GB

Dual fuel light oil/ gas burners

Two stage operation

CE

CODE	MODEL	TYPE
3483201	RLS 28	684 T1
20052632	RLS 28	684 T1
3484101	RLS 38	685 T1
20052633	RLS 38	685 T1
3484601	RLS 50	686 T1
20052634	RLS 50	686 T1

20139625 (2) - 09/2018

Translation of the original instructions

1 Declarations

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

Manufacturer:	RIELLO S.p.A.	
Address:	Via Pilade Riello, 7 37045 Legnago (VR)	
Product:	Dual fuel light oil/ gas burners	
Model and type:	RLS 28 RLS 38 RLS 50	684 T1 685 T1 686 T1

These products are in compliance with the following Technical Standards:

EN 676

EN 267

EN 12100

and according to the European Directives:

GAR	2016/426/EU	Gas Appliances Regulation
MD	2006/42/EC	Machine Directive
LVD	2014/35/UE	Low Voltage Directive
EMC	2014/30/EU	Electromagnetic Compatibility

Such products are marked as follows:

CE **CE-0085CT0269**

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

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

Manufacturer:	RIELLO S.p.A. 37045 Legnago (VR) Italy Tel. ++39.0442630111 www.rielloburners.com
Distributed by:	RIELLO NV Ninovesteenweg 198 9320 Erembodegem Tel. (053) 769 030 Fax. (053) 789 440 e-mail. info@riello.be URL. www.riello.be

This document certifies that the series of devices specified below is in compliance with the model described in the EC Declaration of Conformity and has been manufactured and distributed in compliance with the requirements defined in the Legislative Decree of January 8th 2004 and July 17th 2009.

Type of product:	Dual fuel light oil/ gas burners		
Model:	RLS 28 RLS 38 RLS 50		
Regulation applied:	EN 267 and A.R. of January 8th 2004 - July 17th 2009		
Controlling organisation:	Kiwa Gastec Italia S.p.A. Via Treviso, 32/34 31020 San Vendemiano (TV) - Italy		
Values measured:		LIGHT OIL	GAS
	RLS 28	Max. CO: 13 mg/kWh	Max. CO: 16 mg/kWh
		Max. NOx: 113 mg/kWh	Max. NOx: 90 mg/kWh
	RLS 38	Max. CO: 7 mg/kWh	Max. CO: 5 mg/kWh
		Max. NOx: 157 mg/kWh	Max. NOx: 100 mg/kWh
	RLS 50	Max. CO: 9 mg/kWh	Max. CO: 10 mg/kWh
		Max. NOx: 128 mg/kWh	Max. NOx: 104 mg/kWh

Legnago, 21.04.2018

General Manager
RIELLO S.p.A. - Burners Department
Eng. U. Ferretti

Research and Development Director
RIELLO S.p.A. - Burners Department
Eng. F. Comencini

2 Information and general warnings

2.1 Information about the instruction manual

2.1.1 Introduction

The instruction manual supplied with the burner:

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

Symbols used in the manual

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

2.1.2 General dangers

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

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

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

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

2.1.3 Other symbols

DANGER: LIVE COMPONENTS

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

DANGER: FLAMMABLE MATERIAL

This symbol indicates the presence of flammable materials.

DANGER: BURNING

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

DANGER: CRUSHING OF LIMBS

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

WARNING: MOVING PARTS

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

DANGER: EXPLOSION

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

PERSONAL PROTECTION EQUIPMENT

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

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

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

ENVIRONMENTAL PROTECTION

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

IMPORTANT INFORMATION

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

➤ This symbol indicates a list.

Abbreviations used

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

2.1.4 Delivery of the system and the instruction manual

When the system is delivered, it is important that:

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

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

.....

– the address and telephone number of the nearest Assistance Centre

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

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

2.2 Guarantee and responsibility

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

ATTENTION

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

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

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

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

3 Safety and prevention

3.1 Introduction

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

Specifically:

it can be applied to boilers operating with water, steam, diathermic oil, and to other uses expressly named by the manufacturer; the type and pressure of the fuel, the voltage and frequency of the electrical power supply, the minimum and maximum deliveries for which the burner has been regulated, the pressurisation of the combustion chamber, the dimensions of the combustion chamber and the ambient 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.

ATTENTION

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

3.2 Personnel training

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

The user:

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

➤ undertakes to inform his personnel in a suitable way about the application and observance of the safety instructions. With that aim, the user undertakes to ensure that everyone knows the use and safety instructions for his own duties;

➤ Personnel must 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:

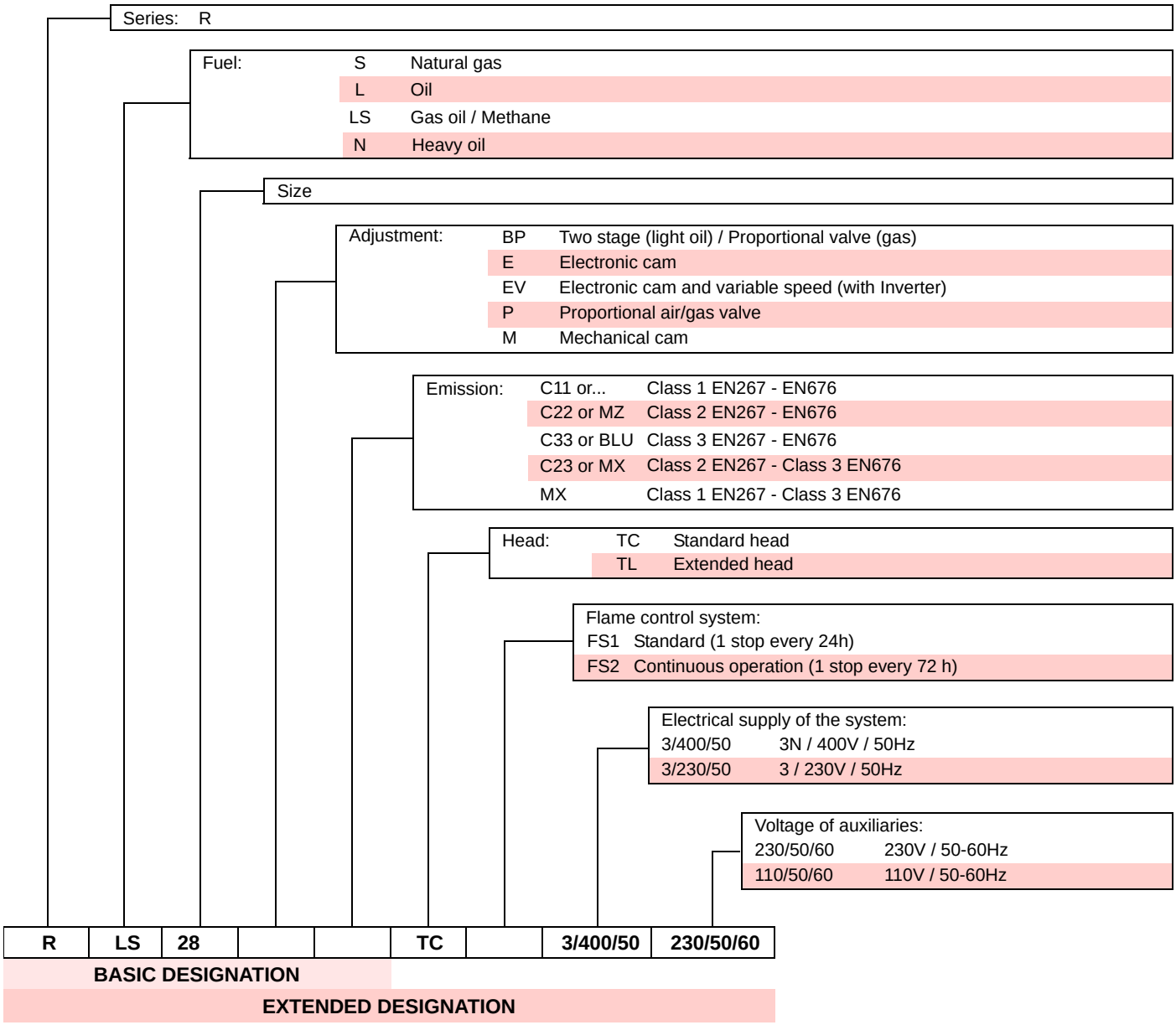
➤ must take all the measures necessary to prevent unauthorised people gaining access to the machine;

➤ 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.

4 Technical description of the burner

4.1 Burner designation



4.2 Models available

Designation		Voltage	Start-up	Code
RLS 28	TC	1/230/50	Direct	3483201
RLS 28	TL	1/230/50	Direct	20052632
RLS 38	TC	1/230/50	Direct	3484101
RLS 38	TL	1/230/50	Direct	20052633
RLS 50	TC	3/230-400/50	Direct	3484601
RLS 50	TL	3/230-400/50	Direct	20052634

4.3 Burner categories - Countries of destination

Country of destination	Gas category
SE - FI - AT - GR - DK - ES - GB - IT - IE - PT - IS - CH - NO	I_{2H}
DE	I_{2ELL}
NL	I_{2L} - I_{2E} - I_2 (43.46 ÷ 45.3 MJ/m^3 (0°C))
FR	I_{2Er}
BE	$I_{2E(R)B}$
LU - PL	I_{2E}

4.4 Technical data

Model			RLS 28	RLS 38	RLS 50
Type			684 T1	685 T1	686 T1
Power (1) Delivery (1)	min - max	kW kg/h	100/163 ÷ 325 8.5/13.7 ÷ 27.4	116/232 ÷ 442 9.8/19.6 ÷ 37.3	145/290 ÷ 581 12.3/24.5 ÷ 49
Fuels			– Light oil, max. viscosity at 20 °C: 6 mm^2/s (1.5 °E - 6 cSt) – Natural gas: G20 (methane) - G25 – LPG - G31 (butane)		
Gas pressure at max. output (2) - Gas: G20/G25/G31		mbar	11/16.2/9.5	13/19.2/12	14/20.8/10.5
Operation			– Intermittent (min. 1 stop in 24 hours) – Two-stage (high and low flame) and one-stage (all - nothing)		
Pump	Output at 12 bar Pressure range Fuel temperature	kg/h bar °C max	67 4 - 18 60		
Nozzles		number	2		
Standard applications			Boilers: water, steam, diathermic oil		
Ambient temperature		°C	0 - 40		
Combustion air temperature		°C max	60		
Noise levels (3)	Sound pressure Sound power	dB(A)	68 79	70 81	72 83
Weight (including packaging)		kg	46 - 48(4)	48 - 50(4)	50 - 52(4)

Tab. A

(1) Reference conditions: Ambient temperature 20°C - Gas temperature 15°C - Barometric pressure 1013 mbar - Altitude 0 m a.s.l.
(2) Pressure at test point 7) (Fig. 4) with zero pressure in 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 output. The sound Power is measured using the "Free Field" method, required by the EN 15036 standard, and according to “Accuracy: Category 3” measurement, as described in EN ISO 3746.
(4) Blast tube: short-long

4.5 Electrical data

Model		RLS 28	RLS 38	RLS 50
Electrical power supply	1 Ph	1 N ~ 230 50 Hz		
Electrical power supply	3 Ph	-	3 ~ 230/400 V +/-10% 50 Hz	
Fan motor	rpm V W A	2800 230 250 2.1	2800 230 420 2.9	2800 230 - 400 650 2.4 - 1.7
Fan motor capacitor	µF	8	12.5	-
Pump motor	rpm V W A	2800 220/240 90 0.8		
Pump motor capacitor	µF	5		
Ignition transformer	V1 - V2 I1 - I2	230 V - 2 x 5 kV 1.9 A - 30 mA		
Max. single-phase electrical supply absorbed electric power Light oil Gas	 W max W max	 750 500	 1000 865	 400 250
Max. three-phase electrical supply absorbed electric power Light oil Gas	 W Max. W Max.	 - -	 - -	 950 950
Protection level		IP 44		

Tab. B

4.6 Maximum dimensions

The dimensions of the burner are given in Fig. 1.

Note that to inspect the combustion head the burner must be moved backward and turned upward. The maximum dimension of the burner, without casing, when open is given by measurement H.

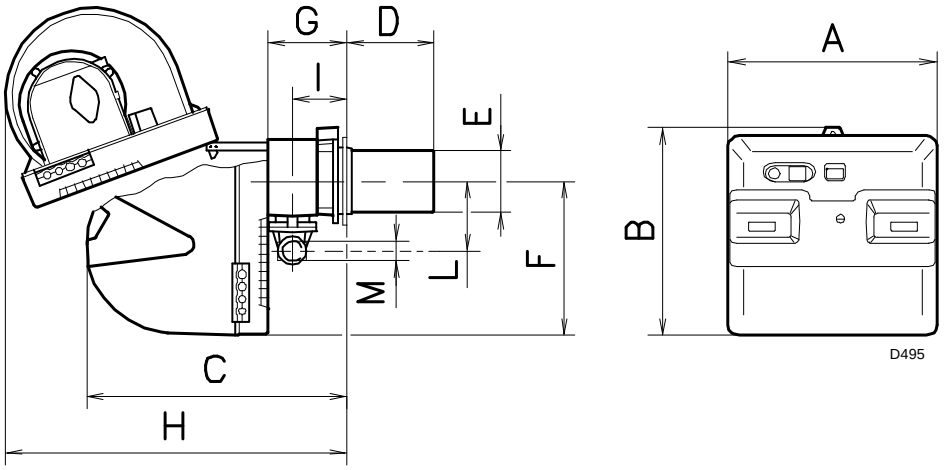


Fig. 1

mm	A	B	C	D(1)	E	F	G	H	I	L	M
RLS 28	476	474	580	191 - 326	140	352	164	810	108	168	1”1/2
RLS 38	476	474	580	201 - 336	152	352	164	810	108	168	1”1/2
RLS 50	476	474	580	216 - 351	152	352	164	810	108	168	1”1/2

Tab. C

(1) Blast tube: short-long

4.7 Burner equipment

Flange for gas train . . . . . No. 1
Seal for flange . . . . . No. 1
Flange fixing screws M 8 x 25 . . . . . No. 4
Thermal flange gasket . . . . . No. 1
Screws to fix the burner flange to the boiler: M 8 x 25 . . . . No. 4
Cable grommets for electrical wiring (RLS 28 and RLS 38 single-phase) . . . . . No. 5
Cable grommets for electrical wiring (RLS 50 three-phase). . . . . No. 5
Flexible hoses . . . . . No. 2
Nipples for flexible hoses with gaskets . . . . . No. 2
Kit for LPG operation . . . . . No. 1
Label for LPG operation. . . . . No. 1
Instruction. . . . . No. 1
Spare parts list . . . . . No. 1

4.8 Firing rates

The burners RLS 28 - 38 - 50 can work in two ways: one-stage or two-stage.

The **MAXIMUM OUTPUT** is chosen within area A (and B for RLS 50)(Fig. 2). To use also area B (RLS 50), the combustion head has to be pre-calibrated as shown on page 18.

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

RLS 28 = 100 kW = 8.5 kg/h

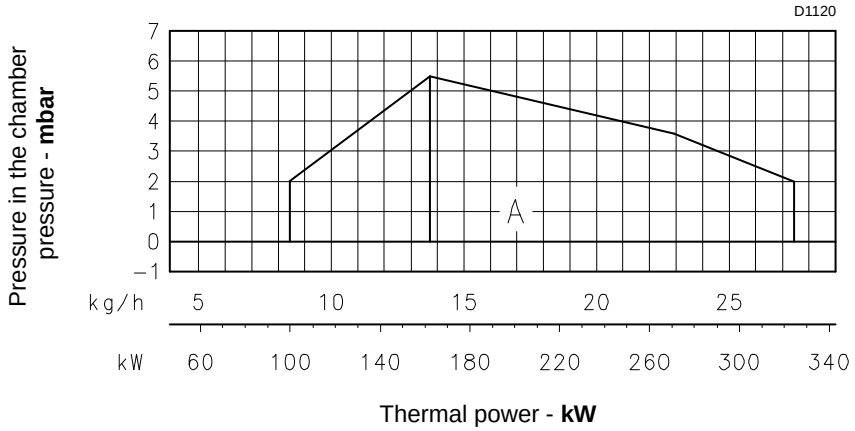
RLS 38 = 116 kW=9.8 kg/h

RLS 50 = 145 KW = 12.3 kg/h

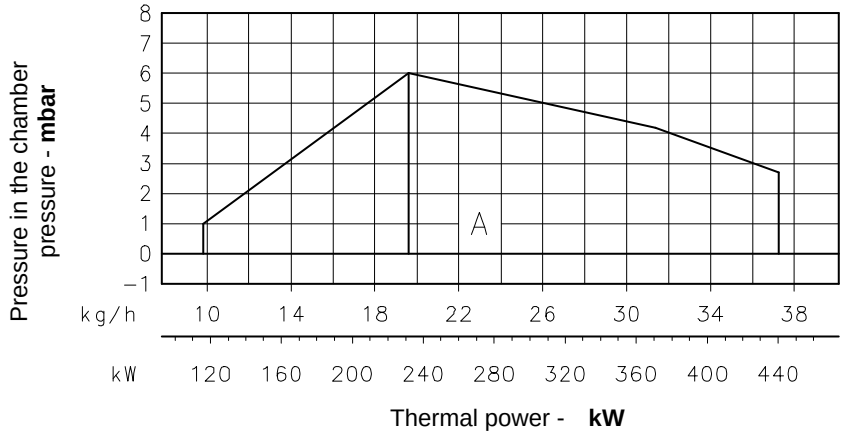
ATTENTION

The firing rate value (Fig. 2) has been obtained considering an ambient temperature of 20 °C, an atmospheric pressure of 1013 mbar (approx. 0 m a.s.l.), and with the combustion head adjusted as shown on page 20.

