

## **GB** Forced draught gas burners

Modulating operation



| CODE     | MODEL        | TYPE   |
|----------|--------------|--------|
| 20204449 | RS 310/E ULX | S045T1 |
| 20204450 | RS 510/E ULX | S046T1 |



**Translation of the original instructions**

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## 1 Information and general warnings

### 1.1 Information about the instruction manual

#### 1.1.1 Introduction

The instruction manual supplied with the burner:

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

#### Symbols used in the manual

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

#### 1.1.2 General dangers

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



**DANGER**

Maximum danger level!

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



**WARNING**

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



**CAUTION**

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

#### 1.1.3 Other symbols



**DANGER**

#### **DANGER: LIVE COMPONENTS**

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



#### **DANGER: FLAMMABLE MATERIAL**

This symbol indicates the presence of flammable materials.



#### **DANGER: BURNING**

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



#### **DANGER: CRUSHING OF LIMBS**

This symbol indicates the presence of moving parts: danger of crushing of limbs.



#### **WARNING: MOVING PARTS**

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



#### **DANGER: EXPLOSION**

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



#### **PERSONAL PROTECTION EQUIPMENT**

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



#### **OBLIGATION TO ASSEMBLE THE COVER AND ALL THE SAFETY AND PROTECTION DEVICES**

This symbol signals the obligation to reassemble the cover and all the safety and protection devices of the burner after any maintenance, cleaning or checking operations.



#### **ENVIRONMENTAL PROTECTION**

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



#### **IMPORTANT INFORMATION**

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



This symbol indicates a list.

#### **Abbreviations used**

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

### 1.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

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

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

## 1.2 Guarantee and responsibility

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



**WARNING**

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

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

- incorrect installation, start-up, use and maintenance of the burner;
- improper, incorrect or unreasonable use of the burner;
- intervention of unqualified personnel;
- carrying out of unauthorised modifications on the equipment;
- use of the burner with safety devices that are faulty, incorrectly applied and/or not working;
- installation of untested supplementary components on the burner;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- continuation of use of the burner when a fault has occurred;
- repairs and/or overhauls incorrectly carried out;
- modification of the combustion chamber with inserts that prevent the regular development of the structurally established flame;
- insufficient and inappropriate surveillance and care of those burner components most likely to be subject to wear and tear;
- use of non-original components, including spare parts, kits, accessories and optional;
- force majeure.

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

## 2 Safety and prevention

### 2.1 Introduction

The burners have been designed and built in compliance with current regulations and directives, applying the known technical rules of safety and envisaging all the potential danger situations.

It is necessary, however, to bear in mind that the imprudent and clumsy use of the equipment may lead to situations of death risk for the user or third parties, as well as the damaging of the burner or other items. Inattention, thoughtlessness and excessive confidence often cause accidents; the same applies to tiredness and sleepiness.

It is a good idea to remember the following:

- The burner must only be used as expressly described. Any other use should be considered improper and therefore dangerous.

In particular:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly foreseen by the manufacturer;

the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the room temperature must all be within the values indicated in the instruction manual.

- Modification of the burner to alter its performance and destinations is not allowed.
- The burner must be used in exemplary technical safety conditions. Any disturbances that could compromise safety must be quickly eliminated.
- Opening or tampering with the burner components is not allowed, apart from the parts requiring maintenance.
- Only those parts envisaged by the manufacturer can be replaced.



WARNING

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

### 2.2 Personnel training

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

The user:

- undertakes to entrust the machine exclusively to suitably trained and qualified personnel;
- undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, he undertakes to ensure that everyone knows the use and safety instructions for his own duties.
- Personnel must observe all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel must inform their superiors of every problem or dangerous situation that may arise.
- The assembly of parts of other makes, or any modifications, can alter the characteristics of the machine and hence compromise operating safety. The manufacturer therefore declines any and every responsibility for any damage that may be caused by the use of non-original parts.

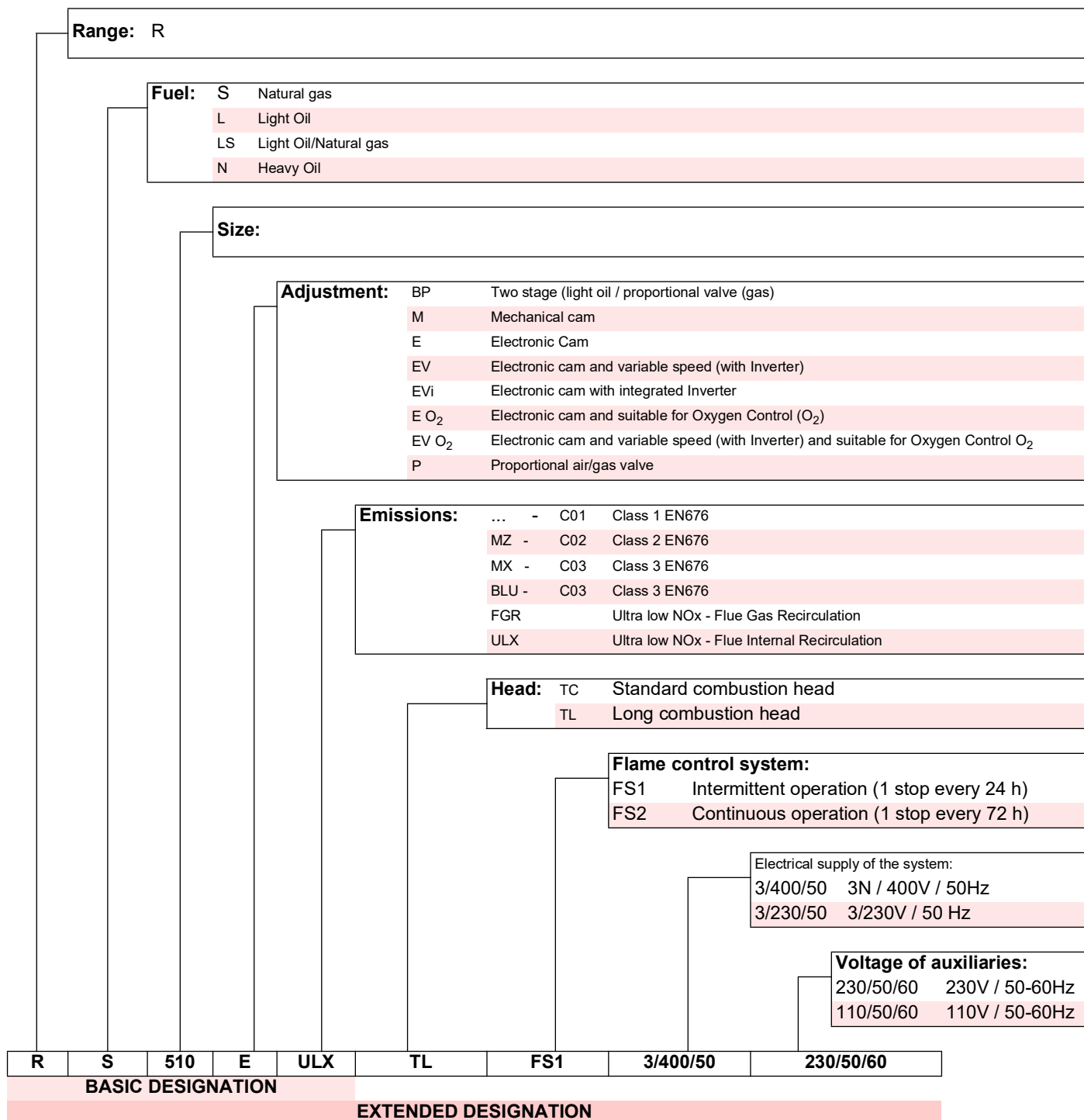
In addition:



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

### 3 Technical description of the burner

#### 3.1 Burner designation



## 3.2 Models available

| Designation         | Voltage   | Start-up   | Code     |
|---------------------|-----------|------------|----------|
| RS 310/E ULX TL FS1 | 3N/400/50 | Direct     | 20204449 |
| RS 510/E ULX TL FS1 | 3N/400/50 | Star/Delta | 20204050 |

Tab. A

## 3.3 Technical data

| Model                                           | RS 310/E ULX                                |       | RS 510/E ULX    |                 |
|-------------------------------------------------|---------------------------------------------|-------|-----------------|-----------------|
| Type                                            | S045T1                                      |       | S046T1          |                 |
| Power <sup>(1)</sup><br>Delivery <sup>(1)</sup> | Min. - Max.                                 | kW    | 370/1250 ÷ 3700 | 570/1900 ÷ 4600 |
| Fuels                                           | Natural gas: G20 (methane gas)              |       |                 |                 |
| Gas pressure at max. output <sup>(2)</sup> Gas: | - G20                                       | mbar  | 280             | 210             |
|                                                 | - G25                                       | mbar  | 375             | 290             |
| Operation                                       | FS1: Intermittent (min. 1 stop in 24 hours) |       |                 |                 |
| Standard applications                           | Boilers: water, steam, diathermic oil       |       |                 |                 |
| Ambient temperature                             | °C                                          |       | 0 - 50          |                 |
| Combustion air temperature                      | °C max                                      |       | 60              |                 |
| Noise levels <sup>(3)</sup>                     | Sound pressure                              | dB(A) | 78              | 80              |
|                                                 | Sound power                                 | dB(A) | 89              | 93              |
| Burner net weight                               | kg                                          |       | 161             | 185             |
| CE                                              | No.                                         |       | CE-0123DN1089   |                 |

Tab. B

- (1) Reference conditions: Room temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.  
 (2) Pressure at the test point 5)(Fig. 4 on page 11) with zero pressure in the combustion chamber and at maximum burner output.  
 (3) Sound pressure measured in manufacturer's combustion laboratory, with burner operating on test boiler and at maximum rated output. The sound power is measured with the "Free Field" method, as per EN 15036, and according to an "Accuracy: Category 3" measuring accuracy, as set out in EN ISO 3746.

## 3.4 Electrical data

| Model                     |                    | RS 310/E ULX                        |  | RS 510/E ULX           |  |
|---------------------------|--------------------|-------------------------------------|--|------------------------|--|
|                           |                    | DIRECT START-UP                     |  | STAR-TRIANGLE START-UP |  |
| Main electrical supply    |                    | 3N ~ 400V   +/-10% 50 Hz            |  |                        |  |
| Fan motor IE3             | rpm                | 2920                                |  | 2920                   |  |
|                           | V                  | 220-240/380-415                     |  | 400/690                |  |
|                           | kW                 | 7.5                                 |  | 12                     |  |
|                           | A                  | 25.2/14.5                           |  | 21/12.2                |  |
| Ignition transformer      | V1 - V2<br>I1 - I2 | 230 V - 2 x 12 kV<br>0.24 A - 30 mA |  |                        |  |
| Absorbed electrical power | kW max             | 8.8                                 |  | 13.8                   |  |
| Protection level          |                    | IP 54                               |  |                        |  |

Tab. C

### 3.5 Burner equipment

|                                                           |       |
|-----------------------------------------------------------|-------|
| Gas elbow                                                 | No. 1 |
| DN65 gasket                                               | No. 1 |
| Thermal insulation screen                                 | No. 1 |
| M20 fittings for inlet of optional electrical connections | No. 4 |
| N16 nuts                                                  | No. 4 |
| M 18 x 60 screws                                          | No. 4 |
| M 16 x 60 screws                                          | No. 4 |
| M16 x 67 stud bolts                                       | No. 4 |
| GW 150 gas pressure switch                                | No. 1 |
| Instructions                                              | No. 1 |
| Spare parts list                                          | No. 1 |



It is recommended to tighten the screws of the gas flange with a tightening torque of **40 Nm ±10%**.



Tighten the nuts gradually (first to 30%, then to 60% up to 100%) according to the cross pattern shown in the figure.



For the use of the gas pressure switch GW 150 (supplied separately), refer to paragraphs "Firing rates" on page 9 and "Maximum gas pressure switch" on page 33.

### 3.6 Maximum dimensions

The maximum dimensions of the burner are given in Fig. 1.  
Bear in mind that inspection of the combustion head requires the burner to be opened and the rear part turned on the hinge.

The maximum dimensions of the open burner are indicated by the A, R and R2 positions. The I position is reference for the refractory thickness of the boiler door.

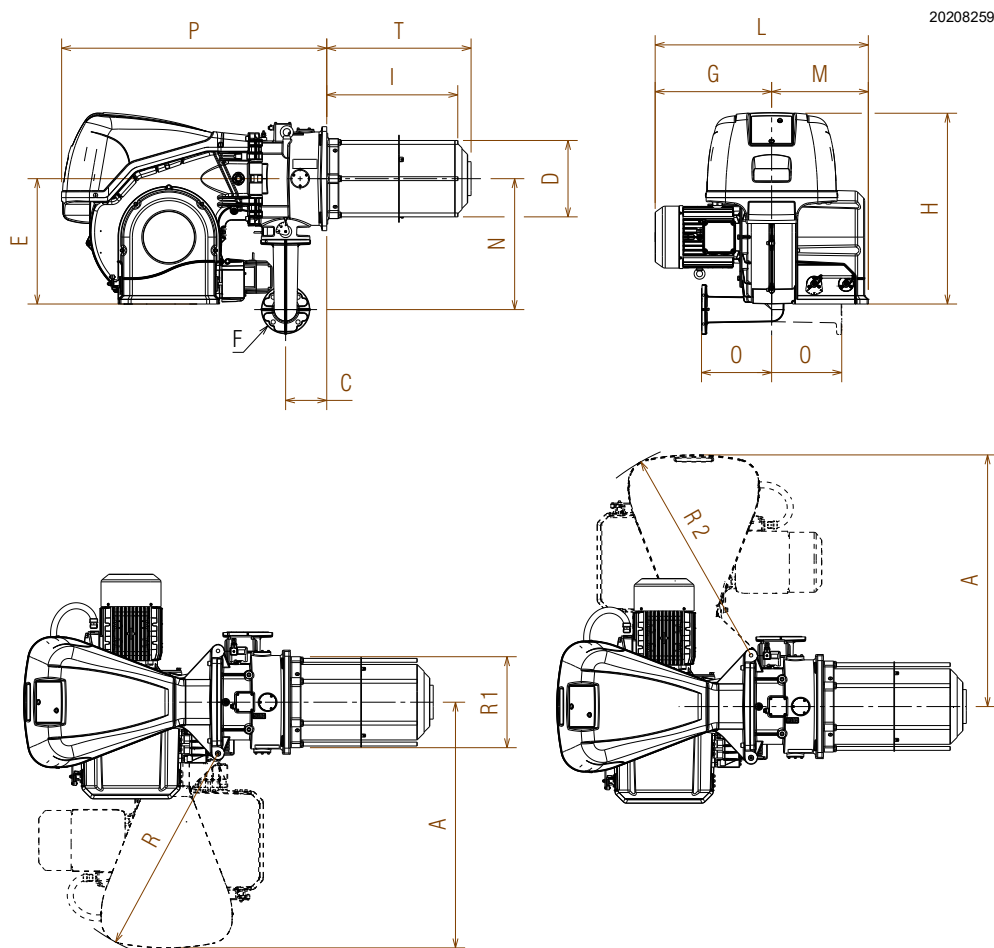


Fig. 1

| mm           | A    | C   | D   | E   | F*   | G   | H   | I   | L   | M   | N   | O   | P    | R   | R1  | R2  | T   |
|--------------|------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|
| RS 310/E ULX | 1015 | 176 | 312 | 518 | DN65 | 480 | 790 | 525 | 880 | 400 | 541 | 290 | 1104 | 886 | 376 | 886 | 590 |
| RS 510/E ULX | 1015 | 176 | 312 | 518 | DN65 | 527 | 790 | 525 | 927 | 400 | 541 | 290 | 1104 | 886 | 376 | 886 | 590 |

Tab. D



\* The gas adaptor is set also for DN 80 bore.

## 3.7 Firing rates

The **maximum output** must be higher than the following values (Tab. E):

| Model        | kW   |
|--------------|------|
| RS 310/E ULX | 1250 |
| RS 510/E ULX | 1900 |

Tab. E



If the chosen maximum output is exactly equal to these values (Tab. E), the central gas calibration must be modified (see "Central gas adjustment" on page 24).

If the chosen maximum output is lower than the following values (Tab. F):

| Model        | kW   |
|--------------|------|
| RS 310/E ULX | 1860 |
| RS 510/E ULX | 2800 |

Tab. F



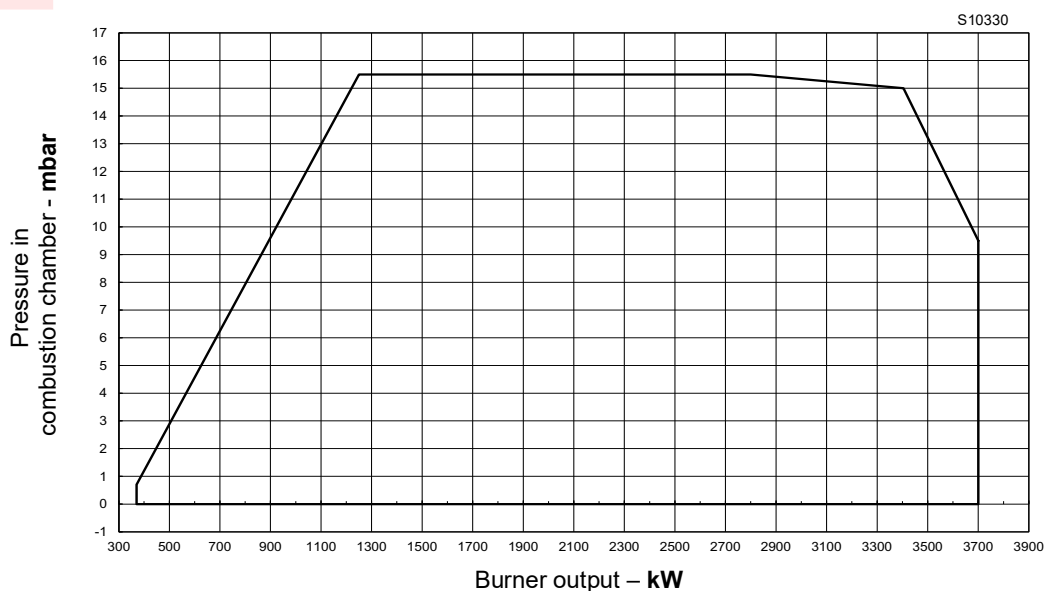
replace the GW 500 maximum pressure switch (Fig. 4 on page 11) installed on the burner with the GW 150 gas pressure switch supplied as equipment.

The **minimum output** must not be lower than the minimum limit of the diagram (Fig. 2).



The firing rate was obtained considering a room temperature of 20°C and an atmospheric pressure of 1013 mbar (approx. 0 m above sea level), with the combustion head adjusted as shown at page 23.

### RS 310/E ULX



### RS 510/E ULX

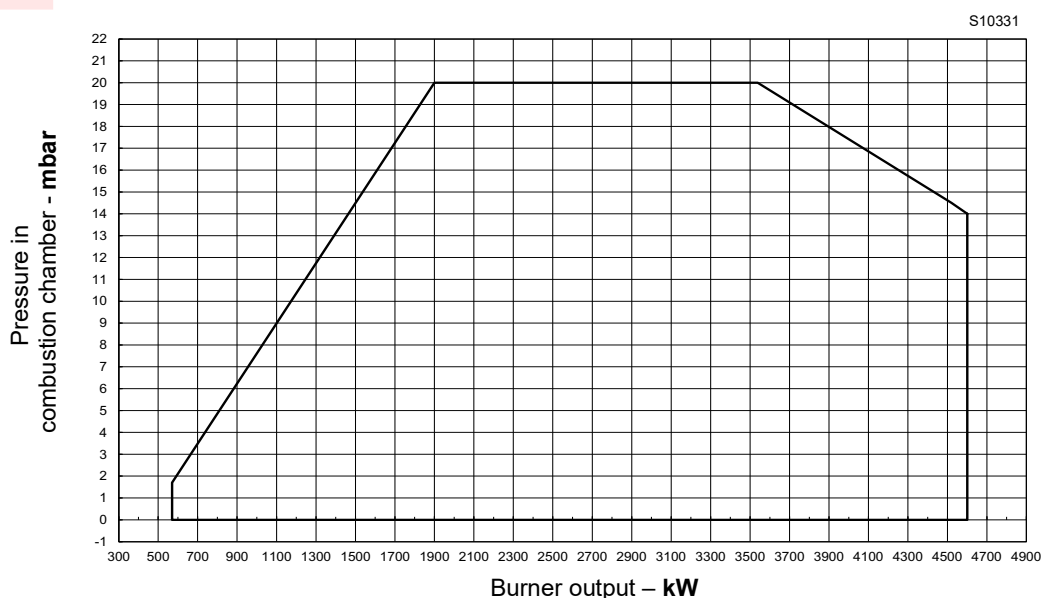


Fig. 2

### 3.8 Test boiler

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

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

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

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

#### Example:

Output 5000 kW - diameter 100 cm - length 5 m

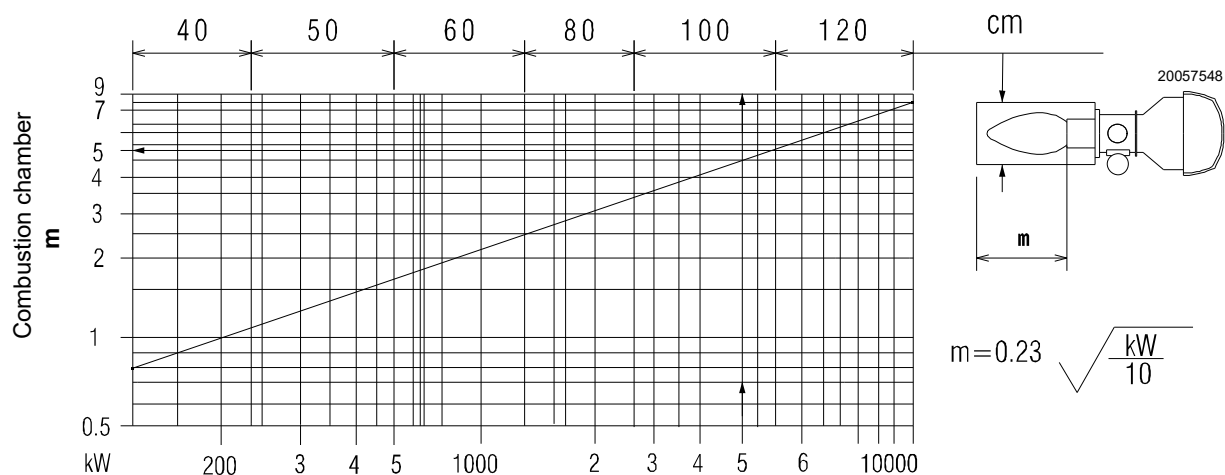


Fig. 3

## 3.9 Burner description

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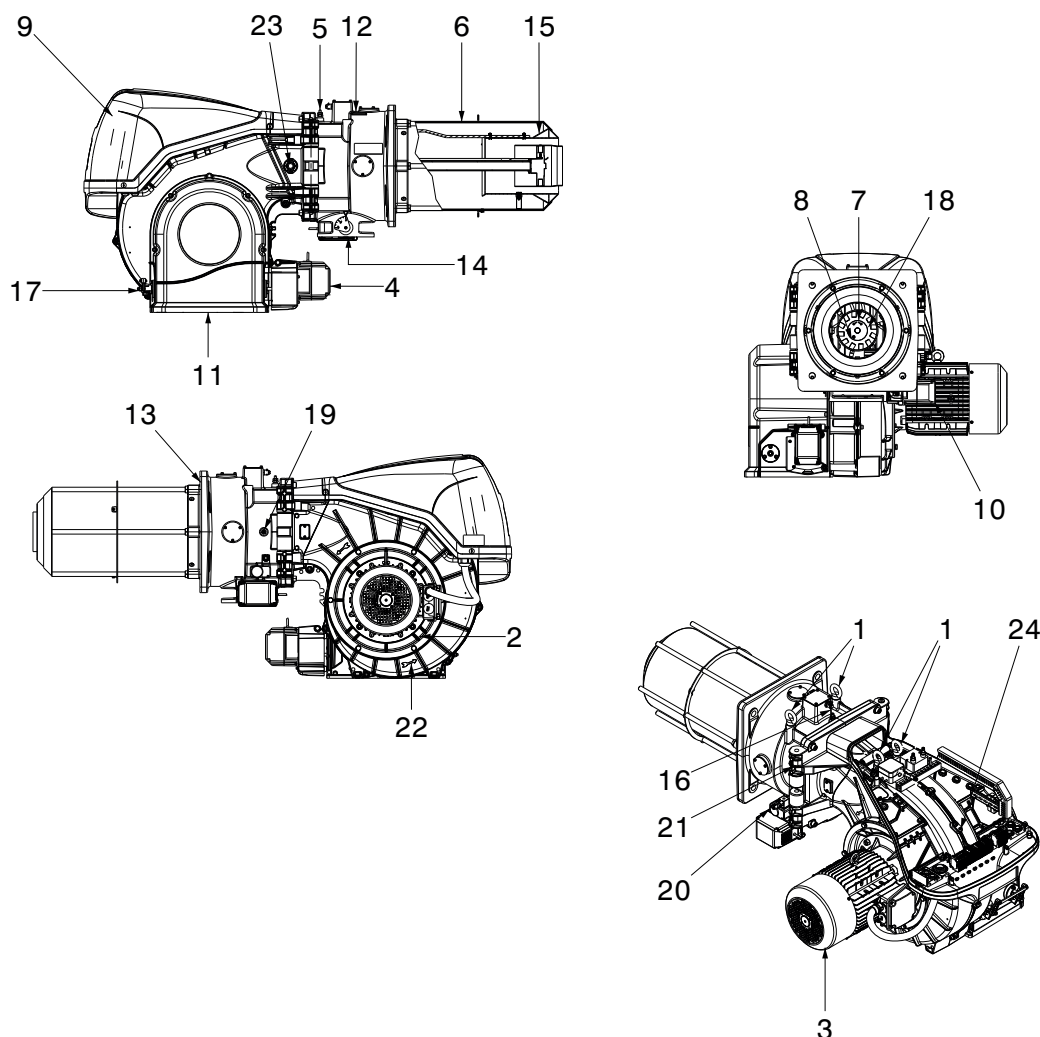


