

## **GB** Dual fuel gas oil/ gas burners

Gas progressive two-stage or modulating operation/oil two-stage operation

# CE



# B10

| CODE                | MODEL        | TYPE  |
|---------------------|--------------|-------|
| 20034838 - 20034839 | RLS 68/M MX  | 779 T |
| 20034840 - 20034841 | RLS 120/M MX | 780 T |



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**1 Declaration**

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

Manufacturer: RIELLO S.p.A.  
 Address: Via Pilade Riello, 7  
 37045 Legnago (VR)  
 Product: Dual fuel gas oil/ gas burners  
 Model: RLS 68-120/M MX  
 These products are in compliance with the following Technical Standards:  
 EN 676  
 EN 267  
 EN 12100  
 and according to the European Directives:  
 GAR 2016/426/EU Gas Appliances Regulation  
 MD 2006/42/CE Machine Directive  
 LVD 2014/35/EU Low Voltage Directive  
 EMC 2014/30/EU Electromagnetic Compatibility

Such products are marked as follows:



CE-0085BP0175

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

**Declaration of Conformity A.R. 8/1/2004 & 17/7/2009 – Belgium**

Manufacturer: RIELLO S.p.A.  
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 Distributed by: RIELLO NV  
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 Tel. (053) 769 030  
 Fax. (053) 789 440  
 e-mail. info@riello.be  
 URL. www.riello.be  
 It is hereby certified that the apparatuses specified below conform with the model of the type described in the CE conformity declaration and they are produced and placed in circulation in conformity with the provisions defined in L.D. dated January 8, 2004 and July 17, 2009.  
 Type of product: Dual fuel gas oil/ gas burners  
 Model: RLS 68-120/M MX  
 Regulation applied: EN 267/676 and A.R. dated January 8, 2004 - July 17, 2009  
 Control body: TÜV Industrie Service GmbH  
 TÜV SÜD Gruppe  
 Ridlerstrasse, 65  
 80339 München DEUTSCHLAND  
 Measured value:

|              | OIL                                      | GAS                                    |
|--------------|--|--|
| RLS 68/M MX  | CO max: 12 mg/kWh<br>NOx max: 138 mg/kWh | CO max: 8 mg/kWh<br>NOx max: 70 mg/kWh |
| RLS 120/M MX | CO max: 6 mg/kWh<br>NOx max: 130 mg/kWh  | CO max: 7 mg/kWh<br>NOx max: 64 mg/kWh |

**Manufacturer's Declaration**

RIELLO S.p.A. declares that the following products comply with the NOx emission limits specified by German standard "1. BImSchV release 26.01.2010".

| Product                        | Type  | Model        | Power         |
|--------------------------------|-------|--------------|---------------|
| Dual fuel gas oil/ gas burners | 779 T | RLS 68/M MX  | 200 - 860 kW  |
|                                | 780 T | RLS 120/M MX | 300 - 1200 kW |

Legnago, 21.04.2018

Executive General Manager  
 RIELLO S.p.A. - Burner Department  
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Research & Development Director  
 RIELLO S.p.A. - Burner Department  
 Mr. F. Comencini

**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 Danger: live components**



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

**Other symbols**



**ENVIRONMENTAL PROTECTION**

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

- This symbol indicates a list.

**Abbreviations used**

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

**Delivery of the system and the instruction manual**

When the system is delivered, it is important that:

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

.....

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

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

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

To ensure a periodic check, the manufacturer recommends the drawing up of a Maintenance Contract.

## 2.2 Guarantee and responsibility

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



**WARNING**

Failure to observe the information given in this manual, operating negligence, incorrect installation and carrying out of non authorised modifications will result in the annulment by the manufacturer of the guarantee that it supplies with the burner.

In particular, the rights to the guarantee and the responsibility will no longer be valid, in the event of damage to things or injury to people, if such damage/injury was due to any of the following causes:

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of unauthorised modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- 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;
- 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.**

Riello warranty is subject to correct burner, appliance and application matching, and set up in line with Riello's instructions and guidelines. All components within the hydraulic circuit suitable for bio fuel use and supplied by Riello will be identified as Bio compatible. No warranty is given in relation to the use of components which are not so identified with bio fuel blends. If in any doubt please contact Riello for further advice.

If any Riello burners are used with fuel with a bio content >10% then the components within the hydraulic circuit maybe affected and are not covered under warranty. The hydraulic circuit consists of;

- Pump
- Hydraulic ram (where applicable)
- Valve block
- Flexible oil lines (considered as a consumable component)

1. Irrespective of any warranty given by Riello in relation to normal use and manufacturing defects, when fuels not meeting the relevant standards are used, or where fuel storage issues have not been addressed correctly, or the equipment used is not compatible, if failures occur which are directly or indirectly attributed to such issues and/or to the non-observance of this guidance, then no warranty or liability is implied or accepted by Riello.
2. Riello have carefully chosen the specification of the bio compatible components including the flexible oil lines to protect the pump, safety valve and nozzle. The Riello warranty is dependent upon the use of Riello genuine components including the oil lines, being used.
3. Riello warranty does not cover defects arising from incorrect commissioning or servicing by non Riello employed service engineers, and any issues impacting the burner arising from external site related issues.

## 2.3 Guidance for the use of bio fuel blends up to 10%

### Background

With increasing focus on renewable and sustainable energy requirements, Bio fuel usage is set to increase. Riello is committed to promoting energy conservation and the use of renewable energy from sustainable resources including liquid bio fuels, however there are some technical aspects that must be considered at the planning stage of using such fuels to reduce the potential for equipment failure or the risks of fuel leakage.

Liquid Bio fuel is a generic description used for oil that can come from numerous feed stocks including recycled cooking oils. These types of oils have to be considered and treated differently from standard mineral or fossil fuels, as they are generally more acidic, hygroscopic and less stable.

Due to this, a holistic approach is needed from the specification of the liquid Bio fuel, the storage of the fuel, its oil supply line and ancillary equipment, and very importantly the oil filtration and the burner itself. The specification for FAME (Fatty Acids Methyl Ester) liquid Bio fuel is critical to reliable equipment operation.

It is a minimum requirement that the fuel blend (up to 10% Bio) is obtained with gasoil in accordance with the relevant EN standards, regional regulations and FAME in accordance with EN 14214. It is also important that the fuel blends meet the require-

ments related to operational environment conditions within the relevant EN standards.

When choosing your Riello oil products where you know Bio fuels will be in use, please make sure that a Bio compatible burner and/or components have been supplied. If an existing burner is to be used with a liquid Bio fuel then a kit may be required to make it compatible and the guidance notes enclosed concerning oil storage and filtration must be adhered to. The end user is responsible for the thorough verification of the potential risks associated with the introduction of a bio fuel blend and the suitability of the appliances and installation applicable.

Irrespective of any warranty given by Riello in relation to normal use and manufacturing defects, when fuels not meeting the relevant standards are used, or where fuel storage issues have not been addressed correctly, or the equipment used is not compatible, if failures occur which are directly or indirectly attributed to such issues and/or to the non-observance of this guidance, then no warranty or liability is implied or accepted by Riello.

### 2.3.1 Information and general instructions

To ensure consistency, the supplier of the fuel must be able to demonstrate compliance with a recognised Quality Control and management system to ensure high standards are maintained within the storage, blending and delivery processes. The installation oil storage tank and its ancillaries must also be prepared BEFORE liquid Bio fuel is introduced. Checks and preparation should include;

- For new installations, make sure that all materials and seals in the oil storage and supply line to the burner are compatible with Bio fuels. For all installations, there must be a good quality bio compatible oil filter at the tank and then a secondary filter of 100 Microns protecting the burner from contamination.
- If an existing oil storage tank is to be used then in addition to the materials checks as detailed above, it will be essential that the tank is first inspected for condition and checked for water or other contamination. Riello strongly recommends that the tank is cleaned and oil filters replaced prior to Bio fuel delivery. If this is not completed then due to the hydroscopic nature of Bio fuel, it will effectively clean the tank, absorb water present which in turn will result in equipment failure that is not covered by the manufacturer's warranty.
- Depending on the capacity of the oil storage tank and oil usage, fuels may remain static within the tank for some considerable time and so Riello recommends that the oil distributor is consulted regarding the use of additional Biocides within the fuel to prevent microbial growth from occurring within the tank. Riello suggests that fuel suppliers and or service companies are contacted for guidance on fuel filtration. Special attention should be applied to fuel applications where oil may be stored for long periods of time.
- The burner must be set according to the appliance application and commissioned checking that all combustion parameters are as recommended in the appliance technical manual.
- Riello recommends that the in line and burner oil pump filters are inspected and if required replaced at least every 4 months during burner use, before the burner start-up following a long period of discontinue operation and even more frequently where contamination has occurred. Particular attention is needed when inspecting and checking for fuel leakages from seals, gaskets and hoses.

### 2.3.2 Product Disclaimer Statement

**CAREFULLY READ THE FOLLOWING DISCLAIMER. YOU ACCEPT AND AGREE TO BE BOUND BY THIS DISCLAIMER BY PURCHASING RIELLO BIO COMPATIBLE BURNERS AND/OR COMPONENTS.**

Although the information and recommendations (hereinafter "Information") in this guidance is presented in good faith, believed to be correct and has been carefully checked, Riello (and its subsidiaries) makes no representations or warranties as to the completeness or accuracy of the Information. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Riello (and its subsidiaries) be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information.

Other than set forth herein, Riello (and its subsidiaries) makes no additional warranties with respect to the bio compatible burner, either express or implied, including that of merchantability or fitness for a particular purpose or use.

In no event shall Riello (and its subsidiaries) be liable for any indirect, incidental, special or consequential damages including, without limitation, loss of profits, damages for loss of business profits, business interruption, loss of business information, loss of equipment, or other pecuniary loss or compensation for services whether or not it is advised of the possibility of such damages.

With the exception of injuries to persons, Riello's liability is limited to the customer's right to return defective/non-conforming products as provided by the relevant product warranty.



## 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 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 detailed as available as spare parts by the Manufacturer can be replaced.

### 3.2 Safety warnings

The dimension of the boiler's combustion chamber must respond to specific values, in order to guarantee a combustion with the lowest polluting emissions rate.

The Technical Service Personnel will be glad to give you all the information for a correct matching of this burner to the boiler.

This burner must only be used for the application it was designed for.

The manufacturer accepts no liability within or without the contract for any damage caused to people, animals and property due to installation, adjustment and maintenance errors or to improper use.

### 3.3 Basic safety rules

- Children or inexperienced persons must not use the appliance.
- Under no circumstances must the intake grids, dissipation grids and ventilation vents in the installation room be covered up with cloths, paper or any other material.
- Unauthorised persons must not attempt to repair the appliance.
- It is dangerous to pull or twist the electric leads.
- Cleaning operations must not be performed if the appliance is not disconnected from the main power supply.
- Do not clean the burner or its parts with inflammable substances (e.g. petrol, alcohol, etc.). The cover must be cleaned with soapy water.
- Do not place anything on the burner.
- Do not block or reduce the size of the ventilation vents in the installation room.
- Do not leave containers and inflammable products or combustible materials in the installation room.

### 3.4 Personnel training

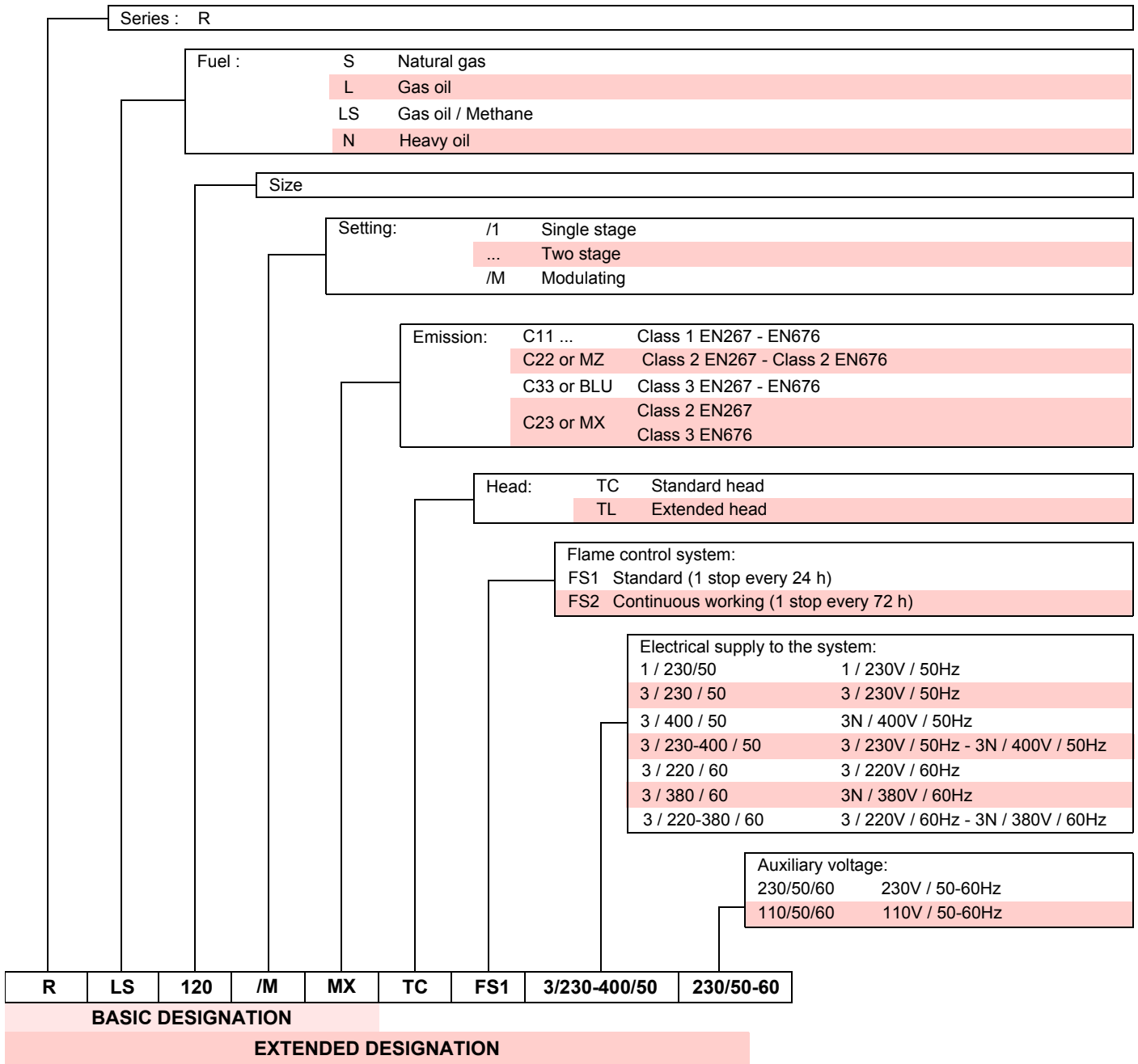
The user is the person, body or company that has acquired the machine and intends to use it for the specific purpose. He is responsible for the machine and for the training of the people working around it.

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- must take all the measures necessary to prevent unauthorised people gaining access to the machine;
- 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;
- 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.
- 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.

**4 Technical description of the burner**

**4.1 Burner designation**



**4.2 Models available**

| Designation |    | Electrical supply | Code     |
|-------------|----|-------------------|----------|
| RLS 68/M    | TC | 3/230-400/50      | 20034838 |
| RLS 68/M    | TL | 3/230-400/50      | 20034839 |
| RLS 120/M   | TC | 3/230-400/50      | 20034840 |
| RLS 120/M   | TL | 3/230-400/50      | 20034841 |

Tab. A

**4.3 Technical data**

| Model   |                            |            | RLS 68/M MX  | RLS 120/M MX           |
|---|----------------------------|------------|--|------------------------|
| Type  |                            |            | 779 T  | 780 T                  |
| Output <sup>(1)</sup><br>Delivery <sup>(1)</sup>                  | 2 <sup>nd</sup> stage      | kW<br>kg/h | 350 - 860<br>30 - 73   | 600 - 1200<br>50 - 101 |
|   | min. 1 <sup>st</sup> stage | kW<br>kg/h | 200<br>17  | 300<br>25              |
| Fuel  |                            |            | Gas oil, viscosity at 20 °C: 6 mm <sup>2</sup> /s max (1,5 °E - 6 cSt)<br>Gas oil and Blends of gas oil and bio fuel (FAME in accordance with EN 14214) up to 10%<br>Natural gas: G20 (methane) - G21 - G22 - G23 - G25<br>GPL - G30 (propane) - G31 (butane)              |                        |
| Gas pressure at maximum delivery <sup>(2)</sup><br>gas: G20 / G25 |                            | mbar       | 12.6 / 16.4  | 19.5 / 25.3            |
| Operation   |                            |            | <ul style="list-style-type: none"> <li>- Intermittent (min. 1 stop in 24 hours) / Continuous</li> <li>- Light oil: Two-stage (high and low flame) and single-stage (all - nothing)</li> <li>- Gas: Progressive two-stage or modulating by kit (see accessoires)</li> </ul> |                        |
| Nozzles   |                            | number     | 2  |                        |
| Standard applications   |                            |            | Boilers: water, steam, diathermic oil  |                        |
| Ambient temperatur  |                            | °C         | 0 - 40   |                        |
| Combustion air temperature  |                            | °C max     | 60   |                        |
| Pump  | delivery (at 12 bar)       | kg/h       | 220  |                        |
|   | pressure range             | bar        | 10 - 20  |                        |
|   | fuel temperatur            | °C max     | 60   |                        |
| Electrical protection   |                            |            | IP 44  |                        |
| Noise levels <sup>(3)</sup>                                       | Sound pressure             | dB(A)      | 76   | 79                     |
|   | Sound power                |            | 87   | 90                     |

**Tab. B**

- (1) Reference conditions: ambient temperature 20°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.  
 (2) Pressure at test point 4)(Fig. 6 at page 13) with zero pressure in the combustion chamber and maximum burner output.  
 (3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum output.  
 The sound power is measured with the "Free Field" method, as per EN 15036, and according to an accurate "Accuracy: Category 3" measurement, as described in EN ISO 3746.