RLS 28



RLS 38



RLS 50

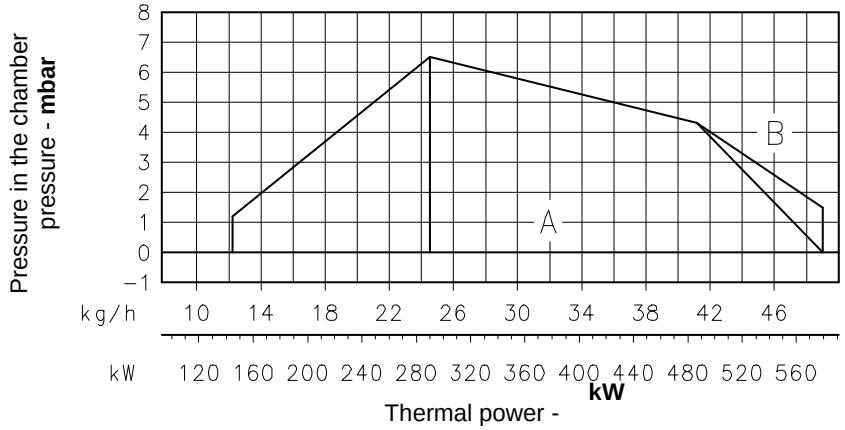


Fig. 2

4.9 Test boiler

The burner/boiler combination does not pose any problems if the boiler is EC approved and its combustion chamber dimensions are similar to those indicated in the diagram (Fig. 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 obtained in special test boilers, according to EN 676 standard.

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

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

MODULATING RATIO

The modulating ratio, obtained in test boilers, according to standard (EN 676 for gas, EN 267 for light oil), is of 4:1 for light oil and 7:1 for gas.

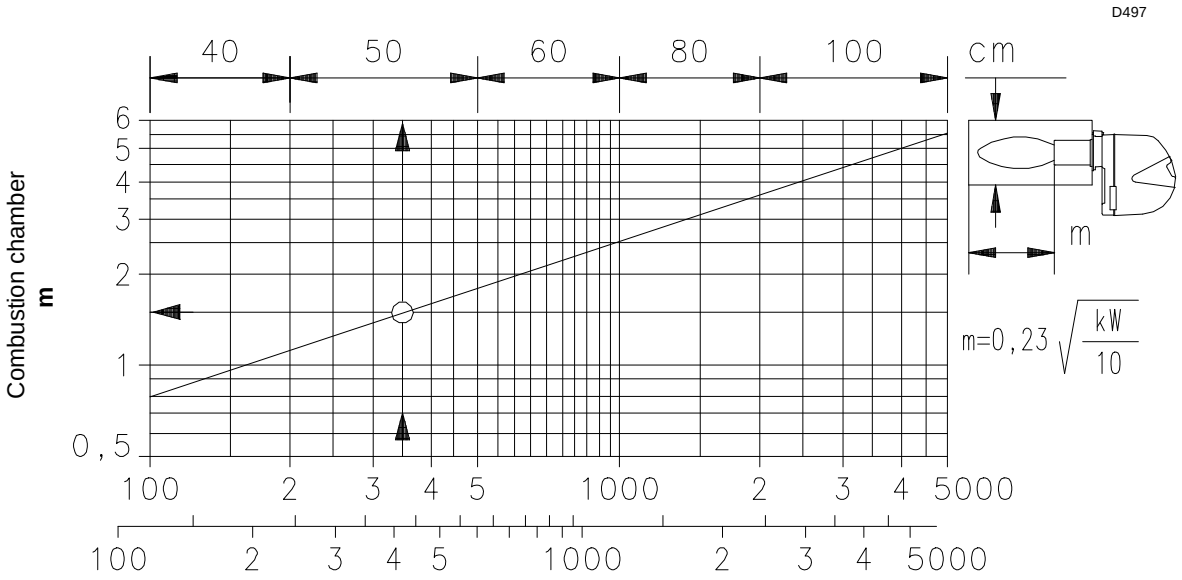


Fig. 3

4.10 Burner description

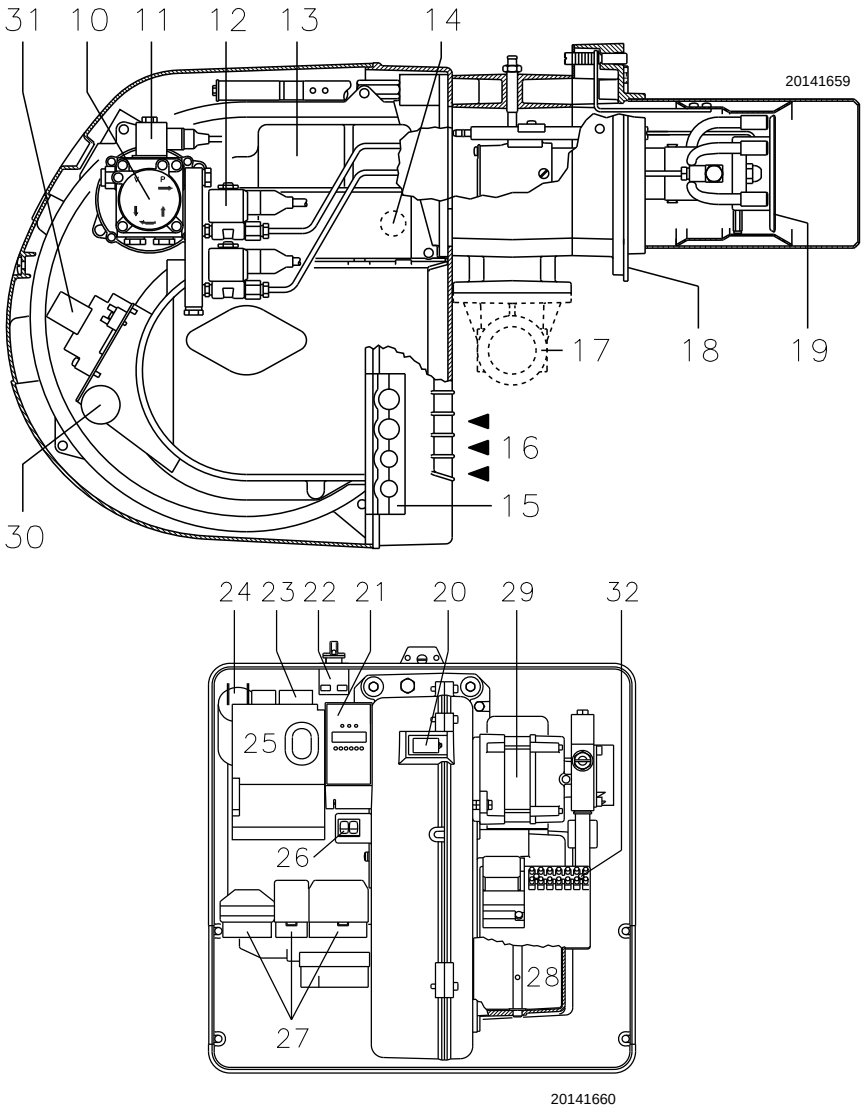


Fig. 4

1 Combustion head
2 Ignition electrodes
3 Screw for combustion head adjustment
4 Pipe coupling
5 Minimum air pressure switch (differential type)
6 Air pressure test point
7 Gas pressure test point and head fixing screw
8 Screw securing fan to sleeve
9 Slide bars for opening the burner and inspecting the combustion head
10 Pump
11 Safety valve
12 1st and 2nd stage valves
13 Servomotor. When the burner is not operating the air gate valve is fully closed in order to reduce heat dispersion from the boiler due to the flue draught which draws air from the fan suction inlet.
14 Flame sensor
15 Plate prearranged for 4 holes for the passage of hoses and electrical cables.
16 Air inlet to fan
17 Gas input pipe
18 Boiler fixing flange
19 Flame stability disc
20 Flame inspection window
21 LED PANEL
22 ON/OFF selector
23 Fan motor contactor and thermal relay with reset button (three-phase RLS 50)
24 Fan motor capacitor (RS 28 - RLS 38)
25 Control box with lockout pilot light and reset button
26 Two electric switches:
– one for “burner off - on”
– one for “1st - 2nd stage operation”
27 Plugs for electrical wiring
28 Air damper
29 Pump motor
30 Pump motor capacitor
31 Change of fuel relay
32 Auxiliary terminal board

Two types of burner lockout may occur:

CONTROL BOX LOCKOUT:

if the control box 25)(Fig. 4) push-button lights up, it indicates that the burner is in lockout.

Press the push button to reset.

MOTOR LOCKOUT (RLS 50 three-phase):

Release by pressing the push button on thermal relay 23)(Fig. 4).

4.11 Control box (LFL1.333...)

Important notes

ATTENTION

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

The control box LFL1.333... 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!

➤ All interventions (assembly and installation operations, assistance, etc.) must be carried out by qualified personnel.
➤ Before modifying the wiring in the LFL1.333 control box connection area, fully disconnect the system from the power supply (omnipolar separation).
➤ Protection against electrocution from the control box and all connected electric components is obtained with the correct assembly.
➤ Before any intervention (assembly and installation operations, assistance, etc.), ensure the wiring is in order and that the parameters are correctly set, then make the safety checks.
➤ Falls and collisions can negatively affect the safety functions. In this case, the control box must not be operated, even if it displays no evident damage.
➤ **Do not press the reset button or the remote reset button of the control box for more than 10 seconds because this will damage the internal relay.**

For safety and reliability, comply with the following instructions:
– Avoid conditions that can favour the development of condensate and humidity. Otherwise, before switching on again, make sure that the entire control box is perfectly dry!
– Static charges must be avoided since they can damage the control box's electronic components when touched.

Use

The LFL1.333 control box is a control and supervision system of medium and large capacity forced draft burners for intermittent operation (at least one controlled shutdown every 24 hours).

Installation notes

- Check the electrical wiring inside the boiler complies with the national and local safety regulations.
- Do not confuse the powered conductors with the neutral ones.
- Ensure that spliced wires cannot get into contact with neighbouring terminals. Use adequate ferrules.
- Arrange the H.V. ignition cables separately, as far as possible from the control box and the other cables.
- When wiring the unit, make sure that AC 230 V mains voltage cables are run strictly separate from extra low-voltage cables to avoid risks of electrical shock hazard.

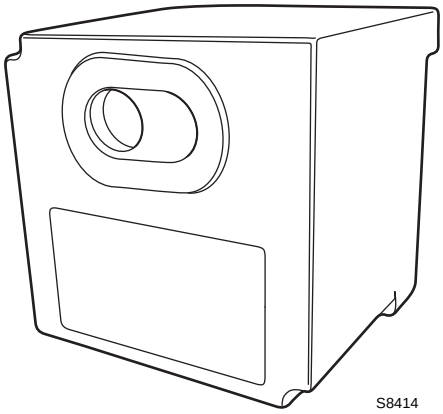


Fig. 5

Electrical wiring of the flame detector

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

- Always separate the detector cables from the other cables:
  – The capacitive reactance of the line reduces the size of the flame signal.
  – Use a separate cable.
- Respect the allowed cable lengths.
- The ionisation probe is not protected against the risk of electrocution. When connected to the electricity supply, the ionisation probe must be protected against any accidental contact.
- Position the ignition electrode and the ionisation probe so that the ignition spark cannot form an arc on the probe (risk of electric overcharge).

Technical data

Mains voltage	AC 230 V -15 % / +10 %
Mains frequency	50 / 60 Hz ±6 %
Fuse (Internal)	T6.3H250V
Primary fuse (external)	max. 10 A
Weight	approx. 1 kg
Power absorption	approx. AC 3.5 VA
Protection level	IP40
Safety class	II
Input current at terminal 1	max. 5 A continuous (peaks of 20 A / 20 ms)
Load on the control terminals	max. 4 A continuous (peaks of 20 A / 20 ms)
Environmental conditions	
Operation Climatic conditions Mechanical conditions Temperature range Humidity	DIN EN 60721-3-1 Class 1K3 Class 1M2 -20...+60°C < 95% RH

Tab. D

4.12 Servomotor (LKS 210 ...)

Important notes

ATTENTION

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

Avoid opening, modifying or forcing the actuators.

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

Assembly notes

- Check the relevant national safety standards are respected.
- When assembling the servomotor and connecting the damper, the gears can be disengaged by means of a lever, allowing the drive shaft to be easily adjusted in both directions of rotation.

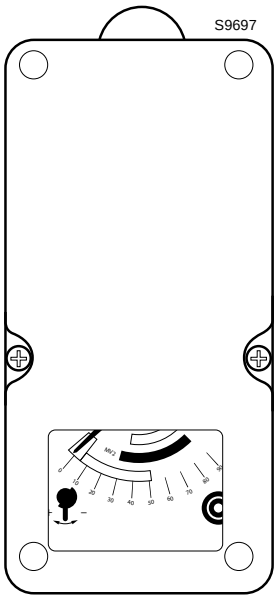


Fig. 6

Technical data

MODEL	LKS 210 - 08
Operating voltage	200-240V - 50/60 Hz
Switching capacity of auxiliary and limit switches	10 A/ 250V
Opening time	0-90°, 5 sec.
Firing angle	0 - 90°
Torque	1.5 Nm
Rotation direction	Clockwise
Weight	0.7 kg
Protection level	IP 44

Tab. E

5 Installation

5.1 Notes on safety for the installation

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

DANGER

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

ATTENTION

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

DANGER

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

5.2 Handling

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

ATTENTION

Burner handling operations can be highly dangerous if not carried out with the greatest attention: distance unauthorised personnel, check integrity and suitability of the means available.
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).
During the handling, keep the load at not more than 20-25 cm from the ground.

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

CAUTION

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

5.3 Preliminary checks

Checking the consignment

CAUTION

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

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

Checking the characteristics of the burner

Check the identification label of the burner, showing:
- ➤ the model (**A**)(Fig. 7) and type of burner (**B**);
- ➤ the year of manufacture, in cryptographic form (**C**);
- ➤ the serial number (**D**);
- ➤ the data for electrical supply and the protection level (**E**);
- ➤ the 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**).
- ➤ light oil maximum viscosity (**L**).

D9243

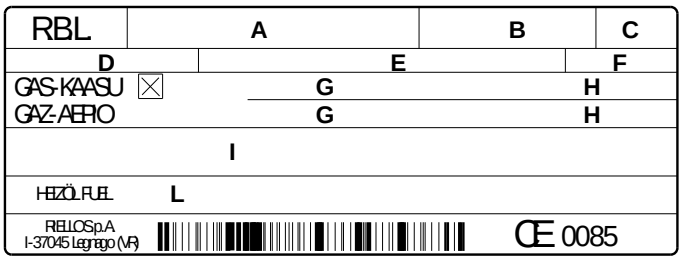


Fig. 7

ATTENTION

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

5.4 Operating position

ATTENTION

- The burner is set up to operate only in positions **1, 2, 3** and **4** (Fig. 8).
- 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** are forbidden for safety reasons.

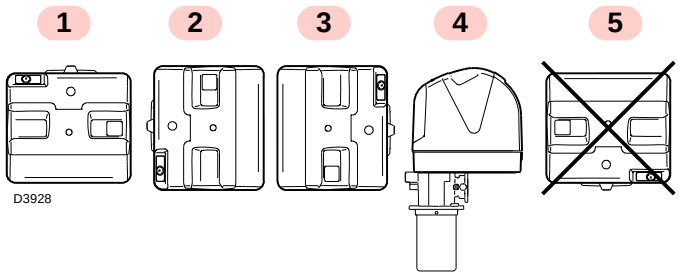


Fig. 8

5.5 Preparing the boiler

5.5.1 Boring the boiler plate

Pierce the closing plate of the combustion chamber, as in Fig. 9.