Fig. 4

- 1 Lifting rings
- 2 Fan
- 3 Fan motor
- 4 Air damper servomotor
- 5 Combustion head gas pressure test point
- 6 Combustion head
- 7 Ignition electrodes
- 8 Ionisation probe
- 9 Electrical panel cover
- 10 Gas butterfly valve servomotor
- 11 Fan air inlet
- 12 Pipe coupling
- 13 Gasket for boiler fixing
- 14 Gas butterfly valve
- 15 Shutter
- 16 Combustion head movement screw
- 17 Lever for controlling the dampers with graduated scale
- 18 Flame stability disk
- 19 Combustion head air pressure test point
- 20 Maximum gas pressure switch with pressure test point
- 21 Hinge for opening the burner
- 22 Indication for checking the rotation direction of the purging motor
- 23 Flame inspection window
- 24 Pressure test point for air pressure switch “+”



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



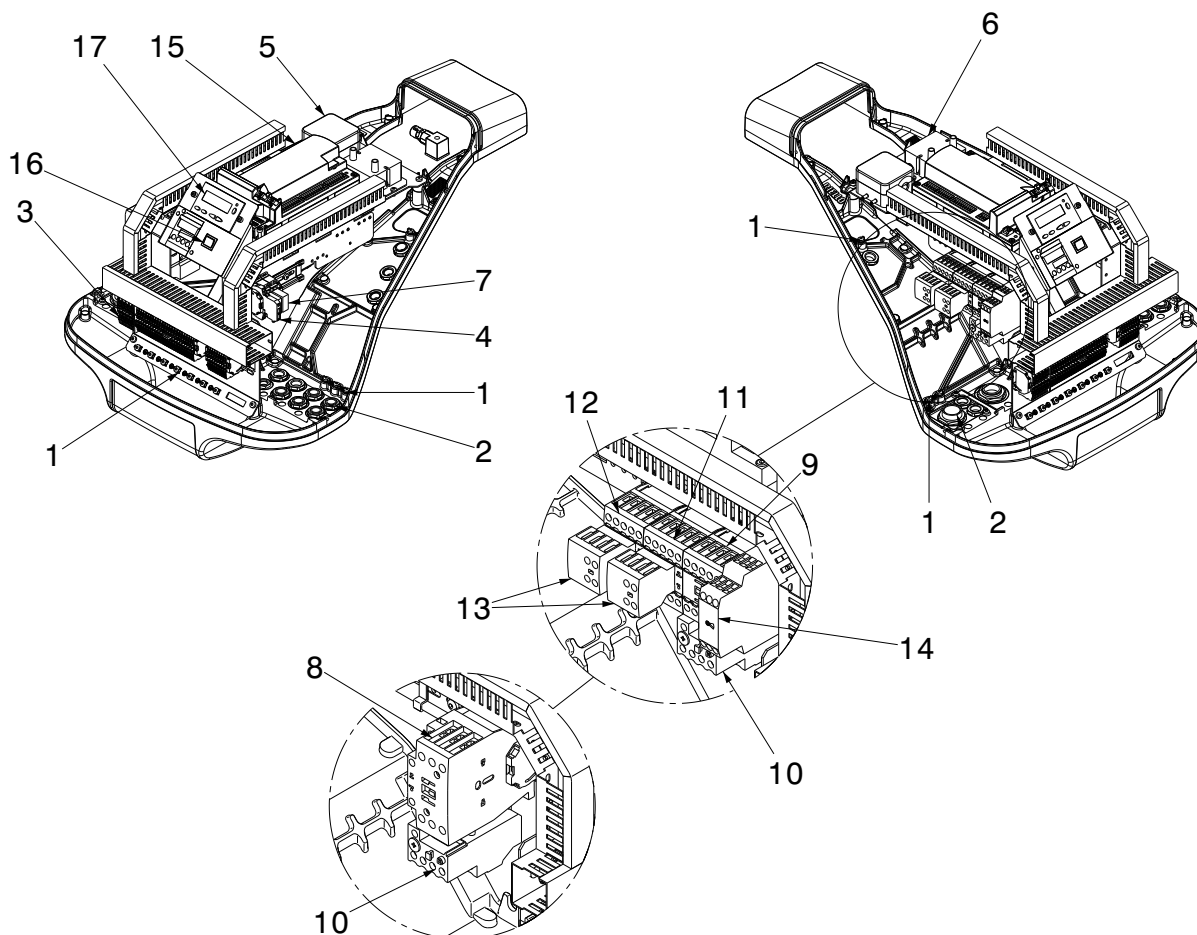
The burner can be opened to the right or to the left without links to the fuel supply side.



To open the burner see section “Access to head internal part” on page 22.

**3.10 Electrical panel description**

20197930


**Fig. 5**

- 1 Earth terminal
- 2 Supply cables and external connections passage
- 3 Main terminal supply board
- 4 Auxiliary circuits fuse (includes a spare fuse)
- 5 Air pressure switch
- 6 Ignition transformer
- 7 Free contact relay
- 8 Direct start up line contactor
- 9 Star/delta start-up line contactor
- 10 Thermal relay (with reset button)
- 11 Delta contactor (star/delta start up)
- 12 Star contactor (star/delta start up)
- 13 Auxiliary contacts
- 14 Timer for delta/star start-up
- 15 Electronic cam
- 16 ON/OFF selector
- 17 Operator panel with LCD display

## 3.11 Flame control for the air/fuel ratio (REC 27 ...)

### Warnings



#### WARNING

To avoid accidents, material and/or environmental damage, observe the following instructions!  
The flame control is a safety device! Avoid opening or modifying it, or forcing its operation. Riello S.p.A. cannot assume any responsibility for damage resulting from unauthorised interventions!



#### Risk of explosion!

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

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

The flame control contains the following components:

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



#### WARNING

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

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before carrying out any checks on the wiring, fully isolate the system from the electric mains (omnipolar separation). Check the system is not powered and cannot be accidentally reconnected. Failure to do this will lead to the risk of electrocution.
- Protection against electrocution from the flame control and all connected electric components is obtained with the correct assembly.
- After every intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then perform the safety checks.
- Falls and collisions can negatively affect the safety functions. In this case, the flame control must not be operated, even if it displays no evident damage.
- During the programming of the air-fuel ratio control curves, the technician should constantly observe the quality of the combustion process (for example using a gas analyser) and, in the event of inadequate combustion values or dangerous conditions, should take appropriate action, for example shutting down the system manually.
- The plugs of the connection cables or other accessories can be disconnected when the system has been switched off.

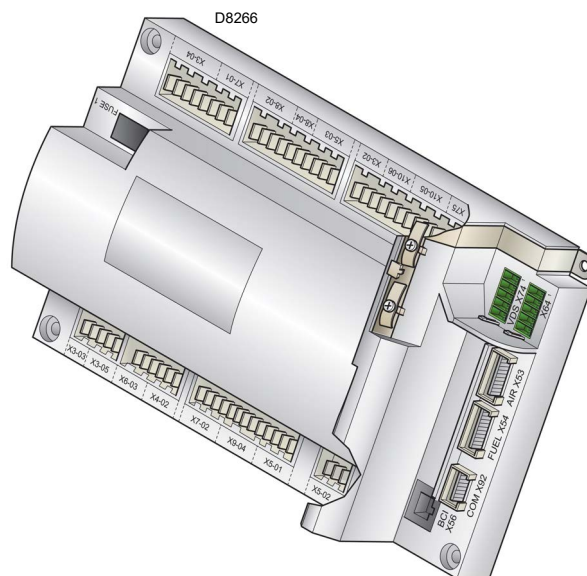


Fig. 6

- The connections to the actuators do not provide a secure separation from the mains voltage. Before connecting or changing the actuators the system should be off to avoid any conditions that could cause the formation of condensation or humidity. Otherwise, before switching on again, make sure that the entire flame control is perfectly dry!
- Static charges must be avoided since they can damage the flame control's electronic components when touched.
- Static charges must be avoided since they can damage the flame control's electronic components when touched.

**Technical data**

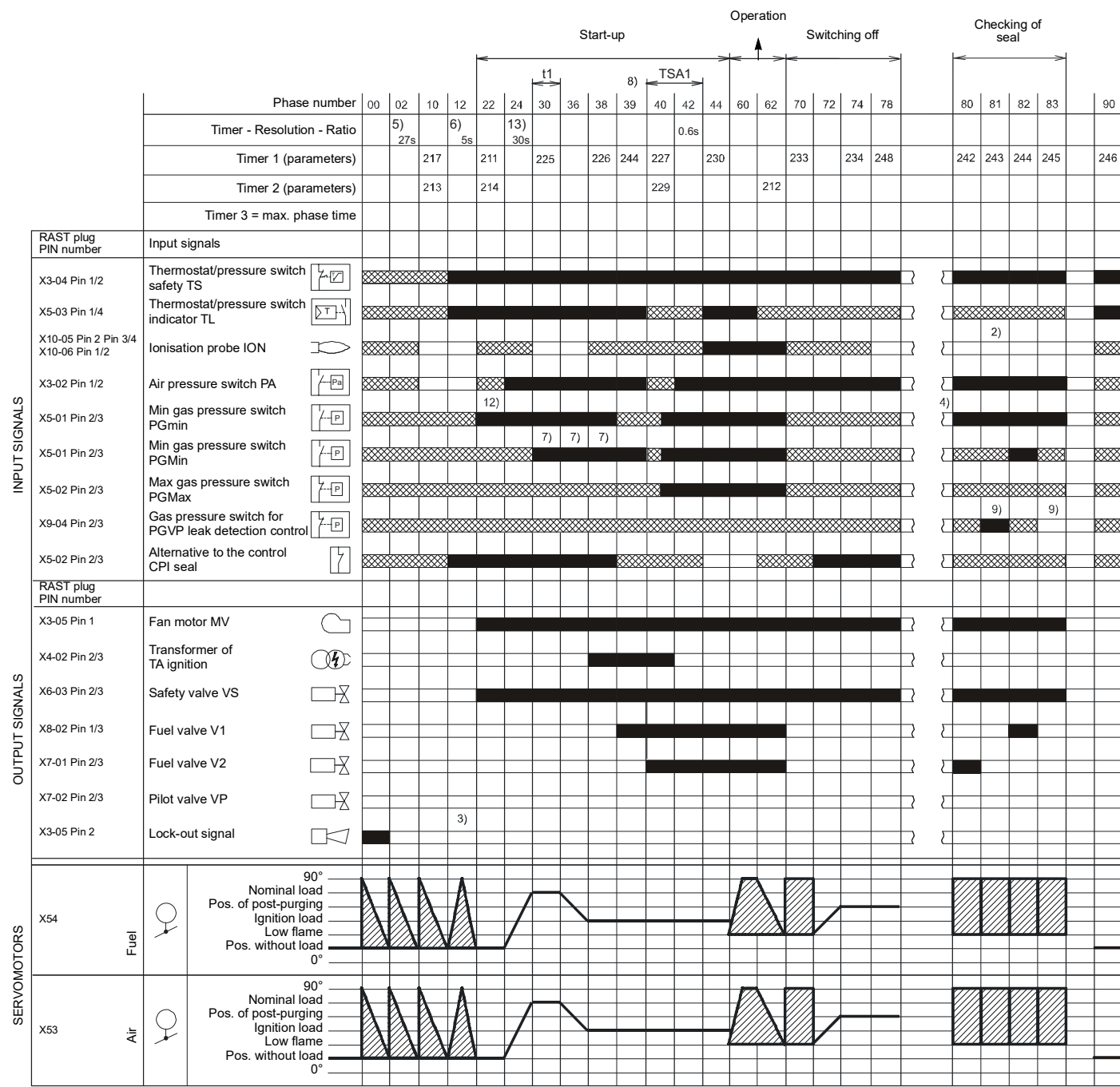
|                           |                                                              |                                                                               |
|---------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------|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

**Tab. G**

**WARNING**

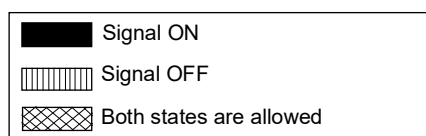
Condensation, the formation of ice and the entry of water are prohibited!

## 3.12 Operation sequence of the burner



S8870

Fig. 7



### 3.12.1 List of phases

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

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

### 3.13 Operator panel operation

The flame control REC 27 ... is connected directly to the operator panel (Fig. 8).

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

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



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

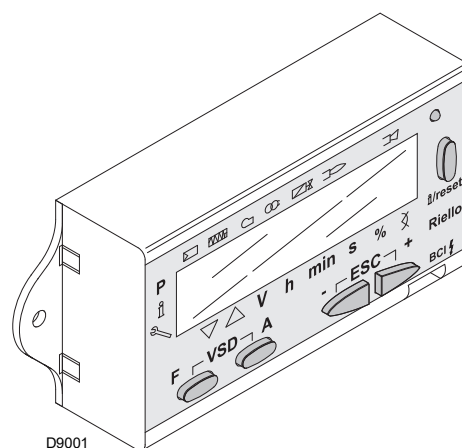


Fig. 8

#### 3.13.1 Description of the symbols on the display

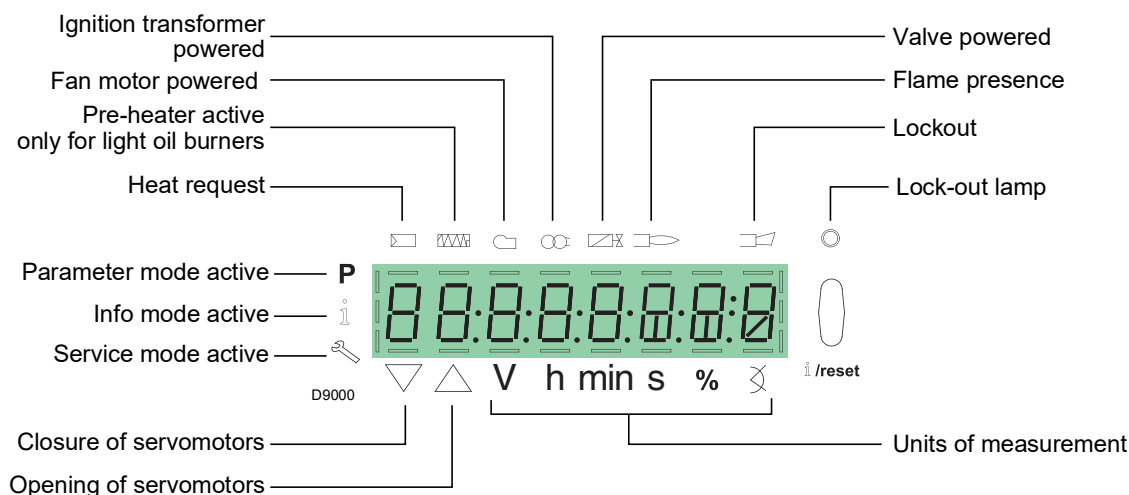
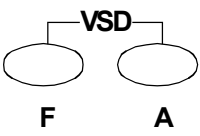
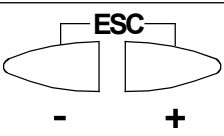


Fig. 9

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

## 3.13.2 Description of the buttons

| Button                                                                              | Button                              | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <b>Button F</b>                     | To adjust the fuel servomotor<br>(keep  pressed and adjust the value by pressing  or  )                                                                                                                                                                                                                                      |
|    | <b>Button A</b>                     | To adjust the air servomotor<br>(keep  pressed and adjust the value by pressing  or  )                                                                                                                                                                                                                                       |
|    | <b>Buttons A and F VSD function</b> | To change the mode setting parameter P<br>(simultaneously press  and  plus  or  )                                                                                                                                                           |
|    | <b>Button Info and Enter</b>        | <ul style="list-style-type: none"> <li>• <b>Enter</b> in Parameters Mode</li> <li>• <b>Reset</b> in the event of a lockout</li> <li>• Access to a lower level of the menu</li> <li>• To navigate in <b>Mode Info</b> or <b>Service</b> and permits: <ul style="list-style-type: none"> <li>–the selection of the parameter (flashing symbol)(press for &lt;1 s)</li> <li>–access to a lower level of the menu (press from 1...3 s)</li> <li>–access to a higher level of the menu (press from 3...8 s)</li> <li>–access to another Mode (press for &gt; 8 s)</li> </ul> </li> </ul> |
|    | <b>Button -</b>                     | Lowering the value <ul style="list-style-type: none"> <li>– Access to a lower point of the modulation curve</li> <li>– Scrolling the parameter list</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                      |
|   | <b>Button +</b>                     | Increasing the value <ul style="list-style-type: none"> <li>– Access to a higher point of the modulation curve</li> <li>– Scrolling the parameter list</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | <b>Buttons - and +</b>              | Quit function (ESC)<br>(press  and  simultaneously) <ul style="list-style-type: none"> <li>– Does not confirm the value</li> <li>– Access to a higher level of the menu</li> </ul>                                                                                                                                                                                                                            |

Tab. H

**3.14 Servomotor (SQM33....)**
**Warnings**

**WARNING**

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

- All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
- Before modifying the wiring of the servomotor in the connection area, fully disconnect the burner control device from the power supply (omnipolar separation).
- To avoid the risk of electrocution, protect the connection terminals in a suitable manner and correctly fix the cover.
- After every intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order, then make the safety checks.
- Falls and collisions can negatively affect the safety functions. In this case, the servomotor must not be operated, even if it displays no evident damage.


**WARNING**
**Assembly notes**

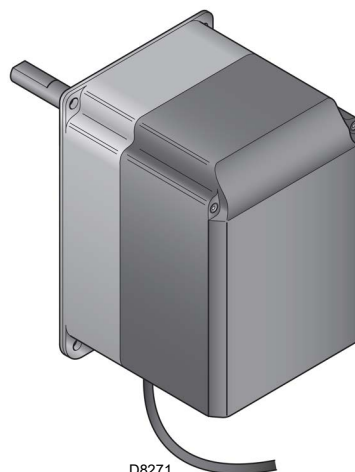
The connection between the actuator command shaft and the control element must be rigid, without any mechanical play.

**Installation notes**

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


**WARNING**

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


**Fig. 10**
**Technical data**

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

**Tab. I**

**WARNING**

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

### 3.15 Calibration of the thermal relay

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

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

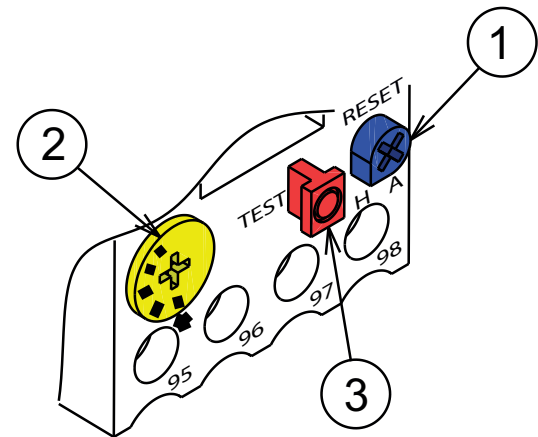
To reset, in case of an intervention of the thermal relay, press the "RESET" button 1) of Fig. 11.

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



**CAUTION**

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



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**Fig. 11**

## 4 Installation

### 4.1 Notes on safety for the installation

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



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



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

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

### 4.2 Handling

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



The handling operations for the burner can be highly dangerous if not carried out with the greatest attention: keep any unauthorised people at a distance; check the integrity and suitability of the available means of handling. Check also that the area in which you are working is empty and that there is an adequate escape area (i.e. a free, safe area to which you can quickly move if the burner should fall). When handling, keep the load at not more than 20-25cm 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.

Release the burner from the wooden platform by removing the bolts/nuts/screws that secure the burner to the platform.

Handle the burner following the safety standards and regulations of the laws in force and using the eyebolts supplied as equipment.

### 4.3 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; but should be collected and disposed of in the appropriate places.

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|               |  |   |  |      |  |
|---------------|--|---|--|------|--|
| <b>R.B.L.</b> |  | A |  | B    |  |
|               |  | D |  | C    |  |
|               |  | E |  | F kW |  |
| GAS-KAASU     |  | G |  | H kW |  |
| GAZ-AEPIO     |  | G |  | H kW |  |
|               |  | I |  |      |  |
|               |  |   |  | A    |  |
|               |  |   |  | A    |  |
|               |  |   |  | Kg   |  |
|               |  |   |  | CE   |  |

Fig. 12

#### Checking the characteristics of the burner

Check the identification label of the burner, showing:

- the model (A)(Fig. 12) and type of burner (B);
- the year of manufacture, in cryptographic form (C);
- the serial number (D);
- the data for electrical supply and the protection level (E);
- the absorbed electrical power (F);
- the types of gas used and the relative supply pressures (G);
- the data of the burner's minimum and maximum output possibilities (H) (see Firing rate).

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

- the category of the appliance/countries of destination (I).



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

## 4.4 Operating position



WARNING

- The burner is designed to operate only in positions 1, 2, 3 and 4 (Fig. 13).
- Installation 1 is preferable, as it is the only one that allows the maintenance operations as described in this manual.
- Installations 2, 3 and 4 permit operation but make maintenance and inspection of the combustion head more difficult.



DANGER

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

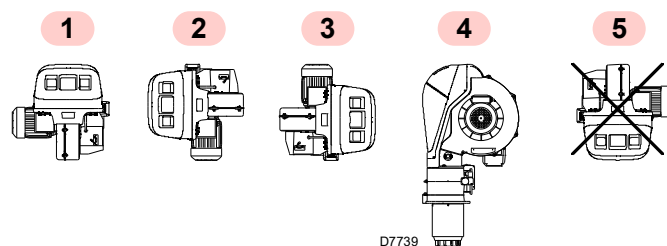


Fig. 13

## 4.5 Preparing the boiler

### 4.5.1 Boring the boiler plate

Drill the combustion chamber locking plate as shown in Fig. 14 (Tab. J). The position of the threaded holes can be marked using the thermal screen supplied with the burner.

### 4.5.2 Blast tube length

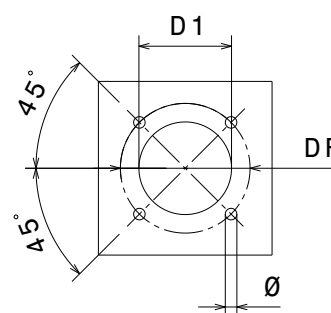
The length of the blast tube must be greater than the thickness of the boiler door complete with its fettling.

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

The refractory can have a conical shape (minimum 60°).

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

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



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Fig. 14

| mm           | D1  | DF  | Ø   |
|--------------|-----|-----|-----|
| RS 310/E ULX | 390 | 452 | M18 |
| RS 510/E ULX | 390 | 452 | M18 |

Tab. J

## 4.6 Securing the burner to the boiler



WARNING

Prepare a suitable lifting system using the rings 3)(Fig. 15), after removing the fixing screws 7) of the casing 8).

- Fit the heat insulation supplied onto the blast tube 4)(Fig. 15).
- Fit the entire burner onto the boiler hole prepared previously (Fig. 13), and fasten with the screws supplied.



WARNING

The seal between burner and boiler must be airtight.



WARNING

Pay particularly attention to the external gas pipes 9 (Fig. 15) during the burner fixing to the boiler in order to avoid to damage them.

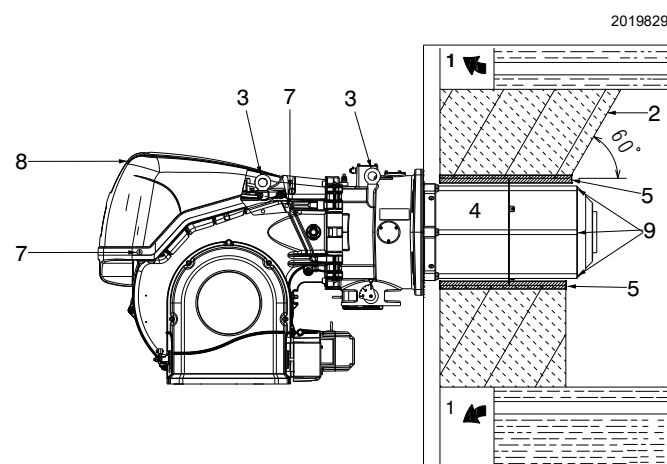


Fig. 15

### 4.7 Access to head internal part

The burner leaves the factory set for opening to the right, therefore maintaining the pin 1)(Fig. 16) in the housing.

To open the burner towards the right, proceed as follows:

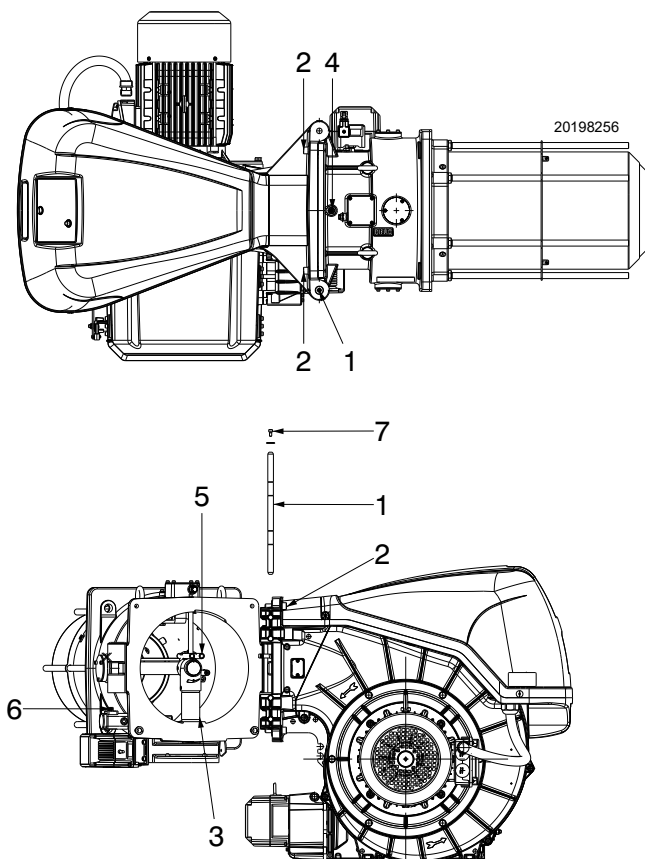
- A disconnect the plug/socket 6)(Fig. 16) of the maximum gas pressure switch;
- B remove the screws 2);
- C open the burner to a maximum of 100-150 mm by rotating around the hinge and release the cables of electrodes and the ionisation probe 5);
- D fully open the burner as in Fig. 16;
- E undo the screw 4) with pressure test point;
- F release the combustion head by lifting it from its housing 3), then take out the combustion head.



