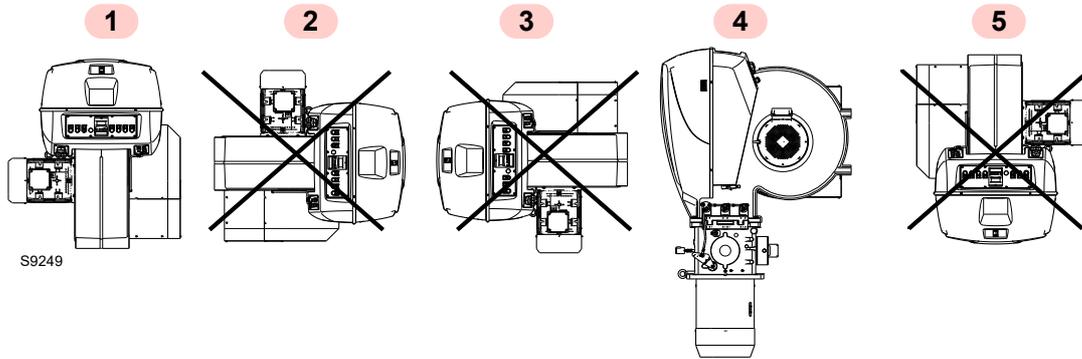


Fig. 11

5.5 Removing the shutter lockout screws



Remove the screws 1)-2) and nuts before fitting the burner onto the boiler (Fig. 12).
Replace them with screws 3) M8x20 supplied as standard.

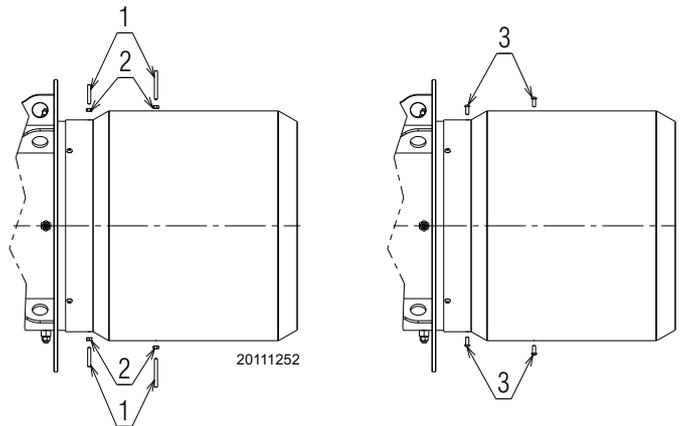


Fig. 12

5.6 Preparing the boiler

5.6.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 13.
The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

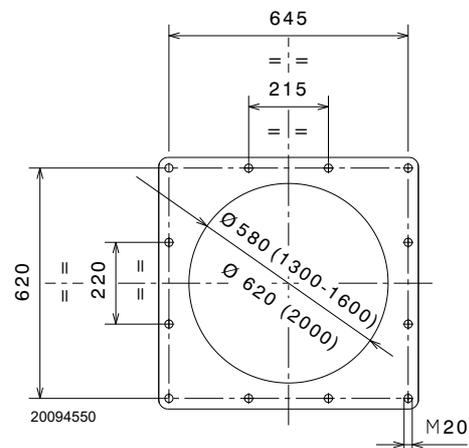


Fig. 13

5.6.2 Blast tube length

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

For boilers with front flue passes 1)(Fig. 15) or flame inversion chamber, a protection in refractory material 5) must be inserted between the boiler fettling 2) and the blast tube 4).

This protective fettling must not compromise the extraction of the blast tube.

For boilers with a water-cooled front piece, a refractory lining 2)-5)(Fig. 15) is not necessary, unless expressly requested by the boiler manufacturer.

5.7 Coupling of the burner - Centre of gravity position



Provide an adequate lifting system.



WARNING

Hook and lift the burner as shown in Fig. 14.

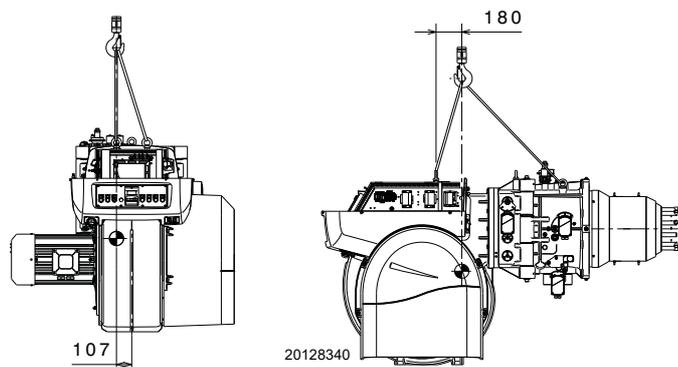


Fig. 14

5.8 Securing the burner to the boiler



Prepare a suitable lifting system using the rings 3) after having removed the casing 8) unscrewing screws 7)(Fig. 15).



WARNING

The seal between burner and boiler must be airtight.

- Insert the thermal protection supplied with the blast tube 4).
- Fit the entire burner onto the boiler hole, prepared previously, as in Fig. 13, and fasten with the screws supplied (tightening torque 250 ÷ 300 Nm).

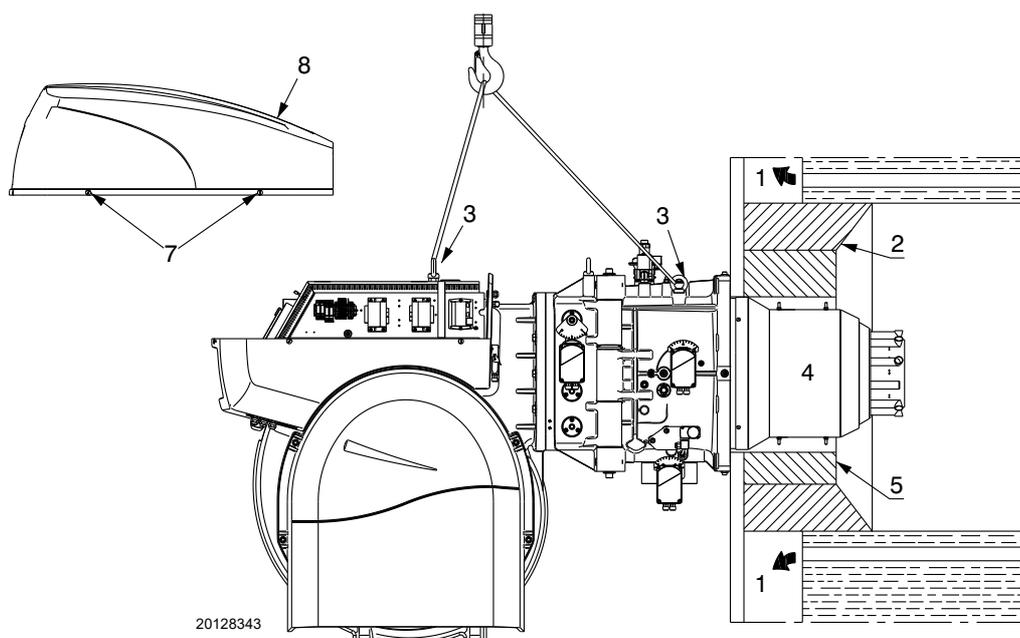


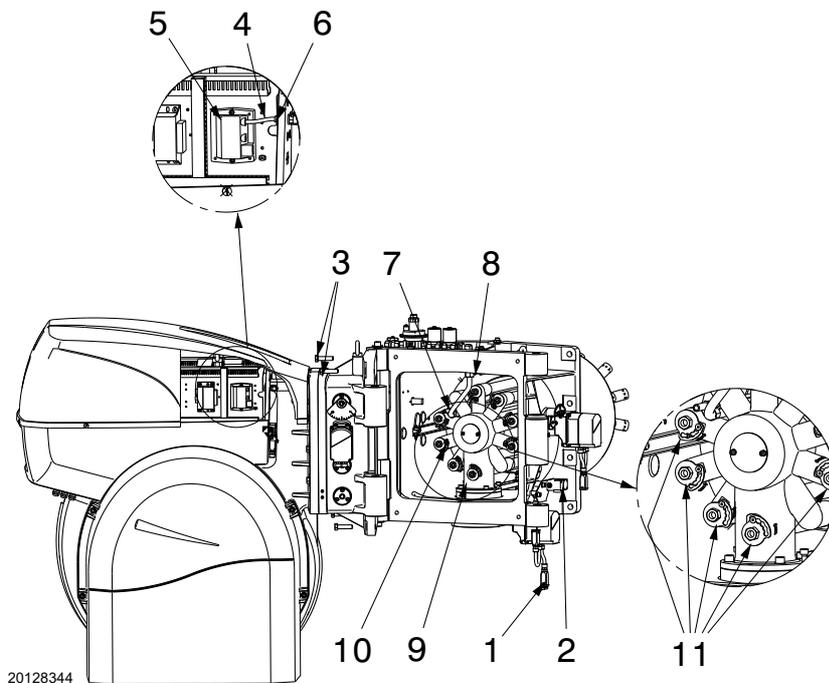
Fig. 15

5.9 Access to head internal part

In order to reach inside the combustion head (Fig. 16) proceed as follows:

- disconnect the gas servomotor socket 1);
- disconnect the electrical connection from the gas pressure switch 2);
- remove the cover;
- disconnect the electrode cable 4) from the transformer 5) and extracting it by unscrewing the connector 6);
- remove the 4 fixing screws 3);

- open the burner completely;
- disconnect the electrode pilot cable 7);
- release the ignition pilot connector 8);
- pull out the inner part of the head 10), after unscrewing the screws 9) that block it to the pipe coupling;
- for the RS 1600/E and RS 2000/E versions, before extracting the combustion head, it is necessary to unscrew the screws 11) that lock the pipes and turn them 90°, as shown in the illustration.



20128344

Fig. 16

5.10 Electrode positioning



WARNING

Position the electrode on the ignition pilot observing the indications in Fig. 17.

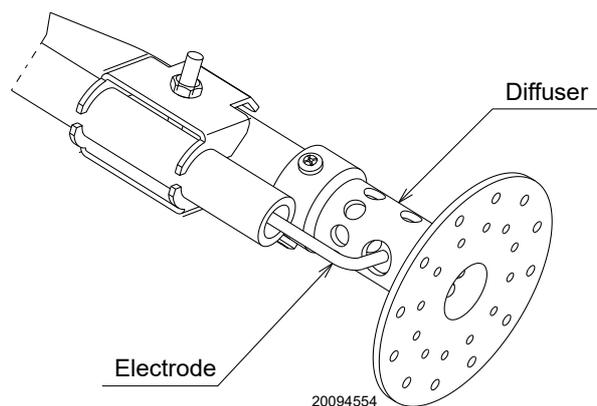


Fig. 17

5.11 Gas feeding



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

Precautions: avoid knocking, attrition, sparks and heat.