**4.4 Electrical data**

**Motor IE1**

| Model                        |                      | RLS 68/M MX        | RLS 120/M MX                      |
|------------------------------|----------------------|--------------------|-----------------------------------|
| Electrical supply            | V/Ph/Hz              | 230-400/3/50       |                                   |
| Auxiliary power supply       | V/Ph/Hz              | 230/3/50           |                                   |
| Fan motor                    | rpm                  | 2890               |                                   |
|                              | V                    | 230/400            |                                   |
|                              | kW                   | 1.5                |                                   |
|                              | A                    | 5.9/3.4            |                                   |
| Pump motor                   | V                    | 220/240            |                                   |
|                              | W                    | 550                |                                   |
|                              | A                    | 3.6                |                                   |
| Pump motor capacitor         | µF                   | 25                 |                                   |
|                              | Ignition transformer | V1 - V2<br>I1 - I2 | 230 V - 2 x 5 kV<br>1.9 A - 30 mA |
| Electrical power consumption | kW max               | 2.6                | 3.2                               |

**Tab. C**

### Motor IE2

| Model                        |         | RLS 68/M MX      | RLS 120/M MX |
|------------------------------|---------|------------------|--------------|
| Electrical supply            | V/Ph/Hz | 230-400/3/50     |              |
| Auxiliary power supply       | V/Ph/Hz | 230/3/50         |              |
| Fan motor                    | rpm     | 2860             | 2860         |
|                              | V       | 230/400          | 230/400      |
|                              | kW      | 1.5              | 2.2          |
|                              | A       | 5.5/3.4          | 7.9/4.6      |
| Pump motor                   | V       | 220/240          |              |
|                              | W       | 550              |              |
|                              | A       | 3.6              |              |
| Pump motor capacitor         | µF      | 25               |              |
| Ignition transformer         | V1 - V2 | 230 V - 2 x 5 kV |              |
|                              | I1 - I2 | 1.9 A - 30 mA    |              |
| Electrical power consumption | kW max  | 2.5              | 3.1          |

Tab. D

### 4.5 Countries of destination - Burner categories

| Country of destination   | Gas category  |
|--|---|
| IT - AT - GR - DK - FI - SE - EE - CZ - HU - LT - SK - BG - LV - SI - PL | II <sub>2</sub> H3B/P   |
| ES - GB - IE - PT  | II <sub>2</sub> H3P   |
| NL   | I <sub>2L</sub> - I <sub>2E</sub> - I <sub>2</sub> (43.46 ÷ 45.3 MJ/m <sup>3</sup> (0°C)) |
| FR   | II <sub>2</sub> Er3P  |
| DE   | II <sub>2</sub> ELL3B/P   |
| BE   | I <sub>2</sub> E(R)B, I <sub>3</sub> P  |
| LU   | II <sub>2</sub> E3B/P   |
| NO - CY - MT   | I <sub>3</sub> B/P  |
| RO   | I <sub>2</sub> H  |

Tab. E

### 4.6 Packaging - Weight

- The burners stand on a wooden base which can be lifted by fork-lifts. Outer dimensions of packaging are indicated in Tab. F.
- The weight of the burner complete with packaging is indicated in Tab. F.

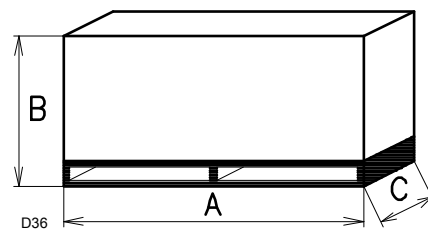


Fig. 1

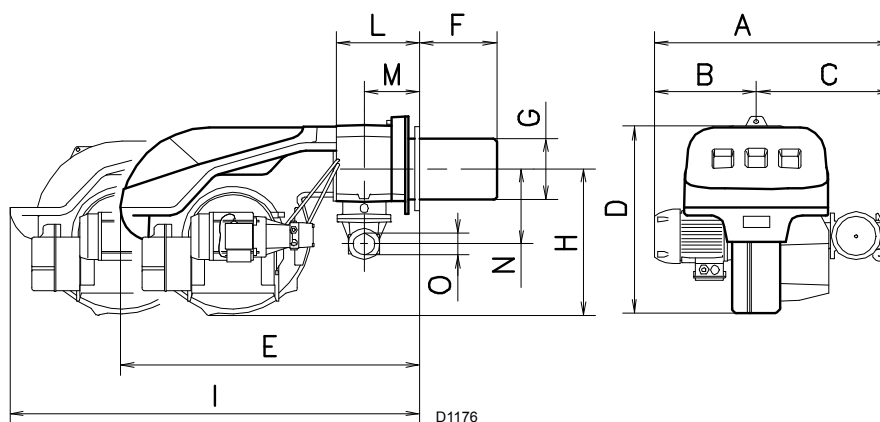
| mm           | A <sup>(1)</sup> | B   | C   | kg |
|--------------|------------------|-----|-----|----|
| RLS 68/M MX  | 1270 - 1400      | 750 | 900 | 70 |
| RLS 120/M MX | 1270 - 1400      | 750 | 900 | 76 |

Tab. F

**4.7 Overall 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 withdrawn on the slide bars.

The maximum dimension of the burner when open, without casing, is give in measurement I.



**Fig. 2**

| mm           | A   | B   | C   | D   | E   | F <sup>(1)</sup> | G   | H   | I <sup>(1)</sup> | L   | M   | N   | O  |
|--------------|-----|-----|-----|-----|-----|------------------|-----|-----|------------------|-----|-----|-----|----|
| RLS 68/M MX  | 691 | 296 | 395 | 555 | 840 | 260-395          | 189 | 430 | 1161-1300        | 214 | 134 | 221 | 2" |
| RLS 120/M MX | 733 | 338 | 395 | 555 | 840 | 260-395          | 189 | 430 | 1161-1300        | 214 | 134 | 221 | 2" |

**Tab. G**

<sup>(1)</sup> Blast tube: short-long

**4.8 Firing rates**

During operation, burner output varies between:

- a MAXIMUM OUTPUT
- a MINIMUM OUTPUT which must not be lower than the minimum limit in the diagram.

| Model        | kW  |
|--------------|-----|
| RLS 68/M MX  | 200 |
| RLS 120/M MX | 300 |

**Tab. H**



**WARNING**

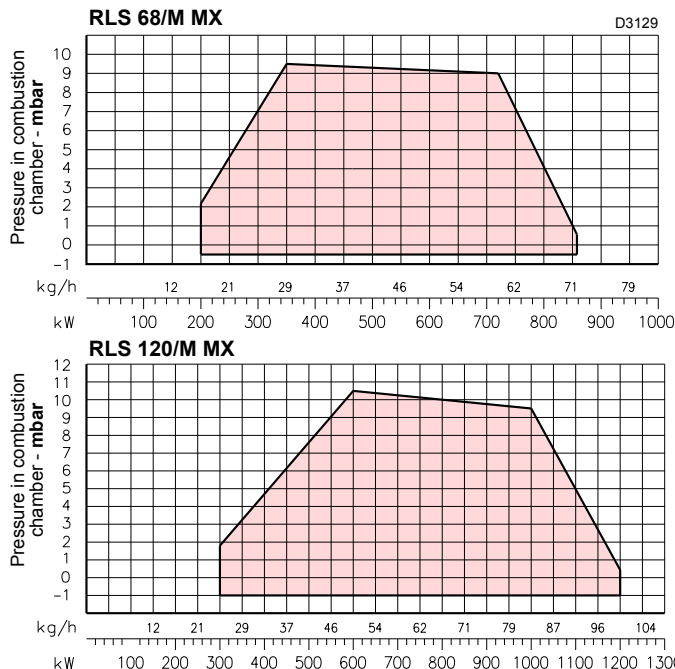
The firing rate value (Fig. 3) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m above sea level), and with the combustion head adjusted as shown on page 27.

**4.8.1 Modulation ratio**

The modulation ratio, determined using test boilers according to standard (EN 676 for gas, EN 267 for gas oil), is:

- 3 : 1 (gas);
- 2 : 1 (gas oil).

In case of gas operation the burner can be used with a different modulation ratio depending on the application - contact the manufacturer for further information.



**Fig. 3**

**4.9 Test boiler**

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

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

**Example:**

output 650 Mcal/h: diameter 60 cm - length 2 m.

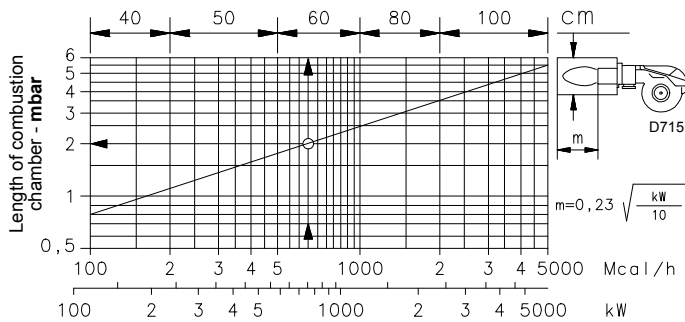
**4.9.1 Commercial boilers**

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.

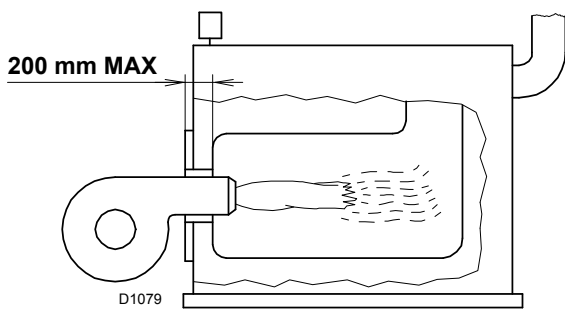
The maximum thickness of the boiler's front door must not exceed 250 mm (Fig. 5).

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 (Fig. 4), it is advisable to perform preliminary tests.

(\*) For flame inversion boilers, a kit is available to reduce CO emissions if required.



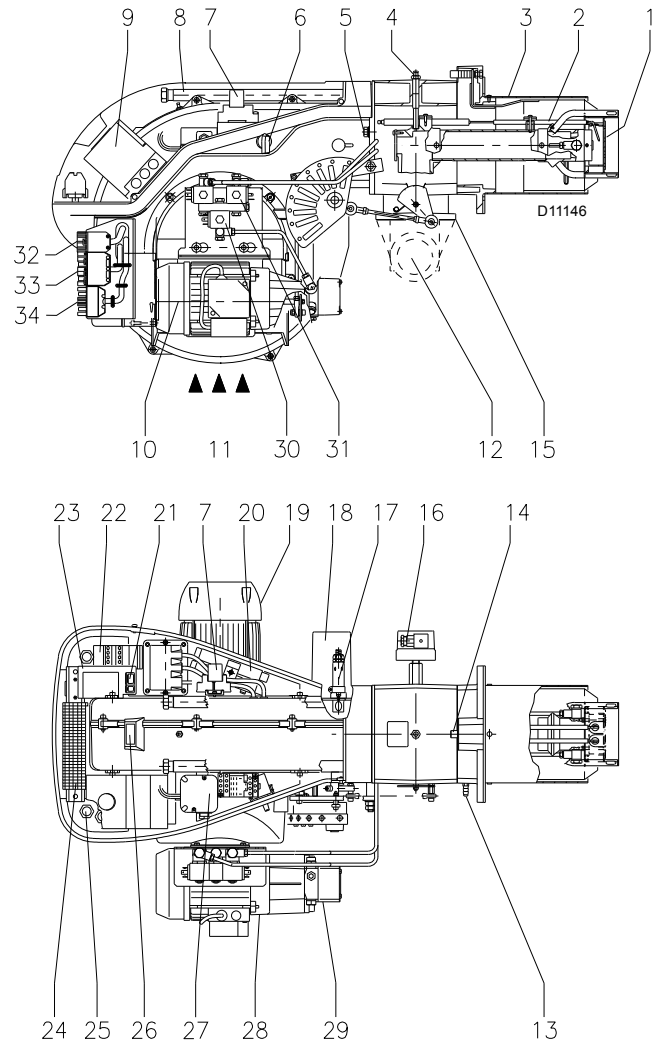
**Fig. 4**



**Fig. 5**

**4.10 Burner description**

- 1 Flame stability disk
- 2 Ignition electrodes
- 3 Combustion head
- 4 Gas pressure test point and head fixing screw
- 5 Screw securing fan to sleeve
- 6 OIL/GAS selector
- 7 Relay
- 8 Slide bars for opening the burner and inspecting the combustion head
- 9 Control box with lock-out pilot light and lock-out reset button
- 10 Air gate valve
- 11 Air inlet to fan
- 12 Gas input pipework
- 13 Air pressure test point
- 14 Screw for combustion head adjustment
- 15 Sleeve with flange for securing the burner to the boiler and gas butterfly valve
- 16 Max. gas pressure switch
- 17 Cell UV
- 18 Servomotor controlling the gas butterfly valve and of air gate valve (by means of a variable profile cam mechanism).  
When the burner is not operating the air gate valve is fully closed in order to reduce heat dispersion from the boiler due to the flue draught which draws air from the fan suction inlet.
- 19 Fan motor
- 20 Extensions for slide bars 8)
- 21 Power switch for different operations:  
automatic - manual - off  
Button for: Power increase - power reduction
- 22 Motor contactor and thermal cut-out with reset button
- 23 Bracket for mounting the power regulator RWF
- 24 Terminal strip
- 25 Fairleads for electrical connections by installer
- 26 Flame inspection window
- 27 Minimum air pressure switch (differential operating type)
- 28 Pump motor
- 29 Pump
- 30 Safety solenoid valve
- 31 1<sup>st</sup> and 2<sup>nd</sup> stage valves
- 32 4 pole socket
- 33 7 pole socket
- 34 6 pole socket



**Fig. 6**

Two types of burner failure may occur:

**Control box lock-out:**

if the control box 9)(Fig. 6) pushbutton lights up, it indicates that the burner is in lock-out. To reset, press the pushbutton.

**Motor trip:**

release by pressing the pushbutton on thermal relay 22)(Fig. 6).

**4.11 Standard equipment**

- 1 - Gas train flange
- 1 - Flange gasket
- 4 - Flange fixing screws (M10x35)
- 1 - Thermal insulation screen
- 4 - Screws (M12x35) to secure the burner flange to the boiler
- 2 - Hoses
- 2 - Nipples for hoses with gaskets
- 1 - Instruction booklet
- 1 - Spare parts list



In case of use with gas oil containing up to 10% Bio blend, it will be essential to use flexible oil lines suitable for bio fuel use. Please contact Riello for further information.

**5 Installation**

**5.1 Notes on safety for the installation**

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



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



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

**5.2 Handling**

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



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



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/KASU <input checked="" type="checkbox"/> | G |   | H       |
| GAZ/AEFO                                     | G |   | H       |
| I  |   |   |         |
| HEZOL FUEL                                   | L |   |         |
| RIELLO SpA<br>I-37045 Legnago (VR)           |   |   | CE 0085 |

D9243

**Fig. 7**

**Checking the characteristics of the burner**

Check the identification label of the burner, showing:

- the model (A)(Fig. 7) and type of burner (B);
- the year of manufacture, in cryptographic form (C);
- the serial number (D);
- the data for electrical supply and the protection level (E);
- the electrical input power (F);
- the types of gas used and the relative supply pressures (G);
- the data of the burner's minimum and maximum output possibilities (H) (see Firing rates)

**Warning.** The output of the burner must be within the boiler's firing rate;

- the category of the device/countries of destination (I).
- gas oil (L) max. viscosity.



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



**5.4 Installer/Service notes for the use of Gas oil with Bio blends up to 10%**

- During the burner installation, check that the gasoil and bio fuel blends are in accordance with Riello specifications (please refer to the chapters "Technical Data" and "Guidance for the use of bio fuel blends up to 10%" within the burner technical manual).
- If a Bio blend is in use the installer must seek information from the end user that their fuel supplier can evidence that the blends of fuel conform to the relevant standards.
- Check that the materials used in the construction of the oil tank and ancillary equipment are suitable for bio fuels, If not these must be upgraded or replaced with Bio compatible parts.
- Particular attention should be given to the oil storage tank and supply to the burner. Riello recommends that existing oil storage tanks are cleaned, inspected and any traces of water are removed BEFORE bio fuel is introduced (Contact the tank manufacturer or oil supplier for further advice). If these recommendations are not respected this will increase the risk of contamination and possible equipment failure.
- In line oil filters should be replaced making sure that they are Bio compatible. Riello recommends a good quality bio compatible oil filter at the tank and a secondary 100 micron filter are used to protect the burner pump and nozzle from contamination.
- The burner hydraulic components and flexible oil lines must be suitable for bio fuel use (check with Riello if in doubt). Riello have carefully chosen the specification of the bio compatible components including the flexible oil lines to protect the pump, safety valve and nozzle. The Riello warranty is dependent upon the use of Riello genuine components including the oil lines, being used. The burner must be commissioned and combustion parameters set to appliance manufacturer's recommendations.
- Regularly check visually for any signs of oil leakage from seals, gaskets and hoses.
- It is strongly recommended that with Bio fuel use, oil filters are inspected and replaced every 4 months. More regularly where contamination is experienced.
- During extended periods of non operation and/or where burners are using oil as a standby fuel, it is strongly recommended that the burner is put into operation for short periods at least every three months.

**5.5 Operating position**

The burner is designed to work only in the positions 1, 2, 3 and 4. Installation 1 is preferable, as it is the only one that allows performing maintenance operations as described in this manual. Installations 2, 3 and 4 permit operation but make maintenance and inspection of the combustion head difficult, page 33.



Any other position could compromise the correct working of the appliance. Installation 5 is prohibited for safety reasons.

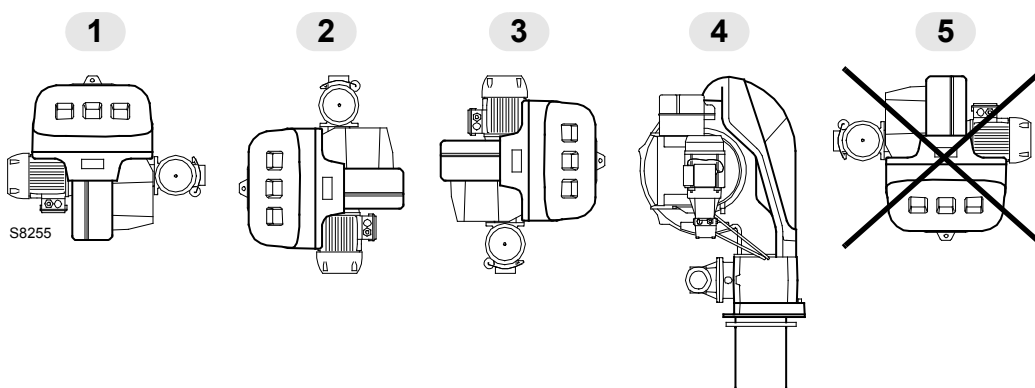


Fig. 8

**5.6 Boiler plate**

Drill the combustion chamber locking plate as shown in Fig. 9. The position of the threaded holes can be marked using the thermal screen supplied with the burner.

| mm           | A   | B         | C    |
|--------------|-----|-----------|------|
| RLS 68/M MX  | 195 | 275 - 325 | M 12 |
| RLS 120/M MX | 195 | 275 - 325 | M 12 |

Tab. I

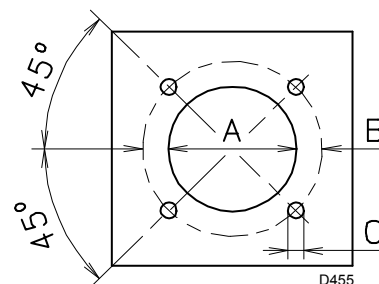


Fig. 9

**5.7 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.

The range of lengths available, L (mm), is as follows:

| Blast tube 12)(Fig. 10) | Short | Long |
|-------------------------|-------|------|
| RLS 68/M MX             | 250   | 395  |
| RLS 120/M MX            | 250   | 355  |

For boilers with front flue passes 15)(Fig. 10) or flame inversion chambers, protective fettling in refractory material 13) must be inserted between the boiler fettling 14) and the blast tube 12).