The position of the threaded holes can be marked using the thermal insulation screen supplied with the burner.

mm	A	B	C
RLS 28	160	224	M 8
RLS 38	160	224	M 8
RLS 50	160	224	M 8

Tab. F

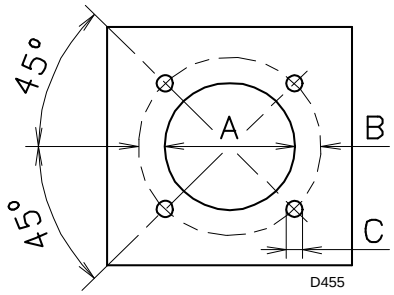


Fig. 9

5.5.2 Blast tube length

The length of the blast tube must be selected according to the indications provided by the manufacturer of the boiler, and in any case it must be greater than the thickness of the boiler door complete with its fettling. The range of lengths available, L (mm), is as follows:

mm	RLS 28	RLS 38	RLS 50
Standard	191	201	216
Elongated	326	336	351

Tab. G

For boilers with front flue passes 13) or flame inversion chamber, a protection in refractory material 11) must be inserted between the boiler fettling 12) and the blast tube 10).

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

For boilers with a water-cooled front piece, a refractory lining 11)-12)(Fig. 10) is not necessary, unless expressly requested by the boiler manufacturer.

5.5.3 Securing the burner to the boiler

Provide an adequate lifting system.

- Separate the combustion head from the rest of the burner (Fig. 10):
- disconnect the light oil pipes unscrewing the two unions 4).
- remove screw 14) and extract the cover 15).
- remove screws 2) from the two slide bars 3).
- remove screw 1) and pull the burner back on slide bars 3) by about 100 mm.
- Disconnect the wires of the electrodes and then pull the burner completely off the slide bars, after removing the split pin from the slide bar 3).

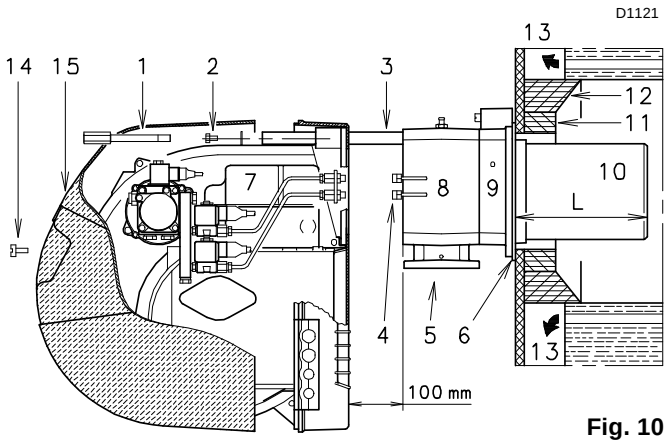


Fig. 10

ATTENTION

The seal between burner and boiler must be airtight.

5.6 Access to head internal part

In order to reach inside the combustion head (Fig. 11) proceed as follows:

➤ remove the screw 1) and the internal part 2).

Be careful as some drops of fuel may leak out during this phase.

5.6.1 Combustion head pre-calibration

For the **RLS 50** model, check whether the maximum output of the burner in the 2nd stage is within area **A** or in area **B** of the firing rate. See "Firing rates" on page 11.

– If it is in area A, no intervention is required.
– However, if it is in area B:

➤ Loosen the screws 1)(Fig. 12) and disassemble the blast tube 2);

➤ Move the fixing point of the rod 3)(Fig. 12) from position **A** to position **B**, thereby drawing back the shutter 4);

➤ Reassemble the blast tube 2)(Fig. 12) and the screws 1)

Once this operation (if necessary) has been carried out, fix the flange 9)(Fig. 10 on page 17) to the boiler plate, interposing the insulating gasket 6)(Fig. 10 on page 17) supplied. Use the 4 screws supplied with the unit, after protecting the thread with anti-locking product. The seal between burner and boiler must be air-tight.

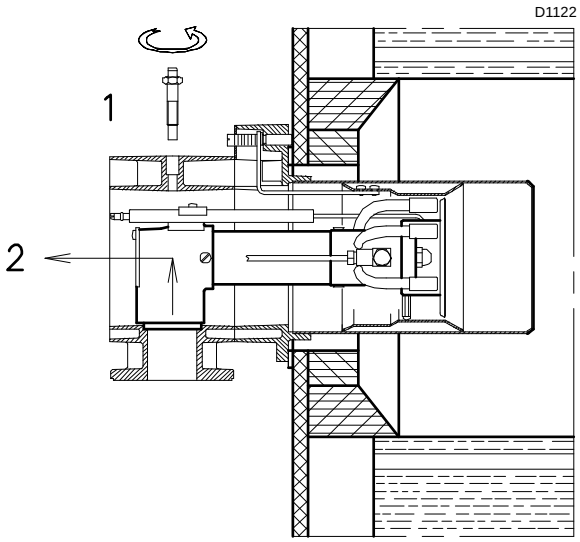


Fig. 11

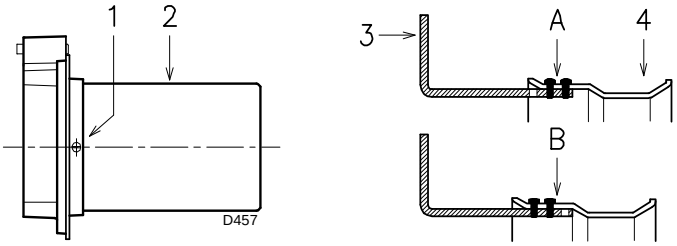


Fig. 12

5.7 Electrode positions

ATTENTION

Check that the electrodes are positioned correctly, as in Fig. 13, complying with the dimensions indicated.

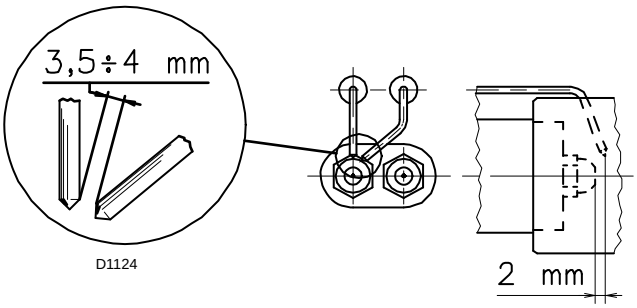


Fig. 13

5.8 Nozzle installation

The burner complies with the emission requirements of the EN 267 standard. In order to guarantee that emissions do not vary, recommended and/or alternative nozzles specified by Riello in the Instruction and warning booklet should be used.

ATTENTION

It is advisable to replace the nozzle once a year during periodical maintenance.

CAUTION

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

The manufacturing Company shall not be liable for any such damage arising from non-observance of the requirements contained in this manual.

- Remove the screw 1) and the internal part 2)(Fig. 14).
- Assemble the two nozzles with the socket spanner 1)(A Fig. 15) (16mm), after removing the plastic plugs 2)(A Fig. 15), passing from the central opening of the flame stability disc. Alternatively, loosen the screws 1)(B Fig. 15), remove the disc 2)(B Fig. 15), and replace the nozzles using the spanner 3)(B Fig. 15).
- The nozzle for the 1st stage of operation is the one beneath the ignition electrodes, Fig. 13 on page 18.

ATTENTION

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

- Refit the burner 4)(Fig. 16) on the slide bars 3) at about 100 mm from the pipe coupling 5), burner in the position shown in Fig. 10 on page 17.
- Insert the electrode cables and then slide the burner up to the pipe coupling, the burner in the position indicated in Fig. 16.
- Refit screws 2)(Fig. 16) on slide bars 3).
- Fix the burner to the pipe coupling with the screw 1) and put back the split pin in one of the two slide bars 3)(Fig. 16).
- Reconnect the light oil pipes by screwing the two fittings 4)(Fig. 10 on page 17).

ATTENTION

On closing the burner on the two guides it is advisable to gently pull the high voltage wires outwards until they are under slight tension.

5.8.1 Recommended nozzle

Both nozzles must be chosen from among those listed in table (Tab. H).

The first nozzle determines the delivery of the burner in the 1st stage.

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

The deliveries of the 1st and 2nd stages have to be within the value range indicated Tab. A on page 8.

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

In general both nozzles have the same delivery.

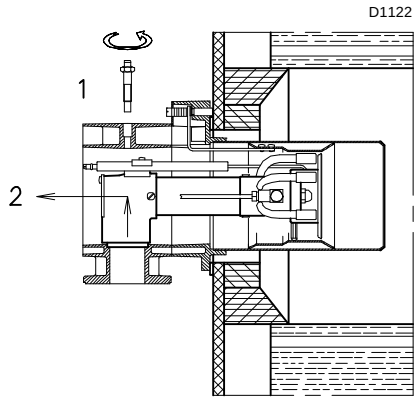


Fig. 14

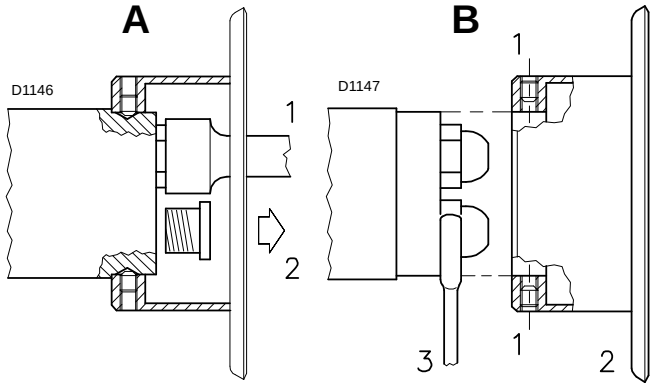


Fig. 15

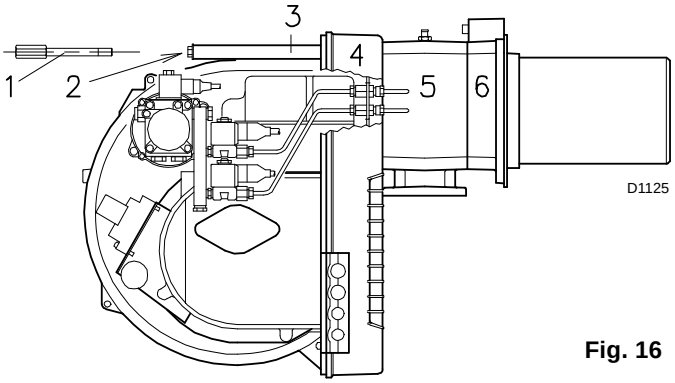


Fig. 16

60	GPH	Kg/h			kW
		10 bar	12 bar	14 bar	12 bar
RLS 28	2.00 2.25 2.50 3.00 3.50	7.7 9.6 8.6 11.5 13.5	8.5 9.5 10.6 12.7 14.8	9.2 10.4 11.5 13.8 16.1	100.8 112.7 125.7 150.6 175.5
RLS 38	2.50 3.00 3.50 4.00 4.50 5.00	9.6 11.5 13.5 15.4 17.3 19.2	10.6 12.7 14.8 17.0 19.1 21.2	11.5 13.8 16.1 18.4 20.7 23.0	125.7 150.6 175.5 201.6 226.5 251.4
RLS 50	3.00 3.50 4.00 4.50 5.00 5.50 6.00	11.5 13.5 15.4 17.3 19.2 21.1 23.1	12.7 14.8 17.0 19.1 21.2 23.3 25.5	13.8 16.1 18.4 20.7 23.0 25.3 27.7	150.6 175.5 201.6 226.5 251.4 276.3 302.4

Tab. H

5.9 Combustion head adjustment

5.9.1 Adjustments prior to ignition (with light oil)

The adjustment of the combustion head depends only on the maximum output of the burner in the 2nd stage.

➤ Turn the screw 5)(Fig. 17) until the notch indicated by the diagram (Fig. 18) corresponds with the front part of the flange 6)(Fig. 17).

Example burner RLS 38:

burner output in 2nd stage = 30 kg/h.

➤ The diagram (Fig. 18) shows that for this output, the adjustment of the combustion head is carried out on the notch 4, as in Fig. 17.

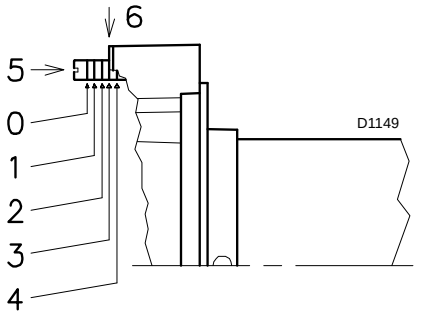


Fig. 17

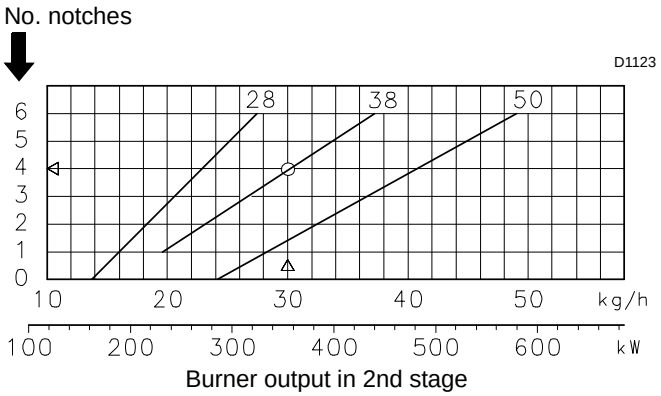


Fig. 18

Pump adjustment

No adjustment of gas delivery is required.

The pump leaves the factory set at 12 bar, a pressure to be checked and eventually modified after the burner has been started. In this phase, therefore, limit to apply a pressure gauge on the specific pump connector.

Fan damper adjustment

For the initial ignition, leave the factory setting for the 1st and 2nd stages.

5.10 Light oil supply

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

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel shut-off valve is closed before performing any operation on the burner.

ATTENTION

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

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

Tank higher than burner A (Fig. 19)
The distance "P" must not exceed 10 meters in order to avoid subjecting the pump's seal to excessive strain; the distance "V" must not exceed 4 meters in order to permit pump self-priming even when the tank is almost completely empty.

Tank lower than burner B (Fig. 19)
Pump depression values higher than 0.45 bar (35°cm°Hg) must not be exceeded. Because at higher levels gas is released from the fuel; the pump becomes noisy and its lifetime is shortened.
It is good practice to ensure that the return and suction lines enter the burner from the same height; the suction line is more difficult to disconnect.

5.10.1 Loop circuit

The loop circuit is composed of a duct starting from the tank and going back to it, in which an auxiliary pump makes the pressurised fuel flow. A branch from the loop supplies the burner.

This circuit is extremely useful whenever the burner pump does not succeed in self-priming because the tank distance and/or height difference are higher than the values listed in Tab. I.

+/- H [m]	**L** [m] **Ø** [mm]		
	8	10	12
4.0	35	90	152
3.0	30	80	152
2.0	26	69	152
1.0	21	59	130
0.5	19	53	119
0	17	48	108
-4.0	-	6	20
-3.0	4	16	42
-2.0	9	27	64
-1.0	13	37	86
-0.5	15	43	97

Tab. I

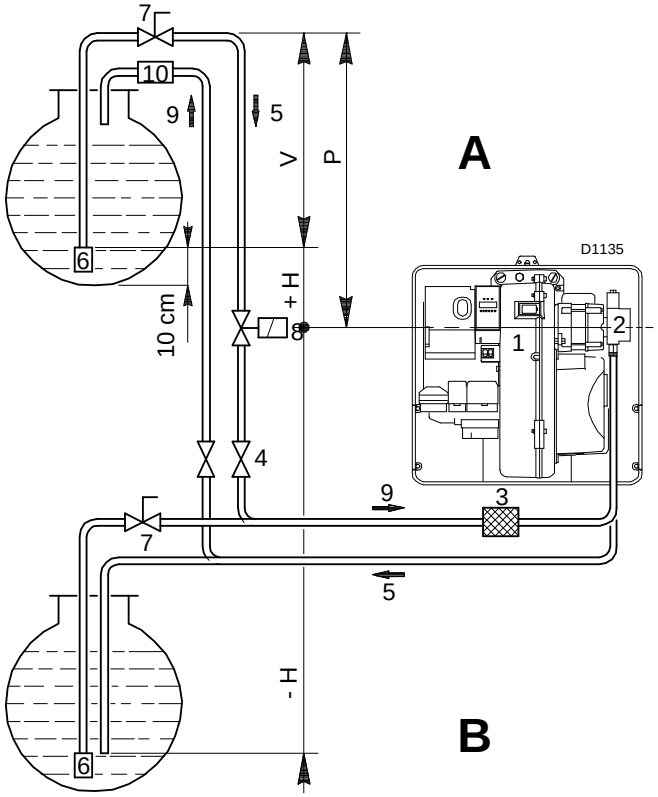


Fig. 19

Key (Fig. 19)

H = Pump/Foot valve height difference
L = Piping length
Ø = Inside pipe diameter
1 = Burner
2 = Pump
3 = Filter
4 = Manual on/off valve
5 = Suction line
6 = Foot valve
7 = Quick closing manual valve with remote control (Italy only)
8 = On/off solenoid valve (Italy only)
9 = Return line
10 = Check valve (Italy only)

5.10.2 Hydraulic connections

CAUTION

➤ Make sure that the hoses to the pump supply and return line are installed correctly.