**WARNING**

To open the burner from the opposite side, before removing the pin 1)(Fig. 16), make sure that the 4 screws 2) are tight.

Then shift the pin 1) to the opposite side and then proceed as described above at point A).



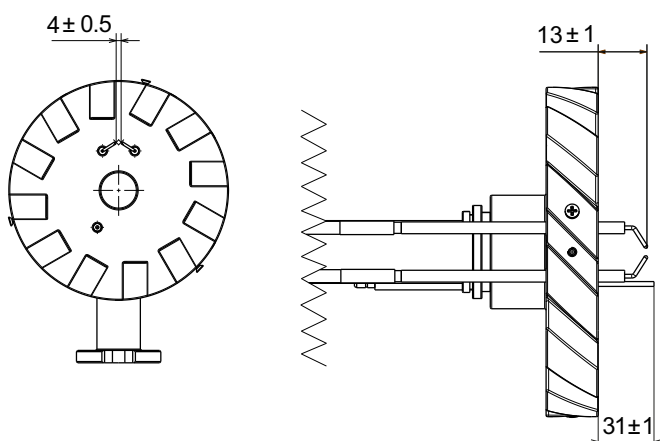
**Fig. 16**

### 4.8 Ionization probe and electrodes position



**WARNING**

Check that the ionization probe and electrodes are placed as in Fig. 17, according to the dimensions indicated.



**Fig. 17**

## 4.9 Combustion head adjustment

Rotate the screw 1) until the notch you have found corresponds with the front surface of the screw itself.

The combustion head is opened by turning the screw 1) anti-clockwise.

The combustion head is closed by turning the screw 1) clockwise (Fig. 18)



The burner leaves the factory with the combustion head set at notch 0 (Fig. 18).

This setting allows to secure the movable components during the transport of the burner.

### NOTE:

Depending on the specific application, the adjustment can be modified.

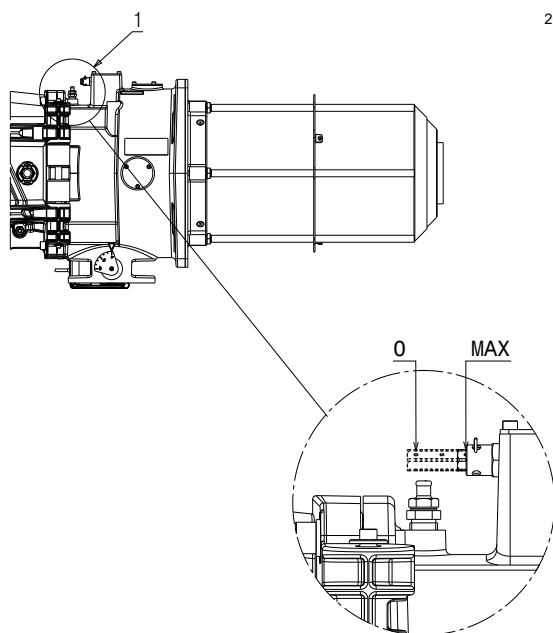


The combustion head can be adjusted within the following ranges:

RS 310/E ULX: 0 - 10

RS 510/E ULX: 0 - 10

The adjustment cannot be carried out outside these ranges.

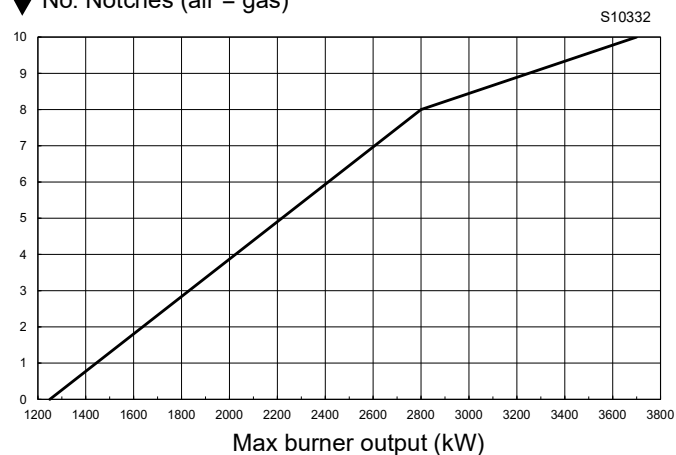


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Fig. 18

### RS 310/E ULX

↓ No. Notches (air = gas)



### RS 510/E ULX

↓ No. Notches (air = gas)

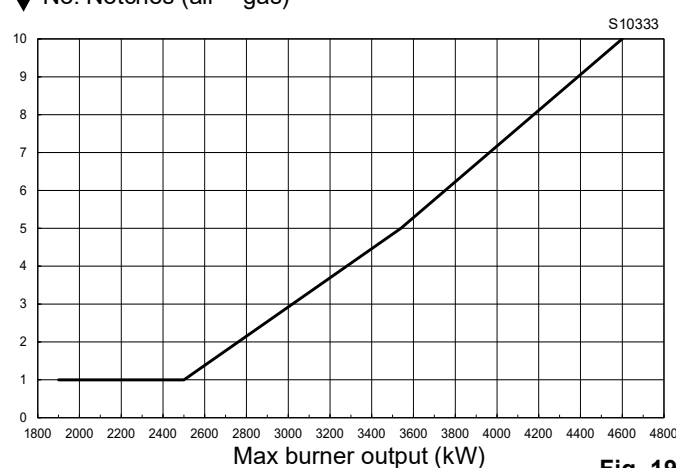


Fig. 19

Before starting up the burner, carry out the settings according to the required output and indicated in the diagram (Fig. 19).

### 4.10 Central gas adjustment

As you can see in Fig. 20 the gas flows through the combustion head in two different ways:

- external gas flows from the pipes 1) that surrounds the combustion head;
- central gas flows from the tube 2) and then through the plates 3) behind the flame disc.

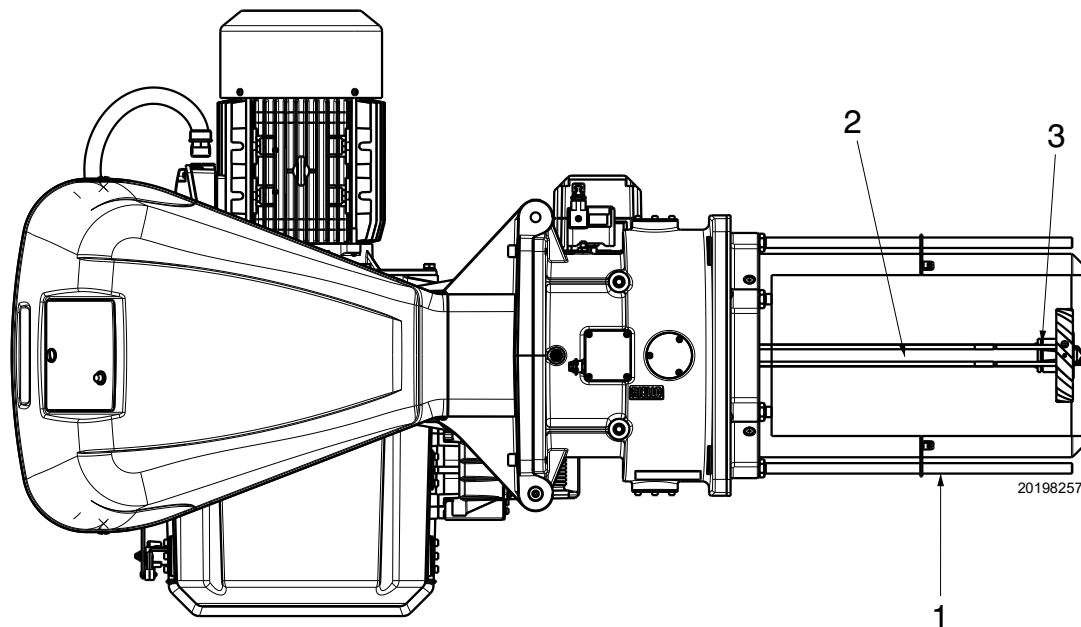


Fig. 20

#### 4.10.1 Central gas setting

The factory setting for the central gas is with the following passage holes (Fig. 21).

RS 310/E ULX    Central hole + 2 open holes

RS 510/E ULX    Central hole + 2 open holes

If necessary, modify as indicated in "Firing rates" on page 9:

- hook the combustion head as indicated in the paragraph "Access to head internal part" on page 22;
- remove or add one or more screws 1) (Fig. 21) as follows:

RS 310/E ULX    Open central hole

RS 510/E ULX    Open central hole

- re-assemble the combustion head.

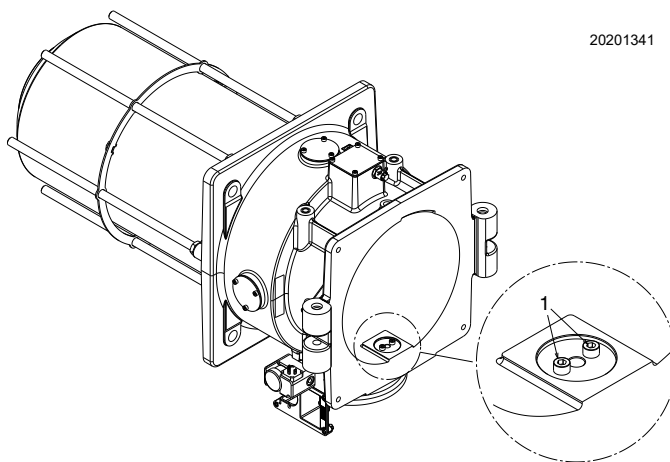


Fig. 21

## 4.11 Gas feeding



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

Precautions: avoid knocking, attrition, sparks and heat.

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



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

### 4.11.1 Gas feeding line (Example) - For functional details refer to the gas train manual

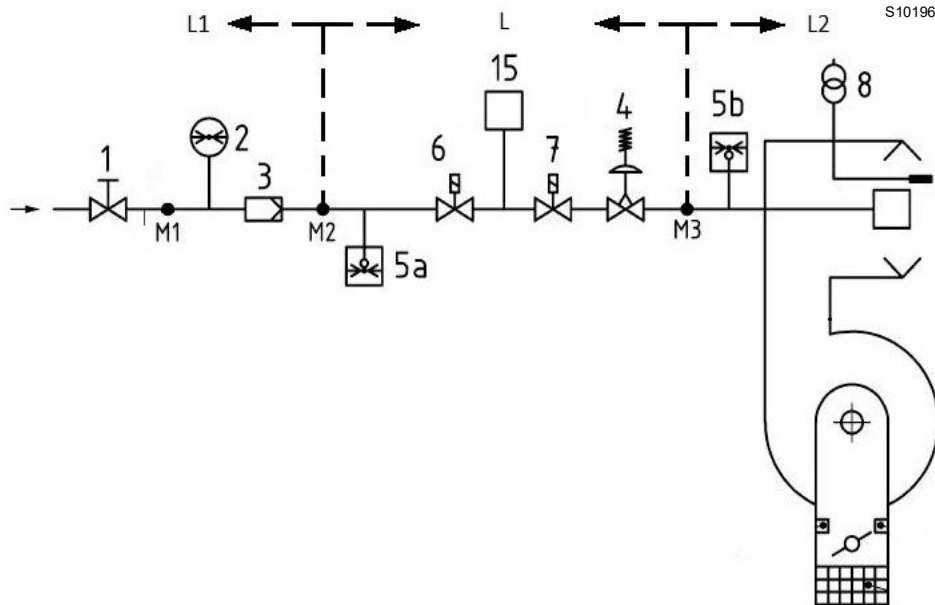


Fig. 22

Key (Fig. 22)

- 1 Manually operated shut-off valve
- 2 Pressure gauge
- 3 Filter
- 4 Governor
- 5a Low pressure protection device
- 5b Max gas pressure switch
- 6 1st safety shut-off valve
- 7 2nd safety shut-off valve
- 8 Ignition device
- 15 Valve proving system
- L Gas train - supplied loose
- L1 Installer responsibility
- L2 Burner
- M1 Pressure outlet
- M2 Pressure outlet
- M3 Pressure outlet

### 4.11.2 Gas train

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

### 4.11.3 Gas train installation



Disconnect the electrical power using the main switch.



Check that there are no gas leaks.



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



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



The operator must use the required equipment during installation.

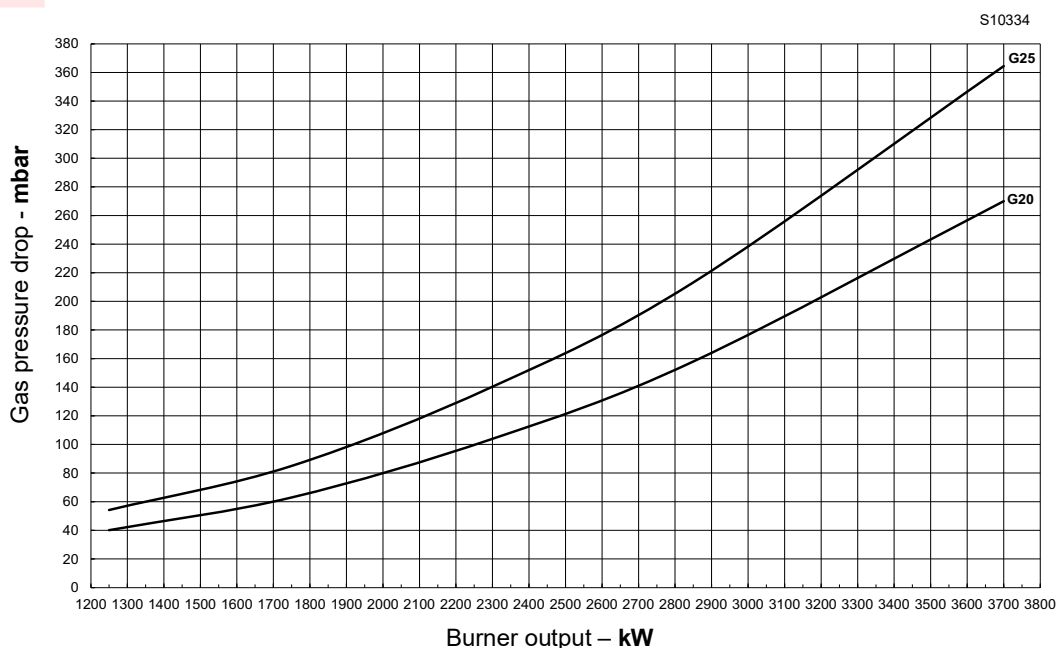
### 4.11.4 Gas pressure

Each diagram indicate the minimum pressure drops depending on the maximum burner output.

The values shown, refer to:

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

#### RS 310/E ULX



#### RS 510/E ULX

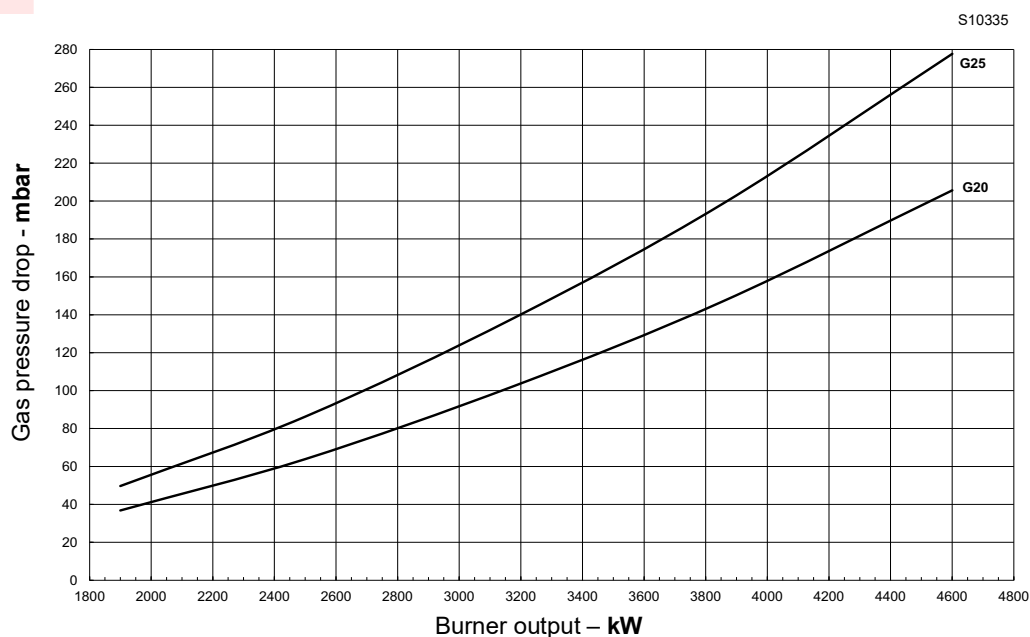


Fig. 23

Calculate the approximate output of the burner in this way:

- subtract the combustion chamber pressure from the gas pressure measured at test point P1 (Fig. 24).
- Enter the mbar scale (Fig. 23) and read the corresponding output by reading on the dashed line.

#### Example RS 510/E ULX with G20 natural gas:

Fixed Output operation

Gas pressure at test point P1 = 100 mbar

Pressure in combustion chamber = 10 mbar

$$100 - 10 = 90 \text{ mbar}$$

A pressure of 90 mbar, corresponds to an output of 3000 kW with factory setting for central gas.

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

To calculate the required gas pressure at test point P1)(Fig. 24), set the MAX output required from the burner operation:

- find the nearest output value.
- Read the pressure at the test point P1)(Fig. 23).
- Add this value to the estimated pressure in the combustion chamber.

**Example for RS 510/E ULX with G20 natural gas:**

Required burner maximum output operation: 3000 kW

Gas pressure at an output of 3000 kW = 90 mbar

Pressure in combustion chamber = 10 mbar

$$90 + 10 = 100 \text{ mbar}$$

Pressure required at test point P1)(Fig. 23).



WARNING

The output and gas pressure data refer to operation with gas butterfly valve fully open (90°) on the whole firing rate.

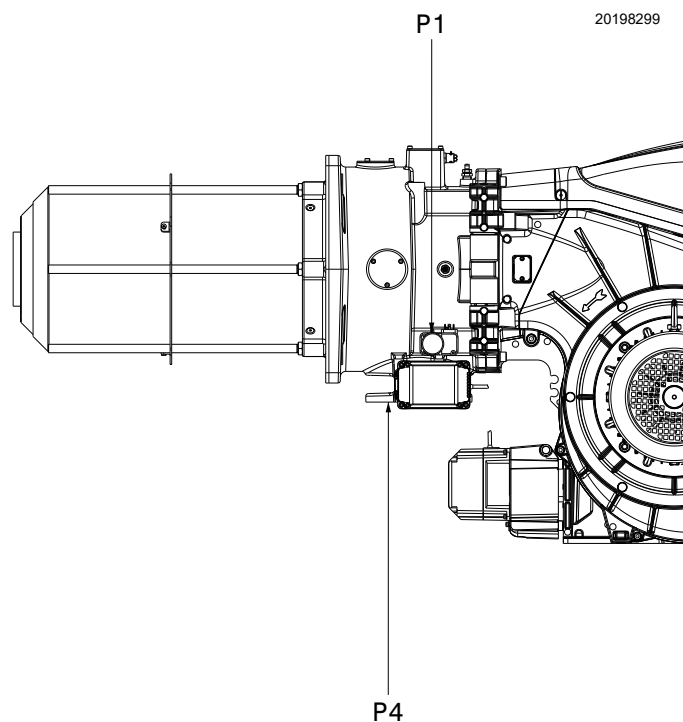


Fig. 24

### 4.12 Electrical wiring

#### Notes on safety for the electrical wiring



**DANGER**

- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be made in accordance with the regulations currently in force in the country of destination and by qualified personnel. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The FS1 burners have been set for intermittent operation. This means that the burner should compulsorily be stopped at least once every 24 hours to enable the flame control to check its own safety and efficiency at start-up. Normally the boiler's thermostat/pressure switch ensures that the burner stops. If this is not the case, a time switch should be fitted in series to TL to stop the FS1 burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum power absorption of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for that level of power absorption.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use a multiple pole switch with at least a 3 mm gap between the contacts (overvoltage category III), as envisaged by the present safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.
- Check the electric wiring inside the boiler complies with the national and local safety regulations.
- Live and neutral should not be mixed up (this could cause dangerous malfunctions, a loss of protection against electric shocks, etc.).
- Make sure the cable grommets of the connected cables comply with the relevant standards (e.g. EN60730 and EN60 335).
- When wiring the unit, make sure that AC 230V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

Before carrying out any maintenance, cleaning or checking operations:



**DANGER**

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



**DANGER**

Turn off the fuel interception tap.



**DANGER**

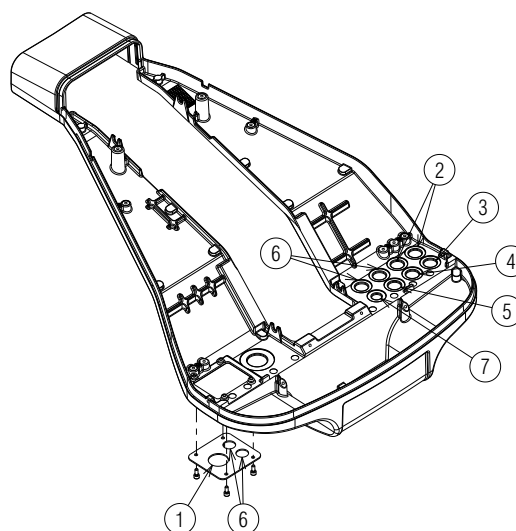
Avoid condensate, ice and water leaks from forming.

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

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

#### 4.12.1 Supply cables and external connections passage

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



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**Fig. 25**

Key (Fig. 25)

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



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

## 5 Start-up, calibration and operation of the burner

### 5.1 Notes on safety for the first start-up



**WARNING**

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



**WARNING**

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



**WARNING**

Before starting up the burner, refer to section see "Safety test - with gas ball valve closed" on page 50.

### 5.2 Adjustments prior to ignition

Combustion head adjustment has already been described in the section "Combustion head adjustment" on page 23.

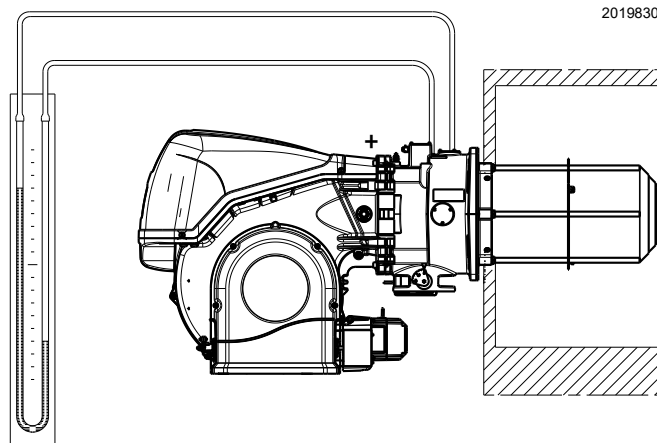
In addition, the following adjustments must also be made:

- open manual valves upstream from the gas train.
- Adjust the minimum gas pressure switch to the start of the scale.
- Adjust the maximum gas pressure switch to the end of the scale.
- Adjust the air pressure switch to the start of the scale.
- Adjust the pressure switch for the leak detection control (PVP kit)(Fig. 31 on page 34) according to the instructions supplied with the kit.
- Purge the air from the gas line. We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- Fit a U-type pressure gauge or a differential pressure gauge (Fig. 26), with socket (+) on the gas pressure of the pipe coupling and (-) in the combustion chamber. The manometer readings are used to calculate MAX burner output using Fig. 22 and Fig. 23 on page 26.
- Connect two lamps or testers to the two gas line solenoids to check the exact moment in which voltage is supplied. This operation is unnecessary if each of the two solenoids is equipped with a pilot light that signals voltage passing through.



**CAUTION**

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



**Fig. 26**

### 5.3 Burner start-up

Electrically power the burner using the disconnecting switch on the boiler panel.

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



**DANGER**

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

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

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

As soon as the burner starts up, go in front of fan motor cooling fan and check it is rotating anticlockwise or else in the direction of the arrow shown in the diagram Fig. 4 on page 11.

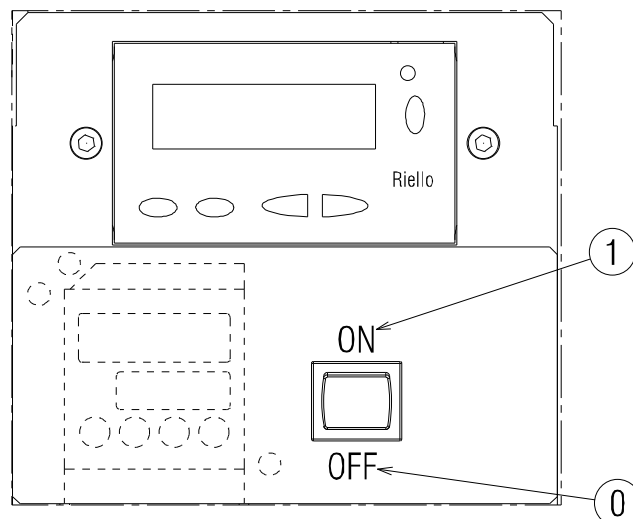
If this is not the case:

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



**DANGER**

Invert the phases on the three-phase power supply. This operation must be carried out with the electrical supply disconnected. Follow the "Start-up procedure" on page 40.



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**Fig. 27**

## 5.4 Air / fuel adjustment

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

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

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

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

### 5.4.1 Air adjustment for maximum output

- Adjust the servomotor to maximum opening (nearly 90°) so that the air butterfly valves are entirely open.