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

For boilers having a water-cooled front the refractory fettling 13)-14)(Fig. 10) is not required unless it is expressly requested by the boiler manufacturer.

**5.8 Securing the burner to the boiler**

Detach the combustion head from the burner:

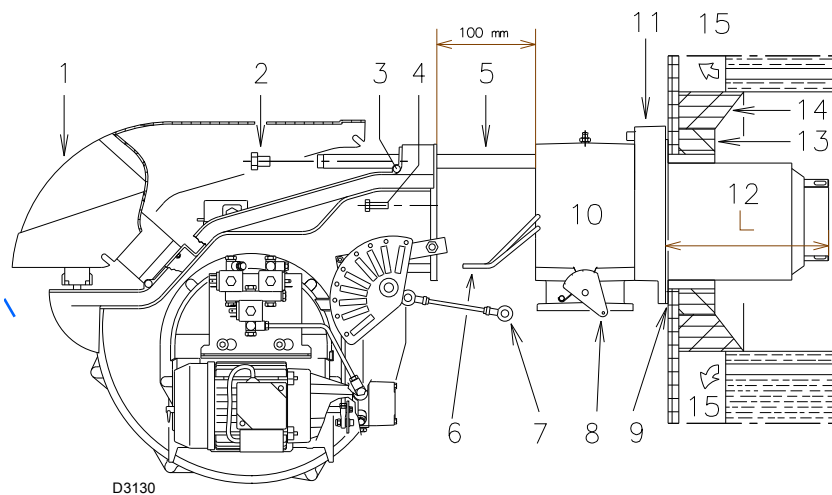
- disconnect the hoses by unscrewing the two connectors 6)(Fig. 10).
- Disengage the articulated coupling 7) from the graduated sector 8).
- Loosen the 4 screws 3) and remove the cover 1).
- Remove the screws 2) from the slide bars 5).
- Remove the 2 screws 4) and pull the burner back on slide bars 5) by about 100 mm.
- Disconnect the electrode wires and then pull the burner

completely off the slide bars.

- Secure the sleeve with flange 11) to the boiler plate, interposing the thermal insulating screen 9) supplied with the burner.
- Use the 4 screws, also supplied with the unit, after first protecting the thread with an anti-locking product.



The seal between burner and boiler must be airtight.



**Fig. 10**

**5.9 Nozzle installation**

The burner complies with the emission requirements of the EN 267 standard.

In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the Instruction and warning booklet should be used.



It is advisable to replace nozzles every year during regular maintenance operations.



The use of nozzles other than those specified by Riello S.p.A. and inadequate regular maintenance may result into emission limits non-conforming to the values set forth by the regulations in force, and in extremely serious cases, into potential hazards to people and objects.

The manufacturing company shall not be liable for any such damage arising from nonobservance of the requirements contained in this manual.

**5.9.1 Choice of nozzles for 1<sup>st</sup> and 2<sup>nd</sup> stage**

Both nozzles must be chosen from among those listed in Tab. J. The first nozzle determines the delivery of the burner in the 1st stage.

The second nozzle works together with the 1st nozzle to determine the delivery of the burner in the 2nd stage.

The deliveries of the 1st and 2nd stages must be contained within the value range indicated on page 9.

Use nozzles with a 60° spray angle at the recommended pressure of 12 bar.

As a rule the two nozzles have equal deliveries but the 1st stage nozzle may have a delivery less than 50% of the total delivery when a reduction of the counter-pressure peak is desired at the moment of starting (the burner allows good combustion rates also with a 40 - 100 % ratio between the 1st and 2nd stage).

**Example:**

Boiler output = 900 kW - efficiency 90 %

Output required by the burner = 900 : 0.9 = 1000 kW;  
 1000 : 2 = 500 KW per nozzle;  
 therefore, two equal, 60°, 12 bar nozzles are required:  
 1° = 10 GPH - 2° = 10 GPH,  
 or the following two different nozzles: 1° = 12 GPH - 2° = 8 GPH.

| GPH  | kg/h   |        |        | kW<br>12 bar |
|------|--------|--------|--------|--------------|
|      | 10 bar | 12 bar | 14 bar |              |
| 5.00 | 19.2   | 21.2   | 23.1   | 251.4        |
| 5.50 | 21.1   | 23.3   | 25.4   | 276.3        |
| 6.00 | 23.1   | 25.5   | 27.7   | 302.4        |
| 6.50 | 25.0   | 27.6   | 30.0   | 327.3        |
| 7.00 | 26.9   | 29.7   | 32.3   | 352.3        |
| 7.50 | 28.8   | 31.8   | 34.6   | 377.2        |
| 8.00 | 30.8   | 33.9   | 36.9   | 402.1        |
| 8.30 | 31.9   | 35.2   | 38.3   | 417.5        |
| 8.50 | 32.7   | 36.1   | 39.2   | 428.2        |
| 9.00 | 34.6   | 38.2   | 41.5   | 453.1        |
| 9.50 | 36.5   | 40.3   | 43.8   | 478.0        |
| 10.0 | 38.4   | 42.4   | 46.1   | 502.9        |
| 10.5 | 40.4   | 44.6   | 48.4   | 529.0        |
| 11.0 | 42.3   | 46.7   | 50.7   | 553.9        |
| 12.0 | 46.1   | 50.9   | 55.3   | 603.7        |
| 12.3 | 47.3   | 52.2   | 56.7   | 619.1        |
| 13.0 | 50.0   | 55.1   | 59.9   | 653.5        |
| 13.8 | 53.1   | 58.5   | 63.3   | 693.8        |
| 14.0 | 53.8   | 59.4   | 64.5   | 704.5        |
| 15.0 | 57.7   | 63.6   | 69.2   | 754.3        |
| 15.3 | 58.8   | 64.9   | 70.5   | 769.7        |
| 16.0 | 61.5   | 67.9   | 73.8   | 805.3        |
| 17.0 | 65.4   | 72.1   | 78.4   | 855.1        |
| 17.5 | 67.3   | 74.2   | 80.7   | 880.0        |
| 18.0 | 69.2   | 76.4   | 83.0   | 906.1        |
| 19.0 | 73.0   | 80.6   | 87.6   | 956.0        |
| 19.5 | 75.0   | 82.7   | 89.9   | 980.9        |
| 20.0 | 76.9   | 84.8   | 92.2   | 1005.8       |
| 21.5 | 82.7   | 91.2   | 99.1   | 1081.7       |
| 22.0 | 84.6   | 93.3   | 101.4  | 1106.6       |
| 22.5 | 86.5   | 95.5   | 103.7  | 1132.6       |
| 23.0 | 88.4   | 97.6   | 106.0  | 1157.5       |
| 23.5 | 90.4   | 99.7   | 108.3  | 1182.4       |
| 24.0 | 92.2   | 101.8  | 110.6  | 1207.3       |

Tab. J

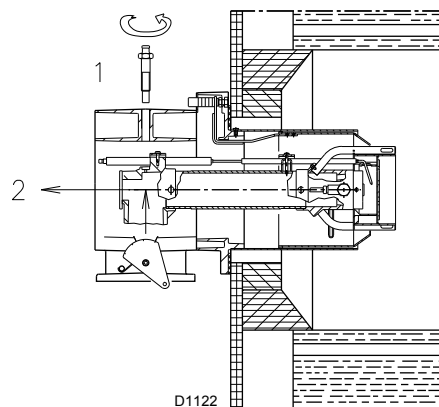


Fig. 11

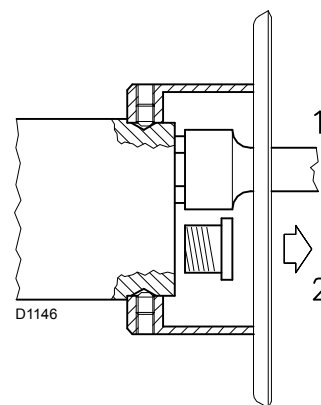


Fig. 12

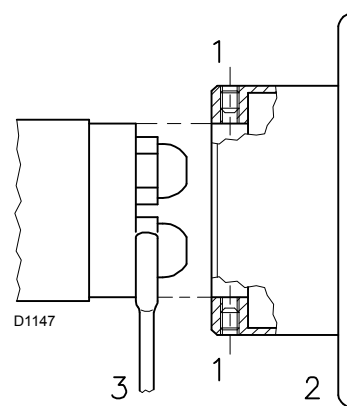


Fig. 13

**5.9.2 Nozzle assembly**

- Remove screw 1)(Fig. 11) and extract the internal part 2).
- Fit two nozzles with the box spanner (16 mm) 1)(Fig. 12), after having removed the plastic plugs 2).
- Fitting the spanner through the central hole in the flame stability disk or loosen screws 1)(Fig. 13).
- Remove disk 2)(Fig. 13) and replace the nozzles using the wrench 3).



**WARNING**

Do not use any sealing products such as gaskets, sealing compound, or tape.  
 Be careful to avoid damaging the nozzle sealing seat. The nozzles must be screwed into place tightly but not to the maximum torque value provided by the wrench.

The nozzle for the 1st stage of operation is the one lying beneath the firing electrodes (Fig. 14).

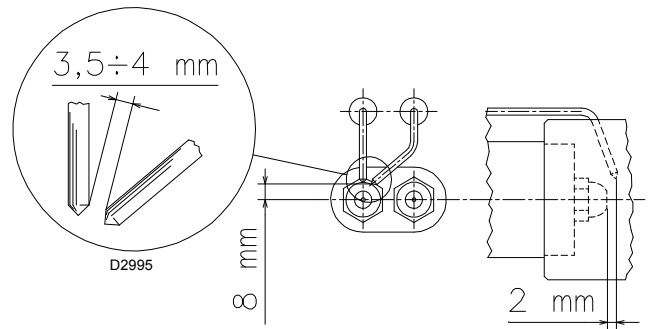


Make sure that the electrodes are positioned as shown in Fig. 14.

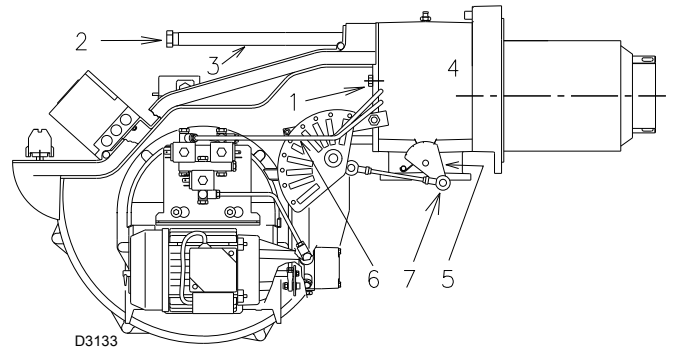
- Refit the burner to the slide bars 3)(Fig. 15) at approximately 100 mm from the sleeve 4) - burner positioned as shown in Fig. 10 at page 16.
- Insert the ignition electrode cables and then slide the burner up to the sleeve so that it is positioned as shown in Fig. 15.
- Refit screws 2) on slide bars 3).
- Secure the burner to the sleeve by tightening screws 1).
- Connect the oil pipes again by screwing on the two connectors 6)(Fig. 10 at page 16).
- Reconnect the articulation 7) to the graduated sector 8).



When fitting the burner on the two slide bars, it is advisable to gently draw out the high tension cables until they are slightly stretched.



**Fig. 14**



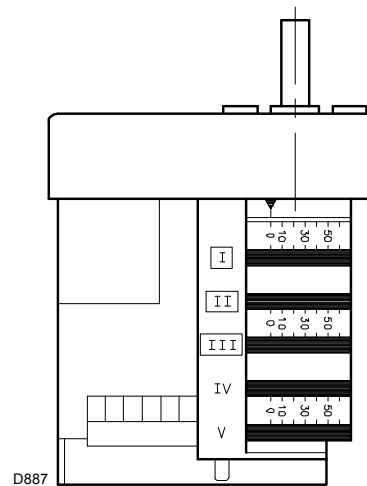
**Fig. 15**

**5.10 Servomotor**

The servomotor (Fig. 16) provides simultaneous adjustment of the air gate valve, by means of the variable profile cam, and the gas butterfly valve. The servomotor rotates through 130 degrees in 33 seconds.

Do not alter the factory setting for the 5 cams; simply check that they are set as indicated below:

- Cam I: 130°**  
Limits rotation toward maximum position.  
When the burner is at max output the gas butterfly valve must be fully open: 90°.
- Cam II: 0°**  
Limits rotation toward the minimum position.  
When the burner is shut down the air gate valve and the gas butterfly valve must be closed: 0°.
- Cam III: 30° (gas)**  
Adjusts the ignition position and the MIN output.
- Cam IV: 30° (gas oil)**  
Adjusts the ignition position and the 1st stage output.
- Cam V: 90°**  
Determines when the 2nd-stage diesel oil valve opens.



**Fig. 16**

**5.11 Gas oil supply**



**WARNING**

Where gas oil containing bio diesel is in use, it is recommended to avoid over oxygenation of the blended fuels.

Where at all possible avoid the use of two pipe systems where the circulated fuel is returned to the tank.

If this cannot be avoided make sure that the return pipe is normally below the surface of the fuel level within the storage tank.



**WARNING**

In case of use with gas oil containing up to 10% Bio blend, it will be essential to use flexible oil lines suitable for bio fuel use.

Please contact Riello for further information.



**DANGER**

It is strongly recommended a periodic check of the pump pressure operation (annually or better every six months, if the burner operation is continuous).



**CAUTION**

You are advised to use additional filters on the fuel supply line.

Riello recommends a good quality fuel filter at the tank (Fig. 17 - Fig. 18) and a secondary filter (100 μ for gas oil and 15 μ for kerosene) are used to protect the burner pump and nozzle from contamination.

In case of Biodiesel use, pay attention to install Biocompatible filters.

**5.11.1 Double-pipe circuit**

The burner is equipped with a self-priming pump which is capable of feeding itself within the limits listed in the Tab. K.

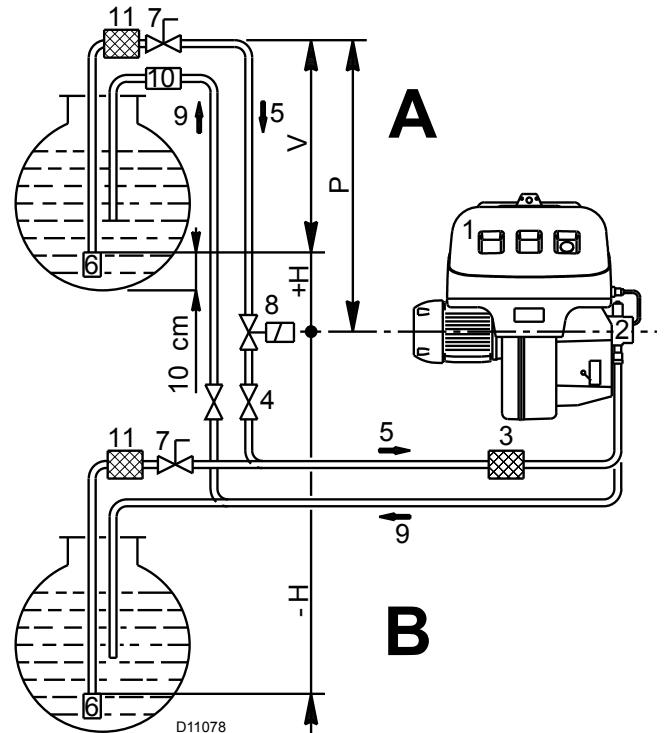
**The tank higher than the burner A (Fig. 17)**

The distance "P" must not exceed 10 meters in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 4 meters in order to permit pump self-priming even when the tank is almost completely empty.

**The tank lower than the burner B (Fig. 17)**

Pump depression values higher than 0.45 bar (35 cm Hg) must not be exceeded because at higher levels gas is released from the fuel, the pump starts making noise and its working life-span decreases.

It is good practice to ensure that the return and suction lines enter the burner from the same height; in this way it will be more improbable that the suction line fails to prime or stops priming.



**Fig. 17**

Key (Fig. 17)

- H Pump/Foot valve height difference
- L Piping length
- ∅ Inside pipe diameter
- 1 Burner
- 2 Pump
- 3 Filter
- 4 Manual on/off valve
- 5 Suction line
- 6 Foot valve
- 7 Rapid closing manual valve remote controlled (only Italy)
- 8 On/off solenoid valve (only Italy)
- 9 Return line
- 10 Check valve (only Italy)
- 11 Tank filter

| +/- H<br>(meters) | L (meters) |         |         |
|-------------------|------------|---------|---------|
|                   | ∅ 12 mm    | ∅ 14 mm | ∅ 16 mm |
| + 4               | 71         | 138     | 150     |
| + 3               | 62         | 122     | 150     |
| + 2               | 53         | 106     | 150     |
| + 1               | 44         | 90      | 150     |
| + 0.5             | 40         | 82      | 150     |
| 0                 | 36         | 74      | 137     |
| - 0.5             | 32         | 66      | 123     |
| - 1               | 28         | 58      | 109     |
| - 2               | 19         | 42      | 81      |
| - 3               | 10         | 26      | 53      |
| - 4               | -          | 10      | 25      |

**Tab. K**

**5.11.2 Single-pipe circuit**

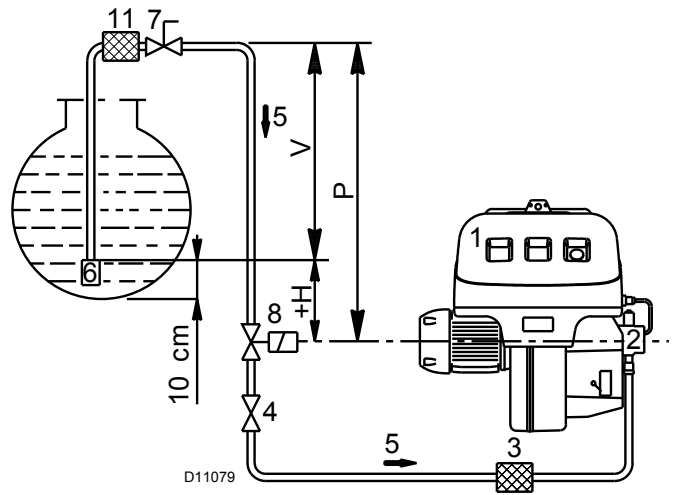
In order to obtain single-pipe working it is necessary to unscrew the return hose, remove the by-pass screw 6)(Fig. 19) and then screw the plug 7)(Fig. 19).

The distance "P" must not exceed 10 meters in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 4 meters.

For the priming pump loosen the screw 3)(Fig. 21) in order to bleed off the air contained in the suction line and wait until the fuel flows out.