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



WARNING

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

5.11.1 Gas feeding line

Key (Fig. 18 - Fig. 19 - Fig. 20 - Fig. 21)

- 1 Gas input pipe
- 2 Manual valve
- 3 Vibration damping joint
- 4 Pressure gauge with push-button cock
- 5 Filter
- 6A Includes:
 - filter
 - working valve
 - safety valve
 - pressure adjuster
- 6B Includes:
 - working valve
 - safety valve
 - pressure adjuster
- 6C Includes:
 - safety valve
 - working valve
- 6D Includes:
 - safety valve
 - working valve
- 7 Minimum gas pressure switch
- 8 Leak detection control, provided as an accessory or integrated, based on the gas train code. In compliance with the EN 676 standard, the leak detection control is compulsory for burners with maximum outputs over 1200 kW.
- 9 Gasket, for "flanged" versions only
- 10 Pressure adjuster
- 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

MBC "threaded"

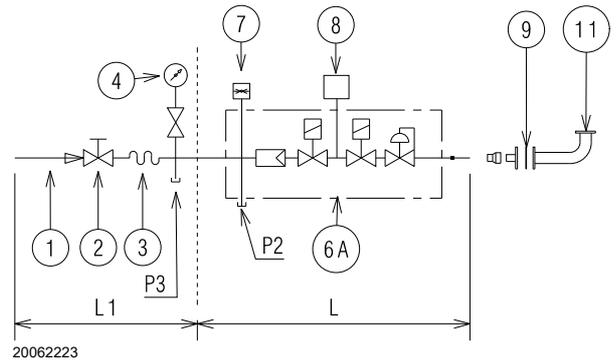


Fig. 18

MBC "flanged" - VGD

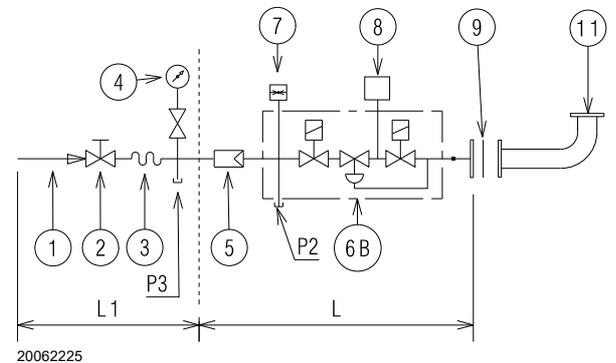


Fig. 19

DMV "flanged or threaded"

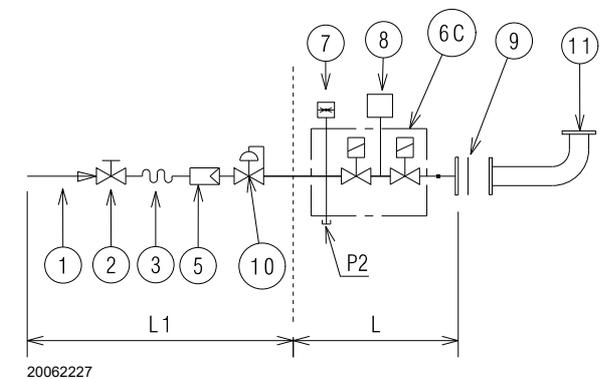


Fig. 20

CB "flanged or threaded"

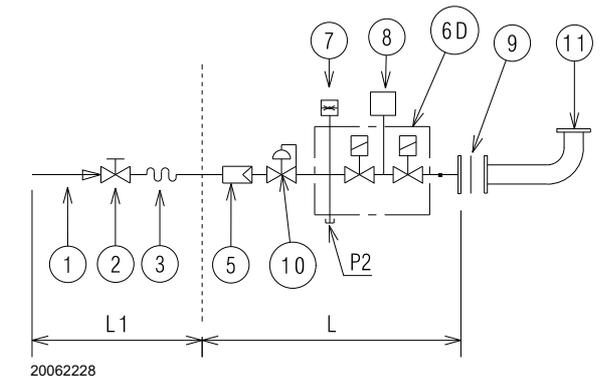


Fig. 21

5.11.2 Gas train

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

5.11.3 Gas train installation



Disconnect the electrical power using the main switch.



Check that there are no gas leaks.



Pay attention when handling the train: danger of crushing of limbs.



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



The operator must use the required equipment during installation.

The gas train is prearranged to be connected to the burner by the flange 1) (Fig. 22).

5.11.4 Gas pressure

Tab. J indicates the pressure drops of the combustion head and gas butterfly valve, on the basis of the burner operating output.

The values shown in Tab. J refer to:

- Natural gas G 20 NCV 9.45 kWh/Sm³ (8.2 Mcal/Sm³)
- Natural gas G 25 NCV 8.13 kWh/Sm³ (7.0 Mcal/Sm³)

Column 1

Combustion head pressure drop.

Gas pressure measured at test point 1)(Fig. 23), with:

- combustion chamber at 0 mbar;
- burner working at maximum modulating output;
- combustion head set as on page 21.

Column 2

Pressure loss at gas butterfly valve 2)(Fig. 23) with maximum opening: 90°.

To calculate the approximate output at which the burner operates:

- subtract the pressure in combustion chamber from the gas pressure measured at test point 1)(Fig. 23).
- Find, in Tab. J related to the burner concerned, the pressure value closest to the result of the subtraction.
- Read off the corresponding output on the left.

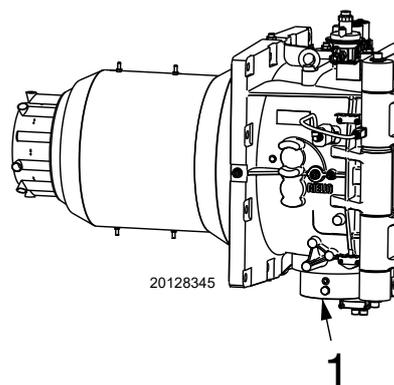


Fig. 22

	kW	1 Δp (mbar)		2 Δp (mbar)	
		G 20	G 25	G 20	G 25
RS 1300/E	9500	60	89	17	25
	10000	63	94	19	28
	10500	69	103	21	31
	11100	76	113	23	34
	11600	84	125	25	37
	12200	92	137	27	40
	12700	101	150	29	43
	13200	109	162	31	46
	13700	116	173	33	49
RS 1600/E	14300	122	182	36	54
	9503	23	34	13	19
	10200	27	40	14	21
	10900	31	46	15	22
	11600	35	52	16	24
	12400	41	61	17	25
	13100	46	69	18	27
	13800	51	76	20	30
	14500	56	83	22	33
RS 2000/E	15200	62	92	24	36
	15560	66	98	26	39
	15200	58	86	11	16
	15700	62	92	13	19
	16300	67	100	16	24
	16800	71	106	19	28
	17400	76	113	21	31
	17900	81	121	24	36
	18500	87	130	27	40
	19000	92	137	30	45
	19600	98	146	33	49
	20100	104	155	36	54

Tab. J

Example RS 1300/E BLU FS1 with natural gas G20:

Operation at maximum modulating output

Gas pressure at test point 1)(Fig. 23)	=	102 mbar
Pressure in combustion chamber	=	10 mbar
102 - 10	=	92 mbar

A pressure of 92 mbar, column 1, corresponds in Tab. J to an output of 12200 kW.

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

To calculate the required gas pressure at test point 1)(Fig. 23), set the maximum modulating output required from the burner operation:

- find the nearest output value in Tab. J for the burner in question.
- Read, on the right (column 1), the pressure at the test point 1)(Fig. 23).
- Add this value to the estimated pressure in combustion chamber.

Example RS 1300/E BLU FS1 with natural gas G20:

Operation at maximum modulating output

Gas pressure at an output of 12200 kW	=	92 mbar
Pressure in combustion chamber	=	10 mbar
92 + 10	=	102 mbar

pressure required at test point 1)(Fig. 23).

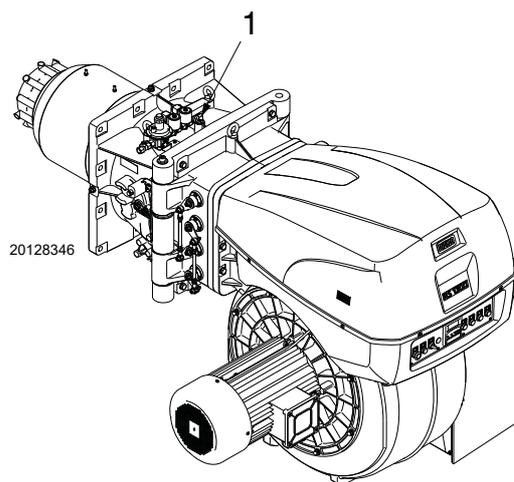
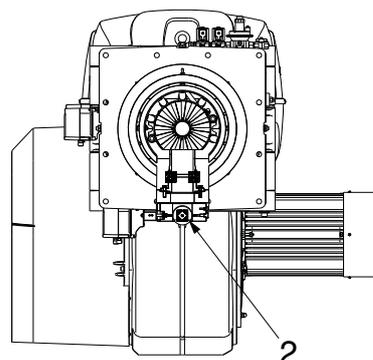


Fig. 23

5.11.5 Pilot - gas train connection

The burner is fitted with a dedicated gas train that is fixed to the pipe coupling.

- It should be connected to the main train downstream the filter or the pressure adjuster (depending on configuration).



Supply pressure 68 ÷ 500 mbar.

5.11.6 Ignition pilot burner

For proper operation, adjust gas pressure (measured at pressure test point 1)(Fig. 24) as follows:

Model	Gas	mbar	Sm ³ /h
RS 1300/E BLU FS1	G20	26	19
RS 1600/E BLU FS1	G20	26	19
RS 2000/E BLU FS1	G20	26	19

Tab. K



Check pilot flame stability before starting up the main burner.

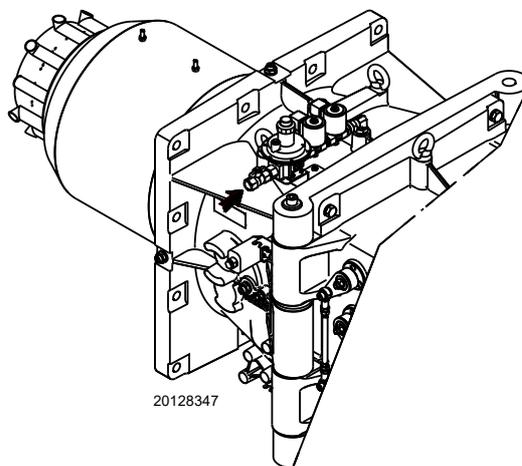


Fig. 24

In the case of ignition problems check:

- correct positioning of the ignition electrode;
- the gas pressure, according to indications.



The data of thermal output and combustion head gas pressure are related to full open (90°) gas butterfly valve.

5.12 Electrical wiring

Notes on safety for the electrical wiring



- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burner has been type-approved for intermittent operation (FS1). This means that it should be stopped compulsorily 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 burner is factory set for FS1 operation (1 stop every 24 hours); it can be converted to FS2 operation (continuous - 1 stop every 72 hours), by changing the parameters using the menu of the AZL Display.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
 - do not use adapters, multiple sockets or extensions;
 - make provisions for an omnipolar switch with a gap between the contacts of at least 3 mm (over-voltage category III), as required by current safety regulations.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



Turn off the burner's power supply using the main system switch.



Turn off the fuel interception tap.



Avoid condensate, ice and water leaks from forming.