### 5.4.2 Air/fuel adjustment and output modulation system

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

The basic system functions control:

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

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



**WARNING**

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

### 5.4.3 Burner adjustment

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

Adjust in sequence:

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

### 5.4.4 Output upon ignition

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

**Example:**

MAX operation output of 600 kW.

The ignition output must be equal to or less than 200 kW with  $t_s = 3s$

In order to measure the ignition output:

- disconnect the plug-socket on the ionisation probe cable (the burner will fire and then go into lockout after the safety time has elapsed);
- perform 10 consecutive ignitions with lockouts;
- on the meter, read the quantity of gas burned: This quantity must be equal to, or lower than, the quantity given by the formula, for  $t_s = 3s$ :

$$V_g = \frac{Q_a \text{ (max. burner delivery)} \times n \times t_s}{3600}$$

**V<sub>g</sub>** volume supplied in ignitions carried out (Sm<sup>3</sup>)

**Q<sub>ai</sub>** ignition delivery (Sm<sup>3</sup>/h)

**n** number of ignitions (10)

**t<sub>s</sub>** safety time (sec)

**Example for gas G20 (9.45 kWh/Sm<sup>3</sup>):**

ignition output 200 kW corresponding to

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

After 10 ignitions with their lockouts, the delivery indicated on the meter must be equal to or less than:

$$V_g = \frac{21.16 \times 10 \times 3}{3600} = 0.176 \text{ Sm}^3$$

### Air adjustment

The adjustment of the air is carried out by changing the angle of the air damper changing the degrees of the air servomotor inside the electronic cam programme.

### 5.4.5 Maximum output

The MAX output must be set within the firing rate (Fig. 2 on page 9).

### Adjustment of gas delivery

Measure the gas delivery on the gas meter. As an indicative guide it can be taken from Fig. 22 and Fig. 23 on page 26, just read the gas pressure on the pressure gauge (shown in Fig. 35 on page 51) and follow the instructions given on page 26.

- If it is necessary to reduce it, lower the output gas pressure via the pressure adjuster located beneath the gas valve.
- If delivery needs to be increased, increase the adjuster outlet gas pressure.

### Air adjustment

If necessary vary the degrees of the air servomotor.

### Indication for the burner ignition

In Tab. K the calibrations of the air and gas servomotors at the ignition point for each model are summarized according to the change of the maximum burnt power.

#### Ignition point - RS 310 ULX -

|                               |      |      |      |
|-------------------------------|------|------|------|
| Maximum power input (kW)      | 3700 | 3400 | 1250 |
| Gas motor/butterfly setting   | 5°   | 5°   | 8°   |
| Air servomotor/damper setting | 6°   | 6°   | 1°   |

#### Ignition point - RS 510 ULX -

|                               |      |      |      |
|-------------------------------|------|------|------|
| Maximum power input (kW)      | 4600 | 3550 | 1900 |
| Gas motor/butterfly setting   | 8°   | 8°   | 8°   |
| Air servomotor/damper setting | 3°   | 3°   | 1°   |

**Tab. K**

To determine the calibrations to use at the first start, proceed as follows:

- 1 Determine the maximum power required by the burner.
- 2 Open the combustion head as indicated in Fig. 18 on page 23.
- 3 Calculate the pressure required downstream of the gas train: this value is given by the sum of the boiler back pressure at the maximum burnt power and the pressure drop read on the diagrams of Fig. 23 on page 26.
- 4 Set the air and gas servomotors as suggested in Tab. K. If the maximum power falls between two indicated values, take an intermediate value between the two according to the opening degrees of the air and gas servomotors.



**At the first ignition it is not recommended to use an air servomotor setting that exceeds the suggested setting by 10% .**

### 5.4.6 Minimum output

The MIN output must be set within the firing rate (Fig. 2 on page 9).

## 5.5 Final adjustment of the pressure switches

### 5.5.1 Air pressure switch

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

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

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

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

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

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

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

In this case also, the pressure gauge must be connected in differential mode, as shown in Fig. 28.

### 5.5.2 Maximum gas pressure switch

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

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

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

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

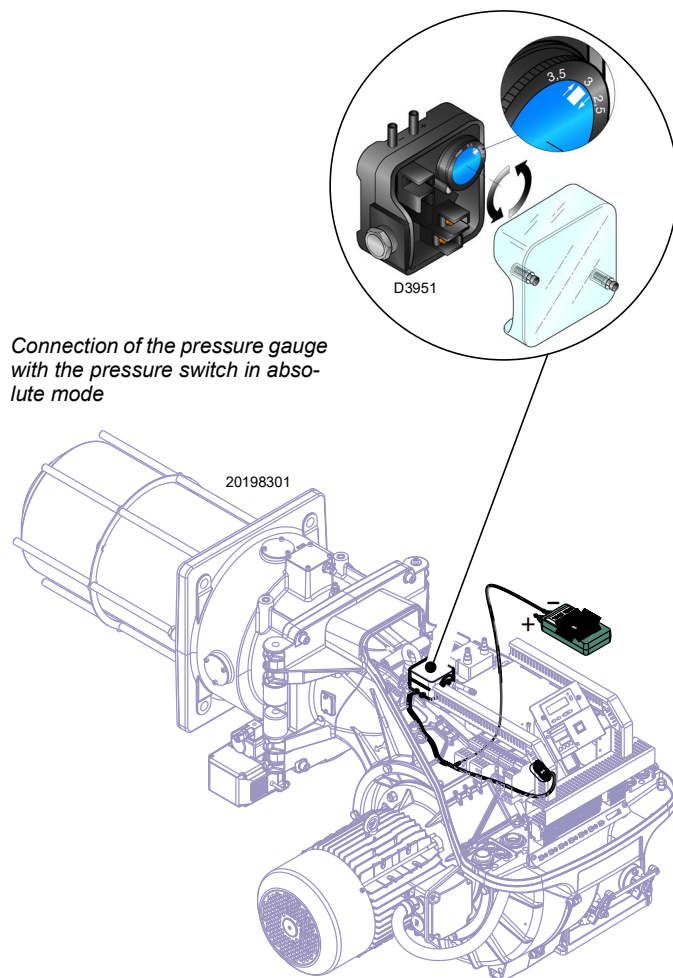


Fig. 28

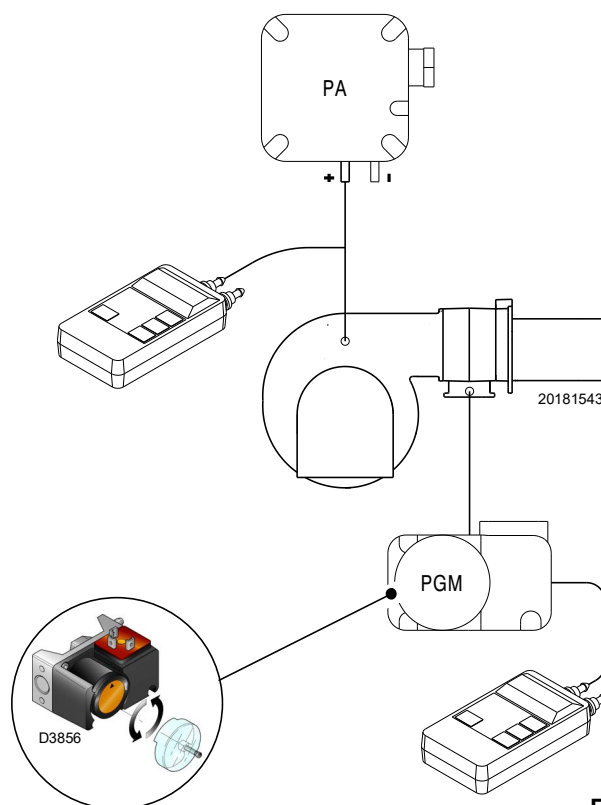


Fig. 29

### 5.5.3 Minimum gas pressure switch

Adjust the minimum gas pressure switch (Fig. 30) after having adjusted the burner, the gas valves and the gas train stabiliser. With the burner operating at maximum output:

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

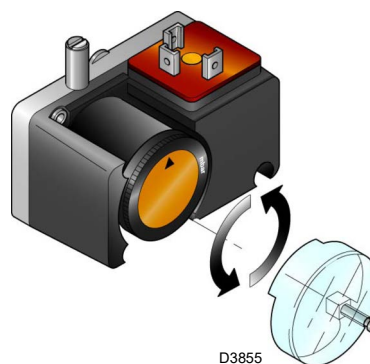


1 kPa = 10 mbar

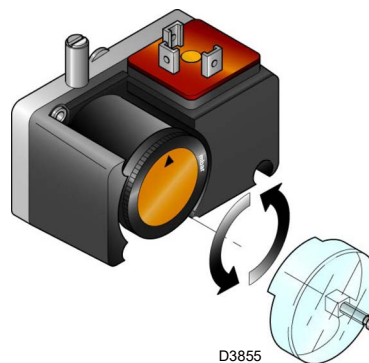
**WARNING**

### 5.5.4 PVP pressure switch kit

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



**Fig. 30**



**Fig. 31**

## 7 Control and display

### 7.1 Visualisation and programming mode

#### 7.1.1 Normal mode

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

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

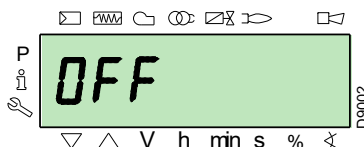
From Normal mode you can access other levels:

- Info mode (**InFo**)
- Service mode (**SEr**)
- Parameter mode (**PArA**)

Some examples in the standard conditions are given below.

##### 7.1.1.1 Burner in stand-by display

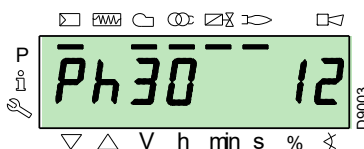
The burner is in the heat request waiting mode, or the selector “0-1” (Fig. 27 on page 30) is at “0”.



##### 7.1.1.2 Display during starting / stopping

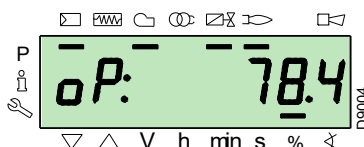
The display visualises the various phases of the start-up, ignition and switch-off of the burner.

In the example, the display indicates that the burner is in **Phase 30** (see diagram Fig. 32) and there are 12 seconds until the next phase.



##### 7.1.1.3 Display of the work position

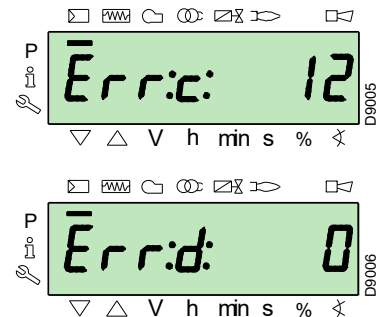
The burner is working in the requested load position (in the example alongside, **78.4%**).



##### 7.1.1.4 Error state message, display of the errors and information

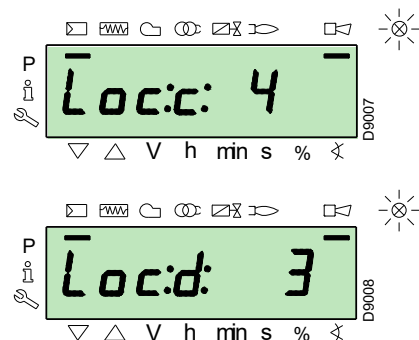
The display visualises alternately the error code (in the example **c: 12**) and the relative diagnostic (in the example **d: 0**).

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

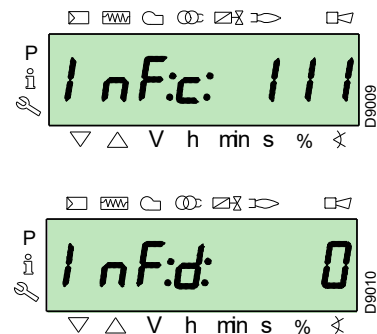


The burner goes into lockout.

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

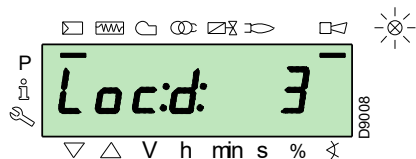
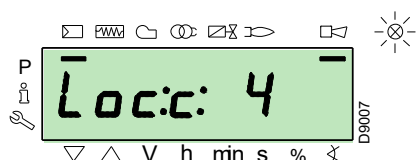


The display visualises alternately an error code and a diagnostic, which does not take the system into safety mode.

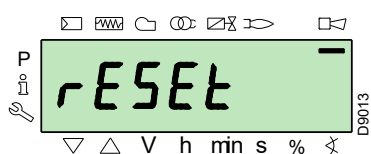


##### 7.1.1.5 Reset procedure

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



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



#### 7.1.1.6 Manual lockout procedure

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



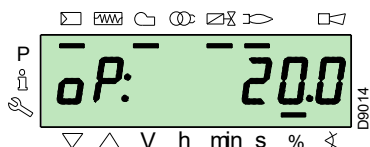
With the selector “0-1” (Fig. 27 on page 30), the burner does not stop immediately, but the switch-off phase is activated.

#### 7.1.1.7 Manual operation procedure

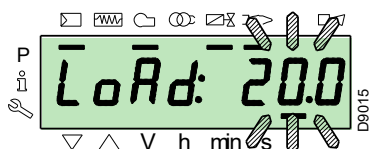
After the adjustment of the burner and the setting of the points on the modulation curve, it is possible to manually check the operation of the burner along the entire curve.

##### Example:

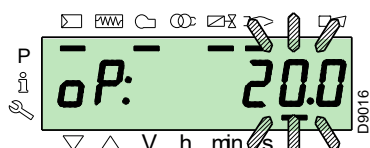
the burner is working at the requested load percentage: 20%.



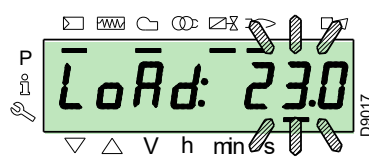
Press the “F” key for 1 second: “LoAd” is displayed and the load percentage flashes.



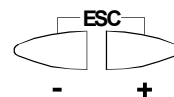
Releasing the “F” key, the standard visualisation appears, with the current load percentage flashing: this means that the burner is working in Manual mode (any outside adjustment is excluded and only the safety devices are active).



Keep the “F” key pressed and, with the keys “+” or “-”, increase or decrease the load percentage.



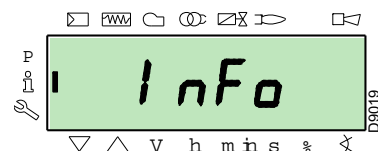
To exit manual mode, press the keys “+” and “-” (ESC) simultaneously for 3 seconds: the burner will work in Automatic mode and the output will depend on the thermostat/adjustment pressure switch (TR).



#### 7.1.2 Info mode

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

- press the “i/reset” key for 1-3 s.
- Release the key immediately when the display shows “InFo”.



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

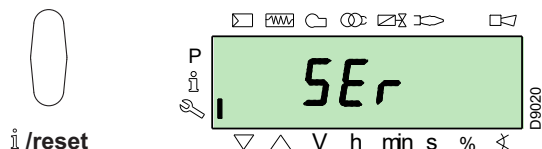
| No. | Parameter                                                       |
|-----|-----------------------------------------------------------------|
| 167 | Volumetric delivery of fuel in the unit of measurement selected |
| 162 | Operation time with flame                                       |
| 163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

Tab. L

### 7.1.3 Service mode

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

- press the “**i/reset**” key for more than 3 s.
- Release the key immediately when the display shows “**SEr**”.



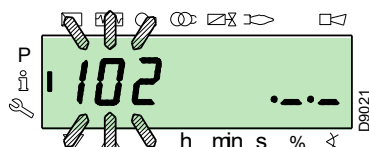
The list of parameters (in the sequence in which they are displayed) is shown in Tab. M.

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

Tab. M

#### 7.1.3.1 Operating mode on Info Mode and Service Mode

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



If the value is not displayed, press the “**i/reset**” key for a period of 1 to 3 seconds

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

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

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

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

For a moment the display will show “**OPeArAte**”.

### 7.1.4 Parameters Mode

The **Parameters Mode (PArA)** displays and allows you to modify/programme the parameters list on page 44.

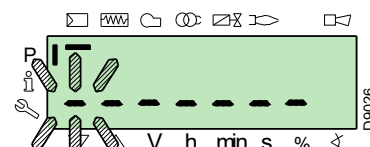
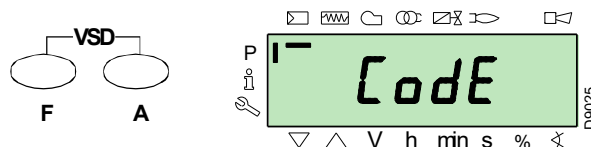
The factory-set parameters are not visible.

To access this level it is necessary to follow the “**Access procedure with password**”.

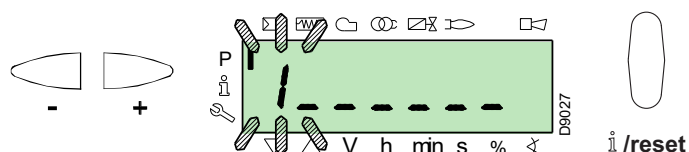
#### 7.1.4.1 Access procedure with password

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

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



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

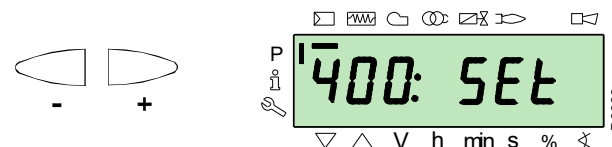
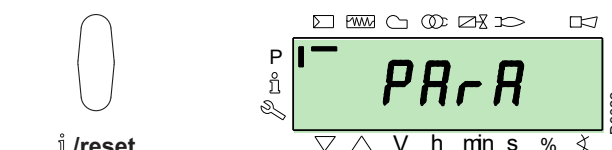


Once you have confirmed, the sign “**-**” will appear.

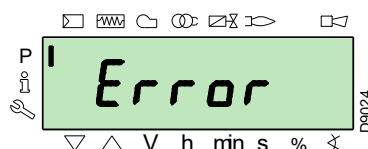
Continue in the same way for the other characters.

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

With the keys “**+**” and “**-**” select the group you require.



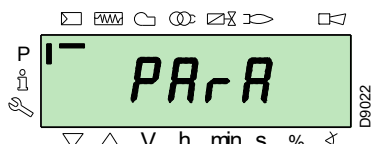
If the password inserted is incorrect, the message “**Error**” will appear for a moment. It is then necessary to repeat the procedure.





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

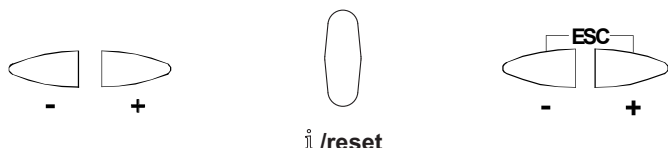
Once the access procedure has been carried out, the display will show **"PARA"** for a few seconds.



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

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

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

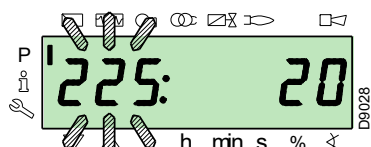


#### 7.1.4.2 Assigning parameter levels

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

## 7.2 Parameter modification procedure

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



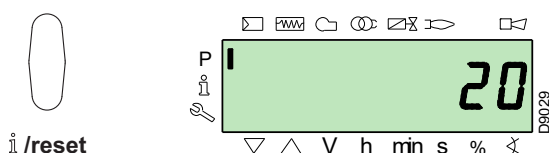
If the value is not visualised, press the key **"i/reset"** for 1 - 3 seconds.

Find below an example of how to modify the parameter relating to the **pre-purging time** (No. 225).

Press the key **"i/reset"**: the value **20** (seconds) will appear.

#### NOTE:

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



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

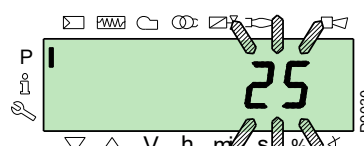
| No.       | Parameter                                                                                                   |
|-----------|-------------------------------------------------------------------------------------------------------------|
| 100: ParA | <b>General parameters</b><br>Information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

Tab. N

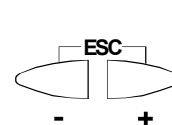
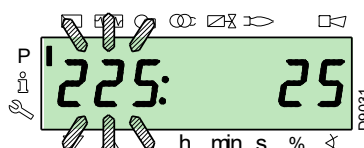


All the parameters are checked in the factory. Modification/tampering may compromise the good operation of the burner and cause injury to people or damage to things. In any case, modifications must be carried out by qualified personnel.

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



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



#### 7.2.0.1 Procedure for inserting and adjusting points on the modulation curve

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

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

To access the **Parameter mode** (group 400) referring to the "Access procedure with password" on page 37.

To insert or adjust a point, proceed as follows.

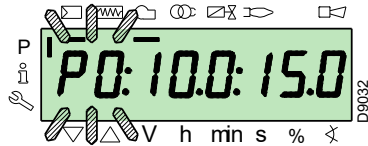
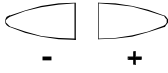
Using the keys **"+"** and **"-"** insert/select the curve point you want and wait for it to flash: this means that the servomotors are now

positioned on the values shown on the display and which correspond to the point previously set.

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



The set value does not require confirmation.



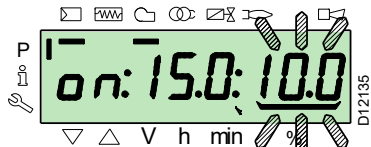
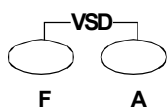
For the fuel servomotor, keep the key “F” pressed (the position in degrees flashes) and press the keys “+” or “-” to increase or decrease the value.



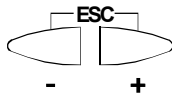
For the air servomotor, keep the key “A” pressed (the position in degrees flashes) and press the keys “+” or “-” to increase or decrease the value.



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



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



### 7.2.0.2 CALC function

The diagram (Fig. 32) shows how the fuel modulation curve is modified if the values of point “P5” are changed.

By keeping the “+” key pressed for more than 3 s, the points from “P6” to “P8” are recalculated.

By keeping the “-” key pressed for more than 3 s, the points from “P4” to “P2” are recalculated.

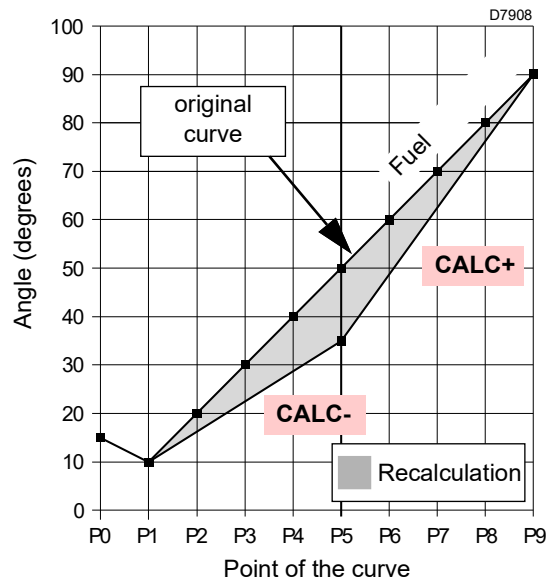


Fig. 32

The diagram of (Fig. 33) shows the fuel modulation curve when, after the modification of point “P5”, the recalculation of all the other points is not carried out.

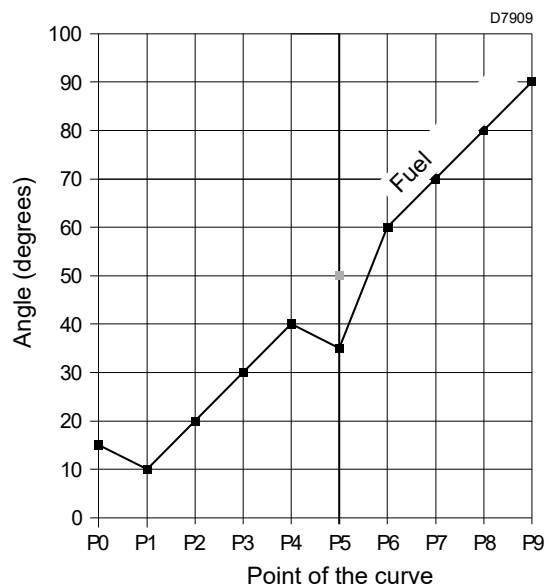
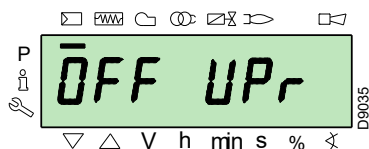


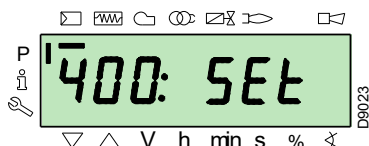
Fig. 33

### 7.3 Start-up procedure

Check that the operator panel display shows the heat request and “OFF Up<sub>r</sub>”: this means it is necessary to set the modulation curve of the burner.



Access the Parameters Level referring to “Access procedure with password” on page 37. The display screen displays the parameters group 400.

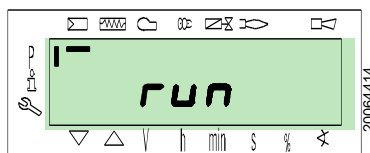


Confirm with the key “i/reset”



i/reset

The display shows “run”



Confirm with the key “i/reset”. The burner starts up. The display shows all the phases and relative times in sequence. The phases are listed in the section “List of phases” on page 16.

#### Phase 22:

Start of the fan motor.

#### Phase 24:

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

#### Phases 80, 81, 82, 83:

These phases relate to the valve seal test.

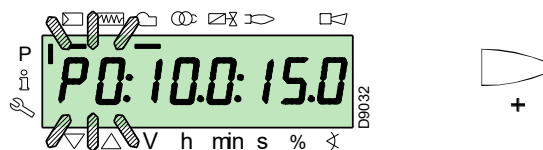
#### Phase 30:

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

#### Phase 36:

The burner goes to its switch-on position, point “P0”, defined in Tab. K on page 32: the display shows a flashing “P0” indication. If the value proposed is adequate, confirm using the “+” button.