Key (Fig. 18)

- H Pump/Foot valve height difference
- L Piping length
- ∅ Inside pipe diameter
- 1 Burner
- 2 Pump
- 3 Filter
- 4 Manual on/off valve
- 5 Suction line
- 6 Foot valve
- 7 Rapid closing manual valve remote controlled (only Italy)
- 8 On/off solenoid valve (only Italy)
- 11 Tank filter



**Fig. 18**

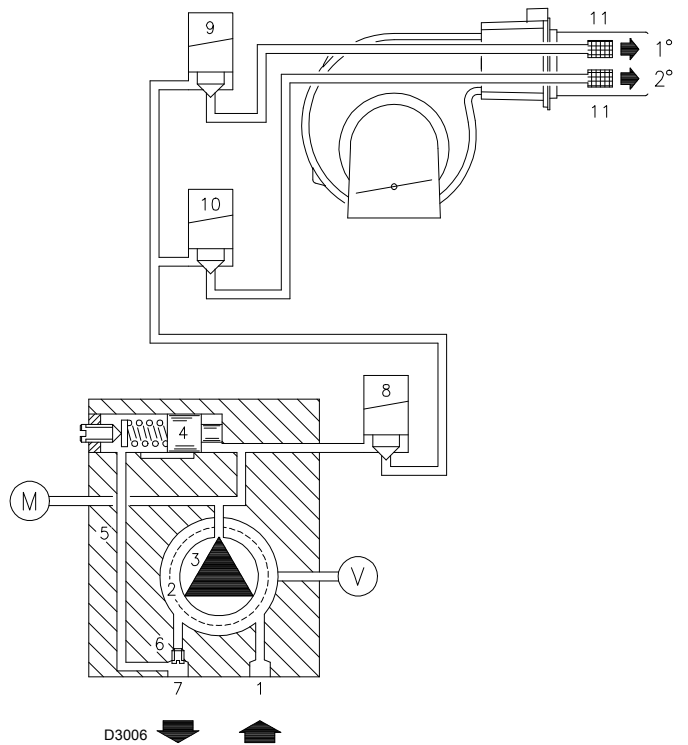
| +/- H<br>(meters) | L (meters) |         |         |
|-------------------|------------|---------|---------|
|                   | ∅ 12 mm    | ∅ 14 mm | ∅ 16 mm |
| + 4               | 71         | 138     | 150     |
| + 3               | 62         | 122     | 150     |
| + 2               | 53         | 106     | 150     |
| + 1               | 44         | 90      | 150     |
| + 0.5             | 40         | 82      | 150     |

**Tab. L**

**5.12 Hydraulic system layout**

Key (Fig. 19)

- 1 Pump suction
- 2 Filter
- 3 Pump
- 4 Pressure governor
- 5 Return pipe
- 6 By-pass screw
- 7 Pump return
- 8 Safety solenoid
- 9 1st stage valve
- 10 2nd stage valve
- 11 Filter
- M Pressure gauge
- V Vacuumeter



**Fig. 19**

**5.13 Hydraulic connections**

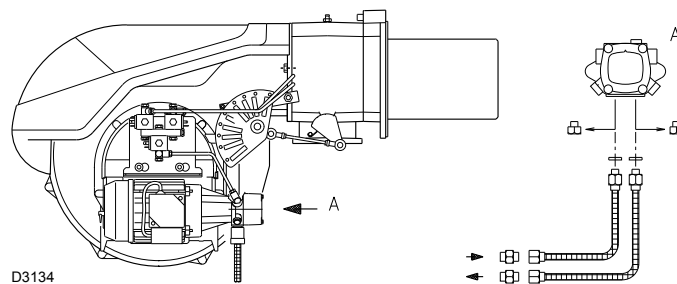
The pumps are equipped with a by-pass that connects return line and suction line. The pumps are installed on the burner with the by-pass closed by screw 6)(Fig. 19).

It is therefore necessary to connect both hoses to the pump.

- The pump will break immediately if it is run with the return line closed and the by-pass screw inserted.
- Remove the plugs from the suction and return connections of the pump.
- Insert the hose connections with the supplied seals into the connections and screw them down.
- Take care that the hoses are not stretched or twisted during installation.
- Install the hoses where they cannot be stepped on or come into contact with hot surfaces of the boiler and where they do

not hamper the opening of the burner.

- Now connect the other end of the hoses to the suction and return lines by using the supplied nipples.

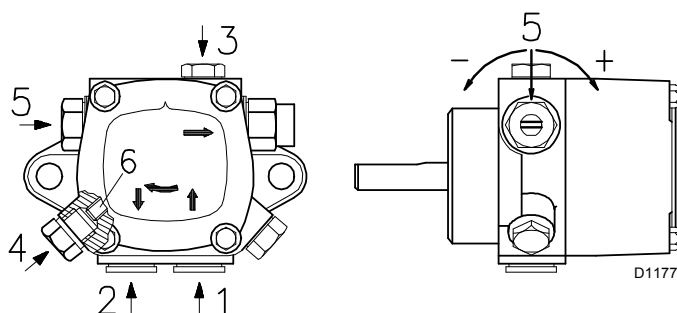


**Fig. 20**

**5.14 Pump**



In case of use with gas oil containing up to 10% Bio blend, it will be essential to use flexible oil lines suitable for bio fuel use. Please contact Riello for further information.



**Fig. 21**

- |                             |        |
|-----------------------------|--------|
| 1 Suction                   | G 1/4" |
| 2 Return                    | G 1/4" |
| 3 Pressure gauge attachment | G 1/8" |
| 4 Vacuum meter attachment   | G 1/8" |
| 5 Pressure governor         |        |
| 6 By-pass screw             |        |

**5.14.1 Technical data**

**Suntec AJV6CC**

|                                       |                          |         |
|---------------------------------------|--------------------------|---------|
| Min. delivery rate at 12 bar pressure | kg/h                     | 220     |
| Delivery pressure range               | bar                      | 10 - 20 |
| Max. suction depression               | bar                      | 0.45    |
| Viscosity range                       | mm <sup>2</sup> /s (cSt) | 1 - 75  |
| Max. gas oil temperature              | °C                       | 60      |
| Max. suction and return pressure      | bar                      | 2       |
| Pressure calibration in the factory   | bar                      | 12      |
| Filter mesh width                     | mm                       | 0.15    |

**Tab. M**

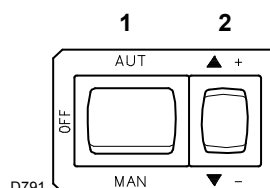
**5.14.2 Pump priming**



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

Obstructions in the line could cause the sealing organ located on the pump shaft to break. (The pump leaves the factory with the by-pass closed).

- Also check to make sure that the valves located on the suction line are open and that there is sufficient fuel in the tank.
- For self-priming to take place, one of the screws 3)(Fig. 21) of the pump, must be loosened in order to bleed off the air contained in the suction line.
- Start the burner by closing the control devices, with switch 1)(Fig. 22) in the "MAN" position and with switch 6)(Fig. 6 at page 13) in the "OIL" position.
- The pump can be considered to be primed when the gas oil starts coming out of the screw 3)(Fig. 21). Stop the burner: switch 1)(Fig. 22) set to "OFF" and tighten the screw 3).



**Fig. 22**

The time required for this operation depends upon the diameter and length of the suction tubing.

If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner, and then repeat the starting operation as often as required.

After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

Do not illuminate the UV cell or the burner will lock out; the burner should lock out anyway about 10 seconds after it starts.



The a.m. operation is possible because the pump is already full of fuel when it leaves the factory.

If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize.

Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump.

**5.15 Gas feeding**



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

Precautions: avoid knocking, attrition, sparks and heat.

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



**WARNING**

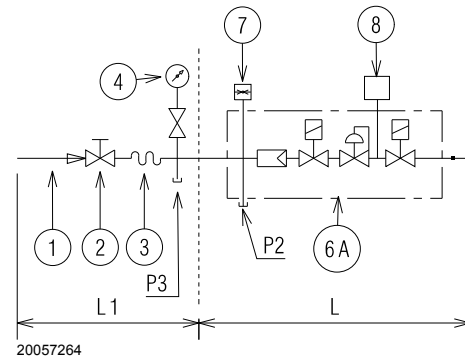
The fuel supply line must be installed by qualified personnel, in compliance with current standards and laws.

**5.15.1 Gas feeding line**

Key (Fig. 23 - Fig. 24 - Fig. 25 - Fig. 26)

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

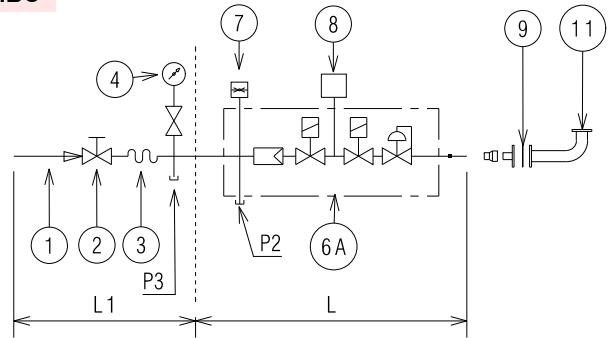
**MB**



20057264

**Fig. 23**

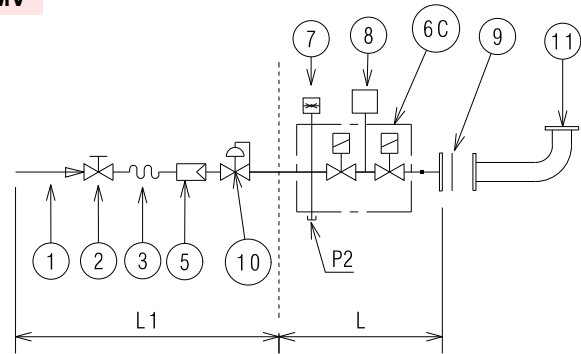
**MBC**



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**Fig. 24**

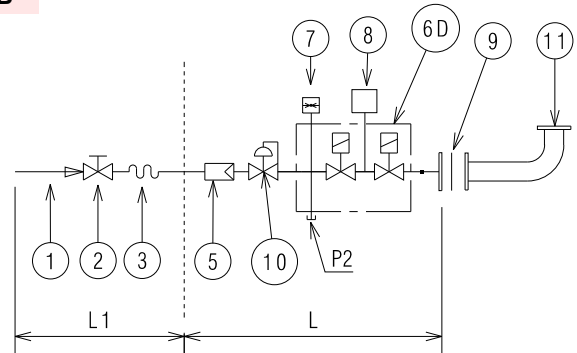
**DMV**



20062227

**Fig. 25**

**CB**



20062228

**Fig. 26**



**5.16 Gas supply**

**5.16.1 Gas line**

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

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

**5.16.2 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.

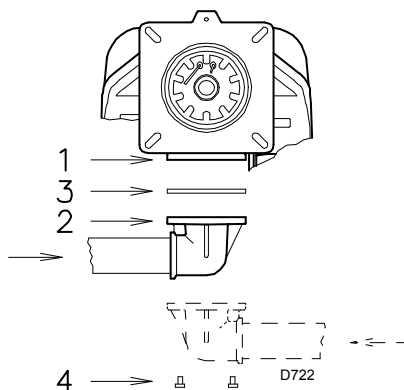
The gas train must be connected to the gas connection 1)(Fig. 27), using the flange 2), the gasket 3) and the screws 4) supplied with the burner.

The train can enter the burner from the right or left side, depending on which is the most convenient, see Fig. 27.



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. 27**

**5.16.3 Gas pressure**

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

|                     | <b>kW</b> | <b>1 Δp (mbar)</b> | <b>2 Δp (mbar)</b> |
|---------------------|-----------|--------------------|--------------------|
| <b>RLS 68/M MX</b>  | 350       | 2.7                | 0.1                |
|                     | 400       | 3.6                | 0.2                |
|                     | 450       | 4.5                | 0.2                |
|                     | 500       | 5.4                | 0.2                |
|                     | 550       | 6.3                | 0.3                |
|                     | 600       | 7.2                | 0.3                |
|                     | 650       | 8.1                | 0.3                |
|                     | 700       | 9.0                | 0.4                |
|                     | 750       | 9.9                | 0.4                |
|                     | 800       | 10.8               | 0.5                |
| <b>RLS 120/M MX</b> | 860       | 12.6               | 0.5                |
|                     | 600       | 4.6                | 0.3                |
|                     | 650       | 5.8                | 0.3                |
|                     | 715       | 7.5                | 0.4                |
|                     | 760       | 8.6                | 0.4                |
|                     | 825       | 10.2               | 0.5                |
|                     | 890       | 11.8               | 0.5                |
|                     | 955       | 13.4               | 0.6                |
|                     | 1020      | 15.0               | 0.7                |
|                     | 1090      | 16.8               | 0.8                |
| 1170                | 18.8      | 0.8                |                    |
| 1200                | 19.5      | 1.0                |                    |

**Tab. N**



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

The values shown in Tab. N refer to:

- Natural gas G 20 NCV 9.45 kWh/Sm<sup>3</sup> (8.2 Mcal/Sm<sup>3</sup>)

Column 1

Load loss at combustion head.

Gas pressure measured at the test point 1)(Fig. 28), with:

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

Column 2

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

To know the approximate output at which the burner is operating at its maximum:

- subtract the combustion chamber pressure from the gas pressure measured at test point 1)(Fig. 28).
- Find, in the Tab. N relating to the burner concerned, column 1, the pressure value closest to the result you want.
- Read the corresponding output on the left.

**Example - RLS 68/M MX:**

Maximum output operation

Natural gas G 20 NCV 9.45 kWh/Sm<sup>3</sup>

Gas pressure at test point 1)(Fig. 28) = 12 mbar

Pressure in combustion chamber = 3.0 mbar

12 - 3.0 = 9 mbar

A maximum output of 700 kW shown in Tab. M corresponds to 9 mbar pressure, column 1, gas G20.

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

To calculate the required gas pressure at test point 1)(Fig. 28), set the maximum output required from the Tab. N operation:

- find the nearest output value in Tab. N.
- Read off the pressure at test point 1)(Fig. 28) on the right in column 1.
- Add this value to the estimated pressure in combustion chamber.

**Example - RLS 68/M MX:**

Required burner maximum output operation: 700 kW

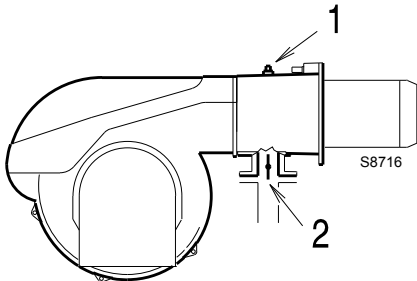
Natural gas G 20 NCV 9.45 kWh/Sm<sup>3</sup>

Gas pressure at an output of 700 kW, column 1 = 9 mbar

Pressure in combustion chamber = 3.0 mbar

9 + 3.0 = 12 mbar

pressure required at test point 1)(Fig. 28).



**Fig. 28**

**6 Electrical system**

**6.1 Notes on safety for the electrical wiring**



**DANGER**

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Do not invert the neutral with the phase in the electrical supply line. Any inversion would cause a lockout due to firing failure.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burners have been set for intermittent operation. 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 the boiler's thermostat/pressure switch ensures the stopping of the burner. If this is not the case, it is necessary to apply in series with IN a timer switch that turns off the burner at least once every twenty-four 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.
- The electrical system must be suitable for the maximum input power of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use an omnipolar switch, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.

Before carrying out any maintenance, cleaning or checking operations:



**DANGER**

disconnect the electrical supply from the burner by means of the main system switch;



**DANGER**

isolate the fuel supply.

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

**6.2 Electrical connections**



**WARNING**

Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Riello S.p.A. declines all liability for modifications or connections other than those shown on these diagrams.

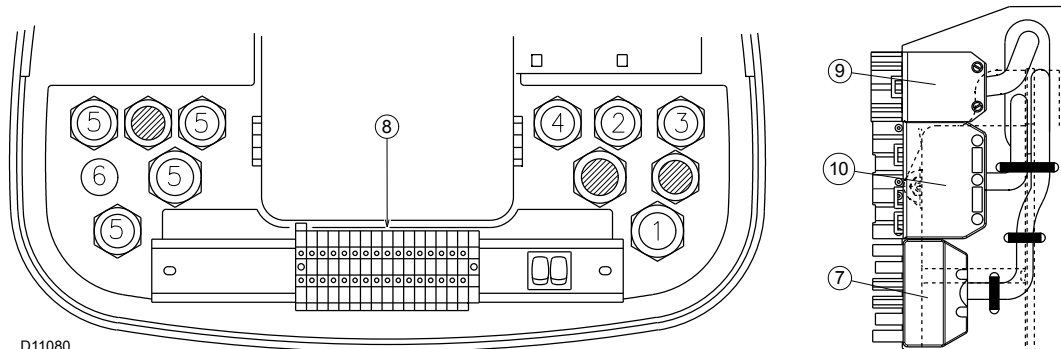
Use flexible cables according to EN 60 335-1. Regulations:

- if in PVC sheath, use at least H05 VV-F;
- if in rubber sheath, use at least H05 RR-F.

All the wires to connect to the burner terminal strip 8)(Fig. 29) must enter through the supplied fairleads.

The fairleads and hole press-outs can be used in various ways; the following lists show one possible solution:

- 1 Pg 13.5 Three-phase power supply
- 2 M20 7 pole socket input
- 3 M20 4 pole socket input
- 4 M20 6 pole socket input
- 5 Optional holes
- 6 Open the hole, if necessary add a cable gland
- 7 6 pole socket for gas valves, gas pressure switch or device for VPS control
- 8 Terminal strip
- 9 4 pole socket for TR thermostat/pressure switch
- 10 7 pole socket single-phase power supply for TR thermostat/pressure switch



D11080

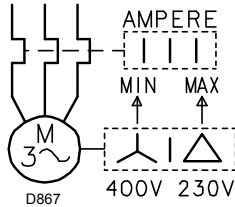
**Fig. 29**

**6.3 Calibration of thermal relay**

This is required to avoid motor burn-out in the event of a significant increase in power absorption caused by a missing phase.

- If the motor is star-powered, 400V, the cursor should be positioned to "MIN".
- If the motor is delta-powered, 230V, the cursor should be positioned to "MAX".

Even if the scale of the thermal cut-out does not include rated motor absorption at 400V, protection is still ensured in any case.



**Fig. 30**



- Do not invert the neutral with the phase wire in the electricity supply line. Any inversion would cause a lockout due to firing failure.
- Only use original spare parts to replace the components.

**6.4 Current to the UV photocell**

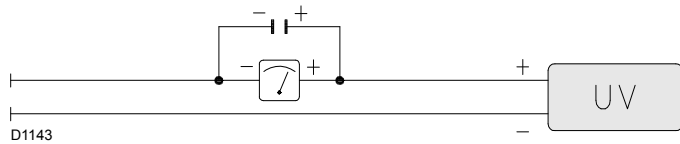
Min value for a good work: 70  $\mu$ A.

If the value is lower, it can depend on:

- exhausted photocell;
- low current (lower than 187 V);
- bad regulation of the burner.

In order to measure the current, use a microammeter of 100  $\mu$ A c.c., connected to the photocell, as in the scheme, with a capacitor of 100  $\mu$ F - 1V c.c. at the same level of the instrument.

See Fig. 31.



**Fig. 31**

**7 Start-up, calibration and operation of the burner**

**7.1 Notes on safety for the first start-up**



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



Before igniting the burner, see the paragraph "Safety test - with gas feeding closed" on page 33.



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

**7.2 Adjustment before first firing (gas oil operation)**

**7.2.1 Combustion head setting**

The setting of the combustion head depends exclusively on the maximum burner output.