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

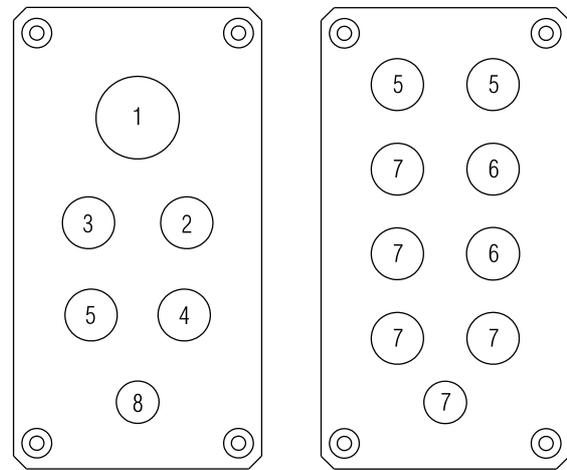
Use flexible cables in compliance with the EN 60 335-1 standard.

5.12.1 Supply cables and external connections passage

All the cables to be connected to the burner should be passed through cable grommets, as shown in Fig. 25.



To guarantee the protection level of the burner, it is necessary to close any holes and fairleads not used using the plugs supplied.



20096726

Fig. 25

Key (Fig. 25)

- 1 Electrical supply
- 2 Minimum gas pressure switch
- 3 Pressure switch for VPS gas valve leak detection
- 4 Gas train
- 5 Consents/Safety
- 6 Available
- 7 Plug
- 8 Speed sensor cable outlet



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

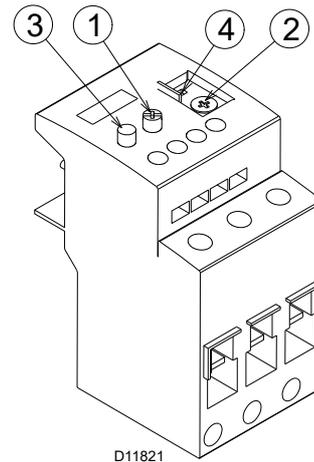
5.13 Calibration of the thermal relay

The thermal relay (Fig. 26) serves to avoid damage to the motor due to an excessive absorption increase or if a phase is missing. For calibration 2), refer to the table indicated in the electrical layout (electrical wiring in charge of the installer).

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

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

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



D11821

Fig. 26



WARNING

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

5.14 Motor rotation

As the burner is not fitted with a phase sequence checking device, the motor rotation may be incorrect.



WARNING

As soon as the burner starts up, go in front of the fan motor cooling fan and check it is rotating anti-clockwise (Fig. 27).

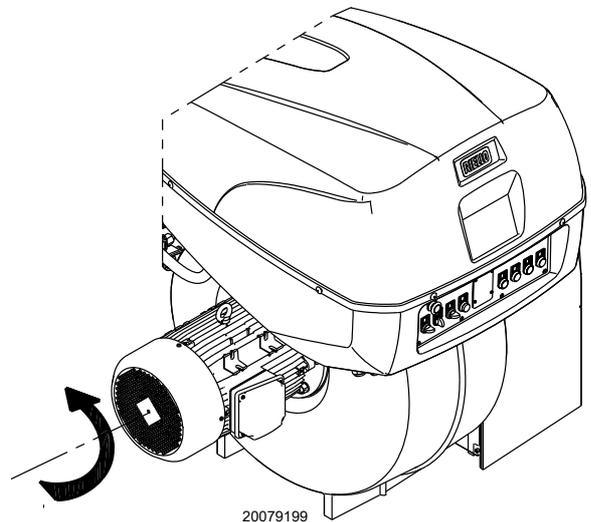
If this is not the case:

- turn the burner switch to position "0" (OFF) and wait for the control box to carry out the switch-off phase;
- disconnect the power supply to the main panel;
- invert the phases on the three-phase power supply.



DANGER

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



20079199

Fig. 27

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up



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



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



Refer to paragraph “Safety test - with gas ball valve closed” on page 30 before the first start-up.

6.2 Adjustments prior to ignition

The adjustments to be carried out are:

- Slowly open the manual valves situated upstream from 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 28) to the start of the scale.
- Purge the air from the gas line. We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Fit a U-type pressure gauge or a differential pressure gauge (Fig. 28), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber. The manometer readings are used to calculate MAX burner output.
- Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied. This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.



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.

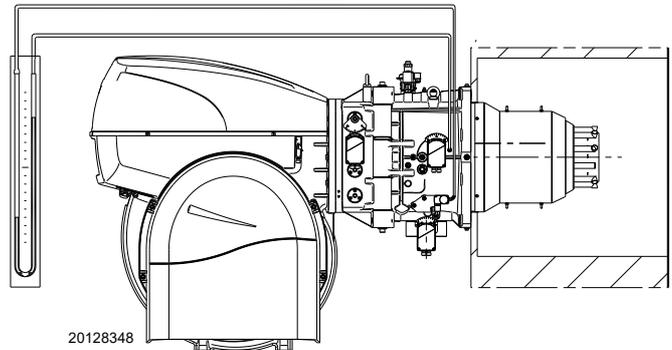


Fig. 28

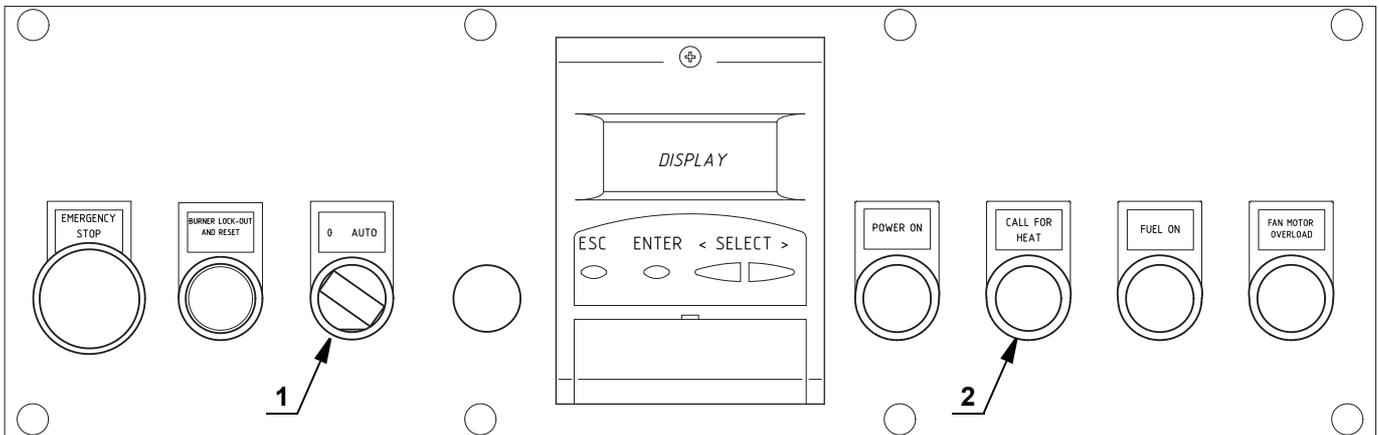
6.3 Burner start-up

Close the remote controls and position the selector 1)(Fig. 29) to “AUTO”.

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

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

When the limit thermostat (TL) is closed, the “HEAT REQUEST” 2)(Fig. 29) signal must be on and the burner starts the starting cycle.



D11968

Fig. 29

6.4 Burner ignition

The burner should light after having performed the above steps. If the motor starts up, but the flame does not appear and the control box goes into lockout, reset it and wait for a new ignition attempt.

If ignition is still not achieved, it may be that gas is not reaching the combustion head within the safety time period of 3 seconds; In this case increase gas ignition delivery.

The arrival of gas at the sleeve is indicated by the U-type manometer (Fig. 28).

If further burner lockouts occur, refer to the “Release procedure” given in the equipment manual supplied.



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.



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.

Once the burner has fired, now proceed with global calibration operations.

6.5 Combustion air adjustment

Fuel/combustion air synchronisation is done with the relevant servomotors (air and gas) by logging a calibration curve by means of the electronic cam.

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

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

The values given in Tab. L may be used as guidelines for correctly calibrating combustion.

EN 676		Air excess		CO
		Max. output. $\lambda \leq 1.2$	Max. output. $\lambda \leq 1.3$	
GAS	Theoretical max CO ₂ 0 % O ₂	CO ₂ % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

Tab. L

6.5.1 Air / gas adjustment and output modulation

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

The basic system functions control:

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

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



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

The first start-up and curve synchronisation manual is supplied with the burner.

At request, the complete manual for the control and setting of all parameters is available.

6.6 Pressure switch adjustment

6.6.1 Air pressure switch - check CO

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

With the burner operating 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 anticlockwise a little bit more.



Fig. 30

6.6.2 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.

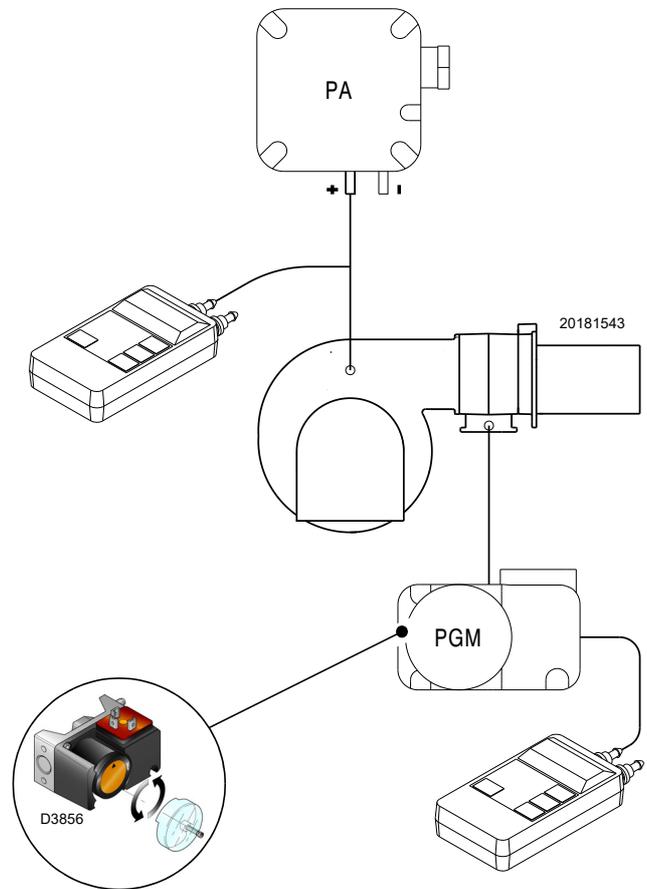


Fig. 31

6.6.3 Minimum gas pressure switch

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

Adjust the minimum gas pressure switch (Fig. 32) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

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

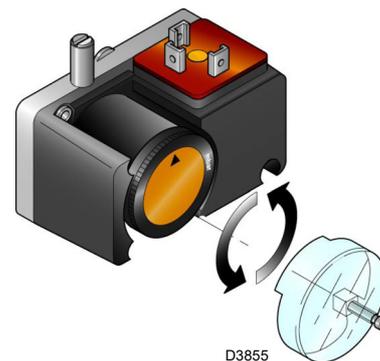
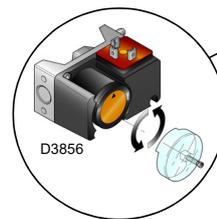


Fig. 32



1 kPa = 10 mbar

6.6.4 PVP pressure switch kit

Adjust the pressure switch for the leak detection control (PVP kit) (Fig. 33) according to the instructions supplied with the kit.