The pumps are equipped with a by-pass that connects return line with suction line. They are installed on the burner with the by-pass closed by screw 6)(Fig. 20).

It is therefore necessary to connect both hoses to the pump. The pump will break down immediately if it is run with the return line closed and the by-pass screw inserted.

Remove plugs from suction and return connectors of the pump.

Insert the hose connections with the supplied seals into the connections and screw them down.

ATTENTION

During the installation, hoses must not be stressed with twisting.

Pass the flexible hoses through the holes of the plate, preferably on the right, Fig. 21:

➤ loosen the screws 1),
➤ divide the insert piece into its two parts 2) and 3) and remove the thin diaphragm blocking the two passages 4).
➤ Place the pipes so that they are not crushed or are in contact with hot parts of the boiler and so it is possible to open the burner.
➤ Connect, finally, the other end of the flexible hoses to the suction line and return line ducts by nipples supplied with the equipment.

5.10.3 Hydraulic circuit diagram

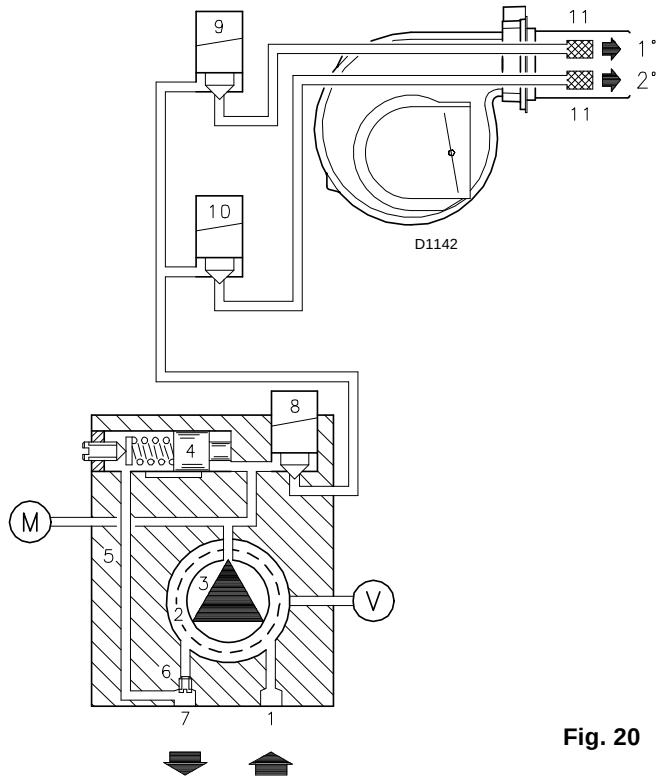


Fig. 20

Key (Fig. 20)

1 Pump suction line
2 Filter
3 Pump
4 Pressure adjuster
5 Return pipe
6 Bypass screw
7 Pump return line
8 Safety valve
9 1st stage valve
10 2nd stage valve
11 Filter
M Pressure gauge
V Vacuometer connection

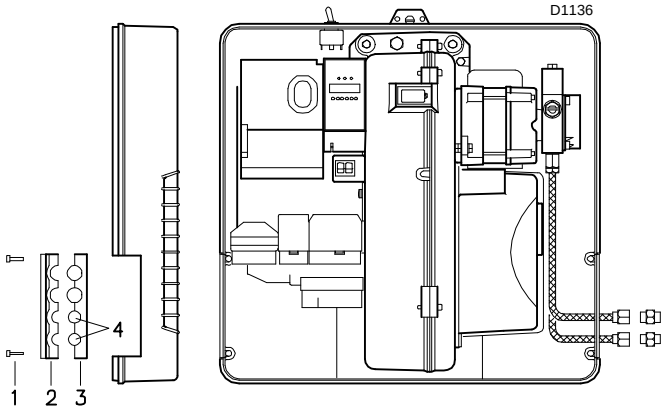


Fig. 21

5.11 Pump

5.11.1 Technical data

Pump	SUNTEC AL 65 B
Min. delivery rate at 12 bar pressure	67 kg/h
Delivery pressure range	4 - 18 bar
Max. suction depression	0.45 bar
Viscosity range	2 - 12 cSt.
Max. light oil temperature	60°C
Max. suction and return pressure	2 bar
Pressure calibration in the factory	12 bar
Filter mesh width	0,150 mm

Tab. J

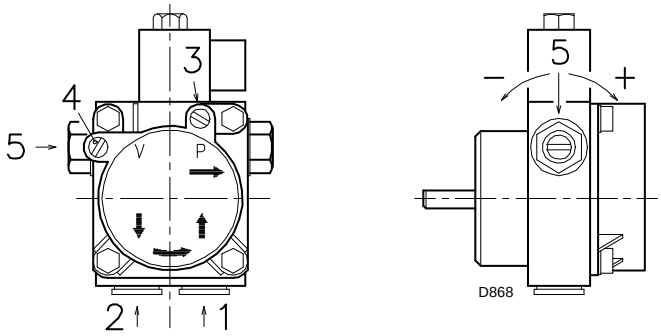


Fig. 22

Key (Fig. 22)

1	Suction line	G 1/4"
2	Return line	G 1/4”
3	Gauge connection	G 1/8”
4	Vacuometer connection	G 1/8”
5	Pressure adjuster	

5.11.2 Priming pump

ATTENTION

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

Obstructions in the line could cause the sealing organ located on the pump shaft to break.

Make sure that the valves on the suction line are open and that there is fuel in the tank.

In order for self-priming to take place, one of the screws 3) of the pump, see Fig. 22, must be loosened in order to bleed off the air contained in the suction line.

ATTENTION

The pump leaves the factory with the by-pass closed.

5.12 Gas supply

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

Precautions: avoid knocking, attrition, sparks and heat.

Make sure the fuel shut-off valve is closed before performing any operation on the burner.

ATTENTION

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

5.12.1 Gas feeding line

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

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

6B Includes:
- working valve
- safety valve
- pressure adjuster

6C Includes:
- safety valve
- working valve

6D Includes:
- safety valve
- working valve

7 Minimum gas pressure switch
8 Leak detection control, supplied as an accessory or built-in, based on the gas train code. In compliance with the EN 676 standard, gas valve leak detection control devices are compulsory for burners with maximum outputs over 1200 kW.
9 Gasket, for “flanged” versions only
10 Pressure adjuster
11 Train-burner adaptor, supplied separately
P2 Pressure upstream of valves/adjuster
P3 Pressure upstream of the filter
L Gas train, supplied separately
L1 Responsibility of the installer

ATTENTION

For applications compliant with Pressure Equipment Directive PED 97/23/EC, the installer must provide for the use of:

- devices suitable for drain and ventilation, as set out in clause K.10 of standard DIN EN 676;

- leak detection control devices, as set out in clause K.14.4 of standard DIN EN 676.

MBC “threaded”

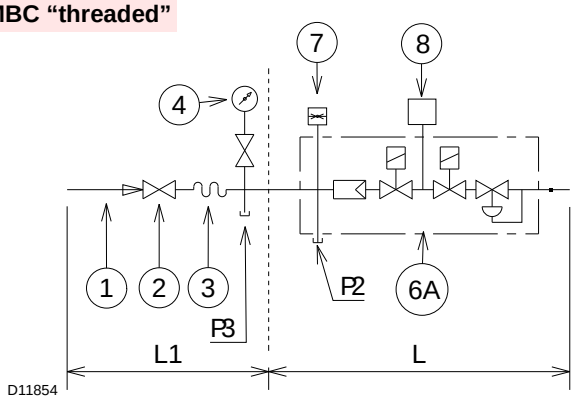


Fig. 23

MBC “flanged”

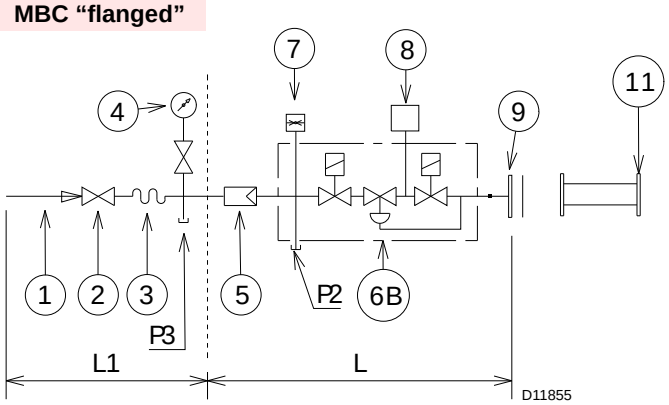


Fig. 24

DMV “flanged or threaded”

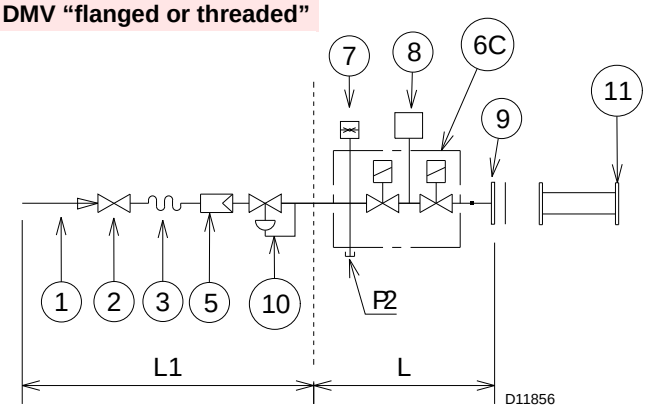


Fig. 25

CB “flanged or threaded”

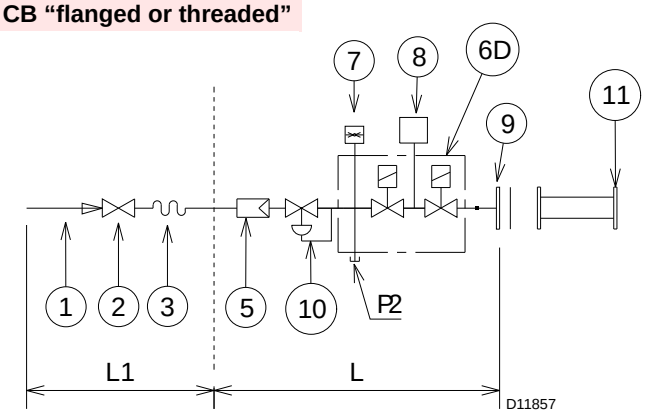


Fig. 26

5.12.2 Gas train

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

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

5.12.3 Gas train installation

Disconnect the electrical power using the main switch.

Check that there are no gas leaks.

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

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

The operator must use the required equipment during installation.

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

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

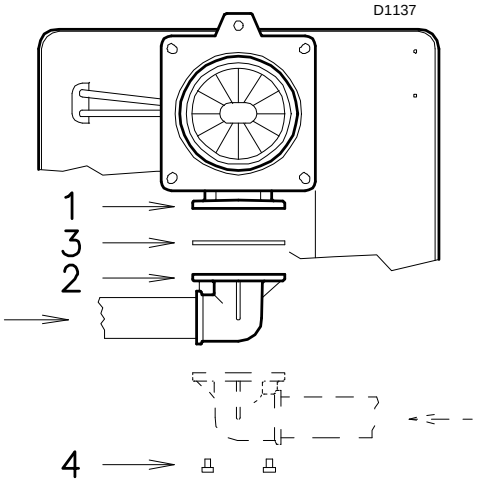


Fig. 27

5.12.4 Gas pressure

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

Model	kW	1 Δp (mbar)		
		G20	G25	G31
RLS 28	163	6.5	9.7	5.5
	185	6.8	10.1	5.7
	210	7.3	10.9	6
	235	8	11.9	6.3
	260	8.7	13.0	6.7
	285	9.6	14.3	7.4
	310	10.4	15.5	8.5
	325	11	16.4	9.5
RLS 38	232	8.8	13.1	9.7
	260	9.1	13.6	10
	290	9.4	14.0	10.3
	320	9.8	14.6	10.6
	350	10.4	15.5	10.9
	380	11.1	16.5	11.2
	410	11.8	17.6	11.5
	442	13	19.4	12
RLS 50	290	10	14.9	8.8
	330	10.2	15.2	8.9
	370	10.5	15.6	9
	410	10.8	16.1	9.1
	450	11.3	16.8	9.2
	490	11.7	17.4	9.3
	530	12.7	18.9	9.7
	581	14	20.9	10.5

Data of head thermal power and gas pressure refer to operation with gas butterfly valve fully open (90°).

Tab. K

The values shown in Tab. K refer to:
– Natural gas G 20 NCV 9.45 kWh/Sm^3 (8.2 Mcal/Sm^3)
– Natural gas G 31 NCV 27 kWh/Sm^3 (23.2 Mcal/Sm^3)

Column 1
Combustion head pressure drop.
Gas pressure measured at test point 1)(Fig. 28), with:
– combustion chamber at 0 mbar;
– Burner operating in 2nd stage
– Gas G20 (methane) - G31 (propane)

To calculate the approximate output at which the burner operates in the 2nd stage:
– subtract the combustion chamber pressure from the gas pressure measured at test point 1) (Fig. 28).
– Find in Tab. K related to the burner concerned, the pressure value closest to the result of the subtraction.
– Read the corresponding output on the left.

Example RLS 28 with natural gas G20:
2nd stage operation
Gas pressure at test point 1) (Fig. 28) = 9.3 mbar
Pressure in combustion chamber = 2 mbar
9.3 - 2 = 7.3 mbar

A pressure of 7.3 mbar, column 1, corresponds in Tab. K to an output of 210 kW.

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

To calculate the required gas pressure at test point 1)(Fig. 28), with the output fixed at that required for the burner in the 2nd stage:
– find the nearest output value in the table Tab. K for the burner in question.
– Read, on the right (column 1), the pressure at the test point 1)(Fig. 28).
– Add this value to the estimated pressure in combustion chamber.

Example RLS 28 with natural gas G20:
Desired output in 2nd stage: 210 kW
Gas pressure at an output of 210 kW = 7.3 mbar
Pressure in combustion chamber = 2 mbar
7.3 + 2 = 9.2 mbar
pressure required at test point 1)(Fig. 28).

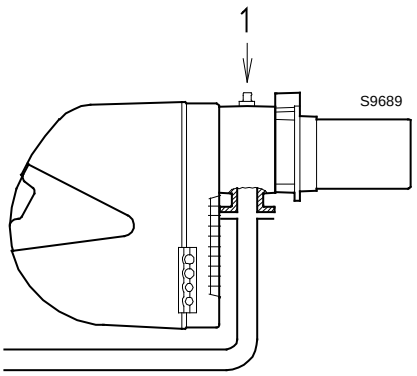


Fig. 28

5.13 Electrical connections

Notes on safety for the electrical wiring

DANGER

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

Before carrying out any maintenance, cleaning or checking operations:

DANGER

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

DANGER

Close the fuel shut-off valve.

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.

5.13.1 Supply cables and external connections passage

All the cables to be connected to the plugs 7)(Fig. 29) of the burner are passed through cable grommets to be inserted in the holes of the plate, left or right, after having unscrewed the screws 8), opened the plate at parts 9) and 10) and removed the thin diaphragm that closes the holes.

The use of the cable grommets and the pre-blanked holes can be done in different manners; for example (Fig. 29):

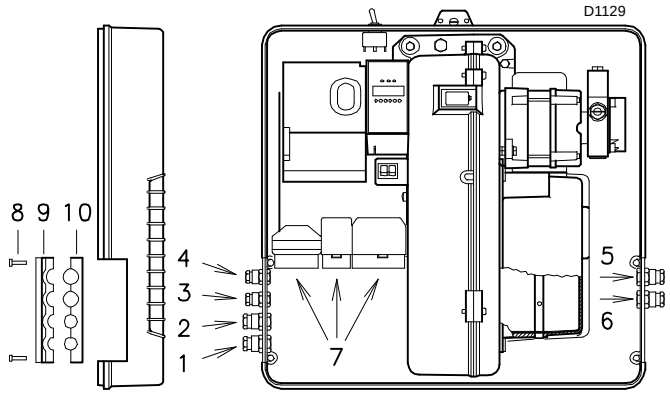


Fig. 29

Key (Fig. 29)

RLS 28 and RLS 38

1	Pg 11	Single-phase power supply
2	Pg 11	Gas valves
3	Pg 9	TL remote control
4	Pg 9	TR remote control
5	Pg 11	Gas pressure switch or valve leak detection control device

RLS 50

1	Pg 11	Three-phase power supply
2	Pg 11	Single-phase power supply
3	Pg 9	TL remote control
4	Pg 9	TR remote control
5	Pg 11	Gas valves
6	Pg 11	Gas pressure switch or valve leak detection control device

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

5.14 Calibration of the thermal relay (RLS 50)

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

➤ If the motor is star-driven, 400V, the cursor must be positioned on "MIN".

➤ If it is delta-driven, 230V, the cursor is positioned on "MAX".

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

The RS 50 three-phase model leaves the factory for 400V power supplies. If the power supply is 230V, change the fan motor connection (from star to triangle) and the calibration of the thermal relay. With the cursor 2).