Turn screw 5 (Fig. 32) until the notch shown in diagram (Fig. 33) is level with the front surface of flange 6 (Fig. 32).



In order to facilitate adjustment, loosen screw 1 (Fig. 11 at page 17), adjust and then tighten.

**Example** RLS 68/M MX:  
maximum burner output = 650 kW.

If diagram (Fig. 33) is consulted it is clear that for this delivery, the combustion head must be adjusted using notch 2, as shown in Fig. 32.

**7.2.2 Pump adjustment**

No settings are required for the pump, which is set to 12 bar by the manufacturer.

This pressure must be checked and adjusted (if required) after the burner has been ignited.

The only operation required in this phase is the application of a pressure gauge on the appropriate pump attachment.

**7.2.3 Fan gate adjustment**

The first time the burner is fired leave the factory setting unchanged for both 1<sup>st</sup> stage and 2<sup>nd</sup> stage operation.

**7.3 Burner calibration (gas oil operation)**



It is advisable to first set the burner for operating on oil and then for gas.

Execute the fuel exchange when the burner is off.

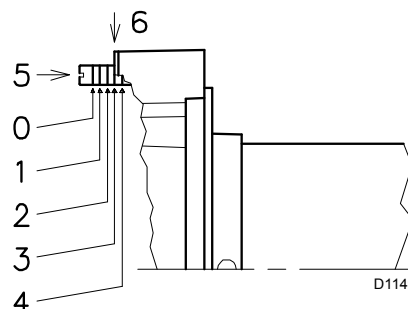
**7.3.1 Firing**

Set switch 1 (Fig. 34) to "MAN".

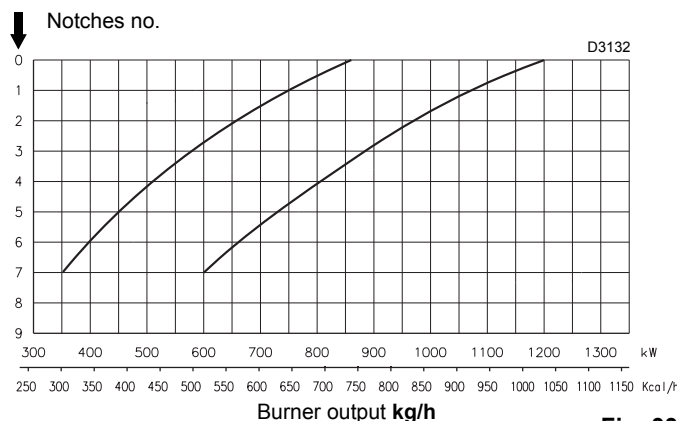
During the first firing, during the passage from the 1<sup>st</sup> to the 2<sup>nd</sup> stage, there is a momentary lowering of the fuel pressure caused by the filling of the 2<sup>nd</sup> stage nozzle tubing.

This lowering of the fuel pressure can cause the burner to lock-out and can sometimes give rise to pulsations.

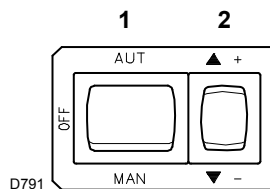
Once the following adjustments have been made, the firing of the burner must generate a noise similar to the noise generated during operation.



**Fig. 32**



**Fig. 33**



**Fig. 34**

**7.3.2 Operation**

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

**1<sup>st</sup> and 2<sup>nd</sup> stage nozzles**

See the information listed on page 16.

**Combustion head**

The adjustment of the combustion head already carried out (page 27) need not be altered unless the 2<sup>nd</sup> stage delivery of the burner is changed.

**Pump pressure**

12 bar: this is the pressure calibrated in the factory which is usually sufficient for most purposes. Sometimes, this pressure must be adjusted to:

10 bar: in order to reduce fuel delivery.

This adjustment is possible only if the surrounding temperature remains above 0°C.

14 bar: in order to increase fuel delivery or to ensure firings even at temperatures of less than 0°C. In order to adjust pump pressure, use the screw 5)(Fig. 21 at page 21).

**1<sup>st</sup> and 2<sup>nd</sup> stage fan air gate valve**

See adjustments of "Servomotor" on page 18.

**7.4 Adjustment before first firing (gas operation)**

Adjustment of the combustion head has been illustrated on page 27.

In addition, the following adjustments must also be made:

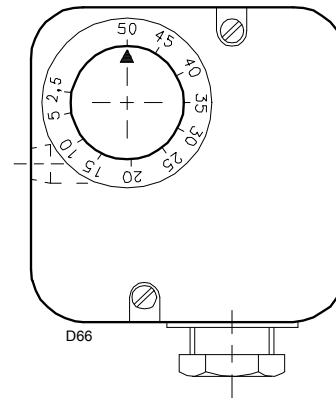
- open manual valves up-line from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale (Fig. 35).
- Adjust the maximum gas pressure switch to the start of the scale (Fig. 36).
- Adjust the air pressure switch to the zero position of the scale (Fig. 37).
- Purge the air from the gas line.  
Continue to purge the air (we recommend using a plastic tube routed outside the building) until gas is smelt.
- Fit a U-type manometer (Fig. 38) to the gas pressure test point on the sleeve.

The manometer readings are used to calculate the MAX. burner power using the Tab. N at page 23.

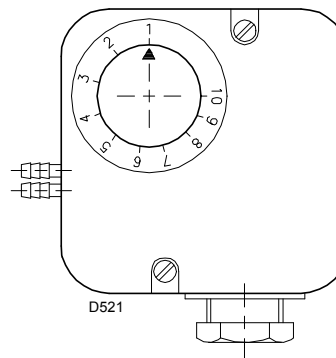
- Connect two lamps or testers to the two gas line solenoid valves VR and VS to check the exact moment at which voltage is supplied.

This operation is unnecessary if each of the two solenoid valves is equipped with a pilot light that signals voltage passing through.

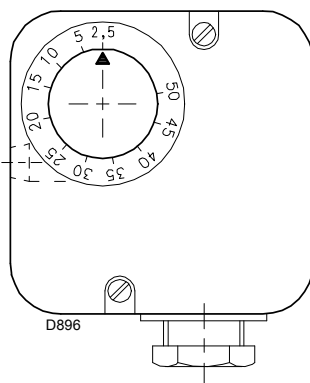
Before starting up the burner it is good practice to adjust the gas train so that ignition takes place in conditions of maximum safety, i.e. with gas delivery at the minimum.



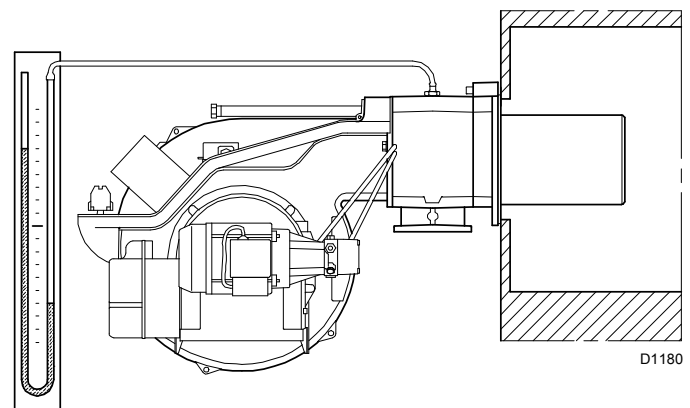
**Fig. 36**



**Fig. 37**



**Fig. 35**



**Fig. 38**

**7.5 Burner starting (gas operation)**



It is advisable to first set the burner for operating on oil and then for gas.

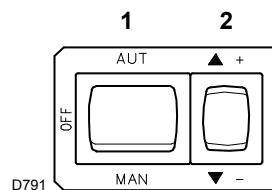
Execute the fuel exchange when the burner is off.

Close the control devices and set switch 1)(Fig. 39) to “MAN”.

As soon as the burner starts check the direction of rotation of the fan blade, looking through the flame inspection window 26)(Fig. 6 at page 13).

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

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



**Fig. 39**

**7.6 Burner firing (gas operation)**

Having completed the checks indicated in the previous heading, the burner should fire. If the motor starts but the flame does not appear and the control box goes into lock-out, reset and wait for a new firing attempt.

If firing 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 firing delivery.

The arrival of gas at the sleeve is indicated by the U-type manometer (Fig. 38).

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

**7.7 Burner calibration (gas operation)**

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

Adjust successively:

- First firing output
- MAX burner output
- MIN burner output
- Intermediate outputs
- Air pressure switch
- Maximum gas pressure switch
- Minimum gas pressure switch

- On the meter read the quantity of gas burned. This quantity must be equal to or lower than the quantity given by the formula:

$$\frac{\text{Nm}^3/\text{h (max. burner delivery)}}{360}$$

Example for G 20 (10 kWh/Nm<sup>3</sup>):  
 max. operation output: 600 kW corresponding to 60 Nm<sup>3</sup>/h.  
 After 10 firings with lock-outs, the delivery read on the meter must be equal to or lower than: 60 : 360 = 0.166 Nm<sup>3</sup>.  
 Firing output must be adjusted on the gas valve throttle.

**7.7.1 First firing output**

According to EN 676 Regulations:

**Burners with MAX output up to 120 kW**

Firing can be performed at the maximum operation output level.

Example:

- max. operation output : 120 kW
- max. firing output : 120 kW

**7.7.2 MAX burner output**

Max. output of the burner must be set within the firing rate range shown on page 11.

In the above instructions we left the burner running in MIN. output operation. Now press button 2)(Fig. 39) “increase output” and keep it pressed until the servomotor has opened the air gate valve and the gas butterfly valve.

**Burners with MAX output above 120 kW**

Firing must be performed at a lower output than the max. operation output. If the firing output does not exceed 120 kW, no calculations are required. If firing output exceeds 120 kW, the regulations prescribe that the value be defined according to the control box safety time “ts”:

- for ts = 2s, firing output must be equal to or lower than 1/2 of max. operation output;
- for ts = 3s, firing output must be equal to or lower than 1/3 of max. operation output.

**Example:**

MAX operation output of 600 kW.

Firing output must be equal to or lower than:

- 300 kW con ts = 2s
- 200 kW con ts = 3s

In order to measure the firing output:

- extract the UV cell 17)(Fig. 6 at page 13) (the burner will fire and then go into lock-out after the safety time has elapsed).
- Perform 10 firings with consecutive lock-outs.

**Gas calibration**

Measure the gas delivery at the meter.

A guideline indication can be calculated from the Tab. N at page 23, simply read off the gas pressure on the U-type manometer, see Fig. 38 at page 28, and follow the instructions on page 23.

- If delivery needs to be reduced, diminish outlet gas pressure and, if it is already very low, slightly close adjustment valve VR.
- If delivery needs to be increased, increase outlet gas pressure.

**Adjusting air delivery**

Progressively adjust the end profile of cam 4)(Fig. 40) by turning the screws 7).

- Turn the screws clockwise to increase air delivery.
- Turn the screws counter-clockwise to reduce air delivery.

**7.7.3 MIN burner output**

Min output must be selected within the firing rate range shown on page 11.

Press button 2)(Fig. 39 at page 29) "output reduction" until the servomotor has closed the air gate valve and the gas butterfly valve to 30° (factory set adjustment).

**Adjusting gas delivery**

Measure the delivery of gas from the gas meter.

- If this value is to be reduced, decrease the angle of cam III (Fig. 41) slightly by proceeding a little at a time until the angle is changed from 30° to 28° - 26°....
- If it has to be increased press the button "output increase" 2)(Fig. 39 at page 29) (i.e. open the gas butterfly valve by 10-15°), increase the cam III angle (Fig. 41) with small successive movements, i.e. take it from angle 30° to 32° - 34°... Then press the button "output decrease" until the servomotor is taken to the minimum opening position and measure the gas delivery.

**Note**

The servomotor follows the adjustment of cam III only when the cam angle is reduced.

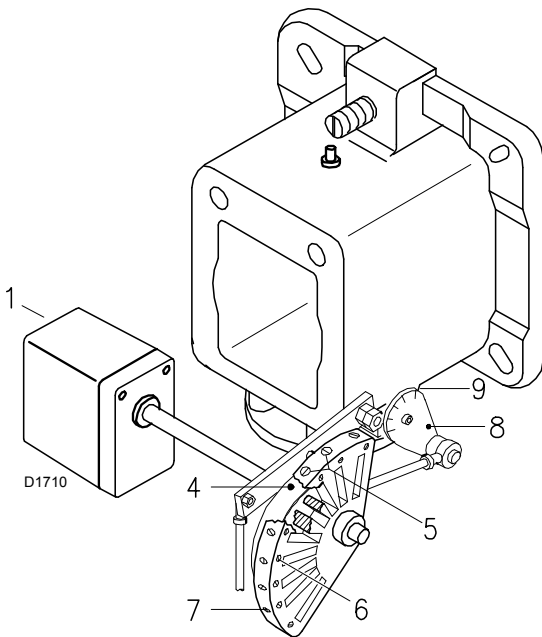
If it is necessary to increase the cam angle, first increase the servomotor angle with the key "output increase", then increase the cam III angle, and finally bring the servomotor back to the MIN output position with the key "output decrease".

- In order to adjust cam III, especially for fine movements, the key 10)(Fig. 41), held by a magnet under the servomotor, can be used.

**Adjustment of air delivery**

Progressively adjust the starting profile of cam 4)(Fig. 40) by turning the screws 5).

It is preferable not to turn the first screw since this is used to set the air gate valve to its fully-closed position.

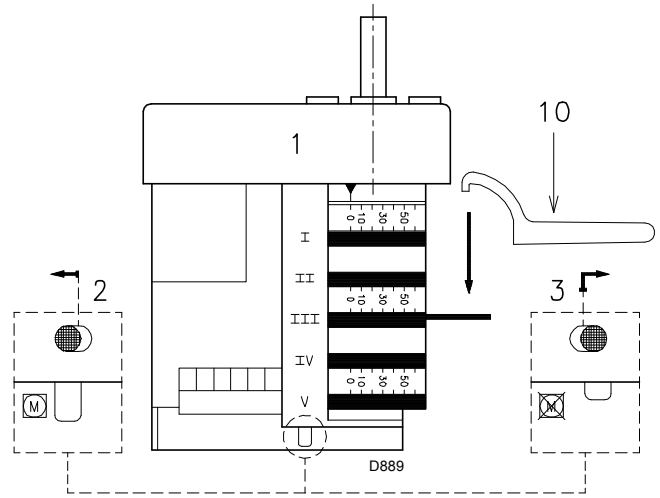


**Fig. 40**

Key Fig. 40

- 1 Servomotor
- 2 Servomotor 1) - Cam 4): engaged
- 3 Servomotor 1) - Cam 4): disengaged
- 4 Adjustable profile cam

- 5 Cam starting profile adjustment screws
- 6 Adjustment fixing screws
- 7 Cam end profile adjustment screws
- 8 Graduated sector for gas butterfly valve
- 9 Index for graduated sector 8
- 10 Key for cam III adjustment



**Fig. 41**

**7.7.4 Intermediate outputs**

**Adjustment of gas delivery**

No adjustment of gas delivery is required

**Adjustment of air delivery**

Press the key 2)(Fig. 39 at page 29) "output increase" a little so that the servomotor turns by about 15°.

Adjust the screws until optimal combustion is obtained. Proceed in the same way with the other screws.



Take care that the cam profile variation is progressive.

- Switch off the burner using switch 1)(Fig. 39 at page 29), at OFF position;
- disengage the cam 4)(Fig. 40) from the servomotor, by pressing the button 3)(Fig. 41);
- moving it to the right, and check more than once that the movement is soft and smooth, and does not grip, by rotating the cam 4) forward and backward by hand.
- Engage the cam 4) to the servomotor again by moving the button 2)(Fig. 41) to the left.
- As far as is possible, try not to move those screws at the ends of the cam that were previously adjusted for the opening of the air gate to MAX and MIN output.
- Finally fix the adjustment by turning the screws 6)(Fig. 40).

**N.B.**

Once you have finished adjusting outputs MAX - MIN - INTERMEDIATE, check ignition once again: noise emission at this stage must be identical to the following stage of operation.

If you notice any sign of pulsations, reduce the ignition stage delivery.



**7.7.5 Air pressure switch**

Adjust the air pressure switch after having performed all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 42).

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

Then turn the knob anti-clockwise by about 20% of the set point and repeat burner starting to ensure it is correct.

If the burner locks out again, turn the knob anti-clockwise a little bit more.



**WARNING**

As a rule, the air pressure switch must prevent the air pressure from lowering below 80% of the adjustment value as well as preventing the CO in the fumes from exceeding 1% (10,000 ppm).

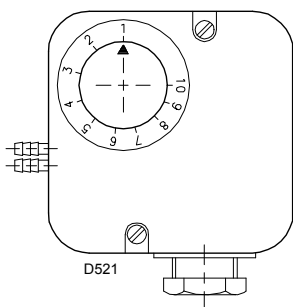
To check this, insert a combustion analyser into the chimney, slowly close the fan suction inlet (for example with cardboard) and check that the burner locks out, before the CO in the fumes exceeds 1%.

The air pressure switch is of the differential type. If a negative pressure in the combustion chamber during pre-purging prevents the air pressure switch from closing, fit a tube between the air pressure switch and the suction inlet of the fan.



**WARNING**

The use of the air pressure switch with differential operation is allowed only in industrial applications and in places where national rules enable the air pressure switch to control only fan operation.



**Fig. 42**



**WARNING**

1 kPa = 10 mbar

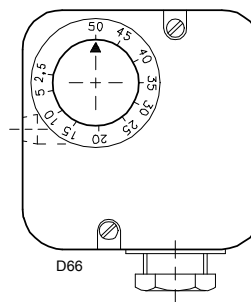
**7.7.6 Maximum gas pressure switch**

Adjust the maximum gas pressure switch after having performed all the other burner adjustments with the maximum gas pressure switch set at the end of the scale (Fig. 43).

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

Then turn the knob clockwise by 0.2 kPa (2 mbar). and repeat burner firing.

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



**Fig. 43**

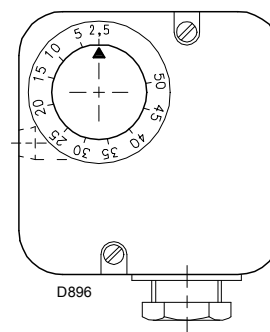
**7.7.7 Minimum gas pressure switch**

Adjust the minimum gas pressure switch after having performed all the other burner adjustments with the pressure switch set at the start of the scale (Fig. 44).

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

Then turn the knob anti-clockwise by 0.2 kPa (2 mbar) and repeat burner starting to ensure it is uniform.

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



**Fig. 44**

**7.8 Gas combustion checks**

**CO<sub>2</sub>**

It is better to set the burner with CO<sub>2</sub> not higher than 10% (gas with Pci 8600 kcal/m<sup>3</sup>).