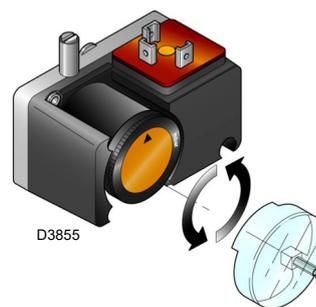


Fig. 33

6.7 Final checks (with burner operating)

<ul style="list-style-type: none"> ➤ Open the thermostat/pressure switch TL ➤ Open the thermostat/pressure switch TS 		The burner must stop
<ul style="list-style-type: none"> ➤ Turn the gas maximum pressure switch knob to the minimum end of scale position ➤ Turn the air pressure switch to the maximum end of scale position 		The burner must stop in lockout
<ul style="list-style-type: none"> ➤ Turn off the burner and cut off the power ➤ Disconnect the minimum gas pressure switch connector 		The burner must not start
<ul style="list-style-type: none"> ➤ Disconnect the flame sensor connection 		The burner must stop in lockout due to ignition failure

Tab. M



WARNING

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

7 Maintenance

7.1 Notes on safety for the maintenance

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

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



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

Before carrying out any maintenance, cleaning or checking operations:



Turn off the burner's power supply using the main system switch.



Turn off the fuel interception tap.



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

7.2 Maintenance programme

7.2.1 Maintenance frequency



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

7.2.2 Safety test - with gas ball valve closed

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

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

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

The start-up cycle must be as follows:

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

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

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



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

7.2.3 Checking and cleaning



The operator must use the required equipment during maintenance.

Combustion

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

Combustion head

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

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.

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.

Voltage on the flame sensor

Minimum value for correct operation: 3.5V DC (value on AZL display at about 50%).

If the value is lower, it could be due to:

- sensor not positioned correctly
- low voltage (lower than 187V)
- bad regulation of the burner

In order to measure, use a voltmeter with a 10V DC scale connected as in the diagram (Fig. 34).

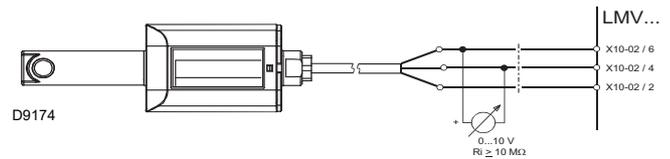


Fig. 34

Gas leaks

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

Gas filter

Change the gas filter when it is dirty.

Combustion

In case the combustion values found at the beginning of the intervention do not respect the standards in force or, in any case, do not correspond to a proper combustion, contact the Technical Assistance Service in order to carry out the necessary adjustments.

EN 676		Air excess		CO
		Max. output. $\lambda \leq 1.2$	Max. output. $\lambda \leq 1.3$	
GAS	Theoretical max CO ₂ 0% O ₂	CO ₂ % Calibration		mg/kWh
		$\lambda = 1.2$	$\lambda = 1.3$	
G 20	11.7	9.7	9	≤ 100
G 25	11.5	9.5	8.8	≤ 100
G 30	14.0	11.6	10.7	≤ 100
G 31	13.7	11.4	10.5	≤ 100

Tab. N

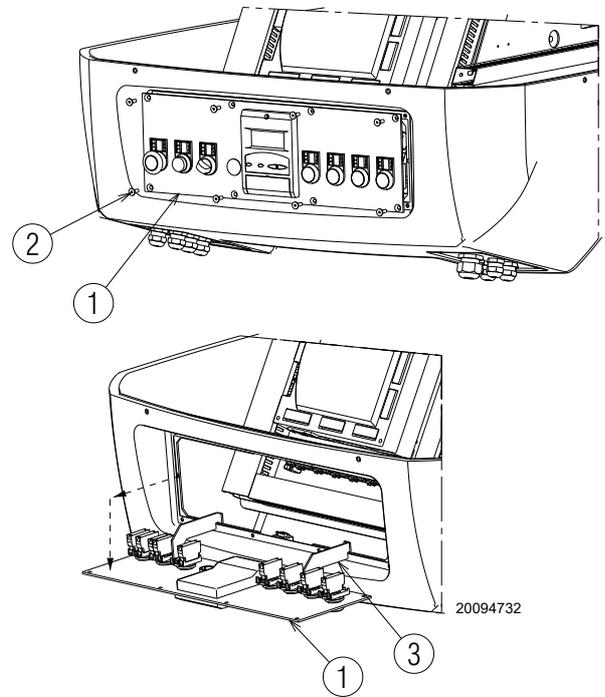


Fig. 35

7.2.4 Electrical panel



Turn off the burner's power supply using the main system switch.

In the event of maintenance/replacement of components in the lower part of the electrical panel, access is possible via the front of the panel itself, following the directions below:

- unscrew the screws 2) of the control panel 1);
- extract the control panel 1) and turn it 90°, hooking it with the brackets 3) in the profile of the electrical panel as shown in Fig. 35;
- after performing the operation, install the control panel 1) in the electrical panel with the appropriate screws 2), arranging the cables present.



Failure to install the control panel 1) in the seat of the electrical panel, results in the machine's loss of "IP" protection.

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

Turn off the burner's power supply using the main system switch.



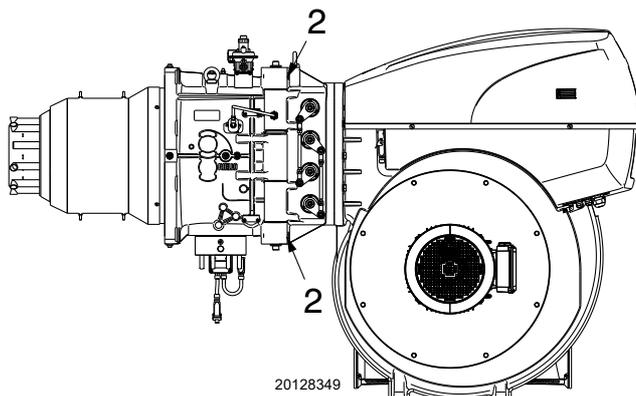
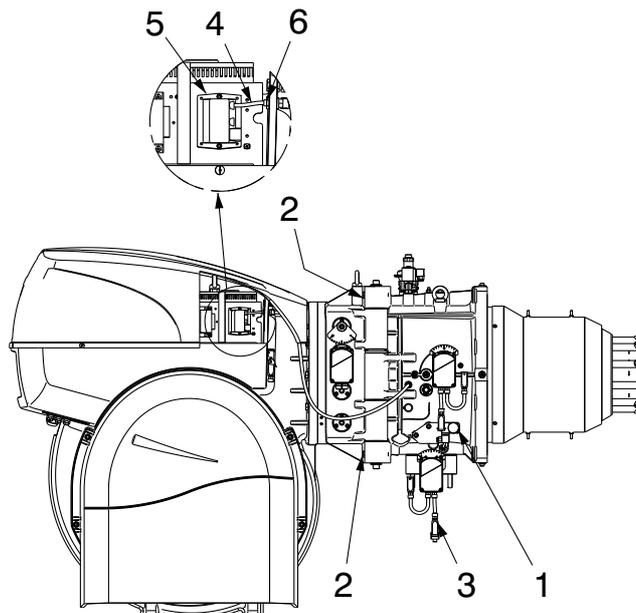
DANGER

Turn off the fuel interception tap.



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

- Disconnect the socket 3) of the gas servomotor.
- Disconnect the electrode cable from the gas pressure switch 1)(Fig. 36).
- Disconnect the socket flame sensor.
- Disconnect the electrode cable 4) from the transformer 5) and extracting it by unscrewing the connector 6).
- Remove the screws 2).
- At this point, it is possible to open the burner on the hinge.



20128349

Fig. 36

7.4 Closing the burner

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

- Secure screws 2) with a tightening torque of $250 \div 300$ Nm.



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

8 Faults - Possible 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 visualises alternately the lockout code and the relative diagnostic. To reset the start-up conditions, refer to the "Reset procedure" indicated in the control box manual supplied.

When the burner starts again, the red LED goes out and the control box is reset.



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.

A Appendix - Accessories
Probe for checking temperature/pressure

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

Software interface kit

Burner	Code
All models	3010388

AZL kit (display and operating unit) (Russia only)

Burner	Code
All models	3010469

Pressure switch kit for leak detection control (supplied as standard)

Burner	Code
All models	3010344

Soundproofing box kit

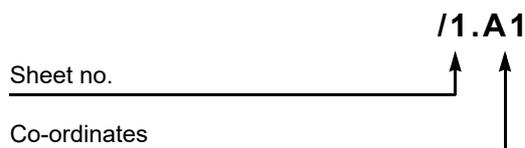
Burner	Code
All models	20108736

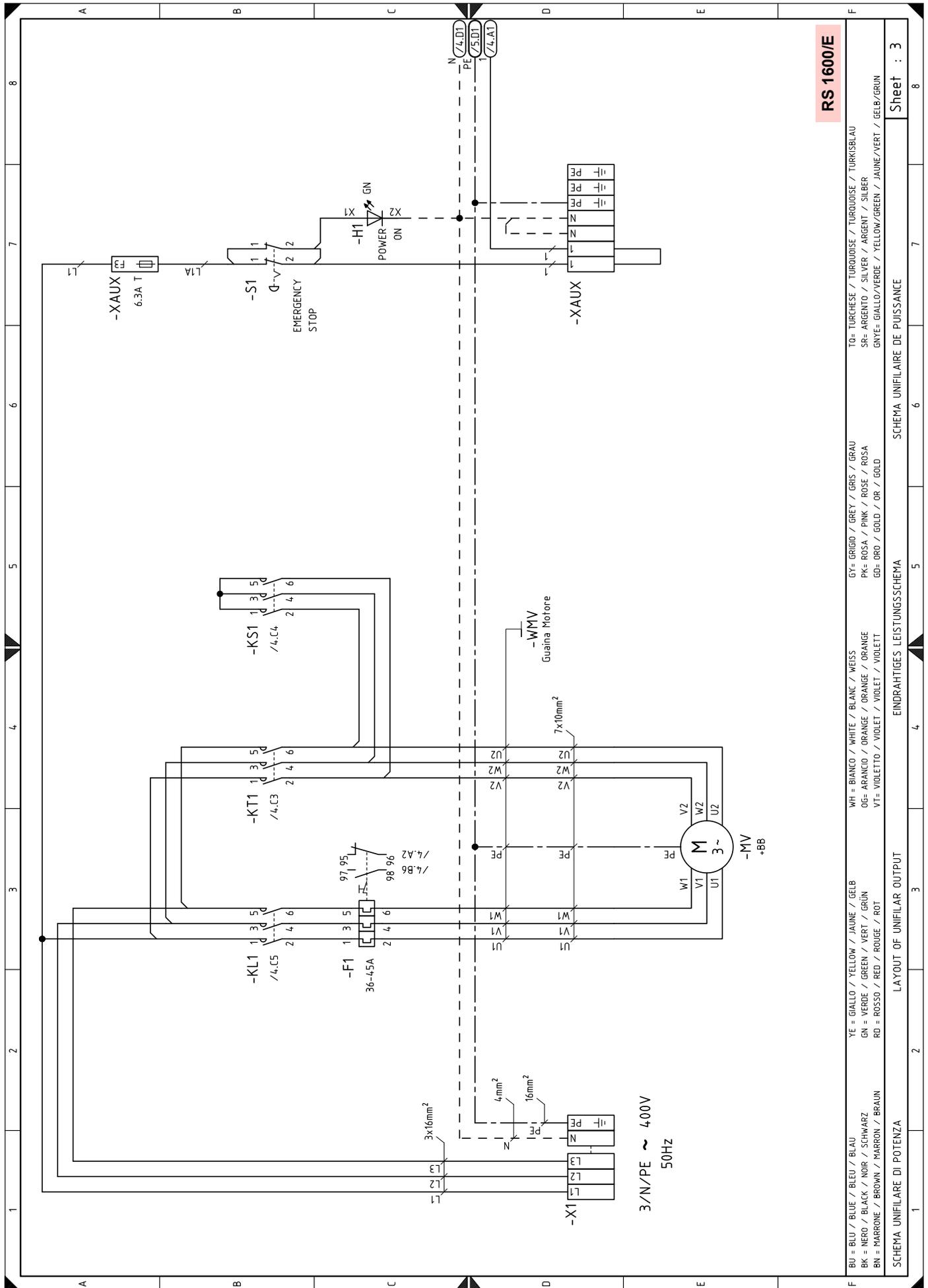
Gas trains in compliance with EN 676

Please refer to manual.