Otherwise, modify the ignition point (see the section “Procedure for inserting and adjusting points on the modulation curve” on page 38).



WARNING

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

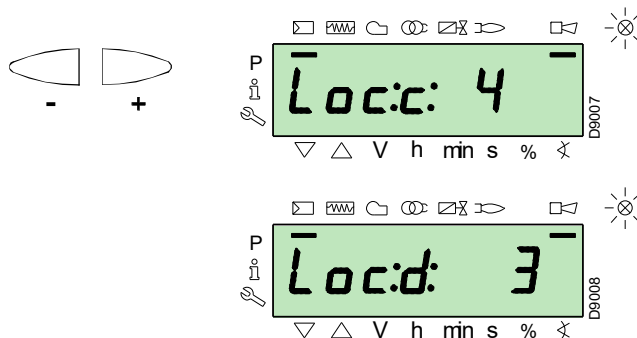
#### Phase 38:

The ignition phase begins and the spark goes off.

#### Phase 40:

The gas valves open (the count of the safety time begins). Using the appropriate visor check there is a flame and that the combustion parameters are correct. If necessary, vary the degrees of opening/closing of the air and fuel servomotors.

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



Solve the problem, referring to the paragraph “Ignition failure” on page 49.

To unlock, see “Reset procedure” on page 35. The display visualises “OFF Up<sub>r</sub>”.

Repeat the “Start-up procedure” on page 40.

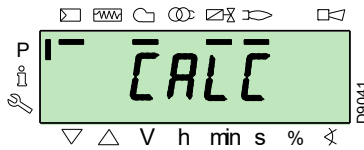


WARNING

The values previously inserted remain stored.

Once the ignition has occurred (point “P0”), proceed with the calibration of the modulation curve.

Press the button “+”: the display visualises the indicator “P1” flashing and proposes the same settings as point “P0”. Press button “+” again: the display shows “CALC” for a few seconds.



The flame control will automatically report the same values set in points “P0” and “P1” at points “P2” to “P8”.



The purpose of this is to reach point “P9” to regulate/determine the maximum operation output.

#### IMPORTANT

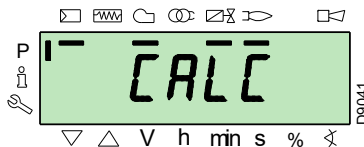
Press “+” until point “P9” is reached.

Once point “P9” is reached wait for the display to show the flashing indicator “P9” proposing the same settings as point “P0”.

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

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

After adjusting point “P9” keep the “-” key on the display pressed for about 5 seconds, “CALC” appears for a few seconds.



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

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

If not, modify the point.

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

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



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

#### IMPORTANT

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

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

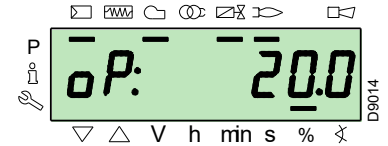
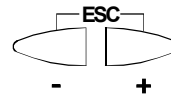
If this is not the case, work also on the gas valve stabiliser: in this case however, it is necessary to revise the calibrations of all the points previously set.

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

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

If you want to make the burner work on just a part of the modulation curve, modify the parameters “546” and “545” according to the “Parameter modification procedure” on page 38.

Press the keys “+” and “-” (ESC) simultaneously twice, the display will show the current load position.



WARNING

At the end of the “Start-up procedure” it is necessary to carry out a “Backup”, which is used to memorise the parameters and the data in the flame control within the display RDI21...

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

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

For the procedure see “Backup” on page 42.

## 7.4 Backup / Restore procedure

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

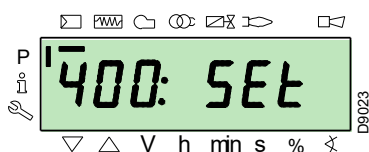
This will allow the data to be used for programming a new REC or to return to the memorised settings of the same REC.

### 7.4.1 Backup

To perform the backup, proceed as follows:

- access the Parameters Level referring to "Access procedure with password" on page 37 .

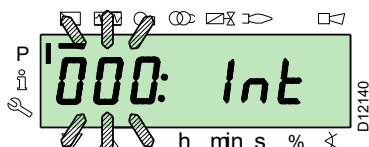
The display screen displays the parameters group **400**.



With the key **"-"**:



Select the parameters group **000**:

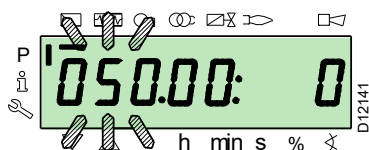


The **000** parameter blinks, confirm using the **"i/reset"** key:



**i/reset**

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

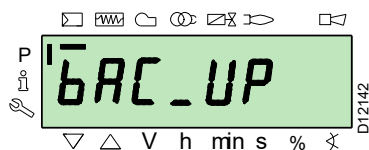


Confirm with the key **"i/reset"**:



**i/reset**

The parameter **bAC\_UP** appears on the display screen:



**WARNING**

We suggest that this operation be carried out at the end of any intervention that involves modifications to what has been set on the cam.

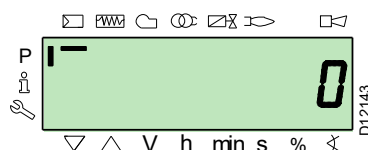
This will allow you to carry out a restore in a simple manner on a new cam supplied as a replacement part, without having to reprogramme the system.

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



**i/reset**

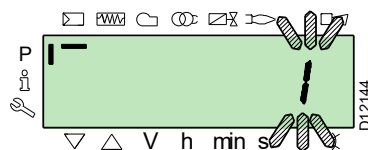
The display screen shows the following value:



Use the button **"+"**:



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



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

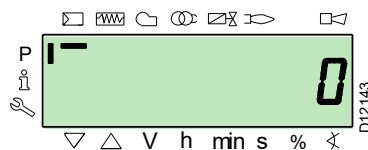


**i/reset**

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



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



**NOTE:**

If an error occurs during the backup process, the display screen shows a negative value. Refer to diagnostic code 137 to determine the cause of the error (see section "List of parameters" on page 44).



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

**7.4.2 Restore**

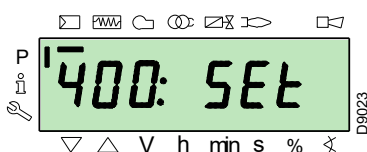
Use this procedure when replacing equipment with a parts code. In this way it is possible to have the default parameters already memorised or those memorised during the start-up.

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

To perform the restore procedure, proceed as follows:

- access the Parameters Level referring to "Access procedure with password" on page 37 .

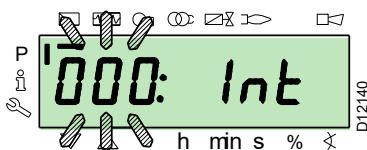
The display screen displays the parameters group **400**.



With the key "-":



Select the parameters group **000**:

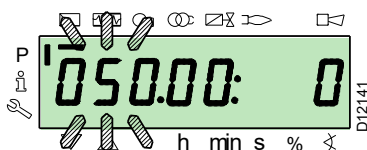


The **000** parameter blinks, confirm using the "i/reset" key:



i/reset

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

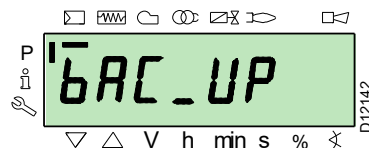


Confirm with the key "i/reset":



i/reset

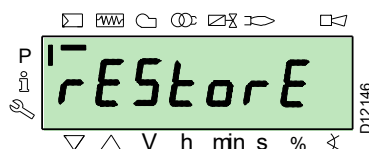
The parameter **bAC\_UP** appears on the display screen:



With the key "+":



select the **REStorE** parameter

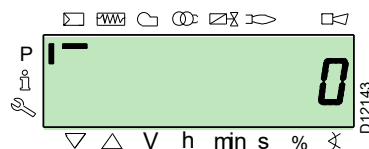


Confirm with the key "i/reset":



i/reset

The display shows the following value.



Use the button "+":



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

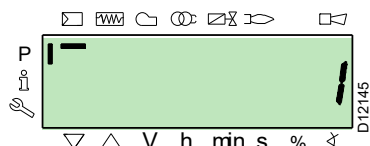


confirm with the button "i/reset" to activate the **restore** process.

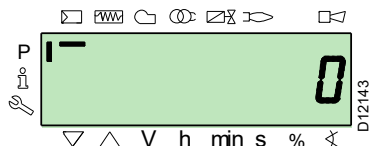


i/reset

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



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


**NOTE:**

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


**IMPORTANT**

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

### 7.4.3 List of parameters

| Parameter |                                                                                                                                                                               | No. of elements | Unit of measurement | Modification                | Values interval |          | Degree of precision | Predefined setting | Access mode                             |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|-----------------------------|-----------------|----------|---------------------|--------------------|-----------------------------------------|
| No.       | Description                                                                                                                                                                   |                 |                     |                             | Min.            | Max.     |                     |                    |                                         |
| 000       | INTERNAL PARAMETERS                                                                                                                                                           |                 |                     |                             |                 |          |                     |                    |                                         |
| 050       | Start backup/restore process via RDI21... / PC TOOL (set the parameter to 1)<br>Index 0 = create backup<br>Index 1 = perform restore<br>Negative values indicate errors       | 2               | -                   | Modification                | -99             | 2        | 1                   | 0; 0               | Service mode                            |
| 055       | Burner identification number created from the backup on RDI21...                                                                                                              | 1               | -                   | Reading only                | 0               | 99999999 | 1                   | 0                  | Service mode                            |
| 056       | ASN number created by the backup on RDI21...                                                                                                                                  | 8               | -                   | Reading only                | 0               | 127      | 1                   | 0                  | Service mode                            |
| 057       | Software Version created by the backup on RDI21...                                                                                                                            | 1               | -                   | Reading only                | 0x100           | 0xFFFF9  | 1                   | 0                  | Service mode                            |
| 100       | GENERAL PARAMETERS                                                                                                                                                            |                 |                     |                             |                 |          |                     |                    |                                         |
| 102       | Flame control identification date                                                                                                                                             | 1               | -                   | Reading only                | 0               | 255      | 1                   |                    | Info mode                               |
| 103       | Flame control identification number                                                                                                                                           | 1               | -                   | Reading only                | 0               | 65535    | 1                   |                    | Info mode                               |
| 104       | Identification number of the group of parameters set                                                                                                                          | 1               | -                   | Reading only                | 0               | 255      | 1                   | 30                 | Info mode                               |
| 105       | Version of the group of parameters set                                                                                                                                        | 1               | -                   | Reading only                | 0               | 0xFFFF   | 1                   | V01.08             | Info mode                               |
| 107       | Software version                                                                                                                                                              | 1               | -                   | Reading only                | 0               | 0xFFFF9  | 1                   | V03.30             | Info mode                               |
| 108       | Software variation                                                                                                                                                            | 1               | -                   | Reading only                | 0               | 225      | 1                   | 1                  | Info mode                               |
| 111       | ASN number to verify the ASN number created by the backup on RDI 21...                                                                                                        | 8               | -                   | Reading only                | 0               | 127      | 1                   | 0                  | Service mode                            |
| 113       | Burner identification                                                                                                                                                         | 1               | -                   | Modification                | 0               | 99999999 | 1                   | Not defined        | Info Mode with password<br>Service Mode |
| 121       | Manual setting of output<br>Not defined = automatic operation                                                                                                                 | 1               | %                   | Modification / zero setting | 0%              | 100%     | 0.1%                | Not defined        | Info mode                               |
| 123       | Minimum output step position<br>Index 0: BACS output<br>Index 1: output of the external load regulator, analogue.<br>Index 2: output of the external load regulator contacts. | 3               | %                   | Modification                | 0%              | 100%     | 0.1%                | 0% ; 1%;<br>0%     | Service mode                            |
| 124       | Beginning flame loss test (TÜV test)(define the parameter at 1)(switch of flame loss fuel valves) A negative value indicates an error (see code 150)                          | 1               | -                   | Modification                | -6              | 1        | 1                   | 0                  | Service mode                            |
| 125       | Frequency of main power supply<br>0 = 50 Hz<br>1 = 60 Hz                                                                                                                      | 1               | -                   | Modification                | 0               | 1        | 1                   | 0                  | Service Mode                            |
| 126       | Brightness of display                                                                                                                                                         | 1               | %                   | Modification                | 0%              | 100%     | 1%                  | 75%                | Service Mode                            |
| 128       | Fuel meter: Led pulse valence<br>(led pulses / volumetric flow units)                                                                                                         | 1               | -                   | Modification                | 0               | 400      | 0,01                | 0                  | Service Mode                            |

| Parameter |                                                                                                                                                                                                                                                                                                                                                                                                                                                    | No. of elements | Unit of measurement                       | Modification                | Values interval |          | Degree of precision | Predefined setting | Access mode  |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------|-----------------------------|-----------------|----------|---------------------|--------------------|--------------|
| No.       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                                           |                             | Min.            | Max.     |                     |                    |              |
| 130       | Eliminate visualisation error chronology<br>To eliminate the visualisation, set the parameter to 1, then to 2<br>Answer 0: process successful<br>Answer -1: timeout of 1_2 - sequence                                                                                                                                                                                                                                                              | 1               | -                                         | Modification                | -5              | 2        | 1                   | 0                  | Service Mode |
| 133       | Default output for TÜV test:<br>Not valid for TÜV test when output is activated<br>2,000 ..... 10,000 = low flame or first / second / third stage                                                                                                                                                                                                                                                                                                  | 1               | %                                         | Modification / zero setting | 20%             | 100%     | 0.1%                | Not defined        | Service Mode |
| 141       | Remote management of flame control<br>0 = off<br>1 = Modbus<br>2 = reserved                                                                                                                                                                                                                                                                                                                                                                        | 1               | -                                         | Modification                | 0               | 2        | 1                   | 0                  | Service Mode |
| 142       | Standby time before a new attempt in event of communication fault<br>Set values:<br>0 = not active<br>1 = .... 7200 s                                                                                                                                                                                                                                                                                                                              | 1               | s                                         | Modification                | 0s              | 7200s    | 1s                  | 120s               | Service Mode |
| 143       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1               | -                                         | Modification                | 1               | 8        | 1                   | 1                  | Info Mode    |
| 144       | Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1               | s                                         | Modification                | 10s             | 60s      | 1s                  | 30s                | Service Mode |
| 145       | Peripheral address for Modbus<br>Set values:<br>1 ... 247                                                                                                                                                                                                                                                                                                                                                                                          | 1               | -                                         | Modification                | 1               | 247      | 1                   | 1                  | Service Mode |
| 146       | Baud Rate for Modbus<br>Set values:<br>0 = 9600<br>1 = 19200                                                                                                                                                                                                                                                                                                                                                                                       | 1               | -                                         | Modification                | 0               | 1        | 1                   | 1                  | Service Mode |
| 147       | Parity for Modbus<br>0 = none<br>1 = odd<br>2 = even                                                                                                                                                                                                                                                                                                                                                                                               | 1               | -                                         | Modification                | 0               | 2        | 1                   | 0                  | Service Mode |
| 148       | Selection of the burner operation during the interruption of the switch-over with the system of remote management.<br>Set values:<br>With <b>modulating operation</b> the settings of the values are the following:<br>0...19.9 = burner switched off<br>20...100 = 20...100% modulation field of the burner.<br>With <b>stage operation</b> :<br>0 = burner off P1, P2, P3<br>No setting = no function in the event of communication interruption | 1               | %                                         | Modification / zero setting | 0%              | 100%     | 0.1%                | Not defined        | Service Mode |
| 161       | Total number of errors                                                                                                                                                                                                                                                                                                                                                                                                                             | 1               | -                                         | Reading only                | 0               | 65535    | 1                   | 0                  | Info mode    |
| 162       | Hours of operation (that can be reset)                                                                                                                                                                                                                                                                                                                                                                                                             | 1               | h                                         | Reset                       | 0 h             | 999999h  | 1 h                 | 0h                 | Info mode    |
| 163       | Total hours of power supply to flame control                                                                                                                                                                                                                                                                                                                                                                                                       | 1               | h                                         | Reading only                | 0h              | 999999h  | 1h                  | 0h                 | Info mode    |
| 164       | Total number of start-ups (that can be reset)                                                                                                                                                                                                                                                                                                                                                                                                      | 1               | -                                         | Reset                       | 0               | 999999   | 1                   | 0                  | Info mode    |
| 166       | Total number of start-ups                                                                                                                                                                                                                                                                                                                                                                                                                          | 1               | -                                         | Reading only                | 0               | 999999   | 1                   | 0                  | Info mode    |
| 167       | Volumetric delivery of fuel in the selected unit of measurement (that can be reset)                                                                                                                                                                                                                                                                                                                                                                | 1               | m <sup>3</sup> , l, ft <sup>3</sup> , gal | Reset                       | 0               | 99999999 | 1                   | 0                  | Info mode    |
| 200       | <b>BURNER CHECKS</b>                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                                           |                             |                 |          |                     |                    |              |

| Parameter |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | No. of elements | Unit of measurement | Modification       | Values interval |         | Degree of precision | Predefined setting | Access mode  |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|--------------------|-----------------|---------|---------------------|--------------------|--------------|
| No.       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |                     |                    | Min.            | Max.    |                     |                    |              |
| 201       | Burner operation mode (fuel supply line, modulating/stage, servomotors, etc.)<br>-- = not defined (eliminate curves)<br>1 = Gmod<br>2 = Gp1 mod<br>3 = Gp2 mod<br>4 = Lo mod<br>5 = Lo 2 stage<br>6 = Lo 3 stage<br>7 = Gmod pneu<br>8 = Gp1 mod pneu<br>9 = Gp2 mod pneu<br>10 = LoGp mod<br>11 = LoGp 2-stage<br>12 = Lo mod 2 fuel valves<br>13 = LoGp mod 2 fuel valves<br>14 = G mod pneu without actuator<br>15 = Gp1 mod pneu without actuator<br>16 = Gp2 mod pneu without actuator<br>17 = Lo 2-stage without actuator<br>18 = Lo 3-stage without actuator<br>19 = G mod only gas actuator<br>20 = Gp1 mod only gas actuator<br>21 = Gp2 mod only gas actuator<br>22 = Lo mod only oil actuator | 1               | -                   | Modify/set to zero | 1               | 22      | 1                   | Not defined        | Service Mode |
| 208       | Stopping of the program<br>0 = deactivated<br>1 = pre-purging (Ph24)<br>2 = Ignition (Ph36)<br>3 = Interval 1 (Ph44)<br>4 = Interval 2 (Ph52)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1               | -                   | Modification       | 0               | 4       | 1                   | 0                  | Service Mode |
| 210       | Alarm as the pre-purging phase begins;<br>0 = Deactivated;<br>1 = Activated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1               | -                   | Modification       | 0               | 1       | 1                   | 0                  | Service Mode |
| 211       | Uphill train fan motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1               | s                   | Modification       | 2s              | 60s     | 0.2s                | 2s                 | Service Mode |
| 212       | Maximum time to reach low flame                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1               | s                   | Modification       | 0.2s            | 10 min  | 0.2s                | 45s                | Service Mode |
| 215       | Maximum repeats of safety circuit<br>1 = No repetition<br>2...15 = Number of repetitions<br>16 = Constant repetitions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1               | -                   | Modification       | 1               | 16      | 1                   | 16                 | Service Mode |
| 221       | Gas: selection of flame sensor<br>0 = QRB.../ QRC<br>1 = ION / QRA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1               | -                   | Modification       | 0               | 1       | 1                   | 1                  | Service Mode |
| 222       | Gas: Selection of the pre-purging function<br>0 = deactivated<br>1 = activated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1               | -                   | Modification       | 0               | 1       | 1                   | 1                  | Service Mode |
| 223       | Maximum repeats of minimum gas pressure switch intervention<br>1 = No repetition<br>2...15 = Number of repetitions<br>16 = Constant repetitions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1               | -                   | Modification       | 1               | 16      | 1                   | 16                 | Service Mode |
| 225       | Gas: pre-purging time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1               | s                   | Modification       | 20s             | 60 min  | 0.2s                | 20s                | Service Mode |
| 226       | Gas: pre-ignition time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1               | s                   | Modification       | 0.4 s           | 60 min  | 0.2s                | 2s                 | Service Mode |
| 230       | Gas: interval 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1               | s                   | Modification       | 0.4 s           | 60s     | 0.2s                | 2s                 | Service Mode |
| 232       | Gas: interval 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1               | s                   | Modification       | 0.4 s           | 60s     | 0.2s                | 2s                 | Service Mode |
| 233       | Gas: post-combustion time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1               | s                   | Modification       | 0.2s            | 60s     | 0.2s                | 8s                 | Service Mode |
| 234       | Gas: Post-purging time (no extraneous light test)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1               | s                   | Modification       | 0.2s            | 108 min | 0.2s                | 0.2s               | Service Mode |
| 236       | Gas: Minimum gas pressure switch input<br>0 = deactivated<br>1 = minimum gas pressure switch (upstream of the fuel valve 1 (V1))<br>2 = valve control via the minimum pressure switch (between fuel vale 1 (V1) and 2 (V2))                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1               | -                   | Modification       | 1               | 2       | 1                   | 1                  | Service Mode |
| 237       | Gas: Maximum gas pressure switch / POC Input<br>0 = deactivated<br>1 = Maximum gas pressure switch<br>2 = POC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1               | -                   | Modification       | 1               | 2       | 1                   | 1                  | Service Mode |

| Parameter                               |                                                                                                                                                                                                                | No. of elements | Unit of measurement | Modification                | Values interval |         | Degree of precision | Predefined setting           | Access mode  |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|-----------------------------|-----------------|---------|---------------------|------------------------------|--------------|
| No.                                     | Description                                                                                                                                                                                                    |                 |                     |                             | Min.            | Max.    |                     |                              |              |
| 241                                     | Gas: Valve leak detection test<br>0 = test deactivated<br>1 = valve leak detection test at start up<br>2 = valve leak detection test at shutdown<br>3 = valve leak detection test at start-up and at shut-down | 1               | -                   | Modification                | 0               | 3       | 1                   | 2                            | Service Mode |
| 248                                     | Gas: Post-purging time (t3)(at deactivation of the load (LR)) - ON                                                                                                                                             | 1               | s                   | Modification                | 1s              | 108 min | 0.2s                | 1s                           | Service Mode |
| 261                                     | Oil: selection of flame sensor<br>0 = QRB.../ QRC...<br>1 = ION / QRA...                                                                                                                                       | 1               | -                   | Modification                | 0               | 1       | 1                   | 0                            | Service Mode |
| 265                                     | Oil: pre-purging time                                                                                                                                                                                          | 1               | s                   | Modification                | 15s             | 60 min  | 0.2s                | 15s                          | Service Mode |
| 266                                     | Oil: pre-ignition time                                                                                                                                                                                         | 1               | s                   | Modification                | 0.6s            | 60 min  | 0.2s                | 2s                           | Service Mode |
| 270                                     | Oil: interval 1                                                                                                                                                                                                | 1               | s                   | Modification                | 0.4 s           | 60 min  | 0.2s                | 2s                           | Service Mode |
| 272                                     | Oil: interval 2                                                                                                                                                                                                | 1               | s                   | Modification                | 0.4 s           | 60 min  | 0.2s                | 2s                           | Service Mode |
| 273                                     | Oil: post-combustion time                                                                                                                                                                                      | 1               | s                   | Modification                | 0.2s            | 60s     | 0.2s                | 8s                           | Service Mode |
| 274                                     | Oil: Post-purging time (no extraneous light test)                                                                                                                                                              | 1               | s                   | Modification                | 0.2s            | 108 min | 0.2s                | 0.2s                         | Service Mode |
| 276                                     | Oil: Minimum input oil pressure switch<br>0 = deactivated<br>1 = activated from phase 38<br>2 = activated from safety time (TSA)                                                                               | 1               | -                   | Modification                | 1               | 2       | 1                   | 1                            | Service Mode |
| 277                                     | Oil: Maximum oil pressure switch / POC Input<br>0 = deactivated<br>1 = Maximum oil pressure switch<br>2 = POC                                                                                                  | 1               | -                   | Modification                | 1               | 2       | 1                   | 1                            | Service Mode |
| 281                                     | Oil: selection transformer ignition phase TA<br>0 = brief pre-ignition (Ph38)<br>1 = long pre-ignition (with fan)(Ph22)                                                                                        | 1               | -                   | Modification                | 0               | 1       | 1                   | 1                            | Service Mode |
| 284                                     | Oil: Post-purging time (t3)(at deactivation of the load (LR)) - ON                                                                                                                                             | 1               | s                   | Modification                | 1s              | 108 min | 0.2s                | 1s                           | Service Mode |
| <b>400 AIR / FUEL MODULATION CURVES</b> |                                                                                                                                                                                                                |                 |                     |                             |                 |         |                     |                              |              |
| 401                                     | Checking fuel servomotor (only setting of the curve)                                                                                                                                                           | 13              | (°)                 | Modification                | 0°              | 90°     | 0.1°                | 0°; 0°; 15°;<br>Not defined  | Service Mode |
| 402                                     | Checking air servomotor (only setting of the curve)                                                                                                                                                            | 13              | (°)                 | Modification                | 0°              | 90°     | 0.1°                | 0°; 90°; 45°;<br>Not defined | Service Mode |
| <b>500 POSITIONING OF SERVOMOTORS</b>   |                                                                                                                                                                                                                |                 |                     |                             |                 |         |                     |                              |              |
| 501                                     | Position of the fuel servomotor in absence of flame<br>Index 0 = standby position<br>Index 1 = pre-purging position<br>Index 2 = post-purging position                                                         | 3               | (°)                 | Modification                | 0°              | 90°     | 0.1°                | 0°; 0°; 15°                  | Service Mode |
| 502                                     | Position of the air servomotor in absence of flame<br>Index 0 = standby position<br>Index 1 = pre-purging position<br>Index 2 = post-purging position                                                          | 3               | (°)                 | Modification                | 0°              | 90°     | 0.1°                | 0°; 90°; 45°                 | Service Mode |
| 545                                     | Minimum modulation limit<br>Not defined = 20%                                                                                                                                                                  | 1               | %                   | Modification / zero setting | 20%             | 100%    | 0.1%                | Not defined                  | Service Mode |
| 546                                     | Maximum modulation limit<br>Not defined = 100%                                                                                                                                                                 | 1               | %                   | Modification / zero setting | 20%             | 100%    | 0.1%                | Not defined                  | Service Mode |
| <b>600 SERVOMOTORS</b>                  |                                                                                                                                                                                                                |                 |                     |                             |                 |         |                     |                              |              |
| 606                                     | Tolerance limit for position check (0.1°)<br>Index 0 = fuel<br>Index 1 = air<br>More serious position error, where a defect has certainly been detected<br>-> Stop range: (P 606 - 0.6°) a P606                | 2               | (°)                 | Modification                | 0.5°            | 4°      | 0.1°                | 1.7°; 1.7°                   | Service Mode |
| 645                                     | Analogue exit configuration<br>0 = DC 0...10 V<br>1 = DC 2...10 V<br>2 = DC 0 / 2...10 V                                                                                                                       | 1               | -                   | Modification                | 0               | 2       | 1                   | 2                            | Service Mode |
| <b>700 LOG OF THE ERRORS</b>            |                                                                                                                                                                                                                |                 |                     |                             |                 |         |                     |                              |              |
| 701                                     | Error chronology: 701-725.01.Code                                                                                                                                                                              | 25              | -                   | Reading only                | 0               | 255     | 1                   | 0                            | Info mode    |
| •                                       | Error chronology: 701-725.02.Diagnostic code                                                                                                                                                                   | 25              | -                   | Reading only                | 0               | 255     | 1                   | 0                            | Info mode    |