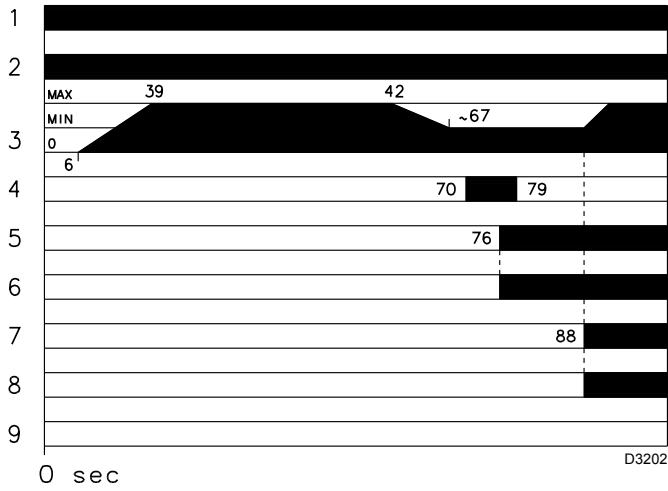
This way avoiding a loss of calibration setting (for example draft variation) that could cause combustion with little air and the production of CO.

**CO**

It must be not higher than 100 mg/kWh.

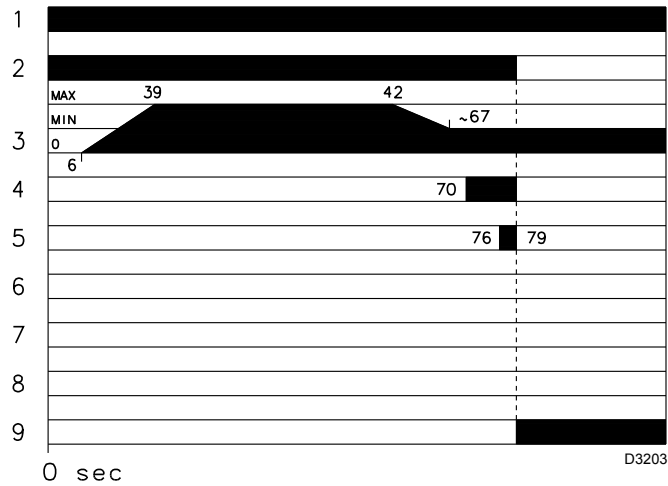
**7.9 Burner operation**

**NORMAL FIRING**  
(n° = seconds from instant 0)



**Fig. 45**

**NO FIRING**



**Fig. 46**

Key Fig. 45 - Fig. 46

- 1 Thermostat
- 2 Motor
- 3 Air gate valve
- 4 Ignition transformer
- 5 First valve
- 6 First flame
- 7 Second valve
- 8 Second flame
- 9 Lock-out

**7.9.1 Burner flame goes out during operation**

If the flame should accidentally go out during operation, the burner will lock out within 1s.

## 8 Maintenance

### 8.1 Notes on safety for the maintenance

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

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



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

Before carrying out any maintenance, cleaning or checking operations:



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



Close the fuel interception tap.

### 8.2 Maintenance programme

#### 8.2.1 Maintenance frequency

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

#### 8.2.2 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.**

#### 8.2.3 Checking and cleaning

##### 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 components of the combustion head are in good condition, not deformed by the high temperatures, free of impurities from the surroundings and correctly positioned. If in doubt, extract the internal part 5)(Fig. 48).

##### UV cell

Clean the glass cover from any dust that may have accumulated. The UV cell 17)(Fig. 6 at page 13) is held in position by a pressure fit and can therefore be removed by pulling it outward forcefully.

##### Flame inspection window

Clean the flame inspection window (Fig. 47).

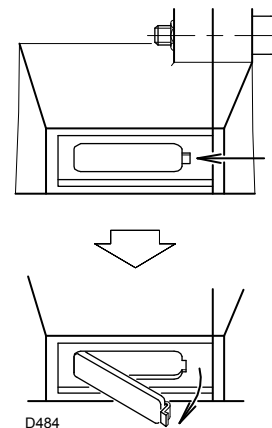


Fig. 47

##### 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.

**Servomotor**

Disengage the cam 4)(Fig. 40 at page 30) from the servomotor, by pressing and moving button 3)(Fig. 41) towards the right, and turn it backwards and forwards by hand to make sure it moves freely.

Now engage the cam again by moving the button 2)(Fig. 41) to the left.

**Burner**

Check for excess wear or loose screws in the mechanisms controlling the air gate valve and the gas butterfly valve.

Also make sure that the screws securing the electrical leads in the burner terminal strip are fully tightened.

Clean the outside of the burner, taking special care with the transmission joints and cam 4)(Fig. 40 at page 30).

**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.

**GAS OIL OPERATION**

**Filters**

Check the filtering baskets on line and at nozzle present in the system. Clean or replace if necessary.

If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

**Pump**

The delivery pressure must be stable. The depression must be less than 0.4 bar.

Unusual noise must not be evident during pump operation.

If the pressure is found to be unstable or if the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner.

This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.

If the pump is found to be responsible, check to make sure that the filter is not dirty.

The vacuumeter is installed upstream from the filter and consequently will not indicate whether the filter is clogged or not.

Contrarily, if the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping. Please check that the supply line and filters are clear.

The use of a pump vacuum gauge will assist in this.

This measure permits the cause of the anomaly to be traced to either the suction line or the pump.

If the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping.

**Hoses**

- Check periodically the flexible pipes conditions. They have to be replaced at least **every 2 years**.
- In case of use of gas oil and bio fuel blends, it is strongly recommended to inspect **even more frequently** the hoses and replace them where contamination has occurred.
- Check to make sure that the hoses are still in good condition.

**Nozzles**

Do not clean the nozzle openings; do not even open them. The nozzle filters however may be cleaned or replaced as required.

It is advisable to replace nozzles every year during regular maintenance operations.

Combustion must be checked after the nozzles have been changed.

**Fuel tank**

If water or contamination is present within the fuel tank, it is essential that this is removed before the equipment is to be used. This is extremely important when gas oil containing Bio diesel is in use. If in doubt about how to achieve this then please contact the fuel or oil tank supplier.

**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 Assistant and have him carry out the necessary adjustments.

| EN 267   | Excess air                       |                 |                                  |
|--|----------------------------------|-----------------|----------------------------------|
|  | Max output<br>$\lambda \leq 1.2$ |                 | Min output<br>$\lambda \leq 1.3$ |
| Theoretical max. CO <sub>2</sub><br>0 % O <sub>2</sub> | Calibration CO <sub>2</sub> %    |                 | CO<br>mg/kWh                     |
|  | $\lambda = 1,2$                  | $\lambda = 1,3$ |                                  |
| 15.2   | 12.6                             | 11.5            | ≤ 100                            |

**GAS OPERATION**

**Gas leaks**

Make sure that there are no gas leaks on the pipework 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 Assistant and have him carry out the necessary adjustments.

| EN 676 | GAS  | Theoretical max.<br>CO <sub>2</sub><br>0 % O <sub>2</sub> | Excess air                       |                                  | CO<br>mg/kWh |
|--------|------|---|----------------------------------|----------------------------------|--------------|
|        |      |   | Calibration CO <sub>2</sub> %    |                                  |              |
|        |      |   | Max output<br>$\lambda \leq 1,2$ | Min output<br>$\lambda \leq 1,3$ |              |
|        |      |   | $\lambda = 1,2$                  | $\lambda = 1,3$                  |              |
|        | G 20 | 11.7  | 9.7                              | 9.0                              | ≤ 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        |

### 8.2.4 Safety components

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

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                             |
| Hoses (if present)                           | 5 years or 30,000 pressurised cycles |
| Fan impeller                                 | 10 years or 500,000 start-ups        |

Tab. O

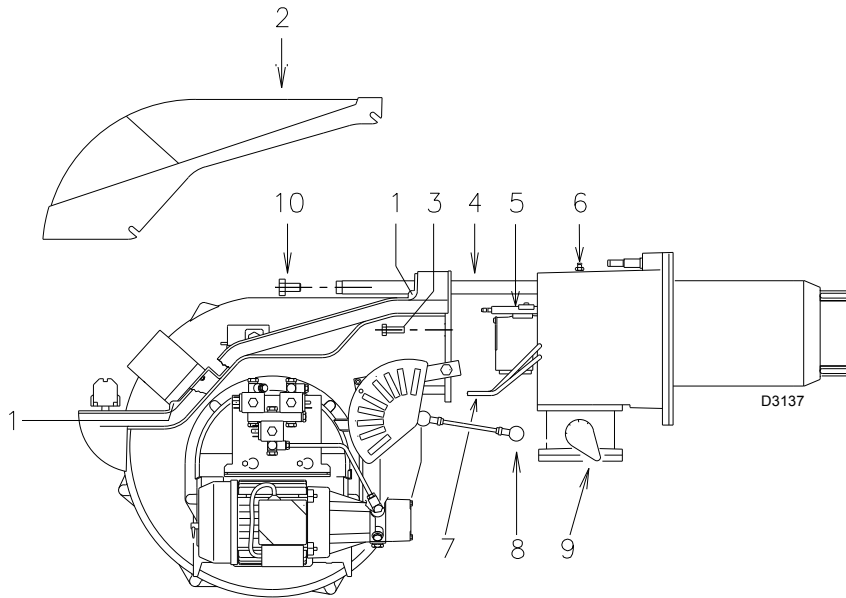
**8.3 Opening the burner**



**Disconnect the electrical supply from the burner.**

- Loosen screws 1)(Fig. 48) and withdraw the cover 2).
- Disconnect the hoses 7)
- Disengage the articulated coupling 8) from the graduated sector 9).

- Remove the screws 10) from the two slide bars 4).
- Fit the two extensions onto the slide bars 4).
- Replace the screws 10) onto the two slide bars.
- Remove screws 3) and pull the burner back by about 100 mm on the slide bars.
- Disconnect the electrode leads and then pull the burner fully back.
- Now extract the internal part 5) after having removed the screw 6).



**Fig. 48**

**8.4 Closing the burner**

- Push the burner until it is about 100 mm from the sleeve.
- Re-connect the leads and slide in the burner until it comes to a stop.
- Refit screws 3), and pull the probe and electrode leads gently out until they are slightly stretched.
- Re-couple the articulated coupling 8) to the graduated sector 9).
- Reconnect the hoses 7).
- Remove the two extensions from the slide bars 4) and return them to their original position.

**9** Faults - Possible causes - Solutions

Find a list of faults, causes and possible solutions for a set of failures that may occur and result in irregular burner operation or no functioning at all.

If a burner malfunction is detected, first of all:

- check that the electrical wiring is adequately connected;
- check whether fuel is delivered;
- check that every adjustment parameter is adequately set.

| <b>GAS OIL OPERATION</b>                                 |  |  |  |
|--|--|--|--|
| <b>SYMBOL (1)</b>  | <b>FAULT</b>   | <b>PROBABLE CAUSE</b>                                  | <b>SUGGESTED REMEDY</b>                          |
| ◀  | The burner does not start  | A limit or safety control device is open               | Adjust or replace                                |
|  |  | Control box lock-out                                   | Reset  |
|  |  | Fan motor blocked                                      | Reset thermal cut-out                            |
|  |  | Oil pressure switch intervenes                         | Adjust pressure switch or eliminate overpressure |
|  |  | No electrical power supply                             | Close all switches - Check connections           |
|  |  | No gas oil   | Check the gas oil supply circuit                 |
|  |  | Control box fuse blown                                 | Replace  |
|  |  | Pump is jammed   | Replace  |
|  |  | Defective motor command control device                 | Replace  |
|  |  | Defective control box                                  | Replace  |
|  |  | Defective electrical motor                             | Replace  |
|  |  | The pilot burner does not work                         | Check  |
|  |  | Defective safety solenoid valve                        | Replace  |
|  | Defective oil modulator  | Recondition or replace                                 |  |
| The burner does not start and a function lock-out occurs | Flame simulation   | Replace control box                                    |  |
|  | Photocell short-circuit  | Replace photocell                                      |  |
|  | 2-phase power supply thermal relay trips   | Reset thermal cut-out when third phase is re-connected |  |
| ▲  | The burner starts but stops at maximum air damper setting                                      | Contact 1 of servomotor does not operate               | Adjust cam I or replace servomotor               |
| P  | The burner starts and then goes into lock-out  | Air pressure switch adjusted badly                     | Adjust   |
|  |  | Pressure switch pressure point pipe blocked            | Clean  |
| ■  | The burner starts and then goes into lock-out  | Fault in flame detection circuit                       | Replace control box                              |
| ▼  | The burner remains in pre-purging phase  | Contact III of servomotor does not operate             | Adjust cam III or replace servomotor             |
| 1  | After pre-purge and the safety time, the burner goes to lock-out and the flame does not appear | The solenoid VP1 allows little gas through             | Increase   |
|  |  | Solenoid valves VP1 or VP2 fail to open                | Renew the coil or rectifier panel                |
|  |  | No fuel in tank; water on tank bottom                  | Top up fuel level or suck up water               |
|  |  | Inappropriate head and air gate valve adjustments      | Adjust   |
|  |  | High voltage cable defective or grounded               | Replace  |
|  |  | High voltage cable deformed by high temperature        | Replace and protect                              |
|  |  | Erroneous valves or transformer electrical connections | Check  |
|  |  | Pump unprimed  | Prime  |
|  |  | Pump suction line connected to return line             | Correct connection                               |
|  |  | Filters dirty (on line 1 at the nozzle)                | Clean  |
|  |  | Valves up-line from pump closed                        | Open   |
|  |  | Incorrect motor rotation direction                     | Change motor electrical connections              |
|  |  | Gas oil solenoid valves fail to open                   | Check the connections and the solenoid valves    |
|  |  | Nozzle clogged, dirty, or deformed                     | Clean or replace                                 |
| The pilot burner does not work                           | Check  |  |  |

| GAS OIL OPERATION |  |  |  |
|-------------------|--|--|--|
| SYMBOL (1)        | FAULT  | PROBABLE CAUSE   | SUGGESTED REMEDY                               |
| 1                 |  | Defective control box                                  | Replace  |
|                   |  | Ignition electrode wrongly adjusted                    | Adjust   |
|                   |  | Grounded electrode due to broken insulation            | Replace  |
|                   |  | Pump/motor coupling broken                             | Replace  |
|                   |  | Ignition transformer defective                         | Replace  |
|                   | The flame ignites normally but the burner locks out when the safety time has elapsed | Defective photocell or control box                     | Replace photocell or control box               |
|                   |  | Dirty photocell  | Clean  |
|                   | Smoke in flame - dark Bacharach  | Not enough air   | Adjust head and fan gate                       |
|                   |  | Erroneous pump pressure                                | Adjust   |
|                   |  | Nozzle filter clogged                                  | Clean or replace                               |
|                   |  | Boiler room air vents insufficient                     | Increase                                       |
|                   |  | Nozzle worn or dirty                                   | Replace  |
|                   |  | Flame disk dirty, loose, or deformed                   | Clean, tighten in place, or replace            |
|                   | Smoke in flame (yellow Bacharach)  | Too much air   | Adjust head and air gate                       |
|                   | Firing with pulsations or flame detachment, delayed firing                           | Poorly adjusted head                                   | Adjust   |
|                   |  | Poorly adjusted fan air gate: too much air             | Adjust   |
|                   |  | Nozzle unsuited for burner or boiler                   | See Nozzle Table                               |
|                   |  | Defective nozzle                                       | Replace  |
|                   |  | Inappropriate pump pressure                            | Adjust   |
|                   |  | Poorly adjusted or dirty firing electrodes             | Adjust   |
|                   |  | Output during ionisation phase is too high             | Reduce   |
|                   | The burner does not pass to 2nd stage  | Control device TR does not close                       | Adjust or replace                              |
|                   |  | Defective control box                                  | Replace  |
|                   | Uneven fuel supply   | Check if cause is in pump or in the fuel supply system | Feed the burner from a tank located nearby     |
|                   | Rusty pump internal parts  | Water in tank  | Suck water from tank bottom with separate pump |
|                   | Noisy pump, unstable pressure  | Air has entered the suction line                       | Tighten connectors                             |
|                   |  | Depression value too high (higher than 35 cm Hg):      |  |
|                   |  | Tank/burner height difference too great                | Feed burner with loop circuit                  |
|                   |  | Piping diameter too small                              | Increase                                       |
|                   |  | Suction filters clogged                                | Clean  |
|                   |  | Suction valves closed                                  | Open   |
|                   |  | Paraffin solidified due to low temperature             | Add additive to gas oil                        |
|                   | Pump unprimes after prolonged pause  | Return pipe not immersed in fuel                       | Bring to same height as suction pipe           |
|                   |  | Air enters suction piping                              | Tighten connectors                             |
|                   | Pump leaks gas oil   | Leakage from sealing organ                             | Replace pump                                   |
|                   | Dirty combustion head  | Nozzle or filter dirty                                 | Replace  |
|                   |  | Unsuitable nozzle delivery or angle                    | See recommended nozzles                        |
|                   |  | Loose nozzle   | Tighten  |
|                   |  | Impurities on flame stability disk                     | Clean  |
|                   |  | Erroneous head adjustment or not enough air            | Adjust, open air damper                        |
|                   |  | Blast tube length unsuited to boiler                   | Contact boiler manufacturer                    |
| I                 | During operation, the burner stops in lock out                                       | Dirty or defective photocell                           | Clean or replace                               |
|                   |  | Defective air pressure switch                          | Replace  |

(1) The control box is fitted with a disc rotates during the firing programme, which can be seen through the transparent lock-out reset button.  
When the burner does not fire or comes to a half following a fault, the symbol which appears behind the reset button indicates the type of problem.