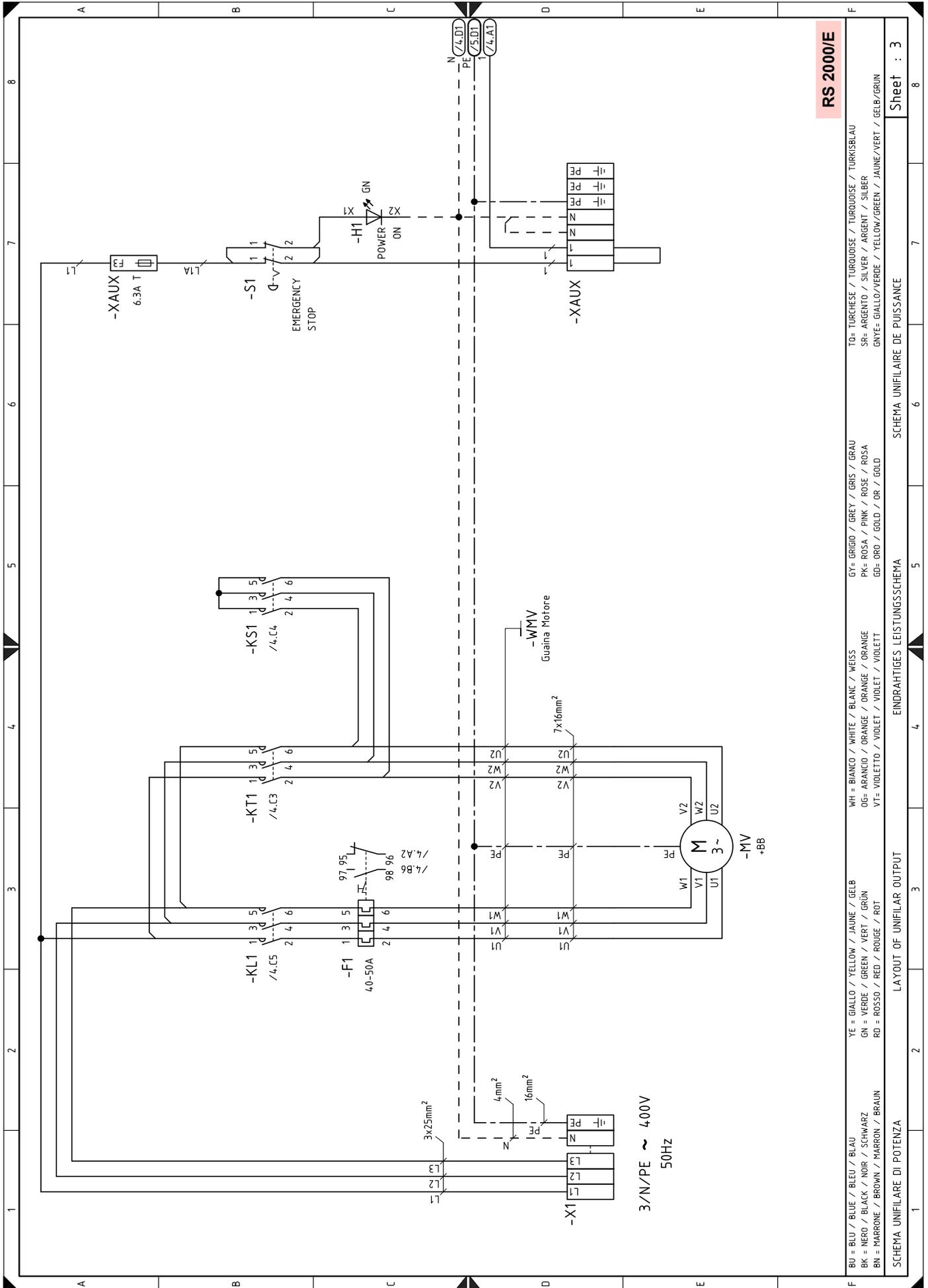
B Appendix - Electrical panel layout

1	Index of layouts
2	Indication of references
3	Layout of unifilar output
4	Star/delta starter operational layout
5	LMV51.... operational layout
6	LMV51.... operational layout
7	LMV51.... operational layout
8	LMV51.... operational layout
9	LMV51.... operational layout
10	LMV51.... operational layout
11	LMV51.... operational layout
12	LMV51.... operational layout
13	Electrical connections set by installer
14	Electrical connections set by installer
15	Electrical connections set by installer

2 Indication of references



BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURSCHSE / TURQUOISE / TURKOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG = ARANCIO / ORANGE / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VT = VIOLETT / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT
SCHEMA UNIFILARE DI POTENZA				
LAYOUT OF UNIFILAR OUTPUT				
EINDRAHTIGES LEISTUNGSSCHEMA				
SCHEMA UNIFILAIRE DE PUISSANCE				
				Sheet : 3



RS 2000/E

BU = BLU / BLUE / BLEU / BLAU	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESE / TURQUOISE / TURKUISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	OG = ARANCIO / ORANGE / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	VT = VIOLETTA / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