| Parameter                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | No. of elements | Unit of measurement                                   | Modification | Values interval |                  | Degree of precision | Predefined setting | Access mode  |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------|--------------|-----------------|------------------|---------------------|--------------------|--------------|
| No.                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                                                       |              | Min.            | Max.             |                     |                    |              |
| •                              | Error chronology: 701-725.03.Error class                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 25              | -                                                     | Reading only | 0               | 6                | 1                   | 0                  | Info mode    |
| •                              | Error chronology: 701-725.04.Phase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25              | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Info mode    |
| •                              | Error chronology: 701-725.05.Start-up meter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 25              | -                                                     | Reading only | 0               | 99999999         | 1                   | 0                  | Info mode    |
| 725                            | Error chronology: 701-725.06.Load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 25              | %                                                     | Reading only | 0%              | 100%             | 0.1%                | 0%                 | Info mode    |
| <b>900 PROCESS INFORMATION</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                                       |              |                 |                  |                     |                    |              |
| 903                            | Actual output<br>Index 0 = fuel<br>Index 1 = air                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2               | %                                                     | Reading only | 0%              | 100%             | 0.1%                | 0%                 | Info mode    |
| 922                            | Position of the servomotors<br>Index 0 = fuel<br>Index 1 = air                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2               | (°)                                                   | Reading only | -50°            | 150°             | 0.01°               | 0°                 | Info mode    |
| 942                            | Heat source active<br>1 = output during the definition of the curves<br>2 = manual output<br>3 = BACS output<br>4 = analogue input output<br>5 = output of the external load regulator contacts                                                                                                                                                                                                                                                                                                                                                   | 1               | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Service mode |
| 947                            | Result of the sampling of the contact (codified in bits)<br>Bit 0.0 = 1: Minimum pressure switch<br>Bit 0.1 = 2: Maximum pressure switch<br>Bit 0.2 = 4: Pressure switch control valves<br>Bit 0.3 = 8: Air pressure switch<br>Bit 0.4 = 16: Open load check<br>Bit 0.5 = 32: ON load check<br>Bit 0.6 = 64: Closed load check<br>Bit 0.7 = 128: Safety circuit<br>Bit 1.0 = 1: Safety valve<br>Bit 1.1 = 2: Ignition<br>Bit 1.2 = 4: Fuel valve 1<br>Bit 1.3 = 8: Fuel valve 2<br>Bit 1.4 = 16: Fuel valve 3/ pilot valve<br>Bit 1.5 = 32: Reset | 2               | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Info mode    |
| 950                            | Relay request status (coded in bits)<br>Bit 0 = 1: Alarm<br>Bit 1 = 2: Safety valve<br>Bit 2 = 4: Ignition<br>Bit 3 = 8: Fuel valve 1<br>Bit 4 = 16: Fuel valve 2<br>Bit 5 = 32: Fuel valve 3/ pilot valve                                                                                                                                                                                                                                                                                                                                        | 1               | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Info mode    |
| 954                            | Flame intensity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1               | %                                                     | Reading only | 0%              | 100%             | 1%                  | 0%                 | Info mode    |
| 960                            | Actual output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1               | m <sup>3</sup> /h, l, h,<br>ft <sup>3</sup> /h, gal/h | Reading only | 0               | 6553,5           | 0,1                 | 0                  | Info mode    |
| 961                            | Status of external modules and visualisation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1               | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Info mode    |
| 981                            | Memory error: Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1               | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Info mode    |
| 982                            | Memory error: diagnostic code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1               | -                                                     | Reading only | 0               | 255              | 1                   | 0                  | Info mode    |
| 992                            | Error indicators                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 10              | -                                                     | Reset        | 0               | 0xFFFFFFFF<br>FF | 1                   | 0                  | Service mode |

**Tab. O**

## 7.5 Operation

### Burner without modulating operation kit

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

- If the temperature or the pressure is low (so the thermostat/pressure switch TR is closed), the burner progressively increases the output as far as the MAX value (point “P9”).
- If the temperature or the pressure increases as far as the opening of the thermostat/pressure switch TR, the burner progressively reduces the output as far as the MIN value (point “P1”),. The sequence repeats endlessly.
- The burner stops when the heat request is less than the heat supplied by the burner at MIN output.

- The thermostat/pressure switch TL opens, the flame control carries out the switching off phase.
- The air damper closes completely to reduce heat losses to a minimum.

### Burner with modulating operation kit

See manual enclosed with the adjuster kit.

## 7.6 Motor lockout

If the motor does not start, it could be because of a thermal relay intervention due to its incorrect calibration or problems with the motor or the main power supply, to release press the button of the thermal relay, see "Calibration of the thermal relay" on page 19.

## 7.7 Ignition failure

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

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

In this case increase gas ignition flow rate. The arrival of gas to the pipe coupling is displayed on the pressure gauge, as shown in (Fig. 35 on page 51).



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

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



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

## 7.8 Burner flame goes out during operation

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

## 7.9 Stopping of the burner

The burner can be stopped by:

- intervening on the disconnecting switch of the electrical supply line, located on the boiler panel;
- removing the transparent protection 30) Fig. 5 on page 12, after unscrewing the relative screw.

There are now two possibilities:

- using the operator panel according to the manual lockout procedure on page 35;
- using the switch 0-1 of Fig. 26 on page 29.

## 7.10 Final checks (with burner operating)

|                                                                                  |  |                                                         |
|----------------------------------------------------------------------------------|--|---------------------------------------------------------|
| ➤ Open the thermostat/pressure switch TL                                         |  | The burner must stop                                    |
| ➤ Open the thermostat/pressure switch TS                                         |  |                                                         |
| ➤ Turn the gas maximum pressure switch knob to the minimum end of scale position |  | The burner must stop in lockout                         |
| ➤ Turn the air pressure switch knob to the maximum end of scale position         |  |                                                         |
| ➤ Turn off the burner and cut off the power                                      |  | The burner must not start                               |
| ➤ Disconnect the minimum gas pressure switch connector                           |  |                                                         |
| ➤ Disconnect the connector of the ionisation probe                               |  | The burner must stop in lockout due to ignition failure |

Tab. P



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

## 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.



**DANGER**

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:



**DANGER**

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



**DANGER**

Turn off the fuel interception tap.



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

### 8.2 Maintenance programme

#### 8.2.1 Maintenance frequency



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

#### 8.2.2 Safety test - with gas ball valve closed

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

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

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

The start-up cycle must be as follows:

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

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

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



**WARNING**

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

#### 8.2.3 Checking and cleaning



The operator must use the required equipment during maintenance.

##### Combustion

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

##### Combustion head

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

##### Burner

Check that there are not excess wear or loosen screws.

Clean the outside of the burner.

##### Fan

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

**Boiler**

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

**Gas leaks**

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

**Gas filter**

Change the gas filter when it is dirty.

**Electric current to the flame sensor**

Clean the ionization probe from any dust.

Check the mechanical integrity of the component and the flame signal measured by the flame control.

**Combustion**

If the combustion values measured before starting maintenance do not comply with applicable legislation or do not indicate efficient combustion, consult the table or contact our Technical Support Service to implement the necessary adjustments.

It is advisable to set the burner according to the type of gas used and following the indications in Tab. Q.

| EN 676 |                                                       | Air excess                        |                 |                                   |                 |
|--------|-------------------------------------------------------|-----------------------------------|-----------------|-----------------------------------|-----------------|
|        |                                                       | Max. output<br>$\lambda \leq 1.2$ |                 | Min. output<br>$\lambda \leq 1.3$ |                 |
|        |                                                       | CO <sub>2</sub> % Calibration     |                 | CO                                | NO <sub>x</sub> |
| GAS    | CO <sub>2</sub> theoretical<br>max. 0% O <sub>2</sub> | $\lambda = 1.2$                   | $\lambda = 1.3$ | mg/kWh                            | mg/kWh          |
| G 20   | 11.7                                                  | 9.7                               | 9.0             | $\leq 100$                        | $\leq 170$      |
| G25    | 11.5                                                  | 9.5                               | 8.8             | $\leq 100$                        | $\leq 170$      |

Tab. Q

**8.2.4 Safety components**

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

The specified life cycles do not refer to the warranty terms indicated in the delivery or payment conditions.

| Safety component                            | Life cycle                           |
|---------------------------------------------|--------------------------------------|
| Flame control                               | 10 years or 250,000 operation cycles |
| 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                             |
| Fan impeller                                | 10 years or 500,000 start-ups        |

Tab. R

**8.2.5 Measuring the ionisation current**

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

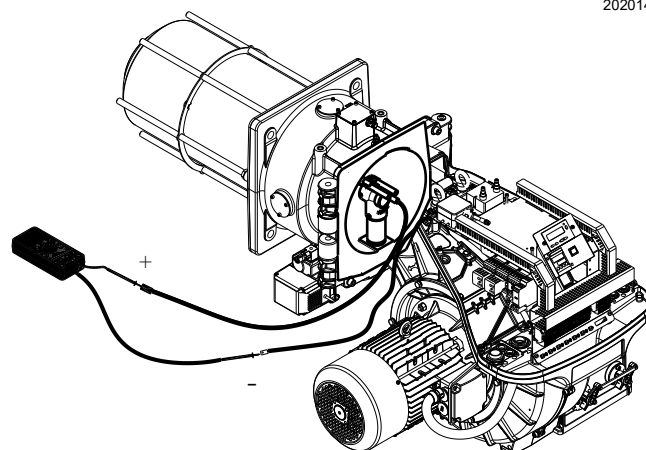
The minimum current for flame control operation is 4  $\mu$ A. The operator panel displays "30%" (see "List of parameters" on page 44, parameter no. 954).

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

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



Carefully check the polarities!

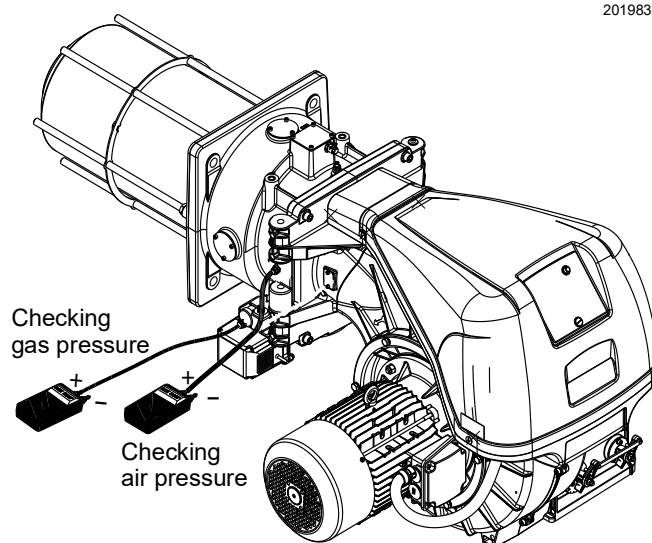


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Fig. 34

**8.2.6 Checking the air and gas pressure on the combustion head**

To carry out this operation it is necessary to use a pressure gauge to measure the air and gas pressure at the combustion head, as shown in Fig. 35.



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Fig. 35

**8.3 Opening the burner**

---



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



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



Turn off the fuel interception tap.

To open the burner, use the same procedure set out in “Access to head internal part” on page 22.

**8.4 Closing the burner**

---

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



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

## 9 Faults - Possible causes - Solutions

If faults arise in ignition or operations, the burner performs a "safety stop", which is signalled by the red burner lockout LED. The display of the operator panel visualises alternately the lock-out code and the relative diagnostic.

To restore start-up conditions, refer to the "Reset procedure" on page 35

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



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

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



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

### 9.1 List of error codes

| Error code     | Diagnostic code | Meaning of the REC 27.100A2 system                                                          | Recommended measures                                                         |
|----------------|-----------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>No Comm</b> |                 | <b>No communication between REC 27.100A2 and RDI21...</b>                                   | Check the wiring between the flame control REC 27.100A2 and display RDI21... |
| <b>2</b>       | <b>#</b>        | <b>No flame at the end of TSA1</b>                                                          |                                                                              |
|                | 1               | No flame at the end of safety time 1 (TSA1)                                                 |                                                                              |
|                | 2               | No flame at the end of safety time 2 (TSA2)                                                 |                                                                              |
|                | 4               | No flame at the end of safety time 1 (TSA1)<br>(software version ≤ V02.00)                  |                                                                              |
| <b>3</b>       | <b>#</b>        | <b>Air pressure error</b>                                                                   |                                                                              |
|                | 0               | Air pressure switch off                                                                     |                                                                              |
|                | 1               | Air pressure switch on                                                                      |                                                                              |
|                | 4               | Air pressure on – Lockout alarm at start                                                    |                                                                              |
|                | 20              | Air pressure, fuel pressure on - Alarm lock at start                                        |                                                                              |
|                | 68              | Air pressure, POC on – Alarm lockout at start                                               |                                                                              |
|                | 84              | Air pressure, fuel pressure, POC on - Alarm lockout at start                                |                                                                              |
| <b>4</b>       | <b>#</b>        | <b>Extraneous light</b>                                                                     |                                                                              |
|                | 0               | Extraneous light during start-up                                                            |                                                                              |
|                | 1               | Extraneous light during switch-off                                                          |                                                                              |
|                | 2               | Extraneous light during start-up – Lockout alarm at start                                   |                                                                              |
|                | 6               | Extraneous light during start-up, air pressure - Alarm lockout at start                     |                                                                              |
|                | 18              | Extraneous light during start-up, fuel pressure - Alarm lockout at start                    |                                                                              |
|                | 24              | Extraneous light during start-up, air pressure, fuel pressure - Alarm lockout at start      |                                                                              |
|                | 66              | Extraneous light during start-up, POC – Alarm lockout at start                              |                                                                              |
|                | 70              | Extraneous light during start-up, air pressure, POC - Alarm lockout at start                |                                                                              |
|                | 82              | Extraneous light during start-up, fuel pressure, POC - Alarm lockout at start               |                                                                              |
|                | 86              | Extraneous light during start-up, air pressure, fuel pressure, poc - Alarm lockout at start |                                                                              |
| <b>7</b>       | <b>#</b>        | <b>Loss of flame</b>                                                                        |                                                                              |
|                | 0               | Loss of flame                                                                               |                                                                              |
|                | 3               | Flame loss (software version ≤ V02.00)                                                      |                                                                              |

| Error code          | Diagnostic code | Meaning of the REC 27.100A2 system                                                 | Recommended measures                                                                                                                                                                                                                     |
|---------------------|-----------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | 3...255         | Flame loss during TÜV test (flame loss test)                                       | The diagnostics covers the period between the closure of the fuel valve to the point the flame loss is detected (resolution 0.2 s → value 5 = 1 s).                                                                                      |
| <b>12</b>           | <b>#</b>        | <b>Valve leak detection control</b>                                                |                                                                                                                                                                                                                                          |
|                     | 0               | V1 leaks                                                                           | Leak test<br>Check if the valve on the side of the gas has any leaks.<br>Check the wiring and make sure that the circuit is open.                                                                                                        |
|                     | 1               | V2 leaks                                                                           | Leak test<br>Check if the valve on the side of the burner has any leaks.<br>Check if the pressure switch for the leak test (PGVP) is closed when gas pressure is not present.<br>Check the wiring and check if there is a short circuit. |
|                     | 2               | Valve leak detection test not possible                                             | The valve leak detection is active, but the minimum gas pressure switch is selected as input for X9-04 (check parameters 238 and 241)                                                                                                    |
|                     | 3               | Valve leak detection test not possible                                             | The valve leak detection is active, but no input has been assigned (check parameters 236 and 237)                                                                                                                                        |
|                     | 4               | Valve leak detection not possible                                                  | Valve leak detection is active, but 2 inputs have already been assigned (configure parameter 237 or maximum gas Pressure switch or POC)                                                                                                  |
|                     | 5               | Valve leak detection not possible                                                  | The valve leak detection is active, but 2 inputs have been assigned (check parameters 236 and 237)                                                                                                                                       |
| <b>14</b>           | <b>#</b>        | <b>POC</b>                                                                         |                                                                                                                                                                                                                                          |
|                     | 0               | POC Open                                                                           | Check if the closure contact of the valve is closed                                                                                                                                                                                      |
|                     | 1               | POC Closed                                                                         | Check the wiring<br>Check if the closure contact of the valve opens when the valve is checked                                                                                                                                            |
|                     | 64              | POC Open - Alarm lockout at start                                                  | Check the wiring<br>Check if the closure contact of the valve is closed                                                                                                                                                                  |
| <b>19</b>           | 80              | Fuel pressure, POC - Alarm lockout at start                                        | Check that the pressure switch is closed when no pressure is present from the fuel<br>Check that there are no short-circuits                                                                                                             |
| <b>20</b>           | <b>#</b>        | <b>Pmin</b>                                                                        |                                                                                                                                                                                                                                          |
|                     | 0               | Minimum gas/oil pressure absent                                                    | Check that there are no line interruptions                                                                                                                                                                                               |
|                     | 1               | Scarcity of gas - Alarm lockout at start                                           | Check that there are no line interruptions                                                                                                                                                                                               |
| <b>21</b>           | <b>#</b>        | <b>Pmax/POC</b>                                                                    |                                                                                                                                                                                                                                          |
|                     | 0               | Pmax: Max. gas/oil pressure exceeded<br>POC: POC open (software version ≤ V02.00)  | Check the wiring.<br>POC: check whether the closure contact of the valve is closed                                                                                                                                                       |
|                     | 1               | POC closed (software version ≤ V02.00)                                             | Check the wiring.<br>Check if the closure contact of the valve opens when the valve is checked                                                                                                                                           |
|                     | 64              | POC Open - Lockout alarm at the start (software version ≤ V02.00)                  | Check the wiring.<br>Check if the contact of the valve opens when the valve is checked                                                                                                                                                   |
| <b>22<br/>OFF S</b> | <b>#</b>        | <b>Safety circuit/Burner flange</b>                                                |                                                                                                                                                                                                                                          |
|                     | 0               | Safety circuit open /Burner flange open                                            |                                                                                                                                                                                                                                          |
|                     | 1               | Safety circuit open /Burner flange open - Alarm lockout at start                   |                                                                                                                                                                                                                                          |
|                     | 3               | Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start |                                                                                                                                                                                                                                          |
|                     | 5               | Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start |                                                                                                                                                                                                                                          |
|                     | 17              | Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start |                                                                                                                                                                                                                                          |
|                     | 19              | Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start |                                                                                                                                                                                                                                          |

| Error code     | Diagnostic code | Meaning of the REC 27.100A2 system                                                                              | Recommended measures                                                         |
|----------------|-----------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                | 21              | Safety circuit open /Burner flange open, extraneous light - Alarm lockout at start                              |                                                                              |
|                | 23              | Safety circuit open /Burner flange open, extraneous light, air pressure, fuel pressure - Alarm lockout at start |                                                                              |
|                | 65              | Safety circuit /Burner flange open, POC - Alarm lockout at start                                                |                                                                              |
|                | 67              | Safety circuit open /Burner flange open, extraneous light, POC - Alarm lockout at start                         |                                                                              |
|                | 69              | Safety circuit open /Burner flange open, air pressure, POC - Alarm lockout at start                             |                                                                              |
|                | 71              | Safety circuit open /Burner flange open, extraneous light, air pressure, POC - Alarm lockout at start           |                                                                              |
|                | 81              | Safety circuit open /Burner flange open, fuel pressure, POC - Alarm lockout at start                            |                                                                              |
|                | 83              | Safety circuit open /Burner flange open, extraneous light, air pressure, POC - Alarm lockout at start           |                                                                              |
|                | 85              | Safety circuit open /Burner flange, air pressure, fuel pressure, POC - Alarm lockout at start                   |                                                                              |
|                | 87              | Safety circuit open /Burner flange, extraneous light, air pressure, fuel pressure, POC - Alarm lockout at start |                                                                              |
| <b>50 ÷ 58</b> | <b>#</b>        | <b>Internal error</b>                                                                                           | Carry out a reset; if the error arises repeatedly, replace the flame control |
| <b>60</b>      | <b>0</b>        | <b>Internal error: no valid load checking device</b>                                                            | Carry out a reset; if the error arises repeatedly, replace the flame control |
| <b>65 ÷ 67</b> | <b>#</b>        | <b>Internal error</b>                                                                                           | Carry out a reset; if the error arises repeatedly, replace the flame control |
| <b>70</b>      | <b>#</b>        | <b>Fuel/air checking error: Calculation position in modulation</b>                                              |                                                                              |
|                | 23              | Invalid load                                                                                                    | No valid load                                                                |
|                | 26              | Curve points not defined                                                                                        | Adjust the curve points of all the actuators                                 |
| <b>71</b>      | <b>#</b>        | <b>Special position not defined</b>                                                                             |                                                                              |
|                | 0               | Standby position                                                                                                | Set the standby position of all the servomotors used                         |
|                | 1               | Pre-purging position                                                                                            | Set the pre-purging position of all the servomotors used                     |
|                | 2               | Post-purging position                                                                                           | Set the post-purging position of all the servomotors used                    |
|                | 3               | Ignition position                                                                                               | Set the ignition position of all the servomotors used                        |
| <b>72</b>      | <b>#</b>        | <b>Fuel/air internal checking error:</b>                                                                        | Carry out a reset; if the error arises repeatedly, replace the flame control |
| <b>73</b>      | <b>#</b>        | <b>Fuel/air internal checking error: multistep calculation position</b>                                         |                                                                              |
|                | 23              | Position calculation, invalid stage load                                                                        | No valid load                                                                |
|                | 26              | Position calculation, stage curve points not defined                                                            | Adjust the curve points of all the servomotors                               |
| <b>75</b>      | <b>#</b>        | <b>Fuel/air ratio internal checking error: cyclical data check</b>                                              |                                                                              |
|                | 1               | Check synchronisation data, different current load                                                              |                                                                              |
|                | 2               | Check synchronisation data, different target load                                                               |                                                                              |
|                | 4               | Check synchronisation data, different target positions                                                          |                                                                              |
|                | 16              | Check synchronisation data, different positions reached                                                         |                                                                              |
| <b>76</b>      | <b>#</b>        | <b>Fuel/air internal checking error:</b>                                                                        | Carry out a reset; if the error arises repeatedly, replace the flame control |

| Error code     | Diagnostic code                                                               | Meaning of the REC 27.100A2 system                    | Recommended measures                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|-------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>85</b>      | <b>#</b>                                                                      | <b>Reference error of a servomotor</b>                |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | 0                                                                             | Reference error of the fuel servomotor                | The reference of the fuel servomotor was not successful.<br>It was not possible to reach the reference point.<br>1. Check if the servomotors have been inverted.<br>2. Check if the servomotor is blocked or overloaded.                                                                                                                                                                                                     |
|                | 1                                                                             | Reference error of the air servomotor                 | The reference of the air servomotor was not successful.<br>It was not possible to reach the reference point.<br>1. Check if the servomotors have been inverted.<br>2. Check if the servomotor is blocked or overloaded.                                                                                                                                                                                                      |
|                | Bit 7<br>Valence $\geq 128$                                                   | Reference error owing to parameter modification       | The parameterisation of an actuator (e.g. the reference position) has been modified. This error will be visualised to start up a new reference.                                                                                                                                                                                                                                                                              |
| <b>86</b>      | <b>#</b>                                                                      | <b>Fuel servomotor error</b>                          |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | 0                                                                             | Position error                                        | It was not possible to reach the target position within the requested tolerance range.<br>1. Check if the servomotor is blocked or overloaded.                                                                                                                                                                                                                                                                               |
|                | Bit 0<br>Valence 1                                                            | Circuit open                                          | Circuit open shown on the servomotor connection.<br>1. Check the wiring (the voltage between pin 5 or 6 and 2 of the X54 connector must be $> 0.5$ V).                                                                                                                                                                                                                                                                       |
|                | Bit 3<br>Valence $\geq 8$                                                     | Curve too steep in terms of train ratio               | The slope of the curve can correspond to a maximum position modification of $31^\circ$ between 2 points of the modulation curve.                                                                                                                                                                                                                                                                                             |
|                | Bit 4<br>Valence $\geq 16$                                                    | Deviation of section compared with the last reference | Overloading of the servomotor or servomotor subjected to mechanical torsion.<br>1. Check if the servomotor is blocked in any point along its range of action.<br>2. Check if the torque is sufficient for the application.                                                                                                                                                                                                   |
| <b>87</b>      | <b>#</b>                                                                      | <b>Air servomotor error</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | 0                                                                             | Position error                                        | It was not possible to reach the target position within the requested tolerance range.<br>1. Check if the servomotor is blocked or overloaded.                                                                                                                                                                                                                                                                               |
|                | Bit 0<br>Valence 1                                                            | Circuit open                                          | Circuit open shown on the servomotor connection.<br>1. Check the wiring (the voltage between pin 5 or 6 and 2 of the X54 connector must be $> 0.5$ V).                                                                                                                                                                                                                                                                       |
|                | Bit 3<br>Valence $\geq 8$                                                     | Curve too steep in terms of train ratio               | The slope of the curve can correspond to a maximum position modification of $31^\circ$ between 2 points of the modulation curve.                                                                                                                                                                                                                                                                                             |
|                | Bit 4<br>Valence $\geq 16$                                                    | Deviation of section compared with the last reference | Overloading of the servomotor or servomotor subjected to mechanical torsion.<br>1. Check if the servomotor is blocked in any point along its range of action.<br>2. Check if the torque is sufficient for the application.                                                                                                                                                                                                   |
| <b>90 - 91</b> | <b>#</b>                                                                      | <b>Burner internal checking error</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>93</b>      | <b>#</b>                                                                      | <b>Flame signal acquisition error</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | 3                                                                             | Short circuit of the sensor                           | Short circuit in the QRB sensor...<br>1. Check the wiring.<br>2. Flame detector probably faulty.                                                                                                                                                                                                                                                                                                                             |
| <b>95</b>      | <b>#</b>                                                                      | <b>Relay supervision error</b>                        |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | 3 Ignition transformers<br>4 Fuel valve 1<br>5 Fuel valve 2<br>6 Fuel valve 3 | External power supply - Contact active                | Check the wiring                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>96</b>      | <b>#</b>                                                                      | <b>Relay supervision error</b>                        |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                | 3 Ignition transformers<br>4 Fuel valve 1<br>5 Fuel valve 2<br>6 Fuel valve 3 | The relay contacts have joined together               | Check the contacts:<br>1. flame control connected to the power supply: the fan output must be without voltage.<br>2. Disconnect the power supply. Disconnect the fan. The resistive connection between the fan output and the neutral wire is not allowed.<br>If one of the 2 tests fails, replace the flame control because the contacts are definitively joined together and it is no longer possible to guarantee safety. |