To reset, in case of an intervention of the thermal relay, press button 1)(Fig. 31).

ATTENTION

The automatic reset can be dangerous.

This operation is not foreseen in the burner operation.

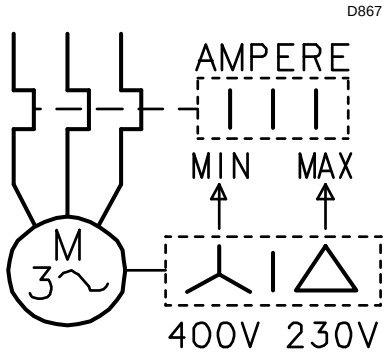


Fig. 30

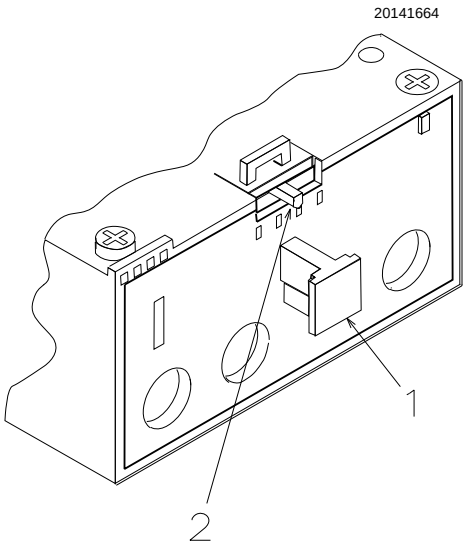


Fig. 31

6 Start-up, calibration and operation of the burner

6.1 Notes on safety for the first start-up

ATTENTION

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.

ATTENTION

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

ATTENTION

Before starting up the burner, refer to section "Safety test - with no gas supply" on page 36.

6.2 Adjustments prior to ignition (light oil)

ATTENTION

It is recommended to adjust first the light oil burner and then the gas burner.

Carry out the fuel change with burner off.

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

6.2.1 Nozzle

See information on page 19.

6.2.2 Combustion head

The adjustment of the combustion head already carried out on page 20 need not to be altered unless the 2nd stage output of the burner is changed.

6.2.3 Pump pressure

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

10 bar in order to reduce fuel delivery. It is possible only if the ambient temperature remains above 0 C;

14 bar in order to increase fuel delivery or to ensure firings even at temperatures of less than 0 °C.

In order to change pump pressure, act on screw 5) (Fig. 22 on page 23).

(See information on page 23).

6.2.4 1st stage fan damper

Keep the burner operating at 1st stage by setting the switch 2)(Fig. 32) to the 1st stage position. The fan damper can be adjusted by operating the orange level of the servomotor ("Servomotor adjustment" on page 32).

6.2.5 2nd stage fan damper

Turn switch 2) (Fig. 32) to the 2nd stage position. The fan damper can be adjusted by operating the red level of the servomotor ,("Servomotor adjustment" on page 32).

6.3 Burner ignition (light oil)

Start the burner by closing the remote controls, with the switch 1)(Fig. 32) in the **"ON"** position and with the fuel selector switch set to "**OIL**" (Fig. 33).

The pump can be considered to be primed when the light oil starts coming out of the screw 3)(Fig. 22 on page 23). Stop the burner: set switch 1)(Fig. 32) to "**OFF**" and tighten the screw 3).

The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at the first start of the burner and the burner locks out, reset the burner and repeat the start-up operation.

Do not light the flame sensor or the burner will lock out.

During the first firing, during the passage from the 1st to the 2nd stage, there is a momentary lowering of the fuel pressure caused by the filling of the 2nd nozzle tubing. This lowering of the fuel pressure can cause the burner to lockout and can sometimes give rise to pulsations.

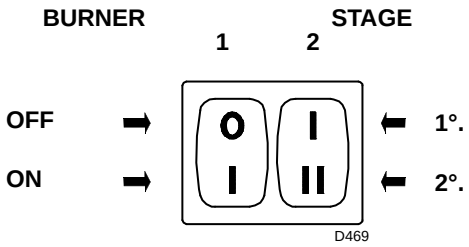


Fig. 32

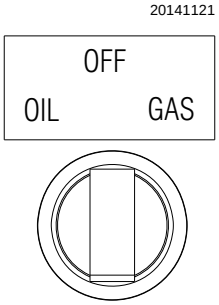


Fig. 33

6.4 Adjustments prior to ignition (gas)

Combustion head adjustment is already described on page 20.

In addition, the following adjustments must also be made:

- ➤ open the manual valves upstream of the gas train.
- ➤ Adjust the minimum gas pressure switch to the start of the scale (Fig. 39).
- ➤ Adjust the air pressure switch to the start of the scale (Fig. 38).
- ➤ Bleed off the gas line air. We recommend using a plastic tube routed outside the building and to purge air until gas is smelt.
- ➤ Fit a U-type pressure gauge (Fig. 34) to the gas pressure test point on the pipe coupling.
- ➤ Used to approximately calculate burner output in the 2nd stage using the Tab. K on page 25.
- ➤ Connect two lamps or testers in parallel to the two gas line solenoid valves VR1 and VS in order to check the exact moment at which voltage is supplied. This operation is not required if each of the two solenoid valves 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.

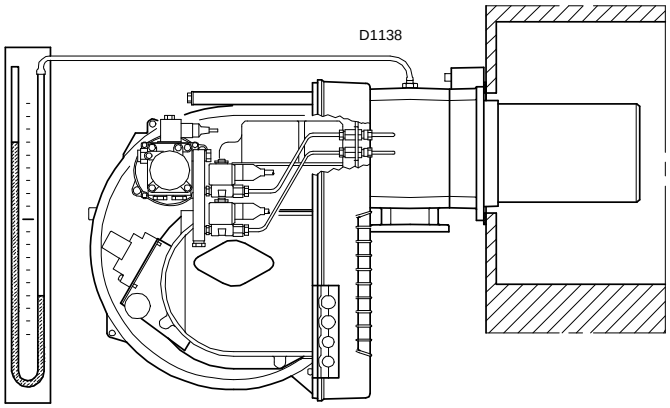


Fig. 34

6.5 Burner start-up (gas)

ATTENTION

It is recommended to adjust first the light oil burner and then the gas burner.

Carry out the fuel change with burner off.

Close the remote controls and turn:

- ➤ switch 1)(Fig. 32 on page 29) in “**BURNER ON**” position;
- ➤ switch 2)(Fig. 32 on page 29) in “**1st STAGE**” position:
- ➤ fuel selector switch in “**GAS**” position (Fig. 35).

As soon as the burner starts, check that the lamps or the testers connected to the solenoid valves or the warning lights on the solenoid valves indicate no voltage presence. If voltage is present, stop the burner **immediately** and check the electrical wiring.

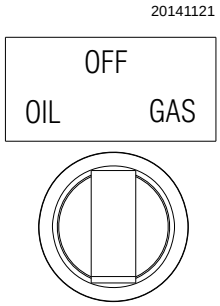


Fig. 35

6.6 Burner ignition

Once the above steps are completed, the burner should ignite.

If the motor starts but the flame does not appear and the control box goes into lockout, reset and wait for a new ignition attempt.

If ignition does not occur, it is possible that gas is not reaching the combustion head within the safety time period of 3 seconds. Therefore, it is necessary to increase gas ignition delivery.

The arrival of gas to the sleeve is indicated by the U-type pressure gauge (Fig. 34).

If the burner locks out again, refer to chapter "Faults - Possible causes - Solutions” on page 40.

ATTENTION

In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row. If the burner locks out for a third time, contact the customer service.

DANGER

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

Once ignition has taken place, proceed with global calibration operations.

6.7 Burner adjustment (gas)

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

Adjust in sequence:
1 Burner output in 2nd stage
2 Burner output in 1st stage
3 Output upon ignition
4 Air pressure switch
5 Gas minimum pressure switch

6.7.1 Output in 2nd stage

2nd stage output must be selected within the firing rate range indicated in page 11.

Turn switch 2)(Fig. 32) to the 2nd stage position: the servomotor will open the air damper on the value previously set for the light oil and will control the opening of the 2nd stage VR2 gas valve.

Adjustment of gas delivery

Adjust the gas delivery to the air quantity.
– If delivery needs to be reduced, diminish the adjuster outlet gas pressure; if it is already very low, slightly close the 2nd stage VR2 valve.
– If delivery needs to be increased, increase the adjuster outlet gas pressure.

6.7.2 Output in 1st stage

1st stage output must be selected within the firing rate range indicated in page 11.

Turn switch 2)(Fig. 32) to the 1st stage position: the servomotor will close the air damper on the value previously set for the light oil and will control the opening of the 1st stage VR1 gas valve.

Adjustment of gas delivery

Adjust the gas delivery to the air quantity by operating the 1st stage VR1 gas valve.

6.7.3 Ignition output (gas)

According to standard EN 676:

Burners with MAX output up to 120 kW

Ignition can occur at the maximum operation output level. Example:

- max. operation output: 120 kW
- max. output upon ignition: 120 kW

Burners with MAX output above 120 kW

Ignition must occur at a lower output than the max. operation output.

If ignition output does not exceed 120 kW, no calculations are required. If ignition output exceeds 120 kW, the regulatory standard sets that the value be defined according to the control box safety time "ts":
– for "ts" = 2s, ignition output must be equal to or lower than 1/2 of max. operation output;
– for "ts" = 3s, ignition output must be equal to or less than 1/3 of max. operation output.

Example:

MAX operation output of 600 kW.

Ignition output must be equal to or lower than:

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

In order to measure the ignition output:
– Remove the UV sensor 14)(Fig. 4 on page 13) (the burner starts and locks out after the safety time).
– Perform 10 ignitions with consecutive lockouts.
– Read the quantity of gas burned on the meter. This quantity must be equal to or lower than the quantity given by the formula:

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

Example for G 20 gas (10 kWh/Nm^3):

Max operation output, 600 kW

corresponding to 60 Nm^3/h.

After 10 ignitions with a lockout, the output indicated on the meter must be equal to or less than:

60: 360 = 0.166 Nm^3.

The ignition output must be adjusted on the gas valve brake.

6.7.4 Operation with LPG - Propane - Butane

The RLS 28 - 38 - 50 burners can operate also with LPG -Propane-Butane.

In this case it is necessary to replace the six nozzles 2)(Fig. 36) screwed onto the holes 1)(Fig. 36), which are suitable for natural gas, with those for LPG-Propane-Butane, provided as standard with the burner. See page 31.

Apply the adhesive label for LPG operation near the characteristics label.

The firing rate and the adjustment of the burner are the same as for natural gas.

The pressure of the G31 gas (Propane) is shown on page 25.

Gas train: use the train for natural gas, see page 25, with a 3/4" or 1" diameter.

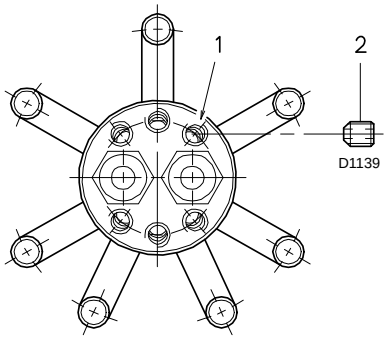


Fig. 36

Nozzle hole

Burner	Natural gas Ø mm	LPG/Propane/Butane
RLS 28	4	2.5
RLS 38	5	2.5
RLS 38	5	3

Tab. L

6.8 Servomotor adjustment

The servomotor (Fig. 37) adjusts the air damper.

Do not alter (for the moment) the factory setting for the 4 levers. A graduated label with 4 coloured sectors shows the intervention point of the levers.

It is equipped with 4 levers:

BLUE LEVER: It adjusts the position of the air damper with the burner at rest: air damper closed.

ORANGE LEVER: It adjusts the position of the air damper with the burner operating in 1st stage.

RED LEVER: It adjusts the position of the air damper with the burner operating in 2nd stage.

Determines when the 2nd stage gas or light oil valve opens.

It must always intervene (slightly) before the red lever and after the orange lever.

It must not intervene with the red lever, to prevent the gas or light oil valve from not opening at all.

BLACK LEVER: It must not intervene immediately after the orange lever, to prevent a combustion with an air defect.

To approach the moment of the gas or light oil valve opening at the damper 2nd stage position, turn the black lever toward the left; to postpone the moment of the opening, turn the lever toward the right.

Summarising, the lever must intervene according to the following sequence:

1° Blue lever

2° Orange lever

3° Black lever

4° Red lever

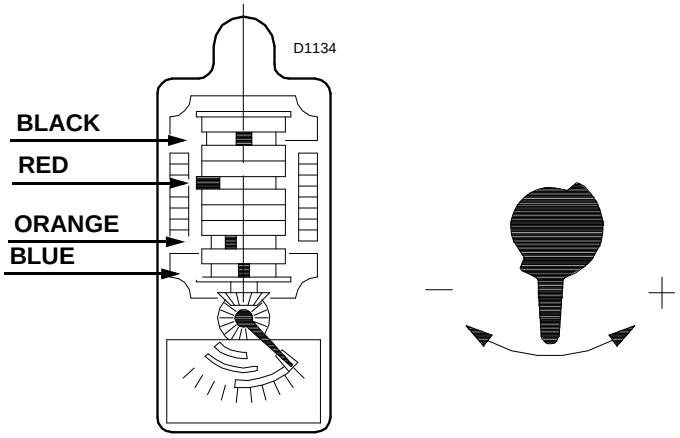


Fig. 37

6.9 Pressure switch adjustment

6.9.1 Air pressure switch - check CO

Adjust the air pressure switch after performing all other burner adjustments with the air pressure switch set to the start of the scale (Fig. 38).
With the burner operating in 1st stage, increase adjustment pressure by slowly turning the relevant knob clockwise until the burner locks out.
Then turn the knob anticlockwise by about 20% of the set point and repeat burner start-up to ensure it is correct.
If the burner locks out again, turn the knob slightly anticlockwise.

Fig. 38

ATTENTION

as a rule, the air pressure switch must limit the CO in the fumes to less than 1% (10,000 ppm).

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

The incorporated air pressure switch can work in a 'differential' mode if connected with two pipes. If a strong depression in the combustion chamber during the pre-purging phase does not allow the air pressure switch to switch, this can be obtained by applying a second tube between the air pressure switch and the suction inlet of the fan. In this way, the pressure switch will work in differential mode.

ATTENTION

The use of the air pressure switch with differential operation is allowed only in industrial applications and where rules enable the air pressure switch to control only fan operation without any reference to CO limit.

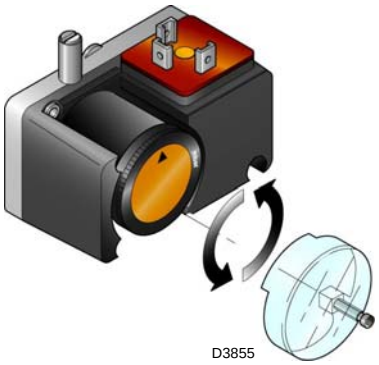


Fig. 39

6.9.2 Gas minimum pressure switch

Adjust the minimum gas pressure switch after performing all the other burner adjustments with the pressure switch set to the start of the scale (Fig. 39).

With the burner operating at maximum output, increase the pressure. With the burner operating in 2nd stage, increase the adjustment pressure by slowly turning the relative knob clockwise until the burner stops.

Then turn the knob anticlockwise by 0.2 kPa (2 mbar) and repeat burner start-up to ensure it is uniform.

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

ATTENTION

1 kPa = 10 mbar

6.10 Operation sequence of the burner

6.10.1 Burner start-up

0 s TL closes, fan motor starts, (in case of oil operation, pump motor starts)

6 s servomotor starts, maximum opening.

11 s air damper is at its maximum opening

42 s servomotor closing phase starts at the minimum output.

45 s air damper is in the ignition point position (minimum output)

48 s ignition transformer strikes a spark

54 s 1st stage fuel valve opens

57 s ignition discharge ends

66 s with TR in 2nd stage, servomotor reaches its maximum opening and the second fuel valve opens.

Burner start-up

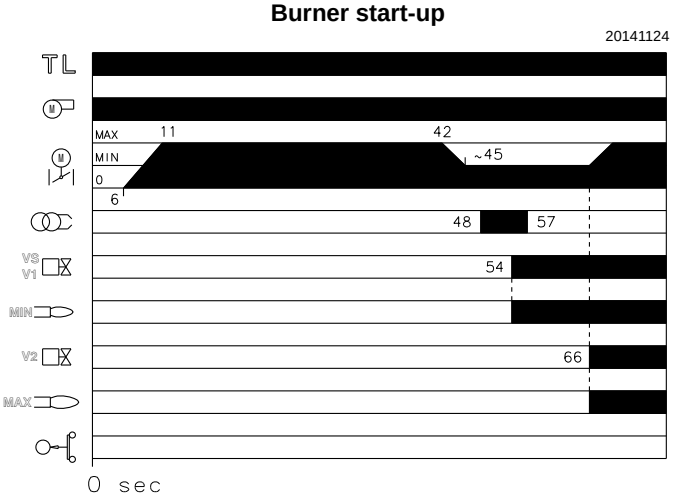


Fig. 40

6.10.2 Ignition failure

If the burner does not fire, it goes into lockout within 3 seconds after the valve opens and approximately 57 seconds after the TL closes.