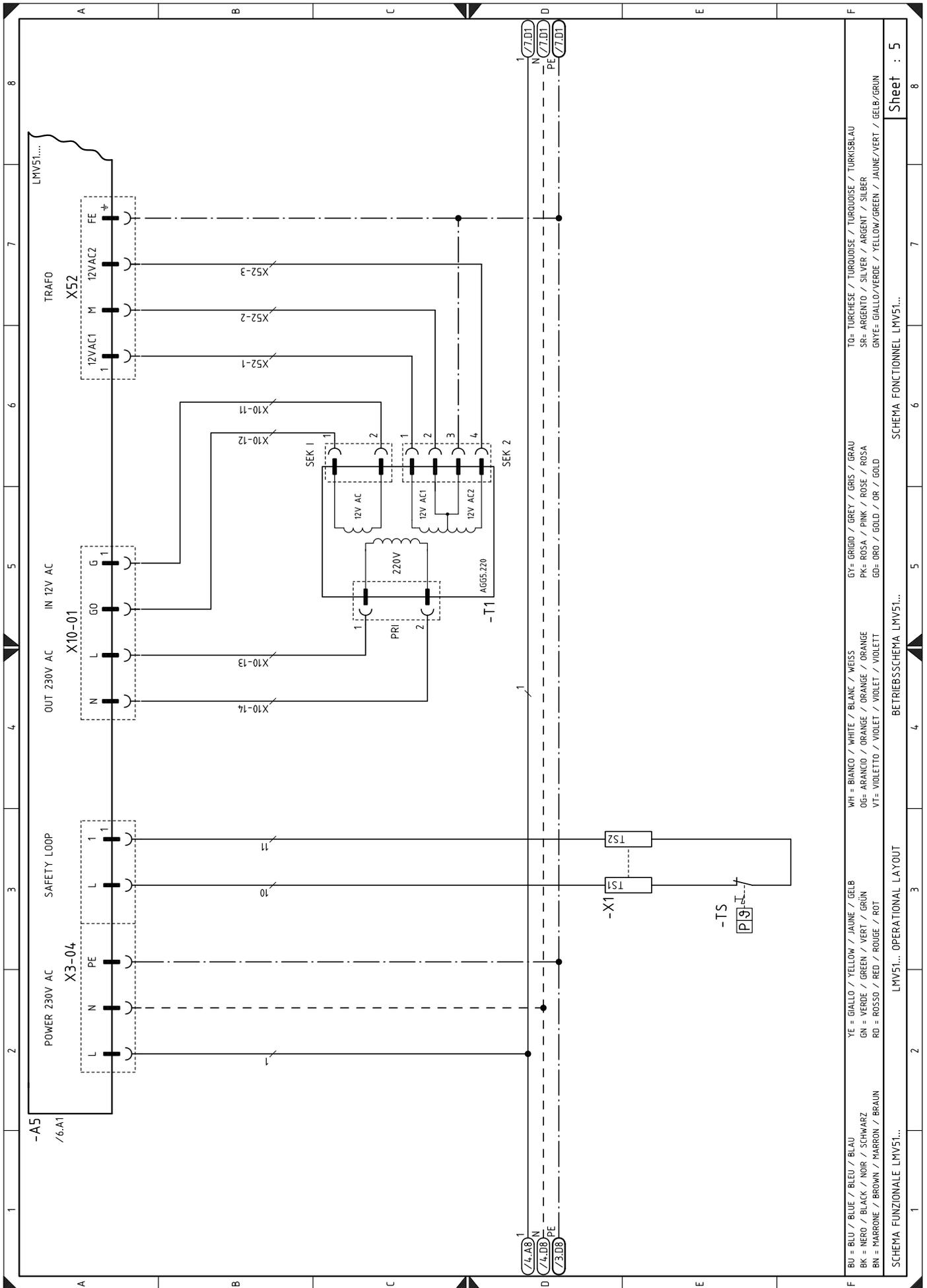
SCHEMA UNIFILARE DI POTENZA

LAYOUT OF UNIFILAR OUTPUT

EINDRAHTIGES LEISTUNGSSCHEMA

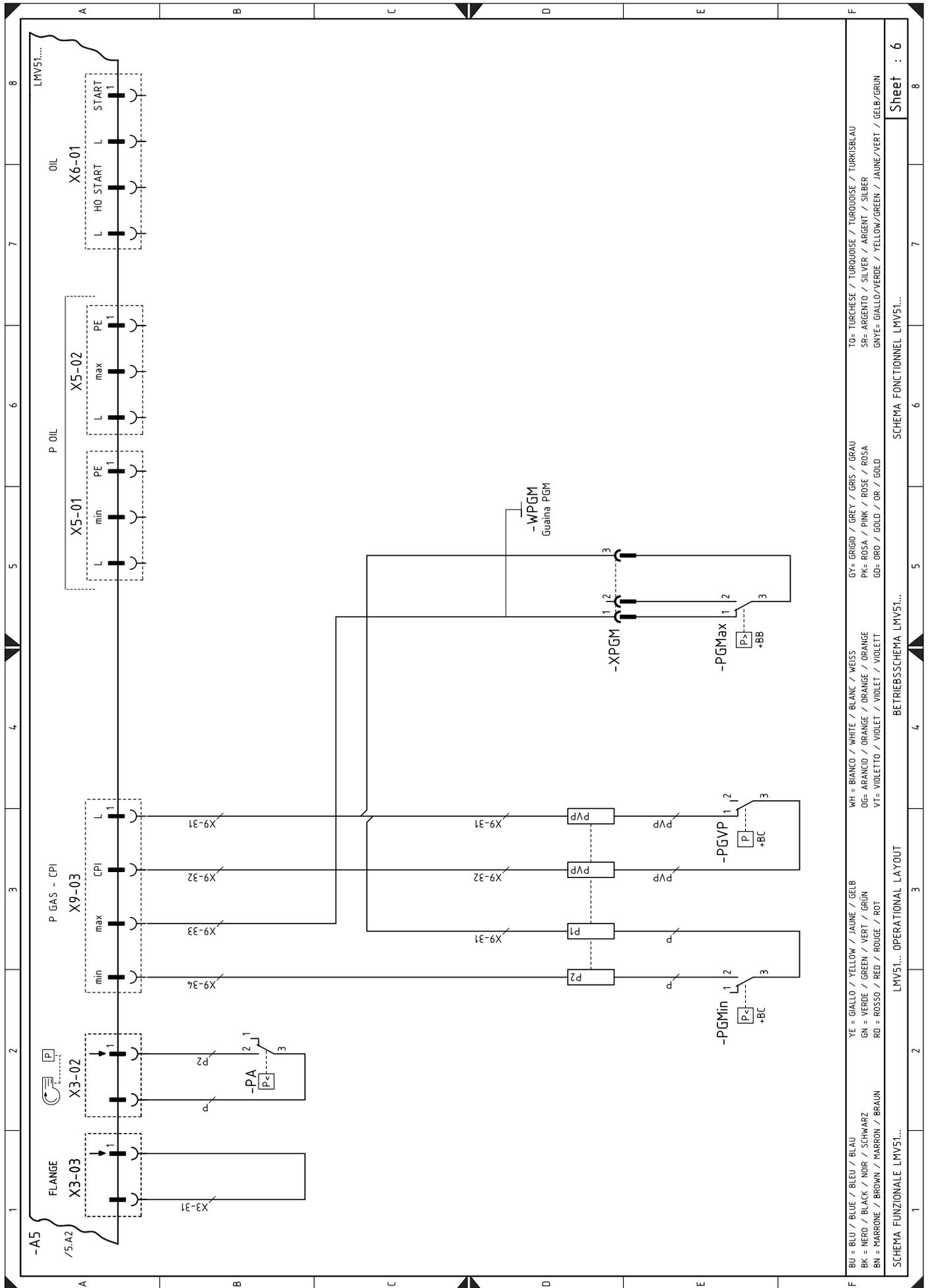
SCHEMA UNIFILAIRE DE PUISSANCE

Sheet : 3



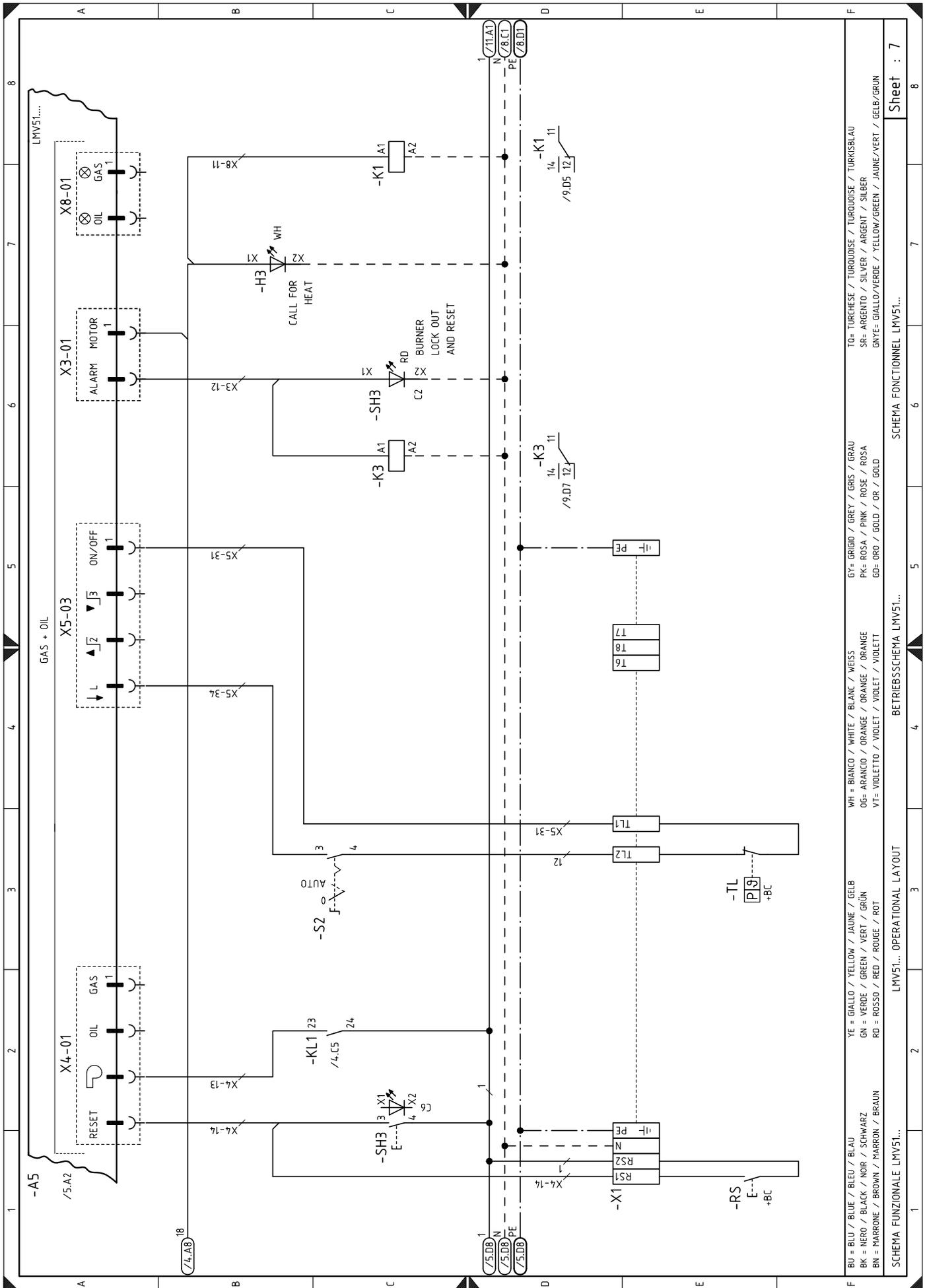
SCHEMA FUNZIONALE LMV51...
 SCHEMA FONCTIONNEL LMV51...
 OPERATIONAL LAYOUT
 BETRIEBSSCHEMA LMV51...
 SCHEMA FONCTIONNEL LMV51...
 Sheet : 5

BU = BLU / BLUE / BLEU / BLAU
 BK = NERO / BLACK / NOIR / SCHWARZ
 BN = MARRONE / BROWN / MARRON / BRAUN
 YE = GIALLO / YELLOW / JAUNE / GELB
 GN = VERDE / GREEN / VERT / GRÜN
 RD = ROSSO / RED / ROUGE / ROT
 WH = BIANCO / WHITE / BLANC / WEISS
 OG = ARANCIO / ORANGE / ORANGE / ORANGE
 VT = VIOLETTO / VIOLET / VIOLET / VIOLETT
 GY = GRIGIO / GREY / GRIS / GRAU
 PK = ROSA / PINK / ROSE / ROSA
 GB = GR0 / GOLD / OR / GOLD
 TO = TIRCHESE / TURQUOISE / TURQUOISE / TURKISBLAU
 SR = ARGENTO / SILVER / ARGENT / SILBER
 GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN



BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESE / TURQUOISE / TURKOISE / TURKISBLAU
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG = ARANCIO / ORANGE / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VT = VIOLETTO / VIOLET / VIOLET / VIOLETT	GD = ORO / GOLD / OR / GOLD	GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

SCHEMA FUNZIONALE LMV51... LMV51... OPERATIONAL LAYOUT BETRIEBSSCHEMA LMV51... SCHEMA FONCTIONNEL LMV51... Sheet : 6



TO= TURCHESE / TURQUOISE / TURKISBLAU
 SR= ARGENTO / SILVER / ARGENT / SILBER
 GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

GY= GRIGIO / GREY / GRIS / GRAU
 PK= ROSA / PINK / ROSE / ROSA
 GB= GRU / GOLD / OR / GOLD

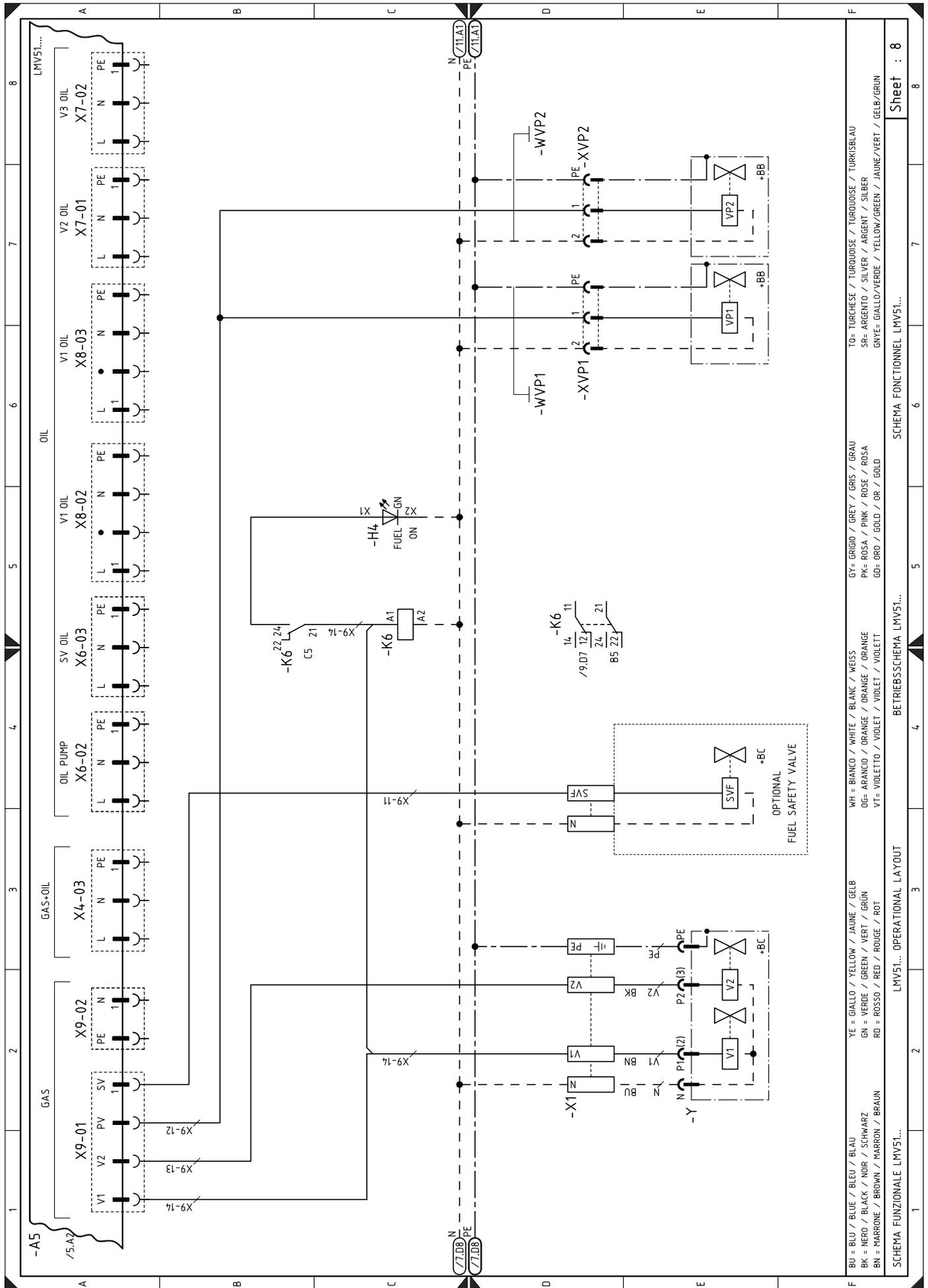
WH = BIANCO / WHITE / BLANC / WEISS
 OG= ARANCIO / ORANGE / ORANGE / ORANGE
 VT= VIOLETT / VIOLET / VIOLET / VIOLETT