| Error code       | Diagnostic code                                                                                                                                                                                                                                                                                                                                   | Meaning of the REC 27.100A2 system                                                                              | Recommended measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>97</b>        | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Relay supervision error</b>                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                  | 0                                                                                                                                                                                                                                                                                                                                                 | The safety relay contacts have joined together or the safety relay has been powered by an external power supply | <p>Check the contacts:</p> <ol style="list-style-type: none"> <li>1. flame control connected to the power supply: the fan output must be without voltage.</li> <li>2. Disconnect the power supply. Disconnect the fan. The resistive connection between the fan output and the neutral wire is not allowed.</li> </ol> <p>If one of the 2 tests fails, replace the flame control because the contacts are definitively joined together and it is no longer possible to guarantee safety.</p> |
| <b>98</b>        | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Relay supervision error</b>                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                  | 2 – Safety valve<br>3 Ignition transformers<br>4 Fuel valve 1<br>5 Fuel valve 2<br>6 Fuel valve 3                                                                                                                                                                                                                                                 | The relay does not start up                                                                                     | Carry out a reset; if the error arises repeatedly, replace the unit                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>99</b>        | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Relay internal checking error</b>                                                                            | Carry out a reset; if the error arises repeatedly, replace the flame control                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                  | 3                                                                                                                                                                                                                                                                                                                                                 | Relay internal checking error                                                                                   | <p>Carry out a reset; if the error arises repeatedly, replace the flame control</p> <p>Software version V03.10: If error C:99 D:3 occurs during the standardisation of the VSD, temporarily deactivate the Alarm function at the start of the pre-purging phase (parameter 210 = 0) or interrupt the signal controller-ON</p>                                                                                                                                                                |
| <b>100</b>       | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Relay internal checking error</b>                                                                            | Carry out a reset; if the error arises repeatedly, replace the flame control                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>105</b>       | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Contact sampling internal error</b>                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                  | 0 Min. pressure switch<br>1 Max. pressure switch<br>2 Valve operation test pressure switch<br>3 Air pressure<br>4 Load controller open<br>5 Load controller on/off<br>6 Load controller closed<br>7 Safety loop / burner flange<br>8 Safety valve<br>9 Ignition transformers<br>10 Fuel valve 1<br>11 Fuel valve 2<br>12 Fuel valve 3<br>13 Reset | Blocked upon irregularity                                                                                       | Can be caused by capacitive loads or presence of DC voltage on the main power supply of the flame control. The diagnostic code indicates the input in which the problem arose                                                                                                                                                                                                                                                                                                                |
| <b>106 ÷ 108</b> | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Contact request internal error</b>                                                                           | Carry out a reset; if the error arises repeatedly, replace the flame control                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>110</b>       | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Voltage monitoring test internal error</b>                                                                   | Carry out a reset; if the error arises repeatedly, replace the flame control                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>111</b>       | <b>0</b>                                                                                                                                                                                                                                                                                                                                          | <b>Low level of power supply</b>                                                                                | <p>Insufficient mains voltage.</p> <p>Conversion of the diagnostic code</p> <p>Voltage value (230 V AC : 1.683)</p>                                                                                                                                                                                                                                                                                                                                                                          |
| <b>112</b>       | <b>0</b>                                                                                                                                                                                                                                                                                                                                          | <b>Reset power supply voltage</b>                                                                               | Error code for the carrying out of a reset in the event of power supply restoration (absence of error)                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>113</b>       | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>Mains voltage supervision internal error</b>                                                                 | Carry out a reset; if the error arises repeatedly, replace the flame control                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>115</b>       | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>flame control meter internal error</b>                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>116</b>       | <b>0</b>                                                                                                                                                                                                                                                                                                                                          | <b>Life cycle of the flame control in the critical interval (250,000 Start ups)</b>                             | The envisaged life cycle of the flame control has been exceeded. Replace it.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>117</b>       | <b>0</b>                                                                                                                                                                                                                                                                                                                                          | <b>Life cycle of the flame control exceeded</b>                                                                 | The switch-off threshold has been reached.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>120</b>       | <b>0</b>                                                                                                                                                                                                                                                                                                                                          | <b>Interruption of fuel limiting meter input</b>                                                                | Too many disturbance impulses on the input of the fuel meter. Improve the electromagnetic compatibility.                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>121 ÷ 124</b> | <b>#</b>                                                                                                                                                                                                                                                                                                                                          | <b>EEPROM access internal error</b>                                                                             | Carry out a reset, repeat and check the last setting of the parameters. Restore the group of parameters: if the error arises repeatedly, replace the flame control.                                                                                                                                                                                                                                                                                                                          |

| Error code | Diagnostic code | Meaning of the REC 27.100A2 system                                             | Recommended measures                                                                                                                                                |
|------------|-----------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 125        | #               | EEPROM reading access internal error                                           | Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the flame control.                                  |
| 126        | #               | EEPROM writing access internal error                                           | Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the flame control.                                  |
| 127        | #               | EEPROM access internal error                                                   | Carry out a reset, repeat and check the last setting of the parameters. Restore the group of parameters: if the error arises repeatedly, replace the flame control. |
| 128        | 0               | EEPROM access internal error - synchronisation during the initialisation       | Carry out a reset; if the error arises repeatedly, replace the flame control.                                                                                       |
| 129        | #               | EEPROM access internal error – command synchronisation                         | Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the flame control.                                  |
| 130        | #               | EEPROM access internal error - time-out                                        | Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the flame control.                                  |
| 131        | #               | EEPROM access internal error - page interrupted                                | Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the flame control.                                  |
| 132        | #               | EEPROM register initialisation internal error                                  | Carry out a reset; if the error arises repeatedly, replace the flame control.                                                                                       |
| 133 ÷ 135  | #               | EEPROM access internal error – request synchronisation                         | Carry out a reset, repeat and check the last setting of the parameters. If the error arises repeatedly, replace the flame control.                                  |
| 136        | 1               | Restoration started                                                            | The restoration of a backup has been started (no error)                                                                                                             |
| 137        | #               | Internal error – backup / restoration                                          |                                                                                                                                                                     |
|            | 157 (-99)       | Restoration – OK, but backup < compared with set data of current system        | Restoration successful, but the backup data installed are fewer than those currently present in the system.                                                         |
|            | 239 (-17)       | Backup - logging of the backup on RDI21... failed                              | Perform the reset and repeat backup                                                                                                                                 |
|            | 240 (-16)       | Reset - no backup in RDI21...                                                  | No backup in RDI21...                                                                                                                                               |
|            | 241 (-15)       | Reset - Interruptions relating to impracticable ASN                            | The backup has an impracticable ASN and cannot reset the unit                                                                                                       |
|            | 242 (-14)       | Backup – the backup carried out is contradictory                               | The backup is irregular and cannot be transferred again                                                                                                             |
|            | 243 (-13)       | Backup – the data comparison between the internal microprocessors is irregular | Repeat the reset and backup                                                                                                                                         |
|            | 244 (-12)       | The backup data are incompatible                                               | The backup data are incompatible with the current version of the software; the restoration is not possible                                                          |
|            | 245 (-11)       | Error in access to the parameter Restore_Complete                              | Repeat the reset and backup                                                                                                                                         |
|            | 246 (-10)       | Restoration – time-out during logging in EEPROM                                | Repeat the reset and backup                                                                                                                                         |
|            | 247 (-9)        | The data received are contradictory                                            | The series of backup data is not valid; restoration is not possible                                                                                                 |
|            | 248 (-8)        | The restoration cannot currently be carried out                                | Repeat the reset and backup                                                                                                                                         |
|            | 249 (-7)        | Restoration – interruption caused by inadequate identification of the burner   | The backup has an inadequate identification of the burner and must not be transferred to the flame control                                                          |
|            | 250 (-6)        | Backup – the CRC of a page is not correct                                      | The series of backup data is not valid; restoration is not possible                                                                                                 |
|            | 251 (-5)        | Backup – the identification of the burner is not defined                       | Define the identification of the burner and repeat the backup                                                                                                       |
|            | 252 (-4)        | After restoration, the pages are still in INTERRUPTION                         | Repeat the reset and backup                                                                                                                                         |
|            | 253 (-3)        | The restoration cannot currently be carried out                                | Repeat the reset and backup                                                                                                                                         |
|            | 254 (-2)        | Interruption owing to transmission error                                       | Repeat the reset and backup                                                                                                                                         |
|            | 255 (-1)        | Interruption owing to time-out during the restoration                          | Carry out a reset, check the connections and repeat the backup                                                                                                      |
| 146        | #               | Time-out of the system automation interface                                    | Refer to the Modbus User Documentation (A7541)                                                                                                                      |
|            | 1               | Modbus time-out                                                                |                                                                                                                                                                     |
| 150        | #               | TÜV test                                                                       |                                                                                                                                                                     |

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

| Error code | Diagnostic code | Meaning of the REC 27.100A2 system                                | Recommended measures                                                         |
|------------|-----------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|
| 210        | 0               | The selected operating mode is not released for the standard unit | Select an operating mode released for the standard unit                      |
| 240        | #               | <b>Internal error</b>                                             | Carry out a reset; if the error arises repeatedly, replace the flame control |
| 245        | #               | <b>Internal error</b>                                             | Carry out a reset; if the error arises repeatedly, replace the flame control |
| 250        | #               | <b>Internal error</b>                                             | Carry out a reset; if the error arises repeatedly, replace the flame control |

**Tab. S**

**A Appendix - Accessories****Kit for modulating operation**

| Burner     | Output regulator                                 | Code     |
|------------|--------------------------------------------------|----------|
| All models | RWF 50.2 3-POINT OUTLET                          | 20085417 |
|            | RWF 55.5 COMPLETE WITH RS-485 INTERFACE          | 20074441 |
|            | RWF 55.6 COMPLETE WITH RS-485/PROFIBUS INTERFACE | 20074442 |

| Burner     | Probe              | Adjustment field | Code    |
|------------|--------------------|------------------|---------|
| All models | PT 100 temperature | - 100...+ 500°C  | 3010110 |
|            | 4 - 20 mA pressure | 0...2.5 bar      | 3010213 |
|            | 4 - 20 mA pressure | 0...16 bar       | 3010214 |

**Soundproofing box kit**

| Burner     | Type | dB(A) | Code    |
|------------|------|-------|---------|
| All models | C7   | 10    | 3010376 |

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

| Burner     | Code    |
|------------|---------|
| All models | 3010436 |

**Modbus interface kit**

| Burner     | Model  | Code    |
|------------|--------|---------|
| All models | OCI412 | 3010437 |

**Continuous purging kit**

| Burner     | Code     |
|------------|----------|
| All models | 20074542 |

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

| Burner     | Gas train type | Code    |
|------------|----------------|---------|
| All models | MB - CB        | 3010344 |

**Gas trains in compliance with EN 676**

Please refer to manual.



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

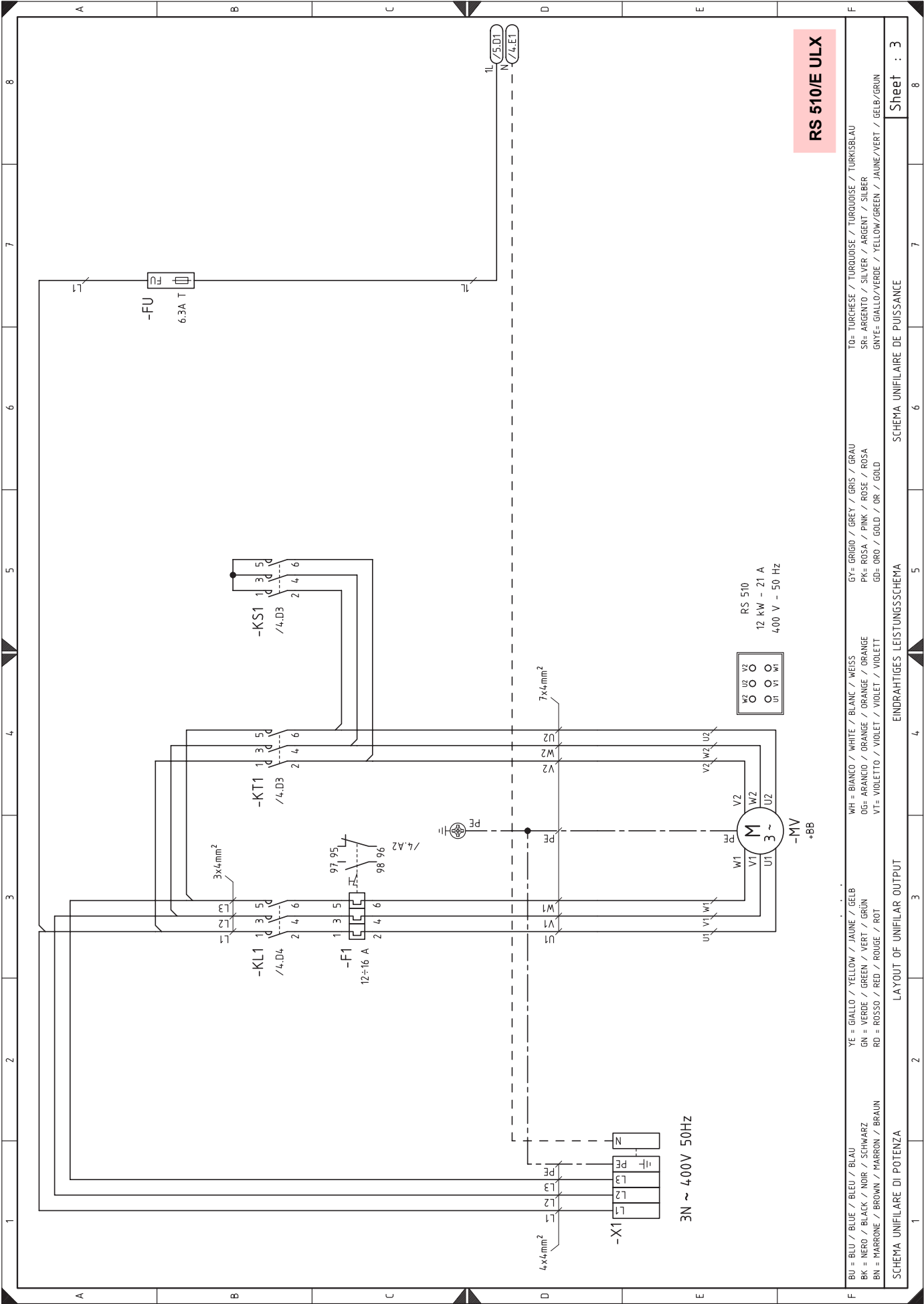
**B Appendix - Electrical panel layout**

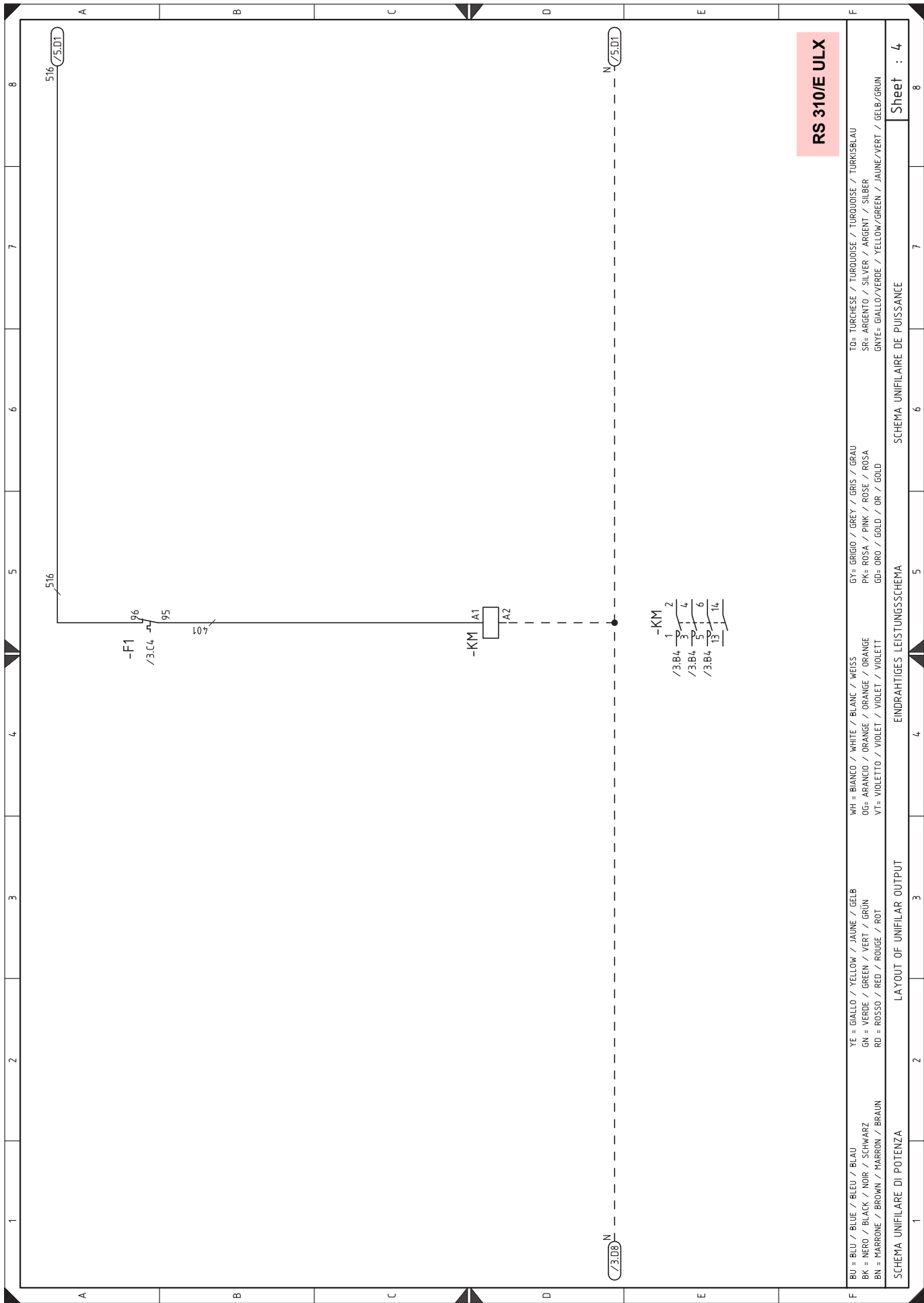
|           |                                                       |
|-----------|-------------------------------------------------------|
| <b>1</b>  | <b>Index of layouts</b>                               |
| <b>2</b>  | Indication of references                              |
| <b>3</b>  | Layout of unifilar output                             |
| <b>4</b>  | Layout of unifilar output                             |
| <b>5</b>  | Layout of unifilar output                             |
| <b>6</b>  | Layout of unifilar output                             |
| <b>7</b>  | Operational layout                                    |
| <b>8</b>  | Operational layout                                    |
| <b>9</b>  | Operational layout                                    |
| <b>10</b> | Electrical connections for power regulator (internal) |
| <b>11</b> | Electrical connections set by installer               |
| <b>12</b> | Electrical connections set by installer               |
| <b>13</b> | Inputs/outputs power regulator                        |