IGNITION FAILURE

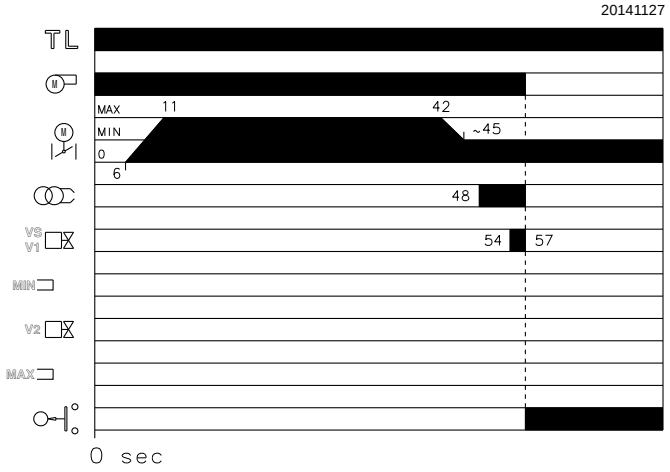


Fig. 41

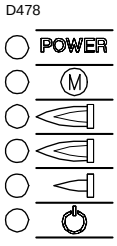
6.10.3 Burner flame goes out during operation

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

6.10.4 LED PANEL

It gives 6 information through the lighting up of the LEDs. See Fig. 42.

Key:



= Voltage present
= Fan motor lockout (red)
= Burner lockout (red)
= 2nd stage operation
= 1st stage operation
= Burner operation

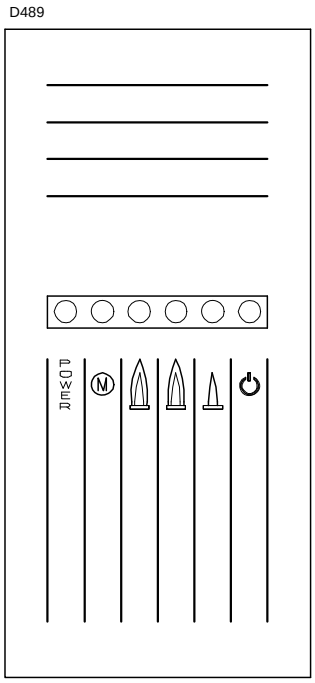


Fig. 42

6.11 Final checks (with burner operating)

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

Tab. M

ATTENTION

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

7 Maintenance

7.1 Notes on safety for the maintenance

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

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


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

Close the fuel shut-off valve.

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

7.2 Maintenance programme

7.2.1 Maintenance frequency

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

7.2.2 Safety test - with no gas supply

To perform commissioning in safety conditions, it is very important to check correct wiring between gas valves and burner.

For this purpose, after checking that connections comply with the burner wiring diagrams, it is necessary to carry out a start-up cycle with gas cock closed (dry test).

1 The manual gas valve must be closed using the locking/unlocking device (“Lock-out / tag out” procedure).
2 Ensure that burner limit electrical contacts are closed
3 Ensure that minimum gas pressure switch contact is closed
4 Try to start the burner.

The start-up cycle must occur according to the following steps:

– Fan motor start-up for pre-purging
– Gas valve leak detection control, if applicable.
– Pre-purging completion
– Achievement of the ignition point
– Power supply of the ignition transformer
– Supply of gas valves.

As gas is closed, the burner cannot ignite and its control box will switch to stop or safety lockout condition.

The actual supply of gas valves can be checked by inserting a tester; some valves are equipped with lights (or closing/opening position indicators) that activate as soon as they are powered.


ATTENTION

IF POWER SUPPLY OF GAS VALVES OCCURS IN UNEXPECTED MOMENTS, DO NOT OPEN THE MANUAL VALVE, DISCONNECT POWER SUPPLY, CHECK WIRINGS, CORRECT THE ERRORS AND CARRY OUT THE WHOLE TEST AGAIN.

7.2.3 Checking and cleaning

The operator must use the required equipment during maintenance.

Combustion
Carry out an analysis of the combustion 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.

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

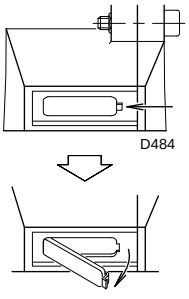


Fig. 43

Electrical current to flame sensor (Fig. 44)

Clean the glass cover from any dust that may have accumulated.
To remove the sensor pull it outwards with force; it is inserted only by pressure.
Min. value for a good work: 70 µA.
If the value is lower, it could be due to:
– exhausted sensor
– low voltage (lower than 187 V)
– bad regulation of the burner

In order to measure the current, use a microammeter of 100 µA d.c., connected in series to the sensor, as in the scheme, with a capacitor of 100 µF - 1V d.c. at the same level of the instrument.

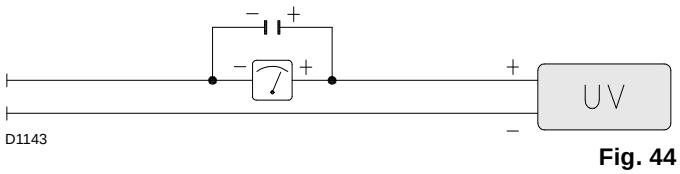


Fig. 44

Burner
Check that there are not excess wear or loosen screws. The screws securing the electrical leads in the burner plugs should also be fully tightened.
Clean the outside of the burner.
Clean and grease the adjustable profile of the cams.

Fan
Check to make sure that no dust has accumulated inside the fan or on its impellers, 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.

LIGHT OIL OPERATION

Pump
The delivery pressure must comply with the table on page 23.
The depression must be less than 0.45 bar.
Unusual noise must not be evident during pump operation.
If the pressure is unstable, or the pump runs noisily, the flexible hose must be detached from the line filter and the fuel must be sucked from a tank located near the burner.
This measure permits the cause of the anomaly to be traced to either the suction piping or the pump.
If the problem lies in the suction line, check the filter is clean and that air is not entering the piping.

Filters
Check the filtering baskets on line and at nozzle present in the system.
Clean or replace if necessary.
If rust or other impurities are observed inside the pump, use a separate pump to lift any water and other impurities that may have deposited on the bottom of the tank.

Nozzles
It is advisable to replace nozzles once a year during periodical maintenance.
Do not clean the nozzle openings.

Flexible hoses
Check to make sure that the hoses are still in good condition.

Fuel tank
Approximately every 5 years, suck any water on the bottom of the tank using a separate pump.

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

EN 267	**Air excess**		**CO**
	Max. output $\lambda \leq$ **1.2**	**Min. output** $\lambda \leq$ **1.3**	
Theoretical max CO_2 0 % O_2	**CO_2 % Calibration**		**mg/kWh**
	λ **= 1.2**	λ **= 1.3**	
15.2	12.6	11.5	≤ 100

Tab. N

GAS OPERATION

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

Gas filter
Change the gas filter when it is dirty.

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

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

Tab. O

7.2.4 Combustion control (gas)

CO_2
It is advisable to adjust the burner with a CO_2 not greater than about 10% (gas with Ncv 8600 kcal/m3). In this way it is avoided that a small decalibration (for example a variation in the tension) could cause a combustion with an air defect and with the subsequent formation of CO.

CO
It should not exceed 100 mg/kWh.

7.2.5 Safety components

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

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

Safety component	Life cycle
Flame control	10 years or 250,000 operation cycles
Flame sensor	10 years or 250,000 operation cycles
Gas valves (solenoid)	10 years or 250,000 operation cycles
Pressure switches	10 years or 250,000 operation cycles
Pressure adjuster	15 years
Servomotor (electronic cam)	10 years or 250,000 operation cycles
Oil valve (solenoid)	10 years or 250,000 operation cycles
Oil regulator	10 years or 250,000 operation cycles
Pipes/ oil fittings (metallic)	10 years
Flexible hoses (if present)	5 years or 30,000 pressurised cycles
Fan impeller	10 years or 500,000 start-ups

Tab. P

7.3 Opening the burner

DANGER

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

DANGER

Close the fuel shut-off valve.

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

- ➤ Remove screw 1) and extract the cover 2).
- ➤ Disconnect the light oil pipes 3).
- ➤ Remove screw 5), the split pin 9) and pull the burner back by about 100 mm on the slide bars 6). Disconnect the electrode cables, then completely retract the burner.
- ➤ Turn it as indicated in the diagram, and insert the split pin 9) into the hole of one of the two guides so that the burner remains in that position.

At this point it is possible to extract the inner part 7) after having removed the screw 8)(Fig. 45).

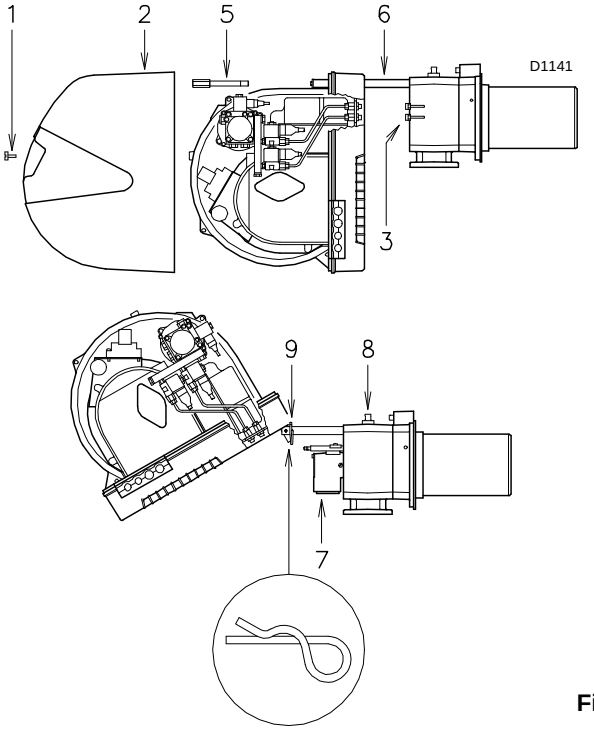


Fig. 45

7.4 Closing the burner

- ➤ Remove the split pin 9) and push the burner until it is approx. 100 mm from the pipe coupling.
- ➤ Reconnect the cables and slide in the burner until it comes to a stop. Replace the screws 5) and split pin 9) and carefully pull the cables outwards until they are slightly taut.
- ➤ Reconnect the light oil pipes.

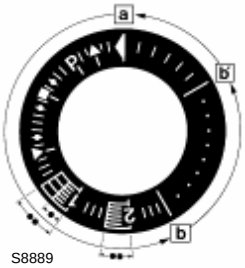
After carrying out maintenance, cleaning or checking operations, reassemble the cover and all the safety and protection devices of the burner.

8 Faults - Possible causes - Solutions

The LFL1.333... control box is equipped with a lockout indicator (Fig. 46) that turns during the start-up programme, and is visible from the small lockout window.

When the burner does not start or stops, due to a failure, the symbol that appears on the indicator indicates the type of interruption.

The positions of the lockout indicator are shown in Fig. 47.



Lockout indicator

a-b	Start-up sequence
b(b')	Idle stages (without contact confirmation)
b(b')-a	Post-purging programme

Fig. 46

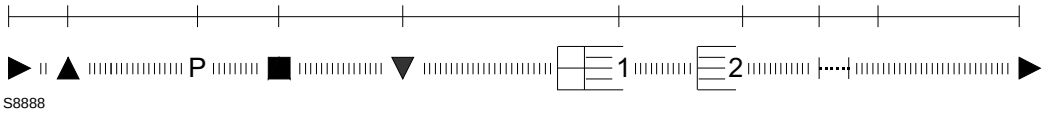


Fig. 47

Fuse replacement

The fuse 2)(Fig. 48) is in the rear part of the control box. A spare fuse 1) is also available: it can be extracted after breaking the panel tab A) that houses it. In the event that fuse 2) has been tripped, replace it as shown in Fig. 48.

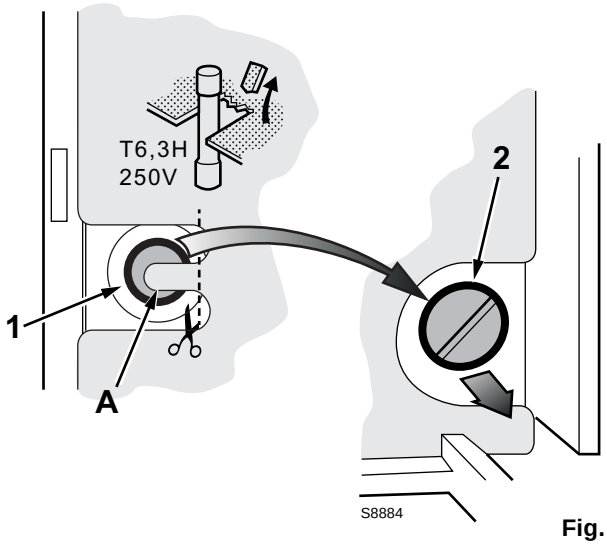


Fig. 48

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

If a burner malfunction is detected, first of all:
- check that the electrical wiring is adequately connected;
- check whether fuel is delivered;
- check that every adjustment parameter is adequately set.

ATTENTION

In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row. If the burner locks out for a third time, contact the customer service.

DANGER

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

8.1 Light oil operation

Symbol	Problem	Probable cause	Suggested remedy
◀	The burner does not start	Limiter or safety control device open	Adjust or replace
		Control box lockout	Release
		Fan motor lockout	Release the thermal relay
		No electrical power supply	Close all switches - check connections
		No light oil	Check the light oil supply circuit
		Control box fuse interrupted	Replace
		Pump is jammed	Replace
		Faulty motor remote control switch	Replace
		Defective control box	Replace
		Faulty electrical motor	Replace
		Defective safety solenoid valve	Replace
	The burner does not come on and the lockout appears	Flame simulation	Replace the control box
		Flame sensor short circuit	Replace flame sensor
		Two-phase electrical supply, thermal relay steps in	Reset the thermal relay at return of the three phases
▲	The burner starts but stops at maximum air damper setting	The servomotor contact does not intervene	Adjust cam or replace servomotor
P	The burner starts and then goes into lockout	Air pressure switch poorly adjusted	Adjust it
		Pressure switch pressure point pipe blocked	Clean
■	The burner starts and then goes into lockout	Failure to the flame detection circuit	Replace control box
▼	The burner remains in pre-purging phase	The servomotor contact III does not intervene	Adjust cam or replace servomotor
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	No fuel in the tank, or water on the bottom	Refill with fuel, or remove the water
		Bad head and damper adjustments	Adjust
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Bad electrical wiring on valves or transformer	Check
		Pump unprimed	Prime it
		Pump suction line connected to return line	Correct connection
		Soiled filters (nozzle line)	Clean
		Valves up-line from pump closed	Open them
		Opposite motor rotation	Change electrical wiring to the motor
		Light oil solenoid valves do not open	Check connections and solenoids
		Pilot burner does not work	Check
		Defective control box	Replace
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		Motor/pump coupling broken	Replace
		Faulty ignition transformer	Replace
	The flame ignites regularly but the burner goes into lock out at the end of the safety time	Faulty flame sensor or defective control box	Replace flame sensor or control box
		Dirty flame sensor	Clean
	Smoke in flame (dark Bacharach)	Little air	Adjust the fan head and damper
		Incorrect pump pressure	Adjust
		Nozzle filter clogged	Clean or replace
		Boiler room air vents insufficient	Increase
		Dirty or worn nozzle	Replace
		Flame disk soiled, loose or deformed	Clean it, tighten it or replace it
	Smoke in flame (yellow Bacharach)	Too much air	Adjust head and air dampers

Symbol	Problem	Probable cause	Suggested remedy
	Ignition with pulses or flame failure, delayed ignition	Poorly adjusted head	Adjust
		Incorrectly adjusted fan air damper: too much air	Adjust
		Nozzle not fit for burner or boiler	See nozzle table
		Defective nozzle	Replace
		Unsuitable pump pressure	Adjust
		Ignition electrode not adjusted correctly or soiled	Adjust it
		Output during ignition phase is too high	Reduce
	The burner does not pass to the 2nd stage	Remote control device TR fails to close	Adjust or replace
		Defective control box	Replace
	Uneven fuel supply	Understand whether the cause lies in the pump or the fuel supply system	Supply fuel to the burner from a tank positioned near the burner itself
	Pump rusty on the inside	Water in the tank	Remove the water with a pump
	Noisy pump, unstable pressure	Air has entered the suction line	Block the couplings
		Depression value too high (higher than 35 cm Hg):	
		Excessive difference of level between burner and tank	Power the burner from a loop circuit
		Piping diameter too small	Increase
		Dirty suction line filters	Clean
		Suction line valves closed	Open them
		The paraffin solidifies due to the low temperature	Put additive in the light oil
	Pump unprimes after prolonged pause	Return pipe not immersed in fuel	Bring it to the same height as the suction line
		Air in the suction line	Block the couplings
	Pump leaks light oil	Loss of sealing organ	Replace the pump
	Dirty combustion head	Dirty nozzle or nozzle filter	Replace
		Unsuitable nozzle delivery or angle	See recommended nozzles
		Loose nozzle	Block it
		Environmental impurities on flame stability disc	Clean
		Incorrect head adjustment, or little air	Adjust it, opening the damper
		Blast tube length not suitable for the boiler	Contact the boiler manufacturer
	Burner goes into lockout during operation	Flame sensor faulty or dirty	Replace it or clean it
		Air pressure switch faulty	Replace