YE = GIALLO / YELLOW / JAUNE / GELB
 GN = VERDE / GREEN / VERT / GRÜN
 RD = ROSSO / RED / ROUGE / ROT

BU = BLU / BLUE / BLEU / BLAU
 BK = NERO / BLACK / NOIR / SCHWARZ
 BN = MARRONE / BROWN / MARRON / BRAUN

SCHEMA FUNZIONALE LMV51...
 LMV51... OPERATIONAL LAYOUT
 BETRIEBSSCHEMA LMV51...
 SCHEMA FONCTIONNEL LMV51...

Sheet : 7



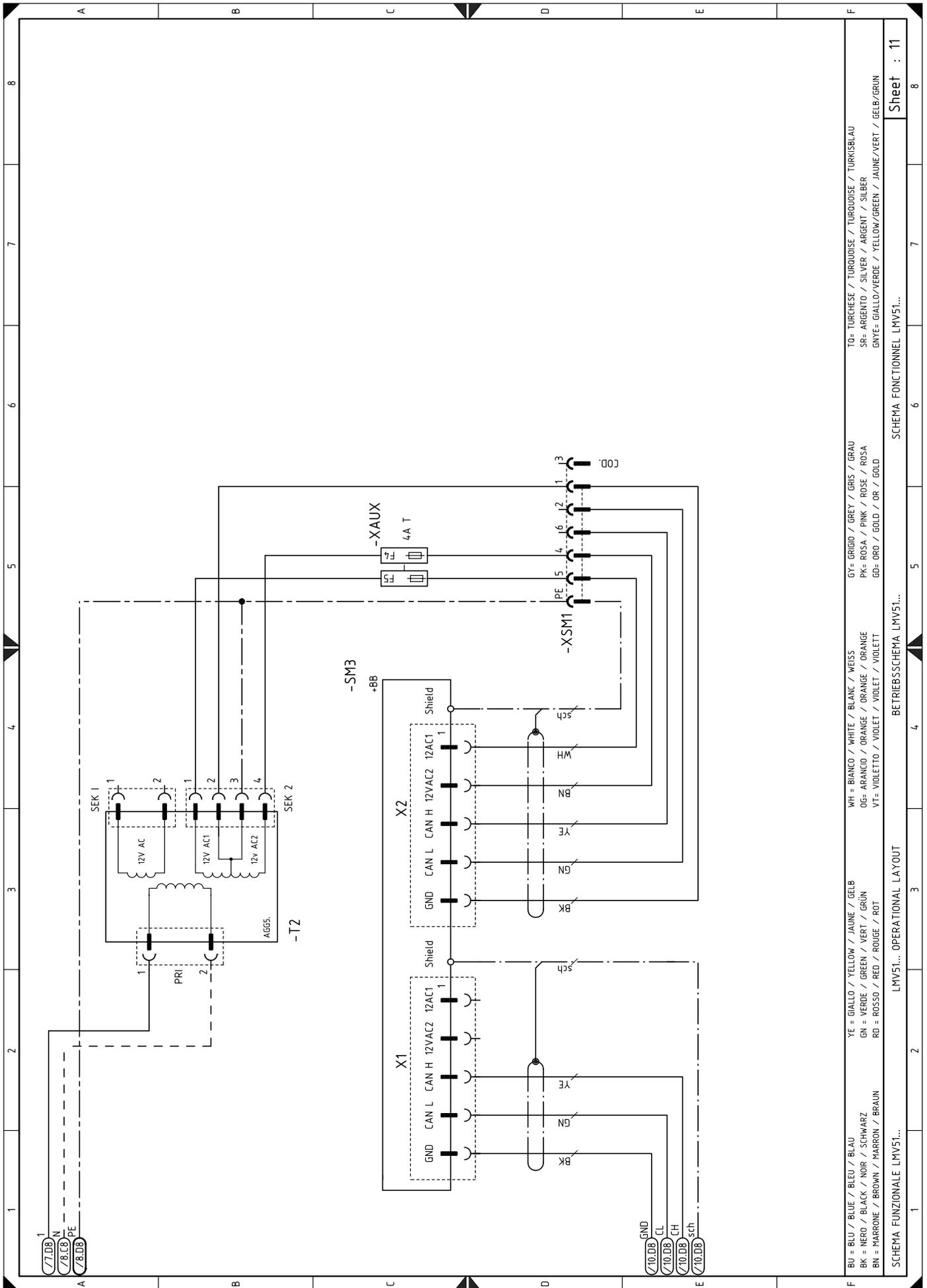
TO= TURCHESE / TURDOISE / TURDOISE / TURKISBLAU
 SR= ARGENTO / SILVER / ARGENT / SILBER
 GNYE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRUN

GY= GRIGIO / GREY / GRIS / GRAU
 PK= ROSA / PINK / ROSE / ROSA
 GD= ORO / GOLD / OR / GOLD

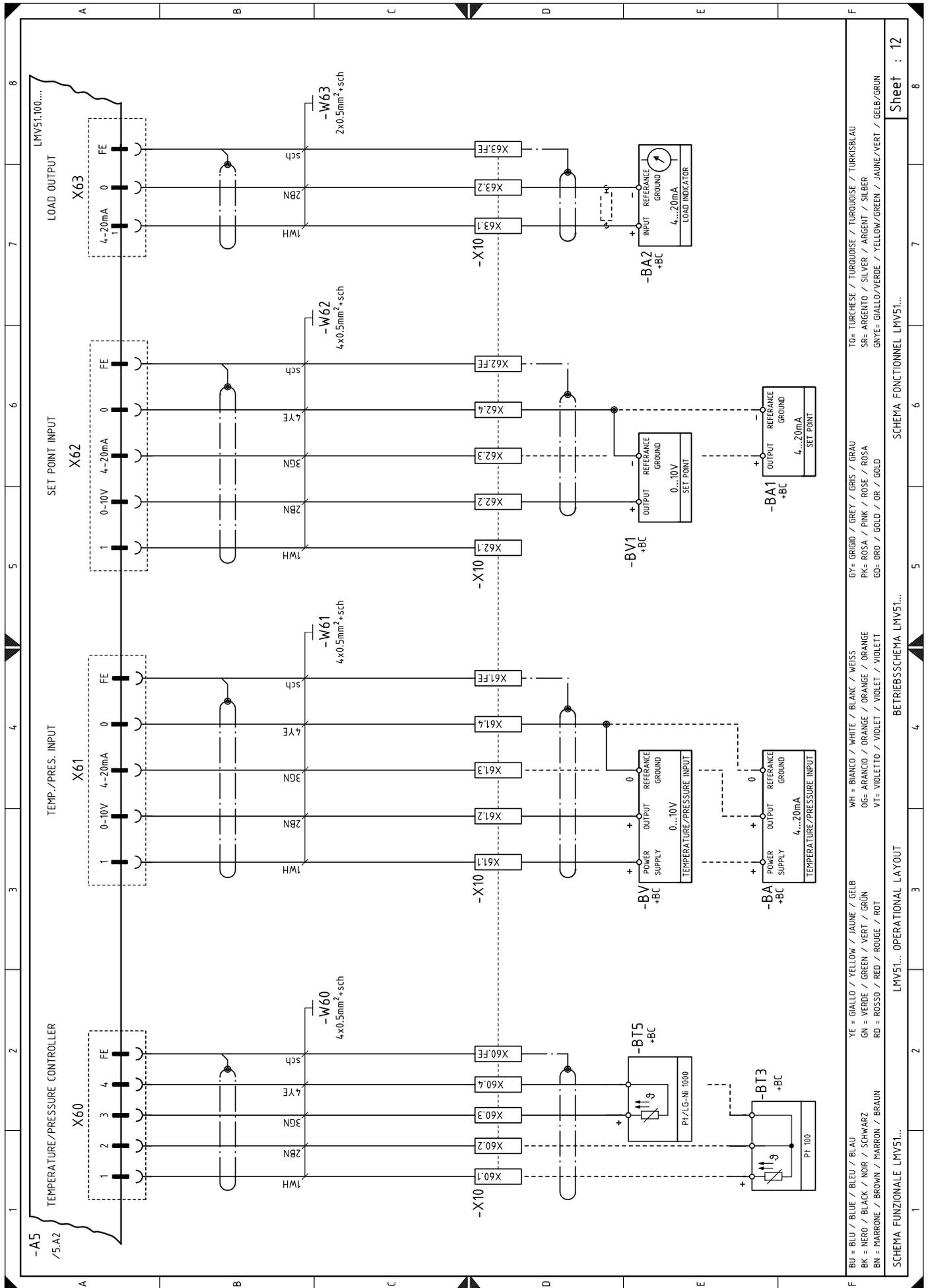
WH = BIANCO / WHITE / BLANC / WEISS
 OG= ARANCIO / ORANGE / ORANGE / ORANGE
 VT= VIOLETTA / VIOLET / VIOLET / VIOLETT