| GAS OPERATION            |  |   |   |
|--------------------------|--|---|---|
| SYMBOL (1)               | FAULT  | PROBABLE CAUSE  | SUGGESTED REMEDY                                  |
| ◀                        | The burner does not start  | No electrical power supply  | Close all switches and check connections          |
|                          |  | A limiter or safety control device is open                        | Adjust or replace                                 |
|                          |  | Control box lock-out  | Reset control box                                 |
|                          |  | Control box fuse blown  | Replace (2)                                       |
|                          |  | Erroneous electrical connections                                  | Check   |
|                          |  | Defective control box   | Replace   |
|                          |  | No gas supply   | Open the manual valves between meter and train    |
|                          |  | Mains gas pressure insufficient                                   | Contact your GAS COMPANY                          |
|                          |  | Minimum gas pressure switch fails to close                        | Adjust or replace                                 |
|                          |  | Air pressure switch in operating position                         | Adjust or replace                                 |
|                          | Contact (locking cam) of servomotor does not operate   | Adjust locking cam or replace servomotor                          |   |
|                          | The burner does not start and a function lock-out occurs                                       | Flame simulation  | Replace control box                               |
|                          |  | Defective motor command control device                            | Replace   |
|                          |  | Defective electrical motor  | Replace   |
| Motor protection tripped |  | Reset thermal cut-out   |   |
| ▲                        | The burner starts but stops at maximum air damper setting                                      | Contact of servomotor does not operate                            | Adjust cam or replace servomotor                  |
| P                        | The burner starts and then goes into lock-out  | Air pressure switch inoperative due to insufficient air pressure: |   |
|                          |  | Air pressure switch adjusted badly                                | Adjust or replace                                 |
|                          |  | Pressure switch pressure point pipe blocked                       | Clean   |
|                          |  | Poorly adjusted head  | Adjust  |
|                          |  | Dirty fan   | Clean   |
|                          |  | High negative draft in chamber                                    | Ask our technical office                          |
| ■                        | The burner starts and then goes into lock-out  | Fault in flame detection circuit                                  | Replace control box                               |
| ▼                        | The burner remains in pre-purging phase  | Contact servomotor does not operate                               | Adjust cam or replace servomotor                  |
| 1                        | After pre-purge and the safety time, the burner goes to lock-out and the flame does not appear | The solenoid VP1 allows little gas through                        | Increase  |
|                          |  | Solenoid valves VP1 or VP2 fail to open                           | Renew the coil or rectifier panel                 |
|                          |  | Gas pressure too low  | Increase pressure at governor                     |
|                          |  | Ignition electrode wrongly adjusted                               | Adjust  |
|                          |  | Grounded electrode due to broken insulation                       | Replace   |
|                          |  | High voltage cable defective or grounded                          | Replace   |
|                          |  | High voltage cable deformed by high temperature                   | Replace and protect                               |
|                          |  | Ignition transformer defective                                    | Replace   |
|                          |  | Erroneous valves or transformer electrical connections            | Repeat connection                                 |
|                          |  | Defective control box   | Replace   |
|                          |  | A cock down-line of the gas train is closed                       | Open  |
|                          |  | Air in pipework   | Bleed air   |
|                          |  | The burner goes to lock-out right after flame appearance          | The solenoid VP1 or VP2 allows little gas through |
|                          | Dirty flame sensor   |   | Check, replace flame sensor                       |
|                          | Defective connection   |   | Check, replace flame sensor                       |
|                          | Insufficient defection current (min.70 µA)   |   | Measure current, replace flame sensor             |
|                          | Exhausted, defective flame sensor  |   | Replace   |
|                          | Max. gas pressure switch operates  |   | Adjust or replace                                 |
|                          | Defective control box  |   | Replace   |

| GAS OPERATION         |  |  |   |
|-----------------------|--|--|---|
| SYMBOL <sup>(1)</sup> | FAULT  | PROBABLE CAUSE   | SUGGESTED REMEDY  |
|                       | The burner repeats the starting cycle without lock out | Mains gas pressure is near the valve to which the min. gas pressure switch gas is adjusted. The repeated drop in pressure which follows valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner comes to a halt. Pressure increases again, the pressure switch closes again and the firing cycle is repeated. And so on. | Reduce operating pressure of minimum gas pressure switch.<br>Replace gas filter |
|                       | Lock out without symbol indication                     | Flame simulation   | Replace control box   |
|                       | During operation, the burner stops in lock out         | Defective flame sensor   | Replace worn parts  |
|                       |  | Fault on air pressure switch   | Replace   |
|                       |  | Max. gas pressure switch operates  | Adjust or replace   |
| ◀                     | Lock out when burner stops                             | Flame remains in combustion head or flame simulation   | Eliminate persistence of flame or replace control box                           |
|                       | Ignition with pulsation                                | Poorly adjusted head   | Adjust  |
|                       |  | Ignition electrode wrongly adjusted  | Adjust  |
|                       |  | Poorly adjusted fan air gate: too much air   | Adjust  |
|                       |  | Output during ionisation phase is too high   | Reduce  |

- (1) The control box is fitted with a disc rotates during the firing programme, which can be seen through the transparent lock-out reset button.  
When the burner does not fire or comes to a halt following a fault, the symbol which appears behind the reset button indicates the type of problem.
- (2) The fuse is located in the rear part of the control box. A pull-out fuse is also available as a spare part which can be fitted after breaking the tag on the panel which holds in place.

## A Appendix - Accessories (optional)

### OUTPUT POWER REGULATOR KIT RWF

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

Two components should be ordered:

- the output regulator to install on the burner
- the probe to install on the heat generator

| Parameter to control |                 | Probe                          |         | Output power regulator |                      |
|----------------------|-----------------|--------------------------------|---------|------------------------|----------------------|
|                      | Range           | Type                           | Code    | Type                   | Code                 |
| Temperature          | - 100...+ 500°C | PT 100                         | 3010110 | RWF50<br>RWF55         | 20082208<br>20099657 |
| Pressure             | 0...2.5 bar     | Probe with output<br>4...20 µA | 3010213 |                        |                      |
|                      | 0...16 bar      |                                | 3010214 |                        |                      |

### POTENTIOMETER KIT

Depending on the servomotor fitted to the burner, a three-pole potentiometer (1000 Ω) can be installed to check the position of the servomotor.

| Burner                 | Code    |
|------------------------|---------|
| <b>RLS 68-120/M MX</b> | 3010021 |

### EXTENDED HEAD KIT

“Standard head” burners can be transformed into “extended head” versions, by using the special kit. The kits available for the various burners, giving the original and the extended lengths, are listed below.

| Burner                 | Code    |
|------------------------|---------|
| <b>RLS 68-120/M MX</b> | 3010360 |

### DEGASSING UNIT

It may occur that a certain amount of air is contained in the fuel sucked up by the pump.

This air may originate from the fuel itself as a consequence of de-pressurisation or air leaking past imperfect seals.

In double-pipe systems, the air returns to the tank from the return pipe; in single-pipe systems, the air remains in circulation causing pressure variations in the pump and burner malfunctions.

For this reason, we advise installing a degassing unit near the burner in single-pipe installations.

Degassing units are provided in two versions:

| Burner                                  | Code     |
|---|----------|
| <b>RLS 68-120/M MX</b> (without filter) | 20034277 |
| <b>RLS 68-120/M MX</b> (with filter)    | 20034281 |

#### Degassing unit characteristics

|   |  |
|---|--|
| Burner output                             | 80 kg/h max                                      |
| Fuel pressure                             | 0.7 bar max                                      |
| Ambient temperature                       | 40 °C max  |
| Fuel temperature                          | 40 °C max  |
| Attachment connectors<br>(without filter) | FF G 1/4 tank side<br>FM G 3/8 conic burner side |
| Attachment connectors<br>(with filter)    | FF G 3/8 tank side<br>FM G3/8 conic burner side  |

### SPACER KIT

If burner head penetration into the combustion chamber needs reducing, varying thickness spacers are available, as given in the following table.

| Burner                 | Code    |
|------------------------|---------|
| <b>RLS 68-120/M MX</b> | 3000722 |

### SOUND PROOFING BOX

If noise emission needs reducing even further, sound-proofing boxes is available.

| Burner                 | Box type | Average noise reduction [dB(A)] | Code    |
|------------------------|----------|---------------------------------|---------|
| <b>RLS 68-120/M MX</b> | C4/5     | 10                              | 3010404 |

### CONTINUOUS VENTILATION KIT

If the burner requires continuous ventilation in the stages without flame, a special kit is available as given in the following table.

| Burner                 | Code    |
|------------------------|---------|
| <b>RLS 68-120/M MX</b> | 3010094 |

### HEAD KIT FOR REVERSE FLAME CHAMBER

In certain cases, the use of the burner on reverse flame boilers can be improved by using an additional Pipes Kit.

| Burner              | Code     |
|---------------------|----------|
| <b>RLS 68/M MX</b>  | 20006401 |
| <b>RLS 120/M MX</b> | 20006402 |

### GAS TRAINS APPROVED ACCORDING TO EN 676

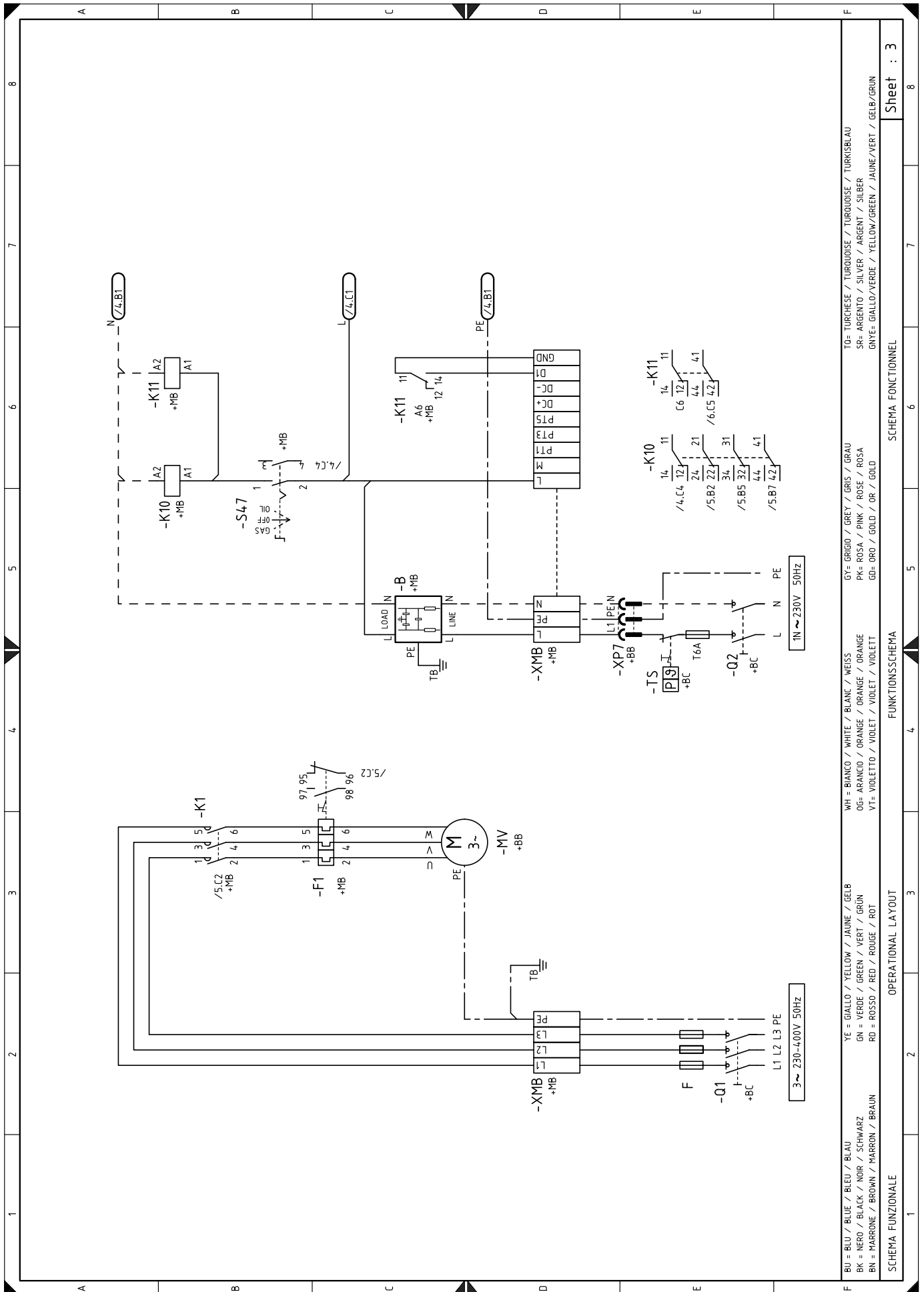
Refer to the instruction manual.

**B Appendix - Electrical panel layout**

|          |   |
|----------|---|
| <b>1</b> | <b>Index of layouts</b>                 |
| <b>2</b> | Reference layout                        |
| <b>3</b> | Operational layout                      |
| <b>4</b> | Operational layout                      |
| <b>5</b> | Operational layout                      |
| <b>6</b> | Operational layout                      |
| <b>7</b> | Operational layout                      |
| <b>8</b> | Electrical connections set by installer |
| <b>9</b> | Electrical connections set by installer |

**2 Reference layout**

Sheet no. \_\_\_\_\_ ↑ ↑ /1.A1  
Coordinates \_\_\_\_\_ ↑ ↑



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

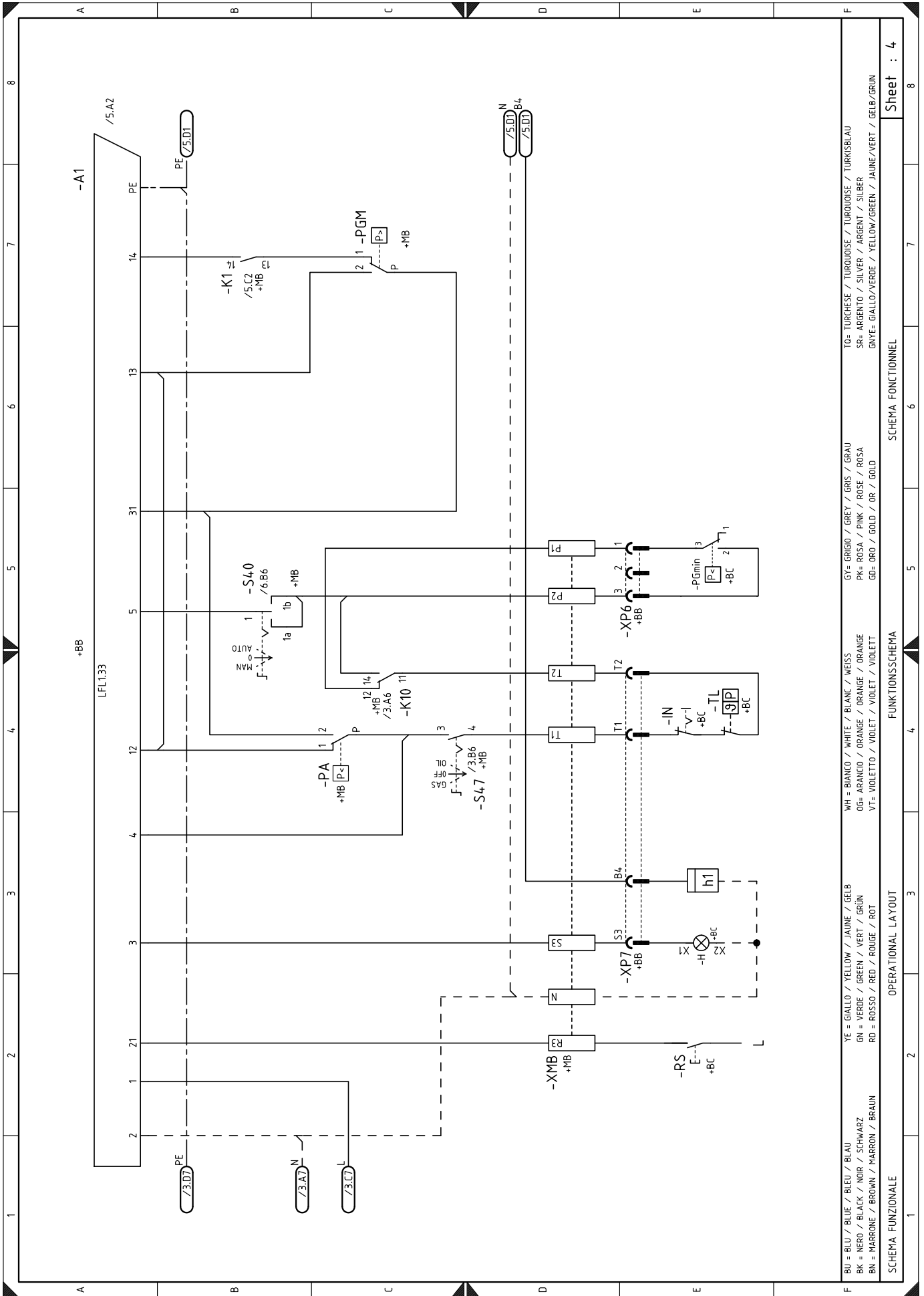
WH = BIANCO / WHITE / BLANC / WEISS  
 GY= GRIGIO / GREY / GRIS / GRAU  
 PK= ROSA / PINK / ROSE / ROSA  
 GD= BRG / GOLD / OR / GOLD

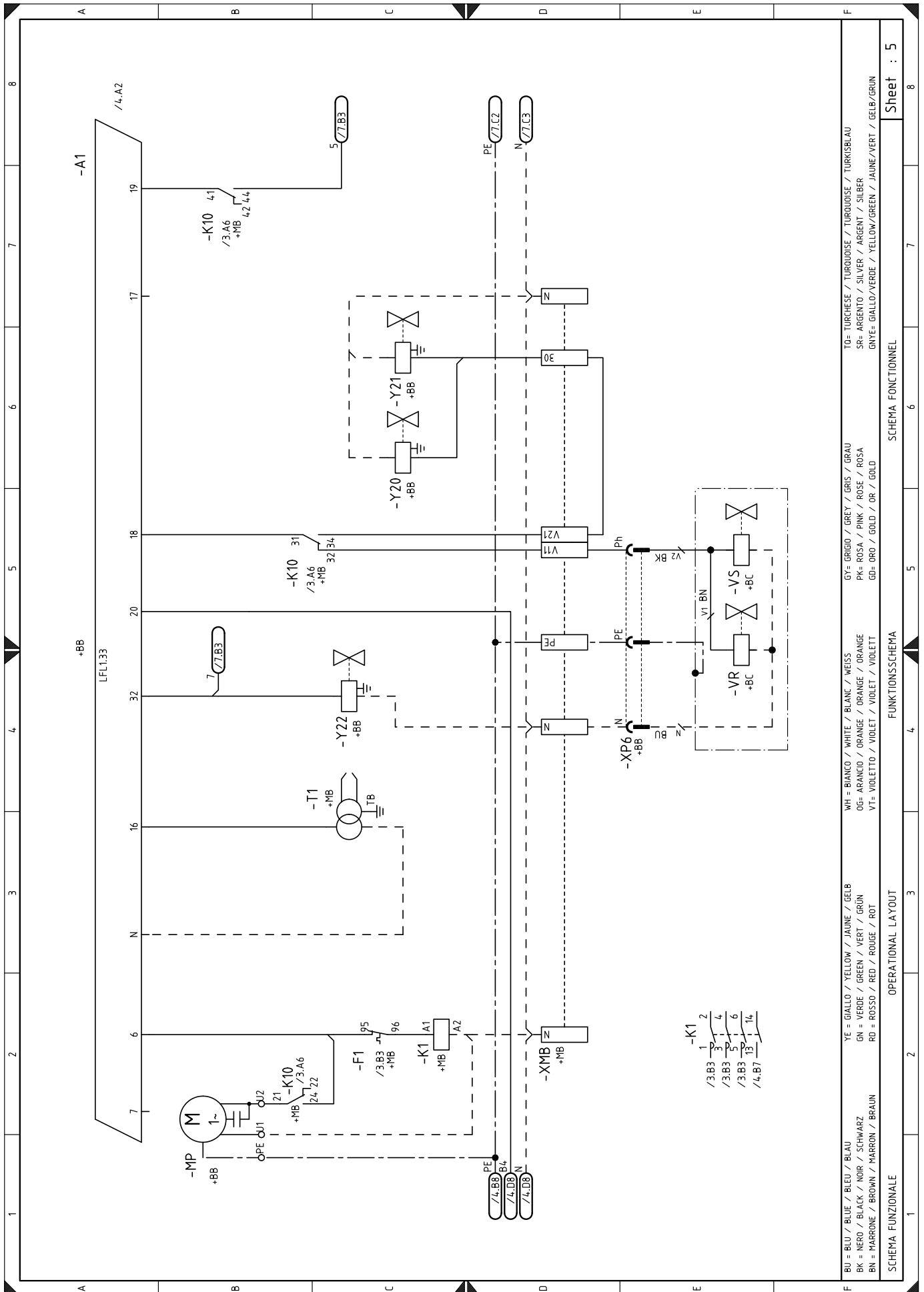
YE = GIALLO / YELLOW / JAUNE / GELB  
 GN = VERDE / GREEN / VERT / GRÜN  
 RD = ROSSO / RED / ROUGE / ROT