Tab. Q

8.2 Gas operation

Symbol	Problem	Probable cause	Suggested remedy
◀	The burner does not start	No electrical power supply	Close all switches and check connections
		A limit or safety thermostat/pressure switch open	Adjust or replace
		Control box lockout	Release the control box
		Control box fuse interrupted	Replace it (2)
		Incorrect electrical wiring	Check
		Defective control box	Replace
		No gas supply	Open the manual valves between meter and train
		Mains gas pressure insufficient	Contact your GAS COMPANY
		Minimum gas pressure switch fails to close	Adjust or replace
		Air pressure switch in operating position	Adjust or replace
		The servomotor contact does not intervene (closure cam 0°)	Adjust the closure cam 0° or replace the servomotor
	The burner does not come on and the lockout appears	Flame simulation	Replace the control box
		Faulty motor remote control switch	Replace
		Defective electrical motor	Replace
		Motor lockout	Release the thermal relay
▲	The burner starts but stops at maximum air damper setting	The servomotor contact does not intervene (maximum cam opening)	Cam adjustment (maximum opening) or replace the servomotor
P	The burner starts and then goes into lockout	Air pressure switch does not switch owing to lack of air pressure:	
		Air pressure switch poorly adjusted	Adjust or replace
		Pressure switch pressure point pipe clogged	Clean
		Poorly adjusted head	Adjust
		Dirty fan	Clean
		High depression in the furnace	Contact our Technical Department
■	The burner turns on and then remains in lockout mode	Failure to the flame detection circuit	Replace the control box
▼	The burner remains in pre-purging phase	The servomotor contact does not intervene (minimum cam)	Cam adjustment (minimum) or replace the servomotor

Symbol	Problem	Probable cause	Suggested remedy
1	Once the pre-purging and the safety time has elapsed the burner goes into lockout without the flame appearing	The GAS solenoid valve lets too little gas through	Increase
		The GAS solenoid valve does not open	Replace the coil or the rectifier panel
		Gas pressure too low	Increase pressure at governor
		Ignition electrode incorrectly adjusted	Adjust it
		Electrode grounded due to broken insulation	Replace
		High voltage cable defective or grounded	Replace
		High voltage cable deformed by high temperature	Replace and protect
		Faulty ignition transformer	Replace
		Incorrect valve or ignition transformer connections	Redo them
		Defective control box	Replace
		A closed valve upstream the gas train	Open
		Air in pipework	Bleed air
	Lockout with flame appearing	The GAS solenoid valve lets too little gas through	Increase
		Dirty flame sensor	Check, replace flame sensor
		Faulty connection	Check, replace flame sensor
		Insufficient detection current (min.70 µA)	Measure current, replace flame sensor
		Flame sensor exhausted, faulty	Replace
		Maximum gas pressure switch intervention	Adjust or replace
		Defective control box	Replace
	The burner continues to repeat the start-up cycle without lockout	The gas pressure in the gas mains lies very close to the value to which the gas pressure switch has been set. The sudden drop in pressure after valve opening causes temporary opening of the pressure switch itself, the valve immediately closes and the burner stops. Pressure increases again, the pressure switch closes again and the ignition cycle is repeated. And so on.	Reduce the intervention pressure of the minimum gas pressure switch. Replace the gas filter cartridge
	Lockout without symbol indication	Flame simulation	Replace the control box
|	Burner goes into lockout during operation	Faulty flame sensor	Replace worn parts
		Air pressure switch faulty	Replace
◀	Lockout when the burner stops	Permanent flame in the combustion head or flame simulation	Eliminate permanency of flame or replace the control box
	Ignition with pulsations	Poorly adjusted head	Adjust
		Ignition electrode incorrectly adjusted	Adjust it
		Incorrectly adjusted fan air damper: too much air	Adjust
		Output during ignition phase is too high	Reduce

Tab. R

A Appendix - Accessories

Extended head Kit (for short head versions only)

Burner	L (mm) Standard head	L (mm) Head obtainable with the kit	Code
RLS 28	191	326	3010264
RLS 38	201	336	3010265
RLS 50	216	351	3010266

Soundproofing box kit

Burner	Type	dB(A)	Code
All models	C1/3	10	3010403

Degasser kit

Burner	Filter	Code
All models	with filter	3010055
All models	without filter	3010054

LPG kit

Burner	Code
All models	3010304

Maximum gas Pressure switch Kit

Burner	Code
All models	3010493

Differential Circuit breaker kit

Burner	Code
All models	3010321

Flange connection Kit

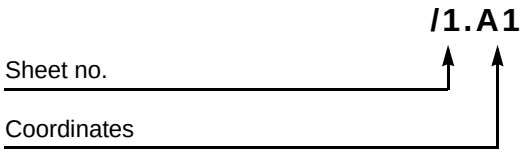
Burner	Code
All models	3010138

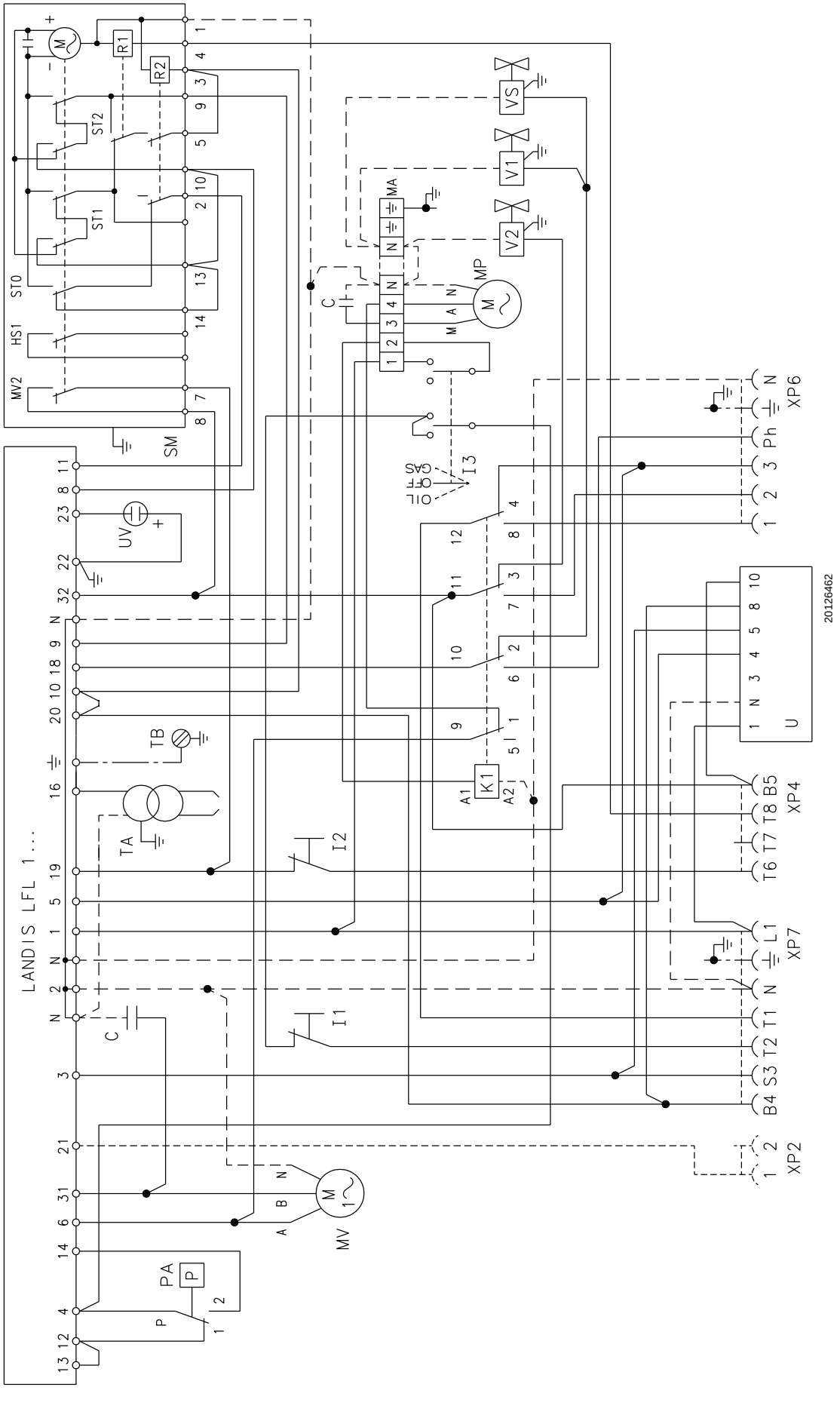
Gas trains in compliance with EN 676

Please refer to manual.