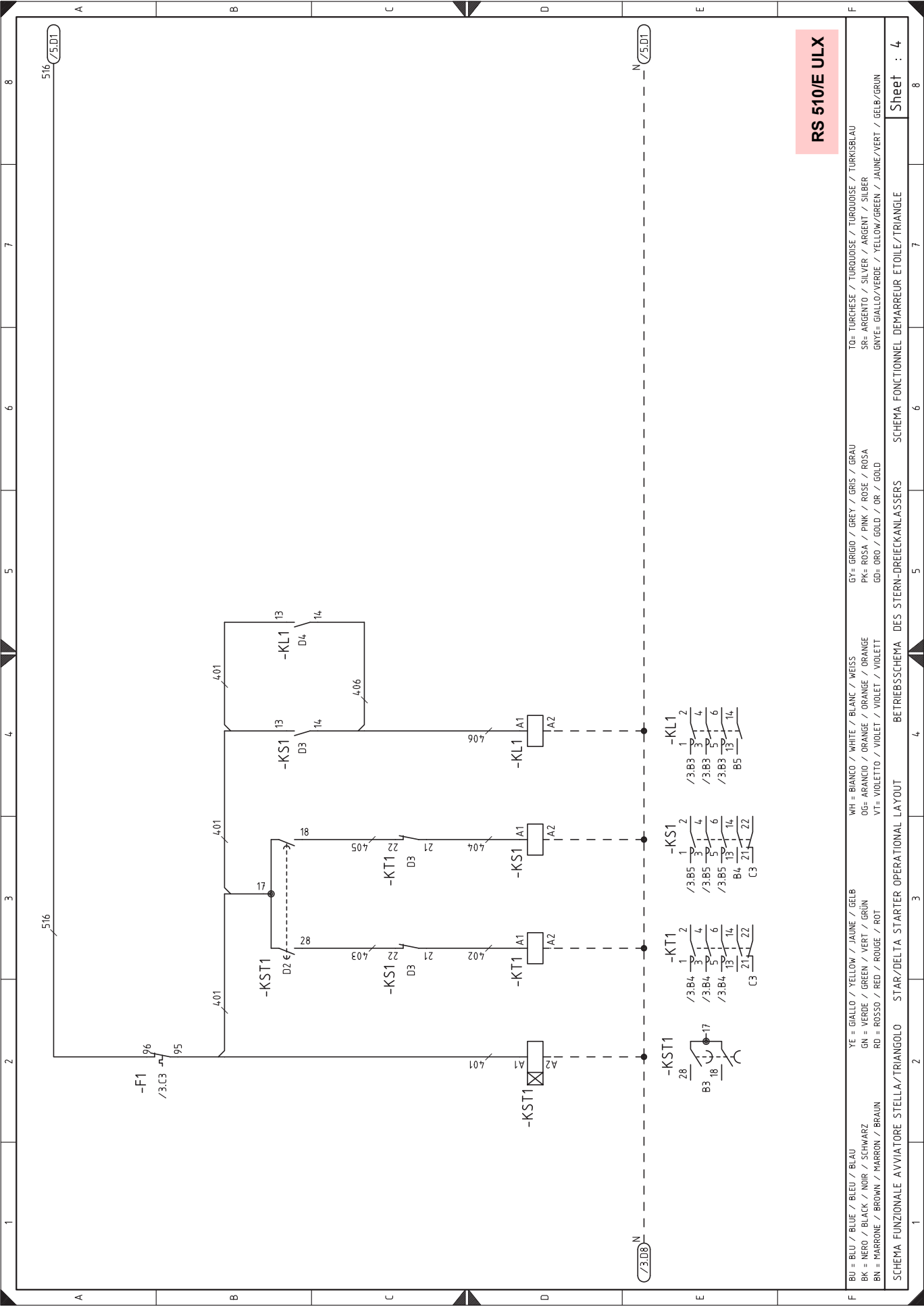
**2 Indication of references**

Sheet no. /1.A1  
 Co-ordinates

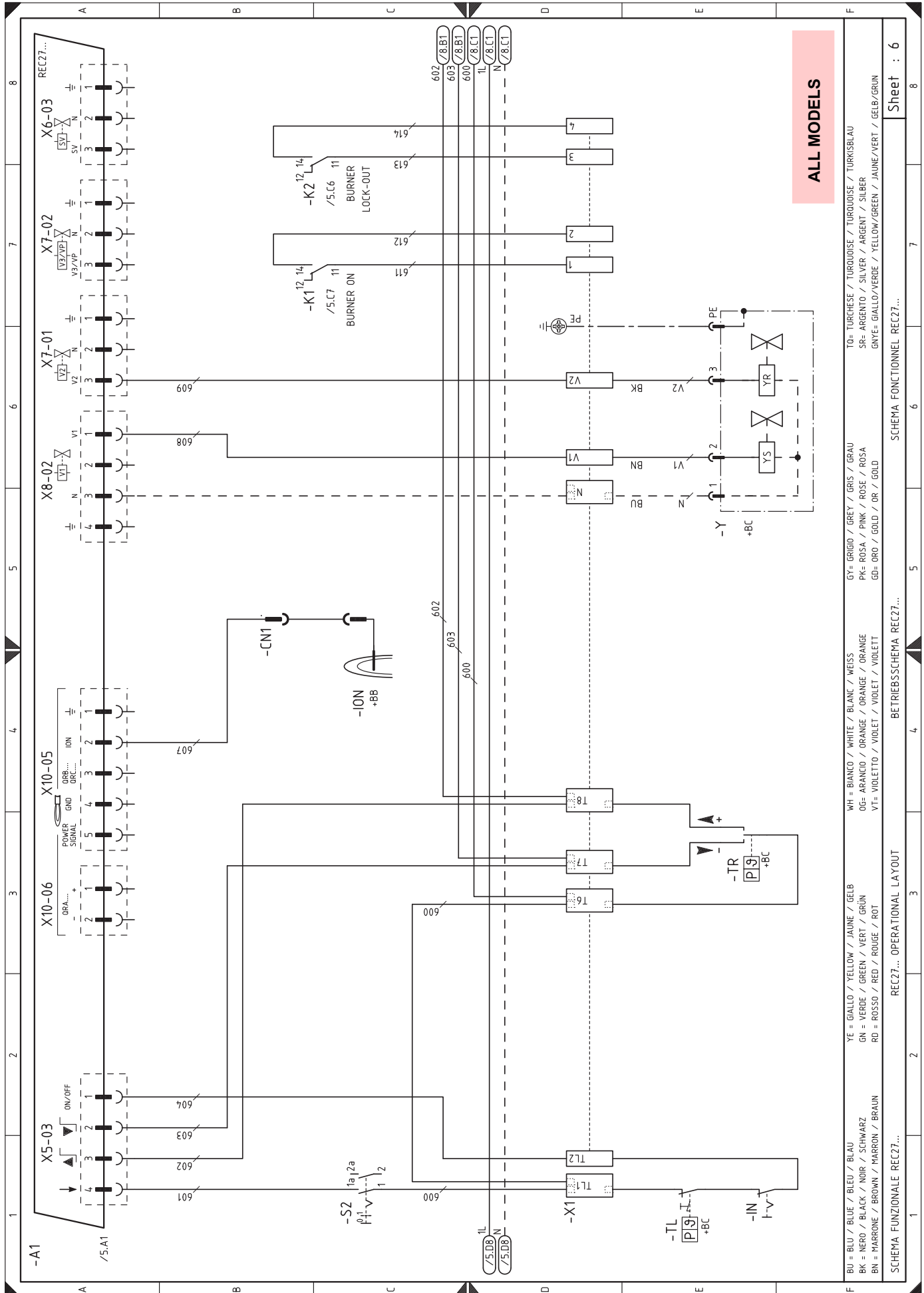


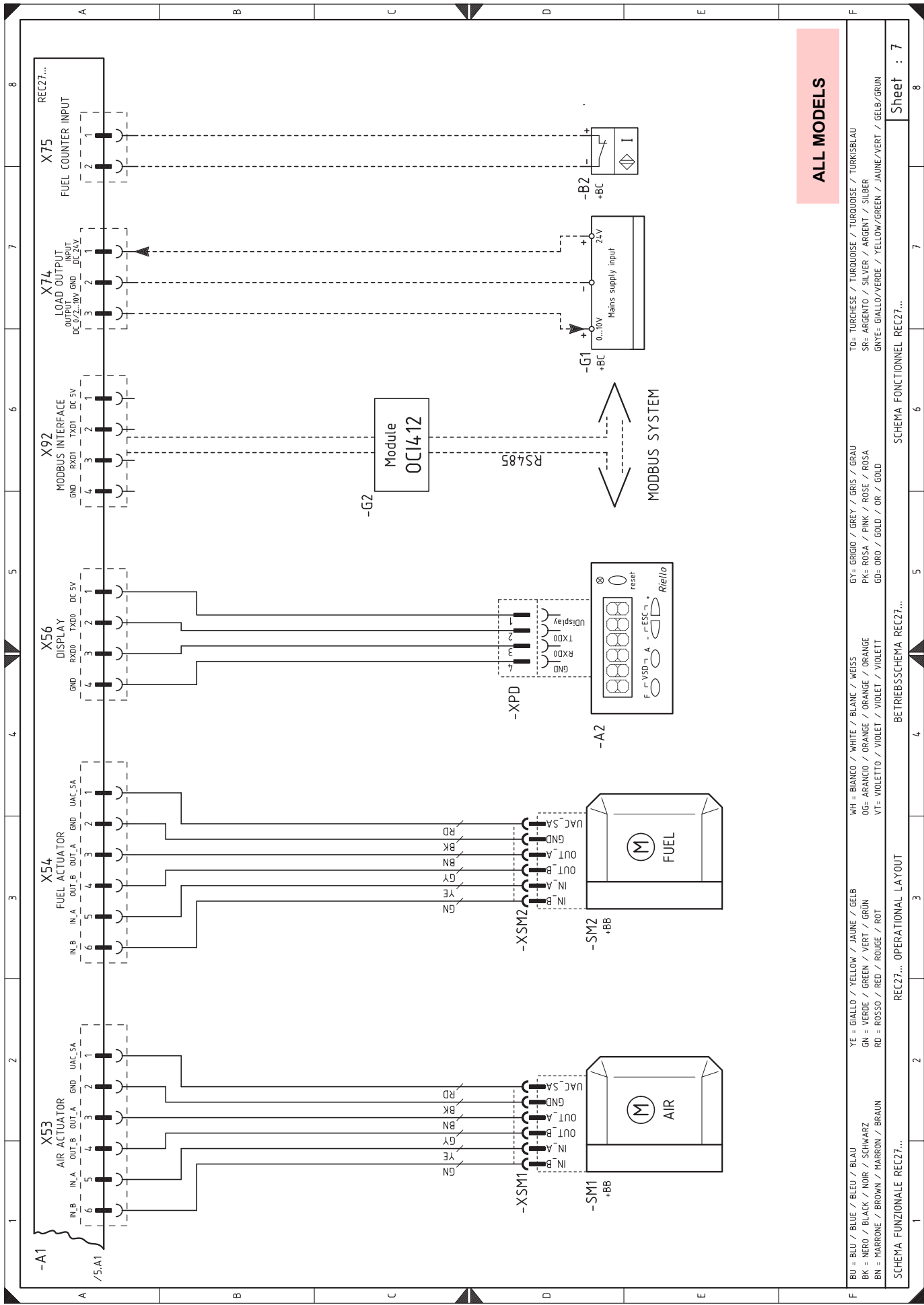


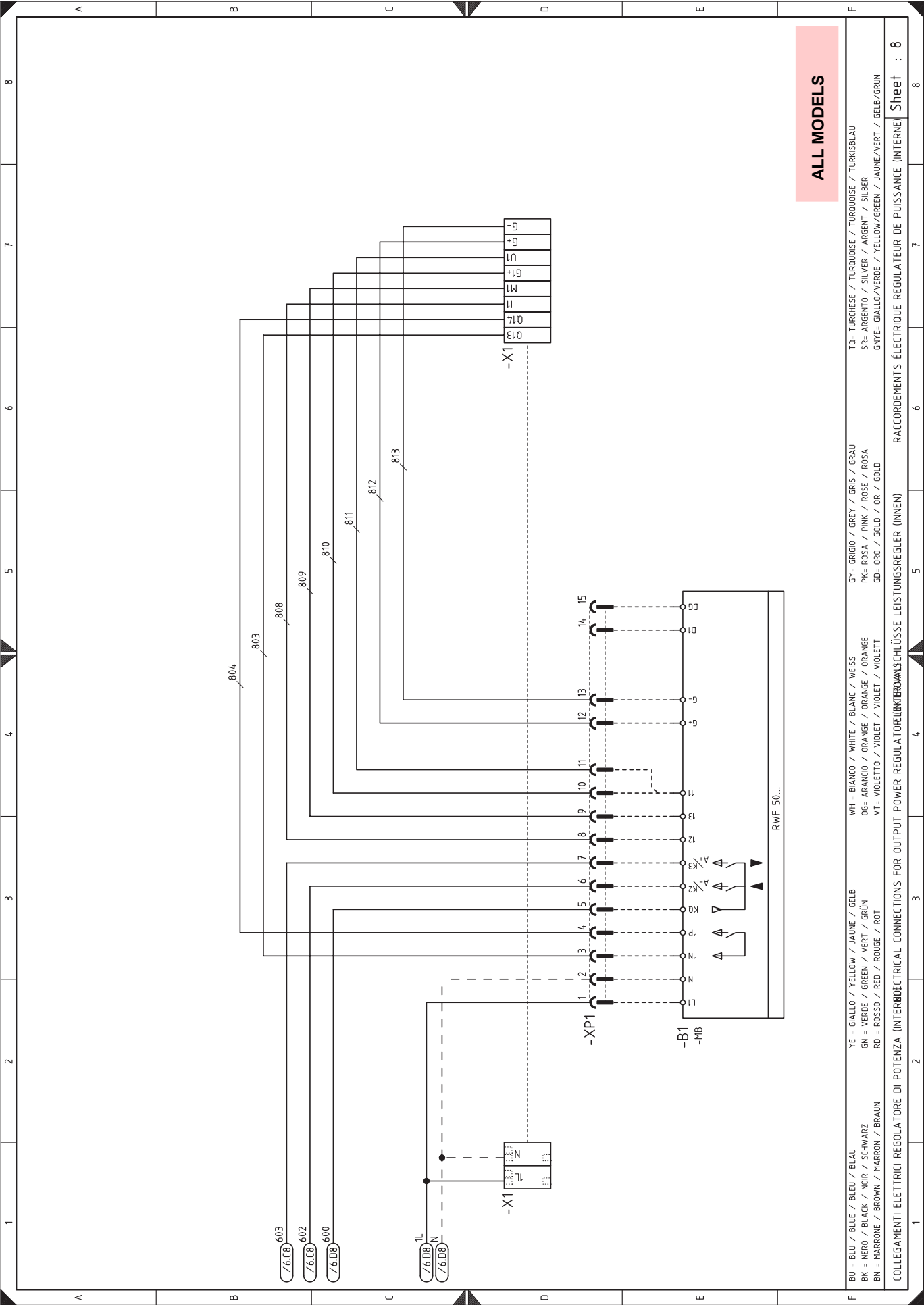






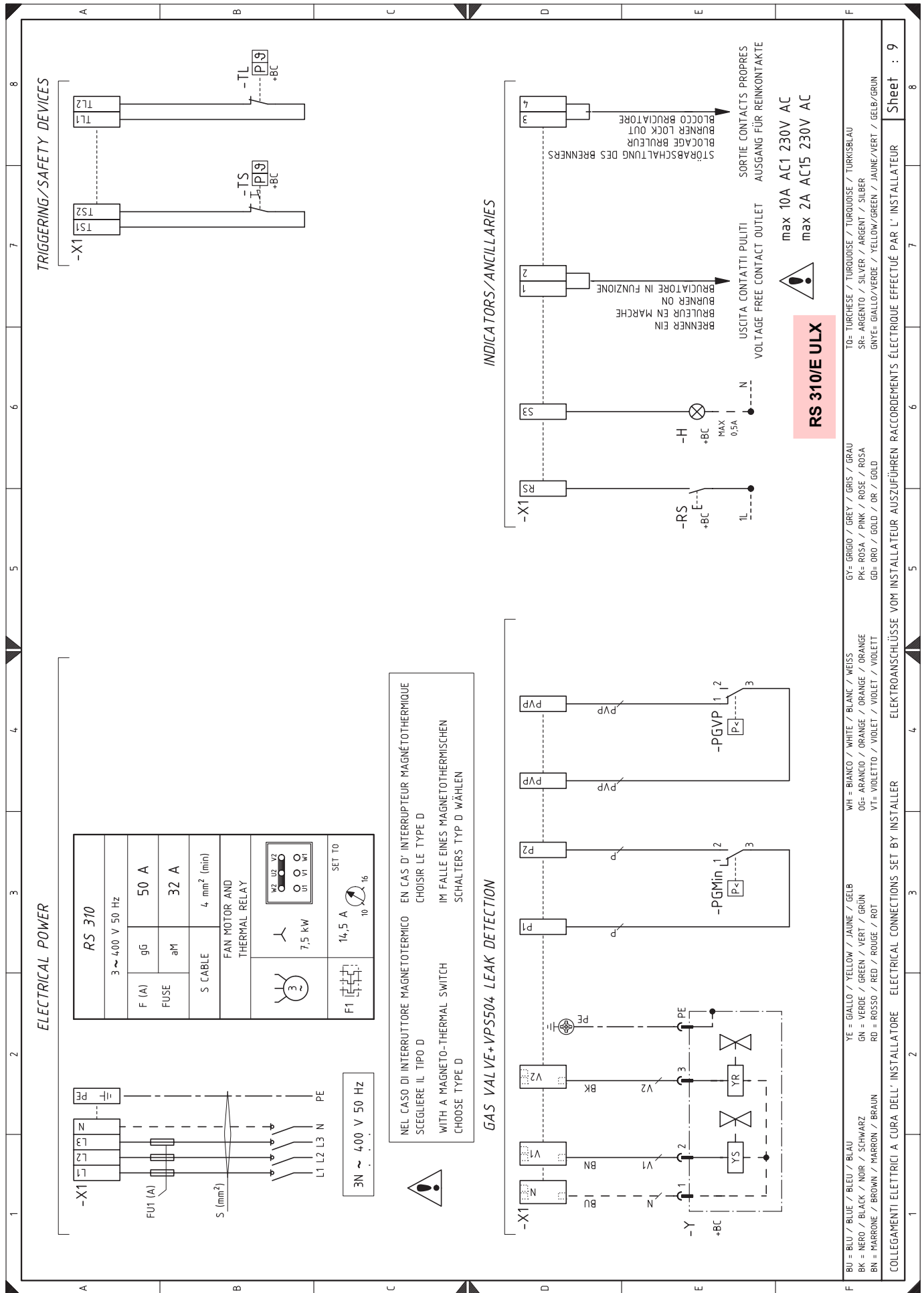




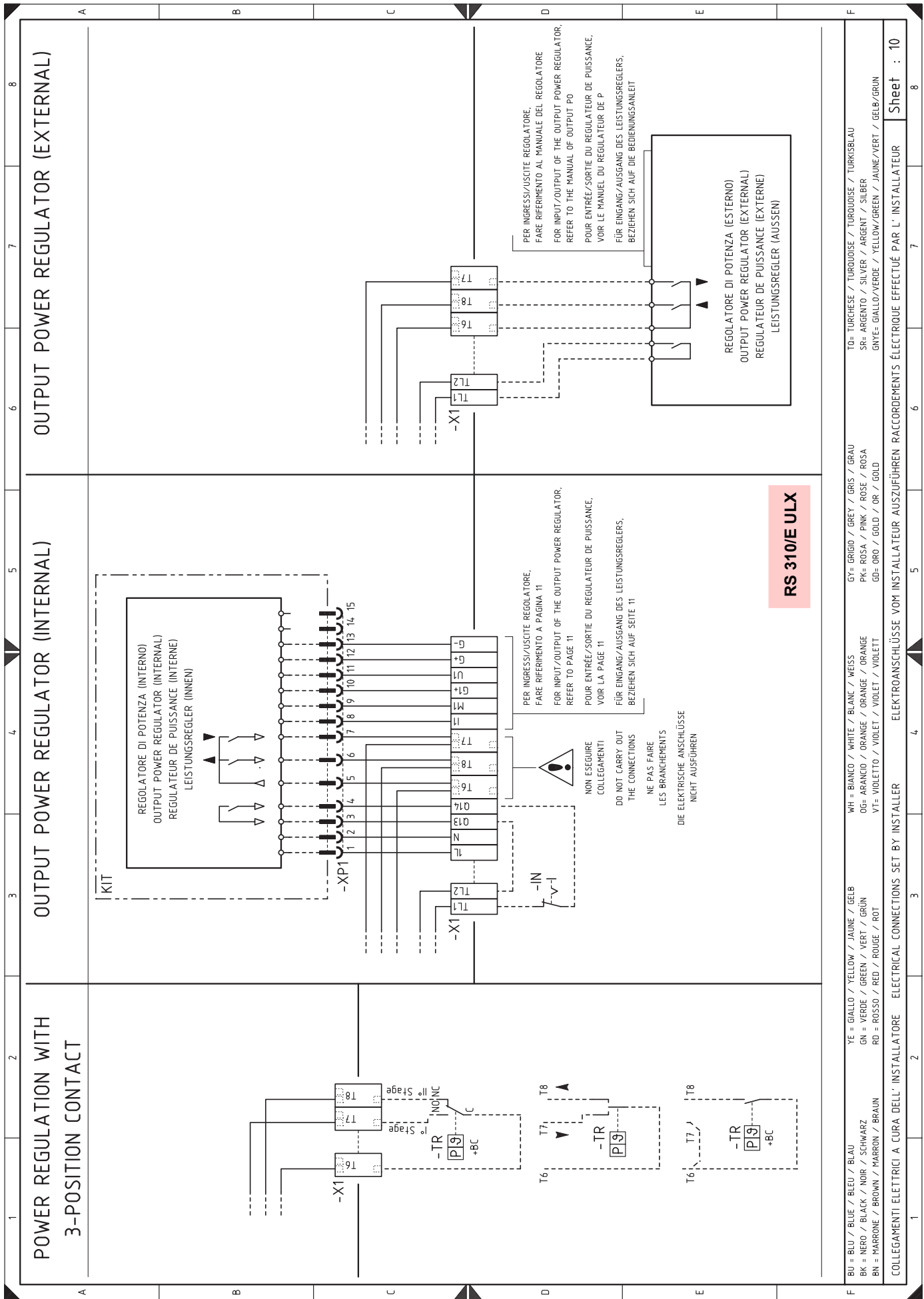


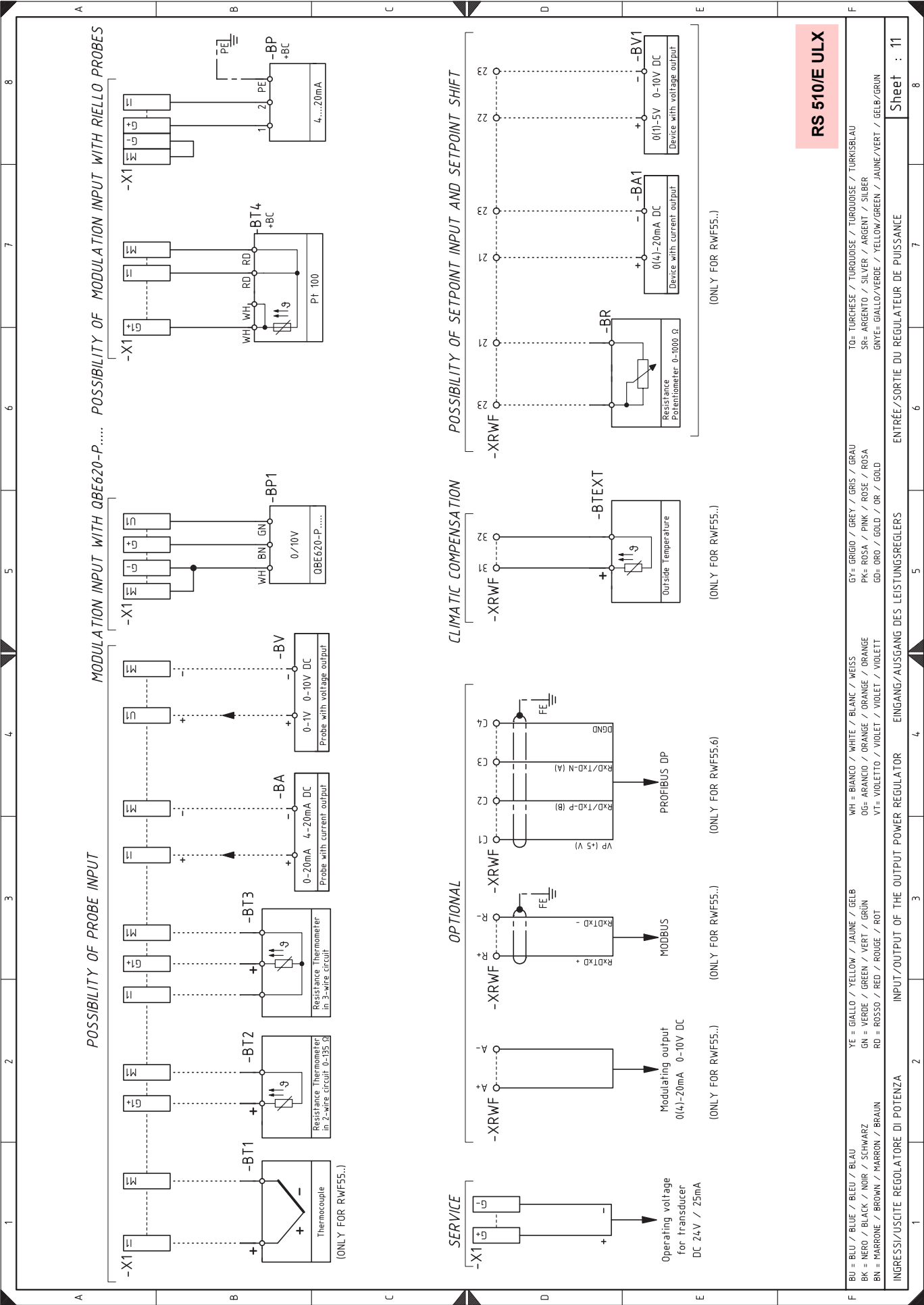
ALL MODELS

|                                                                                                                                                    |                                     |                                          |                                  |                                                            |                                                    |   |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------|----------------------------------|------------------------------------------------------------|----------------------------------------------------|---|---|
| BU = BLU / BLUE / BLEU / BLAU                                                                                                                      | YE = GIALLO / YELLOW / JAUNE / GELB | WH = BIANCO / WHITE / BLANC / WEISS      | GY = GRIGIO / GREY / GRIS / GRAU | TO = TURCHESE / TURQUOISE / TURKISBLAU                     |                                                    |   |   |
| BK = NERO / BLACK / NOIR / SCHWARZ                                                                                                                 | GN = VERDE / GREEN / VERT / GRÜN    | OG= ARANCIO / ORANGE / ORANGE / ORANGE   | PK= ROSA / PINK / ROSE / ROSA    | SR= ARGENTO / SILVER / ARGENT / SILBER                     |                                                    |   |   |
| BN = MARRONE / BROWN / MARRON / BRAUN                                                                                                              | RD = ROSSO / RED / ROUGE / ROT      | VT= VIOLETTO / VIOLET / VIOLET / VIOLETT | GD= ORO / GOLD / OR / GOLD       | GNVE= GIALLO/VERDE / YELLOW/GREEN / JAUNE/VERT / GELB/GRÜN |                                                    |   |   |
| COLLEGAMENTI ELETTRICI REGOLATORE DI POTENZA (INTERELECTRICAL CONNECTIONS FOR OUTPUT POWER REGULATOR) (KRAFTSTROMSCHLÜSSE LEISTUNGSREGLER (INNEN)) |                                     |                                          |                                  |                                                            | RACCORDI ELETTRICI REGOLATORE DI POTENZA (INTERNE) |   |   |
| 1                                                                                                                                                  | 2                                   | 3                                        | 4                                | 5                                                          | 6                                                  | 7 | 8 |
| Sheet : 8                                                                                                                                          |                                     |                                          |                                  |                                                            |                                                    |   | 8 |









**Wiring layout key**

|        |                                                                       |
|--------|-----------------------------------------------------------------------|
| A1     | Flame control                                                         |
| A2     | Display and calibration unit                                          |
| B1     | Output regulator RWF50 internal                                       |
| B2     | Fuel meter                                                            |
| BA     | Probe with output under current                                       |
| BA1    | Device with output under current, for modifying remote setpoint       |
| BP     | Pressure probe                                                        |
| BP1    | Pressure probe                                                        |
| BR     | Remote setpoint potentiometer                                         |
| BT1    | Thermocouple probe                                                    |
| BT2    | Probe Pt100, 2 wires                                                  |
| BT3    | Probe Pt100, 3 wires                                                  |
| BT4    | Probe Pt100, 3 wires                                                  |
| BTEXT  | External probe for climatic compensation of the setpoint              |
| BV     | Output probe in voltage                                               |
| BV1    | Output device in voltage to modify remote setpoint                    |
| F1     | Fan motor thermal relay                                               |
| FU     | Auxiliary circuits safety fuse                                        |
| G1     | Load indicator                                                        |
| G2     | Communication interface for Modbus system                             |
| H      | Burner working lighting signal output                                 |
| IN     | Burner manual stop electric switch                                    |
| ION    | Ionisation probe                                                      |
| KL1    | Star/triangle starter line contactor                                  |
| KT1    | Star/triangle starter triangle contactor                              |
| KS1    | Star/triangle starter star contactor                                  |
| KST1   | Star/triangle starter timer                                           |
| K1     | Clean contacts output relay burner switched on                        |
| K2     | Clean contacts output relay burner lockout                            |
| MV     | Fan motor                                                             |
| PA     | Air pressure switch                                                   |
| PE     | Burner earth                                                          |
| PGMax  | Maximum gas pressure switch                                           |
| PGMin  | Minimum gas pressure switch                                           |
| PGVP   | Gas pressure switch for valve leak detection control device           |
| RS     | Burner reset switch                                                   |
| S2     | ON/OFF selector                                                       |
| SM1    | Air servomotor                                                        |
| SM2    | Gas servomotor                                                        |
| TA     | Ignition transformer                                                  |
| TL     | Limit thermostat/pressure switch                                      |
| TR     | Adjustment thermostat/pressure switch                                 |
| TS     | Safety thermostat/pressure switch                                     |
| Y      | Gas regulator valve + gas safety valve                                |
| X1     | Terminal board for main supply                                        |
| XPD    | Plug for on board display                                             |
| XPGMax | Maximum gas pressure switch connector                                 |
| XPGMin | Minimum gas pressure switch connector                                 |
| XPGVP  | Gas pressure switch connector for valve leak detection control device |
| XRWF   | Terminal board for output power regulator RWF50                       |





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The logo consists of the word "RIELLO" in a bold, red, sans-serif typeface.

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