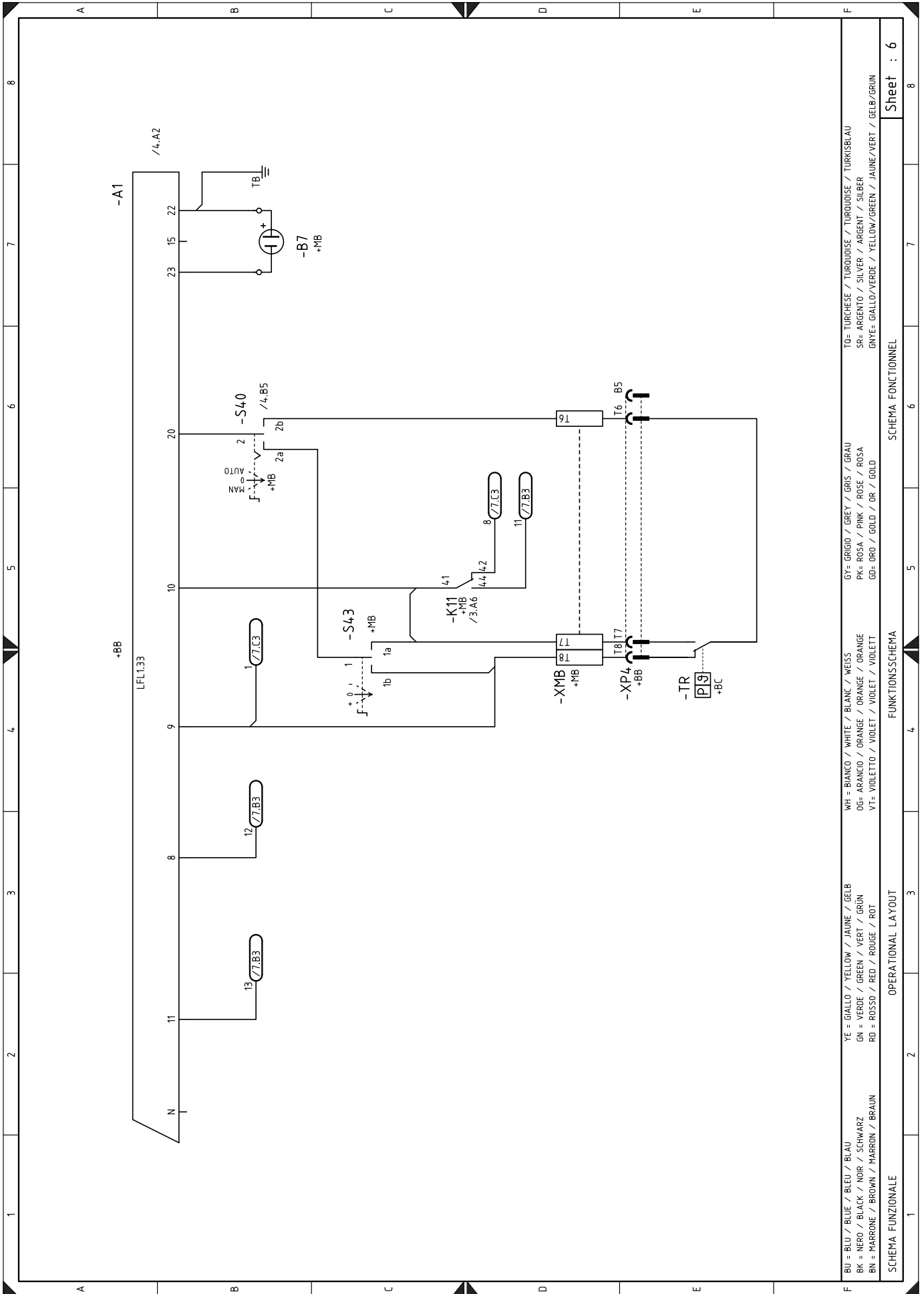
BU = BLU / BLUE / BLEU / BLAU  
 BK = NERO / BLACK / NOIR / SCHWARZ  
 BN = MARRONE / BROWN / MARRON / BRAUN

SCHEMA FUNZIONALE  
 SCHEMA FONCTIONNEL  
 OPERATIONAL LAYOUT  
 SCHEMA FUNCTIONNEL

Sheet : 3

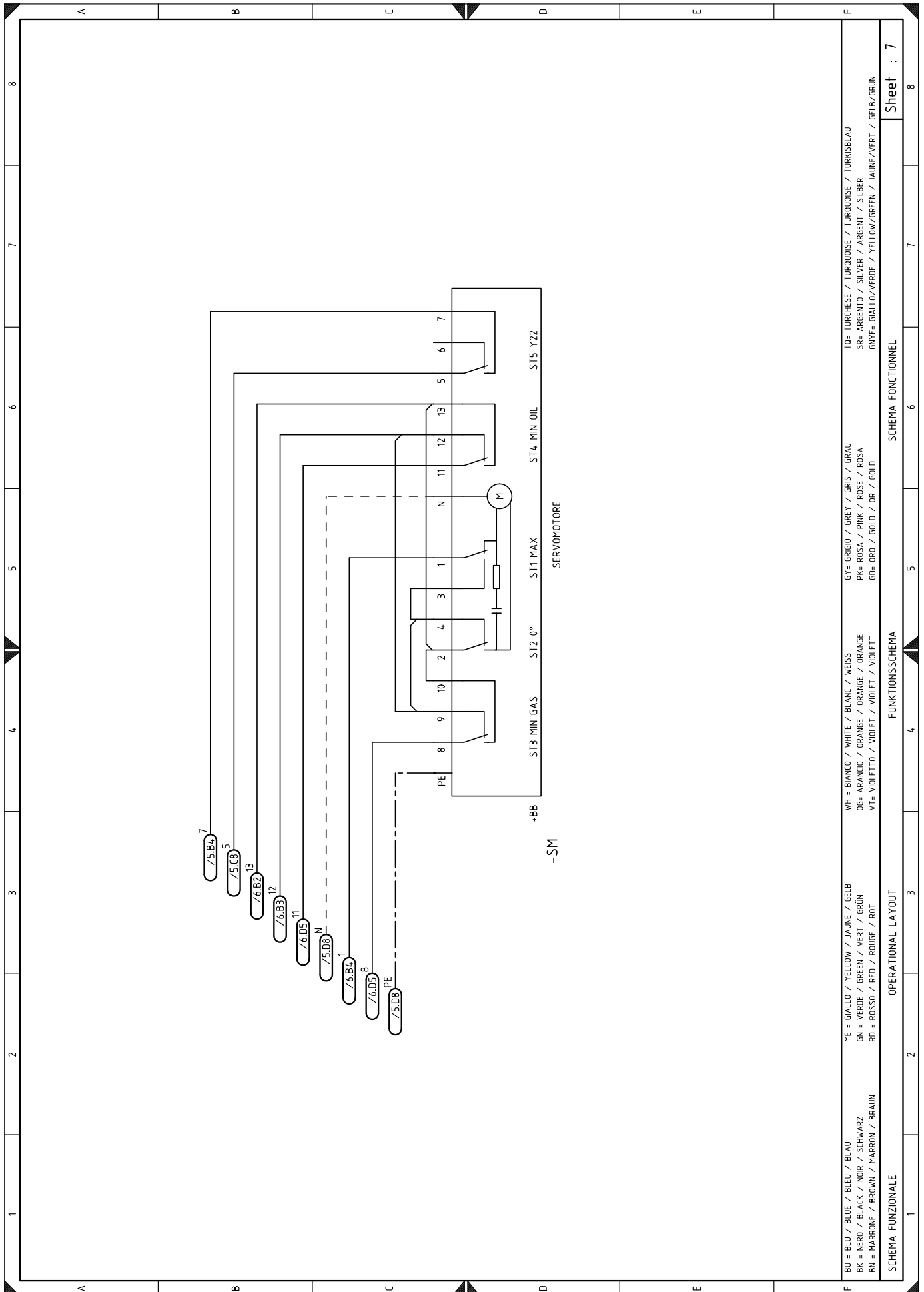






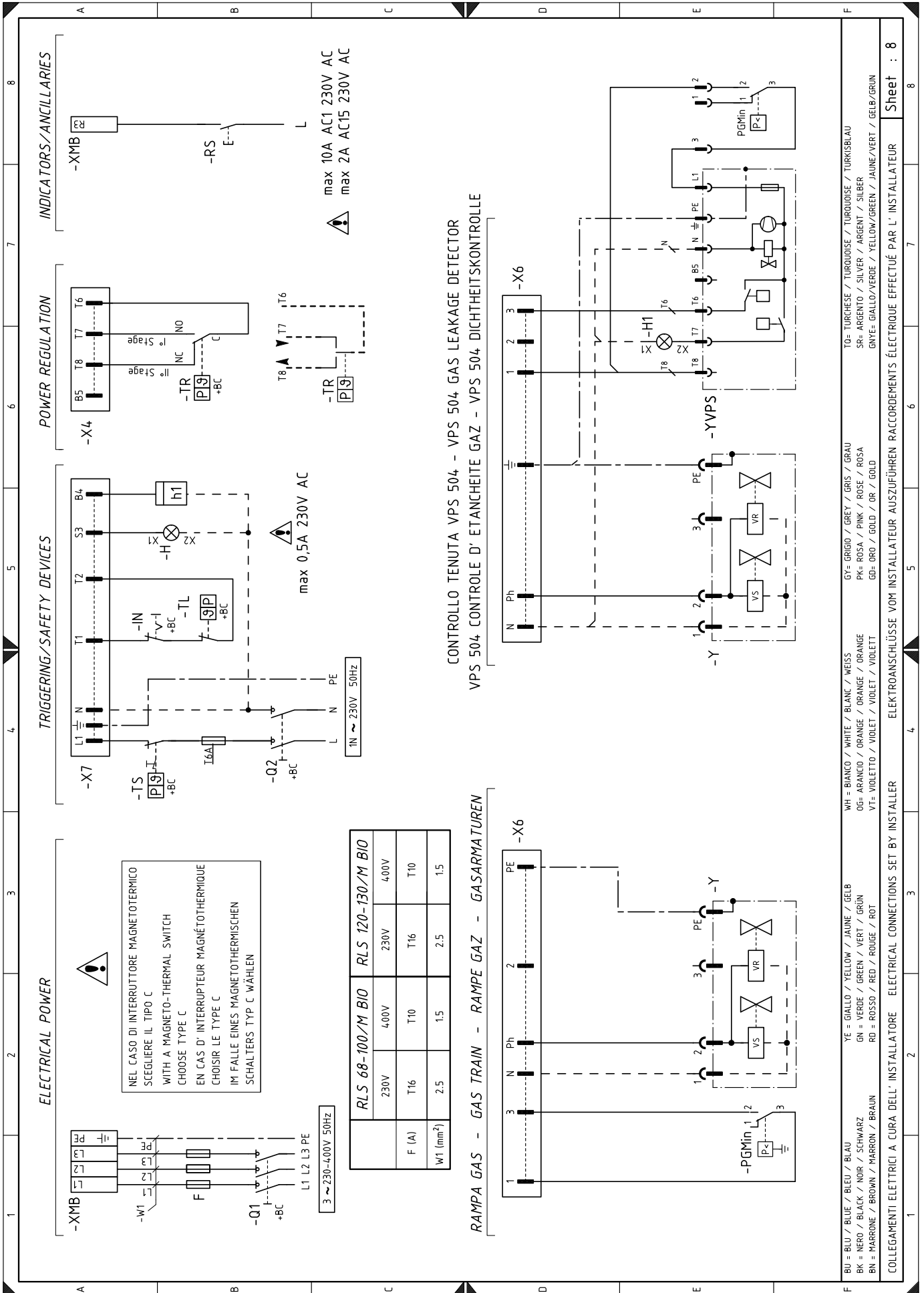
Sheet : 6

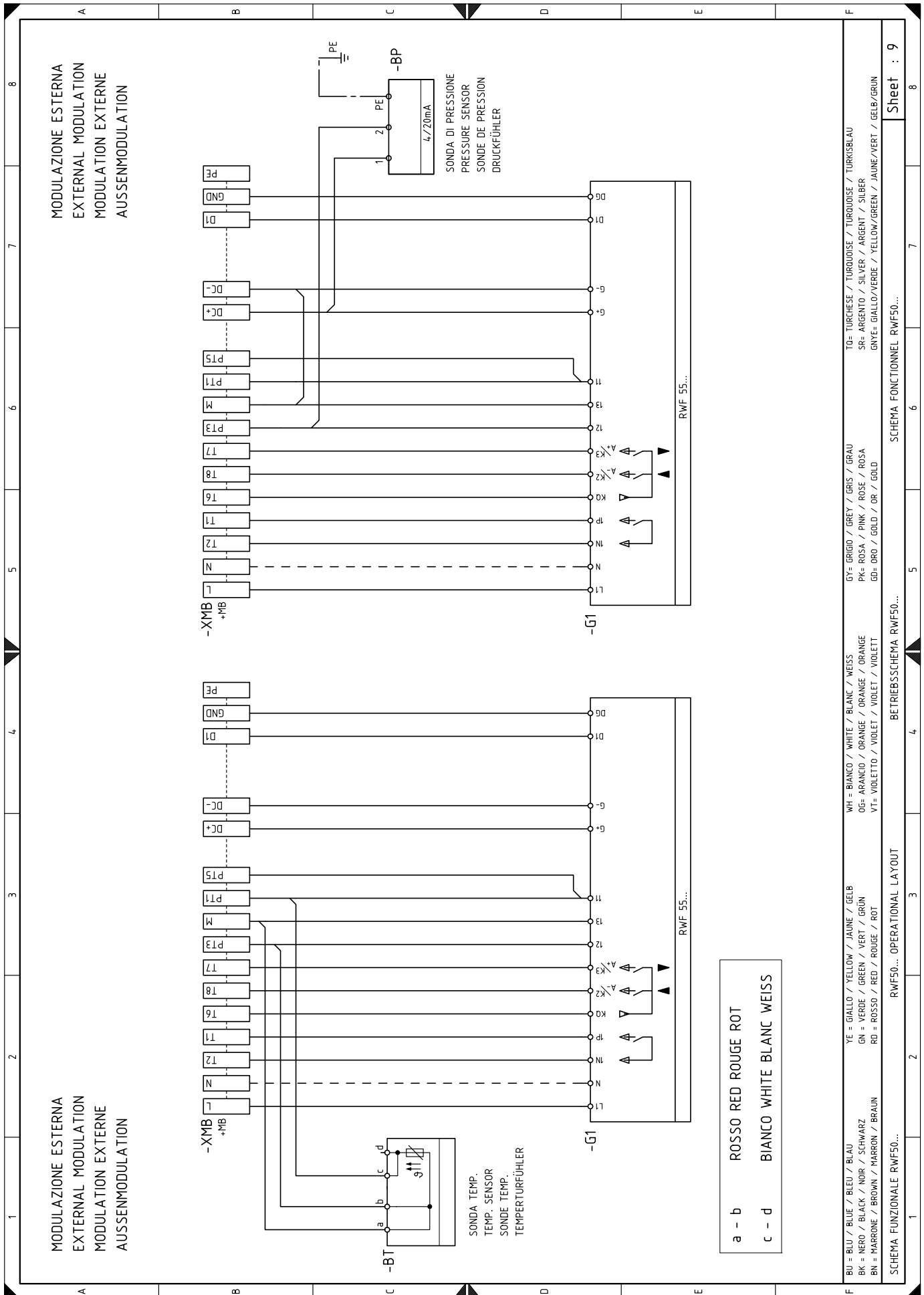




**F** BU = BLU / BLUE / BLEU / BLAU  
 BK = NERO / BLACK / NOIR / SCHWARZ  
 BN = MARRONE / BROWN / MARRON / BRAUN  
 YE = GIALLO / YELLOW / JAUNE / GELB  
 GN = VERDE / GREEN / VERT / GRÜN  
 RD = ROSSO / RED / ROUGE / ROT  
 WH = BIANCO / WHITE / BLANC / WEISS  
 OG = ARANCIO / ORANGE / ORANGE / ORANGE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

SCHEMA FUNZIONALE / OPERATIONAL LAYOUT / FUNKTIONSSCHEMA / SCHEMA FONCTIONNEL  
 Sheet : 7





**Key to layouts**

|       |   |
|-------|---|
| A1    | Control box   |
| B     | Protection against radio interference   |
| BP    | Pressure probe  |
| BT    | Temperature probe   |
| B7    | UV cell (intermittent operation)  |
| F1    | Thermal cut-out   |
| G1    | Power regulator RWF   |
| H1    | Remote lock-out signal of leak detection control device   |
| H     | Remote lock-out signal  |
| K1    | Fan motor contactor   |
| K10   | Relay   |
| K11   | Relay   |
| MV    | Fan motor   |
| MP    | Pump motor  |
| SM    | Servomotor  |
| PA    | Air pressure switch   |
| PGmin | Min. gas pressure switch  |
| PGM   | Max. gas pressure switch  |
| TL    | Load limit remote control system:<br>shuts down the burner when the boiler temperature or<br>pressure reaches the preset value. |
| TR    | High-low mode load remote control system:<br>controls min. and max. output.   |
| TS    | Safety load control system:<br>operates when TL is faulty   |
| IN    | Burner manual stop switch   |
| RS    | Lock-out reset button   |
| S40   | Switch for following operations:<br>MAN = manual<br>AUT = automatic<br>OFF  |
| S43   | Button for:<br>- = power reduction<br>+ = power increase  |
| S47   | Oil/gas selector  |
| T1    | Ignition transformer  |
| XMB   | Burner terminal strip   |
| VS    | Safety valve (gas)  |
| VR    | 1 <sup>st</sup> stage adjustment valve (gas)  |
| YVPS  | Gas leak detection control device   |
| Y20   | Safety valve (gas oil)  |
| Y21   | 1 <sup>st</sup> stage adjustment valve (gas oil)  |
| Y22   | 2 <sup>nd</sup> stage adjustment valve (gas oil)  |
| XP4   | 4 pole socket   |
| XP6   | 6 pole socket   |
| XP7   | 7 pole socket   |
| X4    | 4 pole plug   |
| X6    | 6 pole plug   |
| X7    | 7 pole plug   |
| h1    | 1 <sup>st</sup> stage hour counter  |
| Y     | Gas valve unit  |
| TB    | Burner ground   |
| Q1    | Three-phase disconnect switch   |
| Q2    | Single-phase disconnect switch  |
| F     | Fuses for three-phase line protection   |
| T6A   | Fuses for single-phase line protection  |
| +BB   | On board burners components   |
| +BC   | On board boiler components  |
| +MB   | Base plate burners components   |







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