B Appendix - Electrical panel layout

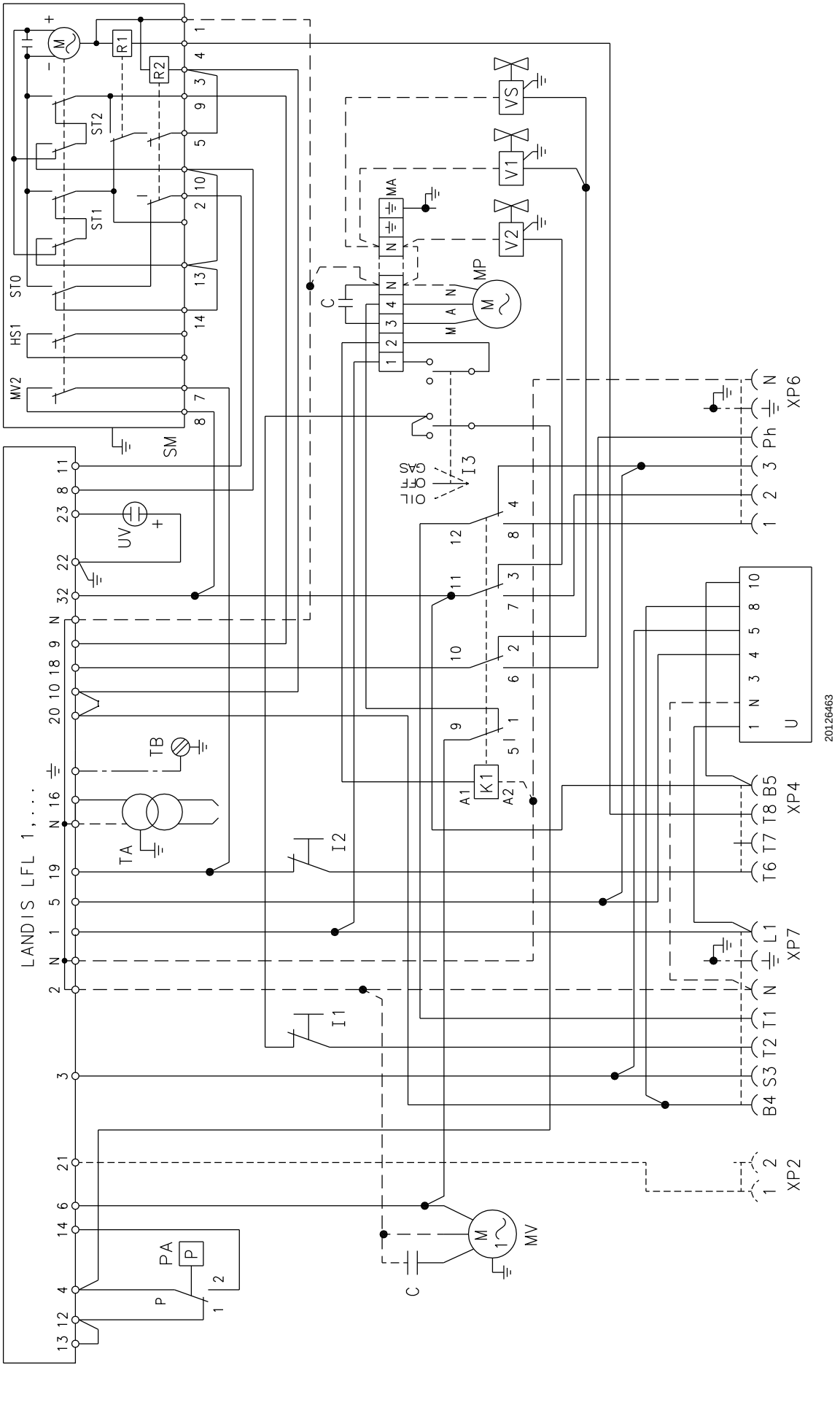
2 Indication of references





RLS 28

DIAGRAM A



RLS 38

DIAGRAM A

RLS 50

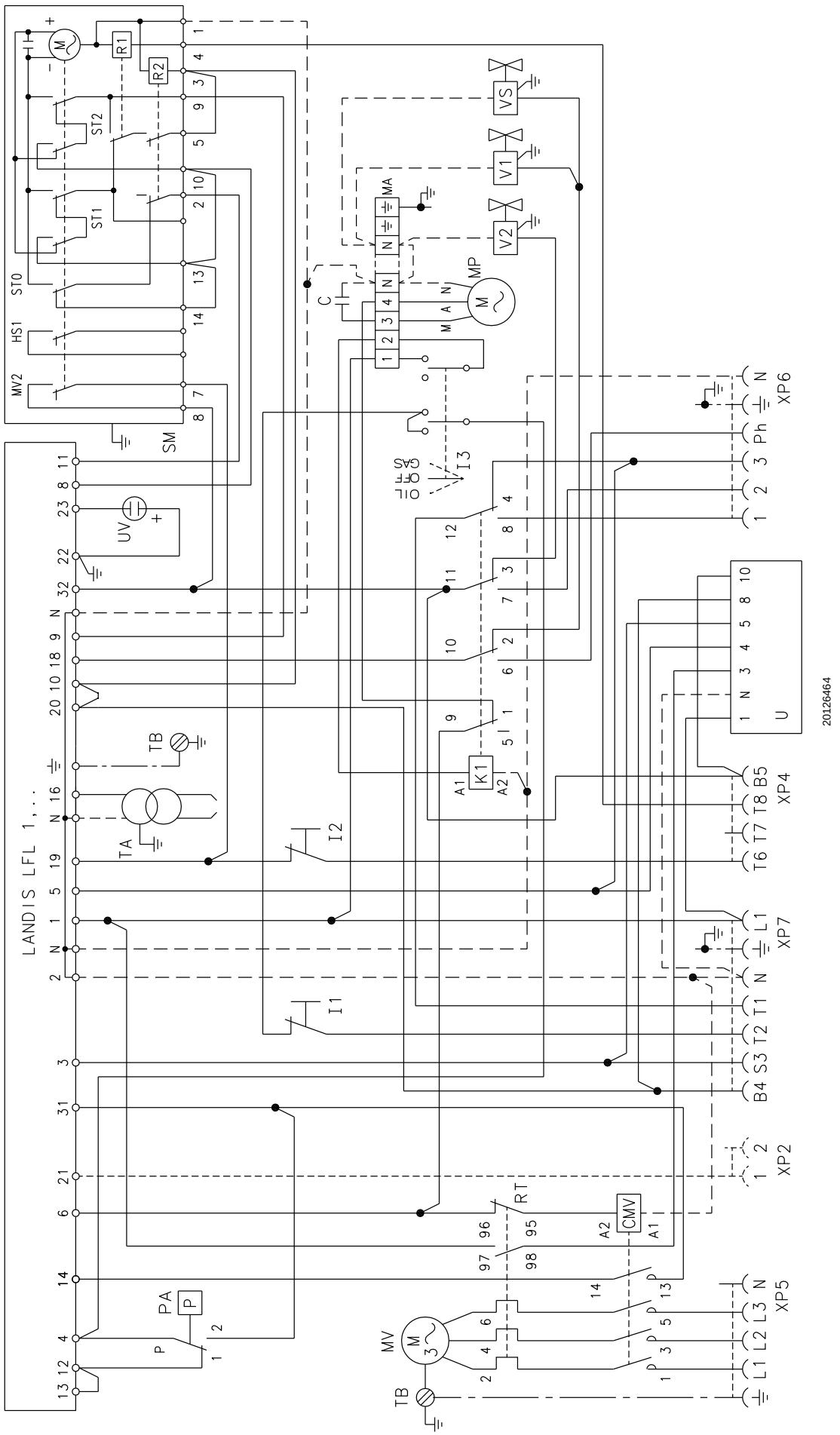
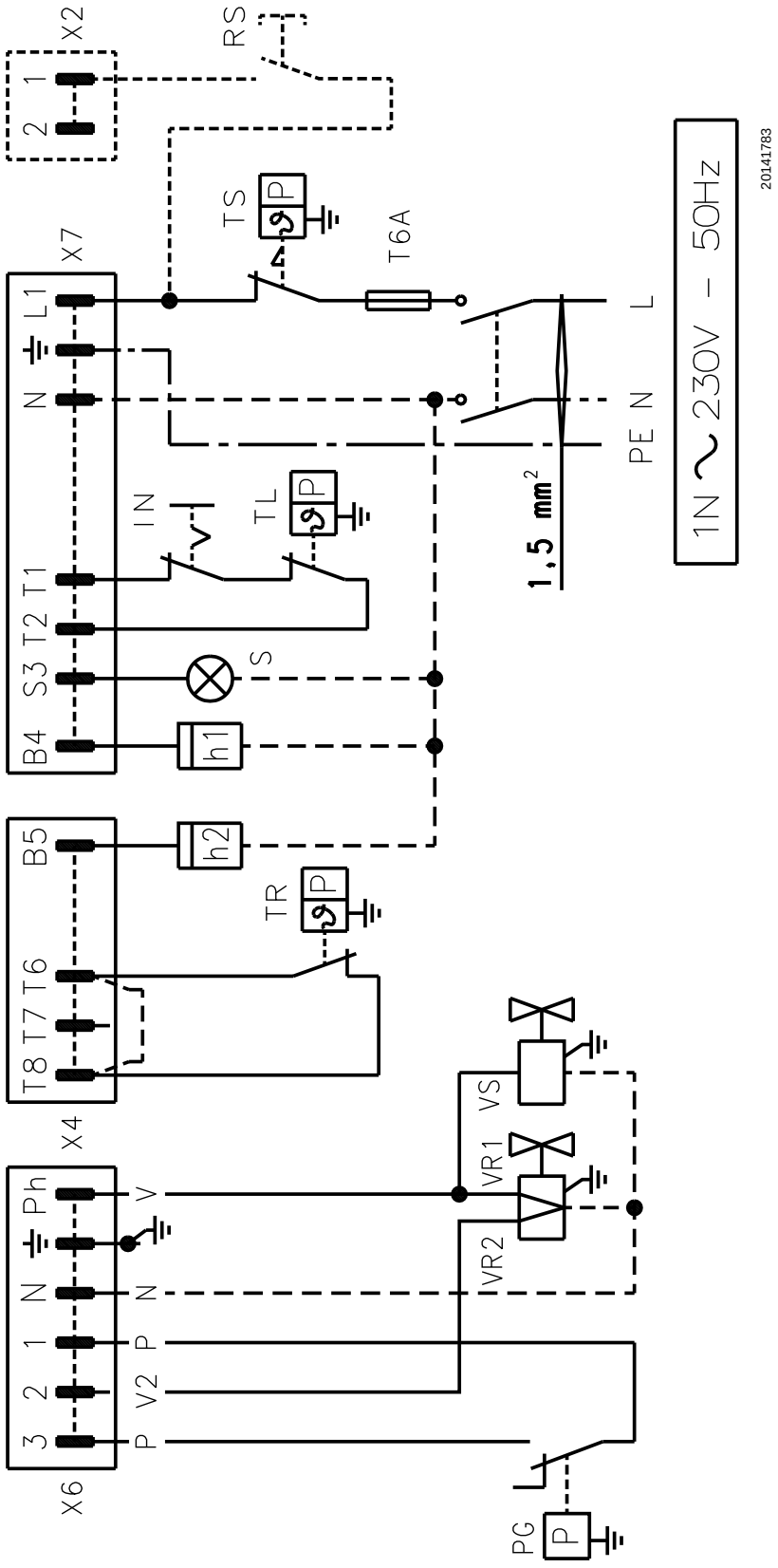
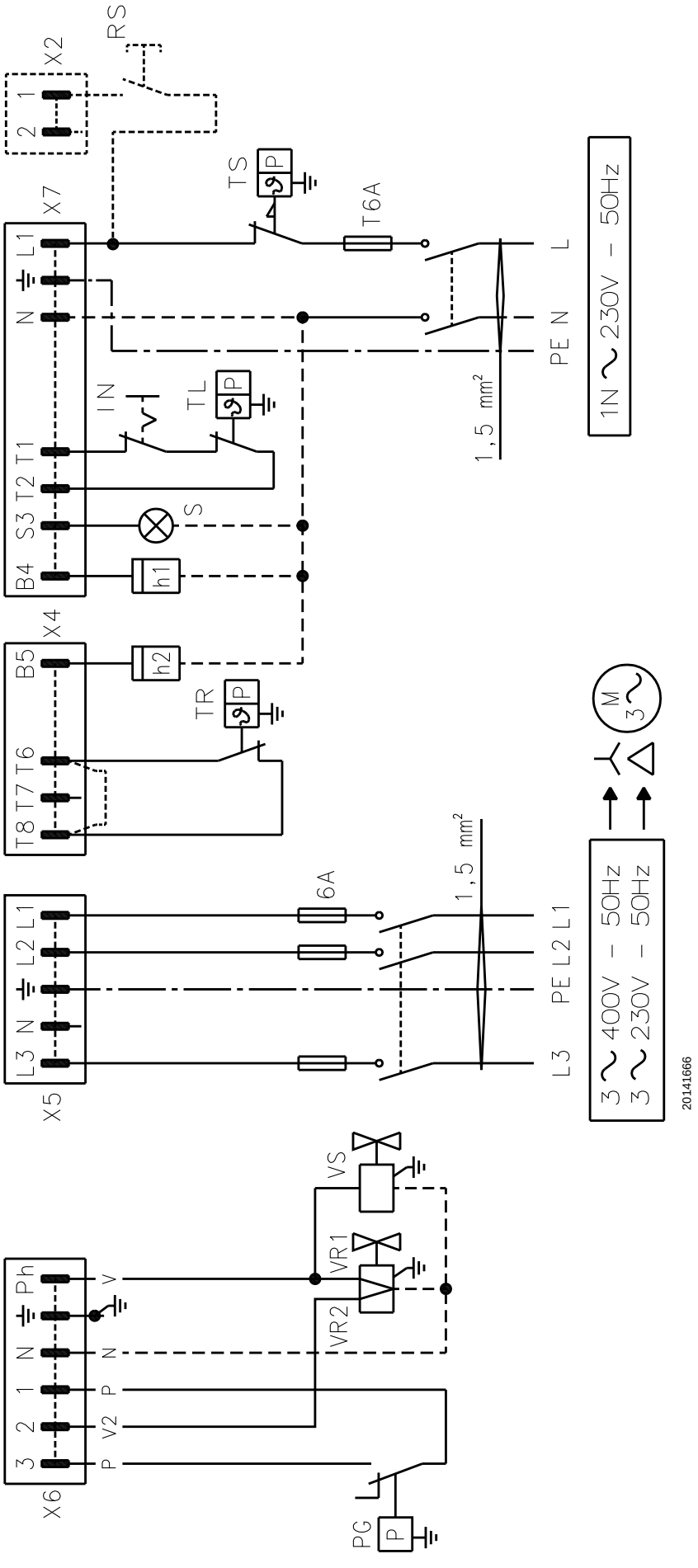


DIAGRAM A



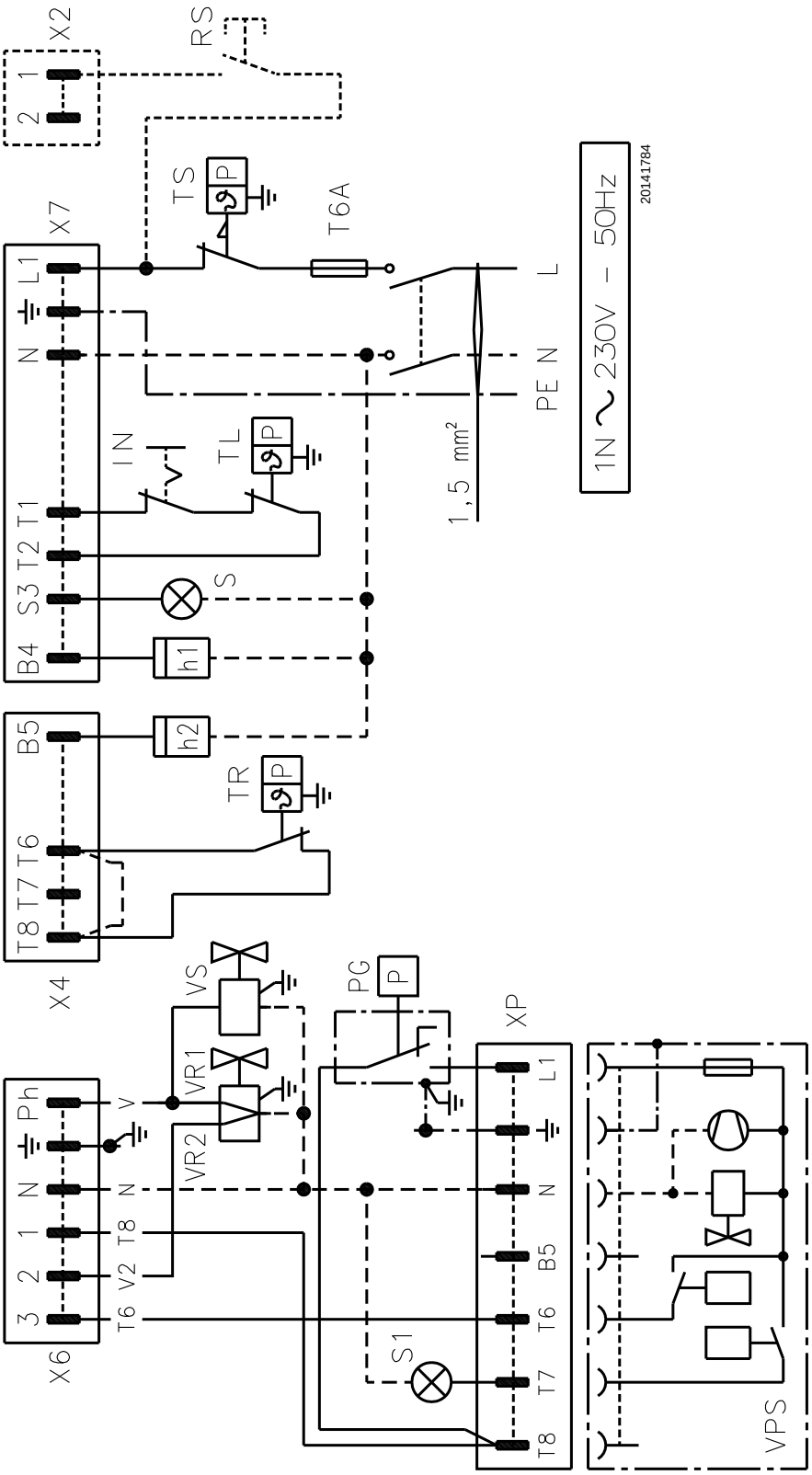
RLS 28-38

DIAGRAM B



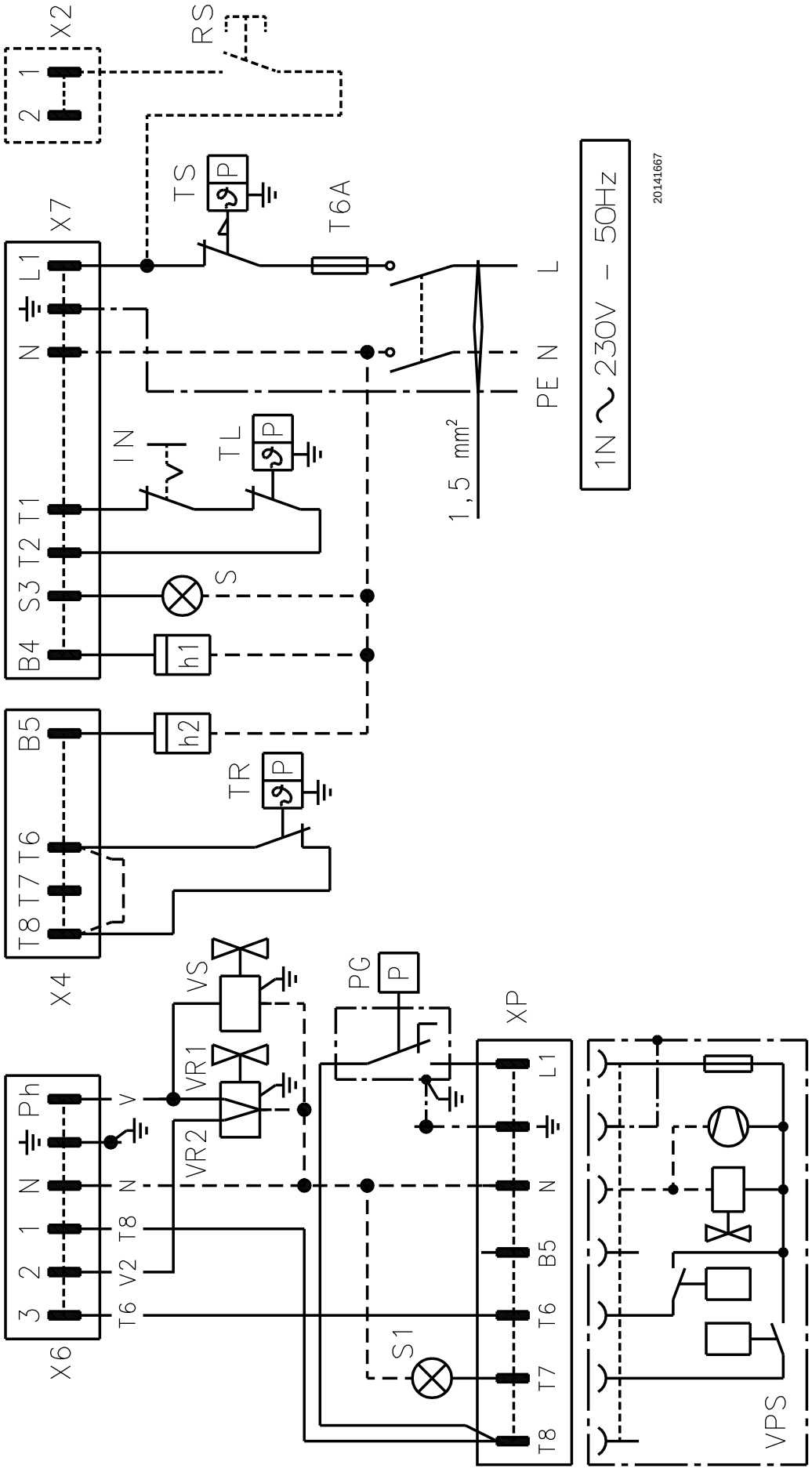
RLS 50

DIAGRAM B



RLS 28-38

DIAGRAM C



RLS 50

DIAGRAM C

WIRING DIAGRAM KEY

DIAGRAM A

A	Blue
B	White
M	Brown
N	Black
C	Capacitor
CMV	Motor contactor
K1	Relay
LFL 1....	Electrical control box
I1	Switch: burner on-off
I2	Switch: 1°- 2° stage
I3	Oil/gas selector switch
MA	Terminal board
MV	Fan motor
MP	Pump motor
PA	Air pressure switch
RT	Thermal relay
SM	Servomotor
TA	Ignition transformer
TB	Burner earth
XP2	2-pole socket (if any)
XP4	4-pole socket
XP5	5-pole socket
XP6	6-pole socket
XP7	7-pole socket
U	LED PANEL
UV	UV cell
V1	1st stage light oil valve
V2	2nd stage light oil valve
VS	Safety light oil valve

ATTENTION

RLS 28 - 38 - 50 burners leave the factory ready for two-stage operation and must therefore be connected to the TR remote control.

Instead, if burner single-stage operation is required, replace the TR remote control with a jumper between terminals T6 - T8 of plug X4.

DIAGRAM (B)

Electrical connection without gas valve leak detection control

DIAGRAM (C)

Electrical connection with gas valve leak detection control

h1	1st stage hour counter
h2	2nd stage hour counter
IN	Burner manual stop electric switch
XP	Plug for leak detection control
X2	2-pole socket (if any)
X4	4-pole plug
X6	6-pole plug
X7	7-pole plug
PG	Min. gas pressure switch
RS	Remote reset button (if any)
S	Remote lockout signal
S1	Remote lock-out signal of leak detection control
TR	Adjustment remote control: commands 1st and 2nd operating stages. If you want the burner to have one-stage operation, replace the TR with a jumper.
TL	Limiter control device: shuts down the burner when the temperature or the boiler pressure reaches the pre-set value.
TS	Safety limit control device: intervenes in case of TL failure
VR1	1st stage adjustment valve
VR2	2nd stage adjustment valve
VS	Safety valve

ATTENTION

The leak detection control takes place immediately before each burner start-up.

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