YE = GIALLO / YELLOW / JAUNE / GELB
 GN = VERDE / GREEN / VERT / GRUN
 RD = ROSSO / RED / ROUGE / ROT

BU = BLU / BLUE / BLEU / BLAU
 BK = NERO / BLACK / NOIR / SCHWARZ
 BN = MARRONE / BROWN / MARRON / BRAUN



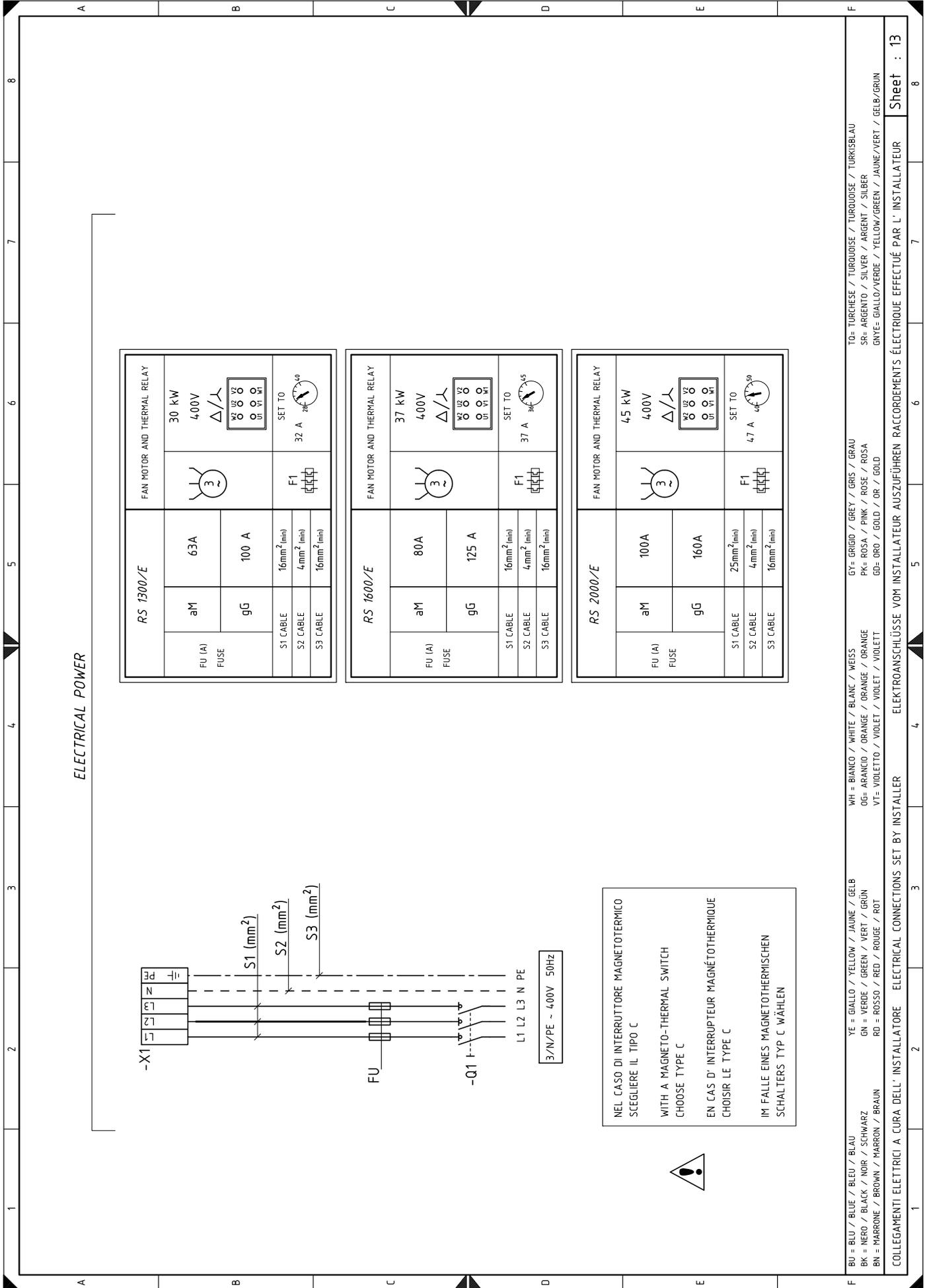
BU = BLU / BLUE / BLEU / BLAU	YE = GIALLO / YELLOW / JAUNE / GELB	WH = BIANCO / WHITE / BLANC / WEISS	GY = GRIGIO / GREY / GRIS / GRAU	TO = TURCHESE / TURQUOISE / TURKUISE / TURKISBLAU			
BK = NERO / BLACK / NOIR / SCHWARZ	GN = VERDE / GREEN / VERT / GRÜN	OG = ARANCIO / ORANGE / ORANGE / ORANGE	PK = ROSA / PINK / ROSE / ROSA	SR = ARGENTO / SILVER / ARGENT / SILBER			
BN = MARRONE / BROWN / MARRON / BRAUN	RD = ROSSO / RED / ROUGE / ROT	VT = VIOLETTA / VIOLET / VIOLET / VIOLETT	GB = GRU / GOLD / OR / GOLD	GNV = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / BELB/GRÜN			
SCHEMA FUNZIONALE LMV51...	LMV51... OPERATIONAL LAYOUT	BETRIEBSSCHEMA LMV51...	SCHEMA FONCTIONNEL LMV51...				
1	2	3	4	5	6	7	8

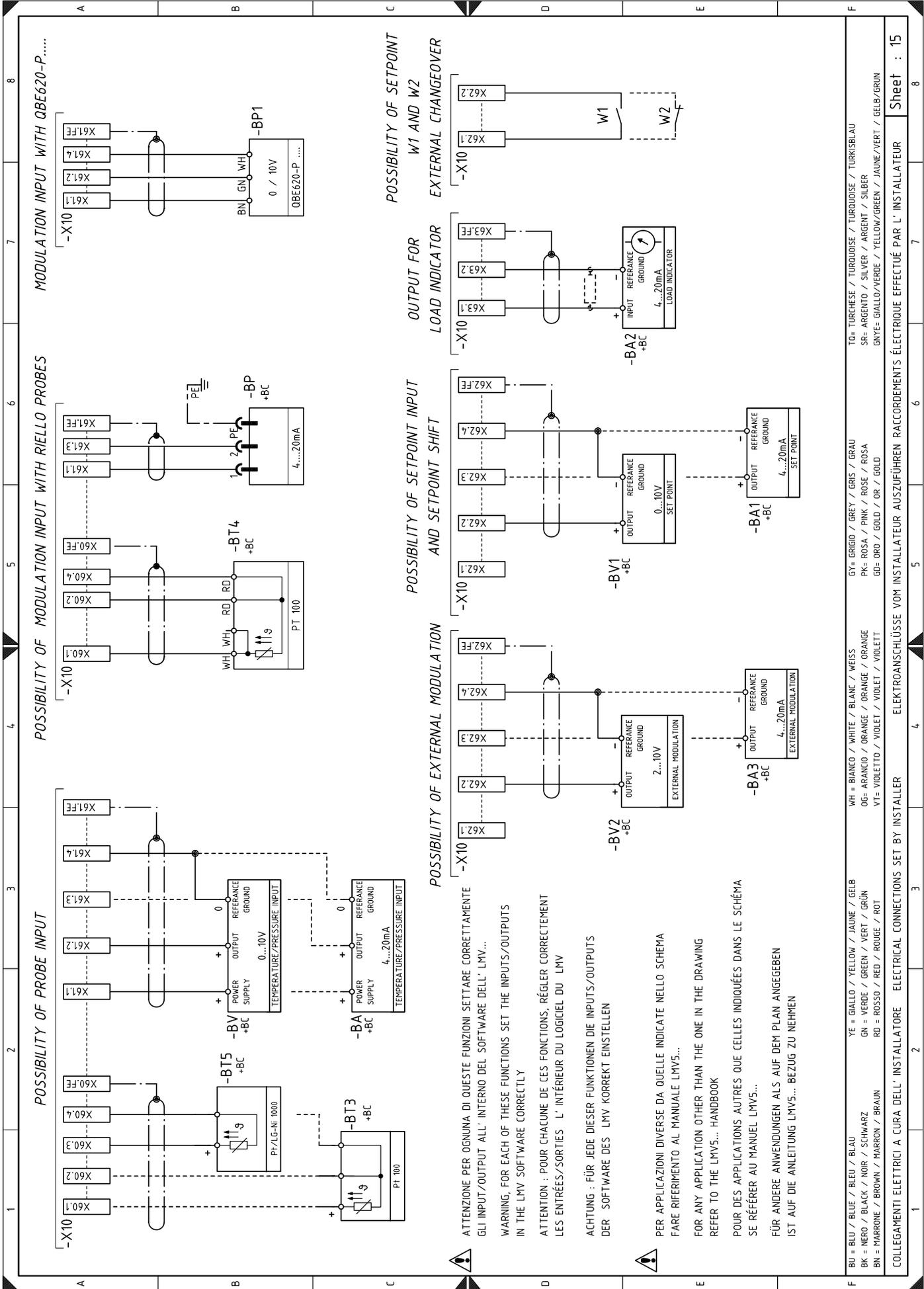


BU = BLU / BLUE / BLEU / BLAU
 BK = NERO / BLACK / NOIR / SCHWARZ
 BN = MARRONE / BROWN / MARRON / BRAUN
 YE = GIALLO / YELLOW / JAUNE / GELB
 GN = VERDE / GREEN / VERT / GRÜN
 RD = ROSSO / RED / ROUGE / ROT
 WH = BIANCO / WHITE / BLANC / WEISS
 OG = ARANCIO / ORANGE / ORANGE / ORANGE
 VT = VIOLETTA / VIOLET / VIOLET / VIOLETT
 GR = GRIGIO / GREY / GRIS / GRAU
 PK = ROSA / PINK / ROSE / ROSA
 GO = ORO / GOLD / OR / GOLD
 TO = Turchese / TURQUOISE / TURQUOISE / TURKISBLAU
 SR = ARGENTO / SILVER / ARGENT / SILBER
 GNYE = GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN

SCHEMA FUNZIONALE LMV51...
 LMV51... OPERATIONAL LAYOUT
 BETRIEBSSCHEMA LMV51...
 SCHEMA FONCTIONNEL LMV51...

Sheet : 12





Wiring layout key

A5	Control box	T2	Servomotor auxiliary transformer
AZL	Display for control box	VP1	Pilot valve 1
BA	Output probe in current	VP2	Pilot valve 2
BA1	Output device in current to modify remote setpoint	XAZL	AZL display connector
BA2	Load indicator with input under current	XAUX	Auxiliary terminal board
BA3	Device with current output for remote modulation	XPGM	Maximum gas pressure switch connector
BP	Pressure probe	XS	Flame sensor connector
BP1	Pressure probe	XSM	Servomotor connector
BT3	Probe Pt100, 3 wires	XVP1	VP1 connector
BT4	Probe Pt100, 3 wires	XVP2	VP2 connector
BT5	PT 1000 probe, 2 wires	X1	Main terminal supply board
BV	Output probe in voltage	X10	Kit terminal board
BV1	Output device in voltage to modify remote setpoint	Y	Gas regulator valve + gas safety valve
BV2	Device with voltage current output for remote modulation		
F1	Fan motor thermal relay		
F3	Auxiliary fuse		
F4	Servomotor auxiliary transformer fuse		
F5	Servomotor auxiliary transformer fuse		
H1	Light signalling burner on		
H2	Fan motor lockout warning lamp		
H3	Heat request lighting signal		
H4	Burner working lighting signal		
KL1	Star/triangle starter line contactor		
KS1	Start/triangle starter star contactor		
KST1	Star/triangle starter timer		
KT1	Star/triangle starter triangle contactor		
K1	Clean contacts output relay with fan motor working		
K2	Clean contacts output relay motor lockout		
K3	Clean contacts output relay for burner lockout		
K6	Clean contacts output relay burner switched on		
MV	Fan motor		
PA	Air pressure switch		
PE	Burner earth		
PGMax	Maximum gas pressure switch		
PGMin	Minimum gas pressure switch		
PGVP	Gas pressure switch for valve leak detection control device		
Q1	Line disconnect switch		
QRI	Flame sensor		
RS	Remote burner reset button		
S1	Emergency stop button		
S2	0 / AUTO selector		
SH3	Burner reset button and lock-out signal		
SM1	Air servomotor		
SM2	Fuel servomotor		
SM3	Head servomotor		
SVF	Gas safety valve (external, if present)		
TA	Ignition transformer		
TL	Limit thermostat/pressure switch		
TS	Safety thermostat/pressure switch		
T1	Control box transformer		

RIELLO

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